ARCHITECTS OF ABUNDANCE:
INDIGENOUS REGENERATIVE FOOD AND LAND MANAGEMENT SYSTEMS AND THE EXCAVATION OF HIDDEN HISTORY

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Abstract

Pre-Columbian and contemporary Indigenous Nations of North and South America (hereafter referred to as Turtle Island and Abya Yala) have managed ecosystems extensively to produce prolific and predictable food systems for themselves and non-humans, whom they often view as relatives. The elements of earth, water, fire, and air are explored to analyze Indigenous soil management, Indigenous aquaculture, Indigenous pyrogenic land management, and Indigenous oral histories, respectively. First, a review of four Indigenous societies and their soil management techniques revealed that none of these systems require outside fertilizer or irrigation to sustain ecocentric food systems on millennial scales. Second, a comparative analysis of six Indigenous fisheries showed how these communities operate on regional-scales, manually augment habitat for key species, are thousands of years old, and are driven by value systems rooted in reciprocity, reverence, respect, restraint, and responsibility to homeland. Third, an in-depth analysis of fire regime data from a variety of sources indicates that Diné and Pueblo Ancestors did indeed manage the Ch'ooshgai (Chuska) Mountain Range with routine burning during the Holocene epoch and negates theories that these fire regimes were due to lightning ignition. Fourth, a synthesis of interviews with four contemporary Indigenous land managers confirms that these cultural groups were and are active managers of local ecosystems. Despite coming from different places, all interviewees are driven by a similar set of principles: reverence for the sacredness of life, non-humans are the equal and sacred relatives of humans, and a belief that human groups are divinely assigned to care for their respective homelands. The next chapter offers an articulation of a theory of Indigenous Regenerative Ecosystem Design (IRED) to support the field and outline potential avenues for future research. The eighth chapter offers policy recommendations based on successful Indigenous food systems for federal, tribal, and non-governmental agencies to help us effectively address the social and environmental challenges of our times. The ninth chapter proposes that the extent and sophistication of Indigenous food systems were minimized in the historical record precisely because they are living contradictions to the narratives used to legitimize land seizure and attempted genocide. Overall, it was found that most traditional Indigenous communities are not passive observers of nature but are instead influential facilitators of landscape scale abundance, rooted in an ethic of kinship and reverence.

Keywords: Indigenous Land Management, Natural Resource Management, Traditional Ecological Knowledge, Sustainable Food Systems, Regenerative Practice, Kincentric Ecology

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Acknowledgments

Kodǫǫ́ Hózhǫ́ Dooleeł.

In Beauty and Joy it Begins.

I'd like to first thank *Nahasdzáán Shimá* (Mother Earth), *Yádiłhił Shitaa'* (Father Sky) and the *Diyin Dine'é* (Holy Beings) for giving me life and helping me overcome up to this point. Writing this dissertation has also taught me to thank the countless living beings that exist all around me and within me that help me to live. A deep thank you to Vina Brown and the Haíłzaqv Nation for being the first to articulate to me how Indigenous cultures "go beyond just sustainability" and work enhance their environments. I extend gratitude to the countless Ancestors of the various Indigenous Nations mentioned in this dissertation for proving these systems are possible. I'd like to thank my own Ancestors of the Diné (Navajo), Tsétsêhéstâhese (Cheyenne), Scottish, British, and other Nations for the journeys they undertook to bring me here today. I'd like to thank my ceremonial community for helping me continue to seek and feel the *Diyin Dine'é*. I'd like to thank my family for the sacrifices they've made for me to complete this dissertation. A big thank you to my nieces and nephews for their infinite inspiration and motivation. I'd like to thank Valentin Lopez, Redbird Edward Willie, Marcus Briggs-Cloud, and Roberto Nutlouis, who gave very generously of their hearts, minds, and time to make this dissertation possible. I'd like to thank my dissertation committee Dr. Jessica Black of the Gwich'in Nation, Dr. Gregory Cajete of the Tewa Nation, Dr. Melissa Nelson of Anishinaabe, Métis, and Norwegian Nations, Dr. Yvette Running Horse Collin of the Oglala Lakota Oyate, and Dr. Richard Hum of the European Nations. Your sacrifice and support have made this possible. Thank you, Dr. Marc Abrams, for your hard work, guidance, and inspiration. Lastly, I'd like to thank researchers of the past (including those I disagree with) for helping me form these ideas. May this study be a helpful tool for future ephemeral caretakers of *Nahasdzáán Nihiimá*.

Hózhǫ́ Náhásdlíį́', Hózhǫ́ Náhásdlíį́', Hózhǫ́ Náhásdlíį́', Hózhǫ́ Náhásdlíį́'.

In Beauty it is Finished.

Dedication

To future generations of life on Earth.

1

General Introduction

> Before any planning work on environmental and social issues happens, Indigenous learners must take into account what my mother always stressed to me—that we should always seek guidance and protection from our sacred landscape of Diné Tah [Navajo Homeland], by making offerings of White Shell, Turquoise, Abalone, Black Jet, Corn, and Blue Flower Pollen to the Sacred Life Elements of Air, Earth, Water, and Light. This undertaking is to give gratitude and keep the human open to communication with our Spiritual and Physical environment that is alive within and all around us. I like to think of Offerings as respect for Mother Earth and Father Sky, as well as coverage and blessing for your safety and clear direction in your work.
>
> *–Marie Gladue, Diné Elder*

1.1 Introduction

The following is a series of articles concerning the intersection of Indigenous land management techniques, the regenerative food systems they create, and the underlying values systems that sustain them. In the spirit of Gladue's words, this dissertation is a literary offering to Air, Earth, Water, and Light, which form its core chapters. The Earth chapter looks at Indigenous soil management techniques, which occur on regional scales. The Water chapter looks at Indigenous regenerative fisheries and aquaculture. The Light chapter looks at fire as an Indigenous ecological management tool. The Air chapter is dedicated to the oral testimonies of four contemporary Indigenous land managers and the air that moves through us when we speak. Both theory and policy are then proposed based on a careful examination of various Indigenous food and land management systems. The final chapter details how and why the extent of Indigenous land management systems was hidden from the historical record.

While there is one Australian case study reviewed in depth, the rest concern Indigenous Nations of North and South America, hereafter referred to as Turtle Island and Abya Yala, respectively (more on that later). Geographic restrictions notwithstanding, this dissertation should

pique our interest in similar phenomena found in Indigenous cultures throughout the world.

All the food and land management systems examined are at least 1,000 years old, and some are as old as 11,500 before present (BP). The timeframe examined is the Holocene—about 12,000 years BP to the present day. This of course involves many thousands of years prior to Christopher Columbus's landfall in Turtle Island and Abya Yala, as well as the centuries that followed.

Many data sources were utilized, including: tree ring data, fossilized pollen records, archaeological data, early written accounts, Indigenous oral histories, ceremonial symbology, Creation Narratives, interviews with present-day Indigenous knowledge keepers, my personal experience as an Indigenous woman, as well as sediment records and deductive reasoning.

As an Indigenous researcher of Diné (Navajo), Tsétsêhéstâhese (Cheyenne) and European lineages, this scholarship will naturally be a hybridization of various cultural perspectives. In addition to maintaining academic rigor according to European scientific standards, I also seek to maintain rigor within our socio-spiritual covenants as Indigenous People, which almost universally involve respect, reciprocity, reverence for the Sacred, and responsibility to Creation. In this spirit, these inquiries are offered as a heartfelt scientific offering to the Air, Earth, Water, and Light in hopes that they may serve future generations of Life on Earth.

The primary message of this dissertation is that the environments of pre-Columbian Turtle Island and Abya Yala were not "*terra nullius*," "virgin land", nor "wilderness" as most of us are taught. Rather, these ecosystems were more often than not designed by Indigenous civilizations to be prolific and abundant for all life. As we will see in the following chapters, the environments were vast gardens, extensively managed and curated by densely populated Native Nations. For this reason, "architects" is used in the title of the dissertation—to help readers understand that Native People were not scattered nomads hoping to find a berry to eat or a deer to hunt. Rather, (with some exceptions) Indigenous civilizations were living in highly manicured biomes, designed through extensive and sophisticated land management techniques to support complex and biodiverse life systems.

These management systems sometimes worked to achieve a form of "arrested succession" within ecosystems. For example, instead of letting an entire forest be taken over by pine, Native Nations would apply gentle fire every fall to maintain an oak savannah that supplied predictable acorn harvests (Anderson & Barbour, 2003). "Good fire" not only prevents catastrophic fire by keep fuel loads down (Norgaard, 2014), but also brings nutrient-dense ash into the soil system (Anderson, 2005), stimulates healthy grass growth for grazing animals like elk and deer (Morrissey, 2019), opens meadows for easy travel (Nuttall, 1821), spaces trees to prevent disease

(V. Lopez, personal communication, June 10, 2022), suppresses weevil, bark beetle, and other insect populations (Anderson & Barbour, 2003), and prevents sapling and shrub thickets from absorbing limited nutrients, water, and sunlight from the overall forest system (Stewart, 2002). By applying routine and methodical disturbance to their homelands, Indigenous Nations managed to augment biodiversity and ecosystems health (Salmón, 2000).

Popular science books sometimes frame Indigenous civilizations as prone to collapse (Diamond, 2011). In the following pages, it is proposed that our fixation on Indigenous collapse is biased and erroneous due to (a) the fact that collapsed societies tend to be more environmentally degrading and therefore more apparent in the archaeological record, leading to sampling bias, and (b) sophisticated and sustainable Indigenous societies do not fit well into the dominant narrative that Indigenous People are primitive, a narrative often used to justify past land seizure and attempted genocide The general trend reflected in more subtle records, such as paleoecology, fossilized pollen records, oral history, and ethnography is that Indigenous Nations of Turtle Island and Abya Yala were astonishingly long-lasting. Moreover, while many Indigenous societies experienced socio-ecological collapse prior to European colonization, these groups often metabolized catastrophe into practical wisdom. As we will see in the oral histories that follow, many Indigenous groups rose from the ashes of their crumbled civilizations armed with greater knowledge and insight into how to live intelligently and sustainably in their homelands. This is evidenced by the fact that the dozens of case studies examined in depth within this dissertation are over 1,000 years old, with some being up to 11,500 years old. Indigenous civilization collapse is thus reframed from "proof of Indigenous naiveté" to "an important steppingstone towards societal sustainability." It is from these hard lessons that incredibly long records of Indigenous economic and ecological wisdom were born.

Whether it's the 3,000-year-old Shawnee Chestnut orchards in Kentucky (Delcourt et al., 1998), the 6,000-year-old clam gardens of Coastal Salish communities (Lepofsky et al., 2021), the 3,000-year-old soil management techniques of Indigenous Amazonians (Neves et al., 2004), 11,500 year-old abalone fisheries of Chumash People of Santa Barbara, California (Erlandson et al., 2005), the ancient practice of intentionally burning the forest floor by Maskoke People in present-day Alabama (M. Briggs-Cloud, personal communication, July 8, 2022), intensive management of bison pasturage with fire by Great Plains Indigenous People (Stewart, 2002), or Bolivian flood plain aquaculture by pre-contact Bauré People (Erickson, 2006)—these continents have a rich history of intensive, sustainable, and sophisticated management of bioregional ecosystems by Indigenous societies.

These sustainable systems have of course been heavily compromised through the near annihilation of Indigenous People in many parts of the world, leading to mass extinctions of species who depended on their human management. Despite the immeasurable destruction of such societies, remarkable remnants of these systems survived and continue to thrive in various oases. The legacy of these Ancestors give us hope. They prove that human beings have been "keystone species" in the past—a linchpin that helps hold ecosystems together—and we can therefore become this once again.

In recent decades, ecological historians have heavily interrogated the popular notion that these continents were "natural" and "wild" prior to 1492, that they lacked any real cultivation or large-scale management, or that Indigenous Nations lacked the sophistication and agency to generate the worlds they wished to see. This notion—an "empty," "natural" environment only lightly affected by Indigenous residents prior to European arrival—has since been dubbed by academics as the "Pristine Myth" (*e.g.*, Denevan, 1992; Sluyter, 1999; Beazley, 2005; Keating, 2007; Clement & Junqueira, 2010).

Though still largely unknown to the general public, the realization that Indigenous Nations profoundly altered these continents like a vast garden finally hit the Western scientific community in the late 20th century. Since then an abundance of terms poured forth to try and describe this phenomenon, including: kincentric ecologies (Nelson & Shilling, 2018), biocultural landscapes (Caillon et al., 2017), Indigenous bio-engineering, cultural eco-regions (Nelson, 2008), landscape construction (Grier, 2014), pre-Columbian landscape modification (de Souza, 2019), Traditional Resource and Environmental Management (TREM) (Lepofsky, 2009; Fowler & Lepofsky, 2011), Native American land-use (Abrams & Nowacki, 2008), cultural niche construction (Laland & O'Brien, 2011), ecological engineering (Martin et al., 2010), engineered landscapes, engineered cultural landscapes (Erickson, 2010), Indigenous "built landscapes" (Denevan, 1992), humanized landscapes (Mann, 2005), domesticated landscapes (Sugiyama et al., 2020), human ecosystems (Delcourt & Delcourt, 2007), resource creation (Erickson, 2000), "tending the wild" (Anderson, 2005), anthropogenic ecosystems (Lepofsky et al., 2021), cultural anthromes, cultural natures, and anthropogenic natures (Ellis et al., 2021), and so on. Indeed, much work has been done to thoroughly debunk the "pristine myth" and honor the the true history of pre-contact Indigenous People. Now, work must be done to synthesize these studies, increase their public visibility, generate 21st century policy recommendations based on this understanding, and work towards a general theory of this phenomenon. The latter chapters of this dissertation offer these starting blueprints from an Indigenous perspective.

Ultimately, this dissertation is a presentation of the definition, theory, and implications of Indigenous Regenerative Ecosystem Design (IRED). The "excavation of hidden history" in the title of this dissertation is a double entendre. Much of the supporting data for this dissertation comes from archaeological records that were literally dug out of the earth. At the same time, this project entailed digging up forgotten and hard-to-find resources, articles, books, colonial diaries, and Elder knowledge. Through this research process, 300+ published and unpublished data sources relating to the topic were unearthed and analyzed. There will always be more digging to do, but hopefully this preliminary excavation serves to fascinate, inform, and inspire the world as a small act of scholarly service. The work is meant to provide a launch pad for future Indigenous and non-Indigenous scientists who seek to learn from the past to protect the future.

This study hopes to amplify the conversation, synthesize much of the work that has been done, and deepen our understanding through in-depth interviews with contemporary Indigenous land and food stewards from the perspective of a female Indigenous researcher. To my knowledge, despite the topic of this dissertation being a Native American phenomenon, no Native person has had the chance to share their written thoughts on the subject in a comprehensive manner.

1.2 *Chapter Overview*

This is a manuscript style dissertation, meaning each of the chapters are stand-alone articles intended to be published on their own. When placed together as a constellation, they cover a broad range of topics concerning Indigenous Regenerative Ecosystem Design (IRED).

The beginning chapters follow a conceptual line of Water, Fire, Earth, and Air. This is both to honor what Diné Elders teach as the four sacred elements and to also reflect the role each of these elements play in the world of Indigenous land management.

Chapter 2 looks at Indigenous pedogenesis, or the human creation of soil systems. To do this, four case studies were examined: (a) Southwest dryland alluvial farming techniques, (b) Southeast management of soil systems with fire and cane break maintenance, (c) Mebêngôkre creation of Terra Preta soils in the Amazon, and (d) Indigenous soil management of prairie ecosystems through seasonal burning. This chapter proves that without any importation of outside fertilizers or irrigation, many Indigenous Nations managed to sustain and augment soil systems over the span of thousands of years. Recommendations are provided for those

interested in sustainable soil management today.

Chapter 3 works to characterize the aquaculture of Indigenous Nations past and present through a synthesis of six case studies: Pacific Northwest clam gardens, Bauré floodplain aquaculture, Haíłzaqv herring habitat management, Gunditjmara eel farming, the Chumash Channel Islands fishery, and the Piscataway/Algonquin oyster fisheries of the Chesapeake Bay. This chapter also includes a systematic synthesis of the value systems undergirding each of these biocultural regions to identify patterns and lessons for us today.

Chapter 4 deeply examines the hypothesis that Diné and Puebloan Indigenous Nations managed the Ch'ooshgai (Chuska) Mountains with intentional, low intensity burning of forest floors. While the Western scientific community does not consider this possibility, a compilation of historical documents, ethnographic data, tree ring data, fossilized charcoal records, and practices of neighboring groups form a strong argument that Indigenous Ancestors actively managed this forest ecosystem through anthropogenic fire. To honor and memorialize this ancient practice on a continental scale, the introduction also provides a large list of Native Nations who nourished various biomes with their intentional fires.

Chapter 5, the "Air" chapter, honors the thoughts and voices of four Indigenous People who carry traditional land management knowledge and wisdom. Whole interviews are presented in this chapter to give as much "airtime" as possible to those voices that have been excluded from the historical and scientific record. This is perhaps the richest chapter of the dissertation, as it holds incredibly detailed knowledge not just of IRED praxis but of the underlying principles and values that kept these systems running for thousands of years. Each interview represents a very generous gift from the interviewee to the world. A discussion of these interviews follows with an analysis of patterns and differences in the four interviews.

Chapter 6 is a distillation of the previous chapters into a more unified theory of Indigenous Regenerative Ecosystem Design. It presents past attempts to articulate this phenomenon and a rigorous analysis of the commonalities of dozens of case studies of Indigenous food system/bioregional design techniques. This chapter seeks to clarify, deepen, and expand our understanding of this global phenomenon. It also seeks to unify the scattered study of this practice from the perspective of Indigenous scientists (as opposed to colonial scientists who have done most of the writing and theorizing around the topic).

Chapter 7 constitutes actionable policy items that could be enacted today based on this synthesis of literature and interviews. These recommendations are for three different sectors: federal agencies, Indigenous grassroots communities and agencies, and non-governmental popula-

tions.

Chapter 8 attempts to explain why the extent and sophistication of Indigenous food systems and land management has been largely omitted from the historical record and popular consciousness. It proposes the following line or reasoning:

- Colonial groups have seized the lands and labor of Indigenous groups throughout time and across the globe;
- Colonial groups work to sanitize their actions to legitimize their imprint;
- Colonial powers throughout time and across the globe have justified land seizure by deeming themselves religiously, culturally, racially, and/or technologically superior, while framing those they displace or enslave as "primitive," "savage," "subhuman," "uncivilized," and "cultureless";
- These denigrations are not genuine beliefs about the "other" but are manufactured as a license to seize land and labor;
- Any indicator of Indigenous social complexity or sophistication becomes a threat to the fragile rationale of "cultural superiority" used by colonial powers to legitimize the seizure of land and labor;
- The sophistication and extent of Indigenous land management is one of many things hidden or minimized by colonial systems as it contradicts "primitive" representations of Indigenous People;
- Colonial systems have categorized highly civilized and functional land management systems as "uncivilized," and "unimportant," thereby impoverishing humanity and the planet as a whole of the sophisticated sciences therein;
- There may also be unconscious omissions of Indigenous land history because colonial groups did not practice these kinds of regional scale, holistic management techniques, and therefore could not recognize and record them in colonial writings.

In this manner, I propose that IRED systems have been marginalized and, in some cases, intentionally omitted from the record. This chapter delves deeply into examples worldwide where colonial groups have been incentivized to deny, minimize, or hide the sophistication of Indigenous civilizations.

The final chapter is a general conclusion for the entire dissertation.

1.3 *A Note on Terminology and Capitalization*

In this dissertation, the terms "America," "North America", or "Native American" are rarely used. This is with intention and purpose. The term "America" comes from an historical figure named Amerigo Vespucci who was assigned by colonial powers to find people to enslave and gold to extract (Bethell, 1987; Ferández-Armesto, 2008). For many Indigenous People, it does not feel appropriate to name the land after a man who engaged in these activities. The majority of Native Nations see this land as a place for kinship, kindness, abundance, and generosity. Vespucci's exploits symbolize the opposite. For this same reason many Native People prefer not to be called "Native American."

Turtle Island is used to denote what is commonly known as North America and *Abya Yala* is used to denote what is commonly known as Central and South America. These are both Indigenous words for these lands. Turtle Island as a term for North America comes from a Creation Narrative shared by the Haudenosaunee, Anishinaabeg, and other Indigenous Nations. In this story, Sky Woman falls to this world from above and lands on a turtle's back. She works with a variety of animals to get a little bit of mud from the bottom of the waters to then create land and continents where seeds can be sown.

In some versions of the story, it is ultimately the smallest and most meek animal who retrieves it for her (the muskrat). He sacrifices his very life to retrieve it (Kimmerer, 2020, p. 4). This story communicates several things. It encourages humans to work with non-humans together in cooperation and mutual respect. It teaches humanity we are indebted to the courage and generosity of the animals for our very life and home. It teaches us about the selflessness, determination, and bravery of the muskrat. It teaches us to never discredit the smallest things because they can bear the greatest gifts. It teaches us to honor women as the progenitors of life. This may seem like a quaint story or a nice "myth." However, it could also be seen as a form of social technology because it inculcates certain values which in turn guide human behavior towards respect and sustainability.

Abya Yala comes from the Dule People of Panama and Columbia (Muyolema, 2001; Arias et al., 2012; del Valle Escalante, 1987) and means in the Dulegaya language "land in its full maturity." The Dule Indigenous Nation of Panama and Colombia believe that the world has gone through four stages of evolution and is currently in its "mature" stage. del Valle Escalante (1987) explains how this term began to be used by Indigenous People in "Latin America":

> After the [Dule Nation] won a lawsuit to stop the construction of a shopping mall

> in Dulenega, they told a group of reporters that they employed the term Abya Yala to refer to the American continent in its totality. After listening to this story, Takir Mamani, the Bolivian Aymara leader, and Tupaj Katari, one of the founders of the [I]ndigenous rights movement in Bolivia, suggested that Indigenous People use the term Abya Yala in their official declarations to refer to the continent. (p. 116)

In an effort to recenter Indigenous ways of speaking about Indigenous lands and to avoid using terms premised on violence and hierarchy, the terms Turtle Island and Abya Yala are used throughout this dissertation. These terms are used with full awareness that Turtle Island and Abya Yala are borrowed from very specific Indigenous Nations, that there are many other Indigenous terms for these lands, and that Indigenous People are not a cultural monolith

In this dissertation, "Indigenous People" is used to describe Native residents of a given place as opposed to "Indians," "Native Americans," "Amerindians," or "American Indians." "Indian" is a term meaning different things to different people. Some Indigenous Elders use the term with pride and prefer it. At the same time, for many non-Native people, the term can often invoke inaccurate and derogatory stereotypes. For example, in the present-day United States, children often played a common game of "Cowboys and Indians" where the children who pretend to be "Cowboys" are given the task of killing the "Indians." The term Indian can also invoke harmful images of Native People procured by Hollywood (as this is the term often used in films).

Indigenous comes from the Latin roots *indu-* (meaning "in") and *gignō* (meaning "give birth to"). Indigenous thus means a people born from within, or native to a place. This more literal term is often preferred by Native People around the world whose cultures did not migrate to a place but are truly and deeply of that place and have lived there for tens of thousands of years.

Indigenous, Indigenous People, Indigenous Nation, and Native People are capitalized throughout the dissertation to honor that these are nations, like any other cultural group that would be capitalized. This is also to offer dignity to said groups and counteract centuries of dehumanization and derogatory stereotyping of Native People. The words Elder and Elders are capitalized in following with current publications by Indigenous scholars to reflect the great esteem we hold for Elderly People. Ancestors is capitalized throughout this dissertation for the same reason.

1.4 *Kincentric Ecology and Indigenous Ecocentrism*

Kincentric Ecology as a term was created by Indigenous scholars to describe how many Native cultures view natural elements as their kin, or "relatives," and how this perception guides their interactions with the world around them (Martinez, 2018; Salmón, 2000). It is used throughout this dissertation and thus warrants a brief discussion. Martinez (2018) coined the term according to the following definition:

> Kincentricity refers to the reciprocal relationships contained in Indigenous stories of an "Original Compact" made between the animals and humans. Animals would offer their lives to humans provided that humans would take care of the plants and animals by asking for permission to harvest—leaving gifts in exchange for lives taken, not taking more than is needed, showing respect for their bodily remains after they were killed and butchered for food, and not failing to regularly care for their habitats and relations. If humans failed to honor this compact, the plants and animals would refuse to offer their lives for human sustenance and would cause harm or misfortune to the hunter or gatherer, his or her family, and even future generations of their community. This kincentric relationship has evolved over time into what modern Western peoples call ethics: a code, model, or standard that guides or regulates our behavior with the natural world. Because Indigenous ethics regulate cultural land-care practices that provide protection, sustenance, and well-being for the people, it could be called an ethical-economic model. Since this ethical-economic code informed the daily activities of men and women working together to survive on the land, it had to work well over long periods of time or people would not have continued to survive. (p. 140)

The notion of "not failing to regularly care for their habitats" is highly germane to this dissertation, as we will see that time and time again a central motivator of these food systems is that the managers support and provide for non-human lifeforms and their habitats, whom they see as their relatives. As we will see, habitat expansion is a key land management strategy for many Indigenous Nations.

Similarly, Salmón (2000) describes the concept of kincentricity as follows:

> Indigenous [P]eople view both themselves and nature as part of an extended ecological family that shares ancestry and origins. It is an awareness that life in any environment is viable only when humans view the life surrounding them as kin. The kin,

> or relatives, include all the natural elements of an ecosystem. Indigenous [P]eople are affected by and, in turn, affect the life around them. The interactions that result from this "kincentric ecology" enhance and preserve the ecosystem. (p. 1327)

Salmón refers to several Indigenous Nations who believe that humans were born of certain plants and animals and are therefore related to them, as in the case of the Laguna Pueblo Nation, Rarámuri Nation, Abenaki Nation, Lenape Nation, and Maya Nations (p. 1331). Such Creation Narratives cement the kinship relationship between these groups and species that are prominent in their region. For example, in the Chumash Creation Narrative some humans are transformed into dolphins. For this reason, dolphins are not only seen as equal to Chumash People, but as another form of human (Broyles-Gonzalez & Khus, 2011).

Salmón also notes how ecological systems are "only viable when humans view the life surrounding them as kin." This dissertation seeks to convey a similar notion: that the underlying principles of human systems are what ultimately determine its viability. Salmón reiterates a central finding of this research: that these systems were made sustainable precisely because of their underlying principles and value systems, which lie at the heart of any given food system. Kincentrism is a term born of both Germanic and Latin roots but crafted by Indigenous People of Turtle Island. Conceptually, it encourages us to center a kinship-based relationship with non-humans and treat them as if they were our own nuclear family. This is the message we see repeated time and time again throughout these sustainable Indigenous food and land management systems.

Another term that bears mentioning is Indigenous Ecocentrism. As the name suggests, ecocentrism is a way of looking at the world that centers and cares for the whole ecosystem. This is important in various Indigenous worldviews, which often work very hard to honor and support all elements and relationships within an ecosystem.

Having said this, Eurocentric and Euro-American conversations about ecocentrism do not sufficiently encompass Indigenous notions of ecocentrism. Ecocentrism as defined by Euro-American writers is incredibly helpful and on the right track but is missing a few key elements before it can resonate with Indigenous values and histories. As such, a definition of Indigenous Ecocentrism is offered here.

Euro-American environmentalists coined the term "ecocentrism" to offer an alternative to anthropocentrism, or a worldview that centers human beings above all else (Eckersley, 1992; Hettinger & Throop, 1999; Kopnina, 2014; Lawrence, 2017). Previous discussions on ecocentrism are rooted in Aldo Leopold's influential treatise on a "land-ethic" (1949). Lawrence (2017)

shares a high-level definition:

> Eco-centrism is a philosophy of ecological interrelatedness that acknowledges the inherently dynamic nature of the world and holds that "all organisms are not simply interrelated with their environment" but that they are also constituted by a synthesis of these relations.... [E]co-centrism therefore emphasizes ecological "assemblages" and considers anthropocentric perspectives as normatively misguided because they offer a myopic morality that is insufficient to govern human relationships to the environment.... [B]y progressing the notion of biospheric egalitarianism, eco-centrism recognizes inherent value across all nature and understands that humanity is a fundamental and deeply connected part of the whole ecosphere.... This ethics-based reconceptualization brings into question traditional hierarchies within society-nature relations and encourages respect and care from humans to non-human species. (pp. 1–2)

This English word approximates what many Indigenous People and cultures believe: that all life is equal and we must therefore respect all life.

From an Indigenous perspective, we may look to the linguistic clues of *Pachamama* (a Quechua/Aimara concept), *Mitakuye Oyasin* (a Pte Oyate [Lakota/Dakota/Nakota] concept), and *Są'áh Naagháí Bik'eh Hózhóón* (a Diné concept) to elaborate what an Indigenous Ecocentrism could entail. Each of these cultures extended personhood, respect, and importance to the non-human realms, as well as the non-physical realms.

In Quechua/Aimara culture, the earth is honored as a female person who is a mother of humanity and all life, needing our reverence, reciprocity, and respect to maintain ecosystem balance (Inquilla-Mamani & Chambi-Apaza, 2019). Huanca (2019) writes: "[F]or us, the *Pachamama* is a living entity, where different worlds (physical and non-physical) converge in an interrelated fashion" (p. 7).

Similarly, *Mitakuye oyasin*, a concept from the Pte Oyate or Buffalo Nation (Lakota/Nakota/Dakota), is often translated as "All My Relations." Sičangu Lakota Elder Ione Quigley provides the following in-depth explanation:

> We treat equally, as in a circle. We look at the concept of *mitakuye oyasin*, all my relatives, and that everything in a circle is related. And when you're related and connected, you're not higher, you don't look at something or someone as being higher, or the other way, lower. You see everything as being equal in life. I need the plants. I

> need the air. I need the water. I even need you. That is how we look at things, is that life is the concept *mitakuye oyasin*—we're all connected and related. (Modaff, 2019, p. 346)

The guiding principle of *mitakuye oyasin* has powerful implications for how the Pte Oyate treat the world around them. Not only is personhood afforded to non-humans, they are also understood to be *relatives*, deserving the same treatment we would afford our nuclear families.

Sičangu Lakota Elder Albert Whitehat Sr. offers the following definition:

> So, we have that kind of connection with creation. So, we never abused the earth in any way; it's a relative giving us something. And we don't worship these things; they're relatives. We treat it like you would treat your mother, your brother, your father. When your father gives you something, you return something to your father. Your mother raised you and you take care of your mother. You respect and honor your mother. So, it's the same concept with creation. (Modaff, 2019, p. 346)

The Lakota concept of *mitakuye oyasin* is thus akin to ecocentrism in that it centers our relationship with all life. It expands this definition, however, in that it affords personhood not only to "biotic" things like buffalo and blue grama grass, but to "abiotic" things as well, such as thunder and stone. These, too, are viewed as living relatives to humanity that can be animated by a spiritual and conscious energy just as the human body can be.

Są́'áh Naagháí Bik'eh Hózhóón is hard to translate into English—as it contains ideas that English has no words for—but it is nevertheless connected to the English concept of ecocentrism. House (2002) attempts to relay the following translation:

> *Są́'áh Naagháí Bik'eh Hózhóón* refers to a life that is characterized by the balanced and harmonious interrelationship of male *Są́'áh Naagháí* protection way and female *Bik'eh Hózhóón* blessing way aspects, which comprise everything that exists in the four directions of the natural world, with the practitioner [existing between earth and sky]. The center goes everywhere you go; it never changes. *Są́'áh Naagháí* is all things in the natural world: elements, people, animals, plants, heavenly bodies, and daily phenomena. *Bik'eh Hózhóón* is all the things around you: mountains, clouds, rains, sun, moon, lightning, dawn, yellow twilight. Together, they have male and female relationships in everything you see and provide balance and interconnectedness in an orderly way. (pp. 92–93)

Encoded within *Są́'áh Naagháí Bik'eh Hózhóón* is the notion that not only is the whole earth liv-

ing and sacred, but so too is the whole universe. The sacredness of this universe resides both within us and all around us as well—therefore warranting respect and reverence all around and within. *Są'áh Naagháí Bik'eh Hózhóón* also acknowledges that the masculine and feminine are complementary counterparts that work in harmony to create life. As such, this concept also establishes codes of conduct not only towards women (harmony and respect), but towards the whole earth, which is viewed as feminine. It is a blueprint for how to engage with creation that necessitates all the tenets of ecocentrism and more.

Ecocentrism holds important parallels to many Indigenous views of land, life, and earth. There are some aspects of Western ecocentrism, however, that may not resonate with Indigenous history and culture. For example, there is a large conversation within ecocentrism about "wildness" and "wilderness" (Hettinger & Throop, 1999). The notion of preserving a vast, untouched wilderness before mankind (Europeans) entered the scene is erroneous in its thinking. Worldwide, environments prior European colonization were not wild in the sense that they were deeply and extensively cultivated and managed by Indigenous People on regional scales (as this dissertation seeks to demonstrate). The designation of Turtle Island as "wild," and a yearning to return to a "wild" state has wonderful intentions, but inadvertently erases tens of thousands of years' worth of intensive, intentional, and extensive manicuring of landscapes committed by Indigenous Nations. In other words, an imaginary ecosphere without humans (and specifically without the Indigenous Nations who had populated these places for tens of thousands of years) is incomplete and ahistorical. Thus, an Indigenous Ecocentrism might not work to "preserve" the "wild" state of nature, but rather understands that human touch and human presence are part and parcel of honoring the non-human world because humans have an important, tending role in the natural world.

Secondly, an Indigenous Ecocentrism acknowledges and works to counter the discrimination of early Euro-centric conservationism. Leopold (a co-founder of ecocentric ethics) noted in 1924 that, "Pioneering has absorbed the best brawn and brains of the Nordic race since the dawn of history" and that "Nordics" held "a racial genius for pioneering, surpassing all other races" (as cited in Powell, 1985, p. 201). In this manner, being within nature and fighting for the environment was framed as a European task and venture, first and foremost, from the beginning of American conservationism.

John Muir was Leopold's contemporary and a founding father of American environmentalism. While he had a true love for the natural world, his views were steeped in the discriminatory currents of his time. On a visit to Tsalagi (Cherokee) communities in Murphy, North

Carolina, Muir described Tsalagi homesteads as "uncouth [transient] establishments from the wigwams of savages" (as cited in Merchant, 2003, p. 382). He did not understand that in the year of his visit (1867), Tsalagi People were on the run from 300 years of attempted displacement, persecution, and attempted genocide by European forces. It may not have been fair to comment on the state of Tsalagi groups who at this time were sustaining the unspeakably violent pressures of colonization.

Of his visitation with Nüümü People in California (aka the Mono Nation) he wrote, "[a] strangely dirty and irregular life these dark-eyed dark-haired, half-happy savages lead in this clean wilderness" (as cited in Merchant, 2003, p. 382). Muir repeatedly characterizes Indigenous People as a blemish on the face of a "pristine nature." Those same people worked for millennia to manicure and sculpt the environments Muir so deeply enjoyed.

Moreover, Muir had not considered that it was legal at this time to hunt native Nüümü People for money (payments made for scalps at the capital in Sacramento), and that this may have affected the health and state of the group he encountered (Lindsay, 2012). The bounty hunting of California Native People resulted in a violent and traumatizing episode for these communities. This episode was on top of several centuries of Spanish and Mexican violence against Native Californians, which also profoundly altered Indigenous life (Erlandson et al., 2001). Mann poignantly points out that the representation of Indigenous People as "dirty savages" by colonial ecologists is "as if he had come across refugees from a Nazi concentration camp, and concluded that they belonged to a culture that had always been barefoot and starving" (2005, p. 9). In this manner, it is important to note that the soils of Euro-American conservationism are rife with misrepresentation, exclusion, and prejudice against Indigenous People.

This prejudice was not restricted to Native People alone, however. Muir also stated that Black Americans were "easygoing and merry, making a great deal of noise and doing little work. One energetic white man, working with a will, would easily pick as much cotton as half a dozen Sambos and Sallies (as cited in Merchant, 2003, p. 382). The normalized racism of Muir's time was and continues to be extreme and harmful to Black Americans and is reflected in his concepts of environmentalism.

The prejudiced ideological logs built into the frame of modern conservationism affect us still today. For instance, large "green" organizations, such as the World Wildlife Federation, Environmental Defense Fund, and the Nature Conservancy, receive the bulk of international environmental funding and are largely controlled by European-descent People. One could argue that—while the times are slowly changing—the task of protecting, defining, and making deci-

sions about "the environment" has been mostly entrusted to European People in the tradition of Muir, Leopold, and their contemporaries.

An Indigenous Ecocentrism is therefore sensitive to (a) the conscious and subconscious tendrils of racial supremacy that run throughout ecosystems protection efforts and (b) the settler colonial context we collectively operate within in our efforts to heal the world. By being more cognizant and sensitive to these historical and present realities, we can build an ecocentrism that is inclusive not only of all non-humans, but all humans of all races as well.

Lastly, an Indigenous Ecocentrism acknowledges that human groups worldwide for tens of thousands of years have honored the universal value of all life and that this concept was not pioneered by Euro-Americans. Even within Lawrence's (2017) beautiful definition of ecocentrism, she mistakenly writes: "This concept was first explored by conservationist Aldo Leopold, who advanced the notion that there is intrinsic value in all living things regardless of the value that humans can derive from them" (p. 1). It is important that as ecocentrism works to center the health of the whole earth, we concurrently decenter Euro-American intellectuals. The notion of ecocentrism is ancient and vast throughout the world. We will only be vastly enriched when we include the whole gamete of beautiful and diverse understandings of the concept itself from diverse perspectives.

In sum, an Indigenous Ecocentrism embraces the following beliefs and principles:

- Our goal as human beings is to think about and protect the health of all creation;
- The health of the elements within the system of creation are dependent on the health of creation as a whole;
- All elements of creation are not only equal to humans but are our kin relatives;
- Indigenous People extensively managed large regions of the world's continents, requiring us to dispel the mythes of "pristine wilderness" and "*terra nullius*";
- Creation is sacred;
- Creation is composed of both physical and non-physical elements that intersect and are interrelated/interdependent;
- The illusions of racial and cultural superiority have created imbalances and these imbalances need to be repaired with care and truth;
- The scientific knowledge encoded and embedded within many Indigenous cultures, languages, and worldviews has been intentionally destroyed by colonization and is needed to rebalance the world;

- The feminine and masculine elements of creation are complementary and in need of respect, support and balance.

In conclusion, the term ecocentrism, coined by early Euro-American conservationists is a very helpful term when trying to communicate Indigenous Principles and values to the English-speaking world. Nevertheless, the current conversation around this term lacks the cultural and historical breadth needed to encompass the experiences of Indigenous People in general, and within the United States especially. Indigenous Ecocentrism is suggested to close these gaps and counter the colonial underpinnings of conventional environmentalism.

1.5 Researcher Background

My first and foremost identity rests in my clans in accordance with traditional Diné positionality. We are a matrilineal people and so our "last names" or "clan names" come from our mothers instead of our fathers. My primary clan then comes from my mother, who is *Naaneesht'ezhi Taach'iinii*, or the Zuni Pueblo Division of the Red Running into the Water People of the Diné Nation. My second clan is my father's clan, which he obtained from his mother. She was from what is now called Anadarko, Oklahoma and descended from the Tsétsêhéstâhese or Southern Cheyenne Nation. My third clan would be my mother's father's clan, which is the *'Áshįįhi*, or the Salt Clan of the Diné Nation. My last clan would be my patrilineal clan, which is of the European clans. *Ákót'éego Diné asdzáán nishĺį* (In this way, I identify as a Diné woman). Diné people are also incorrectly known as "Navajo," a distorted Tiwa word applied to us by outside colonial groups. We generally prefer our true name, Diné, which literally means "The People." We are indigenous to parts of what is now called Arizona, Colorado, Utah, and New Mexico (the "Four Corners" area). We share this homeland with beautiful Tiwa-speaking, Keres-speaking, Hopi, Zuni, Ndé, Nuche, and Numu relatives.

Aside from my personal background, I have had the privilege of visiting, spending time with, and "making relatives" with many Indigenous communities throughout Turtle Island and Abya Yala. This includes but is not limited to the Winnemem Wintu, Maskoke (Creek), Omæqnomenew (Menominee), Lenape, Ndé (Apache), Tiwa (Taos Pueblo), Lakota, Anishinaabeg, Haíłzaqv (Heiltsuk), Hopi, Toi Ticutta (Paiute-Shoshone), Amah Mutsun, Nuche (Ute), Yukatek (Maya), Náhuatl, Kanaka Maoli (Native Hawai'ians), Chamorro, Pomo, Onasatis (Wappo), Hinono'eino (Arapaho), Gweechoon Deka (Eastern Shoshone), Yuchi, Asháninka, Mapuche, Lisjan Ohlone, Maklaks (Klamath/Modoc), Bodéwadmi (Potawatomi), Rarámuri (Tarahumara),

Coahuiltecan, Tongva, Chumash, ɬəʔamɛn (Tla'amin), Niitsitapi (Blackfeet Confederacy), Kanien'kehá:ka (Mohawk), Chahta (Choctaw), and Wampanoag Nations.

Internationally, I have been able to spend time with the !Kung Nation of Nimibia, Māori people of Aotearoa (New Zealand), Ka Phlou of Thailand, and the Bundjalung Nation of Australia.

All of these Nations have been incredibly hospitable to me, and each has their own hard history of surviving attempted genocide. We generally share a common challenge to exist in worlds where we are largely invisible and/or mischaracterized. Perhaps for this reason we feel a sense of unity and kinship with each other (see Vaughn, 2017 for an interesting discourse on trans-Indigenous solidarity). Due to extractive settler colonial processes, we almost universally struggle with dispossession and poverty. We often struggle with mental health issues that come from the extreme violence and drugging our Ancestors were subjected to. We often struggle with high rates of diabetes due to the near destruction of our traditional food systems. In the face of these challenges, however, I have seen incredible beauty, resilience, generosity, humility, humor, and kindness among all these diverse nations. We generally have a profound desire to continue to exist as who and what we are, not just for our own benefit, but for the benefit of all life. We generally have a keen sense of and respect for the sacredness of all things.

I was fortunate to have my traditional Diné womanhood ceremony which occurs after a young woman's first menstruation. During this time, they asked me to grind corn for four days and we made a large cake out of this corn meal. On the final day, after staying up all night in song and prayer, I had to give away every piece of this corn cake to the people around me. Since I was very young I was taught I had a responsibility to my people and to the earth. Thus, it is true I am not a passive or detached scientist (as if such a thing exists), but a researcher deeply desiring for my people to have health, sustenance, and connection to our languages and cultures, which are fading with each passing Elder.

My primary motivator is compassion. To care for others. To try to forgive those who have harmed me and my people. To protect those in danger. To take the time to care for Elders, children, disabled people, and pregnant mothers. We are taught to be warriors, not of physical might, but of spiritual acumen and discipline. This is who I was taught to be by my family, my mentors, the songs of our ceremonies, and our Elders. I cannot change who I am for my research, nor do I care to. My research is my prayer—as is everything we do—for the healing of the world.

At the same time, my patrilineal lineage is almost entirely of European descent. I carry the lineage of many people who came to Turtle Island from overseas. I know our remorse; I know

our uprootedness; I know our weaknesses; and I know our strengths. I have spent a lot of time in Eurocentric institutions, universities, and organizations. I can easily communicate with this culture and these realms as well.

I see my European Ancestors as people who were themselves colonized. We have lived through the Roman expansion, the burning of women as "witches," the Inquisition, the Black Death, and more. The intergenerational trauma of Euro-Americans is sometimes harder to access because it is buried deeper in the pages of history. I believe it is important to heal that lineage with compassion and understanding, as well as with accountability and courage, and to see the ways in which we have perpetuated these cycles of violence onto others.

I attempt to translate things back and forth between the cultures. As a descendent of colonial people, I feel it is my duty to leverage my privilege in support of the needs and dreams of the Indigenous and diasporic communities we nearly destroyed.

I am awestruck and inspired by all human groups. I love languages, different forms of faith, cultural customs, varied connections to homeland, varied struggles, and the beauty of human diversity. I will do my best to stand and help any community of any background who has been "othered" and marginalized because of who we are. Having come from a long line of people who were told we were nothing, I know how important it is for each human group to find their deepest root of Indigeneity, learn more about it, and become proud of it. I will always strive to support that journey for all people.

1.6 Conclusion

The following series of papers is thus an offering to the elements that give us life, as well as an offering of policy, theory, and history. The chapters explore various dimensions of Indigenous land management techniques and their corresponding food systems. It is concluded that, contrary to popular belief, Indigenous People managed Turtle Island and Abya Yala extensively. It is also concluded that many Indigenous groups throughout these continents developed refined sciences of sustainability. I propose that the key to their success lies within the principles and value systems of these Nations. Those values are nearly universally rooted in: kinship with creation, reverence for the Sacred, reciprocity, restraint, responsibility to homeland, and respect for non-human beings.

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2

Earth: Indigenous Soil Management Systems and their Lessons for Today

2.1 Abstract

This survey explores the landscape-scale impacts of pre-Columbian and present-day soil management practices of four Indigenous Nations. These case studies are treated in isolation and then considered as a whole to highlight common features of their approaches. Policy recommendations for contemporary soil management are offered based on this analysis. The A:shiwi (Zuni Pueblo) and other Southwest Native Nations leverage the preexisting topography of the land by placing their fields at the base of small watersheds to catch the monsoon floods and the nutrients they carry with them from upland soils. The historical maintenance of canebrake (native bamboo) ecosystems by Southeast Indigenous groups is then reframed as a form of landscape-scale soil management, highlighting the interplay between Indigenous fire, soil fertility, canebrake regrowth, and grazing animals such as the southern bison. Mebêngôkre (Kayapó) soil management practices are then reviewed to uncover the innovative and diverse nourishment and upkeep of otherwise nutrient-poor Amazonian soils. Lastly, pre-Columbian grassland management systems are investigated to reveal the large-scale soil management practices of Great Plains and Midwest Indigenous Nations, emphasizing the role of dormant season burns in the maintenance of American grasslands and their underlying soil systems. It was found that none of these systems required the importation of non-local fertilizers or water nor did any of the four systems employ extensive plowing or tillage. Each management system was uniquely adapted to local precipitation patterns and preexisting pedological conditions. These practices suggest that any given system has all essential inputs readily and locally available, even in seemingly adverse conditions. Another commonality between each of these systems was their regional scale and connectivity to ecological processes of the surrounding landscape. This sits in contrast to contemporary Western farming techniques which operate without deliberate connection to surrounding ecosystems and rely heavily on imported water and fertilizers.

Keywords: Traditional Ecological Knowledge, Indigenous Resource Management, Soil Management, Anthrosols, Pedogenesis, Regenerative Agriculture

2.2 *Introduction*

This survey explores the landscape-scale impacts of pre-Columbian and present-day soil management practices of four Indigenous Nations. These case studies are treated in isolation, and and then considered collectively to highlight shared approaches. Policy recommendations for contemporary soil management are offered based on this analysis. The A:shiwi (Zuni Pueblo) and other Southwest Native Nations leverage the preexisting topography of the land by placing their fields at the base of small watersheds to catch every drop of the monsoon floods and the nutrients they carry with them from upland soils. The historical maintenance of canebrake ecosystems by Southeast Indigenous groups is then reframed as a form of landscape-scale soil management, highlighting the interplay between Indigenous fire, soil fertility, canebrake regrowth, and grazing animals such as southern bison. Mebêngôkre (Kayapó) soil management practices are then reviewed revealing the innovative and diverse nourishment and upkeep of otherwise nutrient-poor Amazonian soils. Lastly, pre-Columbian grassland management systems are investigated to reveal the large-scale soil management practices of Great Plains and Midwest Indigenous Nations, emphasizing the role of dormant season burns in the maintenance of American grasslands and their underlying soil systems. It was found that none of these systems required the importation of non-local fertilizers or water nor did any of the four systems employ extensive plowing or tillage (*e.g.*, Gagnon, 2009; Hart & Hart, 1997; Hecht, 1992, 2004; Hill, 1938; Homburg et al., 2005; Lima et al., 2002; Norton et al., 2003; Oetelaar, 2014; Sandor et al., 2002; Schmieder, 1927; Stewart, 2002, 2007). Each management system was uniquely adapted to local precipitation patterns and preexisting pedological conditions. These practices suggest that any given system has all essential inputs readily and locally available, even in seemingly adverse conditions. Another commonality between each of these systems was their regional scale and connectivity to ecological processes of the surrounding landscape. This sits in contrast to contemporary Western farming techniques which operate without deliberate connection to surrounding ecosystems and rely heavily on imported water and fertilizers.

2.3 *A:shiwi Soils: Zuni Floodwater Farming*

The first Indigenous soil management case study revolves around the traditional farming practices of the A:shiwi Nation whose homelands span the border of present-day Arizona and New Mexico (also known as Zuni Pueblo). Runoff agriculture, floodwater farming and alluvial farming are all terms used to describe the agricultural method of strategically placing cultivated fields at the base of small watersheds. Every monsoon storm naturally carries irrigation, silt, nutrients, and minerals from the loamy uphill soils, reinjecting the cultivated field with the supplements that nourish corn and other crops (Homburg et al., 2005; Norton et al., 1998, 2003; Pawluk, 1995; Sandor et al., 2002). A:shiwi and other Southwest Indigenous Nations allow gravity, monsoon cycles, and the natural pedological processes of uphill soils to do the work for them, never bringing in outside irrigation or fertilizers. Frank Cushing observed the following in 1920:

> The effect of the network of barriers is what the [A:shiwi] prayed for, namely, that with every shower, although the streams go dry three hours afterward, water has been carried to every portion of the field, has deposited a fine loam over it all, and moistened from one end to the other the substratum. Not only this, but also, all rainfall on the actual space is retained and absorbed within the system of minor embankments. (as cited in Cushing, 1979; reprint of original writings)

Archeological studies suggest that A:shiwi peoples have been practicing this technique for at least 1500–3000 yr. B.P. (Kintigh, 1985; Damp & Kendrick, 2000; Homburg et al., 2005; Damp, 2007). While A:shiwi practices are the most documented by Western scientists, this method is also practiced by other Indigenous Nations in the arid Southwest United States and northern Mexico (*e.g.*, Hill, 1938; Doolittle, 2000; Hack, 1942; Nabhan, 2013).

There are a number of key features of this soil management system. The first is choosing the best place to position the cultivated field. Sandor et al. (2002) cite the importance of choosing a valley that is not too big, such that incoming rain does not damage the field, with an optimal field-to-watershed ratio being about 1:25 (p. 5). In addition, alluvial soils collect above lower clay layers to generate robust A horizons (topsoils), where more water and nutrients are available to the rooting-zone of crops (p. 5). Sandor states that "Traditionally farmers prepared new fields by building [temporary brush] dams a year or more before cropping, allowing time for soil incorporation and decomposition of fresh sediment and organic matter inputs" (p. 7).

In addition to the nuanced timing and placement of fields, there involves a great deal of up-

land soil management, since this is the source of the alluvial nutrients carried down in monsoon streams. A number of species, such as juniper (*Juniperus* spp.), pinyon (*Pinus edulis*), ponderosa pine (*Pinus ponderosa*), and Gambel oak (*Quercus gambelii*) sit above the fields, providing nutrients via decomposed tree litter that will then wash downstream. Micro- and cryptobiotic soils[1] assist nitrogen-fixing plants such as mountain mahogany (*Cercocarpus montanus*), deer vetch (*Lotus wrightii*), and scurfpea (*Psoralea tenuflora*) to bring vital nitrogen that help fields prosper (Homburg et al., 2005, p. 669). This highlights the important practice of protecting the integrity of these watersheds by preventing erosion and floodwater incision (Norton et al., 2003). The A:shiwi term, *tanayan so:we*—meaning "forest sand"—refers to this special, loamy soil transported from upslope ecosystems by stormflows. They are crucial to the productivity of their agricultural fields (Pawluk, 1995, p. 92; Norton et al., 1998). In their in-depth soil analysis of A:shiwi fields, Homburg et al. (2005) conclude that even after prolonged cultivation, A:shiwi soils are nutrient dense and productive.

Southwest Indigenous Nations undoubtedly managed these upland ecosystems either through protection or active management. Recent studies suggest that Southwest juniper-piñon ecosystems were fire-managed by Native Peoples prior to the prohibition of this practice by the U.S. Forest Service and other agencies. This was not only to nourish soils by adding nutrient dense ashes, but to also encourage the growth of edible, pyro-adapted plants (Raish et al., 2005; Roos et al., 2010; Sullivan et al., 1992; Sullivan & Forste, 2014). Presumably these practices were intertwined as a holistic management strategy for the whole soil system, from uplands to lowland agricultural fields.

In-field management practices are also important. Earthen berms around individual cornstalks [2] are important in both slowing down incoming floodwaters and funneling rains that fall directly into fields close to crop roots (Muenchrath et al., 2017, p. 175). A:shiwi People also practice "dynamic terracing" by using local materials (such as brush and stone) to make temporary dams in and upstream of their fields. These are easily constructed and deconstructed such that farmers can quickly adapt to the dynamism of each monsoon season (Sandor et al., 2002, p. 7).

All of these practices go into the creation and maintenance of sustainable agricultural environments whose nutrient base and water source are continually regenerated through the

[1] Superficial soil crusts found in arid lands created by algae, cyanobacteria, and fungi.

[2] Also called gridded or waffle gardening.

preexisting dynamics of local nutrient, hydrological and climatological cycles of this desert ecosystem. While considerable effort has gone into the investigation of A:shiwi soil management, much of the nuances of Southwest Indigenous soil techniques remain misunderstood by the outside world. Further research that is respectful, reciprocal, and relevant to local Indigenous Nations could continue to reveal the importance of honoring Indigenous leadership in the world of regenerative soil management praxis.

2.4 *Fire, Bamboo, and the Rich Soils of the Pre-Columbian Southeast*

Over the millennia, Indigenous Nations of what is now called the Southeastern United States cultivated a close relationship with Indigenous bamboo species known as River or Giant Cane (*Arundinaria gigantea*) and Switch Cane (*Arundinaria tecta*) (Swanton, 1946; Neuman, 1984). The cultivation and management of cane ecosystems is crucial to the stabilization of bottomlands, floodplains, and riparian soil systems in these areas of extreme precipitation (Campbell, 1985; Singh et al., 2019). Indigenous Nations managed these cane ecosystems in part with the routine application of low intensity fire to clear competing vegetation and stimulate clonal growth of new cane culms (DeVivo, 1991; Platt & Brantley, 1997; Gagnon et al., 2013). In pre-contact times (and to a lesser extent today), fast-growing canebrakes provided materials for Indigenous architecture, hunting, flutes, basketry, adornments, ceremonial instruments, games, rafts, and other implements (Platt et al., 2009). Canebrakes also supplied ample forage for Southeast bison populations that were critical to the ceremonial and nutritional needs of Southeast Indigenous Nations (Stewart, 2007; see also references in Platt & Brantley, 1997, p. 13). In this way, human, buffalo, and cane formed a symbiotic relationship which also enhanced surrounding soil systems (Figure 2.1).

Canebrakes are pyro-adapted and disturbance-dependent. In the absence of human and lightning fires, these ecosystems give way to the dominating canopies of encroaching tree species (Hughes, 1957, 1966; Shepherd et al., 1951; Gagnon & Platt, 2008; Gagnon, 2009). It has been noted that, "Under complete fire exclusion cane stands lose vigor and are gradually replaced by woody vegetation," of which there are plenty of fast-growing forest species in the Southeast (Platt & Brantley, 1997, p. 12). Pyro-adapted cane enjoys its symbiotic relationship with humans and their application of fire at the exclusion of the ever-encroaching, more-dominant tree species. This fundamental relationship signals an important historical relationship between human fire, cane populations and the fertile soils they foster.

Cash crops (especially cotton) largely supplanted these cane ecosystems in the 18th and 19th century (Stewart, 2007). Sadly, extractive monocrop practices, as well as the alteration of hydrological cycles in the Southeast, have reduced cane habitat by an estimated 98% (Noss et al., 1995).

These species have a profound effect on Southeast soil systems, which live in constant relationship with heavy precipitation, temporary flooding and, more so in pre-Columbian times, the impact of large ungulate and other herbivore populations (Platt & Brantley, 1997; Schoonover & Williard, 2003; Stewart, 2007). Recent studies report that the presence of Giant Cane result in increased: (a) organic matter content, (b) water stable aggregates, (c) soil porosity, (d) soil productivity and (e) infiltration rates (Singh et al., 2019). Canebrakes also enhance water quality by stabilizing the banks of riparian ecosystems and absorbing excess sediments and nutrients during flood events (Schoonover et al., 2005; Blattel et al., 2009; Schoonover et al., 2011; Singh et al., 2019).

The fertility of fire-managed canebrake soil systems is well documented. Canebrakes are reported to have supported traditional Indigenous agricultural practices in the Southeast by generating fuel for slash and burn agriculture (Ethridge, 2004; see also references listed on Platt et al., 2009, p. 276). The constant interplay between Indigenous fire and cane growth generated nutrient dense soils that were highly sought after by early colonists when looking for arable land (Platt & Brantley, 1997, p. 14; Saikku, 2005). As Logan (1859) states: "cane growth [was]... the standard by which settlers estimated the value of lands. If it grew no higher than five feet... the soil was deemed ordinary, but a growth of twenty or thirty feet indicated the highest degree of fertility" (p. 10). On a related note, Stewart (2007) acknowledges:

> Because cane was an excellent marker of soil quality and because it often grew on prime bottomland, it became its own signal for destruction when settlers followed herders and cotton followed cattle into cane country. Larger and healthier brakes were the most enticing of all, because of what the vitality of the brake said about the soils in which it thrived. Settlers began to clear bottomland brakes, to convert cane land to cotton and corn, everywhere they went in the South. Observers noticed the relationship between the emergence of permanent settlements and the disappearance of cane in many places as early as the late eighteenth century. (p. 69) In this manner, Indigenous stewardship and relationship with canebrakes was later exploited by settler agriculturalists.

Olmsted (1851) gave detailed descriptions of how large canebrakes were razed, burned, and

converted to cropland. He writes: "From the ease with which it is cleared and from the fertility of the soil, (which may be accurately determined by the size of the canes) cane land is preferred above all others in the region" (as cited in Stewart, 2007, p. 71). Consistent with these accounts, Coughlan & Nelson (2018) report a significant statistical correlation between Euro-American settlement patterns and abandoned Indigenous canebrakes in colonial South Carolina.

Indigenous Nations supported the presence of cane populations, protecting them from forest encroachment through regular burns. The interplay between cane rhizomes, floodplain geological and hydrological cycles, and frequent fire in turn generated nutrient dense soils, highly prized by the extractive pursuits of early colonizers. Through the near complete erasure of Indigenous populations and their cane, much of the Southeast bottomland riparian ecosystems has been converted to woody ecosystems or mono-crop agricultural. Great efforts are currently underway to rehabilitate canebrake ecosystems and the soil systems they create and protect (Zaczek et al., 2004; Schoonover et al., 2011; Eade et al., 2018). The knowledge and leadership of Southeast Indigenous People should be acknowledged and followed in the restoration of canebrakes, not only to mimic these practices for the benefit of society as a whole, but in an effort towards environmental justice through the restoration of Indigenous stewardship and decision-making power over more acreage of potential cane habitat.

2.5 *Biological and Praxis Diversity: Mebêngôkre Soil Innovation*

The Mebêngôkre (Kayapó) Indigenous Nation of present-day Para and Mato Grosso, Brazil are one of many expert soil managing societies of Amazonia (Lima et al., 2002). They and others are well-known for their ability to create thick and fertile A horizons through a variety of soil amendment and maintenance practices. Their resultant soil systems are known interchangeably as Terra Preta de Índio, Amazonian Dark Earths (ADE) and Anthropogenic Black Earths (Cunha et al., 2009). The following is an in-depth analysis of Mebêngôkre soil management practices.

Mebêngôkre agroforesters cultivate many food items including but not limited to sweet potato, yams, cassava, plantains, bananas, maize, beans, squash, groundnut, various tubers, papaya, mango, and pineapple. Soil amendments are as diverse as the crops they nourish. Mebêngôkre field managers apply ash from in-field cooking activities, termite species, along with their nest soils and organic material, nearby forest litter, a variety of manure and dung, previously enriched soils, crop residues such as peelings, leaves, vines, etc., and ash from in-

field burning (Posey, 1985; Hecht, 1992, 2004).

In addition, the working of soil micro-environments is meticulous, refined, and strategic. To prevent damage to soil structure through over-tilling, Mebêngôkre farmers practice concentrated tillage whereby only the area where the seed is planted is tilled, leaving the rest of the micro-ecosystem intact (Hecht, 1992). In addition, Mebêngôkre agroforesters manage "infield microvariability" by creating concentric planting zones. That is, within polycultural fields, each crop is given its unique space within the field such that soil treatments for one crop do not affect the immediate soils of other crops (Hecht & Posey, 1989).

The temporal planning of crops is equally nuanced (the following temporally based practices are as reported in Hecht, 1992). For instance, the Mebêngôkre practice relay cropping, or the planting of new seeds while other crops are in the middle stages of their development. Annual crop rotation within the same field (switching of crop types from year to year) is also practiced. This protected the soils from degradation presumably through the alternation between crops that took nutrients and crops that gave nutrients to their soil bases. They also continually plant in a variety of micro-environments such as the sides of walking trails, cultivated fields, near burial grounds to honor the deceased, around old village sites, in natural and man-made forest gaps, in swidden plots, in household gardens, and on hillslopes such that no one soil locale is degraded and the overall system yields continual, year-round harvests. Additionally, resting fields are fallowed in ways that attract game animals such that even in their "off-time" they generate sustenance for the community.

Additionally, the types of crops Mebêngôkre communities choose to plant help maintain overall soil health and longevity. Hecht (1992) reports that "sweet potato, cassava, yams and perennials, periodically intercropped with maize, beans, cucurbits, introduced rice and numerous other minor crops and ritual plants" nourish and support Amazonian soil structures (p. 134). Moreover, the necessity of fire and ash to support these nutrient poor soils requires the inclusion of pyro-adapted species. Along with these, fruit and nut trees are also planted. This biodiverse planting system is refined even more through the practice of polyvarietal cropping, or the planting of multiple subspecies of the same crop (Dufour, 1990).

Throughout this process there is no use of imported fertilizers (aside from nearby tree liter and other organic materials), nor is there the use of any herbicides or pesticides (Posey, 1985).

Hecht (1992) highlights the regional ecosystems connectivity of Mebêngôkre soil management practices in her recommendations:

> developers should look at the landscapes and agricultural systems around them and

> ask what it takes to keep each running, and what features of each system could potentially contribute to the others. The Kayapo and other rural populations don't just manage agricultural fields, they manage whole landscapes. (p. 140)

This collection of practices emphasizes the diversity not just of crops planted, but also the diversity of types of soil amendments, planting areas, planting times and other stewardship techniques.

Only through long-term relationships with the land could such knowledge be cultivated and implemented. This highlights the importance of recognizing and respecting Indigenous stewardship rights and the return of stolen land. By definition, Indigenous stewardship practices are based on millennial-scale, longitudinal studies of their own homelands, resulting in such intricate and efficient management praxes.

In a comparative study, it was found that over a span of 10 years Mebêngôkre agroforesters would produce 1,704 kilograms of protein/hectare. This is much more than the 126 kg of protein/hectare produced by a nearby domesticated livestock production system. In a five-year period, the production of all crops was 61,750 kilograms/hectare, whereas a nearby colonist agricultural system produced 21,800 kilograms/hectare (Hecht, 1992, p. 137). Adjusted for the amount of person-days/hectare that went into the cultivation of these systems, the Mebêngôkre system produced 52% more protein than the domesticated livestock project, and 77% more yield than colonial agricultural methods, which employed heavy imported fertilizers and monocrop techniques (Hecht, 1992, p. 136). Moreover, it was found that soils from a single swidden plot could continue to yield food for up to 11 years due to wise timing and selection of crops and a wide variety of continual soil amendment practices. Neighboring colonial agricultural soils could rarely make it past five years before needing rest (Hecht, 1992, p. 134).

Through a great diversity of landscape management practices, Mebêngôkre agroforesters are able to generate nutrient dense soils, nutrient dense crops, and long production cycles on a single soil system. This is owed to the constant tending of soils through infield burning, innovative mulching and soil amendment practices, creative spatial and temporal planning of crops and a reciprocal ethic in relation to the soil and surrounding landscape.

2.6 The Grass Burning Moon: Indigenous Soil Management of Prairie Ecosystems

One large-scale and often overlooked form of Indigenous soil management involves the upkeep of native grasslands on the Great Plains and in the Midwest. These once-extensive grasslands

stabilized vast tracts of soil and supported a host of large herbivores who in turn supported the cultural, spiritual, nutritional, and material needs of Native Nations. The upkeep of these grasslands was not solely for human benefit, however. An ethic of ecocentrism and stewardship underpinned these practices, intended for the benefit of all life (Martin & Garrett, 2010).

These grasses were managed, in large part, by routine, low intensity burns set by a variety of Indigenous Plains Nations for thousands of years (Shimek, 1911; Schmieder, 1927; Boyd, 2002; Brockway et al., 2002, p. 136; Stewart, 2002; Abrams & Nowacki, 2008, p. 1125; Oetelaar, 2014; Roos et al., 2018). This fire activity had profound and intentional effects on soil microbiological processes. Light, patchy burning in dormant seasons can increase overall soil health through the addition of nutrients through ash, heating of soil organic matter (SOM), increased nitrogen and phosphorus mineralization rates, increased species richness and increased pH levels of soils (James, 1982; Wright & Bailey, 1982; Schoch & Binkley, 1986; Wan et al., 2001). Depending on a number of factors—including time of year, fire intensity and ecosystem type—fire can positively hasten the chemical conversion of expired plant tissues into bioavailable nutrients and stimulate soil macro- and microbiological processes (see Brockway et al., 2002; Scharenbroch et al., 2012, p. 81).

Miller Christy, a prolific naturalist of his time, frequented the northern tallgrass plains and recorded the frequent Indigenous prescribed burns he saw and the very fine soil they produced. In 1892, he published his records of deep, fine, loamy A horizons produced by routine burning. He attempted to gauge the antiquity of this practice by guessing the time it would take for fine ash to create such deep topsoils:

> I do not think it is at all difficult for any well-trained mind, capable of weighing the effect of a very small cause very often repeated, readily to comprehend that the blackness, fineness, and fertility of the soil of the prairies is the effect, in a very large measure at least, of the annual deposition, for many generations past, of a very small quantity of this grass ash, which must undoubtedly have great manurial value. In Minnesota and Manitoba, the thickness of the black loam varies from about one to three feet; but, taking the average of about eighteen inches, and the average annual deposition of ash at only one-thirty-second of an inch, we find that it would have taken just 576 years to deposit eighteen inches of soil by this means alone. But the ash would certainly rot further and become consolidated after deposition, therefore let us double our figures, and we get 1152 years as the time required for the formation of eighteen inches of black loam. (Christy, 1892, p. 82)

Despite this calculation being a rough estimate at best, it is clear that the loamy A horizons (topsoils) of the Great Plains were hundreds, if not thousands, of years in the making. Their depth and fertility mirrored that of Amazonian Dark Earths (ADEs) that have made Indigenous Peoples of the Amazon so famous (Cunha et al., 2009). These soils were generated by the methodical, seasonal burning of Indigenous Plains Nations, without whom, the tallgrass ecosystems would have collapsed into shrub lands or forest thickets.

A major purpose of intentional burns was to spur the growth of nutrient dense grasslands for herbivore populations such as bison, deer (*Odocoileus*), pronghorn (*Antilocapra*) and elk (*Cervus*). The protein-rich diet of Plains Nations was directly supported by their fire-based management of soils and grasses, much like that of the canebrakes in the Southeast. The ecological interdependence of fire, flora, fauna, and the microbiological processes of these soils cannot be understated (Boyd, 2002; Abrams & Nowacki, 2008; Oetelaar, 2014; Roos et al., 2018; Morrissey, 2019; Nanavati & Grimm, 2020).

For example, Ancestors of the Illinois Confederacy supported and, in some cases, created Midwest grasslands. Morrissey writes how these Nations:

> shaped and altered much of this region as an anthropogenic creation. Like many other indigenous groups in North America, their most important tool was fire. Burning the prairies, they made the grasses hospitable for grazers, and managed prairie as a game reserve to maximize productivity. (Morrissey, 2019, p. 56)

This is corroborated by linguistic evidence of a neighboring Indigenous Nation, the Myaamia (Miami Tribe) of the Ohio River Valley.

The Myaamia lunar calendar mentions two moons named for human-set fires: *saašaakayolia kiilhswa* (the Grass Burning Moon) and *kiiyolia kiilhswa* (the Smokey Burning Moon). These correspond with the Gregorian fall months of September and October. Abrams & Nowacki (2008) note:

> the dominance of dormant-season burns strongly points to Native American origin.... The term 'Indian Summer' was specifically derived from the red smoky appearance of the sky associated with regular Native burning in the Autumn." (p. 1125)

In a recent publication from the Myaamia Center at Miami University, Myaamia authors explain that:

> [i]n saašaakayolia kiilhswa [the Grass Burning Moon], we see fire as something that restores and gives new life to the prairie. Fire helps clear the land of old grass and

> brush and opens seed pods that have fallen to the ground. Because of fire, new flowers and plants emerge in the spring. (McCoy et al., 2011, p. 60)

We often imagine Indigenous Nations following bison herds but there is increasing evidence that at times the bison herds followed Indigenous fire, which fostered living soil systems and nutrient dense grasslands (*e.g.*, Roos et al., 2018; Oetelaar, 2014; Boyd, 2002). This would logically follow given the ample evidence suggesting that tallgrass is pyro-adapted (DeBano et al., 2007; Fuhlendorf & Engle, 2004; Abrams & Nowacki, 2008, p. 1125). These seasonal burns and other practices also attracted a variety of species that worked to support the ecosystem as well, such as buffalo, deer, and antelope.

Indeed, these vast grassland ecosystems came to depend on human set fires and tend to disappear in their absence. Disease and genocidal policies extinguished not only Indigenous populations but their fires as well. These pyro-adapted environments gave way to forest encroachment as ancient savannas closed in on themselves (Taylor, 1867, p. 5; Chavannes, 1941, p. 80; Axelrod, 1985; Higgins et al., 1989; McPherson, 1995; Hart & Hart, 1997). Without the gentle pressure of fire to eliminate the competition of more woody species, grasslands gradually transition into the chaparral and forest ecosystems we see today (Cottam, 1949; Abrams, 1986; Nuzzo, 1986). Axelrod (1985) and Chavannes (1941) report a 50% decrease in prairie lands from 1829 to 1854 in Wisconsin following the suppression of Indigenous fire regimes in the area. As European farmers spread westward into the depopulated homelands of Native Nations, they encountered rich soils. They often mislabeled these soil systems as "*terra nullius*," "virgin land", or "wilderness", instead of what they truly were: living heirlooms, thousands of years in the making. New plow technology, extractionist ethics, and an increased demand for wheat during World War I precipitated the plowing and destruction of 32 million acres of buffalograss–blue grama prairie between 1909 and 1929 (Worster, 2004, p. 24). In just twenty years, these ancient Great Plains soil systems (along with their capacity to sequester carbon) vanished from the land.

These living relics lost their nuanced maintenance and protection resulting in the pedological disaster known as The Dust Bowl (Holleman, 2017). The Dust Bowl narrative often focuses on what Euro-American farmers did wrong, but the sudden catastrophe also points to an equally important narrative about what Indigenous managers did right: through the consistent application of gentle fire and enhancement of biodiverse root systems, dust storms did not occur for thousands of years under Indigenous management (see Brockway et al., 2002 for a discussion on shortgrass fire ecology).

Thus, the dense populations of Indigenous Nations of the Great Plains and the Midwest managed vast grassland ecosystems with routine, low-intensity, dormant season burns. The effects of fire on these ecosystems include but are not limited to increased bioavailable nutrients, pH levels, SOM, species richness, and mineralization processes. The removal of Indigenous fire, compounded by the large-scale plowing of grassland root systems gave rise to the collapse of most of these ancient grasslands. The gentle and meticulous firing of plains ecosystems is one of the largest and most overlooked forms of pre-Columbian Indigenous soil management and could inform grassland restoration projects today.

2.7 *Discussion*

These studies demonstrate that Indigenous People indeed wield immense influence on regional scale soil systems through highly specialized knowledge. They disprove what Shetler wrote in a Smithsonian publication just 20 years ago and what many people still believe today:

> Pre-Columbian America was still the First Eden, a pristine natural kingdom. The native people were transparent in the landscape, living as natural elements of the ecosphere. Their world, the New World of Columbus, was a world of barely perceptible human disturbance. (Shetler, 1991, p. 226)

These studies also counter early colonial assertions that: (a) Native People were living "idly" on the land and (b) this justified colonial seizure of "wasted" Indigenous lands. For example, Emer de Vattel, and 18th century colonial intellectual, believed that:

> the people of Europe, too closely pent up at home, finding land of which the savages stood in no particular need, and of which they made no actual and constant use, were lawfully entitled to take possession of it, and settle it with colonies. (de Vattel, 1835, pp. 145–146)

Thomas More echoed these sentiments when he wrote in 1516 that war was:

> perfectly justifiable, when one country denies another its natural right to derive nourishment from any soil which the original owners are not using themselves, but are merely holding to as a worthless piece of property. (More & Turner, 1965, pp. 79–80)

According to John Locke, land was made into "property" after a human being put their labor into its cultivation. He wrote in 1689:

> Though the earth, and all inferior creatures, being common to all men, yet every man

> has a property in his own person: this nobody has any right to but himself. The labour of his body, and the work of his hands, we may say, are properly his. Whatsoever then he removes out of the state that nature hath provided, and left in it, he has mixed his labor with, and joined to something that is his own, and thereby makes it his property. (Locke, 1824, pp. 145–146)

Soil management thus became a metaphor for land title in early colonial times. Again and again, Indigenous People were said to have "no use" of their lands, nor were they actively cultivating the soil. This was leveraged as grounds for land seizure and genocide, as reflected in another de Vattel's statements:

> Every nation is then obliged by the law of nature to cultivate the land that has fallen to its share .... Those nations ... who inhabit fertile countries, but disdain to cultivate their lands ... are injurious to all their neighbours, and deserve to be extirpated as savage and pernicious beasts. (de Vattel, 1835, p. 35)

Indigenous soil management systems thus have far-reaching implications for ecological and colonial history. They take away one more argument used at contact (and in some cases still used today) to dispossess Indigenous People of their lands and lives. Articulations of regional Indigenous soil management correct the stubborn and prevailing narrative that Indigenous People were impotent and indolent on the land, lacking ability or agency to determine their own ecological situations. This comparative study implores us to reconsider that narrative. Regarding policy, these case studies illuminate certain paths forward.

The world currently faces a convergence of crises such as biodiversity loss, food shortages, climate instability, ecological fragmentation, over-dependence on volatile global markets, Indigenous language/cultural/economic loss, unresolved political histories, lack of community resilience, catastrophic fire, and flooding/floodplain management. The dual policy of (a) adopting these soil strategies and (b) restoring key lands to Indigenous leadership as pilot projects can address all these issues. The success of Indigenous anthropogenic systems is reflected in the fact that, while Indigenous People constitute only 5% of the global population, they oversee 80% of the world's biodiversity according to a recent UN report (Ogar et al., 2020). The maintenance of these effective linguistic, cultural, ecological, and infrastructure systems depends vitally on access to ancestral homelands. This is because these cultures are locally adapted, place-based, and stand on the shoulders of thousands of years of trial and error within a that homeland (Johnston, 2022). Pilot projects where management leadership is restored to tradi-

tionally trained Indigenous People can both increase soil health while also providing sites of teaching and learning for the world to expand international food security, biodiversity, community resilience, and climate stability.

2.8 Conclusion

In conclusion, a review of the practices of these four biocultural systems uncovers hopeful implications for contemporary soil management across diverse biomes and hope for food systems sustainability in the future. None of these approaches to soil management, for example, involved the importation of outside fertilizers or the piping of water. Each Nation adapted to their unique hydrological and pedological contexts whether it be heavy rains, arid environments, nutrient poor soils, or encroaching woody thickets. None of these traditional approaches employed the plow or extensive tillage. Interestingly (and encouragingly), all four of these contexts supported highly productive food systems using only locally available inputs, implements and skillsets. This suggests that any given system has the potential to be free-standing, independent of geopolitical occurrences beyond the local hydrological and pedological system. In addition, each of these systems operated on regional scales as opposed to contemporary Western farming techniques that often operate divorced from ecological processes beyond the property line. This implies that the division of lands into distinct parcels revokes from the farmer and her community the ability to tap into the larger and more powerful advantages of landscape-scale inputs, hydrological cycles, and ecosystems connectivity.

2.9 *References*

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2.10 *Figures*

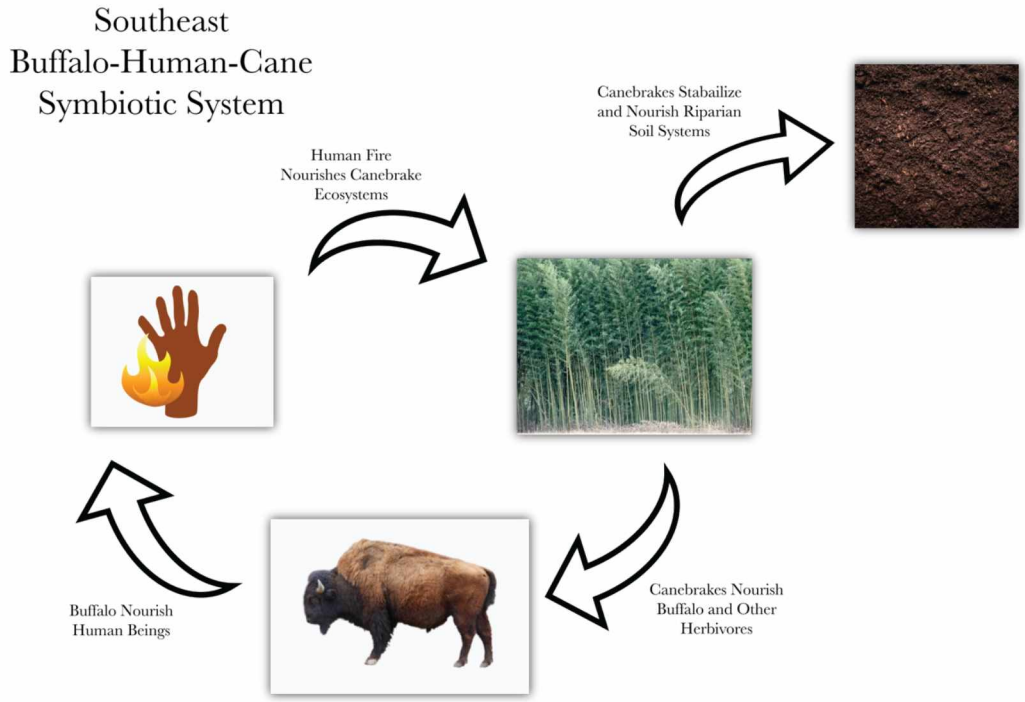

Figure 2.1: Human-Bison-Cane nutrient cycle facilitated by Southeast anthropogenic fire

3

Water: Aquaculture of Indigenous Nations Past and Present

3.1 Abstract

Six ancient, sustainable Indigenous fisheries were analyzed and compared to map their underlying principles, values, goals, strategies, and characteristics (PVGSC analysis) to identify lessons for contemporary fishery management. The following principles were identified as primary drivers of the six fisheries: (a) non-human lifeforms are equal to or greater than human beings, (b) cultural groups have a sacred responsibility to care for their respective homelands, and (c) respectful human engagement within ecosystems is necessary to fulfill these obligations. The most prominent fishery values were identified as follows: kinship with creation, reciprocity, responsibility to the health of the whole system, restraint, generosity, efficiency/economical design, circularity, reverence, and responsibility to future generations. Common goals among the six fisheries are as follows: feed and care for non-human lifeforms, feed and care for humans, design for perpetuity, diversify biota, enhance preexisting life systems, and maintain ecosystem balance. Common fishery strategies were as follows: anthropogenically expand preexisting habitat, augment lower trophic levels, employ organic and local materials, design for lasting returns, support species diversification, and dovetail with preexisting forces of nature. All fisheries operated on millennial scales (1,000–11,000 years old) as well as regional scales. All were confirmed to be biodiverse and human assisted. This PVGSC analysis suggests that the key to success for these fisheries lies in their underlying principles and value systems, which then shape management goals, strategies, and characteristics. The lessons elucidated by this comparative analysis have significant implications for contemporary fisheries management, biodiversity recovery, international food security, historical ecology, marine and land management governance structures, research ethics, and Indigenous sovereignty. It is recommended that researchers respectfully consult with Indigenous Nations to improve research in the area, rehabilitate contemporary fisheries, and honor Native Nations. It is also recommended that con-

temporary fisheries management not only incorporate Indigenous stewardship methods but also restore sovereignty and decision-making power in key marine ecosystems to Indigenous Nations as pilot projects.

Keywords: Indigenous People, sustainable fisheries, natural resource management, cultural niche construction, anthropogenic ecosystems, humanized landscapes

3.2 *Introduction*

Contrary to popular belief, Indigenous Nations exercised precise and deliberate influence on aquatic ecosystems on aquatic ecosystems to create predictable and abundant food sources for themselves and lifeforms around them (*e.g.*, Atlas et al., 2017; Bell & Johnston, 2008; Blatrix et al., 2018; Deur et al., 2015; Erickson, 2000; Erlandson et al., 2005; Gauvreau et al., 2017; Lepofsky et al., 2021). Compared to the millennial scale of these practices, Western science has only just begun to explore these complex and effective stewardship techniques. These advanced practices enhanced habitats in ways that supported large human and non-human populations and augmented ecosystem biodiversity. As with terrestrial systems, Indigenous fisheries constructed habitats where there were none by leveraging organic technologies in a practice of sustainable ecosystems modification (Abrams & Nowacki, 2008; Bird et al., 2013; Roos et al., 2018; Lepofsky et al., 2021).

When we hear the term "anthropogenic" (i.e., manmade) in the field of ecology, it is often a negative descriptor. For example, there are anthropogenic algal blooms caused by manmade fertilizers that run into rivers and ponds. There are anthropogenic environments littered with dead stumps in the wake of clear-cutting projects. We see anthropogenic cityscapes leaking toxic industrial runoff into nearby streams and oceans. Indeed, "anthropogenic" has become a dirty word in the field of ecology.

In the case of sustainable Indigenous anthropogenic systems, however, we often see a very different world. Research has uncovered (for the Western world) certain systems where human contributions are so nourishing to oceanic ecosystems that if those humans were to disappear, the whole system would suffer. We see hand-planted kelp forests that attract herring fish who lay their eggs by the billions on this newfound surface area. We see rock walls constructed along the coastline which augment habitat for clams and other intertidal organisms. We see weirs made of reeds or earth that funnel fish into pools for easy, millennial-scale harvest. We see a world where humans become what conservation biologists call a "keystone species," or an

organism that many other species and systems depend on.

The present work leverages the Indigenous research methodology of storytelling by simply telling the stories of these sustainable fisheries through a scientific lens (Christensen, 2012; Geia et al., 2013; Fernández-Llamazares & Cabeza, 2018). An important facet of Indigenous storytelling is making use of examples to elucidate larger lessons. In this case, this methodology leverages quantitative data generated by ecologists, archaeologists, and paleoecologists to tell a broader story of Indigenous aquatic ecosystems management. This process naturally unearths overarching patterns and lessons the world can learn from today.

It was found that these stewardship practices are millennial-scale, landscape-scale, and ecocentric (intended to benefit the whole system rather than human beings alone). It was also found that these practices rely on sustainable ecosystems modification using local, non-synthetic materials with a heavy focus on habitat expansion. In these systems, the health of human populations is positively correlated with overall ecosystems health and biodiversity. These systems work with—and in some cases harness—the immense forces of nature to cultivate the capacity of a given fishery. These techniques work for continuity of all species, which in turn work for the continuity of humans according to the widespread Indigenous ethic of cyclic reciprocity.

Indigenous Nations are defined as distinct cultural groups, bound by a common language and cosmology, that have lived within a specific geographic locale on a millennial scale. Aquaculture is defined as the intentional cultivation of aquatic lifeforms with at least a partial intention to provide sustenance to a particular human community.

The following stories of Indigenous aquaculture uncover principles and practices that can be used today. Their implications are significant in the areas of contemporary fisheries management, biodiversity recovery, international food security, historical ecology, marine and land management governance structures, research ethics, and Indigenous sovereignty (defined as the freedom and power of Indigenous People to make and implement decisions in their respective homelands).

3.3 The Building Blocks of a Food System: Principles, Values, Goals, Strategies, and Characteristics

In the process of comparing these fisheries, it became clear that the true rudder of Indigenous fisheries is their underlying system of principles and values. Principles are defined as our basic assumptions: the things a society takes for granted in daily life. Based on these assumptions,

we define our values—the things that are important to us. From these values sprout our goals, the things we wish to create or achieve. Depending on our goals, our strategies for achieving them will look different. Then, if our strategies are successful, we come to the outward characteristics of our lives (see Figure 3.1).

For example, if the goal of a society is to maximize profits, and that society sees other lifeforms as a means to that end, then their outward appearance will look very different from a society whose goal is to honor other lifeforms as equal and create a system that sustains those lifeforms as well as humans. If it is true that principles and values are the deepest teachers of Indigenous fisheries, then what matters is not so much where a fishery is located, when it was built, who it was built by, how many fish were caught per year, or the number of species that were caught. The deeper lessons reside in the invisible realms of the human mind and heart. Why do these nations go to the water? What are their assumptions and goals as they approach marine life? This analysis suggests that the values of respect, reciprocity, reverence, and responsibility are the true rudders that steer a ship to success when it comes to land and marine systems management and that without these inner values, American fisheries will continue to fail and collapse (Gamble, 2008; Rothschild et al., 1994; Moore et al., 2002; Wilberg et al., 2011). Thus, the following stories elucidate some of the deeper and outward dimensions of six ancient, Indigenous fisheries in hope they can offer the world an alternative path.

3.4 *Ancient Clam Gardens of the Pacific Northwest*

In the Pacific Northwest, Indigenous Nations constructed (and continue in some place to construct) coastal rock walls in between and along the low tide and high tide boundaries (intertidal zone). This catches sediment and water from the receding waves as a strategy to expand clam habitat The remnants of these anthropogenic clam gardens were found on 35% of the coastline of Quadra Island, British Columbia (which has since been depopulated due to disease and attempted genocide) (Lepofsky et al., 2021). This wall network was found to be at least 3,500 years old (Smith et al., 2019b). The authors note that the original wall network may have been even greater since the study area has been heavily weathered. They also note that this rock wall network exists in addition to preexisting clam habitats that were stewarded and enhanced by ancestral communities. This area is on or near the ancestral homelands of the We Wai Kai, We Wai Kum, K'omoks, Xwemalhkwu, Kwakwaka'wakw, and Klahoose First Nations.

This habitat expansion technique is known as *líXwxiwey* in the Kwakwaka'wakw language

community, which means "to roll stones" (Deur et al., 2015). Once the tide has dropped to its lowest point, stones are rolled down to the low tide boundary to form rock walls along the shoreline. Some are kilometers long. Rising tides bring nutrients and sediment from the sea to the inland side of the rock wall. As the tide recedes, the wall serves as a sediment and water catchment system creating calmer pools amenable to clams and other intertidal organisms.

In addition to the creation of the wall, clam gardeners also worked to maintain the newly generated clam habitat:

> Oral tradition suggests that clam harvesters also observed that clams actually grow better when their substrate is disturbed from time to time, and when dense populations of clams are thinned out leaving more space for the smaller ones to grow with less competition. Clams continued to regenerate as long as the clams were harvested at a rate that did not exceed their productive capacity and at a time of the year when their ability to reproduce was not impaired, as long as younger clams were left intact or returned to the beds, and as long as the clam beds were kept clean and maintained. (Deur et al., 2015, p. 203)

Deur et al. (2015) also present the underlying values and intentions of the Nations who practiced clam garden management:

> In the cosmology of the Kwakwaka'wakw and other Indigenous People of the Northwest Coast, clams have been regarded as having families and societies equivalent to those of humans, and with their own abilities and needs. As [Clan Chief] Kwaxsistalla expressed it, "We had the same voice at the beginning of time—all the animals, the people." Thus, humans maintained and enhanced the habitats of culturally-preferred species, influenced not only by general knowledge of the species and ecosystems, but guided by notions of reciprocity and responsibility to the species on which they depended. Clams were like their own relatives in a different form; Kwakwaka'wakw harvesters were motivated to ensure that clams were able to thrive and have their needs met; if this was done consistently, it was understood that clams would continue to support the interests and needs of humans by presenting themselves more abundantly for harvest .... These factors provided powerful incentives for clam resource intensification—informed by caloric considerations, certainly—but refracted through a particular worldview that mediated Kwakwaka'wakw understandings and responses to environmental causes and effects. (p. 206)

Also reported in Deur et al. (2015), "Narratives describe how the first lokiwey [intertidal rock wall] was created by Mink, a powerful being who established the precedent for a number of cultural activities and subsistence technologies according to Kwakwa'wakw oral tradition." As with many Indigenous cultures, animals such as the clam and the mink are not seen as "beneath" humans, but equal or greater beings warranting respect and humility.

The same Indigenous expert interviewed on this topic identified at least four types of clams that were housed in these gardens when he was a boy: *gulgulum* (littleneck clam), *matani* (horse or "gaper" clam), *gawiganux* (butter clam), and *joli* (cockle) (Deur et al., 2015, p. 204). Moreover, these clam gardens provided a caloric and habitat base for a host of other species. Raccoons, minks, river otters, sea ducks, and geese are a few of the species that are reported to benefit from clam gardens (Deur et al., 2015, p. 208). Thus, these Indigenous Nations practiced/practice a form of polyculture with a goal of honoring biodiversity. [1]

3.4.1 Pacific Northwest Clam Gardens Underlying Principles/Assumptions

Based on the ethnographic information provided by local Elders, some underlying tenets of clam gardening are as follows:

- The inherent worth of animals is equal to that of humans
- Human beings have a sacred duty to take care of other lifeforms
- Human beings are meant to be active co-creators of life systems
- The food system exists to benefit other lifeforms as well as humans.
- It is good to have a variety of species within a single life system/food system
- Humans can tap into the preexisting forces of nature to create a healthy food system

3.4.2 Pacific Northwest Clam Gardens Underlying Values

From these principles, it is safe to say the following values hold a priority within the maintenance of the food system:

- Human Agency
- Respect
- Reciprocity

[1] Polyculture is the intentional cultivation of a variety of species versus monoculture, which is the intentional cultivation of just a single species in a given area.

- Relationship
- Stewardship
- Restraint
- Service
- Honor and reverence for the Sacred
- Efficiency

Respect is reflected in how clams and other animals are seen as equal to humans. Reciprocity, restraint, and stewardship are reflected in the fact that humans tend to the homes of the clams and ensure sustainable harvest rates. Service and reverence are reflected in the underlying tenet of a divine duty bestowed to humans to care for their non-human counterparts. Efficiency is reflected in the ways clam gardeners let the immense forces of nature do much to the work needed to achieve their goals. Human intervention is valued as an essential piece of the ecological puzzle.

3.4.3 *Pacific Northwest Clam Gardens Goals*

Growing out of these principles and values are a few apparent goals of the fishery:

- Feed and care for humans
- Feed and care for non-humans
- Design a food system that is sustainable and available in perpetuity
- Increase and maintain clam biodiversity

3.4.4 *Pacific Northwest Clam Gardens Strategies*

- Observe conditions that work for clams and recreate them
- Augment lower trophic levels to boost the overall life system
- Observe and recreate conditions that support lower trophic levels
- Build structures that generate lasting returns (rock walls are gifts that keep on giving)
- Diversify the species available within the food system
- Work and dovetail with forces of nature
- Steward preexisting systems instead of replacing them

3.4.5 *Pacific Northwest Clam Gardens Characteristics*

- Stewards: Various First Nations groups within the Pacific Northwest
  - Quadra Island study area tended by We Wai Kai, We Wai Kum, K'omoks, Xwemalhkwu, Kwakwaka'wakw and Klahoose First Nations
- Location: Pacific Northwest coastal ecosystems
- Age: Millennial-scale Quadra Island rock walls dated to be at least 3,500 years old Scale: Landscape/Bioregional
  - The Quadra Island rock wall network covers 35% of coastline (15 km)
  - The Quadra Island rock wall network generates 15 hectares of anthropogenic clam habitat (Smith et al., 2019, p. 3)
- Anthropogenic: Yes; System is stewarded and co-constructed in collaboration with environmental forces by humans
- Building Materials: Stone
  - Intertidal rock walls constructed to augment clam habitat
  - Local, non-synthetic
- Biodiversity: High
  - At least four different species of clams were cultivated, as well as a host of other biotic communities which came to benefit from the clam garden
- Domestication of Species: Semi-domestication
  - System is largely undomesticated, making more habitat available to naturally occurring clam populations
  - It is likely that clams were transplanted from garden to garden

3.4.6 *Pacific Northwest Clam Gardens Discussion*

This fishery exhibits many interesting dimensions that we can learn from and apply today. Firstly, Coastal Salish Nations observed the conditions in which clams naturally thrived and then recreated those systems. Habitat augmentation is thus a form of food systems management for Indigenous People in the area.

Secondly, it is highly economical from an energy input and output standpoint. There is a large initial investment to construct the wall but once it is created there are unending returns if properly maintained and harvested.

Thirdly, it works with powerful preexisting natural forces. Much of the kinetic energy needed to maintain these gardens is created by the moon, the tide, and all their related forces. We Wai Kai, We Wai Kum, K'omoks, Xwemalhkwu, Kwakwaka'wakw, and Klahoose First Nations worked (and in many cases still work) in tandem with the gravitational pull of the moon that lowers and raises the ocean, bringing tons of sediment and water to edible clams.

Fourthly, this 3,500-year-old system embodies foresight. These Nations thought in a sustainable manner as they were careful not to overharvest from their gardens. They expanded the habitat and number of calories available to their Nations while ensuring they did not destroy or deplete its source.

Fifthly, this food system is not human-centric. The anthropogenic expansion of intertidal pools was designed to support and benefit clam populations as much as human beings. It also gave a caloric base for a host of other species that came to benefit from the system.

This story also speaks of the importance of biodiversity in Indigenous Food Systems as evidenced by the polyculture approach of clam gardeners.

Finally, these data demonstrate the overwhelming importance of working with Indigenous experts. Although a multitude of articles discussed clam gardens, most of them spoke of the gardeners in the past tense, did not acknowledge many of these practitioners are still with us today, or that that they can help the world understand this phenomenon today. Comparatively, the findings of Deur et al. (2015) were unmistakably more nuanced. This is attributed to Indigenous knowledge keepers who contributed to the study. Without this important work, we would only know the physical properties of the fishery, and not the human dimensions of values and goals that made the system work. To honor the expertise of Indigenous Elders as important holders of scientific, cultural, and geographic expertise, Deur et al. (2015) officially named Indigenous Elder Adam Dick "as co-author—an appropriate mechanism for acknowledging his fundamental contributions to the research presented here" (p. 202).

In conclusion, while there may be more important dimensions of this fishery that were missed by the above interpretation, we can ascertain the basic tenets, values, goals, and strategies that make Pacific Northwest clam gardeners so effective.

3.5 Bauré Aquatic Farms of the Bolivian Amazon

The Bauré People of present-day Baures, Bolivia generated complex anthropogenic aquafarms by working with flood waters on their savanna homelands (Erickson, 2000, 2010; Blatrix et al.,

2018). These Ancestors built a large complex of earthen causeways to harness floodwaters during the rainy season. These anthropogenic waterways facilitated canoe transportation. In addition to canals and causeways, the Bauré engineered a network of permanent, zigzag-shaped earthen fish weirs, or fish funnels. This generated a perennial supply of fish that were easily harvested. In one study area, Bauré Ancestors had constructed over 48 kilometers of zigzagged, earthen fish weirs within a 16 km^2 area (a dense 2.9 kilometers of earthworks for every square kilometer).

The use of these fish weirs can be traced back as early as 1030 AD (Blatrix et al., 2018), and were seen to be employed until the late 17th century when colonial forces depopulated the Bauré Nation (Blatrix et al., 2018, p. 11). These settlements thus persisted for at least 600 years and perhaps much longer, indicating that this was indeed a sustainable aquaculture complex. Bauré People continue to live in their floodplain homelands, despite their numbers and culture being fragmented by the processes of colonization and assimilation.

When the area flooded each rainy season, fish would flow into the savanna. As the water receded, the weirs would funnel the fish to certain areas for easy harvest. It was also found that these zigzagged earthworks were multifunctional in terms of supporting the overall Bauré food system. For example, they served as habitat for large amounts of edible snails. According to Erickson: "*Pomacea gigas* reproduce and grow at an impressive rate and an average of 23.8 snails per m is recorded in Bolivian wetlands. The artificial fisheries of Baures potentially produced hundreds of tonnes of edible snails as a secondary food source" (Erickson, 2000, p. 191).

Moreover, this massive hydraulic complex made a home for various edible fruits. It was noted that:

> The most common vegetation associated with the fish weirs and ponds is the palm *Mauritia flexuosa* .... A single tree can produce up to 5,000 edible fruits each year and a single hectare yields 10–60 t of fruit. The fruits are high in vitamins C and A, oil (12%) and protein (4-5% dry weight). The ground tissue produces large amounts of edible starch. Edible larvae of the palm beetle thrive in the decomposing trunks. In addition, the palm is a favoured food of game animals and fish. The fibres of the fronds and trunks are used for basketry, mats, hammocks, bowstrings, thatch and roof beams. (Erickson, 2000, p. 191)

In this manner, Bauré causeways doubled as habitat for fruit trees and snails, which in turn provided a caloric base for other edible game animals. There is evidence that these causeways were not only constructed to manage water systems but were packed with burned debris to

increase their fertility as fruit tree habitat (Erickson, 2000, p. 193).

No Indigenous People were interviewed in the literature reviewed. It appears as though this pre-Columbian Indigenous city worked with earth and water in a way that not only bolstered a predictable and nutritional fishery, but extended habitat to various edible plants and animals. As Erickson (2010) writes, "Native [P]eoples did not 'adapt' to what some scientists argue was an environment characterized by limited resources for human development, but rather, they created the world they desired through resource creation and management" (p. 645).

3.5.1 *Bauré Floodplain Fishery Underlying Principles/Assumptions*

While there were no Bauré People interviewed to ascertain the exact principles they lived by, we may assume the following simply based on the outward appearance of the floodplain fishery:

- Humans can tap into the preexisting forces of nature to create a healthy food system
- It is good to have a variety of species within a single life system/food system
- Human beings are meant to be active co-creators of life systems

There are likely very rich principles and principles behind Bauré floodplain management, like Pacific Northwest clam gardeners. Due to the dearth of Bauré consultants present in the literature, however, it is unclear to the author whether they feel a similar divine duty to care for non-humans or afford equal worth to non-humans.

3.5.2 *Bauré Floodplain Fishery Underlying Values*

- Human agency

Similarly, non-Bauré peoples can presently only guess as to what values these floodplain managers held dear. What we can say is that Bauré People apparently valued human agency within an ecosystem. That humans were not meant to be passive, but active promoters of abundance.

3.5.3 *Bauré Floodplain Fishery Fishery Goals*

Some of the apparent goals of the fishery are as follows:

- Design a food system that is abundant and perennially available
- Diversify the species available within the food system
- Feed and care for humans

- Ensure the harvest is available in perpetuity

It is likely that there was a goal to feed and care for non-humans, but further consultation must be carried out to confirm.

3.5.4 *Bauré Floodplain Fishery Strategies*

Some of the apparent strategies of Bauré fishery managers are as follows:

- Augment fish habitat by creating pools and waterways with earthen berms
- Build structures that generate lasting returns (earthen weirs channel flood waters for many seasons once constructed)
- Work and dovetail with forces of nature
- Transform single-purpose systems into multi-purpose systems
  - Earthen weirs not only catch floodwaters, but become a soil base for fruit trees
  - Waterways double as fish habitat and transportation canals
  - Orchards are a food source and also attract game animals
  - Earthen causeways augment fish habitat as well as snail habitat

3.5.5 *Bauré Floodplain Fishery Fishery Characteristics*

- Stewards: Bauré Indigenous Nation
- Location: Baures, Bolivia
- Age: Centennial-scale
  - Bauré floodplain settlements have been dated to be at least 600 years old and may be much older
- Scale: Landscape/Bioregional
  - Extant causeway and weir system is at least 16 km^2; pre-Columbian system likely much larger due to weathering of study area
- Anthropogenic: Yes; System is stewarded and co-constructed in collaboration with environmental forces by humans
- Building Materials: Earthworks
  - Earthen berms constructed to create causeways and weirs

  - Local, non-synthetic
- Biodiversity: High
  - Various species of fish, snails, fruit trees, and game animals are some of the known elements of this polycultural system
- Domestication of Species: Semi-domestication
  - Holding ponds for fish could be considered a form of species domestication
  - Orchards planted throughout food systems are in a sense domesticated
  - While fish are funneled into weirs, they are born naturally and occur in the region naturally
  - Game animals that come to feed on the orchards are not domesticated
  - Snails are presumably naturally occurring in the augmented habitat

3.5.6 Bauré Floodplain Fishery Fishery Discussion

At least 1000 years ago, Bauré People of present-day Bolivia created a landscape-scale water catchment system that harnessed floodwaters, augmented fish habitat, doubled as orchard space, and fed not only humans but various other lifeforms and game animals. By moving thousands of tons of dirt and sculpting earthen berms, they created a complex network of anthropogenic fish pools, fish funnels, and canals. These not only generated a predictable and sustainable food system of diverse species of fish, animals, and plants, but also doubled as a canal network for human/goods transportation.

The dearth of Bauré voices in the literature on Bauré earthworks implores us to consult with more local Indigenous People of this region on their terms. Their voices are not sufficiently represented, which leaves unnecessary holes in our understanding of this complex fishery and disregards the expertise of local people. Given that the Bauré Indigenous language has only a handful of speakers left (Crevels, 2002), it is crucial that we reciprocate, support, and learn from the existing Indigenous Knowledge (abbreviated in the academic literature as IK) encoded in this unique language.

Lastly, the monumental scale of this causeway network challenges narratives that Indigenous People of North and South America had low population densities and were not sophisticated in their technology and social organization.

3.6 Haíłzaqv Construction of Herring Spawning Grounds

Another example of Indigenous habitat expansion is found in the homelands of the Haíłzaqv of present-day British Columbia, Canada. The Haíłzaqv (historically and contemporarily) hand-plant kelp forests along the coastline to expand the surface area available to Herring fish as they spawn and lay eggs (Powell, 1985; Gill, 2018). Additionally, they set hemlock boughs into the water to provide additional substrate for this small silver fish (Harris, 2000). The herring come through their channels by the millions each February, turning the coastline a milky white. Their tiny eggs, or roe, attach to any nearby substrate as they are released. These nutritious eggs are valued and traded by Coastal Salish Indigenous Nations and are also a delicacy in international markets.

Based on observations of Tlingit ethnologist George Hunt, Franz Boas published this account in 1921 of Coastal Salish People:

> As soon as the sea begins to look milky, the man goes for the hemlock, and breaks off long branches of the hemlock . . . and he ties the end to the long stones . . . Then he takes the hemlock-branches and ties them to the [cedar] pole with the long, thin rope; and he only stops when he reaches the end of the long pole . . . Then it is an anchor when it is in the water . . . For four days it is left in the water . . . He unties the rope, and puts the hemlock with the spawn on it into the canoe. (as cited in Harris, 2000, p. 201)

Since those times, the Haíłzaqv have continued to set out hemlock and kelp. The contemporary process is described as follows:

> In the spring, when the herring come in from the open ocean, the Heiltsuk build under water kelp gardens from giant kelp [*qaqalis* = roe on broad kelp] along the foreshore for the spawn on kelp fishery. We also put into the ocean stringy kelp [*yaka* = roe on stringy boa kelp] and small hemlock trees [*hant* = roe on hemlock branch]. The kelp is harvested out on the capes where strong tides provide excellent habitat for kelp growth. The kelp is transported into locations with shallow water where the herring are gathered in preparation for spawning. To build kelp gardens, we string lines of kelp across bays where the herring will arrive to spawn. These lines are anchored on each end. We attach floats or buoys to the line to keep the kelp floating as the weight of the herring roe deposited on the kelp becomes heavy after days of her-

> ring spawning. After six days the roe is harvested. If the spawn deposition is not at least 4 or 5 layers thick it is left in the water to hatch and to enhance herring stocks for future spawn on kelp harvests. (Brown & Brown, 2009, p. 39)

By adding suitable substrates such as kelp or hemlock to the system, the Haíłzaqv and their neighbors increase the amount of roe that is added to the food web overall. These nutrients move through trophic levels to nourish salmon, sea lions, orcas, wolves, bears, eagles, and other lifeforms. It also creates a dependable and easily harvested food source, known as "spawn on kelp," or "herring on hemlock." These delicacies are shared with community members, harvested for personal use, and traded locally or internationally (Harris, 2000). The kelp forests also double as a sustainable edible kelp source (Kobluk, 2018).

It is challenging for Western scientists to date this specific harvesting strategy, as neither herring roe nor kelp preserve well in the archaeological record (Moss et al., 2016). Many of these anthropogenic systems are biodegradable by design, making their physical aspects hard to detect hundreds of years later through conventional archaeological means. Moreover, as archaeologists of a foreign culture, we don't always know what significant things there are to look for in the record of ancient and unfamiliar societies, much less how to find it. There is evidence, however, of a herring–Haíłzaqv relationship going back at least 2,500 years through the preservation of herring bones in cultural sites (Powell, 1985, p. 268). It is likely this relationship is much, much older, however, as Haíłzaqv People have lived in this area for at least 7,000 years (Gauvreau et al., 2017). Although it is unknown to Western science exactly how long the Haíłzaqv and their neighbors have engaged in the practice of augmenting herring habitat with hemlock and kelp, Haíłzaqv community members say they have been stewarding in this way since time immemorial (Brown & Brown, 2009).

On a related note, it is estimated that at least 80% of the Haíłzaqv population perished from disease epidemics and colonial violence from 1775 to 1889 (Gauvreau et al., 2017). Boarding schools also discouraged all traditional practices. Through deductive reasoning, we can conclude that, as big as the Haíłzaqv spawn on kelp enterprise is today, it was at least an order of magnitude larger in the past. Even with their smaller numbers today, they have a substantial impact on local herring populations. It stands to reason that their past impact on the coastal ecosystem was an even greater force. The coastal Pacific Northwest—which is adorned with thousands of little islands and channels—once had even more floating cedar logs, supporting myriad hemlock boughs, alongside massive, anthropogenic kelp forests, waiting to be plastered with herring roe each February, like biocultural clockwork, for thousands of years. This anthro-

pogenic substrate indirectly generated an incalculably colossal caloric base that nourished not only humans, but the whole island-coastal life system. With increased Haíłzaqv sovereignty, decision-making power, and leadership, such a world could be augmented once again.

In addition to this form of landscape-scale management, the Haíłzaqv Nation created and continues to create riparian fish weirs to harvest sockeye and other salmonids (Atlas et al., 2017; Moss & Erlandson, 1998). There is also a long-standing tradition of constructing stone fish traps. According to Haíłzaqv archaeologist Elroy White (2011):

> My ancestors inherited a simple physical legacy for the capture of migrating salmon. Their ancestors designed the stone wall structures to minimize maintenance and to maximize efficiency in the capture of thousands of migrating salmon. Rather than reinvent the wheel, the modern Heiltsuk continued a time-honored tradition of utilizing the semicircular beach stone traps that impressively occupy vast tidal flats next to the salmons' natal streams. (White, 2011, p. 89)

These anthropogenic harvest technologies not only sustain the preexisting system but enhance it. They appear to do so through a protective/regenerative harvest/habitat augmentation strategy. The habitats that these species need to thrive are protected from outside harm and pollution as a basic measure (Curran et al., 2020). From there, edible chromists and animals are not harvested to the point where they cannot rebound and return the next year. In the words of Gauvreau et al.: "Leave some behind; the primary focus should be on what is left behind, not what is taken" (Gauvreau et al., 2017, p. 7). Lastly, the Haíłzaqv make a concerted effort to augment the foundational aspects of the ecosystem that key species need to thrive, as in the case of their anthropogenic kelp and hemlock gardens.

3.6.1 Haíłzaqv Herring and Salmon Fishery Underlying Principles/Assumptions

We do not have to guess at the underlying principles that guide Haíłzaqv People as they have performed their own ethnography through a systematic interview process with Elders. From this process they identified seven "fundamental truths" that have guided their stewardship processes since time immemorial—quoted below verbatim:

- Creation: We the coastal first peoples have been in our respective territories (homelands) since the beginning of time
- Connection to Nature: We are all one and our lives are interconnected
- Respect: All life has equal value We acknowledge and respect that all plants and

animals have a life force

- Knowledge: Our traditional knowledge of sustainable resource use and management is reflected in our intimate relationship with nature and its predictable seasonal cycles and indicators of renewal of life and subsistence
- Stewardship: We are stewards of the land and sea from which we live, knowing that our health as a people and our society is intricately tied to the health of the land and waters
- Sharing: We have a responsibility to share and support to provide strength and make others stronger in order for our world to survive
- Adapting to Change: Environmental, demographic, socio-political, and cultural changes have occurred since the Creator placed us in our homelands and we have continuously adapted to and survived these changes

(Brown & Brown, 2009, p. 12-71)

I would add that some of the additional principles underlying their practice are as follows:

- Human beings are meant to be active co-creators of life systems
- It is good to have a variety of species within a single life system/food system
- Humans can tap into the preexisting forces of nature to create a healthy food system
- Ecoocentricism

3.6.2 *Haíɬzaqv Herring and Salmon Fishery Underlying Values*

- Honor
- Respect
- Reciprocity
- Stewardship
- Agency
- Restraint
- Service
- Honor and reverence for the Sacred
- Efficiency

It is written within a Haíłzaqv publication: "During herring spawn the old people teach us to be quiet and not to disturb the fish, as the reproduction of life is viewed as sacred. Also we do not want to offend the herring for fear they may stop spawning" (Brown & Brown, 2009, p. 31). This shows the degree to which the Haíłzaqv respect their herring counterparts.

3.6.3 *Haíłzaqv Herring and Salmon Fishery Goals*

- Generate an abundant source of food and income for Haíłzaqv people
- Ensure these sources are available in perpetuity
- Increase surface area available for herring to deposit their eggs
- Design food systems that also benefit all life including bear, salmon, eagles, sea lions, killer whales, wolves, and more

3.6.4 *Haíłzaqv Herring and Salmon Fishery Strategies*

- Generate a sustainable fishery that supports both humans and all life
- Dovetail with, utilize, and facilitate natural forces of the coastal ecosystem (such as the herring migration, the kelp rate of growth, and preexisting salmon routes) to both feed humans and ensure the system continues
- Do not kill herring to retrieve eggs
- Generate enough roe to feed other lifeforms
- Create adaptable fish traps that can quickly release unharvested fish
- Use locally available, non-synthetic materials in the construction of the system to both increase efficiency and prevent pollution of food source

3.6.5 *Haíłzaqv Herring and Salmon Fishery Characteristics*

- Stewards: Haíłzaqv People and other Pacific Northwest Nations
- Location: Wág?ísla ("Where the River Meets the Ocean")
  - Also known as Bella Bella Island, British Columbia, Canada
- Age: Unknown
  - According to Haíłzaqv, since "time immemorial"

  - Based on historical Haíłzaqv occupation of the area, this harvest strategy is likely at least several thousand years old
- Scale: Landscape/Bioregional
  - Herring habitat augmented throughout coastal ecosystem
  - Fish traps operate throughout river and estuary networks
- Anthropogenic: Yes; System is stewarded and co-constructed in collaboration with environmental forces by humans
- Building Materials: Stone, timber, living kelp, rope
  - Hemlock boughs and living kelp tied to rope and stone to augment herring habitat
  - Stones used to construct adaptable fish traps in rivers
  - Local, non-synthetic materials
- Biodiversity: High
  - Coastal and riparian systems are a part of the Haíłzaqv seasonal fishing system known as Bákvḷá, (also pronounced as "Bákwalá") which includes but is not limited to: Clams (butter, manila, littleneck), cod (ling, rock, red, and many other species), mussels, cockles, urchins, horseclams, scallops, halibut, herring, flounder, sol, salmon (coho, pink, chum, and sockeye), seaweed, kelp, abalone, prawns, crabs, shrimp, sea cucumbers, octopus, eulachons, periwinkles, urchins, sea lions, steelhead, kokanee, harbor seals, ducks (many varieties), geese, and cormorants (Brown & Brown, 2009, p. 37)
- Domestication of Species: Semi-domestication
  - Herring are not domesticated
  - Fish are temporarily trapped, which could be considered a form of semi-domestication
  - System goes to where species naturally occur
  - No fish are perpetually caged, trapped, or farmed
- Commercial
  - In contemporary times, the Haíłzaqv herring roe harvest can generate several million Canadian dollars' worth of income for fishers in addition to providing nutrition to the community (Stueck, 2020)

3.6.6 *Haíłzaqv Herring and Salmon Fishery Discussion*

Another unique characteristic of this system is the absence of species domestication. Unlike a cattle ranch or a pig farm, these animals are by and large free to come and go as they please. Fish weirs do trap salmon, but only temporarily so. In the case of the herring, their free will drives the entire process of the harvest. Humans may strategically position themselves where the animals are, or lure them by augmenting habitat in strategic places, but the animals themselves choose to go to these places of their own accord. Great care is taken to ensure that enough herring spawn is left so that their descendants can continue the ancient cycle of death and rebirth. In this sense, the system honors the consent and free-will of the various life forms involved.

3.7 *Gunditjmara Eel Fishery of Tae Rak, Victoria, Australia*

The Gunditjmara Indigenous Nation has stewarded an eel fishery for at least 6,600 years through careful habitat stewardship and a complex network of channels, holding ponds, stone traps, and weirs (McNiven et al., 2012). This eel fishery is situated in and around Tae Rak (also known as Lake Condah) in Victoria, Australia. Their management techniques ensured a predictable and abundant eel harvest to sustain their populations for thousands of years (Clark & Victorian Tourism Commission, 1990). The lake is fed by a large river and its tributary. In 1843 it was noted by a European columnist that the river was originally fifty yards wide where it fed into the lake (Rose et al., 2016).

Eels are a catadromous species, meaning they mature in fresh water and go to salt water to spawn. As they migrated back and forth between the freshwaters of Lake Condah to the sea, Gunditjmara People would divert them through complex constructed channels as well as hold them in ponds (Coutts et al., 1978; McNiven & Bell, 2010). Eels were funneled with constructed weirs and then harvested using baskets crafted from local grasses. Some of their holding ponds were used to contain the young eels (elvers) migrating upstream, where they would "grow-out" for later harvest (Builth et al., 2008; Rose et al., 2016). Despite this intensive management and harvest, the millennial scale of this fishery infers that the eels were never depleted or disrespected.

Through this long-standing relationship between humans and eels, great fondness and love was cultivated for the eel:

> Our culture and society grew around this creature and it has nourished us for thousands of years. We in turn took care to provide the eel with a safe and healthy habitat, the rivers and wetlands in which it thrived. The eel is an important symbol that identifies and links our people together even today. The eels connect us with past generations, with our country and our cultures. (Rose et al., 2004, p. 10)

The fishery needed to be rehabilitated after European settlers drained the lake to support cattle grazing from 1875–1954 (Rose et al., 2004, p. 593). The Winda Mara Aboriginal Corporation later established the Lake Condah Sustainable Development Project in 2002 in order to "guide the process of restoring the lake and provide the impetus for engagement, reconciliation and healing for Indigenous and non-Indigenous communities in the region" (Rose et al., 2004, p. 595). The lake has been replenished, cultural weirs have been re-constructed, and the eels have returned. This was not without considerable legal and political effort on behalf of the Gunditjmara Indigenous Nation, who spent 11 years in litigation to regain stewardship rights and decision-making power (Weir, 2009). This highlights the sovereignty and leadership of each Indigenous Nation. Often the restoration of functional systems such as these is dependent on the restoration of decision-making power to the stewards/experts of that specific ecosystem.

3.7.1 *Gunditjmara Eel Fishery Underlying Principles/Assumptions*

- Ecocentrism
- The land itself is an entity deserving of treatment equal to human beings.

Rose, 1996 reports that:

> In Aboriginal English, the word "Country" is both a common noun and a proper noun. People talk about country in the same way that they would talk about a person: they speak to country, sing to country, visit country, worry about country, feel sorry for country. People say that country knows, hears, smells, takes notice, takes care, is sorry or happy .... Country is a living entity with a yesterday, today and tomorrow, with a consciousness, and a will toward life. Because of this richness, country is home, and peace; nourishment for the body, mind and spirit; heart's ease. (p.7)

3.7.2 *Gunditjmara Eel Fishery Underlying Values*

- Responsibility to past generations

- Responsibility to future generations
- Stewardship
- Circularity
- Relationship
- Restraint
- Respect
- Reciprocity
- Agency
- Honor and reverence for the Sacred
- Efficiency

3.7.3 *Gunditjmara Eel Fishery Goals*

- Augment and sustain eel populations for harvest
- Design a food system that will be available in perpetuity
- Feed and care for both humans and non-humans
- Carry on the traditions of Ancestors

3.7.4 *Gunditjmara Eel Fishery Strategies*

- Construct stone fish traps, channels, pools, and weirs to augment and sustain eel habitat
- Work with preexisting forces of nature (river and lake system) instead of replacing them
- Build structures that generate lasting returns
- Use locally available, non-synthetic materials in the construction of the system to both increase efficiency and prevent pollution of food source

3.7.5 *Gunditjmara Eel Fishery Characteristics*

- Stewards: The Gunditjmara Indigenous Nation
- Location: Tae Rak (Lake Condah) and tributaries in what is colonially known as Victoria, Australia
- Age: Millennial scale (6,000+ years old)

- Scale: Landscape/Bioregional (works with lake, tributaries, as well as ocean where eel spawn)
- Anthropogenic: Yes; System is stewarded and co-constructed in collaboration with environmental forces by humans
- Building Materials: Organic, non-synthetic, locally available (basalt stone, grass baskets, timber-based fish traps)
- Biodiversity: High
  - Early Europeans reported a highly biodiverse system:

    > a splendid fresh water lake . . . about a mile and a half long and three quarters of a mile wide, and contains almost every variety of fish in abundance, with swans, ducks . . . . It is of considerable depth, and receives a river about fifty yards broad; one side is bold and rocky and contains a number of small coves into one of which a beautiful stream empties itself, and the other side is a gently sloping shore surrounded by a fine tract of country. (as cited in Rose et al., 2016, p. 592)
- Domestication of Species: Semi-domestication
  - While the eels are naturally occurring and naturally replenished, holding ponds, weirs, and fish funnels could be considered a form of semi-domestication

3.7.6 Gunditjmara Eel Fishery Discussion

Like other fisheries mentioned here, the Gunditjmara fishery works with preexisting forces of nature, such as the flow of rivers, the ocean that provides eels a place to spawn, the kinetic force of the spawning eels, etc. It modifies the preexisting structure by investing strategically placed building materials—which are non-synthetic and locally available—with remarkable returns. It has an intensive initial investment of energy (the construction of weirs and ponds). Once this investment is made, however, the energy required to maintain it is negligible compared to the abundance that the system provides for human and non-human use. The fishery has supported the Gunditjmara on a millennial scale, without being depleted. These efficient strategies are summed by Zúñiga (2020):

> The location of the system is in favour of the natural course of the water, taking advantage of the topography and soil conditions resulting from the volcanic eruption and lava flow . . . this system exemplifies a dimension of an eco-cultural landscape, where local ecology is not significantly altered, yet it is strategically enhanced, resulting in a more sustainable and resilient management of the land. It shows that a highly

> functional system does not need large and strongly invasive alterations in nature and can be built and sustained with only local resources. (p. 8)

The literature highlights how the fishery not only provides food, but also a sense of identity and virtue for Gunditjmara people. These things are arguably as essential as food for a healthy life. The very virtue and dignity of the people is dependent, in their eyes, on their ability to upkeep a system that their Ancestors held dear. One Gunditjmara Elder, Ken Saunders, has said that

> Lake Condah is the heart of Gunditjmara country ... we have always been with the lake and it has always looked after us ... if the lake is good then we are good ... we have been different since the lake was drained by authorities but with water soon to return, we will achieve an important healing for the country and for ourselves. (cited in Bell & Johnston, 2008, p. 10)

It is important to note, then, that the physical properties of this fishery are not enough to sustain it; one must also be motivated by the underlying principles, values, and goals of reciprocity and respect. In other words, the exact same structure could be used to destroy eel populations if the goal was profit maximization over the shortest timeframe possible. It is the intangible culture as much as the tangible culture that makes this system functional. Underlying these techniques and strategies is an ethic of stewardship and responsibility to past and future generations.

3.8 Pre-Columbian Oyster Fisheries in the Chesapeake Bay

Recent surveys of shell middens along the Chesapeake Bay shoreline demonstrate Indigenous Nations sustainably managed and continuously harvested oysters in the area for at least 3,500 years straight (Rick et al., 2016). These are the Ancestors and homelands of the present-day Piscataway Indigenous Nation and neighboring nations. No Indigenous descendants or experts were consulted in Western scientific Chesapeake oyster literature to ascertain and honor the nuances of their habitat stewardship practices. What is known to Western science, however, is that despite persistent human harvest over 3,500 years of data, the average size of oyster shells increased over time (Rick et al., 2016, p. 6569). This implies highly sophisticated political, ecological, and technological infrastructures were employed to manage this important keystone species of bay and coastal ecosystems.

The account of Francis Louis Michel, along with many other accounts of European settlers,

marveled in 1702 at Chesapeake oyster populations under Indigenous management:

> The abundance of oysters is incredible. There are whole banks of them so that the ships must avoid them. A sloop, which was to land us at Kingscreek, struck an oyster bed, where we had to wait about two hours for the tide. They surpass those in England by far in size, indeed, they are four times as large. I often cut them in two, before I could put them into my mouth. (Hinke, 1916, p. 35)

Under American management, however, Chesapeake Bay oyster populations and habitat are adversely affected by pollution, disease, dredging, overfishing, and eutrophication (Rothschild et al., 1994; Kemp et al., 2005). Chesapeake oyster populations are currently less than 1% of their historical abundance (Wilberg et al., 2011). A wide variety of scientists and agencies have endeavored to rescue oyster populations from complete collapse in the 21st century with limited success (Mann & Powell, 2007).

The downfall of this fishery is correlated with the decimation of Indigenous populations and their local traditional knowledge. Today there are nearly 20 state-recognized Indigenous Nations in the Chesapeake Bay region—a reflection of the area's past cultural diversity. Few survived the disease epidemics, attempted genocide, and discriminatory policies of the 1500s to the present.

These mostly Algonquin-speaking Nations were systematically excluded from Chesapeake Bay management in colonial times. James Wharton (1957) compiles an impressive synthesis of diary entries from colonial settlers in the Chesapeake Bay area. His conclusions not only chronicle the erasure of Indigenous oyster management in the 17th century, but also reflect the ongoing perception American culture has of Indigenous People as a "problem to be overcome":

> The enmity of the Indians had been a constant irritation .... As soon as it became possible to do so, effort was made to cut them off from the resources of the tidal waters. It was reasoned, and as it turned out, rightly, that with them unable to supplement their food supplies with fish and shellfish, especially oysters, they would be weakened in body and more easily subdued. The word early went out: Keep the Indians away from the water (p. 14)

Wharton's compilation provides firsthand accounts of the beauty and destruction of Algonquin management techniques. At the same time, it reflects the stubborn persistence of anti-Indigenous sentiments in his time (1950s) and culture: his writing reinforces (instead of rejects) the notion that Indigenous People were a "problem." In fact, the people Wharton labels as an

"irritation" managed to sustain and augment a 3,000-year-old fishery, which under American management failed within just 300 years' time. It seems the principles and values driving Euro-American oyster management are more of an irritant to the local ecosystem than anything else. It is not clear from the literature reviewed if Indigenous Nations had a hand in the actual creation or expansion of oyster habitat. Having said that, other case studies implore us to consider that oysters were not only sustainably harvested by Indigenous People, but that their habitat was perhaps influenced in some fashion through Indigenous bioanthropogenesis. This would be consistent with observations around the world demonstrating semi-domesticated habitat support techniques of Indigenous People.

3.8.1 Chesapeake Bay Indigenous Oyster Fishery Underlying Principles/Assumptions

It is likely that Piscataway and other Algonquin-speaking Nations in the area held the principles below, as in other cases, but more consultation must to be carried out to confirm:

- The inherent worth of animals is equal to that of humans
- Human beings have a sacred duty to take care of other lifeforms
- Human beings are meant to be active co-creators of life systems
- The food system exists to benefit other lifeforms as well as humans
- It is good to have a variety of species within a single life system/food system
- Humans can tap into the preexisting forces of nature to create a healthy food system

3.8.2 Chesapeake Bay Indigenous Oyster Fishery Fishery Underlying Values

- Restraint
- Other potential values include: respect, reciprocity, reverence, and others, but more consultation with the Piscataway Nation and neighboring nations must be carried out to confirm.

3.8.3 Chesapeake Bay Indigenous Oyster Fishery Fishery Goals

Based on the longstanding nature of this fishery, it is likely that the fishery had the following goals (as in the case of others) but more consultation with the Piscataway Nation and neighboring nations must be done to confirm:

- Feed and care for humans

- Feed and care for non-humans
- Design a food system that is sustainable and available in perpetuity
- Increase and maintain fishery biodiversity

3.8.4 Chesapeake Bay Indigenous Oyster Fishery Strategies

Judging by the success of the fishery and the longevity of the oyster population, it is likely that the fishery had some of the following strategies, but more consultation with the Piscataway Nation and neighboring nations must be carried out to confirm:

- Augment lower trophic levels to boost the overall life system
- Observe and recreate conditions that support lower trophic levels
- Build structures that generate lasting returns (fish weirs, etc.)
- Diversify the species available within the food system
- Dovetail with forces of nature
- Steward preexisting systems instead of replacing them

3.8.5 Chesapeake Bay Indigenous Oyster Fishery Characteristics

- Stewards: Ancestors of Indigenous Nations of present-day Chesapeake Bay
- Location: Chesapeake Bay, Turtle Island (USA)
- Age: Millennial scale (fishery in operation for at least 3,500 years)
- Scale: Landscape/bioregional scale (whole estuary managed)
- Anthropogenic: Assumed to be so
- Building Materials: Unknown
- Biodiversity: High
  - Historical accounts mention an incredible variety of estuarian food sources

3.9 Chumash Fishery of the Channel Islands, Southern California

Archaeological analyses of Chumash settlements indicate that Chumash Ancestors: (a) harvested shellfish in and around the Channel Islands for at least 11,500 years, (b) hunted sea otters for at least 8,900 years, and (c) worked intensively with kelp forest fisheries for at least

8,500 years (Erlandson et al., 2005, 2008; Braje, 2009). Chumash civilization was once vast and complex, having a heavy hand in the management of both marine and terrestrial food systems (Gamble, 2008). Chumash People "harvested the same suite of resources for nearly 10,000 years without producing any evidence for local extinctions or the collapse of local ecosystems" (Braje, 2009, p. 134).

Like their California coastal neighbors, the Chumash relationship with marine life and ecosystems was deep-seated and refined. Fray Juan Crespí wrote of the Chumash People in 1769:

> [The Chumash] are all very great fishermen who, as soon as day has broken, are at sea in their canoes catching their food. They have large fish traps very well made of rushes, gigs and hooks made from shell and bone, all very well made and stowed, and very good sized nets of different hues. This is entirely a very cultivated, quick, clever folk, skilled in everything, as is bespoken by the flint knives, very gorgeous, that they carry on their heads; the gorgeous and very elegant rushen baskets and bowls worthy of the admiration of any person of good taste; and the bowls made from wood and very shiny solid stone, so splendidly carven I do not know whether anyone using tools for the purpose could do better; whereas these people have no more than bone and flint to do it with. To this, add the canoes, so well made out of planking not two fingers thick, so smooth and so even—and they not possessing any saws or planes (though I suppose they do make planes out of flint or bone). (as cited in Gamble, 2008, p. 37)

These "great fishermen" (and women) undertook the task of sustainably managing the Channel Island ecosystem. Like all kelp-based food webs, this system contained diverse elements that required nuanced and careful management. For instance, if sea otters were overhunted, urchins would lose their predators and urchin populations would explode. Without predation pressure, kelp-eating urchins would then decimate the kelp base resulting in underwater deserts known as urchin barrens. Thus, sea otters protect kelp forests from overexploitation by urchins. All three of these species were harvested and eaten by Chumash People for thousands of years. Sea otter pelts were and still are highly valued in Chumash culture for clothing, crafts, and gifts. Nevertheless, Chumash People hunted sea otters for thousands of years without disrupting the balance of the food web (King, 1990).

The system is of course more complex than just otters, urchins, and kelp. Abalone—an important food item for Holocene Chumash—also feed on the kelp. In addition to sea otters, spiny lobsters and sheephead fish also predate on urchins and abalone. Dozens of varieties

of fish species intermingled with these kelp-based ecosystems under Chumash management. All these elements and more must live harmoniously for the system to carry on. No one species may be over- or underfished. According to the archaeological record, Chumash people managed to uphold this balance for at least 10,000 years.

In just 400 years, Spanish, Mexican, Russian, and American settlers have decimated the Chumash and this food system. This includes the collapse of black abalone (Moore et al., 2002), Channel Island sea otters (Erlandson et al., 2005, p. 11) and keystone species of giant and bull kelp (Salls, 1991). These settler groups appear to have lacked the tenets, values, goals, and strategies that the Chumash utilized in these homelands, yielding the deleterious effects we observe today. Efforts have been made by various groups to restore Channel Island ecosystems and mitigate the cascading effects of overfishing and habitat destruction (Braje, 2009; Airame et al., 2003; Rogers-Bennett et al., 2016).

While the archaeological literature reflects a consensus that the Chumash Channel Island fishery was longstanding and successful, the underlying principles, values, and goals that drove this behavior are less understood. Unlike the Haíłzaqv, Gunditjmara, and Kwakwaka'wakw case studies, Chumash views and beliefs are less documented in Western scientific literature. This seems partly due to a lack of consultation with Chumash People, who to this day hold such nuanced knowledge about their values, principles, and goals as a people.

Tragically, this is also partly due to disease and violence that the more intact Chumash civilization before they could even be interviewed. Archaeological evidence indicates that by the late 1500s, disease and violence from Spanish expeditions and Manila galleon crews had already decimated the Chumash and other California coastal people (Erlandson et al., 2001). This means that the majority of Chumash People may have been nearly completely depopulated over one hundred years before any substantial documentation of their Nation occurred. Surviving groups of Chumash People were further eroded in the 1700s when roughly 85% of the population were forced into Spanish-Catholic concentration camps known as "missions" (Dartt-Newton & Erlandson, 2006). Thus, while the Chumash have miraculously carried their culture to the present day, the older and more nuanced management practices were rendered impossible through the usurpation of highly coveted coastal regions.

Despite these holes in the anthropological record, we can still triangulate fishery principles and values by looking at Chumash Creation Narratives and other Chumash publications. While these are not direct explanations of the values that guided Chumash fishing, they provide the broader cultural context in which fishing occurred. From there, we can infer some principles,

values, and goals that may have undergirded their sustainable fishery.

The following are dimensions of the Chumash fishery identified based on a survey of Chumash Creation Narratives and personal accounts. It should be noted that the literature available does not represent the entirety of Chumash voices, and there is much more respectful consultation to be done with present-day Chumash People. The subsequent section contains the actual narratives and stories that were analyzed to produce these inferences.

3.9.1 Chumash Channel Island Fishery Underlying Principles/Assumptions

- The Earth is a feminine, living being who deeply loves and fights for humans
- Human behavior and action must be managed to prevent overpopulation and destruction of resources
- Animals are not only equal to humans, but can sometimes be preeminent to humans or even sometimes understood to be humans in another form
- Humans are not stewards of other lifeforms, because they are not above life itself
- Different human groups have been divinely assigned to specific homelands with certain responsibilities to those lands

3.9.2 Chumash Channel Island Fishery Underlying Values

- Circularity
- Service to other human beings
- Honor and reverence for the Sacred
- Humility
- Generosity

3.9.3 Chumash Channel Island Fishery Goals

- Feed all creatures, not just humans
- Enhance the system by leaving it more abundant than you found it
- Maintain the balance of the ecosystem

3.9.4 *Chumash Channel Island Strategies*

- Implementation of shifting settlements to allow regeneration
- Focusing the majority of the harvest on lower trophic levels
- Implementation of no-take zones, especially around sacred sites

3.9.5 *Chumash Channel Island Fishery Characteristics*

- Stewards: Chumash Nation
- Location: Channel Islands, Southern California
- Age: Millennial scale (fishery in operation for at least 11,500 years)
- Scale: Landscape/bioregional scale (multiple islands and coasts synchronously managed)
- Anthropogenic: Unknown
- Building Materials: Unknown
- Biodiversity: High
  - Archaeological sites reveal a diverse suite of marine species supported and maintained by Chumash fishers including sea otters, spiny lobster, many varieties of fish, many varieties of abalones, various species of urchins, and kelp (This is not including the terrestrial edible species that were also enjoyed.)

3.9.6 *Chumash Channel Island Fishery Discussion*

Were Holocene-era Chumash People passive hunter-gatherers of the "natural bounty" of the ocean, as so many anthropologists have suggested? Or were they active managers and cultivators of the Channel Islands? Judging by the myriad examples in North America of Indigenous People deliberately architecting the abundance of the system, it seems likely the Chumash would follow suit. The Chumash had an extensive trade network and knowledge of Indigenous Nations all around them, and they have long been hailed as one of the most complex and extensive Indigenous Nations of their region (*e.g.*, Gamble, 2008). They would have had access to and influence over the cultivation techniques practiced all around them.

Moreover, we know Chumash Ancestors employed active management of their terrestrial food systems. They did this, at least in part, by seasonally burning grasslands to stimulate the growth of pyro-adapted, edible, seed-bearing plant species (Timbrook et al., 1982). Presumably,

like the rest of their California counterparts, they also burned to maintain grasslands for herbivores as well as maintain the health of oak savannas that provided acorns (Anderson, 2005). It would stand to reason, then, that their management of marine food systems would not be passive either, but active in its cultivation of conditions for abundance.

Nevertheless, Western scientists have not appropriately examined or considered that the Chumash deliberately augmented marine food bases (as in the case of Kwakwaka'wakw clam gardens or Haíłzaqv kelp forests). Instead, the Chumash are generally framed as passive "hunter-gatherers" who were fortunate enough to enjoy a "natural distribution of marine species" (Perry, 2005). Even Gamble's extensive survey of Chumash culture assumes that technology like the plank canoe—not ecological management—is responsible for their "exploitation of an abundant food supply" (Gamble, 2008, p. 13).

We turn now to a parallel case study to expand our minds on what was possible for the Chumash. For many years, the Gunditjmara community in Australia were considered "hunter-gatherers" of "naturally abundant" eel. Daryl Rose, a Gunditjmara Elder, corrects this record in saying:

> [The eels] would then be forced into these channels and moved down through here into places where the holding pens are. This is part of a farming system. We actually managed the eel. We just didn't come out here and hunt and fish. We actually came out here to collect and manoeuvre and farm and move these eels into places where we wanted them to go so then we could pick them up when we wanted to pick them up. (Smith et al., 2019a, p. 292)

Today, the Gunditjmara eel fishery stands as a venerated example of a 6,000+ year old eel farming system and has been named a UNESCO World Heritage Site. If not for persistent Indigenous voices and more meaningful archaeological analysis, the previous narrative of "Gunditjmara hunter-gatherers" would still persist today.

In similar fashion, archaeologists have branded Chumash People as "complex hunter-gatherers" or "a semisedentary, hunter-gatherer population" (see Coombs & Plog, 1977; Arnold, 1992; Rick et al., 2005; Gamble, 2008; Braje et al., 2011).

Fritz (1995) has even gone so far as to say, "North American Indians along the West Coast ... did not become farmers until after European contact ... the archaeological record in these areas shows long sequences of *in situ* harvesting of wild plant and animal foods" (p. 12).

But what is farming and domestication if not "decisive action for people to manipulate nature rather than merely take advantage of it" (Borowski, 1999)? And is this not what the Chu-

mash and a myriad of other Indigenous Nations had done prior to Columbus's arrival? Yes, Indigenous People did this in more complex, vast, and non-human-centric ways than their Enlightenment Era counterparts in Europe. However, that should not make it any less of a cultivation practice. It should be interpreted simply as a more complex act of cultivation and "farming" with sustainability as a goal.

Fritz's statement is bold and heavily consequential. His and others' "classification" of California Indigenous People as "hunter-gatherers" or at best "complex hunter-gatherers" essentially erases a profound history of active management of both their cultivated plant populations as well as game animals through pasturage management. These plants and animals were not "wild," nor was the landscape in its totality. Indeed, as we realize now, California was a densely populated, extensively managed anthropo-scape, thousands of years in the making (Anderson, 2005; McAdoo et al., 2013).

Ultimately the question is: why are mainstream scientists so hesitant to afford Indigenous Nations the categorical classification of "farmers," "domesticators" or "cultivators"? Lewis (2002) provides profound insights as to why this is so:

> In terms of some of the most basic ideas about cultural evolution . . . uses of fire [to manage grasslands] almost have to be ignored, since to acknowledge their importance in influencing the distribution and increasing the abundance of natural resources amounts to a kind of theoretical heresy. The assumption that hunter-gatherers are ecologically inept, or at least environmentally benign, has been central to the perception that the origins of agriculture constituted a "revolutionary change" in how humans related to the environment . . . it was only with the onset of farming that humans established "control over the forces of nature," assuming that prior to the beginnings of agriculture people could not have influenced the local availability, distribution, and abundance of either plants or animals. (p. 25)

In other words, to admit that Indigenous People have long cultivated their homelands is to blemish the near-sacred axiom that agriculture began in the Fertile Crescent 11,000 BP. Of course, we have archaeological evidence from around the world that humans were actively cultivating their environments earlier than this (Allen, 1974; Crawford, 2009; Yen, 2004).

An important addition to Lewis's point is that "working the land" was in colonial times conflated with "being civilized" (Nicoll, 2002). The term *terra nullius* (meaning "no man's land" and "uncultivated land") was used in reports to European kings and queens to describe Australia and the Americas. It was used to assert that no "civilized" people were living in these

lands and their conquest was therefore justifiable (Collin, 2017; Hendlin, 2014; Watson, 2014). To admit that Indigenous People have long cultivated their homelands is not only to blemish the Fertile Crescent theory, but to challenge the assertion of Western cultural supremacy over Indigenous People. It was thus in the interest of various colonizing groups in general to minimize and ignore Indigenous cultivation of homeland (Flanagan, 1989). It seems as though Indigenous cultivation is either dismissed entirely, or, when it is clearly present, it is recategorized as to something else. We must understand these nuanced, covert, yet powerful cultural dimensions operating beneath anthropological and archaeological praxis concerning the Chumash and other Indigenous Nations.

What do we lose if we mischaracterize active cultivators of regional food systems as mere "hunter-gatherers"? Firstly, we deny the world a great deal of teaching and learning about what made these systems work so well and for so long. The world currently faces a convergence of crises such as biodiversity loss, food shortages, climate instability, ecological fragmentation, over-dependence on volatile global markets, Indigenous language/cultural/economic loss, unresolved political histories, and lack of community resilience. The marine systems named above can significantly inform each of these issues. They can support and inspire a reconfiguration global behavior to be more balanced and successful.

Secondly, as de facto arbiters of truth, we as Western scientists wield immense power to influence how Indigenous People are seen by the world and even how Indigenous People come to see themselves. For example, if we label Kwakwaka'wakw clam-gardeners as "hunter-gatherers," we erase thousands of years of human management from the written record. We re-write this ancient marine cultivation system as just a pile of naturally occurring rocks. The long-standing tapestry of human heritage and ecological knowledge woven into their shorelines could be forever lost in the historical record. Along with that erasure comes the erasure of the sophistication of Indigenous land management sciences, further entrenching the Eurocentric myth of the "primitive Indian." One misstep or mistaken assumption due to our cultural blind spots can result in serious ramifications for the self-esteem and lived reality of Indigenous People in contemporary times, who are deemed either civilized or primitive with the stroke of a Euro-centric pen.

This almost happened for the Kwakwaka'wakw. Despite their extensive management of the land and ocean, Kwakwaka'wakw People were pigeon-holed as hunter-gatherers for a long time by early anthropologists (see Boas, 1897, 1921; Piddocke, 1965; Johnsen, 1986). This characterization could have been cemented forever if other anthropologists and archaeologists had

not visited the remnants of ancient clam gardens at the turn of the 21st century (see Deur et al., 2015, pp. 201–202; Lepofsky et al., 2021). What would be the consequences—both to our scientific pursuits as well as the self-esteem and lived realities of contemporary Chumash People today—if this occurs in the instance of their knowledge and histories?

Lastly, the fact that representation of human groups carries such high stakes highlights the importance of consultation with local Indigenous People. As we can see with Deur et al. (2015), working respectfully and closely with traditional Kwakwaka'wakw Elders added immeasurable resolution to their understanding of clam gardens. The authors espouse the "value of a traditionally trained primary source consultant in solving an enduring mystery and correcting an ethnographic oversight" (p. 202). We also see in the Haíłzaqv case that the inclusion and leadership of Haíłzaqv voices and knowledge provides infinitely greater clarity in our understanding of the value system needed to upkeep such an enduring food web. Unfortunately, the profound alteration of Chumash culture by colonial forces (see Timbrook et al., 1982, pp. 174–175), as well as the general undervaluing of Chumash voices in scientific research, has made it challenging to incorporate their nuanced knowledge in the understanding of Holocene Channel Islands management.

In sum, despite the proven ubiquity of active marine food systems management among west coast Indigenous People in the Americas, the literature does not entertain the idea that Chumash People actively managed the Channel Islands. Chumash People are continually framed as passive "hunter-gatherers" rather than active cultivators of key species and systems. Could it be that the Chumash had a way of enhancing or even expanding Channel Island kelp forests? Could this help to explain the continual and ample presence of red abalone, which love to feed on these kelp forests? Could it be that Chumash were not simply the lucky beneficiaries of red abalone populations that "happened to be there," but were themselves red abalone farmers? Respectful consultation with Chumash Elders could elucidate more about this and other management techniques. These questions and more provide ample fodder for future research.

3.10 The Reconstruction of Chumash Fishery Principles, Values, and Goals Based on Creation Stories and Cultural Narratives

As we saw above, several dimensions of the Holocene-era Chumash fishery system were estimated based on Chumash Creation Narratives and cultural stories. The following is a presentation of the actual texts and narratives that were examined to make these assumptions. This

strategy could be applied to other fisheries as well, such as the Chesapeake Bay context of Piscataway People, for which the outside world has a much less nuanced understanding of the underlying value system.

This analysis was based on a weaving of three authors (Blackburn, 1975; Broyles-Gonzalez & Khus, 2011; Kitsepawit et al., 1981). At the risk of oversimplifying, the following is an attempt to reconstruct the principles, values, and goals that drove the pre-Columbian Chumash fishery by reviewing their cultural and personal testimonies. Hopefully, the plethora of information therein provides a solid cultural context for this incredibly successful fishery that unfolded over the millennia.

"*Earth Wisdom: A California Chumash Woman*" is a narrative of great interest in this analysis (Broyles-Gonzalez & Khus, 2011). The late Pilulaw Khus of the Bear Clan of the Chumash Nation co-authored this extensive testimony containing information on her Chumash-based value system and its underlying principles. Khus provides great insight into the worldview that was passed down to her as a Chumash woman. While it is true that Khus is not of the same generation who were harvesting these resources thousands of years ago, she is a direct descendant of traditionalist Chumash People. She and her people are closest to the living value system of that culture extant in the entire world. If anthropologists can be honored as authorities on a culture that they have only just met, we should extend that same status to direct descendants who have studied that culture all their lives.

Moreover, while some of Khus's narratives are not directly correlated with those Holocene times, the Creation Narratives she shares are. I can speak from experience as an Indigenous Person that our Creation Narratives are very sacred and are not supposed to change when you tell them. The most fundamental aspects of Creation Narratives, presumably, have not changed much since the time they were formulated. According to the Chumash, these stories are from time immemorial. Thus, this analysis rests partly on the assumption that Creation Narratives are a reliable reflection of Holocene Chumash principles and values.

A second source of interest is *December's Child*, edited by Thomas Blackburn (1975). This volume curates dozens of Chumash cultural and personal narratives. These were originally recorded by John P. Harrington between 1912–1928.

Harrington was famous for taking hundreds of pages of notes throughout his time with various Indigenous communities in the early 20th century. Most of his notes, however, were never synthesized into organized ethnographies. Of the hundreds of boxes of notes that Harrington produced (which now sit in the Smithsonian Museum in Washington, D.C.), there are about 60

boxes regarding Chumash culture.

Blackburn undertook the task of compiling some of the Coyote stories, Creation Narratives, and personal narratives relayed by Harrington's Chumash advisors. Blackburn also attempted to analyze some of the main patterns he saw within these stories. Although his is just one interpretation by a Euro-American man, Blackburn does present an interesting take on Chumash principles, values, goals, and ethics.

A third source reviewed here is *Eye of the Flute*, which is also derived from Harrington's notes (Kitsepawit et al., 1981). This source is concerned with "the ritual organization and activities of the Ventureño Chumash" as told to Harrington by Chumash Elder Fernando Librado Kitsepawit (p. 4). Kitsepawit shares many interesting things in this volume that are germane to our inquiry into the principles and values that defined the Holocene Chumash fishery.

3.10.1 Principles/Assumptions

One section of the Chumash Creation Narrative relayed by Khus is the story of the Rainbow Bridge. Encoded in this story are clues regarding the principles and value systems that defined Chumash societal behavior.

This story begins with Chumash People first living on the Channel Islands only. At this time, the Earth (whose name is Hutash) was living among the People. According to Khus, "She lived there with them; and she was extremely happy because these human beings, the Chumash People, were her people, and she loved them very, very much" (Broyles-Gonzalez & Khus, 2011, p. 48).

An issue arose, however, when she noticed they were constantly cold when the storms came. She noticed their food was cold and tasteless. She noticed they had no light to see at night. She wanted to do something to help these poor humans. At that time, according to Khus:

> Sky Serpent, who lives up in the sky, loved Hutash very much. Nowadays he's called the Milky Way. One day Hutash talked to Sky Serpent and she said, "These are my people and I love them very much but I think that they're cold. When Sun isn't out to warm them they don't have light, they don't have any way to keep warm or to cook their food." It troubled Sky Serpent to see Hutash sad because he loved her so much. (Broyles-Gonzalez & Khus, 2011, p. 48)

At this time, Sky Serpent told Hutash that he would help her people. He gathered a storm and with a bolt of lightning gave fire to the people to help them with these issues.

An aside before continuing the Rainbow Bridge Story: this part of the narrative is important as it reflects an underlying belief that the Earth is not only alive but deeply loves human beings. Children grow up with an emotional attachment to Earth when she is personified as a woman who loves them, will fight for them, and provide for them, engendering a relationship of love and respect. Children, from a biological and sociological standpoint, also learn from their mothers. Thus, this designation of the earth as a mother may also inculcate within Chumash children that the earth is a being to learn from.

As an aside, it is interesting to compare this story (female-centered) with the Greek legend of Prometheus (male-centered) because they reflect different sets of principles and values. In the Greek story, a very tenuous and mistrustful relationship (theft) forms the foundation of the relationship between humans and fire. In the Chumash narrative, humanity's relationship with the divine is symbiotic and compassionate.

Returning to the Rainbow Bridge Story: thanks to the gift of fire, the People began to grow in numbers. They began to socialize at night around the fire and this would keep Hutash awake. Since "she and Creator were good friends," she could approach him with her strife (Broyles-Gonzalez & Khus, 2011, p. 49). She told him how she was worried they would run out of food due to overpopulation that fire was fueling. She told him how she could not sleep and was getting headaches.

According to Khus: "Creator of course loved Hutash very much. He saw that she was sad, and he didn't like that so he said, '[Go] to your people and you tell them that tomorrow morning, just as Sun is starting to come up over the mountain, they should be standing on the highest peak' " (Broyles-Gonzalez & Khus, 2011, p. 49). It was at this time that the Creator made a Rainbow Bridge from the highest peak of the island and had them walk across it to present-day Santa Barbara, California, where there was ample room and resources for the people to grow. The Creator helped Hutash and humanity by creating an outlet to more land where they could take care and grow their numbers.

This part of the story is significant in that it reflects a Chumash understanding of overpopulation and overharvest of resources. Part of the reason Chumash People were able to maintain these systems on a millennial scale was through trial and error—reflected in the lessons of these cultural stories—and becoming cognizant of the risks of overpopulation and overharvest.

Returning to the story, the Creator warned the people not to look down as they passed over the Rainbow Bridge. He said they would get dizzy and could fall over. Some of the people did look over because they could not contain their curiosity. Just as Creator had warned, they got

dizzy and fell over and into the ocean. As this time, according to many documented versions of the Rainbow Bridge Story, Hutash saved these people from drowning by transforming them into Dolphins (Broyles-Gonzalez & Khus, 2011; Sonneborn, 2006; Wood, 1995). For this reason, the Chumash always regard Dolphins not only as equal to humans, but another form of human.

This element of the story is telling. It shows that Chumash fishery management was informed by a profound respect and love for other animals. Chumash people did not only see other lifeforms as equal, but even came to identify with them. This is one tenet that upholds a ecoocentric management system in other case studies as well. Thus, the Rainbow Bridge Story is an ancient reflection of at least three Chumash principles: (a) the Earth is a feminine, living being who deeply loves and fights for humanity, (b) humanity is capable of overpopulation and destruction of resource bases, and (c) animals are not only equal to humans, but can be humans in another form.

This is corroborated by the patterns that were identified in Blackburn's review of Harrington's notes on Chumash traditional stories. Some of the patterns interpreted by Blackburn included: (a) the kinship of sentient beings, (b) self-constraint, (c) moderation, and (d) reciprocity.

For instance, one of the stories retrieved by Blackburn is "Momoy's Grandson" (Blackburn, 1975, p. 126). It holds similarities to the Rainbow Bridge Story in that the Sun is framed as a benevolent protector of the people. The figure of Coyote steals the sun's torch and malevolently enjoys scorching all the people on earth. Sun comes to the rescue, chides Coyote for his behavior and retrieves the torch (p. 133).

This idea that Sun is a loving being is reiterated in Blackburn's curation of "The Story of ʔAnucwa" (Blackburn, 1975). In this narrative, ʔAnucwa lost both of her daughters because they ran away. ʔAnucwa became very depressed. It is said that "Sun saw her crying thus and pitied his cousin. He threw down two piñon nuts which she seized and ate. But as soon as she had eaten them two more appeared, and so it went until she was full" (p. 235).

As her daughters were running away, they also became tired, hungry, and exhausted. It is said that:

> Sun took pity on them and shortened the road. And he told his daughters, "two girls are coming—receive them well, for they are my cousin's daughters. I'm going to look for a place where they can stay." And when Ponoya and Šapiqenwaš arrived at Sun's house they were given a place where he could watch over them, and even now they can be seen as two small stars close to the moon. (Blackburn, 1975, p. 236)

Thus, the assumption that the universe contains divine beings that care for and look out for

humanity is reiterated.

Another story retrieved from Khus's narratives yet again reiterates the benevolence of the earth towards human beings. This story occurs at present-day Zaca Lake, California. In this story, when all the "Holy People" (primordial characters) are creating human beings, they are deciding what human should look like. There were several beings present, including Coyote. They had decided everything about how human should look—except the hands. They were having a hard time deciding what the human's hands should look like. Coyote suggested that they should have paws like him. Everyone was so tired and stumped of what the hands should look like that they simply agreed with him.

At this time, according to Khus's telling of the story, Lizard overheard this conversation and thought to herself:

> You know, that's a very poor idea for Human Being to have a paw like Coyote. They won't be able to do anything. They won't be able to pick things up. They won't be able to work and make tools or clothes or anything. They won't even be able to feed themselves. That's really a bad idea .... Human Being should really have a hand just like mine, in order to be able to do very many wonderful things with their hands. (Broyles-Gonzalez & Khus, 2011, p. 53-54)

In hearing this story, children are taught that there are animals that "look out for them" and are caring of human beings. According to Khus:

> Just as it was starting to get light one Holy Person came; then another Holy Person, and another one. And here comes Coyote: Coyote is so happy; he is finally going to get something his way. So he is standing there and everybody is looking for Sun to come out. Coyote is standing there and now can see the light of sun Starting to come up over the mountain. He knew that just in a couple of minutes Sun would come up and that would be the time for him to put his paw down. It was almost time for Sun to come up, and he raised his leg like this. He was all ready to bring it down and put his print on the table, but he had to keep it raised because Sun was not quite up. Then just the very top of Sun started to show over the top of the hill. Coyote started to bring his paw down like this but really, really quick, faster than you can even blink your eye, Lizard jumped out of the crack of the rock, and ran up and she put her little hand right on the top of the white stone table. There was her print of her hand there on the table! Coyote was so angry. Oh he was so angry! The other Holy People

> said, "Too bad, Coyote. She put her hand there first and that's the kind of hand that Human Being is going to have from now on." Don't you know that Coyote just took off running as fast as he could after that Lizard. But Lizard is really small and really quick and she can run through little cracks and crevices where Coyote could not catch her. It's a good thing that Lizard was there because if you ever look at a Lizard's hand you can see that it is very much like Humans'. And that's why we have this wonderful thumb and these wonderful fingers that we can do all these good things with. That's how Human Beings came to be the way we are. (Broyles-Gonzalez & Khus, 2011, p. 54)

This contrasts greatly to the ways in which some cultures see animals as lower beasts to be feared, conquered, and controlled. This relationship with Lizard positions animals as not just equal, but perhaps elevated above and preeminent to humanity, warranting our respect. They not only deserve respect, but deeply love us and take care of us. Thus, affective relationships to other lifeforms, governed by deep love and indebtedness, seem to have underpinned the Chumash fishery management systems.

Another story of Zaca Lake relayed by Blackburn (1975) has to do with how it was created by Thunder. This shows how Chumash culture not only held great respect for animals like Lizard, but also for things like thunder, whom they see as animate:

> There was once a village at that place, and a man ... saw Thunder and started talking in an insulting way to him. And the people said, "Let us get away from here, for Thunder is someone you have to respect." They fled, and as they looked back they saw that where Thunder had sat down there was water, and that man who had spoken to Thunder had disappeared. (Blackburn, 1975, p. 248)

In this way, Zaca Lake was created. This part of the larger Creation Narrative teaches children to have great respect for even things like thunder. It appears that there was such great respect for Creation within Chumash culture that it was even frowned upon to speak poorly of the weather and other forces of creation.

Not only is Thunder believed to be animate, but other elements as well. According to Harrington's notes curated by Blackburn:

> The [Chumash] adored three sacred "bodies"—earth, air, and water .... The sun was male and the moon was female. There were men among the old Indians to whom it was a pleasure to listen when they gave their views on this world. They were men of

> great ideas .... [T]here were three elements concerning which we must be cautious—wind, rain, and fire. The rainbow is the shadow of these three elements that compose the world, and therefore it has three colors. The white is wind, the red is fire, and the blue is rain. The wind was sometimes called *cenhes he?išup?*, "breath of the world." (Blackburn, 1975, p. 96)

We might conjecture, then, that as Chumash fishery managers walked and sailed along the Channel Islands, they were guided by an underlying principle that the elements were alive, sacred, and deserved our reverence and respect.

This feeling of kinship and equality with non-humans and elements is echoed further in another of Khus's passages:

> [T]here were many ways that our people lived that demonstrated the recognition of Life Force, the need for respect, and the interconnection and interaction of all life forms. We were not good "stewards" of the land because nobody stood in that kind of position. We recognize that we are all part of creation and we all carry Life Force. When we do ceremony or council, we always form a circle. Whenever you form a circle, nobody is above anybody else. Everyone is equal. We each bring what we have into the circle. That is honored and respected. This isn't just among the Chumash People. I am very honored to know a lot of traditional people from different Native nations and they all do the same thing. (Broyles-Gonzalez & Khus, 2011, p. 61)

This is a fascinating sentiment—the idea that humans cannot be "stewards" of nature because that designates a superior role to them. It also re-natures humanity by positioning them within a web of life rather than above and apart from them as a "supervisor."

This is akin to Blackburn's excavation of Fernando Librado Kitsepawit's belief regarding the kinship of all beings. His thoughts were recorded as follows:

> Fernando's grandfather told him that all animals are related. The horned toad is wot [leader] of all beasts, the swordfish of all fish, and the *slo?w* [eagle] of all birds. The bear is the older sibling of all the animals. The eagle, condor, and buzzard are said to remove the foulness of the world. I told Fernando of the San Gabriel belief that the condor rips up carcasses for the buzzard—that they are first cousins. Fernando replied that an old man told him that we are all brothers, and our mother is one: this mother earth. He has always believed what the old people told him when he was a boy—that the world is God. (Blackburn, 1975, pp.102–103)

This notion that all animals form a family similar to that of the human nuclear family supports Khus's contemporary reflections on the equality and value of all life.

Another interesting tenet reflected in Chumash narratives is the notion that humans are given a divine assignment to care for their homeland. Khus states, "[s]omehow through the teachings that we Chumash People were given, and through those responsibilities that were assigned to us, we lived for many thousands of years in a state of balance on this land" (Broyles-Gonzalez & Khus, 2011, p. 83). This notion is echoed again in Khus's following statement:

> I've been taught that each people, including people who are [I]ndigenous to other continents, was originally put in a specific place. Each people was given certain gifts particular to that place; and along with those gifts, each people was also given certain responsibilities to that place, which include cultivating that connection with the ancestors .... The expression of Spirit that comes through them has to do with where they live. Do they live in the mountains? In the desert? In the Arctic? All of that has to do with the ways that they will know, understand, and express Spirit. There are certain expressions of Spirit that will be specific to a particular place. (Broyles-Gonzalez & Khus, 2011, p. 51)

As an Indigenous person who has visited dozens of Indigenous Nations across Turtle Island (aka North America), I can attest that I have heard this ethic of a "divine assignment to homeland" repeated again and again.

All these passages together help to form an understanding of the principles that undergirded Chumash life, including their fishery management: (a) the Earth is a feminine, living being who deeply loves and fights for humanity, (b) overpopulation is possible and preventable, (c) animals are not only equal to humans, but can sometimes be preeminent to humans or humans in another form, (d) humans are not stewards of other lifeforms because they are not above life itself, and (e) different human groups have been divinely assigned to specific homelands with certain responsibilities to those lands.

3.10.2 Values

One value espoused by Khus is the notion of circularity. In this case, circular thinking assumes that everything we receive in a food system must be somehow returned to that system to ensure its perpetuity. This hidden value can affect a food system by changing how people harvest and manage the land. Khus provides the following description of circular thinking according to her

Chumash upbringing:

> We understand that everything flows in a circle. There is no beginning and there is no end .... The Mother travels in a circle; the seasons travel in a circle; the animals travel in a circle .... The whales move back and forth, back and forth. This is the way that we think. This is our center. This is how we understand life, and this is how we are .... What is looked upon and admired in the "modern" world is the ability to accumulate wealth .... Among Indigenous [P]eople we understand that you have to keep it moving .... In order to keep it moving, you have to be very careful as you interact with the Mother and with her gifts to you. That's part of it. You have to make sure that you don't take more than what you need. You have to be careful and live in a way that allows that circle to continue to flow. (Broyles-Gonzalez & Khus, 2011, pp. 84–85)

Circular thinking can profoundly alter the way humans manage their food system. If a people believe they must sustain the system with no beginning and no end, they will invariably prioritize the sustainability of that system above short-term gain. Circular thinking can transform a linear system from one of plunder to one of restraint. Like a line, linear systems eventually reach their inevitable end, while circular systems have the capacity to persist.

The notion of circularity is reiterated in "Eye of the Flute" where Kitsepawit recalls the Hutash ceremony. Given that Kitsepawit shared this story as an old man in the early 20th century, we can assume this memory is from the late 1800s. Kitsepawit recalls that an Elder stood in the middle of the room, lifted his staff, and said the following:

> Remember! We have conserved all of the harvest which Hutash gave us. Our harvest has passed; it was abundant. Hutash gave us great satisfaction ... it is the duty of the rain to bathe Hutash, for from this the harvest is born again. Remember! The fiesta of Hutash is your obligation, and we are going to harvest that which is born again. Hutash is the mirror of the Sun, and the Sun is the mirror of Hutash. (Broyles-Gonzalez & Khus, 2011, pp. 52–53)

So much is reflected in this quote, including the notions of circularity and rebirth through the interaction of earth, sun, and rain. The Chumash Hutash "fiesta" or ceremony also reflects to us again the principle that the earth is a loving and benevolent being who loves and fights for her people—and the people appreciate her in return. This value undoubtedly affected how the Holocene Chumash fishery operated.

In addition to circularity, Khus also positions service to other humans as a mediating value of Chumash life and, therefore, of fishery management. She does this by drawing a connection between ecosystems health and human health:

> The overriding principle was the people. You didn't do anything that endangered the people. So if you were not endangering the people, you were not doing anything that endangered Earth, the waters, the air, the plants, the animals or anything, because the people had to have those things in order to live. (Broyles-Gonzalez & Khus, 2011, p. 62)

Thus, it was a dedication to one another, according to Khus, that kept the population in a state of careful management of the land they all depended on. If one truly cared for their neighbor, they must necessarily care for the land this neighbor depended on.

In "Eye of the Flute," a direct quote from Kitsepawit relays many things including the value of love for one's neighbor. These concepts were passed onto Kitsepawit from his grandfather:

> Here where we live is Hutash. You know that each body has its place where the sense of feeling is. All mankind lives in the sphere of Hutash. The sphere of Hutash is everything that contains the human race, and for us the sphere of Hutash is the land. All are born of the earth, and the sun revivifies all creatures. That is where the word "love" triumphs. Love is the basic motivation. From the abundance of the heart the mouth speaks. Now we are going to approach this act—we shall all know that which happens and the significance of Hutash. You can never separate that which is born of your soul (your mind and your emotions). Then you will be all-powerful, then you will be powerful in everything. (Broyles-Gonzalez & Khus, 2011, p. 36)

Kitsepawit's belief that "love is the basic motivation" is akin to Khus's sentiment that caring for the people was the "overriding principle" of life. Thus, it may be safe to assume that love and care for others were incredibly important values for the Holocene Chumash.

In addition to service to other human beings, Khus positions honor and reverence for the sacred as mediating values of daily life. Embedded in Chumash behavior, therefore, is a high priority for these concepts of honor and reverence. Such values can have profound influences on the way a human group manages a food system. As Khus states:

> We will continue to do the ceremonies. The ceremonies, for example, can be as simple as an individual getting up in the morning and greeting Sun when Sun comes up. We greet Sun with prayers and offerings; that's ceremony. Ceremony can be anything

> from that to a gathering of the people in large numbers. Ceremony is that which we do to keep our responsibility to Earth and the ancestors. It involves our being in a state where the ancestors and the spirits can come and be with us. When we sit in ceremony the ancestors are there; believe me, they really are, and so is Spirit. It gives us the opportunity to honor Earth. (Broyles-Gonzalez & Khus, 2011, pp. 85–86)

This passage implies that Chumash fishery systems were not secular in nature, but steeped by prayer and reverence, expressed through ceremony. It mentions the notion of "honor." This is a common value within the case studies compiled here. To honor the earth is to thank Earth, respect Earth, acknowledge Earth, and speak to Earth kindly.

Embedded within the concept of honor, one might say, is a sub-concept of humility. When human beings honor the earth, they must necessarily come to it humbly. This is not a given in human food systems, as there are many points throughout human history where we see the earth and Her bounty as inferior "underlings" to be controlled and extracted for human benefit. As such, it is important to distinguish that humility and honor are indeed embedded within Chumash value systems as they relate to ecological interaction. According to Khus, ceremony is one of the ways that Chumash People express their humility and honor the earth, which includes their fisheries and overall food system.

Our recount of Chumash values would not be complete without speaking of the value of generosity. This value is relayed in a Coyote story unearthed by Blackburn in "December's Child." In this story Coyote came upon some children digging cacomites, a flower native to California whose bulbs are edible:

> Those of the children who were generous said, "Poor grandfather, since you are so skinny eat the bulbs I have dug up so far." But the children who were stingy didn't want to give [Coyote] anything. They said, "Coyote, what I have dug is for my relatives only!" Coyote sat down and watched the children digging, and he ate cacomites until he was satisfied. He bewitched the bulbs so that the good children hardly had to dig at all while the stingy children had to dig very deep for them. (?, p. 221)

This story reflects the desire of parents, who are the storytellers, to instill in their children the idea that the more generous they are, the more they will ultimately have. Stinginess is not only framed as a negative behavior, but also one that could lead someone to misfortune and unfulfillment.

Similarly, in "Eye of the Flute" Kitsepawit recalls that one of his Elders, Narciso, once told

him:

> God will provide for you in the world because of your goodness. Because you are good-hearted, if you give anybody only an acorn, and it is the only thing you have, the fellow to whom you give it will say: "I got away with you." But because of your kindness, the people will be kind to you .... Never do anything that is prejudicial or unlawful and think that no one will see you. For while the sun is shining, an eye is here, and if it is at night, Hutash will see. (Kitsepawit et al., 1981, p. 37)

In story after story, we see that generosity to guests and giving to strangers is a vital value of Chumash People. For example, each time Sun rescues a person, he requests his daughters feed them well (Blackburn, 1975; Kitsepawit et al., 1981). Whenever someone visits another, it is always expected that they are fed with generosity. Food then becomes the medium through which characters within Chumash stories and lived realities express the value of generosity. This undoubtedly influenced how Chumash fisheries operated in Holocene times because maximizing resources for an individual was not the goal.

Not only are the people generous, they see God and Earth as generous beings as well. During the festival to honor God or Creator, Kitsepawit recalls that:

> [An] old man was seated on a whale vertebrae stool, while the twelve helpers, the 'iyalahwicha'sh, formed into two wings of six men .... Then I would make my offering to the old man, saying: "Here is a sacrifice [of seeds] in honor of Kakunupmawa, the father of nature. This we do in honor of our Lord. When God gives he gives in plenty" .... Some people offered the old men seeds, islay, wheat, corn, abalorio and money in little baskets. (Kitsepawit et al., 1981, p. 58)

We see in this account of the God Honoring Festival that the people give offerings to the Creator in thanks for all the generosity the Creator has given to them. Thus, the abundance of Earth (gifted by a host of loving and benevolent beings) is then mirrored by the people through acts of generosity.

In sum, while it may not be an exhaustive list, we can see through this review of Chumash voices that some of the underlying values of the Chumash system were as follows: (a) circularity: humans must do their part to support the circularity of creation, by returning what is taken from the system back into the system; (b) service to other human beings: take care of others above all else; (c) honor and reverence of the sacred: the understanding of the sacredness of people and creation necessitates that we value honor and reverence for the sacred; (d) humility:

in order to honor the sacred, one must come to creation humbly; (e) generosity: it is vitally important to be generous to those around you and always feed those around you. As we will see below an additional value of (f) restraint is also embedded in Chumash culture.

3.10.3 Goals

From the soil of Chumash principles and values of, their goals must necessarily sprout. Khus states that the goal of a food system is to create "good health on this land for all beings, not just for the humans" (Broyles-Gonzalez & Khus, 2011, p. 84). This goal "to feed others," founded on the value of ecocentrism, is a familiar pharos we see guiding other case studies. Chumash People see other lifeforms as their equals, and in some cases even preeminent to humans. It would logically follow, then, that their systems work to feed non-humans as much as humans.

Another familiar goal we see reflected in Khus's narrative is the effort to "enhance" the waters that form the basis for the food web. Just like Kwakwaka'wakw clam gardeners and Haíłzaqv herring managers, Khus felt there was a concerted effort on the part of ancient Chumash to enhance and augment the natural food-bearing capacity of the Channel Islands:

> We have been here for thousands of years. How did that many people manage to live here for that length of time without totally wiping out all the resources? We must have figured out some kind of a system that enhanced resources instead of destroying resources. I want to talk a little bit on a practical level about how we lived here before the invasions. How did the old people live with respect, and honoring that Sacredness or Life Force? We did not overuse resources, nor disregard them, nor did we use them in a frivolous way. Instead of destroying resources, we enhanced those resources. Instead of taking them down, we made it more possible for resources to continue to be around us. (Broyles-Gonzalez & Khus, 2011, p. 60)

Thus, one of the goals of Chumash fishery management (according to Khus) is to augment the vitality of the system—not simply sustain it at a base level. Perhaps not surprisingly, Khus also uses the familiar words "respect" and "honor" within this description. This underscores the above assertion that reverence and honor were important values in Chumash food systems. She also implies the value of restraint, as we see in some of the case studies above.

In addition to enhancing a system, Khus suggests the goal of attaining balance: "[b]alance has to be the goal. And I think that if we operate with respect for Earth and for each other, and if we strive toward balance between everything and everyone, we can get to a place where that

Life Force will come up" (Broyles-Gonzalez & Khus, 2011, p. 84).

While this may seem like an obvious goal, there are many fisheries with quite the opposite goal. For instance, some carry the goal of profit maximization and are more than willing to compromise the balance of a system for short-term profit. They may harvest great amounts of fish that will knock the food web off balance simply because it will provide that fishing company a great profit for a year or two. The Channel Islands are vast, biodiverse, and ancient. Perhaps it was over these 12,000 years or more of operation that Chumash People learned to not disturb the balance for short-term gain.

Therefore, some of the underlying goals of the system (as we can surmise from these texts) are as follows:

- Remain ecocentric: the system is designed to feed all life (not just humans)
- Enhance abundance: leave the system better and more prolific than they found it
- Achieve balance: support the balance between all the interacting elements of the system

It becomes clear through the examination of these case studies that the underlying principles, values, and goals—hidden in the invisible world of human consciousness—are sometimes more instructive than the physical characteristics of a fishery that we can weigh and measure. Nevertheless, let us examine the outward appearance and strategies of the Holocene Chumash fishery to the extent possible.

3.10.4 Strategies

Many have conjectured as to what specific strategies the Chumash employed to maintain and manage such a longstanding fishery. Firstly, according to Khus, one mediating factor is a prohibition of hunting in sacred places. This can have vast and positive ecological consequences as we will later discuss. She states:

> There is no hunting of the pronghorn allowed at this time; the elk hunt is done on a lottery basis. If it were left up to traditional Indian people, there wouldn't be any hunting. But at least there is no hunting by the sacred Painted Rock. That is something that we advocated for a long time: no hunting. There shouldn't be killing around sacred places. That is an abomination. It is very typical, however, of the way Indian sacred places and other sacred issues are treated. You would not have a bunch of hunters running into any kind of Christian church doing killings, unless they were really crazy; yet the United States government, the states, such as California, and their

> agencies tend to allow hunting around sacred places. Well, now there is no hunting at Painted Rock. (Broyles-Gonzalez & Khus, 2011, p. 141)

No-take zones can provide a haven for various species to regenerate themselves. It is from these protected areas that these species can potentially replenish designated hunting areas. It has been conjectured by Western scientists that this was indeed a part of the success of the Chumash fishery system. Braje (2009) suggests that the designation of ancient "no-take" zones may have been an important aspect of Chumash fisheries management.

Secondly, Erlandson et al. (2008) also suggest the implementation of shifting settlements as a possible strategy in Chumash fishery management. The authors present evidence that rotating settlements allowed certain areas to regenerate while Chumash People moved to new places to harvest (Erlandson et al., 2008, p. 2150).

Another management technique proposed is that Chumash People focused much of the harvest on lower trophic levels. For instance, studies found that red abalone was very prominent in ancient Chumash middens. According to Braje, organisms from lower trophic levels are often smaller and can thus rebound faster (Braje, 2009, p. 136). The Chumash fished mostly in this category (as opposed to otter or spiny lobster, which could take longer to rebound). This contrasts greatly with commercial fishing techniques, where often the largest and fastest return is sought first.

While this list is far from exhaustive (and the complete list may be challenging to define without Holocene Chumash voices to tell us), we can surmise that some of the fishery strategies sprouting from Chumash principles, values, and goals are as follows:

- The implementation of no-take zones, especially near sacred sites
- The implementation of shifting settlement patterns to allow areas to regenerate
- Augment and harvest lower trophic levels (the base of the food system)

3.11 Synthesis

So far, we have identified some of the underlying principles, values, and goals of six ancient fisheries. We have also identified some of the strategies employed to achieve these goals, and the outward physical characteristics of these fisheries. Tables 3.1–3.6. summarize these facets to help us consider all these fisheries as a whole, rather than as isolated cases. It should be noted that just because a certain characteristic was not identified does not mean it is not present. It simply means Western scientific pursuits have not yet investigated this dimension.

The five most prominent underlying assumptions and principles of these case studies are as follows: (a) ecocentrism: the food system is designed and intended to benefit all life, not just humans; (b) human/non-human equality: all lifeforms and elements are equal in value and dignity to humans; (c) divine assignment to homeland: human groups have been assigned to certain places to be their protectors, guardians, and stewards by a Higher Power; (d) primordial presence: these human groups have been there since time immemorial; and (e) creation is sacred. Interestingly, the four case studies where we are able to hear from the voices of those people are the places these principles were confirmed to exist.[2] This highlights the importance of properly and respectfully consulting with Indigenous Nations to understand the invisible principles that guide their actions and strategies.

The most prominent values (that were able to be identified) across the six study areas, in order of greatest distribution, are as follows: (a) restraint: being careful not to overexploit a system; (b) human assistance and stewardship: making efforts to support the overall life system; (c) respect, reverence, and honor for the sacredness of life; (d) kinship with Creation: positioning animals, celestial bodies, and plants as family to humanity and treating them as such (fathers, brothers, sisters, mothers). This is not to say other values are less important. Indeed, they all contribute greatly to the success of these fisheries. Each value can teach us so much and help us improve contemporary food systems management.

The most prominent goals identified for the six fisheries are: (a) feed and care for humans: obviously feeding the population is a major goal for a food system; (b) feed and care for non-humans: five out of six fisheries were identified to have the goal of feeding non-humans; (c) design a perpetual system: an explicit goal of five out of six fisheries was to design a system that could function in perpetuity; (d) enhance/improve the biotic system: it was a goal of five out of six fisheries to enhance the system.

The four most prominent strategies identified for the six fisheries are: (a) expand habitat: in order to increase the availability of a certain edible species, a society would expand the habitat of this species and make a home for it; (b) large initial investment with lasting returns: many of these constructed systems involved energy-intensive creations that in turn supported lasting and abundant returns (i.e., intertidal rock walls, eel channels); (c) dovetail with natural forces: the majority of these cases were documented to have stepped in line with preexisting forces of nature; (d) expand preexisting systems: similar to expanding habitat and dovetailing with

[2] The principles expressed in these oral testimonies also bear remarkable similarity to those voiced by the four interviewees in Chapter 5 of this thesis

forces of nature, one strategy employed was to observe systems of health and abundance and work to expand them.

The outward physical properties of these systems are more detectable and clearer cut. The invisible world of human principles, values, and goals are harder to ascertain, especially when looking at ancient systems whose informants are no longer with us.

The most prominent physical properties of the five fisheries are as follows: (a) millennial-scale: each of these systems is at least one thousand years old; (b) landscape/regional scale: these systems were collectively managed on vast, ecosystemic scales; (c) non-synthetic/local materials: all systems were constructed and managed using local, non-synthetic materials such as stone, earthen berms, kelp forests, and plant-based materials; (d) biodiverse: each of the systems were identified to be forms of poly-aquaculture, cultivating and consuming a wide variety of species within the system; (e) anthropogenic: four out of six systems were confirmed to be anthropogenic in nature—meaning that without human assistance, they would not exist.

All but the Haíłzaqv system were dated to be at least 1,000 years old. The mean confirmed age of the other five systems is 6,220 years. Dates reflect the ability of archaeological dating methods more than the age of the system itself (*e.g.*, Zimmerman, 2004; McNiven, 2016). For instance, it is challenging to date the Haíłzaqv herring fishery as herring roe do not preserve in the archaeological record (see Moss et al., 2016). It should be noted that according to the Haíłzaqv Creation Narrative, their kelp and hemlock habitat construction technique is as old as time (Brown & Brown, 2009).

All systems—save the Chumash system—were confirmed to harness immense kinetic forces naturally wrought by the aquatic system that surrounds them. For instance, tidal shifts, the floods that come with rainy seasons, herring runs and roe production, the kinetic force of the rivers, the moon's gravitational pull, and the kinetic force of millions of migrating fish were all harnessed to create predictable and abundant food sources year after year. The Chumash system is not confirmed to have proactively and intentionally worked with any such forces based on the literature. However, given the ubiquity of this practice, it is probable that they did synergize these forces in some manner.

All six case studies were regional scale fisheries. Regional scale is defined as entire landscape, seascape, and ecosystems-wide management. This contrasts with Western seafood farms, which are constricted to relatively small areas as siloed foci of maximized production.

The majority of these systems were confirmed to be explicitly non-human-centric or "ecocentric" (see Chapter 1 for detailed definition and discussion of Indigenous Ecocentrism). This is

distinguished, for example, from Western food systems that are expressly and solely for human benefit, such as pig farms, cattle ranches, and commercial salmon farms.

The study areas confirmed to be ecocentric are where researchers actively consulted with Indigenous Nations themselves. Only through this consultation can the intentions of these managers be made clear. Based on the literature reviewed, Western scientists are unsure if Bauré and Chesapeake Bay Nations intentionally worked to uphold and benefit all the life around them.

All six study areas reflected clear and effective habitat stewardship practices. Indeed, none of these systems would last for thousands of years if the management strategy was ineffective. This is in contrast with Western treatment of these habitats in contemporary times, which has led to the collapse or near collapse of all six of these fisheries within just a few hundred years.

All six study areas were devoid of synthetic construction materials. All management infrastructure and implements were designed using local materials. All but the Chumash case are confirmed to involve some form of Indigenous anthropogenesis in the form of seascape co-construction.

3.12 Discussion

The implications of this study are varied and significant. Firstly, is shows that pre-Columbian Indigenous Nations were not technologically deprived, victims of circumstance, nor struggling to survive. The world of sustainable pre-Columbian fisheries paints a picture of prolific abundance, actively managed and stewarded by the sciences of Indigenous People (*e.g.*, Wharton, 1957). The intellectual sophistication of Indigenous Nations has long been questioned by colonial society. In many cases, Western science has actively sought to prove the intellectual inferiority of Indigenous People (Horsman, 1975). This analysis joins the chorus of articles that challenges (a) the myth of the "Primitive Indian" that persists in many parts of the world today and (b) the *terra nullius* myth, or the notion that Turtle Island and Abya Yala were largely vacant, "unused" territories prior to European colonization.

Secondly, this study makes a case for the restoration of Indigenous sovereignty and decision-making power in the management of our fisheries today. Various countries have begun to experiment with "co-management" whereby Indigenous Nations and colonial society collaborate to steward various ecosystems (Natcher et al., 2005). While this has not always worked well for Indigenous Nations (*e.g.*, Nadasdy, 2003), it may be a good first step to begin the journey of cul-

tivating mutual understanding and Indigenous decision-making power with the ultimate goal of complete Indigenous stewardship over their traditional territories. The undeniable failure of Euro-American ecosystems management has hastened the willingness of these agencies to see things from another view. This should help in the restoration of management rights to Indigenous Nations. The exploration and articulation of sustainable pre-Columbian fisheries have important implications for this process.

This study also has significant connotations in the world of natural history. As many authors have noted, it challenges the prevailing notion that pre-Columbian America was an untouched, pristine wilderness (*e.g.*, Barlow et al., 2012). These results maintain that pre-Columbian ecosystems were heavily influenced, sculpted, and augmented by extensive Indigenous management. As in the case of the Chumash, Indigenous societies that American explorers came upon were already heavily decimated and distorted by previous European disease and terrorism (Erlandson et al., 2001). For this reason, many American settlers misunderstood depopulated Indigenous eco-cities for *terra nullius* (untouched land). Furthermore, it is possible that early Euro-American colonists could scarcely recognize oceanic-scale management because they had no cognate back home, no preexisting conceptual map to refer to or see through. It is hard to recognize something one previously believed to be impossible, or deeper still, had no knowledge of whatsoever. Whatever the case, this study implies that the natural history of the Americas as we know it is severely inaccurate. This, in turn, challenges many conservation policies that equate conservation with "human-less" ecosystems. The results of this study indicate that the conservation of these same systems desperately depends on human participation, responsibility, and engagement: harvesting, tending, hemlock dipping, clipping, low intensity burning, wall and weir building and active stewardship (*e.g.*, Anderson, 2005).

Lastly, this literature review highlights the scarcity of Indigenous voices and knowledge in the literature surrounding Indigenous ecological management. The studies where Indigenous knowledge has been deeply integrated provide a much higher resolution of understanding. For example, we know that not only do Haíłzaqv People dip hemlock boughs and hand-plant kelp forests to augment herring roe biomass, but that their new year starts with the herring spawn. We know that their ancestral culture sees the herring as a sacred relative rather than a resource to be exploited. We know that in their Creation Narrative, it is said that the moon tilts each February to spill a flood of iridescent herring runs into their channels. This transforms a purely reductionist view of these systems into a profoundly nuanced, humanized view. By following the leadership of Indigenous consultants and scholars, we will attain more refined

understandings of these systems. If these values and practices can be successfully articulated to the world, we can rehabilitate these same food systems in the 21st century as in the case of the Gunditjmara eel fishery.

Although this is not a comprehensive synthesis of all Indigenous food systems, and there are surely exceptions to Indigenous fisheries as defined here, these six case studies teach us many great lessons. They show us that with very little energetic input, we can receive incredible output and abundance. Through respectful and reciprocal management of natural cycles, we can have predictable and prolific food sources for thousands and thousands of years without end. These case studies show us that with locally available non-synthetic technologies we can arguably feed our society better than the globalized industrial food system is able to. They demonstrate that there is a unique pattern of Indigenous aquacultural principles and techniques throughout time and across the globe that we can learn from today.

Based on the above analysis I end with three recommendations, for a study of the past is most fruitful when applicable lessons are identified for the present:

1. *Follow Indigenous Leadership in Indigenous Fisheries Research*: To improve the resolution and quality of traditional ecological research, we can respectfully and appropriately integrate the voices of Indigenous People through community based participatory research. This means that Indigenous Nations have an active involvement in the design of research questions, methods, fieldwork, and data interpretation. Western science can more often lend itself as a tool for Indigenous research objectives, instead of the other way around.

2. *Restore Indigenous Sovereignty and Decision-Making Power in Key Areas*: For successful fishery management today, we can learn from Indigenous principles and practices. However, it is also recommended that our pluralistic society move beyond mere mimicry of these techniques, and towards the actual restoration of Indigenous decision-making power when it comes to fisheries management.

3. *Generate Working Models and Proofs of Concept*: Until these ideas are accepted and understood by mainstream society, we can begin the first step of creating small models that work. Due to colonization and other forces of assimilation, Indigenous People do not control very much land and water. However, Indigenous People control enough to change the way the world understands and experiences food and water. It does not take a very large model to demonstrate our sciences and inspire others. Around the world, Indigenous Nations are in a state of cultural renaissance. Moreover, the critical mass of non-Indigenous

support is finally here to help us revitalize and reclaim these food systems in the name of all our relations.

3.13 Conclusion

Six sustainable Indigenous fishery systems were analyzed to identify patterns and lessons for contemporary fishery management. More specifically, their principles, values, goals, strategies, and characteristics (PVGSC) were mapped and compared through Indigenous storytelling and secondary data analysis and synthesis. PVGSC analysis assumes that cultural principles and values are the ultimate drivers of human management systems and consequently define management goals, strategies, and characteristics.

The following principles were identified as primary drivers of the six Indigenous fisheries: (a) non-human lifeforms are equal to or greater than human beings, (b) we are divinely assigned to certain places to be their caretakers and guardians, and (c) respectful human participation within ecosystems is necessary to fulfill these obligations. Some of the common values identified are as follows: kinship with creation, reverence for the Sacred, reciprocity, restraint, service to something greater than oneself, efficiency, circularity, and responsibility to future generations. Common goals among the six fisheries are as follows: feed and care for non-human lifeforms, feed and care for humans, design for perpetuity, diversify biota, enhance preexisting life systems, and help maintain ecosystem balance. Common fishery strategies were as follows: expand habitat for other lifeforms, augment lower trophic levels, design (with organic infrastructure) for lasting returns, facilitate species diversification, and align with preexisting forces of nature. In terms of their outward characteristics, all fisheries are between 1,000-11,000 years old, operate on bioregional scales, employ organic and locally sourced building materials, biodiverse, anthropogenic, and semi-domesticated.

The phenomenon of Indigenous regional fisheries design has significant implications for Indigenous human rights, overall ecosystems health, historical ecology, land management governance structures, conservation biology, research ethics, and natural history.

Finally, it is recommended that researchers respectfully consult with Indigenous Nations to improve the quality of research in this area, that contemporary fisheries' management not only incorporate Indigenous stewardship methods but also restore decision making power to Indigenous Nations themselves and that Indigenous Nations engage in the creation and maintenance of small models of these ideas and praxes until more land and water can be secured.

3.14 References

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3.15 *Figures*

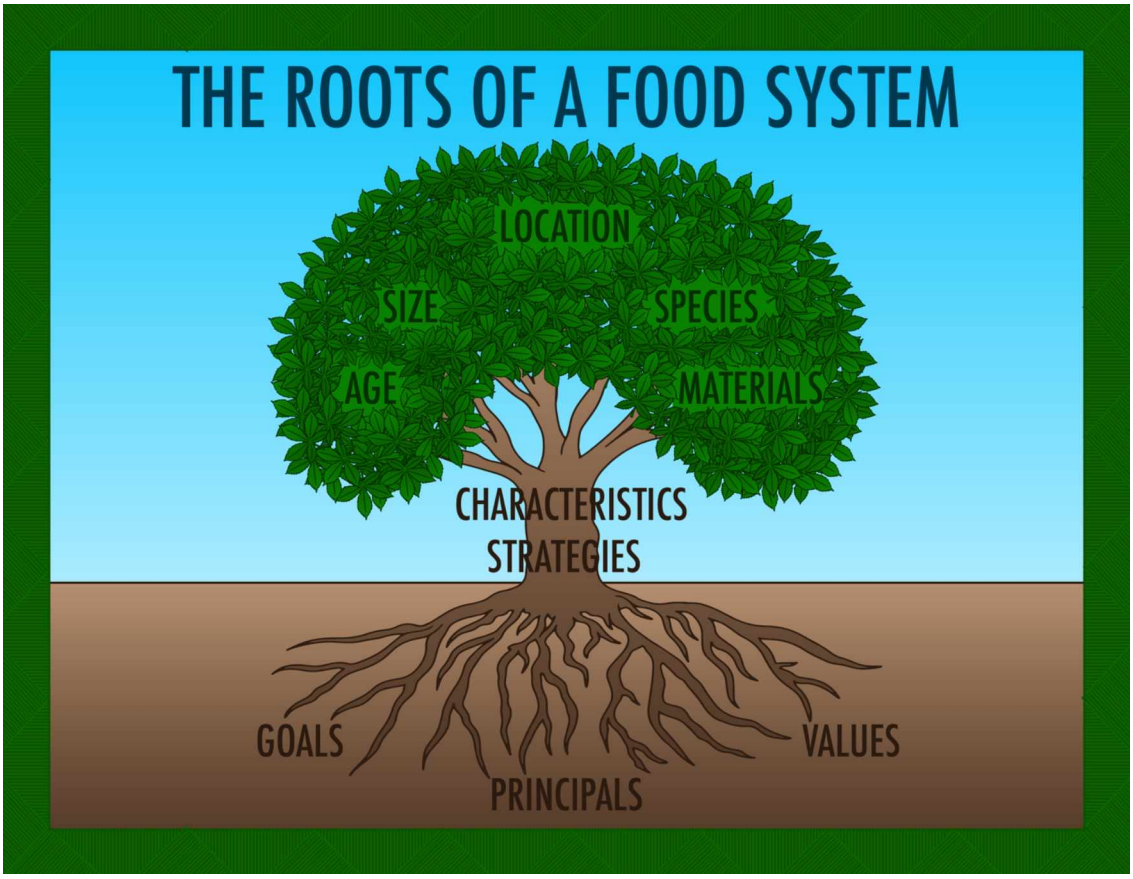

Figure 3.1: Conceptual Model of the Inner Dimensions of Indigenous Food Systems. Courtesy of Marcus Trujillo

3.16 *Tables*

	Kwakwaka'wakw	Baure	Haíłzaqv	Gundaĵmara	Chumash	Chesapeake Bay Nations
Non-Human-Centrism	●	?	●	●	●	?
Human/Non-Human Equality	●	?	●	●	●	?
Divine Assignment to Homeland	●	?	●	●	●	?
Primordial Presence	●	?	●	●	●	?
Interconnection with Creation	●	?	●	?	●	?
Knowledge Validated by Experience	?	?	●	●	●	?
Life Requires Continual Adaptation	?	?	●	?	?	?
Earth as Feminine Being Who Fights for Humanity	?	?	?	?	●	?

Table 3.1: Identified Fishery Assumptions/Principles.

	Kwakwaka'wakw	Baure	Haíłzaqv	Gundaĵmara	Chumash	Chesapeake Bay Nations
Human Assistance/Stewardship	●	●	●	●	●	?
Respect/Reverence/ Honor Sacredness of Life	●	?	●	●	●	?
Reciprocity	●	?	●	●	●	?
Restraint	●	?	●	●	●	●
Service	●	?	●	?	●	?
Efficiency	●	?	●	●	?	?
Circularity	?	?	●	●	●	?
Responsibility to Future Generations	?	?	●	●	?	?
Responsibility to Past Generations	?	?	●	●	?	?
Kinship with Creation	●	?	●	●	●	?

Table 3.2: Identified Fishery Values.

	Kwakwaka'wakw	Bauré	Haíłzaqv	Gundaĵmara	Chumash	Chesapeake Bay Nations
	●	●	●	●	●	?
Feed and Care for Humans	●	?	●	●	●	?
Feed and Care for Non-Humans	●	●	●	●	●	?
Design a Perpetual System	●	?	●	●	●	●
Diversify Biota	●	?	?	?	?	?
Honor Ancestors by Continuing Tradition	?	?	●	●	?	?
Enhance/Improve Biotic System	●	●	●	●	●	?
Maintain Ecosystemic Balance	?	?	?	●	●	?

Table 3.3: Identified Fishery Goals.

	Kwakwaka'wakw	Bauré	Haíłzaqv	Gundaĵmara	Chumash	Chesapeake Bay Nations
	●	●	●	●	●	?
Expand Habitat	●	?	●	●	●	?
Support Lower Trophic Levels	●	●	●	●	●	?
Large Initial Investment with Lasting Returns	●	?	●	●	●	●
Diversify Species in the System	●	?	?	?	?	?
Dovetail Forces of Nature	?	?	●	●	?	?
Expand Preexisting Systems	●	●	●	●	●	?
Design Multi-Purpose Systems	?	?	?	●	●	?
Design Adaptable Systems	?	?	?	●	●	?
Designate No-Take Zones	?	?	?	●	●	?
Rotating Harvest	?	?	?	●	●	?
Harvest Heavily from Lower Trophic Levels	?	?	?	●	●	?

Table 3.4: Identified Fishery Strategies.

	Kwakwaka'wakw	Bauré	Haíłzaqv	Gundaĳmara	Chumash	Chesapeake Bay Nations
Millenial Scale	●	?	●	●	●	?
Landscape/Regional Scale	●	●	●	●	●	?
Non-Synthetic Materials to Support Systems	●	?	●	●	●	●
Biodiverse	●	?	?	?	?	?
Anthropogenic	?	?	●	●	?	?

Table 3.5: Identified Fishery Characteristics

	Kwakwaka'wakw	Bauré	Haíłzaqv	Gundaĳmara	Chumash	Chesapeake Bay Nations
Location	British Columbia	Beni, Bolivia	British Columbia	Victoria, Australia	California, USA	Maryland, USA
Construction Type	Intertidal Walls	Fish Weirs, Canals, Causeways	Herring Spawning Grounds	Channels and Ponds	N/A	Fish Weirs
Construction Material	Stone	Earthworks	Kelp, Cedar, Hemlock Boughs	Earthworks	N/A	Reeds
Aquatic System	Coastal Intertidal Zones	Savanna Floodplain	Island Channels/ Coastlines	Riparian/ Limnal	Island Channels/ Coastlines	Estuary
Primary Fishery	Clams	Fish, Snail	Herring (Roe)	Shortfinned Eel	Abalone, Fish (also Sea Otter, Kelp)	Fish, Horseshoe Crab, Oyster
Earth Forces Harnessed	Tidal Shifts	Seasonal Flooding	Herring Spawn	Riparian Gravity	?	Fish Migration

Table 3.6: Anthropogenic Fishery Geography and Morphology.

4

Fire: Holocene Anthropogenic Burning in the Ch'ooshgai (Chuska) Mountains

4.1 Abstract

Throughout the world and for tens of thousands of years, human beings have applied fire to the land to steward a variety of food systems and bioregions. Despite the documented ubiquity of this practice across Turtle Island (also known as North America), the Western scientific community does not agree that Diné (also known as Navajo) and Puebloan societies managed the Ch'ooshgai (Chuska) Mountains of the Southwest in this manner. A variety of data sets are analyzed to interrogate this question more thoroughly. This exploration involves a synthesis of: (a) journal entries from early observers, (b) tree ring data, (c) ethnographic evidence, (d) fossilized charcoal records, (e) fire practices of neighboring nations, and (f) auto-ethnographical data. Combined, these data sets strongly support the hypothesis that Diné-Puebloan Nations managed the Ch'ooshgai Mountains with routine, low-severity, anthropogenic burning. This would have significant implications for Southwest historical ecology, contemporary forest management, fire safety, and the representation of Indigenous People in Western scientific narratives. Future fossilized pollen (palynological) analysis, lightning density analysis, and community-based participatory research could further illuminate the issue of Holocene anthropogenic burning in the Ch'ooshgai Mountains.

Keywords: Anthropogenic Fire, Diné (Navajo), Chuska Mountains, Historical Ecology, Forest Management, Indigenous Food Systems, Indigenous Ecological Anthropogenics

4.2 Introduction

Both Indigenous and Eurocentric scientists have documented the human application of fire across the globe for tens of thousands of years to manage a variety of biomes and their corresponding food systems (*e.g.*, Bardsley et al., 2019; Bird et al., 2004, 2012; Christianson, 2014;

Dickson-Hoyle et al., 2021; Eriksen, 2007; Fache & Moizo, 2015; Groven & Niklasson, 2005; Hoffman et al., 2021; Kay, 2000; McGlone, 2001; Pyne, 1998; Saha, 2002; Shaffer, 2010; Sheuyange et al., 2005; Trauernicht et al., 2015; Welch, 2014).

Turtle Island (also known as North America) is no exception to this rule, with widespread anthropogenic fire influencing and maintaining food systems in almost every corner of the continent (*e.g.*, Abrams & Nowacki, 2008; Anderson & Lake, 2013; Bahre, 1985; Boyd, 1999; Condie & Raish, 2003; Delcourt et al., 1998; Dickson-Hoyle et al., 2021; Fuhlendorf & Engle, 2004; Hoffman et al., 2017, 2021; Hutchinson et al., 2003; Kay, 2000; Lightfoot & Lopez, 2013; Lewis, 1973; Marlon et al., 2012; McClure, 1899; McCoy et al., 2011; Morrissey, 2019; Nanavati & Grimm, 2020; Pyne, 1998, 2017; Raish et al., 2005; Russell, 1983; Roos, 2008; Roos et al., 2018; Seklecki et al., 1996; Sobrevila, 2008; Stewart, 2002; Sullivan, 1982, 1992; Sullivan et al., 1992, 2015; Sullivan & Forste, 2014; Swetnam et al., 2016; Taylor; Turner, 1999; Whittlesey et al., 1997; Vale, 2002; Williams, 2002).

Despite the universality of this practice across Turtle Island, the Western scientific community generally rejects the notion that Diné (also incorrectly known as Navajo) and Puebloan Nations managed the Ch'ooshgai Mountains of New Mexico and Arizona during the Holocene epoch (defined as 11,700 cal BP until the present day). A variety of sources were analyzed to reassess the possibility that Diné-Puebloan Indigenous societies did indeed apply fire to manage the Ch'ooshgai mountain range during the Holocene epoch. The following sources were compiled for this analysis: (a) journal entries from early observers, (b) tree ring data, (c) ethnographic evidence, (d) fossilized charcoal records, (e) fire practices of neighboring nations, and (f) auto-ethnographical data. The idea that Diné-Puebloan Nations managed the Ch'ooshgai Mountains with systematic, low-intensity, anthropogenic burning during the Holocene era is concluded to be extremely likely based on this synthesis. This has significant implications for a number of contemporary issues including Southwest forest management and fire safety, Southwest historical ecology, historical Diné occupation in the Southwest, and concerns regarding the misrepresentation of Indigenous People in Western scientific narratives. Future palynological analysis, lightning density analysis, and community-based participatory research could further illuminate the issue of Holocene anthropogenic burning in the Ch'ooshgai Mountains.

4.3 Fire as Nourisher of the Land

Across the globe, Indigenous Nations leveraged frequent, low-intensity fire to steward their regional food systems on millennial scales (*e.g.*, Pyne, 1998; Groven & Niklasson, 2005; Sheuyange et al., 2005; Abrams & Nowacki, 2008; Bird et al., 2012). This was done for a variety of reasons including to improve soil conditions, increase yield of pyro-adapted edible plant species, fireproof areas of settlement, maintain ecosystems balance, and generate nutrient-dense grasslands that sustained and attracted game animals (see Lewis, 1973; Kay, 2000; Russell, 1983; Williams, 2002). Literature on this subject is so vast that any scratch of the surface yields a plethora of articles and books describing its ubiquity worldwide and throughout time.

Turtle Island is no exception. In present-day Kentucky, for example, Ancestors of the Shawnee, Cherokee, and Yuchi Indigenous Nations relied heavily on mast trees for sustenance, such as the chestnut, hickory nut, black walnut, and various species of oak. One palynological (fossilized pollen) study reveals the sudden appearance of a chestnut-hickory-walnut-oak forest by these Ancestors (Delcourt et al., 1998). The sediment record also documents an influx of fossilized charcoal just as mast tree taxa enters the record, indicating that routine fire was an important management tool. Fossilized mast tree pollen and fossilized charcoal are both present in these samples for almost 3,000 years until the colonial period when both Indigenous land stewards and their relic forests began to disappear.

Throughout the Pacific Northwest, we also see Holocene Indigenous Nations burning extensively to manage complex food systems (see Boyd, 1999; Hoffman et al., 2017). This was done, among other reasons, "to enhance the growth and production of plant food resources, especially certain types of berries and 'root' vegetables, as well as to create good forage for deer and other game . . . Rotation of burning areas was practiced to achieve continual production in the overall area" (Turner, 1999, p. 206).

Furthermore, Ancestors of the Illinois Confederacy densely populated the Illinois Valley which was also managed with routine, low-intensity burns. Morrissey (2019) writes how these Ancestors:

> shaped and altered much of this region as an anthropogenic creation. Like many other indigenous groups in North America, their most important tool was fire. Burning the prairies, they made the grasses hospitable for grazers, and managed prairie as a game reserve to maximize productivity. (p. 56)

This is corroborated by linguistic evidence of their cousin Nation, the Myaamia (Miami) of the

Ohio River Valley. In the Myaamia lunar calendar, there are two moons named for their fire practices: *saašaakayolia kiilhswa* (the Grass Burning Moon) and *kiiyolia kiilhswa* (the Smokey Burning Moon). These correspond with the Gregorian months of September and October. Myaamia authors state: "In *saašaakayolia kiilhswa*, we see fire as something that restores and gives new life to the prairie. Fire helps clear the land of old grass and brush and opens seed pods that have fallen to the ground. Because of fire, new flowers and plants emerge in the spring" (McCoy et al., 2011, p. 60).

Their neighbors to the south—Ancestors of the Osage and neighboring nations—also used frequent and methodical burns to generate prairie forage in the Ozarks for game animals (Stewart, 2002, pp. 137–139, 149). In reference to the Ozark highlands, Sauer wrote as recently as 1920 that "Indians and other hunters were wont to set fire to the graze in fall or spring in order to improve the grazing for buffalo, elk, and other big game.... Through this practice sprouts and tree seedlings were killed, and thus the grasslands were extended at the expense of forests" (Sauer, 1920, p. 53). Nanavati & Grimm (2020) corroborated these observations with their palynological, fossilized charcoal, and dendrochronological study in the Southern Ozarks which showed extensive anthropogenic burning of the study area. Nuttall also notes the beauty of the fire-managed Ozarks in his 1819 observation:

> Like an immense meadow, the expanse was now covered with a luxuriant herbage, and beautifully decorated with flowers.... so many partial attempts at shrubby and arborescent vegetation, which nature has repeatedly made, and which have only been subdued by the reiterated operation of annual burning, employed by the natives, for the purpose of hunting with more facility, and of affording a tender pasturage for the game. (Nuttall, 1821, p. 200)

Indigenous Nations of the Great Plains were no exception to this widespread phenomenon. Native People of the plains are often viewed as dependent on bison herds, following them wherever they go, but there is ample evidence indicating bison are equally dependent on humans and their fire, which maintained their habitat and grassland food source (*e.g.*, Roos et al., 2018; Oetelaar, 2014; Boyd, 2002). Together, humans and bison were a part of a larger, interrelated community and each had a vital role in the upkeep of the overall system. Moreover, we know tall tallgrass prairie ecosystems are pyro-adapted, indicating that these biosystems evolved with human fire over millennia (Fuhlendorf & Engle, 2004).

As it pertains to the Eastern Woodlands, Abrams & Nowacki (2008) conclude in their extensive survey that:

> the vast majority of vegetation in the eastern USA was managed directly or indirectly by Native Americans, especially through the use of fire.... Native Americans profoundly impacted the distribution and importance of mast and fruit trees and tallgrass prairie as a primary food source through both active and passive means, and that they ubiquitously impacted these vegetation types at the regional and biome levels (not only at the local level). Without their extensive influences prior to European settlement, the Eastern deciduous forest and prairie biomes would have been dramatically different. (p. 1134)

Moreover, Stewart's (2002) *Forgotten Fires: Native Americans and the Transient Wilderness* is perhaps the most extensive and convincing synthesis of evidence of Indigenous anthropogenic fire in pre-Columbian United States. This review travels the map, state-by-state, unveiling an impressive bibliography of hundreds of first-hand accounts of Indigenous food system management by way of systematic fire. This book alone is enough to demonstrate the incredible ubiquity and importance of anthropogenic fire in the creation of pre-contact humanized landscapes.

Unfortunately, these fire regimes almost universally collapsed in the 19th and 20th centuries. Indigenous Nations were killed off by disease and state-ordered genocide, and fire suppression policies were introduced. Pyne (1998) succinctly sums the relationship between Indigenous fire and the Euro-American colonization process:

> In general, indigenous lore, like indigenous fire practices, was extinguished.... Fire suppression became the norm, and the relatively fire-free forests of central Europe, an aberration, became a standard.... Fire policy became an expression of colonial rule, a means of reordering the ruled landscape (Pyne, 1998, pp. 83–84).

Prior to colonization, the burning of savannas happened so frequently that fuel loads never had time to accumulate, eliminating the risk of large-scale catastrophic fires. As Euro-American colonization intensified, however, that frequent, low-severity fire pattern gave way to sporadic, catastrophic fires in the 20th and 21st century (Covington & Moore, 1994; Taylor; Marlon et al., 2012; Nevle & Bird, 2008). Ecosystems across North America—which were dependent on routine anthropogenic burning–went into a state of shock as the fire disappeared. In general, the forests we see today would be unrecognizable to the Indigenous forest managers of pre-Columbian times. Their fire-managed, old growth savannas were logged, and the land gave way to either intensive agriculture or overgrown thickets of young tree stands (Sav-

age, 1991). The subsequent failure of colonial forest management has been so pronounced that Euro-American foresters are systematically exploring ways to reintroduce these Indigenous fire regimes (*e.g.*, Anderson & Lake, 2013; Bardsley et al., 2019; Dickson-Hoyle et al., 2021; Fache & Moizo, 2015; Fuhlendorf & Engle, 2004; Raish et al., 2005; Kay, 2000).

Indeed, from California (Anderson & Lake, 2013) to New England (Bromley, 1935) to the Florida everglades (Snyder, 1991, p. 306), Indigenous Nations shaped the way the land looked and tasted with astonishing amounts of anthropogenic burning for thousands upon thousands of years. The nutrient-rich ash left in the wake of these low-severity fires provided locally available fertilizer. Abundant charcoal deposits provided a home for microbial organisms, thereby creating and sustaining living soil systems on regional scales for thousands of years. Animal and plant communities evolved in tandem with this rhythmic pressure of fire, feasting on the luxuriant forage of pyro-adapted grassland biomes. This not only benefited Indigenous Nations, but all our animal and plant relatives who enjoyed the enriched soils, open savannas and nutrient-dense grasses left in our wake.

4.4 Methodology

Given that such a wide range of Indigenous Nations applied systematic fire, would it not follow that Diné-Puebloan Nations did as well? It would be surprising if the whole continent burned under the gentle pressure of Indigenous fire, but Southwestern forests remained untended. Even so, dendro-chronologists have largely negated the possibility of landscape-scale anthropogenic burning in the Southwest (see Savage & Swetnam, 1990; Savage, 1991; Guiterman et al., 2019). The present analysis reassesses this possibility in the context of the Ch'ooshgai (Chuska) Mountains of present-day New Mexico and Arizona from the perspective of an Indigenous scholar native to the region. The following sources and data sets are examined to explore this argument: (a) ethnographic evidence, (b) journal entries from early observers, (c) tree ring data, (d) fossilized charcoal records, (e) fire practices of neighboring nations, and (f) auto-ethnographical data based on my own experience as a Diné woman.

4.5 Ethnographic Accounts of Diné Anthropogenic Fire

Hill observed that Diné people would burn plots in preparation for planting seeds: "If the land was being put into use for the first time, it was burned over to remove as much brush and tree growth as possible. The larger trees were then removed by setting fire to the base" (Hill, 1938,

p. 24). An ethnographic review by Condie & Raish reports that Diné people also employed fire to "burn patches to improve wild seed production" (Condie & Raish, 2003, p. 29).

In a comprehensive literature review, Raish et al. (2005) relate that Indigenous People in the Southwest burned for a variety of reasons including:

> Clearing land for agricultural fields and pastures, replenishing soil nutrients in agricultural fields, killing woody species in rangelands, encouraging grass growth, increasing wild seed production, stimulating shoot formation (producing straight shoots for basketry and production of other implements), improving growth of both wild and cultivated tobacco, driving and hunting game, and waging war (p. 117).

Through a compilation of both ethnographic evidence and observations and illustrations of colonial naturalists, Stewart (2002) explains the encroachment of Juniper into Diné homelands as a possible result of fire suppression: "Overgrazing and government policy have virtually stopped grass and brush fires in the Navajo Reservation; consequently, junipers are becoming a serious problem" (Stewart, 2002, p. 224). Sullivan et al. (2015) also propose that today's juniper woodlands only exist because of a cessation of regular fire in Southwest homelands. They observed acute differences between today's Southwest piñon-juniper ecosystems and the fire-adapted plant species found in Southwest archaeological sites:

> the economically important ruderals that populate our archaeological samples do not occur or rarely occur in today's pinyon-juniper woodlands, except as a consequence of burning. Such species diversity attenuation is attributable not only to the discontinuance of anthropogenic surface fires in late prehistory, when populations withdrew from the area, but to the suppression of all fires in the twentieth century (pp. 48–49).

The "ruderal" (i.e., fire-induced) plant species found by Sullivan et al. (2015) in archaeological sites included amaranth, sunflower, goosefoot, beeplant, mustards, sunflower species, "wooly Indian wheat," and more, suggesting that these Diné-Puebloan Ancestors cultivated "wild" plants with routine fire.

A contemporary culinary ethnography shares the teachings of Tall Woman (a Diné Elder and food expert). In it, she mentions the importance of these same fire-assisted plants—amaranth, goosefoot, scorched grass, "Indian rice grass," mustards, sunflowers, and more:

> One type of pigweed or amaranth is known as *tł'oh deesk'idí*.... Tall Woman said that it was one of two foundational plants the Navajo depended on for food before corn. The other plant was goosefoot (*tóh deeí*), or grass whose seeds fall. These two plants

were foundational because the big seeds of each could be processed to make breads and mush. (Frisbie, 2018, p. 125)

This firsthand account is consistent with Stewart (2002) and Sullivan et al. (2015), who share a theory that Southwestern Indigenous Nations crafted fire-assisted grasslands where woody species were scarce, but "wild" edible plant species were readily available.

Thus, although not as well-documented, ethnographic data suggests Diné-Puebloan Ancestors used fire to stymie the encroachment of woody species, drive game, promote the growth of disturbance-dependent edible plants (such as amaranth, goosefoot, beeplant, wooly Indian wheat, and more), clear plots for planting, and manage game rangelands. If these lowlands were systematically burned, it would logically follow that the heavily wooded Ch'ooshgai Mountains, with their propensity for catastrophic fire (see Tsinnajinne et al., 2021, p. 3), would also be systematically managed with fire by Diné and Pueblo Ancestors.

4.6 Journal Entries: "Park-Like" Structure of Early Ch'ooshgai Mountains

Compelling evidence in support of Ch'ooshgai anthropogenic burning comes from journal entries of early Euro-American geographers and soldiers. Time and time again they marvel at the open-meadowed, "park-like" forests of the Ch'ooshgai Mountains. Any student of anthropogenic burning recognizes widely spaced old-growth forest coupled with healthy grasslands and open meadows as the hallmarks of Indigenous fire-managed forest, most often with the aim of maintaining pasturage for grazing animals like elk, deer, antelope, and buffalo.

For example, Beale writes about the Ch'ooshgai Mountains in 1858: "The forest was perfectly open and unencumbered with brushwood, so that the travelling was excellent" (as cited in Savage, 1991, p. 273). Similarly, Simpson writes in 1852:

> Yellow pine about eighty feet high and twelve feet in circumference at the trunk, as also some scrub oak ... grow along the route.... Our encampment is near a pond of excellent water, margined with fine grass, and being shaded by some noble pines, and a very pretty wide-spreading oak adding its variety to the landscape.... The pines here are tall and large, the grass luxuriant. (as cited in Savage, 1991, p. 273)

Beadle adds to these observations:

> We entered at the summit on the most magnificent forest I have ever seen since leaving California. The tall sugar pines [sic], from three inches to two feet in thickness, mingled with a few dwarfish oaks, were scattered in regular proportion, and their

> branches completely excluding the sunshine. A cold wind had chilled us on the ridges, but in the forest there was a dead calm, though we could hear the wind sighing far above us. This splendid natural park continued for ten miles. (Beadle, 1873, pp. 547–548)

Gregory writes in 1917 that "Within the zone of yellow pine... on Chuska, Carrizo, and Navajo Mountains... the pine trees are widely spaced and in close groves of oak and grass-floored parks of singular beauty" (as cited in Savage, 1991, p. 273)

These early Euro-American writers do seem to be describing a forest heavily managed by Diné fire. The forest structure they describe—widely spaced, "park-like," old-growth forests with "luxuriant" grassland meadows in between—is a smoking gun for Indigenous pyric forest management. The number of examples of this forest structure across the continent—and its correlation with Indigenous burning—are hard to ignore (*e.g.*, Cronon, 2003; Hutchinson et al., 2003; Kroeber, 1925, p. 396; Weld, 1807, p. 317).

McClure provides one such observation in his 1772 journal entry describing an analogous forest structure in what is now Pennsylvania:

> The woods were clear from underbrush, the oaks and black walnut do not grow very compact, and there is scarcely anything to incommode a traveler in riding, almost in any direction, in the woods of the Ohio. The Indians have been in the practice of burning over the ground, that they may have the advantage of seeing game at a distance among the trees. (McClure, 1899 p. 59)

Marsh (1867) speaks of analogous forest structures throughout Turtle Island:

> In many parts of the North American states, the first white settlers found extensive tracks of thin woods, of a very parklike character, called "oak openings".... These were the semi-artificial pasture grounds of the Indians, brought into that state, and so kept, by partial clearing, and by the annual burning of grass. The object of this operation was to attract the deer to the fresh herbage which spring up after the fire.... That the annual fires alone occasioned the peculiar character of the oak openings, is proved by the fact, that is soon as the Indians had left the country, young trees of many species sprang up and grew luxuriantly upon them. (pp. 136–137)

The notion that this forest structure is engendered by Indigenous anthropogenic fire is corroborated by Briggs's observations of Yosemite Valley: "While the Indians held possession, the annual fires kept the whole floor of the valley free from underbrush, leaving only the majestic

oaks and pines to adorn the most beautiful parks" (Briggs, 1931, p. 289). Stewart's continental survey (Stewart, 2002) provides dozens more examples of these fire-managed, old-growth forests, underscored by luxuriant meadow.

Thus, the handsome, "park-like" nature of the Ch'ooshgai Mountains reported by early observers strongly support the premise of anthropogenic fire in the region.

Beadle foresaw the destruction of this relic forest in 1873 when he said, "This will be a great source of wealth to the Navajoes [sic], if they learn how to use it; for when the Atlantic and Pacific Railroad is completed, every section of this timber will be worth at least five thousand dollars" (Beadle, 1873, pp. 548–549). As we see today, without human pressure and after the logging of Diné-Puebloan old-growth, the Ch'ooshgai Mountains have given way to thickets of young tree stands growing close together (Savage, 1991).

4.7 Tree Ring Data: Fire Regime Collapse Correlates with the Collapse of Diné Traditional Ecological Knowledge

Here I reinterpret the dendrochronological data compiled in Guiterman et al. (2019). This study examined tree ring fire scars to reconstruct fire history in the Ch'ooshgai Mountains and the Defiance Plateau. From 1700 CE–1800 CE, roughly 75 fires were recorded in tree samples collected from the Ch'ooshgai Mountains. In other words, there was an average of three fires recorded for every four-year interval (Figure 4.1). This is quite a high fire frequency to be produced by random lightning ignitions, as the authors posit. No local Diné people were called upon to assist in the interpretation of these fire scar data.

Guiterman et al. (2019) found that this regime collapsed in 1887, when fire suddenly disappears from the fire scar record. Authors of this study set out to see if this was due to either: (a) climatological influences, or (b) the decimation of fuel loads through introduction of livestock. Instead, I posit that the collapse of the Ch'ooshgai fire regime was likely due to the removal of Diné-Puebloan populations and the prohibition of Diné burning knowledge through the advent of the boarding school system.

In consideration of the livestock theory, the general argument is that an influx of grazing animals in the 1830s ate away burnable fuels on the forest floor thereby rendering lightning an impotent ignition source. Kay (2000) challenges the notion, however, that lightning alone can explain Southwest fire frequency:

> In the southwest, over 95% of lightning strikes occur after July while, historically, 85%

> or more of ponderosa pines were scarred by fire during April, May, and June. . . . In many mountain ranges today, there simply are not enough lightning fires to have caused the high fire frequency observed prior to European settlement. Thus, it is logical to assume that a large proportion of the "natural" fire regime in pine forests and other regions of the southwest was actually due to aboriginal burning. (pp. 20–21)

Moreover, Southwest Nations worked with grazing animals—including various species of sheep and goats—long before Spanish arrival. Thus, the "introduction" of grazing animals to the Ch'ooshgai Mountains does not seem to be a plausible cause for fire regime collapse. In fact, Guiterman et al. (2019) found that "livestock and fire coexisted for over 50 years . . . an exceptional pattern" (p. 1). These were the same years that grazing was supposed to be most intensive. It appears unlikely, then, that Diné sheep could spontaneously engender fire regime collapse in 1887.

The presence of grazing animals does not eliminate the need to burn. Indeed, one of the aims of anthropogenic burning throughout the Americas was to generate forage for grazing animals. As we see in the numerous examples above, fire and grazing have worked symbiotically in a wide variety of contexts. Even so, this study and its precursors (see Savage & Swetnam, 1990) point to the "advent" of grazing animals to explain the collapse of Ch'ooshgai fire.

Furthermore, these fire scar data reflect a pause in fire activity from 1864–1868. This is the same period when Diné People were send on a 400-mile death march from Fort Defiance, Arizona to Fort Sumner, New Mexico. An estimated 12,000 Diné people survived the journey and were interned in the camp, while hundreds if not thousands died along the way. Survivors were held captive by the U.S. government in Fort Sumner, New Mexico for four years. Roughly 3,000 Diné died in the camp itself of starvation, corporeal punishment, and illness (Denetdale, 2007). According to tree ring data, the Defiance Plateau fire regime collapsed in 1864—the same year the death march began. On the other hand, the Ch'ooshgai Mountain fire regime was compromised in 1864 but did not completely collapse until about 1880. It is possible that the Defiance Plateau fire regime collapsed sooner because Diné residents were highly accessible to American human traffickers, whereas more distant Ch'ooshgai Mountain residents could elude their attempts more readily.

It is also important to note that Diné people were only released from the Fort Sumner concentration camp on the condition that they send their children to American boarding schools, where much traditional ecological knowledge was denigrated and forbidden. Article VI of the 1868 "peace treaty" reads:

> In order to insure the civilization of the Indians entering into this treaty, the necessity of education is admitted ... they therefore pledge themselves to compel their children, male and female, between the ages of six and sixteen years, to attend school; and it is hereby made the duty of the agent for said Indians to see that this stipulation is strictly complied with; and the United States agrees that, for every thirty children between said ages who can be induced or compelled to attend school, a house shall be provided, and a teacher competent to teach the elementary branches of an English education shall be furnished. (RETA, 1998)

Given these facts, it is quite possible these fire regimes never bounced back due to American prohibition of Diné sciences (including forestry science) in U.S. policy and within school systems—not because of an increase in livestock or a change in climate. It is quite possible that after Fort Sumner the agency and sovereignty of Diné People was diminished evermore, and it remains so today.

Thus, an alternative lens is provided regarding the interpretation of these fire scar data that allows for the possibility of Holocene anthropogenic fire in the Ch'ooshgai Mountains: (a) Southwest Indigenous Nations—like their neighbors throughout the continent and as inferred by 19th century naturalists—applied systematic, low-severity fires to the Ch'ooshgai Mountains to create open-meadowed forests and attract grazing game; (b) the forced removal of Diné People from the area from 1864–1868—and therefore the removal of their burning practice—explains the abrupt paucity of fire scars at that time; (c) the continued depopulation of Diné People and subsequent advent of boarding schools suppressed Diné burning knowledge future forward, thus explaining the collapse of the Ch'ooshgai fire regime. This seems highly likely given that the assimilatory effects of boarding schools, coupled with the disorienting effects of attempted genocide.

4.8 Fossilized Charcoal: An Abrupt Appearance of Fire Activity 4,200 cal BP

Further corroborating these data are fossilized charcoal concentrations from Ch'ooshgai soil analyses. The perennial ponds and lakes that enchanted early explorers provided wonderful conditions for the preservation of pollen, charcoal, and other temporally organized data. This extends further back in time than tree ring data, providing a deeper view of Ch'ooshgai historical ecology.

Paklaian (2017) retrieved a Ch'ooshgai soil core from Beaver Run Pond, with the lowest level

of sediment being deposited around 13,000 cal BP. Interestingly, we see an abrupt and sustained influx of charcoal mass in the record around 4,200 cal BP. This charcoal presence is then sustained for over four millennia (Figure 4.2). This may reflect the onset of routine burning in the area by Southwest Indigenous Nations. Given the impressive width and height of old-growth yellow pine encountered by explorers in the 1800s, it is probable that Ch'ooshgai fire management is a long-standing tradition—perhaps on the order of thousands of years—as we see in other study areas across the continent.

For instance, a similar charcoal profile was excavated at Cliff Palace Pond, Kentucky (Delcourt et al., 1998). They noticed an advent of both fossilized charcoal and edible plant species such as black walnut, hickory nut, chestnut, oak, sumpweed, and others beginning around 3,000 cal BP (Figure 4.3). Authors thus speculate that around 3,000 years ago, Indigenous Nations transformed a nutrient-poor cedar and hemlock forest into a fruitful nut forest—and leveraged low-intensity burns to do so. It is not beyond reason that Diné-Puebloan Ancestors implemented an anthropogenic fire strategy in the Ch'ooshgai Mountains in the mid Holocene as many of their neighbors had.

Paklaian, however, interprets these four millennia of fossilized charcoal deposits at Beaver Run Pond on the Ch'ooshgai Mountains differently:

> ... significant increase in charcoal particle accumulation occurs after 4,200 cal BP. This sharp increase is likely a result of fires burning over the peat deposits, and not necessarily from increased fire activity in the surrounding forest.... The burning of peat deposits, however, may be an indicator of a lowered water table and increased seasonality of the pond infilling. (Paklaian, 2017, p. 38)

It is true that a carbon-rich bog can be ignited by a fire event and smolder for weeks, months, or even years. Even so, it seems unlikely—if not impossible—that pond peat would combust almost continually for four thousand years.

In addition to charcoal profiles, Paklaian's pollen data provides some interesting fodder for theory around fire managed food systems in the Holocene Ch'ooshgai Mountains. The author finds that "*Pinus edulis* continued to expand throughout the middle Holocene" (Paklaian, 2017, p. 39). This species of pine produces the piñon nut, a delicacy that Diné and Puebloan Nations continue to enjoy today. In a separate study, Sullivan & Forste (2014) suggest that Southwest Indigenous Nations may have managed piñon-juniper forests with low-intensity surface fires. Piñon pine pollen frequency in Paklaian's soil core is synchronous to an increase in fossilized charcoal frequency. Is it possible that around 4,200 years ago, Diné Ancestors began to trans-

form the Ch'ooshgai Mountains into a curated food forest in much the same way Southeast Indigenous Nations transformed Kentucky cedar forests into a mast tree garden?

While the fire-managed piñon nut theory is more speculative at this point, the timing and frequency of tree ring fire scars greatly supports the notion that Southwest Indigenous Nations did indeed utilize fire to manage the Ch'ooshgai Mountains on a regional scale. When seen through a political ecology lens, it seems too coincidental that Diné people were trafficked from the area at the very same time their fire regimes collapsed. The livestock theory is less convincing when fire scar data clearly illuminate that Diné shepherds co-existed with frequent fire in the Ch'ooshgai Mountains for approximately 50 years. Moreover, the advent of state-ordered assimilationist schools, and their prohibition of traditional land management knowledge, may be the true cause of the fire-free forest we see today.

4.9 Neighboring Nations: The Fire Practices of Ndé and Puebloan Nations

There is a significant body of literature demonstrating the use of fire throughout the Southwest for a variety of purposes (*e.g.*, to fertilize soils, manage grasslands, clear plots for planting, and generate predictable supplies of edible plants species) (Buskirk, 1986; Gifford, 1940; Kaye & Setnam, 1999; Roos, 2008; Seklecki et al., 1996; Stewart, 2002; Sullivan, 1982, 1992, 1996; Sullivan et al., 1992; Wills, 1995; Whittlesey et al., 1997). While a complete review of these uses is beyond the scope of this study, a few key neighboring nations are examined to support the claim that Diné people knew how to use fire.

4.9.1 Mesa Verde Fire

Similar to the Beaver Run Pond study area, Herring et al. (2014) saw an abrupt influx of fossilized charcoal in the sediment record around 4060 Cal BP near Mesa Verde National Park, Colorado. The authors interpret the data as follows:

> the co-occurrence of the fire/population proxies lends strong evidence to the importance of Native American use of fire to manipulate landscapes. This manipulation of the fire regime by humans is clearly seen when the climate became warmer and drier . . . it is possible that the use of fire to maintain more open landscapes or improve food animal populations (mule deer, elk, bighorn, cottontails) and keeping the chaparral from becoming impenetrable to human access at lower elevations meant more escaped fires at the higher elevations surrounding our study site. (p. 860)

This site is less than 60 miles northeast of the Ch'ooshgai Mountains. Both sites see an influx of charcoal synchronously, perhaps indicating that the knowledge of fire-management was introduced, disseminated, and applied throughout the region around this time. Given the importance of fire management for heavily wooded areas like the Ch'ooshgai Mountains—and if neighboring Holocene Mesa Verde Indigenous residents were intentionally managing the land with fire—it would stand to reason that the Holocene residents of the Ch'ooshgai Mountains also applied fire as a management tool.

4.9.2 Grand Canyon and Mogollon Rim Fire

A variety of palaeoecological proxies were analyzed from sediment samples in two Arizona study areas (Roos et al., 2010) to see if anthropogenic fires played a role in Holocene fire regimes. It was found that frequent anthropogenic burning occurred from about 800 CE to 1100 CE in the Upper Basin settlement area, presumably by ancestral Puebloan residents. In the Mogollon Rim study area (Forestdale Valley), proxies also indicate that frequent anthropogenic burning occurred 1200–1400 CE and 1600–1870 CE.

While the study does not examine samples older than 800 CE, it further proves that the ancestral neighbors of Ch'ooshgai Mountains were no strangers to fire and its usefulness. Again, it would seem unlikely that everywhere around them, the land would receive human fire, but Holocene Ch'ooshgai Mountains residents would not utilize this tool.

4.9.3 Ndé (Apache) Fire

There is also strong evidence of Ndé (Apache) fire regimes in southwestern New Mexico and southeastern Arizona. As our names might tell, Ndé and Diné are related nations, speaking similar Na-Dené dialects. Bahre (1985) compiles a fascinating collection of newspaper articles from an area southwest of the Ch'ooshgai Mountains. One article states: "Last night the crest of the Santa Catalina Mountains was observed on fire in different places, probably fired by the Apache" (p. 193). Another says, "Every mountain over which the Indians have recently passed has been fired. There is method in this business" (p. 193). Another edition reports, "An area of country about five miles square is now burning. It was set on fire by the Indians" (p. 192). These accounts were published in the Arizona Daily Star in the year 1887. Interestingly, all accounts were reported during the same time of year (spring), indicating that these may have been intentional, routine, seasonal burns. No Ndé people were consulted in this study.

Other publications reflect negative sentiments towards Indigenous fire: "Immense fires are still prevailing in some parts of western New Mexico and southeastern Arizona. They are believed to have been set out by Indians. Next to the pleasures of killing, burning appears to be the favorite amusement of the savages" (**?**, p. 192). This account was published in 1882. Just two decades prior, Ndé People were incarcerated at Fort Sumner alongside their Diné cousins while being starved, shot, and tortured by American soldiers (Denetdale, 2007). This is important within the present study, for these sentiments undoubtedly influenced foundational studies by settler scientists of anthropogenic fire in the Southwest: Indigenous People were not seen as human, much less as sophisticated societies capable of sculpting the land with such precision.

If Ndé burners were anything like Indigenous Nations in the rest of the continent, their fire was not malicious, but an ancient forest management practice. A drive through the Gila National Forest today—the ancestral forest of the various Ndé subgroups mentioned in the Daily Star publications—shows the collapse of conifer stands due to mismanagement and, arguably, the suppression of Ndé fire.

If their Ndé cousins to the south set fire deliberately—and if there was indeed "method in this business"—it would be implausible that Diné people did not practice this management in the Ch'ooshgai Mountains as well.

4.9.4 Jemez Fire

Swetnam et al. (2016) analyzed fire scar data in and around Jemez Pueblo, New Mexico beginning in ca 1300. They found an abundance of high-frequency, small-scale fires as early as 1300 CE until the fire regime collapsed in the late 1880s (coincidentally, the same time period of the Ch'ooshgai fire regimes collapse). Eventually the gentle presence of Jemez fire gave way to the fewer, more catastrophic fires we see today. The authors conclude that: "These findings point to the likely overriding role of human-set fires and disruption of fuels continuity in the pre-1680 period relative to the post-1680 period, when, in the absence of extensive human land uses, interannual climate variations were more dominant" (p. 8).

Unfortunately, no Jemez people were consulted for the study, or they could have contributed their expertise. The authors do not conjecture as to why Jemez Ancestors applied their fire but based on the literature covering surrounding groups—and given the importance of fire management in the Jemez forest—it was likely for the same reasons we see in the rest of the region: replenishing soil nutrients, suppressing woody species, fire-proofing areas of settlement, stimulating shoots for basketry, encouraging meadow growth and "wild" seed production, etc. (*e.g.*,

Condie & Raish, 2003). Regardless of their reasons, the deliberate use of fire by their Jemez neighbors suggests that Ch'ooshgai Mountains residents also had access to these strategies.

4.10 Who Did the Burning?

The Western scientific community believes Diné people arrived recently (about 300-500 years ago) to a Puebloan-dominated Southwest, and therefore could not have been responsible for any environmental shaping in the mid-Holocene. Based on my cultural knowledge as a Diné author, however, I would argue that this may not be the case. I would argue that Diné and Ndé people have been in the region much longer than Western anthropology affords. I would also argue that there is a strong possibility that Diné people took part in Southwest anthropogenic fire regimes in the mid to late Holocene, along with their Puebloan, Nuche, and Nüümü neighbors who came from diverse and blurred cultural and linguistic backgrounds.

Pritzker's (2000) *Native American Encyclopedia: History, Culture, and Peoples* purports that Diné people are newcomers to the Southwest:

> the Southern Athapaskans, arrived in the region from their ancestral home in west-central Canada late in the prehistoric period, probably in the 1400s, as bison-hunting nomads. These people settled in abandoned areas formerly populated by the [Ancestral Puebloan] and Mogollon, although they eventually crowded other groups out of hunting and potential farming areas. Both Navajos [Diné] and Apaches [Ndé], the main groups of Southern Athapaskans, continued their nomadic occupations until the nineteenth century and later. (p. 4)

Similarly, Savage (1991) writes: "The Navajo [Diné], an Athabascan people, migrated to the area sometime between 1000-1500 AD and began seasonally occupying the montane forest on a regular basis by 1740" (pp. 272–273).

Following suit, Guiterman et al. (2019) attribute the collapse of Ch'ooshgai fire regimes to the "late arrival" of Diné people:

> Prior to circa 1700, the archaeological record suggests that the area was probably not well used and lacked any large settlements for centuries. The late arrival and permanent residency of the Navajo [Diné] Native American population through the late 19th-century period of widespread fire decline contrasts with most other forested areas of the western United States. (Guiterman et al., 2019, p. 3)

It's worth noting that dendrochronological (tree ring) data in sample does not reveal fire

history earlier than about 1700 CE. By this time Spanish invasion and disease had decimated Southwest Indigenous Nations for almost 200 years (Liebmann et al., 2016; Simmons, 1966). Temporally shallow tree ring data could miss the rich history of a heavily populated and managed Ch'ooshgai Mountains in the mid-Holocene. Most dendrochronologists do not look for Southwest anthropogenic fire in the mid-Holocene, however, because they go into the field assuming it was impossible based on current Western scientific theories on Indigenous migration and populations.

To contextualize Guiterman et al.'s archaeological argument that the Ch'ooshgai Mountains were not "well used and lacked any large settlements for centuries," we must remember that the absence of "ruins" does not equate an absence of people. In other words, for archaeologists the supposition is that if there were great numbers of people in an area, there would be marks on the earth we can see today. However, many Indigenous Nations tried very hard not to leave any marks on the earth that you could see hundreds of years later. This is because, if you did that, it probably meant you had done something disrespectful. For example, traditional Diné architecture today is intentionally ephemeral, designed to be built quickly and also deteriorate quickly. It is quite possible that hundreds of thousands of mid-Holocene homes of very large settlements would be impossible to detect through classical archaeological means. The grandiosity of Chacoan and "cliff dweller" architecture may be more of an aberration than a norm for Southwest Indigenous settlement patterns. These styles may simply be more visible through the lenses that are available to Western archaeologists. What is the most interesting and visible to a Western-trained archaeologist is not necessarily the most populous or most important from a contemporary or even pre-Hispanic Indigenous perspective.

What these "leave no trace" cultures did leave in their wake, however, is biodiversity. Perhaps for this reason, palaeoecological studies, which detect biological rather than material culture, are providing more insightful windows into human ecological history throughout Turtle Island and Abya Yala (also known as South America) (*e.g.*, Maezumi et al., 2018). This is because, with some exceptions, much Indigenous material culture was intentionally designed to biodegrade within a generation or two.

Moreover, the 20th century proposition that the Ch'ooshgai Mountains were unused or lacking large settlements prior to 1700 CE is simply inaccurate. More recent archaeological studies indicate that these mountains were sustaining large populations well before the 12th century (see Betancourt & Davis, 1984; Heilen & Leckman, 2014; Benson, 2017). The Ch'ooshgai forests were also heavily logged to construct Chaco Canyon houses prior to 1000 CE (Betancourt et al.,

1986). Strontium isotope research in Chaco ruins revealed that "both the San Mateo and Chuska [Ch'ooshgai] mountains were providing fir beams in the early construction phases of the great houses such as Pueblo Bonito (A.D. 974)" (English et al., 2001, p. 11894).

We should remember that—like the idea that the Southwest was only lightly and recently inhabited—Western science often takes for granted ideas that are later deemed highly inaccurate. For example, the Bering Strait Theory has been unequivocally disproven. As recently as 2007, a team of geneticists stated, "the ancestors of Native Americans did not reach Beringia until just before 15,000 ybp, and then moved continuously on into the Americas, being recently derived from a larger parent Asian population" (Tamm et al., 2007, p. 1). But a recent publication reports fossilized human footprints in New Mexico that were dated at 21,000-23,000 cal BP—over 6,000 years before humans were "supposed" to be in Turtle Island at all, much less as far south as New Mexico (Bennett et al., 2020).

If Indigenous societies have inhabited the Southwest for at least 21,000 years (and perhaps much longer), it would be curious if the fertile and abundant Ch'ooshgai Mountain system remained untouched, "unused," and uninhabited until just 300 years ago.

Additionally, Diné cultural memory and ethnographic connections to the Chaco Canyon civilization—which flourished from 850 CE-1150 CE (Bernardini, 1999)—contradict the idea that Diné people arrived in the Southwest recently. Based on auto-ethnography (a review of my own cultural knowledge as a Diné author), Diné People believe we are descendants of Chacoan Ancestors. We share stories of how we escaped the oppression of overbearing power structures when the Chaco Canyon civilization finally collapsed. Traditionally, Diné people never visit Chaco Canyon National Historic Park, to symbolize that we are finished with that way of living. This is not to discount the presence of Puebloan and other Southwest cultures, who were surely there at that time, but to help us question the Western scientific version of Diné-Ndé presence in the area.

While the prevailing narrative is that Diné People only arrived in the Southwest around five hundred years ago, some Western anthropological sources do support and corroborate this Diné connection to Chaco Canyon (*e.g.*, Brugge, 1980; Warburton & Begay, 2005; Weiner, 2018). If Diné people were indeed part of the cultural mélange at Chaco Canyon, we would have been in the Southwest at least 600 years earlier than Western science generally affords—and perhaps much earlier.

Moreover, archaeological analysis of Chaco Canyon shows an ancient Southwest presence of both macaw parrot feathers (Watson et al., 2015) and cacao beans (Crown & Hurst, 2009),

indicating that cultural and material trade occurred far and wide. If we afford the possibility of cultural groups arriving to Chaco Canyon from southern Mexico, we should extend that same possibility to Na-Déne People as well.

The Southwest cultural geography of Diné People does not comport with a narrative of recent arrival either. Although parts of Diné cultural geography are "mythical" in nature, I argue that the extent and nuance of these placenames and stories are too vast and complex to have been generated by "newcomers."

For example, according to Diné history, the female deity and Mother of our people, *Asdzą́ą́ Nádleehé* (Changing Woman) was found at *Ch'óol'į'í* (also known as Gobernador Knob, New Mexico) in primordial times. It is said that she experienced the very first *kiinaaldá* (Womanhood Ceremony) at *Dził Naa'oodiłii* (Huerfano Mesa, New Mexico), after which all contemporary *kiinaaldá* ceremonies are modeled today. Based on this emergence story, our Elders tell us we have "always been here."

Changing Woman gave birth to two warriors twins, *Naayéé' Neezghání* (Monster Slayer) and *Tó Báshísh Chíní* (Child Born of Water). At one point, they defeated a monster, whose blood spilled and hardened to create the Mount Taylor lava flow outside of present-day Grants, New Mexico. They also defeated many bird monsters near present-day Shiprock, New Mexico. Two of these bird monsters were babies. The warrior twins spared their lives and transformed one into Eagle and one into Owl. They were both given important spiritual roles in the world. Both an eagle-shaped and an owl-shaped rock sit at the base of the Shiprock volcanic neck that you can see today.

At a certain point, *Asdzą́ą́ Nádleehé* (Changing Woman) rubbed from her skin an essence that she mixed with mud to form the four original Diné clans: (a) *Kinyaa'áanii* (The Towering House clan), (b) *Honágháahnii* (One-walks-around clan), (c) *Tódich'ii'nii* (Bitter Water clan), and (d) *Hashtł'ishnii* (Mud clan). There are many people on and around the Ch'ooshgai Mountains who hold these clan affiliations. Today there are over 60 clans from various cultural groups that integrated into Diné genetic and cultural pools. Many speculate that the *Kinyaa'áanii* (Towering House People) Clan refers not to "Canadian Athabascan" origin, but to the mud-plastered architecture of Mesa Verde and other "ancestral Puebloan" ruins of the Southwest. The *Hashtł'ishnii* (Mud People) Clan also seems to be particular to the desert, where sand and water was and still is used by Diné and Puebloan Ancestors to construct energy-efficient buildings. According to our history, our oldest and most original clans are of the Southwest, not Canada.

Furthermore, the four sacred mountains of Diné People are all located in the Southwest and

circumscribe the Ch'ooshgai Mountain range. They are sacred to other Southwest nations as well. The four sacred mountains have been given very specific names: Sisnaajiní (Black Belt Mountain), *Tsoodził* (Tongue Mountain), *Dook'o'oosłíid* (The Summit Never Melts) and *Dibé Nitsaa* (Big Sheep Mountain). Our Elders have always said that these four sacred mountains are our primordial leaders, providing for us and instructing us on how to live properly.

The complexity of Diné stories, songs, and ceremonies around these mountains cannot be understated. Traditionally, it is only proper to tell the details of these stories orally and during wintertime. What can be shared here is that our doctors must go through rigorous, multi-year trainings to understand of the meaning of these mountains, the medicines they provide, their spiritual nature, and the songs that belong to them. There are some Diné songs that involve these mountains that take several days to sing. A Diné doctor must train to learn the entire song, in proper sequence, before they can begin their healing practice. We say we have always been within these mountains and have a spiritual obligation to protect them.

Moreover, Spider Rock (in present-day Canyon de Chelly National Monument, New Mexico) is the emergence and dwelling place of Spider Woman, who taught Diné people how to weave. Our Elders say we have an ancient connection to this geological formation and many others within Canyon de Chelly.

This is a sprinkling of the innumerable placenames and stories within Diné culture concerning the Southwest. Collectively they imply that Diné people have been in the Southwest for a very long time. Only then could we have developed such an extensive, complex, detailed and affectionate relationship to place. The theory that Diné people are newcomers to the Southwest does not comport with Diné historical identity, geographical knowledge, and story.

Diné cultural enmeshment with the Southwest bioregion indicates that Diné anthropogenic burning in indeed a possibility. While the role and importance of Pueblo groups in the Southwest cannot be understated, it does not rule out the co-existence of Diné influence during the Holocene epoch.

4.11 Diné-Puebloan Cultural Intermixing

Given extensive trade in knowledge, technology, linguistic terms, and genes between Na-Dené Nations and Puebloan Nations, it is not surprising that these groups are strongly culturally intertwined. The partitioning of Southwest Indigenous Nations into distinct "tribes" by 19th century anthropologists seems to be more of a convenient mental model than a cultural reality.

To state that this or that specific Native Nation did controlled burns on the Ch'ooshgai Mountains is challenging, because clear-cut lines between Southwest Native Nations are colonial constructs. While the Southwest diversity can at times be pronounced, there is heavy intermixing between Southwest people linguistically, culturally, and genetically.

For example, growing up in Taos, New Mexico I noticed that our Diné word for cat was the same as the Tewa word for cat. I also noticed that our word for crow was analogous to the Tewa word for crow. Given that cats and crows are found as far north as Alaska, why would Athabascan People need to borrow these words? This linguistic enmeshment may result from a much older relationship between Tewa- and Na-Dené-speaking people. Similarly, both Diné and Tewa People share a Creation Narrative involving a legendary journey through four "worlds" that catalyzed human trial, error, and evolution.

Moreover, as a Diné-speaking author I descend from a Jemez Pueblo paternal great-grandfather. My main (maternal) clan is *Naaneesht'ézhi Táách'iinii*, which translates to the "A:shiwi (Zuni) Pueblo Division of the Red Running into Water People." This clan is a complete hybridization of Pueblo and Diné People expressed through a Na-Dené linguistic framework. Linguistic behavior does not necessarily dictate a person's genetic background. In fact, it is rare to find a Diné person today without one or more clans coming from a Pueblo-related society.

This cultural melding does not end at the nexus of Diné and Puebloan Nations, however, since Diné people intermarried and melded into other Southwestern communities as well. For instance, one Elder shared with me that a Diné wedding basket is only a true wedding basket if woven by a Nuwuvi (Southern Paiute) basket weaver. Every Diné wedding in her family involved trade and interaction with Nuwuvi People to the north and west.

Moreover, as a cultural rule, Diné people cannot marry within their own clan, which encourages intermarriage between genetically diverse peoples. Just as people move, marry, and migrate across the country and around the world today, so too was Indigenous culture in constant flux, merging into and out of one anothers' homelands, languages, cultures, ceremonies, and fire management praxes.

This is all to say that when we talk about the Holocene residents of the Ch'ooshgai Mountains, there is considerable room for cultural complexity and the answer is not clear-cut. It also depends on which group(s) had power or responsibility in the Ch'ooshgai Mountains at any given time. More than one cultural group is likely responsible for Ch'ooshgai fire regimes throughout the Holocene.

While who burned the Ch'ooshgai Mountains is significant, whether they were burned at all

is equally important and holds important implications for contemporary management.

4.12 Discussion

This case study has significant implications for: (a) Southwest historical ecology, (b) contemporary fire management, (c) representation of Indigenous People, and (d) theories regarding human history and influence in the Ch'ooshgai Mountains. It also points to future research that could illuminate the question of Ch'ooshgai anthropogenic burning, such as: (a) consultation with local Diné, (b) more comprehensive Ch'ooshgai palynological analysis, and (c) climatological and lightning analysis.

Systematic, anthropogenic fire on the Ch'ooshgai Mountains during the Holocene has significant implications for Southwest historical ecology in general. It could provide a powerful lens to "discover" other pre-Hispanic anthropogenic fire regimes in places like the Gila River National Forest, Apache-Sitgreaves National Forest, Kaibab National Forest, "Tonto" National Forest, and Lincoln National Forests. It could alter the way we think about Mount Taylor, the Southern Rockies, and other places where Indigenous People are not believed to be capable of leveraging such large-scale forest management techniques. There might be increased interest and faith in the idea that other Southwest forests, previously believed to lack human fire intervention, may indeed be sites of ancient anthropogenic fire.

This issue also has great implications for contemporary forest management and fire safety. The Ch'ooshgai Mountains and other ranges have suffered from "Smokey the Bear" fire suppression policies for over 60 years (Stephens, 2005). The exclusion of systematic human fire can and has increased catastrophic fire worldwide, and especially in the Western regions of Turtle Island (*e.g.*, Butz, 2009; Durigan, 2020; Pattison, 1998). As Pyne (1997) writes:

> Biological preserves are not a kind of Fort Knox for carbon. Living systems store that carbon, and those terrestrial biotas demand a fire tithe. That tithe can be given voluntarily or it will be extracted by force.... Cease controlled burning and, paradoxically, you may stoke ever larger conflagrations. Refuse to tend the domestic fire and the feral fire will return. (p. 324)

Depending on the environment, a forest without systemic burning can accumulate more and more until the system becomes a tinder box waiting for ignition. With the collapse of systematic fire on the Ch'ooshgai Mountains, for example, over 14,000 acres went up in flames during the Assayii Lake Fire in 2014 (Tsinnajinne et al., 2021).

The notion that fire suppression protects and preserves the "pristine" nature of forests quietly ignores the long legacy of Indigenous pyrogenic management of Turtle Island woodlands. As Pyne (1998) writes:

> What humans choose not to do can be as powerful as what they choose to do. Removing anthropogenic fire from ecosystems, even those managed as nature preserves, has not restored a prelapsarian nature, but has probably created an environment that has never before existed and is in fact an artifact of human judgment, however ignorant, and of human will, however incomplete. (p. 98)

From this lens, the careful burning, pruning, and shaping of whole landscapes by Indigenous People is not an assault on nature—it *is* nature, with humans having as much of an ecological purpose as every other lifeform. While Indigenous People cannot be romanticized as perfect stewards of the earth, these cultures did have many tens of thousands of years to refine their ecological praxis, such that some groups became quite longstanding and quite adept.

Climate change has taken the spotlight as an explanation for increased catastrophic fires in the 21st century. However, in many contexts, large-scale fires became an issue directly after the erasure of Indigenous fire management (*e.g.*, Swetnam et al., 2016; Bird et al., 2012). The twin factors of climate change and Indigenous disempowerment have exacerbated a crown-fire trend across the globe. Both factors are highly important to consider in the protection of 21st century forests.

Kay (2000) argues: "Unless the importance of aboriginal burning is recognized, and modern management practices changed accordingly, our ecosystems will continue to lose the biological diversity and ecological integrity they once had even in parks and other protected areas" (p 24). The expansive, old-growth savannas encountered by early observers in the Ch'ooshgai Mountains could be restored if the role of anthropogenic fire in the Ch'ooshgai mountains was better understood.

Furthermore, if these Nations were indeed sophisticated and populous enough to sculpt an old-growth paradise—as their neighbors had across the continent for millennia—this would have important implications for the social and popular representation of Indigenous Nations today. Anthropological literature and pop media in the 19th and 20th century (and even still today) often include representations of Indigenous Nations as "primitive," "savage", "simple" Indians (*e.g.*, Dyk & Sapir, 1967; Horsman, 1975). While these racist and misguided attitudes have improved, ignorance of the sophistication of Indigenous land management still abounds. The lineage of sentiments we descend from as Western scientists has undoubtedly influenced—both

consciously and unconsciously—the lenses through which we understand Southwest people and their historical ecology. Much of the world now positions Western science as the ultimate arbiter of truth. Thus, we have a profound, albeit unfair, ability to shape the representation of entire human groups. Our science in turn affects the way the world views Indigenous Nations of the past and present. The implications of this study are therefore far-reaching in the lived realities of Indigenous communities today.

Finally, the study of Ch'ooshgai anthropogenic burning could begin to challenge notions that the Ch'ooshgai Mountains were "probably not well used" prior to the second millennium (Guiterman et al., 2019; Savage, 1991). More systematic palaeoecological, dendrochronological, ethnographic, and millennial-scale studies could be designed to help us understand if these mountains were indeed routinely burned by humans and if so, for how long. The answers to these questions would have great implications for our understanding of human history and influence in the Ch'ooshgai Mountains.

Further research could illuminate the topic of anthropogenic burning in the Ch'ooshgai Mountains. If considered appropriate and beneficial by Native Nations would allow, comprehensive millennial-scale palynological analyses of the Ch'ooshgai lake beds in collaboration with Diné and Pueblo Elders and community members could be very helpful. Given their Pleistocene age (Wright, 1964), these lake beds could provide a deep and nuanced view into the historical fire ecology of the area. As of now a comprehensive examination has not been carried out.

A more rigorous and comprehensive analysis of lightning history, seasonality, and frequency on the mountain range could also help. Kay (2000) has reviewed literature for the Southwest to disprove the lightning explanation for Southwest fire regimes in general (p. 20). However, it could be helpful to perform a more refined and small-scale analysis for the Ch'ooshgai context in particular. While fire scars have been analyzed, they have not been specifically triangulated with the seasonality and frequency of Ch'ooshgai lightning history.

Last, but certainly not least, it would behoove us to engage in consultation with local, Indigenous Ch'ooshgai residents and produce data with them that is reciprocal, relevant, and respectful through community-based participatory research (Kirkness & Barnhardt, 1991). After all, they are the living carriers of both Puebloan and Diné ancestral knowledge. It is not only ethical to involve Indigenous People in research concerning Indigenous communities; the process and final product is also greatly enriched by their cultural and ecological expertise (Dickson-Hoyle et al., 2021).

4.13 Conclusion

A culturally grounded analysis of journal entries, tree ring data, ethnographic accounts, fossilized charcoal, neighboring practices, and autoethnographic data strongly supports the hypothesis that Diné-Puebloan Nations managed the Ch'ooshgai Mountains with routine, low-severity, anthropogenic burning. The open, park-like meadows observed by early explorers in the 1800s are the hallmarks of Indigenous anthropogenic burning, as observed across North America. Witness-tree fire scars document a clear and consistent fire regime in the Ch'ooshgai Mountains through the mid 19th century. The subsequent collapse of Ch'ooshgai fire is directly correlated with the removal of Diné People from the area and the advent of boarding schools. The abrupt and sustained influx of charcoal deposits in Ch'ooshgai lake beds around 4,200 cal BP are analogous to other study areas where anthropogenic burning was introduced throughout Turtle Island, further corroborated by analogous charcoal records near Mesa Verde, New Mexico deposited by anthropogenic burning. The argument is further supported by ethnographic accounts of Diné anthropogenic burning in other places. Moreover, extensive accounts of anthropogenic fire employed by neighboring Indigenous Nations demonstrate that Diné were of course aware of this effective forest management tool. Autoethnographic data from the author as a Diné person raised in the present-day Southwest indicate that, while controversial, it is highly likely that the Diné presence in the Southwest is longer than Western science generally affords, and it is therefore quite possible Diné People were at least partially responsible for Holocene anthropogenic fire regime in the Ch'ooshgai Mountains. Together, these data strongly support the hypothesis that Diné-Puebloan Ancestors heavily managed the Ch'ooshgai Mountain range with persistent, frequent, low-severity burns to manage rangeland for game animals, maintain forest health and openness, manage grassland and soil systems health, and maintain old-growth forests.

This synthesis encourages us as a scientific community to lend more credence to this highly likely scenario and continue to explore it in earnest. Further research is recommended in the following areas: (a) more comprehensive palynological studies; (b) mapping lightning density, frequency, and seasonality in the Ch'ooshgai Mountains against dendrochronological data to support or negate lightning as an explanation for 18th and 19th century fire scars; and (c) respectful and reciprocal consultation with local Diné Elders and community members to generate data that is relevant and useful to both Western science and the Diné community.

Findings from this area of research will have broad implications for: (a) our understanding

of Southwest historical ecology, (b) contemporary forest management for the Ch'ooshgai Mountains and other Southwest forests, (c) contemporary representation of Indigenous People, and (d) our understanding of human settlement history and ecological influence in the Ch'ooshgai Mountains.

Perhaps most importantly, an earnest and ongoing exploration of this phenomenon could help to restore sovereignty and decision-making power to Southwest Indigenous Nations, that they may manage their ancestral homelands for the well-being of their communities and earth systems.

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4.15 *Figures*

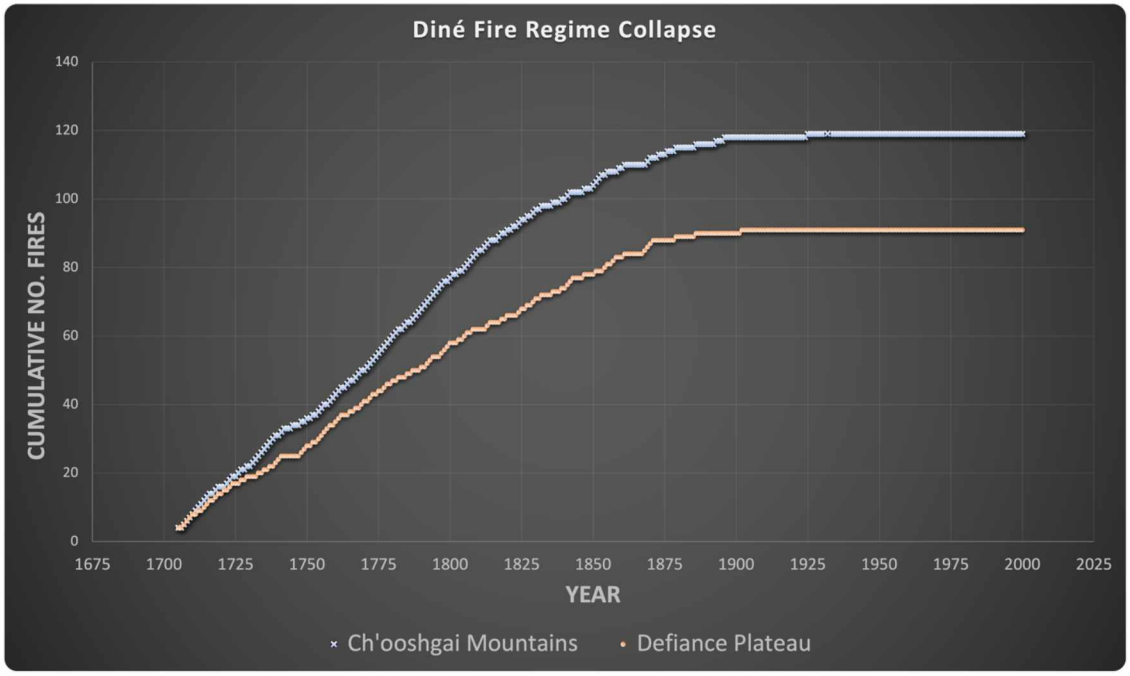

Figure 4.1: Cumulative numbers of dendrochronological fire scars from "high human use areas" (Ch'ooshgai Mountains) and "low human use areas" (Defiance Plateau) (data generously provided by Chris Guiterman)

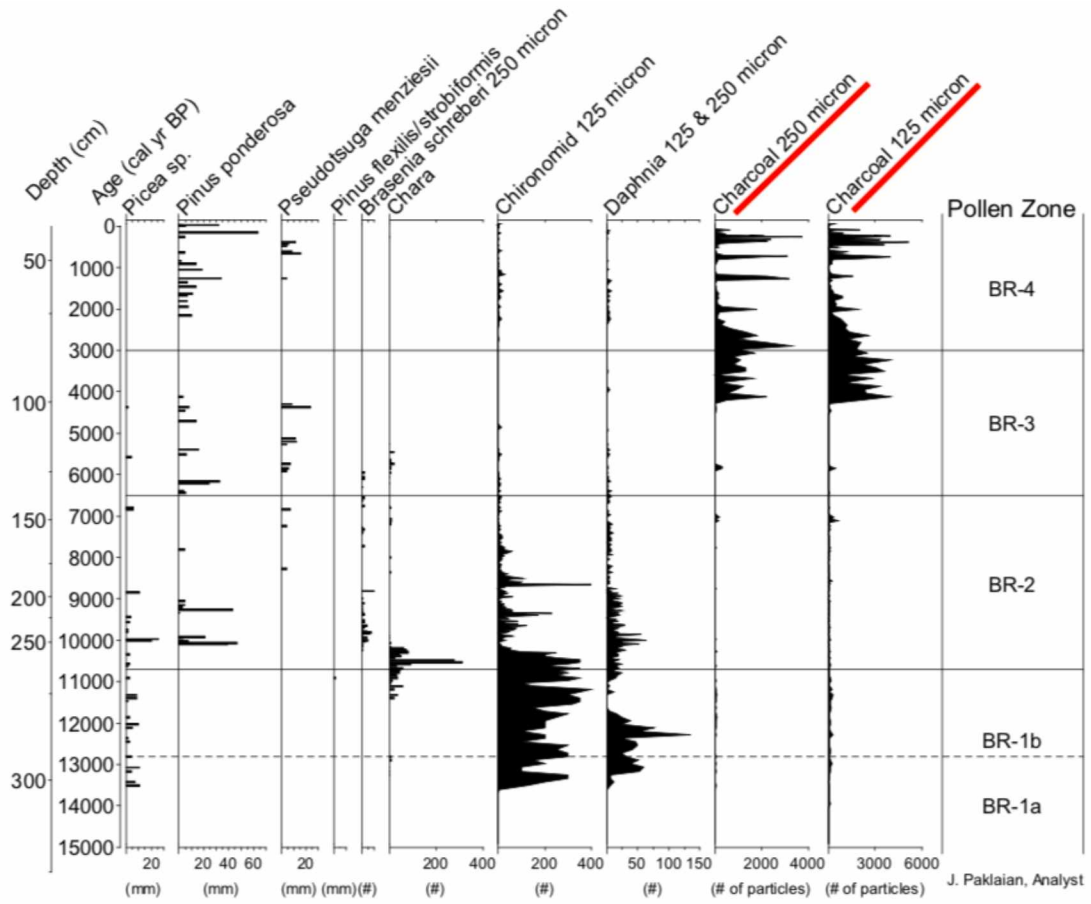

Figure 4.2: Macrofossil and charcoal concentrations in a soil core obtained from Beaver Run Pond, Ch'ooshgai Mountains (reprint permission generously granted by Jonathan Paklaian)

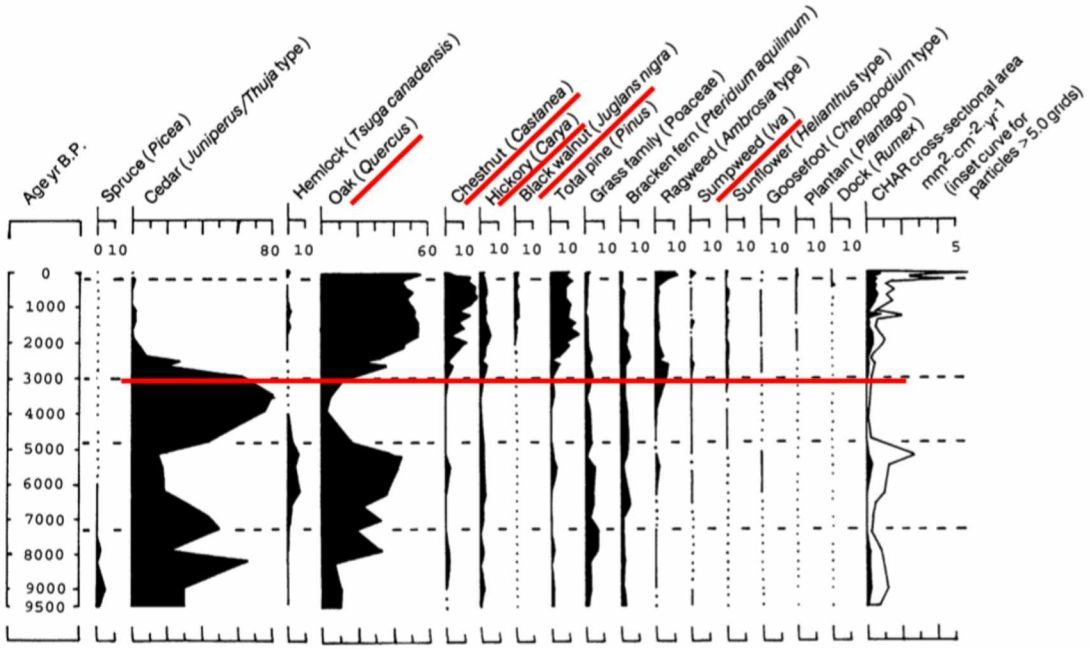

Figure 4.3: Pollen profile of Cliff Palace Pond, McGee, Kentucky (as presented in Delcourt et al., 1998)

5

Air: Honoring Indigenous Voices

> A spiritual energy is alive in the early dawn—it is when we greet the Holy People with the vocal sound of our *Nitsahakees* (thoughts) and prayers, which are communicated through Air.
>
> *–Marie Galdue, Diné Elder*

5.1 Abstract

Interviews with four contemporary Indigenous land stewards from various Native Nations of Turtle Island weave together a profound "guidebook" for successful and active ecological management strategies. +nterviews suggest that their management sciences are rooted in the principles of: (a) respect, (b) kinship with creation, (c) collaboration with community and with creation, (d) humility, and (e) a belief that creation is sacred. Their cultural traditions reflect the hypothesis that various Indigenous Nations of Turtle Island played an integral role in sculpting ecosystems on a bioregional scale through low intensity prescribed burns, biodiverse cultivars, habitat expansion/enhancement, the gardening of whole landscapes, and active participation in and facilitation of complex ecological communities. Interviewees share how these management systems are designed to benefit all life—not just humans—based on a belief that humans hold a sacred covenant to contribute to the health of their respective homelands. Multiple interviewees report that Ancestors honed their ecological sciences over the millennia through a process of trial and error, sometimes involving the complete collapse of their previously unsustainable ways of thinking and living. In this manner, catastrophe was an important corrective mechanism for their ancient societies and ultimately gave rise to more refined and successful ecological philosophy and behavior. This study models an Indigenous methodological agenda where interactions with Indigenous research collaborators are rooted in respect, relationship, reciprocity, responsibility, accountability, and gratitude.

Keywords: Indigenous Regenerative Ecosystem Design (IRED), Indigenous Knowledge, Traditional Ecological Knowledge, Indigenous Land Management, Indigenous Food Sovereignty,

5.2 *Introduction*

This "Air" chapter is dedicated to the voices of four contemporary Indigenous land caretakers. This chapter is significant for many reasons. First, it gives ample "airtime" for Indigenous voices to share their messages and recommendations to the world. Academic red tape and a lack of trust and understanding between Indigenous and Western cultures have made it very challenging for authentic communication to occur between Nations. For this reason, in-depth and authentic Indigenous worldviews are sometimes poorly or inaccurately represented in scientific literature. This chapter represents a thoughtful communication from Indigenous land stewards to the world about Indigenous land management.

Second, this chapter brings dry, scientific data to life, making it relatable on a human level. It shows how these practices are carried out by people with passionate belief systems, urgent needs, and heartfelt aspirations. As we will see, despite being from geographically distinct homelands, each interviewee holds deep emotional connection to places they view as sacred. They are also profoundly dedicated to the healing of their respective communities that are standing back up from the damage wrought by colonization.

Third, each interview is a generous gift from the four research collaborators. Indigenous knowledge has been misused and abused by Western anthropologists for centuries leading to extreme mistrust of Eurocentric researchers and research institutions (Smith, 2021). The generosity of the following interviewees is not a given. A great deal of forgiveness, trust, and compassion was required to share these openhanded, profound, and instructive testimonies.

5.3 *Methodology*

5.3.1 *Relationship, Reciprocity, Reverence, Respect, Responsibility, Accountability*

A strong literary canon concerning proper Indigenous research methodologies and Indigenous community consultation has been penned by Indigenous scholars over the years (*e.g.*, Barlo et al., 2021; Brayboy, 2005; Brayboy et al., 2005; Smith, 2021; Wilson, 2008). These works break open the horizons of traditional ethnographic research by offering fundamental changes that can enhance the research process considerably. In this school of thought, research is undertaken with the understanding that the people we work with are first and foremost human beings. It

rejects the designation of lifeforms (including humans) as "subjects" for scientific examination. Instead, it assumes that scientists—being human themselves—have an affective, personal, and ethical commitment to the human and non-human communities they work with. Our research process, then, must necessarily be "rooted in relationships, responsibility, respect, reciprocity, and accountability" (Brayboy et al., 2005, p. 423).

Moreover, this school of thought acknowledges that when working with Indigenous communities, we are mostly working with people who have been very violently abused by colonial society (Smith, 2021; Brayboy, 2005). In this context, research should not be passive, but active in reversing processes of colonization, wherein academia has played a significant and harmful role (Smith, 2021; Horsman, 1975). We should always treat others with dignity, kindness, and respect. In contexts where human groups have been historically dehumanized, incarcerated, and dispossessed, that process becomes all the more important.

In Barlo et al. (2021), Indigenous Australian scholars define Indigenous ethnography as the praxis of "yarning," or respectful dialogue. Yarning, rooted in kinship and relationship with other people as equals, replaces traditional ethnography, which is often cold, detached, short-lived, and extractive. They write:

> A foundation of eight principles ... provides the structural support for a Yarning methodology. The four main principles are respect, reciprocity, relationship, and responsibility. The four sub-principles are dignity, equality, integrity, and self-determination ....
>
> *Respect* is far more than simply respecting the person you are talking with, as it also includes respecting the knowledge or the information that is being provided. This type of respect is demonstrated through the way the information is used ....
>
> *Reciprocity* is more than giving a like-for-like. Reciprocity is a process that models responsibility. It is also an honouring process that demonstrates the importance of the relationship ....
>
> Indigenous Australian culture is a culture that is built on connectedness and it is the researcher's *responsibility* to not only develop connections with the participant and to maintain them, but it is equally important to develop respectful relationships with the knowledge that is being provided, and to convey that information in a way that fosters respectful narratives.
>
> Once the participant has provided information to a research process, there is a *respon-*

> *sibility* on the part of the researcher to handle the data respectfully, and to keep the participant informed each step of the way during the research process. The researcher has a corollary responsibility to maintain these relationships well after the research has concluded. The information provided is a gift and, as with all gifts, it needs to be treated with respect and honour. The person who is gifting the information continues to be the caretaker of the information. The researcher therefore has a responsibility not to misuse the information provided ....
>
> [E]very person who enters the yarning space is treated with the upmost honour or respect—this concept is referred to as *dignity* of identity.
>
> From an Indigenous perspective ... each person has the same rights and responsibilities within the yarning space—this is true *equality*.
>
> The yarning space is strengthened by each person being honest and fair—this is true *integrity*.
>
> *Self-determination* means that within the yarning space the participant has the freedom to make their own choices about whether to participate or not, how much information to provide, and also to contribute to the analysis and decisions about how their stories are told and presented. Self-determination also recognises the agency of Knowledge and how Knowledge participates in the research process.
>
> A limitation of Yarning methodology is that it requires us as researchers to engage with these principles throughout the entire research process, in all our research relationships, and in our lives and communities beyond our research. As a holistic approach, the process invites our whole-hearted engagement. As stated earlier, if you do not want to be vulnerable and engage in relationships, pick another methodology. Similarly, if one is not willing to take on the responsibilities that go along with accountable research relationships, this is not an appropriate research methodology. If there is a willingness, however, to engage holistically and whole-heartedly, the fruits of this research methodology can be very profound for all those involved [emphases added]. (Barlo et al., 2021, pp. 46–47)

The long quotation above is one of many recommendations by Indigenous scholars on how to transform research from a tool of extraction that benefits scholars and their institutions to a tool of true collaboration that contributes to human communities. While there are many principles and sub-principles, the underlying sentiment is very simple: Be kind, reciprocal, and

grateful throughout the research process.

A similar praxis is articulated by Brayboy et al. (2005) as "Critical Indigenous Research Methodology." On page one of their seminal chapter, authors outline the key points of CIRM as follows:

1. CIRM, an overarching line of thinking about methods and philosophies, is rooted in Indigenous knowledge systems, is anticolonial, and is distinctly focused on the needs of communities;
2. CIRM is rooted in relationships, responsibility, respect, reciprocity, and accountability;
3. Research must be a process of fostering relationships between researchers, communities, and the topic of inquiry;
4. These methodologies ... promote emancipatory agendas that recognize the self-determination and inherent sovereignty of Indigenous People. (p. 423)

In this research paradigm, we acknowledge that it is not respectful to simply "study" a community that is being actively suppressed by a colonial nation state. Rather, our scholarship should be in sensitive to and supportive of the healing and human rights processes that these communities are engaged in.

This is similar to the ideas put forth by Māori scholar Linda Tuhiwai Smith (Smith, 2021):

> In all community approaches *process*—that is methodology and method—is highly important. In many projects the process is far more important than the outcome. Processes are expected to be respectful, to enable people, to heal and to educate. They are expected to lead one small step further towards self-determination (p. 128).

Far too often in academia we are incentivized to make a prioritize our academic careers and calendars at the expense of the integrity of the research process. In some colonial contexts, people and places become steppingstones towards personal gain. Indigenous research methodologies work to highlight and correct these non-relational approaches.

The following four interviews are an attempt at the Yarning/CIRM methodology. This process prioritized my relationship with the interviewee over the final outcome of the interview itself. This involved booking flights for an interview that could have easily been done over the phone because more personal and human dialogue is more respectful and valuable than telecommunication in many Indigenous cultures. It sometimes meant driving eight hours for an interview that got cut short due to a community emergency and doing the rest over the phone.

This is fine because community relationships, and the responsibilities therein, are more important than academic publications.

I was also fortunate to form relationships with each of the interviewees years in advance. This allowed them to observe my character and integrity to the community and the knoweldge. I was able to volunteer for the projects of my interviewees unrelated to the PhD project to form a reciprocal and community-based relationship. It was also important to offer compensation to interviewees for their time. Part of this research practice was to ensure all recordings and transcripts were given to interviewees for their personal and community needs. This involved not claiming any ownership over their interviews but requesting only the ability to publish it in this dissertation.

It was also important to provide ample time to review their transcript prior to publication to check for any errors or misinterpretations. Given a long history of misrepresentation, it is important step in supporting self-determination by affording interviewees the freedom to choose how their messages are presented to the world. It is also important to maintain an ongoing respect for the information by requesting permission from interviewees for any use of their transcripts in subsequent publications. Reciprocity involves continuing to give back to interviewees and their communities long after the interview has ended to honor the gift they have given. The rewards of a PhD, both financial and social, will benefit the researcher for the rest of their lives and are thus indebted to interviewees, lifeforms, and study areas. As such, the research can cement a lifelong relationship of reciprocity and acknowledgement with those foundations. The researcher can do this, in part, by supporting the things and messages that interviewees feel are important, even if they are not wholly relevant to the researcher's primary interests.

Yarning methodology, CIRM, and community-based approaches are thus rooted in honoring the humanity of the people we work with in the research process. It is an art of sharing power and acknowledging that we are a minor stakeholder compared to the very people who make our research possible through their generosity of spirit. It is the challenge of prioritizing respectful relationship over personal gain within a world that incentivizes the reverse. Indeed, I have enjoyed the "fruits" of a methodology rooted in Relationship, Reciprocity, Reverence, Respect, Responsibility, and Accountability as presaged by Barlo et al. (2021).

5.3.2 Other Methodologies

Interview analysis follows the tradition of "qualitative thematic analysis." In other words, identifying themes within the interviews and comparing and contrasting the themes of each inter-

view. I was especially interested in themes or concepts that emerged in more than one interview. Final, edited transcripts of each interview were analyzed through MAXQDA software (VERBI Software, 2021), which was helpful in identifying words that were used most frequently within and across the four interviews. It was also helpful when coding interviews to identify themes and patterns throughout

As it pertains to the specific interview process, I came to each interview with the same 13 pre-defined questions (see Appendix 9.8). However, we were free to follow any threads of conversation that naturally emerged in the interview process (semi-structured interview methodology).

Rather than present small chunks of the interviews, I chose to present interviews in their whole, raw dialogical form, lightly edited for readability. This is for the following reasons:

- Indigenous People have been so poorly represented in the record to date that much more of their voices in official publications is needed;

- Young Indigenous People often only have sparse written records from their Elders and Ancestors, which moves me to include as much of their voices as possible for future generations;

- Unedited dialogue between two people reflects humanity and kinship;

- Almost every message shared by interviewees represented precious and endangered knowledge that should be abridged as little as possible.

I call this a Holistic Relational Interview Presentation Methodology (HRIPM), as it presents both the interviewer and the interviewee as a whole person, and the entire flow of their relationship dynamic as two dialogical human beings.

Some interviews were pared down more than others. For instance, the Maskoke person I interviewed ended up producing a 91-page transcript. This was whittled down to about 30 pages. More informal conversation between us that was not entirely on topic, nor especially important to the interviewee was the first to be omitted. Any greatly off-topic tangents or redundancies were the second to be omitted. Aside from that, anything that appeared to be important to the interview and relevant to the conversation was preserved as much as possible.

5.4 *Interview 1: An Amah Mutsun Coastal Prairie Food System in Northern California*

5.4.1 *Introduction*

This interview occurred on June 10, 2022 with Valentin Lopez, elected leader of the Amah Mutsun Indigenous Nation. The Amah Mutsun—Indigenous to what is now known as Northern California—are a "landless tribe" in that they have no formal reservation. Their long-documented history in the area is a kind of miracle. They survived the brutal concentration camps of the Spanish missionaries, the state-sanctioned and state-funded bounty hunting of Native People by the State of California, and forced relocation into urban areas.

Valentin, continuing a long tradition of responsibility to non-human life, has helped to form the Amah Mutsun Land Trust. Among its many programs, the organization recruits young tribal members in their "Native Stewardship Corps" to tend to various land bases they are able to engage with. They have instituted an Amah Mutsun Garden in the San Juan Bautista State Park, featuring the native and culturally significant plants of their Ancestors. They have also formed a collaboration with the University of California, Santa Cruz to create an arboretum of culturally significant trees. Their primary goals as a Nation are to secure a land base in their ancestral homelands, engage their youth to continue Amah Mutsun traditions, and to bring traditional land management practices to this area (not least of which is the controlled burning of landscapes practiced by their Ancestors).

I was moved to interview Mr. Lopez. We had met many years prior at an effort to protect their sacred site, Juristac, from development by a gravel mining company. During this time, he spoke extensively about the traditional land management practices of his Ancestors. He holds in-depth knowledge about the history of his nation and the values with which his Ancestors worked with the land. The interview occurred on June 10, 2022.

5.4.2 *Interview Transcription*

LJJ: What is your name, tribal affiliation, and homeland?

VL: My name is Val Lopez; I'm the chairman of the Amah Mutsun Tribal Band. Our traditional tribal territory is in the Morgan Hill, Gilroy, Hollister area, and it follows the Pajaro Watershed out to Watsonville along the coast in the Monterey Bay.

LJJ: This is sort of a broad question, but how did your Ancestors ensure food for their community?

VL: Our Creation Story told us that we had the responsibility to take care of "mother earth"—that's a contemporary term, it's not the term that our Ancestors used. To take care of mother earth and all living things, and so from day one we had a responsibility to ensure that there is a good food source, food supply, food resources for the insects, for the birds, for the four-legged, for people, and the fungi. That was our responsibility to take care of all living things. Our people started literally studying about how to take care of the food resources for all of them. A good example is that in our territory there were very many grizzly bears, and the grizzly bears in our territory did not hibernate. They did not need to hibernate because the climate was so mild. We had to ensure that there were good food resources for them year-round. So our people studied a lot about how to take care of those resources.

LJJ: So a lot of what your Ancestors did to ensure food for their community also involved ensuring food for all living things?

VL: Yes, and we're lucky and blessed to be where we are located in central California, because the climate is mild and there's a very large abundance of various kinds of plants. We learned to use over a hundred plants that are food resources. We have over a hundred plants that are used for medicine. We have many plants that are used for basketry, many plants that are used for women's care, babies' care, housing, clothing, etc. We were lucky to have the resources that we did.

LJJ: What were some of the ways that your Ancestors worked with the land to ensure there would be food for the community, and future generations, and I guess in this case for the animals and all life?

VL: It is told to us that Bear taught us what our food resources were, because we had a lot of plants that were poisonous or bad for you. And so rather than eat it we would watch Bear, observe Bear, and see what plants Bear would eat, and then we knew that those plants were safe for us to eat. So that's a big part of how we learned which ones were our food plants. We also recognized that all plants are a gift given to us from Creator. We had a responsibility to take care of, manage, and steward those sources. And because they were given to us by Creator, they were sacred. We recognized all of our food resources as being sacred gifts to us from Creator.

We also did not try to dominate the plants in any way, we didn't try to domesticate the plants in any way. For example, we would not look at a particular plant and say, "Well

if we move this plant over here it will be easier for us to access it or to use it, or it would look nicer over here, or it would serve our purpose better." No. That plant knows where it belongs. Creator put that plant there, and so we had a responsibility to take care of that plant where it chose to be. What we would do is recognize that plant as an important resource for food, basketry, it can even be used for firewood, but it had an important purpose and so we would work to expand that plant. We would grow that patch bigger and bigger and bigger as the animal and people population grew. We would grow that patch bigger to ensure that it met the food needs of all the animals that depended on it. Evidence of this is when the early explorers, before 1769 when the Missions came to California, when those early explorers came by, in their journals and stuff like that, they looked at the landscape from the ships or even on shore and they said it was just a beautiful mosaic of different colors of different plants, and that it was a park-like setting. That's exactly how they described it. That was because of the way our Ancestors stewarded and managed the land. The colonizers, unfortunately, believed that that was just the way things were, that it was a naturally occurring way that the plants grew etc. They did not realize that they were intentionally and carefully managed and stewarded by the Indigenous Peoples. So that's how we did it—we stewarded the plants.

Talking more about the plants, we also recognized that all plants have an obligation to take care of a community—and that community included the fungi, it included the insects, it included the birds and the four-legged, and people. So that plant had a great responsibility. And because there was so much depending on it, those plants started to develop very deep, deep root systems to be very hardy to provide for that community. Developing that deep root system and taking care of that full community gave those plants a lot of resistance to disease. That is something that's really recognized by science today—that our plants are very important for addressing diseases in plants around the world. Do you want examples of those?

LJJ: Yes, please.

VL: In the 1960's there was a wine epidemic, I believe it started in France. It eventually traveled all around the world to different commercial vineyards. They were being devastated and there was not going to be any wine. What a disaster! When they tried to figure out how to address it, what they found was that the root stock of the California grape was resistant to that disease and many other diseases too. To this day vineyards around the world have the root stock from the California grape as part of that root stock. And the

same is true for many nut crops around the world, and the same is true for strawberries for example. There's a lot of commercial strawberry farms around the world but they all have the root stock from the California strawberry.

LJJ: Anything else you'd like to say about how your Ancestors worked with the land to ensure there'd be food for the community?

VL: Well, our people recognized that mother earth was made sacred. And that was most important, that mother earth is made sacred; it's made by Creator, how could it not be sacred. And our people recognized that they had the responsibility to ensure and maintain that sacredness of the lands. So they had a lot of ceremonies and they had a lot of prayers for the land. They learned how to hold ceremonies. For example, for the four seasons, so that there would be balance with the four seasons, so they wouldn't have too much summer or potentially drought, too much winter, and potentially flooding. The seasons had to have balance to ensure stability, and so that the plants could grow as they were intended to grow.

We also learned that because they're gifts, the way that we tended the plant, we would not just take a plant, we would always make an offering. And that offering could be tobacco or some other medicine plant, it could be mugwort, it could be sage. We have a lot of different sages; coastal sage for example. Those are the medicine plants we used, mugwort and sages are big ones. They would make an offering, and they would also have a prayer or sing a song as part of that offering.

When they were working on those patches, they recognized those plants as a relative. Because they were made by father sky, Creator, and they were made by mother earth, our mother. And so they have the same mother and the same father as we do, so they are our relatives. So they recognized that they had the responsibility of a relative with them. They knew they had to sing to them, they had to pray for them, they had to talk to them, they had to listen to them, and they had that really intimate relationship with them. So that right there was a very important part of it, having that relationship. Spirituality is most important, and that's all part of it.

We did not try to dominate mother earth. For example, we did not try to change the course of the rivers. We didn't try to do any extraction of materials (that's not 100 percent true, I'll come back to that). We did not build temples, like pyramids or statues or anything like that. Mother earth is perfect. How could we ever alter it to be better

than what Creator gave us? And so that's why we didn't do any of that. I did say about extraction—we did extract materials for ceremonies, paints; a lot of times you'll see ochre I think it's called, that red paint, and that's on rocks and on the ground and stuff like that a lot of times. We would take ochre, but that would be for ceremony and for prayer only. We would not take it for profit, we would not take it for greed or some other purpose like that.

LJJ: What were some of the values that guided this process of land care, what were the things that were important to the people? You kind of mentioned some already, but maybe if you want to share any more.

VL: Well a lot of it is you don't do your work when you're in a bad mood or have negative thoughts or negative ways. You have to be in the right mood; you have to recognize that when you're working on the land and stuff like that. A good example is the medicine plants. People today, they say, "Look at that medicine plant." They think that going out, getting that plant, making some tea out of it that that's going to give them some medicinal benefit; but what our Ancestors knew is that it is our relationship that really enhances those medicinal qualities. And so for example in our tribe, our last traditional leader was [redacted], but she was a traditional healer. She knew you had to have prayer, you had to have ceremony. You have to have a relationship. You have to know how to sing to them, listen to them, and such like that. And that's what made her such an effective healer, is that she knew how to tend to the plants and to care for them so that they would become powerful medicines.

LJJ: So it wasn't just the chemicals inside of the plant; it was the relationship we had with the spirit of the plant and the respect we had for the plant?

VL: Absolutely

LJJ: Any other values that you feel were driving this system of land care? You mentioned respect and relationship, any others?

VL: A big one is that they had to take care of the plant community and recognizing that. Compare that to what they have today, all these orchards, all these row crops and stuff like that. You're supposed to take care of the fungi, but if any of these plants get fungi on them they get sprayed down with fungicide. It's just the opposite of what we are doing today, that's what our Ancestors did.

LJJ: Were there any values around generosity with your fellow people, how food was shared

or that sort of thing between people?

VL: Our people had the responsibility to take care of all living things; that includes the insects. For example, the monarch butterfly, you know a very important plant for the monarch butterfly is milkweed. So they knew that taking care of the milkweed was very important for that reason, for the butterfly. We have a hummingbird sage. It's a sage plant but it's also very important for the hummingbird. And we had plants for the bees; we have over 1600 species of bees in California, and we knew all the species and we knew how to take care of each one, what their favorite plants were, what their needs were. That was our responsibility, and that's why the greater central coast of California—in particular the Monterey Bay area—is recognized as one of the most biodiverse landscapes in North America, and it was because of the way our people intentionally stewarded and managed those lands.

LJJ: Your garden, based on what I'm hearing, is more designed to feed other things than to feed yourselves.

VL: Absolutely, yeah.

LJJ: This is kind of the same question, so feel free to pass if it doesn't spark anything for you, but what are some of the protocols, rules, or principles that guided your landcare process?

VL: We don't alter landscapes or features, we don't try to dominate or domesticate, we have a responsibility to take care of them and their environment according to what their needs are, not according to our needs, and a lot of the things I mentioned already, kind of applied to that.

LJJ: And so on one hand you're saying you didn't domesticate and on the other hand you're saying they would create these patches. Some might say that is a form of domestication. What would you say to that?

VL: I never had that question asked to me before [*laughter*]. Yeah, what we were trying to do is grow it as it naturally would grow.

VL: And that's kind of what I meant, we would not get these seeds and spread them over there. We would not do that and we would just try to take care of them so that they could take care of the community. That's it, we were trying to help them take care of the community that they are responsible for. So that's what we are doing, we're just assisting them and helping them fulfill their obligation. Versus domesticating them.

LJJ: You're assisting the plants to fulfill their obligation. Because just like us, they have sacred responsibilities too?

VL: Yeah, absolutely.

LJJ: That's a whole new concept for me.

VL: Yeah, you only take a small amount of seeds from each plant, we just give it a little shake. I've done that; when the seeds are ready to drop you just pinch it between your fingers here, give it a little shake, then go to the next plant and give it a little shake. But you're leaving most of the seed there.

LJJ: There's this western concept that I sometimes hear, they call it ecosystems engineering, they call it anthropogenic ecosystems, this is all in the western world. Because they are observing how Native People would craft these landscapes, like you said they weren't just wild, just naturally growing like that, it was curated. So, what are your thoughts on these western concepts of "ecosystems engineering?"

For example, there's the clam gardens of the Pacific Northwest. They would create these intertidal rock walls that would catch the water and the sediment from the rising tide, and when tide would lower they would catch that water and sediment to make calmer waters in the inland side of the wall, and that would create this clam habitat, and they would augment the clam habitat.

Then there's other groups that would plant kelp forests by hand for all types of different purposes including more surface area for the herring fish to spawn. So there's the clam gardens and the kelp forests.

Of course, the prescribed burns all over this continent. Managing the Great Plains, managing the terra preta in the Amazon, where they have those top soils that are six feet deep, because they do these composting techniques. The creation of food forests of the chestnut, the management of grasslands to attract grazing animals. What are your thoughts on that in general? This idea of human assisted landscapes?

VL: Well, I kind of have to correct myself, you know, because, for example, the salmon, when they come back from the ocean to do the migration, they have to transition from saltwater to freshwater. So they don't just come in, they go up the stream. They come in and we knew what they needed to have a really good, abundant food source there for them. So whenever they could come in, they could have a good food source there to get their strength back, to put body weight on, a lot of protein, to get the energy to make that

migration. And so what we would do is keep those spawning beds and the small fish, sardines, the anchovies, the smelt. And there's one or two other species like that, you know, the smaller fish. We had to make sure it was abundant. So, for example, there was a severe storm that year and it washed away a lot of that habitat. We would go back to restore that habitat so that we can help the salmon complete the journey. You know, so that's one way we did that. That's an important one there.

We also knew that whenever the salmon were doing the migration, that they would have pull-outs where they could pull out and rest. So we look at the river and make sure that those rest areas are good, that they aren't blocked or obstructed by a fallen tree or something like that. So we would make sure that those were clear. And then the spawning beds themselves, you know, a hard flood could blow out the spawning beds and stuff like that. So that needed to be restored or repaired. We would do that. So I say we don't alter mother earth, but I guess in some ways that is what we're doing, is just to enhance the natural cycles. To assure that they could be completed.

LJJ: It's almost like facilitating versus replacing or dominating. Because creating a pyramid is so much different than making sure the salmon have a place to rest. But you are creating, you're constructing something; but it's a different purpose, I suppose.

VL: And we did the same with the migrating geese, for example, because whenever the migrating geese would come in, we had a responsibility to make sure that those wetland areas were ready for them. Insects were their preferred foods. And so we wanted to have an abundance of insects there because those insects give them protein. And they can get their strength and energy back quickly so they can continue their journey. So we would take care of the wetlands so we had good habitat, so the salmon could be productive and so therefore, the migrating geese could be productive. The mosquitos, grasshoppers, we wanted them there. They talk about us taking care of the insects, and they go "those are bugs why would they want to take care of those things?" But they're such an important part of it.

LJJ: Would you ever hunt or eat the geese as well?

VL: We had the obligation to take care of them. That was our first obligation. We took care of them. But yet at the same time we took care of them, and they took care of us. It was a reciprocal acknowledgment, you know? We wouldn't go hunting them just for sport or dominate them in any way.

Another good thing to talk about here, is whenever the salmon would start to do their migration, we would never fish the first salmon going upstream, because we knew that they were the strongest, most determined, and physically fit ones that were going to be in front of the pack, so to speak. And those are the qualities that we want to be passed on to the future generations. So we would not fish for a period of time. It could be ten days, two weeks, something like that. But then after that, then we could fish. But we would never take that first run of salmon because they were the genetically most determined and the strongest that could pass that on to future generations.

LJJ: So in a sense, California Natives had an influence in the genetic strength of the salmon. That's incredible. You helped them. You helped shape them. And they helped shape you.

VL: Well, we wanted to help ensure that they continue in perpetuity, you know? And keep the species strong.

LJJ: Do you feel as though your Ancestors practiced ecosystems engineering?

VL: There again, you tell me what that is.

LJJ: Let me ask it a different way. Do you feel your Ancestors practiced the co-creation of landscapes?

VL: We had a responsibility to respect and manage the gifts that were given to us by Creator. And so we had to learn about them. And then we shared that knowledge within the tribe and with other tribes, about how to take care of those resources. As we learned, we would implement those different ways that were shared and that had an influence in it.

LJJ: The graph I want to show you is actually fossilized pollen records from Kentucky. It shows how about 3,000 years ago, all this fossilized charcoal comes in, which they presume is from the Shawnee burning the area. The fire correlates with all these food plants, and you have sumpweed. Sunflower starts coming in. Goosefoot starts coming in a little bit, all these edible and medicinal plants. I thought this graph was amazing because it shows how about 3,000 years ago, the Shawnee kind of moved in and completely altered the landscape. They turned it into a food forest. So the question that I have is, when you look at this graph, what comes to your mind?

VL: We did a lot of research at a place called Quiroste Valley, which is a part of the Año Nuevo State Park. We worked with archaeologists from UC Berkeley and we found a fire pit. That fire pit dated back about 11,000 years. We were able to do a lot of analysis

of what was inside that fire pit. What was used for cooking. There was a lot of plant material. When you look at Año Nuevo now what you see is a Doug fir forest. But when you look at that fire pit, and that fire pit dated 11,000 years back to just before contact. It showed a lot of our native plants, but it also showed charcoal.

They collected [samples] not just from the fire pit but from other areas. They collected fragments of charcoal. I think it was over 1,100 little pieces of fragments of charcoal. And they dated them all and they put them on a graph like this.

It showed that our people regularly used fire every 6 to 8 years, approximately. Fire by lightning only occurs in the Santa Cruz Mountains once every hundred years. So we know that that was used that way. But because there was so much seed in that plant, it was easy to recognize that this right here was an actual grassland.

Without burning, what happens is that the shrubs appear, then the Doug fir appear, and then the redwood trees appear. So the central coast of California was part of a forest system. But when our people moved in, they turned the greater part of that central coast of California into a coastal prairie. That's what brought in that biodiversity and brought in all the various plant diversities. And that's why it's recognized as the most biodiverse landscape in North America, but it's not natural. It was because of the way it was actually converted to prairie and then managed. That kind of goes back to the conversion stuff.

We were able to identify a large number of plants that were in that cooking pit. We also noticed other things like, say, for example, tobacco. I mean, you don't eat tobacco, but we found a lot of tobacco seeds in there. And tobacco does not grow on the coast. Tobacco was traded for. And so we recognize that there's a lot of trading that was happening at this valley. We also saw that there was a lot of fish, a lot of mammal bone, fishbone, but there was no bird bone. So we're kind of thinking that this most likely was part of the bird clan. That's why they weren't eating bird.

The fire was used to maintain that coastal prairie because the shrubs started moving here. But when you burn at that frequency, we burned down the shrub and it would burn the trees and keep it as a coastal prairie. So that's what came to mind when you were showing me that graph. It was used as a way for us to steward and manage the plants. And talking about the birds a little bit more, I'll just give you the full background. We look at fire also as being a gift given to us by Creator, and it's given to us to provide heat. To provide light when it's dark. It allows us to cook our food. It's very

important for ceremonies, because whenever we have a ceremony, we have the fire in the middle. Or just when we pray, we'll have the abalone shell and smudge stick, and we pray.

In that smoke, in that fire carries our words up to Creator. But it not only carries your words, it carries what's in your heart, what's in your mind, what's in your body, what's in your spirit, and what's in your soul. It carries that up to Creator. So the Creator more clearly understands what your needs are, what your prayers are for, and what you truly need, and understands you more. So fire is really important that way, for ceremony and prayer. Also fire is important for managing landscapes. And the people, as I said, would burn regularly, they would burn on a cycle, every six, eight, nine years they would burn. They would look at a landscape and divide that landscape into six, seven, eight different segments. And then they would burn a different segment each year. It wasn't just one big massive burn. They would do a series of burns within that segment, and whenever they would burn with that frequency, you did not get these big catastrophic fires that you see now. You get these fires that just kind of creep along the ground, very low intensity; they're not hot enough to start trees on fire. Maybe a Doug fir can start on fire, but they don't start trees on fire. They also clear that coastal prairie to keep it wide open. And keeping that prairie wide open was important for the food resources, but it was also important so you can keep your eyes on where the grizzly bears are coming from. That was important for that, too. You may have a grizzly bear sneaking up behind you there. But the fire is sacred. When you burn the fire among the trees and understory of the trees, what you're doing is, that fire is cleansing and blessing and smudging those trees. It's restoring a sacredness to them or helping them maintain their sacredness. When that smoke goes up it's actually smudging the tree.

In oak trees, when the smoke goes up there, it chokes out the bugs that are in the tree. When you pick acorns today, 70%, 80% of them have little holes in them from the bugs. But after you smudge the tree like that, the following year, the acorns come down, and they're very clean. No insects. You get a much hardier crop that way so it was important for that. But it's a ceremony when you burn. It's cleansing and restoring and purifying that which is burned. Also when it's going through the ground, it also has the effect of killing insects, like fleas or ticks; it helps clear the ground of those. It makes the ground healthier, not just for us, but for animals as well.

And it has more benefits than just that—whenever you burn it doesn't turn into coal it

turns into charcoal. What's left behind is just charcoal. And, you know, today, at home, I use a Brita filter. I put those little tubes as replacement tubes in the filter, and they have charcoal in them. And that's what you purify your water with. Whenever you have all that charcoal in the ground from that controlled burn, the water runs through that charcoal. You're purifying the water. When that water goes into those streams and oceans, it's much more clean and purified water that's entering there. That's a huge benefit.

A lot of our seed plants require fire to germinate—they have hard shells. A lot of our seeds have very hard shells, much harder than the European seeds. Whenever the fire comes through it'll soften the seeds so they can germinate, and our Ancestors knew that. That's why they would have a frequent burn.

It was also used to help control the food resources. For example, grasses and stuff like that, you burn through and you get just a huge production of seed after that burn. That right there is an important way of providing a food source for the birds and other seed-eating animals and even our Ancestors; seasonally their diets were 40% seed. So you're taking care of that food resource. Then that second year growth, you start getting those shoots coming out of the ground, they can go up to 2 feet to 3 feet. That's the preferred food for the deer, the elk, the antelope, and other grazing animals, because they're soft, they're moist and juicy, and they're just simply delicious, much more than if dried with years with no water or fire.

That third year, you start getting more shrubbier, so it's the way of taking care of the environment. You get that shrubbier stuff, and those are important food plants. They're so soft and very pliable. Those were essential for making cordage—for nets, for traps—and for making thicker cordage so you can tie down tule huts and use it for other general purposes.

That third year is really critical for the smaller animals, like the rabbits and the squirrels. Because after you burn the land is wide open. And so those squirrels and rabbits and all those other little critters, they become very easy prey for the raptors. The raptors just come down to pick them off. So here they're able to hide in that bush. That's really important too. Then as materials get heavier you can use them for additional materials like housing, clothing, tools, and other things. That third year gives you your basketry material too.

LJJ: You mentioned first year, second year, third year. You kind of knew after you did a burn what each year would bring for which plant and animal community? You had different

ones in different stages of regrowth, so you kind of had all operating at once?

VL: That second year, you're burning grass areas again because you're on the coastal prairie, but you're burning at a different patch area. And so you just keep balance in your resources.

LJJ: You mentioned that Doug fir is taking over this area in the present day, and I think the other day you mentioned to me that the various eco-nonprofits want to preserve those firs. They don't like you cutting them down. Is that true?

VL: Yes.

LJJ: So what would you say is the tension between these usually Euro-American nature conservancy organizations and Indigenous land management?

VL: Well, today, environmentalists, you know, they say we need more trees to sequester carbon, sequester carbon, sequester carbon. And then the timber people say we need trees, we need trees, you know. And so that whole management of forest lands is built on economics.

In pre-contact times our people knew you had to keep the number of trees down. I've heard that in pre-contact times they kept it down to like 12, 14 trees per acre. That's what I've heard. Whereas today, I've heard that a lot of timber companies will put 200 trees per acre. How much water is that sucking up? That's impacting the amount of water you have.

Also, you just really increase the fire danger. They want to save it and sequester it for carbon sequestration. But when you burn that tree, all that carbon is just releasing up in the air and all at once. Where's the benefit to that? Whereas, if you take a look at a coastal prairie, our native plants, those root systems go down 15, 20 feet. Well, those roots right there are sequestering carbon and they will never be released into the environment.

LJJ: The grassland roots?

VL: Yes. And they'll never be released into the environment. I'm not aware of a study that shows a comparison between one acre of forest sequestration compared to one acre of grassland sequestration but I'd be very interested in seeing that. Just knowing that the grasslands will never be released into the environment means a lot.

LJJ: All the animals that grow out of that prairie are carbon. They take carbon out of the prairie and put it into their bodies.

VL: That's a good one. I never thought of that one. I'll put that on my list [*laughter*]. They'll be hearing about that one the next time I talk.

LJJ: 12 to 13 trees per acre. So these grasslands and these prairies did have trees on them?

VL: This is more in the mountain forest area where they have limited trees like that. But then even there in the forest, the Indians always had meadows. You used to have these meadows that provided the biodiversity, and that provided for the deer that they would eat, provide for the squirrels and the rabbit they would eat, and the elk they would eat. They had these areas of meadows throughout the forest. It wasn't like it was 100% forest land where there's nothing underneath, just pine needles. It wasn't like that at all. They knew how to maintain that biodiversity. They knew how to provide for the diversity of food resources, including animal resources.

LJJ: I saw a written account of Yosemite before they turned it into a national park, and it was all about the meadows. This was in the early 1800s. And now it's all treed up.

VL: Yeah. And they managed those meadows with fire.

LJJ: Anything else you want to say on that topic of fire before I move to the next question, which is also about fire? [*Laughter*].

VL: Let's go to the next question.

LJJ: So when I read you this introduction, what comes to mind? I ask this question because I think that even though these scientists are on to something, we as Indigenous People can add a lot of color to what they are saying and bring a fresh perspective. This introduction comes from a paper called "Better Homes and Pastures: Human Agency and the Construction of Place in Communal Bison Hunting in the Northern Plains." This is a paper by an archaeologist looking at the plains management. He says, "The effectiveness of bison hunters has been attributed to their understanding of the local climate and topography, the grassland ecosystem, and the behavior of their prey. What is overlooked in this ecological explanation of bison hunting is the role of humans as active agents in the management of the landscape, the control of herd movement, and the maintenance of the kill complex."

So basically he's saying the effectiveness of bison hunters has been talked about, local climate, topography, grassland, ecosystem, etc. But what they're not talking about is how there was an active management of landscape, control of herd movement, and the maintenance of the kill complex. Any thoughts that come to mind?

VL: Well, this is way off topic but what comes to mind is, because of the way that we actively managed our food resources and shared the food resources, our deer and our elk did not migrate. They were there. Even today, down in Cañada de los Osos, they tagged a deer, they monitored it. And in its lifetime, it went no further than a mile and a half from where it was born.

People think of these deer going up and down the coast and over the mountains. We took care of them right there. I mean, we didn't have to do that. We only took what we needed. We didn't take more than that. We had to have a lot of deer because of the bear, you know that was their primary food. And we had wolves, too—they all played an important role. So that's what comes to mind.

LJJ: The deer were given a habitat through the fire?

VL: Yeah. They depended on the food plant. And we ensured that there was an abundance of food plant for them.

LJJ: They depended on the prairies?

VL: They depended on the prairies. Yeah. Or the meadows, as we've talked about. But without that, you would get succession where you had the shrubs and then the pine forest and then the redwood forest moving in. And nothing grows under the redwood forest.

I want to go back to what you talked about today, about those conservation organizations. You know, we wanted to start restoring the coastal prairie and we put in for a permit to cut down up to 10,000 Doug fir trees in Quiroste Valley, which is at Año Nuevo State Park.

A lot of conservation organizations opposed us. Because they said that trees, trees, trees are needed to address air pollution and carbon sequestration. And so we fought. We had to go before the county board of Supervisors to get them to approve our land management plan. And the Sierra Club was there objecting to us. A lot of landowners there were objecting to us.

It was a hard fight. It was a really hard fight. We won at the county level, and then they appealed to the state level. We had to go before the State Coastal Commission and present all over again why we wanted to do that. Luckily, what was really interesting there. . .I'll tell you a side story. It's really funny.

At that Coastal Commission meeting, they had on the agenda an item where they talked about Native American consulting with the Coastal Conservancy. So a lot of tribes

showed up to talk about that item. When the Sierra Club got there to talk about how they opposed the trees, they thought all those tribes were there to support the Amah Mutsun [*laughter*]. And so before that, they wanted to negotiate a settlement. We negotiated a settlement before we even went to the hearing, like the hour before. We talked and they said, well this is our reason and everything else, but we're not going to oppose you, she says. The climate isn't right. There's too many people interested in this. We're not going to oppose you [*laughter*]. And we got to do that. No sweat, you know.

LJJ: And this was to get a conservation plan approved, which included the thinning of the forest?

VL: Yeah. We cleared up that whole Quiroste Valley so we can restore the coastal prairie that was there before. That was very important. We're planning now. Before the end of this year, we're going to do our first burn there. We cut down 10,000 trees and put them in burn piles. And now we're preparing it for broadcast burn. It'll be about 240 acres we're going to burn.

LJJ: Was any knowledge passed down to you about how you would break the fires? I participated in a few burns and we'd have to mow an area, work with the wind, etc. Do you have anything to say about that offhand?

VL: No. This is knowledge that we are working to restore. And so we are trying to be as cautious as we can be so we can get the confidence of the public. At the same time we can learn how to safely use fire. We look for natural breaks in the fire like a river or a road or some open patch area. But at the same time we do use a lot of the contemporary ways of controlling the perimeter to ensure a safe burn, because that's most important. Right up after that Santa Cruz fire, we talked about fire beforehand and nobody wanted to burn. But after the Santa Cruz fire, everybody wants us to burn. It's completely different now. We don't have that threat. And then the Sierra Club knows not to challenge us [*laughter*].

LJJ: So we were talking about how the deer wouldn't travel much more than a mile. Are there any other herbivores that were here pre-contact, aside from deer, that you would support through this ecosystems management?

VL: Oh, elk. Elk's really important. I mean, Watsonville, which is just down the road from where we are, is called Tiuvta. That means "the place of the elk." What they had there is a lot of salt grass. That's the preferred, favored food of the elk and today we want to restore that. We're working to bring back elk. They're going to be transferring 14 elk into

the Santa Cruz Mountains. They're going to put them in [our] territory. We are working on the piece of property now, if we can get it, that's where the elk is going to go.

LJJ: Are there multiple species of elk that you know of?

VL: There are. Mostly in our territory they have the Tule elk and the Roosevelt elk. Roosevelt elk are larger. That's just a controversy. They go, "you need this and that." We just want elk.

LJJ: This is just for my own curiosity, more than anything. Were there any horses pre-contact? Sheep, any other goats?

VL: No.

LJJ: I know there was the San Clemente goat. Any other types of herbivores?

VL: Antelope were the other ones. I mentioned before bear, wolves; but those are the big ones. Coyote. And then you just get smaller and smaller.

LJJ: When you hear this statistic, which is a true statistic, what comes to mind? "Indigenous People built clam garden walls on 35% of the shoreline of Quadra Island, British Columbia," which is a massive island. Anything comes to mind when you think about how they built these clam gardens on 35% of the shoreline of Quadra Island?

VL: Indigenous People have been here for 15 or 20 thousand years; if you think of that in terms of generations, you know that's a thousand generations or more. So it's quite conceivable that over that period of time those walls could be built. They weren't built over a 10-year period or a 20-year period. They were built over generations and centuries. But that tells you, too, that it was very intentional, and it was very important. That knowledge was passed on generation to generation to generation—and the next generation understood what their obligation was. They knew how important it was that they followed through. Because you could not do that in one generation. You couldn't do that in 20 generations. That talks about the intentionality of those walls, and the long term commitment to get them to get them established.

LJJ: Do you want to share anything on this note about marine ecosystems management from your people? Were you all on the coast or a little more inland?

VL: No. We're a coastal tribe. Today we're a member of the Tribal Marine Stewardship Network. And there's four California tribes that are part of it, and three of them are recognized tribes. Tolowa Dee-ni' Nation, Resighini Rancheria, Kashia Band of Pomo Indians,

and [our] Band. And what we do there is we work on stewardship and coastal management, on restoration, and on research.

We spend a lot of time addressing issues tied to climate change. For kelp, for example, the acidification, the warming up of the oceans, has caused the explosion of the purple sea urchins. The purple sea urchins will chew at the roots of the bull kelp. The bull kelp is dying. That whole forest is dying. We're trying to work with the other tribes and with scientists to try to address how we deal with that issue. Some people are going down to the ocean and just collecting purple sea urchins, just to get them out of there. We're going to be training our stewards to scuba dive here by the end of the summer. Our stewards are going to be scuba certified, and they'll be collecting sea urchins. So that's one area.

That bull kelp is really important. The natural predator for the purple sea urchins is the starfish or the sea star, as they call them now. In California, in the Monterey Bay, there's 24 species of starfish and five of them now, because of that issue of acidification, are near extinct. Five of those species. The other ones are getting there themselves. That's a huge issue. That's the kind of stuff that we're involved in, in the research and following and trying to learn and try to address that very specific problem.

The other thing is with the kelp—the kelp forests are incredibly important for buffering the impacts of those severe storms. They're very important. So it's important that we restore those kelp forests to try and minimize the impacts of those storms. Those are the kinds of things that we work with the other tribes on.

The other thing is—important for our sea work—is bringing back the salmon. Recently we participated in taking down a dam. That was a big move for us. It was a small stream, but it was a spring-fed stream. That means that the water is cold. The other rivers are too warm for salmon. But this stream here is spring fed from the Santa Cruz mountains, and so it's cold. The salmon can make it up there. So we took that dam down in October of last year and now we're working to restore the habitat at the mouth, at the river's edge, and up there with the spawning beds. We're looking to restore that.

We are also doing DNA testing there. Environmental DNA in the waters. So that we can track the species that are going through there. We do that testing quarterly. Not just for salmon, but to see what effect taking that dam down had on other species. That's another project we do.

That's important because there's not enough salmon for the whales. So now the whales

are eating the sea otters. So now we're having a sea otter problem. They eat the urchins. The sea otters, what they're doing naturally now (well, not naturally, but just for survival) is they're going into the Elkhorn Slew for safety because the whales can't go in there. The mothers have their pups there. But they have to go up to fish, then come back and give the babies the food. Whenever they go out that Whale catches them and they're gone. So those pups are dying. Those are the kind of issues we deal with.

The other issue we're dealing with is the harmful algae blooms. All those agricultural fields in Santa Cruz, in the Salinas Valley and everything else that come up that Salinas River. The Salinas River is just disgusting, filthy, and the harmful algae blooms just take over and suffocate everything.

We do a lot of research with other tribes that are part of that network to see how to address these things and how we support each other. Share research and share knowledge. We're getting going in a good way and we're getting financed. That's really good, too.

I don't know if this even answers your question.

LJJ: It's blowing my mind. What comes to mind is just how delicate the whole system is and how important every single piece is, and then how American management is a bull in a China shop. Saying, "We'll just take this thing out." And it has enormous effects.

VL: Yeah. They think, "Well, the oceans warm up so what—the people adjust. The species will adjust." Tell that to the starfish. Tell that to the salmon.

LJJ: Do you have any knowledge about "berry management," if you will, or were berries an important part of coastal prairies?

VL: Oh, my gosh, we have berries. They're a very important food. I said we did not domesticate or alter, but I lied—whenever a berry plant would start growing anywhere near a tribal village, they would take that plant out, take it up to where the bears are, and plant it up there. That way the bears would not come down into the village. That's the one exception that we had, because we could not have the berries close to the village.

LJJ: Any other fruits or berries that you want to mention that were part of the diet, you mentioned grapes. Or management of those things.

VL: We have strawberry. We have thimbleberry, we have coffeeberry. We have a lot of berries; elderberry. But the blackberry were the ones that the bears loved and these other ones were so plentiful that it didn't really present a problem with bears. So we stewarded those plants.

For example, the elderberry—the elderberry can be used as a medicine plant. It has a soft inside, the pith, you take that out and you can make whistles out of it. And you also use the elderberry for clapper sticks. Our people did not drum, we didn't have hand drums. We had an earth drum, where you would put a log across a hollowed out area underneath it and boom!, that thing would go out a mile or more. And we had a foot drum, but we did not have hand drums. But what we had were the clapper sticks and the whistles and rattles.

LJJ: And the clapper sticks are made of elderberry.

VL: Yeah, and of course, the elderberry is a food, so food, medicine, and used for musical instruments and those instruments are part of ceremony.

LJJ: The last question is a big one, I think. Because everything I'm asking you is from my narrow perspective. Is there anything else you'd like to share that's bigger than what I'm asking? Anything else you'd like to share about anything?

VL: I have one thing I was saving to talk about at the end, but this is perfect. When I was going to college, you know, it'd be sociology, psychology, anthropology, geology. I knew what those classes were. That "ology" made it easy. But science, I'd go, "What the heck is science?" I had a little cheap dictionary in my back pocket, and I opened it up and, you know, that doesn't do anything. So I said I'm going to go find out.

So I jump on my bike, ride down to the campus, go to the library, go in there, and look for science. I looked at a lot of different dictionaries. And what it comes down to is, science is the study of knowledge. When I look at that and I look at our Ancestors, every one of our Ancestors was a scientist, was an absolute scientist. They had to learn how to use fire. They had to learn how to take care of the food plants for this animal or that animal. They had to learn about how to hold ceremonies, where the places of power were, the seasons, etc. They had to learn all that. And they were very intentional and sophisticated scientists.

So today, we do a lot of work with Stanford, with Berkeley, with UC Santa Cruz, now with UCLA. A lot of our ocean work is through UCLA. But I don't consider any of the work that we do to be research anymore. All of their work is validation work. All that they are doing is validating that the way our people used fire is the way we have to get back to. The way that our people took care of the oceans, the way we took care of those spawning beds at the mouth of the rivers for the salmon, we've got to get back to that.

The way that they took care of the migrating geese. We got to get back to that. The way that our people use the Central Coast for biodiversity. We got to get back to that. All they're doing is validating what our Ancestors did. What really upsets me is that until the science validates it, anything we say is not true.

The perfect example there is fire. We said we used fire to enhance landscape, to increase food production. Nobody believed us. They thought we were stupid. But then there's research out there and they show that fire does, in fact, soften the outer shell of the seed plants. And it's that softening allows it to germinate because those are really hard shells. Once they start seeing that, then they validate it, then it becomes true, then it becomes "real science." Now this is real science. This is what I'm talking about.

So that's what really, really bugs and upsets me is that they don't—they don't value or appreciate or understand or give any credit to the Ancestors that took care of mother earth for 20,000 years. We never suffered climate change. We never suffered a collapse in ecosystems like we do now. We were never faced with just having 60 years of topsoil left before mass starvation hits us. That's what we're looking at now. Our Ancestors never did that and never faced that. But yet, where's the respect? So that's one thing.

LJJ: I'm writing this within an academic context, in order to validate it—and not just validate it, but communicate it. Like, "Hey, this is real. And here's the nuts and bolts of it." That's what I love about how you speak because it's very detailed. It's not like, "Oh yeah, we manage the land." It's more like, "Monarch butterflies like milkweed." That kind of resolution and nuance, I think, is really important to help people grasp these concepts. This is real.

VL: I knew that when I was a child about monarch butterflies.

LJJ: In fact, the other day some birds were in my backyard eating it. They were these tiny, beautiful birds, and they were eating the milkweed.

VL: The cows love it, too. When they put the cattle out there they went straight to the milkweed, and there go the butterflies.

LJJ: The cattle seem to have a devastating effect on California ecosystems.

VL: Yeah, we used to eat milkweed too. Just cook it up. Delicious.

LJJ: Is there anything else before we close?

VL: You know, what I was saying at the very beginning. All restoration work has to begin with restoring and recognizing the sacredness. You want to restore your language—you

have to start with the sacredness, and prayer, and ceremony. You want to restore any part of your culture, your history. You want to restore any of that—it all has to start with sacredness. We have to recognize that. We have to honor that. That is the first word and the last word.

LJJ: Are there any policy recommendations you would put forth for today's world for land management?

VL: If we are going to successfully deal with climate change and survive climate change, it must be Indigenous led. We cannot depend on the scientists. We can't depend on the business people. We can't depend on the engineers. We can't depend on any of that. It must be Indigenous led. It is that Indigenous knowledge that was learned over 20,000 years that is going to allow us to survive climate change. If they're going to try and find some new way to take care of mother earth, it's over.

LJJ: Thank you for your time.

VL: You're more than welcome.

5.5 Interview 2: Diné (Navajo) Alluvial Farming and High Desert Ecosystem Design

5.5.1 Introduction

This interview occurred both in person and over the phone on June 15 and July 12, 2022, with Roberto Nutlouis of the Diné (Navajo) Nation. Deep in his desert homeland, Roberto has co-created an oasis of green through the careful leveraging of topography and monsoon rains. They work on a land base cared for through the generations. They recruit teams of young people from the rural community to participate in the growing of food and to help them reconnect to culture and purpose.

Driving to Roberto's experimental site can boggle the mind: How do people thrive in such a dry area? Especially with a warming planet, these deserts are becoming more and more challenging to live in. Nevertheless, this Diné community manages to produce more corn, beans, and squash than they can eat every year.

While it may be dry as a bone most of the time, this area is subject to torrential desert rains each monsoon season. If one can respectfully and effectively slow and spread these waters in alluvial fans, one can tap into its flow of natural irrigation and utilize the nutrients these floods carry from upland soils.

In addition to this ancient tradition of alluvial farming (also known as run-off agriculture), Roberto's community works with many Elders and food producers in various subregions of the Southwest. For this reason, Roberto has extensive knowledge not just in the cornfield, but in the vast and biodiverse desert landscape that surrounds him. These places have been worked with, prayed with, cultivated, and harvested from for countless generations.

I met Roberto many years ago at a youth conference attempting to address the climate crisis. We later collaborated more extensively to construct and renovate traditional *hoghans* for our Diné (Navajo) community. I was moved to request an interview from Roberto, which he very generously gave, due to his knowledge of the Diné language, his immersion in alluvial farming practices, his connection to a variety of Diné Elders, his ceremonial and Creation Narrative knowledge, as well as his experiential knowledge, having worked with the land and the rain all his life. This is the only person I interviewed who was from the same Indigenous Nation as me. It was a two-part interview occurring on June 15 and July 12, 2022.

5.5.2 *Interview Transcription*

LJJ: Thank you very much for your time. What is your name, your clan, your nation, and homeland?

RN: *Yá'át'ééh* [warm greetings]. My name is Roberto Nutlouis. I'm Bitter Water Clan—*Tódích'íí'nii*. I'm born for *Tótsohnii*, that's the Big Water Clan. My maternal grandfathers are *Mą'ii Deeshgiizhinii*—Coyote Pass Clan (Jemez Pueblo). And my paternal grandfathers are Sweetwater Clan—*Tódik'ǫzhi*. I've lived most of my life here in Piñon, Arizona. I was born in Zuni, New Mexico. Raised here in *Diné Bikéyah* [Navajo Homeland].

LJJ: How did your Ancestors ensure food for their community?

RN: It's definitely a lot of planning and knowing. There's knowledge that the Ancestors carried with them, passed on through generations. Those accumulated knowledges were very important. Then planning when to collect, when to harvest, when to plant, when to encourage growth of other species that are not necessarily domesticated.

In our story, hunger was a powerful force that our people experienced as well. And I think through that, they've learned how to endure and be able to survive. When I think about the Ancestors and our traditional narrative of how our people came across certain foods, in our story it talks about how the world changed at the time—those social and ecological calamities that forced our people into new places; the migrations. Upon com-

ing into these new places, they tried to orient themselves in accordance to how things unfolded in that realm. And oftentimes, they would also seek knowledge of other living beings that were already there and incorporate that into their own.

When you really look at this narrative, they also talk about nonhuman relatives. There's a lot of observation of what other beings were doing in different seasons and learning from nonhuman species. I think all of this played a role in how the Ancestors worked hard to ensure food security.

It took a collective. It wasn't a single act. They had to organize themselves in a way where everybody participated in one way or another for the survival of the community so that the community can thrive, not just survive. Everybody had a role. It was a big part of our kinship systems. That was very key because a lot of our traditional foods are very labor intensive. If you do it with a collective, it's a lot more enjoyable. It helps reaffirm kinship ties and the relationships within the family. There is a lot of interaction and socializing while processing and producing food and making food, preparing food. So, I think those are very key.

But overall, I think it's a continued observation of things, the natural forces, the life forces. Again, in our narrative, we've gone through calamities that required our people, our Ancestors, the Holy People to emerge to different realms, the four worlds that they've gone through. There's a lot of teachings in what they came across in these new places that they emerged into. A lot of observation over time—how the landscape changed. Adapting to the changes. The different times, different places, different ecosystems that existed here.

The landscape is ever-changing. It is never a constant. In that way, innovation and adaptation were key in ensuring we had enough food, and we created systems that were resilient to the ever-changing forces here on the landscapes.

LJJ: Would you say it was mostly agricultural, or not necessarily?

RN: How would I put this? "Indian rice grass," for example, was a very important food for our Ancestors. It's a type of grain that grows on the landscape. Our people would actively encourage them and spread the seeds or create conditions in the ecosystems where these particular plant species would be able to thrive and be able to expand some of their habitat. So our people were engineering the ecosystems in a way, to encourage certain plant species that were vital to the community's food sources. I don't know if "farming"

catches that part—but our people, the Ancestors, before what we understand as farming today, were doing that.

Plant-based [non-agricultural] foods are very important. It's still recognized in our ceremonies. There are certain ceremonies that require certain foods that were utilized prior to the introduction of corn and other cultivated crops. They're still recognized and respected in our ceremonies. I think it was a real mix; it wasn't either/or. But I would like to believe that we had a more [non-agricultural] diet because we had so many varieties of plants in the different seasons.

Here in the Southwest on Diné Bikéyah and other places in the Southwest we have different ecosystems from 15,000 feet up on top of the mountain, all the way down to the lower elevation that was at 4000 or 3000 feet. So in between there's all these different ecological niches and different plants that existed. Our people took full use of those food varieties in the different ecosystems. I think our Ancestors really did both hunting and gathering and actively spreading plant species.

Farming came in for sure. In our tradition it's in the third world, blue world, where our Ancestors came across corn. White corn, blue and yellow corn, and all kinds of different varieties of colored corn and seeds. Turkey brought the seeds to this realm, because [the third] world was being destroyed. Turkey was the one that brought it to this realm, to this fourth world.

In the fourth world was the Bighorn Sheep, *Ya'askidi*, he is the one that has been the caretaker of the seeds. He's depicted in our ceremonies and he's kind of in charge of the fertility of lands and plants, and he's the knowledge carrier of that. He only emerges in the Night Way Chant, the *Ye'i Bi Chei*. He emerges during that time and blesses the people with his presence. He's a carrier of our seeds.

We're told that we five-fingered Diné species, that's where [the seeds] came down to us. The twins got it. It was gifted to them by this being, humpback *Ya'askidi* [Bighorn Sheep]. They gave it to their mother, which is our Goddess, in a sense, our mother [*Asdzą́ą́ Nádleehé*/ Changing Woman]. She was the one that eventually gave it to our people and told us that this is the way that life would be here on this landscape. The seeds and the corn, they also made a journey where we eventually crossed paths and it was gifted to us. We were informed of its importance, its cultural significance, its biological significance in terms of consuming it for biological nutrients. It talks about the collective. The well-being of the collective. Our communities. It takes a group to sustain a community.

Then finally the well-being of the ecology of the ecosystems in which the Ancestors were producing the food, harvesting the food. There was always an awareness of those life forces that allow our foods—whether it's plants or animals or other foods that we collect—that those natural systems needed to stay intact. We don't compromise its integrity. Biodiversity—*ałtaas'éí*—that's what we call it. The biodiversity of ecosystems was critical. And only in healthy ecosystems can diversity really flourish.

Agriculture, how we understand it now, was given to us by the Holy People, by the Ancestors. Those are the things we have to always uphold. Those values you cannot diminish. You can't go without those things when we produce our food.

LJJ: *Ya'askidi* is the bighorn sheep?

RN: A lot of our deities, the Holy People, are the persona of these animals or these Elders. Because these animals were here before us. They're our Elders, teachers, and mentors. We look to them for information as to how should we live here on this earth because they've been living on the landscape fully immersed in that natural way. Whereas we humans have become detached from reality, the natural forces. The animals, they continue to have that awareness and continue to live in accordance with it. So, in that way, we seek them for guidance. Our people believe that the bighorn sheep is a being that belongs to the Holy People. We don't go and hunt bighorn sheep.

When you shear sheep, you'll always notice that in the back, on its neck, there are always seeds of whatever it's coming across on the landscape. You'll always see that. We already knew that that's where they have a bunch of seeds and stuff on their back. When it's depicted on ceremonial drawings like sand paintings, they'll always have this humpback; it's because it's carrying the seeds. That's what causes it to have its humpback [1].

You'll see petroglyphs all over around here. The bighorn sheep was very plentiful in this region. It's unfortunate that when European sheep were introduced here they were also carrying a lot of disease and decimated a lot of the bighorn and the pronghorn. The population of wild game kind of collapsed as well. They were very plentiful.

LJJ: What were some of the ways your Ancestors worked with the land to ensure there would be food for the community and future generations?

RN: The Holy People and the Ancestors emerged into the various worlds. Each had its own

[1] Also known as "Kokopelli" in wider contemporary Southwest society.

way they organized themselves, governed themselves. All of that fell apart, for whatever reason, and they had to emerge to another realm.

When you analyze those stories, those narratives talk about different beings like the bear, the mountain lion, the porcupine, the bluebird, the hummingbird. They all played a role in shaping our food system. I think first and foremost, for our Ancestors, they really looked to these Elders. Especially here on the landscape, because as I mentioned these beings, these Elders, were already fully immersed in the way the natural system works, and they'd created their own way of interacting.

The Ancestors were observing them and figuring out what would work for them in replicating what these other beings were already doing. A big portion of our knowledge of food systems comes from observing what other beings are doing in their habitat and from there beginning to replicate some of those things.

We have farmers that live under rivers, so they irrigate with the river water. You have farmers that live in the desert, like in Leupp [Arizona], that region is totally dry. They found a way to irrigate their fields and use rainwater. We also have Diné people that live in the mountains. They have their own strategies and different water sources that they use. I call us the Canyon Diné because we live in canyon country.

What I had mentioned earlier of our Ancestors observing other beings—one species is the beaver. Beavers were very plentiful here before the Europeans came and demanded their fur. They were very plentiful and they're part of our Creation Story.

I was interviewing my *nali* lady [paternal grandmother] and she was telling me that her brothers and her uncles used to create these brush dams because their fields were situated on an alluvial fan, which is a term used by ecologists for how a watershed works.

When the water comes down from the hill, when it comes to the valley, it spreads out into an alluvial fan. A lot of our people built their food systems within these alluvial fans. And just in observation you can see where it's very lush and the soil is very rich and there's more moisture in the soil. Our people already spotted that. They would create these brush dams, and weave it really tightly. So, when the water came that brush dam would help slow and dissipate that energy because the water can be very powerful, especially if it's going into your cornfield. And these dams catch some of the debris as it made its way into the corn fields. And I was fortunate enough to see some of the remnants of it by my grandmother's field, her family's field.

In my own thinking, how did people come up with this? And then just hearing the stories about beavers, it would make sense for someone to come across a wash that has water. Because the beavers used to live all over in the different drainages into these river systems that we have out here. They created their own environments. Our people, our Ancestors, probably observed that and saw how effective it was in helping to hold back water, to calm the water down, and just put that into agriculture.

And it's really common sense. If you know how to observe your land and be there with it in the various changing seasonal cycles, it could teach you a lot of what the potentials can be. An innovative, creative mind helps to create systems, engineer systems, where the land can be very productive. So that's how this place has evolved.

With that said, that's the spirit of humanity. It's not just Indigenous People—all people. We learn how to adapt, we learn how to create things that are of good service to us and to our environment, to our home. That's the human spirit in us. That's what has helped create this space. There are more ways to work with the land where the land can be very, very productive and very regenerative.

Especially now with a lot of the changes happening due to climate change and extreme weather. We have to continue to observe the land and see how it's responding and where can we assist in its response. Or where do we need to assist ourselves [*laughter*]. Because the land is already doing it itself. It's really us needing to shift our mindset. In our traditional narrative, they say that we went through these various worlds. I feel like that "world" is all in the mindset.

A new world has to emerge from this one we're living in. Everybody knows. Scientists know that we have to drastically change what we're doing. It's been called for, for a long time, but unfortunately it falls to deaf ears when it comes to politicians. Whether we do or don't, the land is going to change. We are going to have to change. It's better to do it now and evolve with it. That's what to me Indigenous means, it's that you evolve with the land. We're trying to learn this new dance that she's putting forth for us. New rhythms on the landscape.

LJJ: What would you say are some of the key features of that value system of our people? What is the value system that mediates not just our food, but everything that we do.

RN: The Bighorn Sheep is the carrier of the seeds of this realm. He gave it to the two twins in exchange for its life. In that story it reminds us of corn, beans, squash, and tobacco.

Corn is the spiritual nourishment. We begin to see it as not just food, but an embodied energy that can heal us at a deeper level. When you look at the corn song, it's saying that the corn is praying for me. So there's that relationship again and food value: the spiritual significance of our food. When we grow our corn, the corn recognizes us and prays for us. We bring it into our ceremonies, our spiritual healing. It plays a very important role in that healing journey. We use the corn pollen in general, during the ceremony. We use white corn meal for the male and the yellow corn meal for the female. And that's what it talks about: it's not just food for biological nourishment, but it's food for the spiritual nourishment. The value of corn reminds us that it's beyond biological, it's also spiritual.

Second is the beans. The beans talk about the biological nourishment. If you add it to your corn and other foods, it enhances the protein content. Especially out here in the Southwest, when you're interacting with your land it requires a lot of energy. You need that biological strength and endurance to be out there with the elements and all its forces. So, our food should also be a biological nourishment.

It seems very common sense, but in reality, the current food system is not nourishing our body. It's doing the opposite. Diné food tradition, Diné food value says our food should be nourishing us so we can do what we need to do. To survive and to thrive out here on these landscapes.

The third one is the squash. Squash is one of those plants that is prolific. When it starts to produce the squash it just produces in so much abundance. They say the more you pick, the more you'll get. That teaches social responsibility and social nourishment. Our food should bring people together. We should learn to live together and share and take care of each other. Like redistribution of wealth. During harvest season, you'll have relatives and neighbors and families start coming around asking for the taste of the harvest. It's usually squash that are the first ones that will start producing.

To be able to give, to be able to ensure that your community is fed, I think is another important value in our food systems. We're supposed to share with our community. And in that to rekindle kinship, relationships. To work together to celebrate that. It should nourish our society, our kinship, our relationships to one another.

Last but not least—none of these are more or less important, they're all equally important—the last one is tobacco. Tobacco is one we don't necessarily cultivate. The majority of these tobaccos are found out on the landscape. That teaches me the importance of the

natural plants, the natural foods that exist out on the landscape that we don't necessarily participate in cultivating. That we also have access to those foods. In order for those foods to exist, ecosystems have to be healthy. There's biodiversity in that natural system that needs to be protected. A lot of that is changing because of climate change. We have to observe: Why are they migrating? Where are they moving? Tobacco teaches us the importance of biodiversity and the health of the land because we don't only eat food we cultivate. There are other foods on the landscape that we also eat, and we have to take care of those too.

Tobacco is associated with the north. It's associated with darkness. And I say, darkness, not in a bad way. It's a beautiful phenomenon that we experience [at night]. A time to let go. We are encouraged to smoke tobacco right before you call it a night to let go mentally of all the things we've encountered both good and bad, whatever it was during the day. Let that go so that we can rest and be rejuvenated throughout the night. So that healing could take place, of our mind and body. The next morning we wake up fresh. *Nitsaahaakees*, a blank slate where we can continue to create beauty again.

You need tobacco too. You have to smoke. These places and spaces that are important and sacred to our people and the energy there. Once it gets desecrated, once it gets abused, once it gets damaged, it also damages that healing energy as well. We're told that we're supposed to have reverence for these places and spaces where we gather our food for healing, our medicine for healing. A lot of these places where people make offerings is where a lot of these plants are also found. Tobacco talks about the importance of keeping our ecology healthy. We have to protect it through the environmental justice movement, calling out these destructive practices that are undermining our wellbeing and these ecosystems that we rely on for healing.

The land and the life forces, we have to have reverence for them and create proper relationships with them. We're fortunate to have various ceremonies—formal ways that we talk to them. We give them offering. We have songs for them.

We actually did a seed blessing ceremony a couple of years before the pandemic. And a lot of the Elders from this region came, and they were very appreciative of it. Some of them said it was their grandparents that last did these ceremonies.

LJJ: Are there any principles or tenets or assumptions that are baked into our Diné philosophy of how we work with the land?

RN: That's a deep question and it's a really cool question. Making my brain turn, like which way to go?

The biggest assumption Diné People have is *Hózhó*. That assumption is put into powerful intentions. *Kodóó hózhó dooleeł* is the first thing we're supposed to utter at dawn when the day breaks when we go out and we pray. It's the first thing we say in all our prayers, *Kodóó hózhó dooleeł*. And *Hózhó* has a lot of different meanings for different people. But I always refer back to the ecology, because that's where a lot of our philosophy and knowledge comes from, the earth. Even in our [standard] prayer, after we say *Kodóó hózhó dooleeł*, we then greet our mother first, *Nahasdzą́ą́n Nihimá* [Our Mother Earth]. That's deeply ingrained in us: That it's a living being with an intimate relationship to us as a mother.

We greet her first after we set our intentions. We understand that there are processes unfolding on Mother Earth that are aligned with the natural laws, the natural flow of energy. Our responsibility as humans, as Diné People, is to understand what that process is. How do we align and synchronize with that natural process? And that is Hózhó. If we can do that. At least for Diné people, we were told to strive for that.

Sa'ah Naagháí Bik'eh Hózhóón is the foundation. *Sa'ah Naagháí Ashkii* is masculine energy. *Bik'eh Hózhóón At'ééd* is a feminine energy. *Sa'ah Naagháí* is timelessness, everlasting. We come from a timeless realm into this realm. *Bik'eh Hózhóón At'ééd* is our expression here in this realm. It means there's a process in place manifesting on this earth. *Bik'eh Hózhóón* is that process, the natural law, the fundamental law that we follow. And if we follow it and honor it, we will be okay because the earth is our mother, our teacher, and our provider.

There's also the teachings of the mountains. They call it *Nitsáhakees-Nahat'á-Iiná-Sihasin*. *Sihasin* some say means hope, which is true. But for me, I look at it from an ecological perspective again. Whatever that natural process is, the ecological functions and the processes, we cannot compromise that. Because those systems are the backbone of other life forces, life beings. Whether it's for current generations or future generations—these life forces have to be maintained, and we must keep its integrity intact, in terms of the ecosystems and the ecology. Then there is hope that life will continue. Without it, then where can you gather hope? If your ecology is destroyed.

We're in that difficult time where it seems like a lot of our ecologies have been destroyed or altered. That's what makes our philosophy so sophisticated. I'm touching on just

a little bit of these deeper terms and ceremonial knowledge. These teachings, we say, came from the mountains. So, our people can decipher meaning just by relating to the mountains in these deep ways where these teachings come from. *Sihasin* is represented by the Northern Mountain [Hesperus Peak].

To have hope is to make sure that we take care of our landscapes, our home, and manage our home in a good way. To not abuse it. Even our physical home, or structured home. I've always been told to keep it clean, don't abuse it. Bless it. We bless our Hogan with cornmeal. That's the same way we're supposed to treat our ecology.

But of course, we've gone astray—as we have done in the past. As our stories say, people go astray. We pick up values that are counterintuitive to the values we were told to follow. We're in those times again. We're witnessing that. We're fully immersed in capitalism, which is the root of this parasitic relationship [to the earth] it has created in us.

So, landscape is really important, taking care of our ecology, taking care of our home. And a lot of our ceremonies refer to these sacred places, sacred life forces, water, flowers, the plant people, and our people prayed to them. We talked to them. We asked for healing, but they have to be healthy to heal us. Things are shifting now. So, this continued observation that our Ancestors have been doing is something we have to keep. We have to continue to gain insight about what the next steps are for people.

LJJ: What are your thoughts on the Western concept of ecosystems engineering? For example, the clam gardens I talked about; the hand-planted kelp forests of the West Coast people; the prescribed fires to manage prairies and forests; the terra preta systems of the Amazon, where they would make those deep compost soils; the creation of food forests; management of grasslands to attract buffalo; etc. What are your thoughts on this whole idea of co-creating ecosystems? And feel free to disagree with the ways I've said it.

RN: I think most people are miseducated. I was also less educated. I read that book, *1491*. The scale of systems that were managed by the Indigenous Ancestors was like, wow. They were thriving. That's how they were able to thrive, creating these systems at that scale. It's fascinating. Also, hopeful. However the Ancestors were inspired, hopefully we are blessed with that same inspiration so that we could create those systems again to feed our people today. It's possible.

I think it can only happen when you have a profound understanding, connection, and reverence for the life forces that you're going to be bringing together to create this beauty,

this magic on the scale that the Ancestors did.

They must have been really good community organizers [laughter]. To organize all that labor force to do that. They were probably masters at it because you have to have sophisticated self-governance to manage that. So, we are very capable of doing it again.

It may not be the way the Ancestors did it. Probably won't be the same way because things are shifting. Landscapes are shifting, but it's okay.

In the end, in terms of food security, I think we really have to localize, strengthen our local food systems in the long run. And this is one way to do it. There's going to be different strategies, which is important too, because different strategies strengthen biodiversity. There's so much creativity to that and how one does it. So there has to be diverse approaches.

LJJ: Do you feel your Ancestors practiced this ecosystems engineering? You were talking about the beavers and the water maneuvering. But if there's any other ways, you're welcome to share that now.

RN: Pastoralism was something huge that the Ancestors brought to this place. Maybe we need to do more research. How did that shape the ecology, the way that our Ancestors practiced it? It's way different.

But yes, we had to create systems to sustain our people and we did it well. At one point, we were considered one of the wealthy tribes even to European standards. One that fascinates my mind is the orchard. Those are some of the places that Kit Carson and his crew went and strategically destroyed—the fruit orchards that our people were planting all over these canyon lands. Those would have been amazing to see.

The word "Navajo." It's not a word that we call ourselves. It's a word from pueblos that recognized our farming ability and success. And that's really what the name refers to, is success in farming. When you look at the traditional stories, the different shapes that people use, it wasn't just a rectangular plow, it was different shapes that they planted. I'm sure those were important in different ecological settings. What shape you're going to use to effectively capture the water or sediments or whatever you're trying to do. Those shapes, I'm sure, played a key role in how you cultivated your space. I know the stories about those shapes that are used.

Our people use game corrals as well. They would manage the herd, so we still have remnants of those game corrals around here.

LJJ: How did those work, if you don't mind me asking?

RN: It was V-shaped, then a circle [a funnel]. My *nali* lady [paternal grandmother] said there were a couple of them where they would run the deer. They exist along all the ridges. They would do their hunting ceremonies, do their chants, and then the people of the community all would have to participate to run the deer. If they didn't go to that one there would be another one. It was like a series of four of them. They would just run the deer, elk, whatever wild game was here until they would run into the game corrals. They would ceremonially harvest some of the deer. They would use their hides for ceremonial use. So again, it really ties in with spiritual nourishment and biological nourishment and those prayers and songs associated with it. They were managing a lot of the deer herds.

Juniper trees are used a lot in our home settlements. So, I'm sure they were managing a lot of the juniper encroachment onto grasslands, because you needed grasslands for livestock.

My grandma was always burning. Growing up I always saw her burn. And it just makes sense now because you see a lot of the brush fires that are happening in California. When I used to go over there a couple of years ago, I knew those were going to burn. It's just common sense.

Burning was just something that you do when there's just too much accumulated biomass. You burn it. Well, now you can use it for mulch and whatever, but my grandma was always burning those big bushes. When tumbleweeds get too big in certain areas, or if there's certain plants like the burrs, those get onto the sheep wool. So if there was a big blooming of burrs she would always go out there and burn. That's how she kept certain plants, the invasive plants, in check. So those are still practiced. When you go to the back roads, you'll see grandmas still burning around the homes and in the cornfields.

Up here [Piñon, Arizona], my paternal grandmother, lived about 3 miles south of here. She had a house that she always burned around at certain seasons and then has cornfield, and *cha'ha'oh* [shade structure] by the cornfield. She was always burning around that area too, around the cornfield and the *cha'ha'oh*.

LJJ: Do you think they do any large scale burning?

RN: We really can't do large scale because you get in trouble and they say it's so overgrazed so there's really not much to burn even if we were allowed to. Because our animals are eating it. Now people are turning to like goats and sheep to help bring down a lot of

that vegetation that would otherwise become a fuel load.

So our people already knew that. I guess on some level there's probably not much need to burn because the livestock were already out there cleaning a lot of these grasslands and shrubs that would otherwise accumulate and burn. But where it needed to be burned, they would burn it.

Forest fires would burn and people would observe that. And there's stories of that. Some clans actually talk about how they emerged from that, the black streak. There was a story that I heard about the migration of one of those clans. Diné People, we are not just like one race of people. We are different groups of people coming together and creating a community. Our kinship really speaks to that, the different groups of people that came to become the Diné People through the kinship system. This Elder, was describing his clan. He traces it back to Wupatki. That's the one with ruins near Flagstaff. When that village collapsed they started migrating, and they were more of a forest people, and they migrated along the Mogollon Rim towards Show Low in that area. The name of their clan derives from the burning of forests.

So, all of our clans have these different histories of different people that eventually became part of our people that makes us who we are. In terms of relationship to fire, we all have a really unique perspective of fire.

Like for us, fire is a protector and we refer to it as both a *chei* [grandfather] and a *masani* [grandmother], depending on how we're utilizing fire. If it's going to be for ceremony, we call it grandpa. If it's for nursing, cooking, that kind of use of fire, we call it *shimá* [mother]. So that's our relationship to fire.

In terms of utilizing fire to manage landscape, people had to do it just in general, Diné or not. Like I said it's just an instinct. When I come across land that is overgrown, it's like, this is going to burn at some point, so might as well burn it in a way that doesn't get out of control. It's very common-sense things. I think it was practiced by everybody, at least here in this continent. I don't know what the landscapes were like in Europe, or in other parts of the world. But I know here fire plays a really important role in ecology. It's coming back. And it's coming back with a bang.

LJJ: What inspired you to start doing the alluvial fan farming?

RN: I grew up right there at the farm. My grandma used to live there and we used to stay with her during the summertime and help her take care of the sheep. We used to see this

phenomenon of the water flowing during the monsoon season. We would go down to the ditches and try to make little dams. We would be there two or three days just putting together these structures to try to capture the water and create our own little swimming pools.

My grandma and others would be upset with us telling us not to play in the waterways. She saw what we were doing in terms of capturing the water. As I got older she indicated that along that area there used to be corn fields a long time ago. I just saw remnants of the fence posts. She used to tell us, "Oh, there used to be cornfields right there. It would be great if we could get the water to flood that area again." I guess that's how it used to be back in the day.

On my father's side my grandmother's my *nali* lady's brothers, they were active farmers. I would go out and visit the fields on my father's side. That's what also inspired me to connect water catchment with food.

LJJ: Why would your grandma get upset with you for playing in the waterways?

RN: Sometimes those floods become real strong. Even in the fields that we created, they would come real strong and could sweep you out. That's what happened to one of my younger cousins. He got swept away by the flood waters. Luckily he survived it, but it did take him all the way out to the highway. So, it is dangerous for little ones. We've lost some community members, some kids playing in the wash during these storms.

LJJ: It's kind of amazing because when you look at our desert homeland, you don't envision rivers so big they could carry children away.

RN: What you just explained is what was so fascinating for me—to see all this rain and all the water flowing.

We would go to [my paternal grandmother's home] during harvest time and help them with harvest. That's my early childhood memory: Just being with the grandmas down in the cornfield. They would have their own makeshift *cha'ha'oh* that they would live in. They would spend several nights there. I really liked living out there in the *cha'ha'oh* with them at the cornfield.

In preschool you make planters. We would plant beans and you watch it grow and you take it home. I was really fascinated just even by that; I remember taking home my little planter seeds that grew out and I showed it to my grandma, my *nali* lady. She helped me transplant it and she planted some squash just behind the house. We planted some

squash and that was my first time planting, in kindergarten or preschool, and just seeing it grow the squash and then producing food.

After my father passed away, when I was around nine years old my mother took us into town to Show Low and we stayed out there off the rez. Being off the reservation for a couple of years helped me to recognize the uniqueness of our culture. I was attending an all-white school with very few Natives and people of color in my school. That's the first time I got introduced to racism too. People just hate [laughter] for no reason other than the color of your skin.

But that school really made me appreciate and want to learn more about my culture. That's when I started really inquiring on: Who are we? Where are we coming from? So just talking with my grandmothers, both sides, that's where I started learning more and more about everything, the good and the bad. The Long Walk.

And about my Elders during that generation that maintained these fields. They would talk a lot about the farming practices and the pastoralist lifeways. That really resonated with me. When I was like 16 years old I first made the cornfield with the help of my uncle and my *masani*'s [maternal grandmother] younger brother.

LJJ: Why do you keep doing alluvial farming? What are the things you like about it?

RN: The strength of the water flowing was pretty powerful. I knew we had to figure out a way to slow it down and spread it on the land. That came from just observing every harvest. You can see that pattern where the water flowed into the field, all those corn would be real nice and vibrant. Where the water didn't touch the field, that's where the corn would be struggling. How do we spread it more effectively so that all the corn could get fed?

So what I love about alluvial farming is when the rains come and the waters start to flow, I find that really satisfying—looking at the water and slowing it down, and I'm watching it flood the field. That's really satisfying and relieving because we do a lot of watering usually in June and July. To get those big Male Rains that makes the water flow, it's always good to see that

And then after the rain, all this life responds to all this water, even things we don't plant. We get a lot of amaranths. We get purslane. They say it has a lot of omega-6. You can actually fry eggs with it because there's natural oils. So we get a lot of that too. That's pretty exciting for me to see when the land responds to the water.

The other thing is working with young people. These agricultural traditions have really eroded away. Many of our people, especially young people, for whatever reason, they were never raised in that. It's not just farming, but there's deeper cultural roots to it. There are real solutions to it, to the issues we're dealing with in our communities today. There's real healing in it.

And to be able to do this work collectively in a way that we enjoy each other's company. It really helps to mend kinship and create new kinships, new relationships in the community. And then the connections nationally and across the rez. You get to meet all kinds of people. We get to host students, people that are interested in it. That really helps too at the local level, when they see other students, college students, come and want to do some work with us.

I did interview my *nali* lady [paternal grandmother]. She told me that her husband and brothers used to make brush dams. If you go down to their field, they would take these old mattress springs and put it along these wooden posts and stuff it with sagebrush. Those fields are also situated right along these alluvial fans. She mentioned that's how they used to slow the water down as it came into the field.

I did go down to look at some of the remains of what they had built. It's relatively flat now because of all the sediments that it had captured over the years. So that really is like, whoa, you can do this. That was the key. Talking to each farmer: water, water, water. Water is so important.

LJJ: I know they've done a lot of research about this with Zuni Pueblo. They're kind of the main ones who've been looked at in Western science when it comes to this practice. Do you know much about Pueblo application of this technique?

RN: Most fields are strategically placed within or along these alluvial fans and waterways. That is a shared farming strategy. I think across the Southwest those of us that are not connected to any irrigation system, like a river flow system, the majority of us I would say are located within or near these alluvial fans. That's where you're going to have the most moisture and the most nutrients in the soil.

LJJ: Would you be open to sharing more about how alluvial farming works with nutrients?

RN: We've done about 56 fields that we've helped rehabilitate. Some of those are located within the alluvial fan. When we were taking out the fence posts, you could see like three to four feet of debris—the good stuff—that had flowed into these fields. And it's

really like rich. That's the evidence I've seen of these fields that have been situated in these alluvial farms. Probably two, three generations back and all those years of them capturing water, it's evident now that it has picked up all that organic matter. All that has flowed into the field has piled up.

And then just in our field, we can see it every year. Where the water flowed and all that nice black, black stuff—the nutrients that get pulled into our fields.

Even if there were no fields there in these alluvial fans, they have some of the richest soil moisture and soil nutrients, because everything flows and spreads right there. Once it spreads and slows down, it drops everything it's carrying. More water is able to percolate into the soil.

The more organic [matter] or compost you have in your soil, it's able to hold more moisture. That's where you see a lot of vegetation growing. Our people understood this. People that have lived out here that have called it home. Not just our people, but others, our neighbors, other tribes, they know. They understood this phenomenon and how to make use of these micro-climates to grow food.

LJJ: Do you feel like that is different than Western farming, or is a reflection of our cultural values in any way?

RN: Yes. I feel that it's collective knowledge and wisdom over time, intergenerational observance of land and all its phenomena. The various life forces that come through the landscapes throughout the seasons and how the land and the plants and everything responds to these things.

That's what makes us Indigenous, is really looking at the land, how it behaves, how it reacts and, and how do we align ourselves with that natural process. To be a part of that natural process. That's really important because that's the only way you're gonna survive long-term [laughter].

I think the Western methodology of farming is forcing the land to do what companies want it to do—greedy people running those companies. Most of those decision-makers have probably never even stepped a foot in these farms that they're responsible for and making decisions for. Decisions are made in an artificial worldview of profits and everybody else is forced to follow rank, all the way down to the people interacting with the land within that system.

But as Indigenous People, people of the land, it's very different. You have to work with

the land, observe its subtle changes (because that could make a big difference, good or bad). And adjust, make use of it. If it's good, if it's not, then re-strategize. Reevaluate your strategy. You're not forcing it. You're working with it.

I feel like that's traditional ecological knowledge there, its continued evolution. I don't think it's ever set in stone. This knowledge that our people have. Especially now with climate change, you know, things are switching up really fast. Things are changing really fast. We have to continue to observe the land.

Whatever technology we have today, try to use what's compatible with our values and with our relationship to the earth. Utilizing those technologies where it's appropriate. Innovation. Innovate and build on to what we have. Try to create newer systems that are even more resilient. That's where we're at today. We have to do that [laughter] to survive for food and water security long-term. Maybe even beyond our own years that we have left to live here on this earth. We have to create systems that can surpass even us.

Most of these were created; we just stepped away from it. A lot of these dormant fields we've come across in our survey—these fields are still there. People have to be brought back to them, reintroduced to them, and to build it up, rehabilitate them.

That's where the opportunity lies in creating infrastructures that can best capture and utilize the water, the nutrients.

Also our seeds. Our seeds is so important because they can tolerate the drought. They can tolerate. . . just like when the floods do flow they're resilient to its energy. Sometimes it can knock them down, but they can rise up again.

We declared our region, GMO-free zone with the chapters a couple of years back. We have to be careful. If we are very successful in rehabilitating our lands and making it farmable, we can't let the corporations hijack it, companies hijack it, greedy people. That's why we did some work around being GMO-free, because that's all tied to greed.

LJJ: You mentioned livestock. Did we always have the Churro Sheep? I know that's a controversial question, so I won't like quote you on it.

RN: Our people and all people in this region, the Southwest, have interacted with sheep. They are part of our Homeland. We coexist with them. So, we've had relationship with sheep way before the Europeans brought their sheep over. We had sheep here; horses came from here. We still have stories of them. So, the idea that we didn't have any relationship with these animals prior to the Europeans, is a really false notion. It's more

complex than just Europeans coming here and bringing these livestock.

But back to sheep—we have evidence that our people have had relationship with sheep because there are petroglyphs all over, even here in our region, *Dził Yijiin* [Black Mesa] region. We have petroglyphs everywhere. The Ancestors have left their mark and there's always an image of sheep. As I mentioned in our narrative, bighorn sheep is the caretaker of the seeds. And we have ceremonies around that. Different parts of the sheep are used in different ceremonies. These ceremonies as I understand it were already here before the Europeans came. Such as the Blackening, where they cover the body with ash, and mix it with [sheep] fat and apply it to the body. These practices have been around way before Europeans came.

We have had relationship with sheep, not just Diné people, but people here in the Southwest in general. That I will say. And you can quote me on that [laughter].

The controversial part, like you said, is were churro always here before Europeans? We've always had relationship with sheep. When you look at our story about the twins and *Asdzą́ą́ Nádleehé* [Changing Woman], everything was in ruins. There were calamities happening all around. Ecological and social calamities happening. The Holy People were very afraid we would be completely annihilated. They petitioned the universe to assist to ensure that we would continue. *Yoołgaii Asdzą́ą́/Asdzą́ą́ Nádleehé* emerged in those challenging times. She was the answer to those prayers. The prayer was, how do we not become extinct? Show us a way that we can survive. Not just survive but thrive. So *Yoołgaii Asdzą́ą́* was gifted. She came and she helped to reestablish the social order of what we now know as *Diné K'éji* [Navajo Way of Life]. In her restructuring it, she reintroduced these animals to us—sheep, horses—in the way that we now see them as, as domesticated. Prior to that, our relationship was to the non-domesticated ones. They say the horses were here, but the sun took them. When the twins went to go see their father, one of the gifts that they were given was horses. They brought that back.

Our narrative is a little more complex and a lot more in-depth than just the simple version of Western history books that says, "Oh, these Athabascans migrated here and they didn't even know how to weave. They just stumble out here." Making us look like we were starving and ignorant until we came across Pueblos and Europeans. Then we "finally got our act together" [laughter]. Which is totally a racist science, I think. It's rooted in a racist science to simplify our history in that way. It's more complex.

I always tell this to my crew (or whoever is willing to listen to me) this term Navajo as

an ethnic or racial term is a very new one. It's part of the American racial discourse, which is not a true discourse for us. It's very much based on race and segregation based on race. But if we look at Diné, it's more complex than that.

Linguistically things can change real fast, but biologically, it remains far longer than linguistics. Like even now, you could say the Diné and Hopi, we've switched out linguistically. We converse in English. Does that make us non-Indigenous to this land? Because now we speak English?

That's kind of what they say about the Athabascans from the Pueblos' perspective. They say you all [Diné] speak Athabascan language. Therefore, you all are not from here. You all are newcomers. For me, [Pueblos] really try to use this argument that Navajos are new: "We're older than you. We have seniority over you. You stole everything from us and made it yours." I always hear that from the Pueblos. On one level, they say they have their own history. They say they don't need white interpretation of their history. They have their own narratives. They prefer that. But when it comes to us as Diné people, they resort to the Western interpretation of us and really use that to degrade us. Unfortunately, that still exists in our communities and our neighbors. We still have certain animosities.

LJJ: Both of my Diné clans are Pueblo clans. One is the Zuni Taach'iinii. The other is Áshįįhi, which is so closely related to Jemez Pueblo you're not supposed to marry. That Western narrative that Athabascans got here in the 1500s has created a wedge between us and our Pueblo relatives who we've been here with for so long. We have our histories of Chaco Canyon, too. Which flourished and collapsed in 1100s. Diné People have our oral narratives of Chaco. So it doesn't make sense that we are so recent.

RN: We have a very complex history on one level. As I was stating earlier, we as Diné People are a people of mixed lineages. Half of our Ancestors were here already as our clans indicate. The other half were migrating. It's a very deep and complex journey that our people have been on and we continue to be on as human beings, not just our people alone. I think all humanity has had this. That's why we have the Athabascan language. And even within each of these Pueblo societies that our clans originated from, they even have their own migration stories. I think there's some validity in Western science, but I think it needs more details. It's not completed right. In certain areas it needs to be cleaned up, take that racism out of it.

LJJ: The Churro Sheep are called *Taa Dibei*. What does that mean and why do you think they're called that?

RN: It's like Philmer [Bluehouse] said: You have your common language, you have your ceremonial language, and you have your esoteric language. We use certain words in certain settings. That word, *Taa Dibei*, I think that one's deeper, like a ceremonial esoteric word. *Taa Dibei* means *The Sheep*, the original sheep. I feel that it is referring to the ones that *Yoołgaii Asdzą́ą́/Asdzą́ą́ Nádleehé* [White Shell Woman/Changing Woman] gave to the people. Now I mentioned that we've had relationship with sheep even prior to her. She's the one that—at least in our narrative—she's the one that gave the people the domesticated version. When we say *Taa Dibei* this is the breed that *Yoołgaii Asdzą́ą́* gave us and then all other breeds came along the way. By Uncle Sam [laughter].

LJJ: The name of the dissertation is "Architects of Abundance" and it says architects because I want to honor the fact that—and this should be obvious, but it's not, for some reason—that a lot of our systems were by design. Instead of what most people think: "the Indians are just running around trying to find a berry to eat." Is there any other thing you'd like to say about that or ways in which you feel we would create systems by design?

RN: You have to be a key observer. Our people really observed what's happening on landscapes. That requires a whole thought process, interpreting what's happening and making decisions. So it wasn't just by coincidence. It wasn't just by stumbling across it. Maybe some[times] it was, but there was a real intent to understand and to connect. That's how our people created landscapes that thrived and allowed them to thrive, too.

LJJ: I know at Chaco Canyon we were not doing things right. But I'm sure they were, you know, architecting landscapes in Chaco. Do you think there's a wrong and a right way to do it? And what differentiates wrong from right when we work on the land? Cause there's a fine line between designing thriving systems and dominating the earth, you know?

RN: We were not perfect [laughter]. The Ancestors were not perfect. That's why we have the stories of the worlds collapsing, the calamities that our people had to go through, the Ancestors, the Holy People had to go through. In those narratives, it really talks about how relationships get disrupted. Either amongst each other as human beings or with the land, other beings that we coexist with, other life forms, sentient beings—things get out balance.

That's probably why in our teachings *k'é* [kinship/relational responsibility] is so important. The teachings behind these stories always come out as: how do we maintain those proper relationships? What are the do's and don'ts that we were taught, the lessons learned from these incidences from previous worlds that led to calamity?

An example, like tattoos. Our people believe that we're not supposed to be marking our bodies in any way and keep things natural the way it was given. When you begin to add things to your body, you're beginning to think that you can be better than the natural order. Everybody interprets these stories in a different way but this is how my grandma used to say that that's what happened.

When people go astray from these original teachings, then they start doing all kinds of things that are not acceptable. [My grandma] always used to use tattoo as an example. When people start marking themselves, that shows society is beginning to shift away from the "do's and don'ts." She would say that's why the Anasazi succumbed to their calamity is they started doing these things: marking themselves up and building these things, thinking that they could dominate [the natural order]. There are different social indicators that Elders will say show that society is in a state of unraveling.

They're very evident in our community. Things are shifting. We're there again. We're there at the social and ecological calamities; were living through them today.

LJJ: You could architect something that is disrespectful, or you could architect something that's in alignment with what's going on. What your grandma said is relevant because she's saying that you trust what creation gives you and that denotes humility. If you trust that it's enough, then you can't do better than it. That's what Elon Musk is doing. He's trying to do better than what was given. He wants to go to Mars. He thinks he can outdo creation and it's that sort of arrogance. What you were saying about positioning the fields where the water already flows, we're just aligning with the way creation already is. We're not trying to siphon it up or pipe it up to Colorado. One of my friends was talking about water sovereignty. Honoring where the water wants to flow. And I feel like your fields are an example of that because you're not irrigating water from way far away. You're tapping into creation, not working against creation, because it's already all there. That's the funny thing about Elon Musk: he's working against creation and he is swimming upstream. Just let go. Let the current take you because it's way bigger than you. It's way stronger than you. Why not work with it?

RN: The community out here identified that as one of the main [obstacles] to working together: someone is going to come in trying to dominate and claim everything as theirs. The Ancestors also dealt with that in their migrations into the various worlds. And the Coyote is... He embodies all of those things that we should not do.

Even in our field, one of my [family members] will go on her power trip. They'll tell others: "These are all mine." They try to claim it all as hers because she has a grazing permit. This notion of individualism and the current land tenure that we're under is created by the feds, managed by the BIA, and is very individualistic. Only one person has their name on the grazing permit. Only one person has their name on the farm permit. So that's a big challenge: working within a system that was designed for the deterioration of our system. It's a catch-22. We've all been, to some extent, indoctrinated with this idea of individualism. "Mine." Our challenge today is to overcome that individualism and come back to the collective.

We try to do that at a grassroots level, but it is really difficult to do that at the [policy level]. Bless their hearts, [a non-profit] is trying to tackle this at the food policy level. For me, these systems are so entrenched, and we've given them so much power that I don't want to waste my energy trying to change the system. At least not now. I would rather focus on the tangible results. That's not to say that that work is not important. I think it's extremely important, but equally important is what do we build then? How do we rebuild? Rely heavily on ancestral wisdom, which includes value systems. But to try to do it within the current system is very difficult. That's not to say impossible. If there's a will, there's a way for sure. Any young people that are coming into this work, they probably have a lot of energy to tackle that. Things are happening so fast in terms of climate change, and how it's undermining and could potentially collapse this Western food system. The last time I read up on food systems and climate change, the current infrastructure, especially here in the west, were not designed to be resilient to what we're experiencing now, the mega-drought. It's no longer a drought it's aridification because drought means that it's gonna come back to normal. We're not going back to normal from what the scientists are saying.

So, these food systems that we have, the Western systems, they have to switch up too at some point. We're at that breaking point with dams—Lake Powell and Lake Mead. It's real, we're seeing it declining. Within the next five years, things are gonna switch up really fast. It's unfortunate we have these old men in these political power positions.

They're just trying to squeeze out as much profits as they can, maybe for their kids, before they die. And that's greed.

LJJ: Have you seen any ways that our culture would work to feed other beings around us? My friend heard a Hopi guy say that you plant enough corn to also feed the birds, which I don't know. Maybe that's a crazy idea, but do you have any notion of this? This notion that our food systems are meant to also feed the rest of creation as well.

RN: Except crows.

LJJ: [*Laughter*].

RN: You go to the grocery stores today and you buy an ear of corn, they're like real perfect ears of corn. The kernels go all the way to the tip. [In] *Diné k'éji*, what I've learned, is those perfect ears of corn belong to the Holy People. It's used for spiritual nourishment. So those perfect ears of corn, you save those and you use that to pray with, to offer gratitude, or when you're doing the healing ceremony. We get people coming around asking for those corn when they're having ceremonies done. We definitely give it out to the community that needs it.

The story goes, the time when corn was being given to our people, the worm and the insect volunteered and said, "We'll eat the corn to make sure that it's okay for humans to eat." So traditionally we eat the corn that the insects and the worms got to because if they can eat it and they love it, then that means it's good for us. Then the perfect ear is we save for spiritual purposes. We don't eat those.

GMOs were developed to withstand the pesticides and herbicides. Within the Western food system, we've eliminated all these "pests"—we call them pests—by spraying them. And now we have a bunch of perfect ears of corn that we buy from the grocery store, and we eat it.

There was a test where they put these GMO seeds next to these ants and their organic corn. And they wouldn't eat the GMO seed. They would only eat the natural ones. And it reminded me of that story of our story, that these bugs volunteered a long time ago to say, "Well, we'll taste it first." So I don't feel any [bad] way about them getting to our corn when they do. It's like, okay, if they like it, then it's good for us.

So just that story in of itself explains that certain foods we do share, at least the ones that we cultivate, we do share with other beings. You just gotta find that balance and understanding with them.

I haven't gotten that far yet with the crows [laughter]. It's still a hate relationship. Love hasn't really come in yet. So maybe this one has to be pondered a little bit more and make peace with them [laughter]. But they do, they come in and eat at least a quarter of our harvest every year. But it's okay, we have more than enough to harvest. They'll ravage some of the corn and then whatever [cobs] they eat, we'll just toss it to the horses. We share our food a lot with the livestock. We'll bring the livestock into the cornfield. They'll munch out all the stalks and whatever's growing in there. They'll drop their manure and all of that gets re-plowed into the field the next growing season. In our larger conversation about food and watershed restoration, we do talk a lot about the wildlife and how do we also create habitats for them as well.

We're also introducing some of the native plants into our fields. I'm calling it the edible landscape. We brought in the sumac, the Chiiłchin berries, wolfberries, cottonwood trees, locust trees, rabbit brush, four-wing salt brush. With the intent to utilize them down the road, when they get well established for food and also for basket making, for dyeing. So we're not having to add more stress to the ones that are struggling to survive out there on the landscape.

One of our young workers is actually experimenting with growing piñon trees and Ponderosa pine trees and Juniper trees. He started a little tree nursery. It's very inspiring to see. We're hoping to begin propagating and grow in more of these native plant varieties. So there's opportunities there for us, once we get a hoop house built, that we can begin to grow [trees] ourselves, introduce them near our fields, our homes. They themselves attract their own clans [laughter], whoever relies on them. They'll be coming around. Bees, butterflies.

We're also seeing a lot of those wild potatoes. They're called the Four Corners Potatoes. I now know how they look like, so we don't hoe when we go out to hoe. We don't hoe those plants, we just let them grow. I continuously see what plants are popping up and encourage them. Last year an Elder identified a plant growing in front of the Hogan. She said it was medicinal. She encouraged us not to plow that field and see if they grow out again next year. We have 11 plots, one we decided to just let it be and just see what other plants begin to emerge. These systems, whether we're utilizing it or not the land itself will be thriving because of our efforts to capture water in them. You can see that it's a lot more lush even if you don't farm it, if you build these structures, you will make the land more productive.

When the first flood comes, which is usually in July or August, we'll allow all of the weeds to grow after that. We'll keep hoeing until August. Then in August, we'll let whatever grows out, grow out. By then, the corn would be big enough to be able to compete with those plants for moisture. The reason why we do that is because we're going to bring our sheep and horses into the field. And that gives the animals about two months' worth of foliage to eat. And that's a big cost saving for us because we don't have to buy hay or anything.

Especially for livestock owners, that's a big plus. You have more foliage for your animals. The BIA are telling [farmers] to ease up on farmlands because it "takes away from your carrying capacity of livestock." So, they're putting farmers against ranchers by telling us to halt any more farmland because that farm would have to take it out of rangeland [for the ranchers' livestock].

[The policy states] once it's converted to farmlands, you can't bring your livestock into it. This is so backwards the way the system works. This current U.S. system doesn't recognize those relationships between farmlands and livestock and how it's mutually beneficial. Those things have been severed legally. You can't bring livestock into your field. It's just so frustrating and discouraging at times. So let it collapse [laughter].

LJJ: That field is not just for you. It's for the animals too. The animals are not just for us to eat—they're are relatives and our companions. We're not doing it just to fatten them up, we're also doing it to give them a life. But then also when we do butcher, they have all those nutrients in them, from the soil, from rain.

Thank you, 'Berto. I really appreciate this. Thank you so much. I can't even explain what a great gift this is that you've given to the world. I hope that it inspires people all over.

RN: It's good to chat, sis. *Nizhóni* [this is good and nice]. I think we really have to inject our knowledge and proclaim our knowledge to these academic systems. So claim them loud and proud.

5.6 Interview 3: A Maskoke View on Food and Land Systems Management

5.6.1 Introduction

This interview took place at *Ekvn-Yefolecv*. This large land-base was purchased in 2018 and returned to the guardianship of Maskoke People. It is a grassroots sustainable community—

where food is procured locally—as well as a highly efficient Maskoke language immersion school. The only children completely fluent in the Maskoke language are said live to at *Ekvn-Yefolecv*. Maskoke People are also incorrectly known as "Creek Indians." The community sits in the ancestral homelands of Maskoke people, in what is colonially known as Weogufka, Alabama. The name is a double entendre in the Maskoke language meaning both "returning to the earth" and "returning to our homelands."

I was fortunate to interview one of its co-founders, Marcus Briggs-Cloud, a fluent Maskoke speaker. He is a deeply dedicated student of Maskoke traditional knowledge as provided by his Elders. He has also spent much time delving into Eurocentric scientific worlds, well-versed in a variety of disciplines.

Ekvn-Yefolecv is a sight to behold. Visitors are strongly discouraged to speak English, especially during class time for the children. Sturgeon, buffalo, horses, heritage breed pigs, goats, endangered chickens, and other animals dot the various nooks and crannies of this southern Appalachian landscape. Crops of heirloom seeds are nestled near Pawpaw Trees, Indigenous Cane, Hickory Nut Trees, White Oak and more. More culturally significant plants than I could ever know (or am allowed to know as an outsider without proper training) fill the land. Innumerable streams flow freely through the rugged topography in this area of great precipitation. An orchestra of cicadas sang so loudly at night, I could scarcely hear the words of my interviewee in the recording. The traditional Maskoke way of life is strong in this area. The seasonal commitments they must carry out as part of their spiritual covenant to the land are alive and well.

I met Marcus many years ago at a Native Youth leadership conference in Norman, Oklahoma. Many years later, while living in Alabama, I was fortunate to reintroduce myself to him and his community. I was permitted to visit *Ekvn-Yefolecv* several times to help with the construction of their budding sustainable infrastructure.

I was moved to ask Marcus for an interview for this study. He and his community have profound, language-informed knowledge of traditional Maskoke land management practices. They have intentionally burned hundreds of acres of forest floor to rekindle this ancient practice of their Ancestors. Perhaps most importantly, this community (being steeped in the language) is profoundly connected to the traditional Maskoke value system. Because I believe that the value system of a culture is the primary driver and sculptor of its food and land management systems, I knew he could provide deep insight into what made Maskoke Ancestors sustainable and successful.

The interview occurred on July 8, 2022. While sitting on the back porch of a cabin in the village, the recording instruments were activated, and the interview began.

5.6.2 Interview Transcription

LJJ: What's your name, tribal affiliation, and homeland, if you're open to sharing?

MBC: [Maskoke Language] I'm Marcus. I'm a Maskoke person and a son of the Wind Clan. Our homelands are what's commonly, colonially known as Alabama and Georgia and some parts of north Florida. Our people were displaced. The majority of our folks in 1836 were removed to what's commonly, colonially known as "Indian Territory," which became Oklahoma in 1907. A faction of our people was removed to what is colonially known as Florida, another faction down to the Tensaw River on the Alabama/Florida border, and likely others who retreated to countless tucked-away places.

LJJ: How did your Ancestors ensure food for their communities?

MBC: I think the majority of our folks are currently unfamiliar with a comprehensive understanding of our traditional food systems, unless they go to the archeological record or other external sources. However, in all extant Maskoke communities, there are a number of food processing skills that somehow survived colonization. It's really remarkable. In our community, we are always seeking to forge a resurgence of those dormant foodways to ensure that the unborn generations inherit a rich and vibrant food system to live by daily across all seasons.

We know from archeology that our people at one time were not agriculturalists. Our stories tell us about the times when certain crops came into our lives. We domesticated [Maskoke Language], known as *Chenopodium berlandieri*, going back 3,850 years ago [also known as pitseed goosefoot, lamb's quarters, and huauzontle, of the Amaranthaceae family], sunflower, and pepo squash. But corn is not really that old by comparison. Corn came to our People through the Corn Woman, that's a story that Maskoke People hung onto after removal. She gifted us something that altogether changed our lifeways.

I feel really fortunate. I grew up in Florida and then I moved to Oklahoma and have been around both communities. I lived in the Poarch Creek community for a while as well, which has some traditional foodways. My reference point is that if a concept exists in both Florida and Oklahoma, then it's a pre-removal one. I see certain food traditions survive between the two places, I know that it's not just something they adapted in the

area that they moved to. It's something that they carried on that's ancient.

The Corn Woman's story is one of those that survived in the East and West. In Florida, that is probably one of the most known stories. Maybe a couple others in concert with that. The Corn Woman is so iconic to our people because we make so many corn dishes. We prepare it so many different ways. The Corn Woman is also iconic because, well, she's a woman. She's the progenitor of the corn. Because of that, women became the caretakers of the corn. The gardens are their domain. And because our ceremonial life revolves around it, the corn established our matriarchal society. So, our entire gender roles, our governance structure, et cetera, is established because of the food. The religion revolves around the food.

Because our language is so tied to the earth, we have the vocabulary to do the things of an agrarian society. We have the verbs that go with all our foodways. Our foodways take a lot of time. Processing the food takes a lot of time. So, if you're living close to the earth, it's the way that our language prescribes—that's the way I view it, the language prescribes the way that you live. My belief is that for traditionally agrarian societies, if our lifeways are not fixated on regenerative agriculture, there's no way that our languages are going to survive. The verbs for cultivation, the traditions that go with observing the gardens, raising the animals, talking about the behaviors of the crops, the behaviors of the animals and our responsibilities to said beings. That takes up a lot of time. We don't have time to talk about Facebook or even what people would call "current events" in the mainstream. So, what do we have to talk about? The things that we're supposed to be living, if you will. The way we're supposed to be living in our traditional foodways. We gauge by the seasons. Our ceremonies. We're looking at what's going on with the gardens. We're looking at what's going on in the natural world for when to plant, when to harvest. And it generates a lot of conversation. As the idea of establishing this ecovillage emerged as a container to utilize our language daily, I sat down to think about verbs that we seldom use; the reason we don't use them is because we don't have a need for them. As our language becomes more obsolete, we inevitably see it disappear. The objective became to identify the verbs we inherited from our Ancestors and fit them back into our lifestyle. Many of those verbs are agriculturally based.

So, we eat turtles, deer, buffalo. We eat lots of "wild" greens because they're so nutrient dense. Our people must have known they felt good after they eat the volunteer greens. A lot of things that are on the ground right now are food sources. We know that today

from Western science, that those volunteer species in the ground are more nutrient dense than what we could plant in the garden. But see, planting in the garden is not just about the food source. It's about the spirituality.

I'll say this about the corn too. I'm not talking about genetically modified sweet corn. I'm talking about our traditional [Maskoke Language], flint corn. We've got flour corn. We have different kinds of corns. I don't want to go into too much detail about it. That gets into more esoteric knowledge. But I'll say this; you've probably heard of Indigenous People in so called "Central America" that nixtamalize the corn by soaking it in this alkaline solution. Our people make a what's called [Maskoke Language]. It's made from this wood here. We make lye with it and then that's what we cook with the corn and what makes the corn bioavailable, the nutrients in the corn. Somehow our people knew that, and we never stopped making it. No matter where you go, Florida or Oklahoma, the Poarch Creek community. People made [Maskoke Language] after the removal of our People from our traditional homelands. What we do is make the lye first and store it. Then we add it anytime we're going to make it. You're supposed to have it on your stove at all times at your camp. If somebody comes over, even if they just walk 50 feet from another camp, that's the first thing you do is serve them [Maskoke Language]. It's that important. If you don't have it, then you serve them water. We continue to drink it fresh. Once it ferments, we call that [Maskoke Language], which gives us a probiotic drink. That is such a staple for health.

Maskoke People are all about health. Our lunar calendar prescribes different things that we are supposed to do to promote our health. We're always looking to use traditional medicine regularly as a preventative, not just to treat symptoms that arise, it's very spiritual. Health that's tied to the biophysical use of plants and animals. We continue that today with the corn.

But there's some trickery going on of course because people are eating this genetically modified stuff. Even for our sacred ceremonies, few folks grow corn. It's common to consume corn off of the side of the road. That's GMO sweet corn raised by a white farmer. Traditionally, each *Etvlwv* grows their own corn.

LJJ: And *Etvlwv* is like "village"?

MBC: Village. Nation. Yeah, because you got to do the work to grow the corn. You got to put those seeds in the ground. You got to do the work in between. Suffice it to say that

there's a lot of attention that goes into that, that goes into this agricultural cycle. It's not just the corn—there's lots of crops.

But the corn, in our village, we don't speak any English around the corn because she's an old woman. The old Maskoke women, they don't like when you're speaking in English. They don't like when you act a certain way. You don't go cranky and pouty around them. You have to conduct yourself in an appropriate way. Being in close proximity to the gardens also holds you accountable for your actions. You have to act appropriately. You got to be on point, for our socio-cultural protocols.

When Europeans first brought the cattle and the hogs, the sheep, et cetera, our people were really opposed to those animals. They would say, "They're going to make us sick. They make you slow like a cow if you eat it." We heard this in our lifetime. For 400 years, Maskoke People were actively adamantly opposed to the consumption of these animals. And because they destroyed the cane breaks in the bottoms. And so, our people were opposed to them.

However, they came to appreciate them somewhere along the line—before Indian removal—and many of them became cattle farmers. Even in Florida today, the Seminole tribe is in the top five cattle operations in the United States. I always remember seeing them riding horses, herding cattle. You know? It was a thing. They didn't speak any English, only spoke in the language. They just, you know, that was their thing being cattle herders. So, it carried over from Alabama–Georgia days.

And the hogs that we raise here at the village, Guinea hogs, are our hogs that our Ancestors contributed to the breeding of. They found that the lard was really valuable. And because these are foragers, they're a landrace breed, you get all those omega-3 benefits from them. Same with the sheep and the goats. Ruminants are even healthier. They figured that out as well. Like, "Let's work with these animals." As a disclaimer, it's nice to know from Western knowledge, as an exercise of their epistemological pursuits, that nixtamalization makes the nutrients bioavailable and that ruminants like buffalo provide omega-3's that we need, but our People didn't articulate their relationship to the foods in that kind of microscopic way, and thus we don't need to create new vocabulary to explain biochemical interactions. My job as a language and cultural revitalizer is to ensure that the practices, and the vocabulary to utter those practices, are impressed upon the children and youth as normalized Maskoke lifeways, and furthermore emphasize the importance of intergenerational transmission of those practices and accompanying

vocabulary to articulate them.

LJJ: Do you think they had pigs prior to colonization?

MBC: I don't know. I look to the language. This is a weird thing: we call an opossum [Maskoke Language]. We call a pig [Maskoke Language]. They started to eat that [European] hog and it became so important that they probably were naming it more daily than the opossum. They start calling that one [Maskoke Language], which means white pig. It's weird though, that the original species would have an adjective attached to it. That's uncommon. But, the word [Maskoke Language] is also onomatopoetic, imitating the hog sound, which is similar to other languages around the world. So, the etymology is a mystery.

LJJ: The original species wouldn't have an adjective.

MBC: Correct. Seldom to have a compound word. It's hard to say but hogs became a really important food staple for our people.

It's also less energy [to raise hogs]. Our folks lived in villages. Pretty stagnant. They ventured out in different ways, but they weren't super mobile intentionally. Their ceremonies were really place based. I don't want to reduce it to an archeological theory, that it was "too much energy to go out and forage." They also think that people who were running around looking for food had no complex cosmology. That's silly too. But I think as our people rooted in place that certainly people had more time to develop a more complex cosmology. If you got a growing season and you're not going out as much to forage, it gives you more time to think about those things, to schedule ceremonies and experiment with the metaphysical world. It gives you more customs. Time for more profound teachings, kinship structure development, to derive taboos etcetera.

Acorns are a major staple in our society too. We call those [Maskoke Language]. Oh, that one that just fell there, is called [Maskoke Language].

LJJ: The hickory nut?

MBC: Yeah. That's a *Carya* species. They're all over here. There's the *Carya glabra*. We say [Maskoke Language]. Pig nut hickory. Then there's [Maskoke Language], *Carya illinoinensis*. That's pecans. Our people took to those. I usually use those scientific names because if I say both the Maskoke and the common names in front of my people, then they'll only use the common English name. If I use the scientific name, they don't typically remember it or will be more inclined to use the Maskoke name before the scientific botanical name [*laughter*]. It's kind of the trick to get them to remember the Maskoke

name, and it's pretty effective. My kids know a couple hundred plant names so far and will continue to learn more as they mature.

LJJ: Chestnut?

MBC: Those chestnuts were a major source of food. That one is not here anymore. We have [Maskoke Language] and [Maskoke Language], two whole moons dedicated to that Chestnut. In this ecosystem we live in a longleaf pine ecosystem as the dominant species. Our folks certainly were burning here [longleaf pine only thrives in fired lands]. The second most common species was Chestnut, in this very land that we're on right now. Unfortunately, you know, the blight took them out.

What does it mean when a culturally significant species like that—so culturally significant that your moons are named after it—goes away? What does that mean? The same for the animals that we work with for medicines. If that species goes extinct, what does it mean? How can we keep track of our moons if two major moons don't have the very extant biota necessary to tell what moon we're in? It's problematic because if a tree was so important to our people that two moons were named after it, it was a dietary staple and we are suffering today without the ability to consume that sacred chestnut. Species extinction has spiritual deprivation implications, but I won't go into that here.

Red wolf conservation, for instance, is so important to us. Bison conservation is so important. The [Maskoke Language], various sturgeon species conservation is so important to us, et cetera. We must do all we can to seek population resurgence of these species, in turn making our medicine and people stronger.

LJJ: Well, they have an impact in your life physically and spiritually. If the physical goes away, it's not complete.

MBC: Right. That's why at *Ekvn-Yefolecv* [Maskoke language immersion ecovillage] we're trying to bring these back. Chestnut is on our list. We're going to try to work with them and see if we can get it to grow past four or five years.

The third most common species around here, [Maskoke Language]. It's a *Quercus marilandica*. That's the one we like to make [Maskoke Language] with, the lye. This [Maskoke Language] tree right here. That's a *Quercus alba*, white oak. We really like those—any of the white oak family—because they have less tannins and it takes less time to leach them. We work with any acorns. We collect them and the kids know how to process them.

We shell them by hand because it's a community activity. It takes a lot of time. You sit around and you visit when you're doing that. It's time for storytelling. It's time for gossiping. In the fall time the kids go out and they harvest them. Then we make the [Maskoke Language], the flour with it and it's good. It's very good. We leach it, then we pound in the [Maskoke Language], then it's good stuff.

LJJ: You make soups out of it or porridges or flours?

MBC: More so flours. We add it into the [Maskoke Language]. But the best one to add into the [Maskoke Language] is the [Maskoke Language], the Hickory. My partner likes to make that. Her grandparents grew up on that. So, she likes to make that too. When you add those Hickory nuts to it, oh, that is our favorite. The meat of the Hickory nuts just adds a whole different flavor. It's called [Maskoke Language].

LJJ: Different from the shag bark hickory?

MBC: Shag bark is different. That's good too. You can make drinks just from the bark alone. They do grow in this area, just not right here. Very few. But we're planting those just because we like that taste.

LJJ: And you make like a cake type of thing when you mix the Hickory with the corn?

MBC: Oh no, it's a drink. You take the meat out of hickory nut. It's very time consuming. But it's good and worth it, you know?

Now with the acorns we do make flour. But they're such a bitter food that people in American society have gotten away from appreciating bitters. But they're very good for your liver, you know? Your liver responds to the bitterness of a plant. This is what I learned from Linda [Native food sovereignty practitioner], the way she does it. She busts them up and soaks them in maple syrup and puts them in the refrigerator for a couple hours. So, I tried doing that and I said, "Oh, I can't go back any other way." It's a good source of protein. It's just very healthy in general. So many benefits. The maple syrup is also medicinal. We can tap trees here, even *Acer rubrum*. We call it [Maskoke Language] in our language. That's the southern maple. It doesn't yield the same as those sugar maples up north. But you can get a little bit from it.

Of course, berries. We've got moons for berries. The [Maskoke Language] is the mulberry. That's very important to us. [Maskoke Language], [Maskoke Language], the dewberries and the blackberries. They're very important. They're the ones that crawl on the ground and the blackberries are the ones that grow up. [Maskoke Language] and

[Maskoke Language], those are different *Vaccinium species*, like blueberries, you could say.

Common names are frustrating. Some people call them huckleberries. And then people call this [Maskoke Language], winter huckleberry. That's why I prefer the scientific name. We know in our language what we're talking about when we say it. If we're talking in Maskoke, we don't have to worry about it. We know exactly what we're talking about.

Takes a lot of time to harvest berries. You're not running around on YouTubes and TikToks. You have to do the work to eat. And if you're not doing the work to eat, then fossil fuel and exploited labor is doing it for you, right? In the industrial food system.

This is why we believe our village life is so important, returning to our foodways. Traditional foodways are the only way to constrain our participation in capitalist consumerism and our participation in the exacerbation of global warming and exploitation of human bodies. I'm not saying that it is our solution to reverse the climate crisis, but certainly, if everybody was doing that, so many things would change.

People wouldn't be having babies just to have a baby. They would really adhere to traditional protocols for marriage, baby making, and your parental responsibilities. You don't have daddies running off on the kids. They have to provide for the family because you got nowhere to go. I mean, you're going to be shamed if you abandon your responsibilities. Yeah. You're gonna be shamed by your people. You can't live without your people because you've got to do all this work to go collect food, or you're going to starve. You have to do it as a community, not as an individual. If everybody returned to traditional foodways, so many things would change for the good.

LJJ: How many acres did you recently burn? Where did you learn about burning and why do you burn here?

MBC: I have always known about burning because we call it [Maskoke Language], which means like "fertilize it." When somebody says [Maskoke Language], they're gonna burn the hammock in Florida. That means you're going to burn the hammock. You burn it to get carbon into the soil. They just knew that it was a good thing to do. They didn't say carbon, but we now know that's what's happening through a Western lens.

Now they always burn the garden to prepare it. That is use of fire.

The fire to our people is a manifestation of the sacred. So, we always had a close rela-

tionship with the fire in many forms.

Now, our people did not burn in Florida and Oklahoma because they didn't reside in fire-adapted, long leaf pine ecosystems. In Florida, the old people would burn small plots for several reasons that I don't want to go into here, but not the same large-scale forest burns like they did in these ecosystems of our traditional homelands since time immemorial.

The *Pinus palustris* species [longleaf pine], we call that [Maskoke Language]or [Maskoke Language]. That's culturally significant species to our people. The long needles, we've always made baskets with. Pre-removal our people did it frequently. Poarch Creek community never stopped making those baskets because they lived in close proximity to longleaf pine. The medicinal benefits, they just substituted other *Pinus* species in their respective places they were removed to. But they are not all fire adaptive species. This ecosystem here does maintain longleaf pine, which is the same *Pinus palustris* species as those in the lower lands of Alabama. But these grow on the ridges here in these Appalachian Mountains. We are in the Appalachian mountains now, at the tail end of them. It's because of our Ancestors' use of prescribed fire that continued [this species]. They liked what they saw after a fire. They knew. After they saw a fire, whether lightning struck or someone accidentally let their camp fire go or whatever, there was great benefits to burning. And they said, "Oh, we can get these particular species to come up and we can eat from them."

I was talking about that [Maskoke Language]—that Chestnut—being the second, most dominant species in this ecosystem. You still see them growing as you keep fire on the ground. That was a major food source. So, they continued to burn.

We have different verbs. In English you say "we're going to have a controlled burn. We're going to use prescribed fire." So those words—burn and fire—those are two words that people use for many things. Like you "burn" your finger while you were cooking. You "burn" your food. "I burnt my food when I was cooking." The fire is "burning" good. Then they say, "build a fire." They say the "fire" is going on the stove. I got a "fire" in my heart.

In Maskoke though, we have multiple words for burning and fire. And again, the fire is the sacred manifestation of [Maskoke Language], the overseer, the Creator. So, we have protocols when we're working with fire. [Maskoke Language], [Maskoke Language], means "We're going to burn the forest." It's an intentional burn as opposed to "it pas-

sively burns."

In our village we look for ways to enact all the verbs that we have. Some people's approach to language revitalization is to say, "Well, we don't really use these words anymore. We need to make up words for the things that we use now." Our approach is, "We have these words. That means that it's tied to something profound, some profound cosmology, or maybe one more piece of the comprehensive cultural puzzle, but it's something we're supposed to be doing. It survived all those generations with this intact verb. So, we need to be verbing."

Burning is very time consuming. You have to plan out the burn. You have to look at the drainages. We got lots of natural drainages here. Well, we don't "have" them because we don't "own it" in Maskoke society, but we have the white man's physical paper title to it. There are many drainages here that serve as fire breaks. This kind of ecosystem is premier to live in because it's easier to burn because of those natural fire breaks with the drainages and the spring fed creeks, little streams that run in the hollows.

We got [Maskoke Language]. We gotta do it because we have a verb for it. That's language revitalization. It's not saying, "We got video games now. Let's make up [a word for] how we are going to game." You know? No. How are we going to honor this tradition of burning?

LJJ: You don't make the language fit a Western lifestyle; you make your lifestyle fit the language?

MBC: The culture of the language. That's how this whole project got started. Recognizing that obsolescence is our biggest enemy. Our language becomes obsolete if all we're doing is interfacing with the Western world. If you dump thousands of words into your lexicon that are inherently premised on post-industrialized capitalist ideology, then we are so far from the traditional ethos that our Ancestors left to us in the first place. What most people do is they assemble these committees with a long list of words they want to approximate. We move further and further from those traditional practices to accommodate the Western world.

So, we said, "Okay, we gotta recreate the society in which the language once functioned best. That means we're gonna have to do some hard things." We let the language be the guide in the process of decolonizing our lives. People are thinking through a Western lens of decolonization. I see "keyboard warriors" writing these memes on social me-

dia all about decolonization. But shoot, they won't come out and burn with us. They wouldn't be caught living in a village full time. They're so attached to this Western world. I'm just speaking from practicality; if you're putting seeds in the ground to grow the corn, you're collecting acorns and processing them, you're burning in these two moons that we burn in, then there's always something to do. You don't have time to be doing all these other things. For us, we take it seriously. If we're saying that we're Indigenous, we say that we're Maskoke, we gotta do Maskoke things. This prescribed fire [Maskoke Language]. That's a part of being Maskoke so we have to do it.

LJJ: Am I allowed to ask when the two moons are and what they're called?

MBC: Well, I don't want to. Like big green entities, they're always trying to tap us for this kind of stuff. I don't want it to go into record anywhere because they only get pieces of it. They don't understand the whole. They say, "Well, I'm not gonna do that part; I only need to know this part." But that part is related to this part is related to this part. You just want that one little piece. They say, "Oh, we're listening to Indigenous People's traditional ecological knowledge." You're getting one piece of it. You don't know how that fits to this, to this, to this, to this. It's a holistic thing. And you can't compartmentalize it. The biggest frustration is that folks are saying, "Indigenous People's traditional ecological knowledge could save us amid climate crisis," but all they think of are the technical components; no one is considering the philosophies and other intangible facets of Indigenous life that are the actual most informative solutions to address climate crisis. I think about our Maskoke teachings on living simply. I've always heard from Elder medicine practitioners that we are supposed to live very simply. That manifestation of that teaching alone bears a major solution to climate change, but that's not what folks are looking for; they're looking for flakes of Indigenous practices that aid in their attempt to engineer their way out of crisis.

There are burn teams. People that are employed just to burn, that get degrees in these things. But for us, it's just a part of the [holistic process].

People reduce the importance of reversing fire suppression, like saying you don't want to let leaf litter build because if there is a natural fire, it'll spread faster and more intense. People say this is why prescribed fire is so important, instead of all the ecological benefits. Because they don't have a use for anything like chestnuts or longleaf pine. They don't know about the medicinal benefits of them. They don't make baskets and rely on them for utilitarian use. So, they don't care. They don't care if there's a fire or not, be-

cause they're not concerned about that species. We aren't going to care either, unless we are making the baskets, unless we are harvesting the medicine from that, unless we are collecting those nuts, we aren't gonna care either. So, you have to live it, walk the talk, in order to appreciate that tradition.

LJJ: It's interesting that the fire specifically helps the Chestnut. I mean I guess it would make sense because the Chestnut co-evolved with the human fire for so long.

MBC: It does well in a fire-adapted ecosystem. We know it was important to our Ancestors because it's two of our thirteen moons. It was an important food source and that's what they look forward to: that moon. They knew when that moon came, it was time to go collect.

LJJ: The longleaf pine is fire dependent as well?

MBC: The longleaf pine is fire dependent. But not the other species. Like the *Pinus taeda* or the *Pinus virginiana*, those are not dependent.

What we see in a lot of places is old growth longleaf pine, but because fire hasn't been on the landscape for so long, when all those die, there are no juveniles to take their place. Our people were not just thinking about themselves. They thought about the generations to come. We say [Maskoke Language]—the children that are not yet here. We have to think about the decisions we make today, how they will impact those people that aren't here. They were making these "food forests" we call them now. They were ensuring there's food available for their generations to come. We didn't call it food forest.

LJJ: There's this graph of data from a Kentucky pond. A fossilized pollen record. You can see about 3000 years ago, the cedar goes away. Oak pops up, chestnut pops up, hickory pops up, pine. You see this continuous presence of fossilized charcoal pop up. Even European scientists were like, "Well, they were fire managing food forests for 3000 years." And it didn't drop until 1830. What comes to mind when you see this graph? Anything in particular?

MBC: Obviously, these are food sources for our people. The junipers are culturally significant. But in our culture, you can't plant them. These are highly endangered, the hemlock. All these here are the ones that we domesticated. Sump weed, sunflower, goose foot. As our people move in, obviously they changed the landscape.

Our people knew something about the rhizosphere because they knew the connection that these trees had to each other. The Elders taught me when a big storm is coming,

you go out and you tell the trees to support each other, to stand firm and to "tell your relatives." You let them know that it's coming, you encourage them, and then they tell their relatives. So how are they communicating? Is it through the ground or what? I don't know, but [the Elders] knew there was a communication between the trees.

These grass families, the prairie ecosystems were significantly altered by animal impact. A large animal like a buffalo is going to impact the hardwood bottoms and the grasses. Our Ancestors made meadows. Our people created grasslands. Europeans witnessed this and our oral tradition tells us that we did this. It's how we brought the bears and the buffalo in. We do holistic management here because traditionally those meadows our Ancestors made, the buffalo would come [to them]. The buffalo made pathways for our people to travel on, too. They would make these prairies or these meadows and the buffalo would come in graze. They're densely populated on there. So, they're pooping, stomping their poop in, and increasing soil fertility, phosphorous, nitrogen. They don't have time to eat to the meristem of the grass because the red wolves come up on them and run them off. There's no red wolves anymore to do that. The reason we do holistic management is to serve in the role of the red wolf. We're running them off from pasture to pasture. So they don't eat to the meristem of the grass, which would prevent it from being able to regenerate.

I am not a grass ecologist, but I think about *Eryngium yuccafolium*, for instance, which is technically a grass, highly medicinal. I think that our Ancestors used fire on these prairies to regenerate native perennial grasses. Not only for the animals, but because it created forest edges and they got lots of medicinals to come up. When they clear cut a section, I've seen from my own experience, all these medicinals that come up and that *Eryngium yuccifolium* is culturally significant. That's technically a grass, but the buffalo don't really like those. There's a number of things that they don't really eat, but it's important to us. It seems like some of the things the buffalo did not eat were important to us. We could still go and harvest them after the buffalo or the bears had come through that area.

Then the birds can drop seeds in those areas and in those meadows. We can see pollinator attractors coming up, which are also culturally significant. We want those pollinators around because those are links to the spirit world. I don't want to get into all that traditional knowledge here, but it's all wrapped up in it. The cosmology is all wrapped up in the ecology.

Which is why it's important for us to cultivate it. And you can't be passive on the land. Our people were not passive on the land. That's the most annoying thing to me working with these big green organizations. We got chastised by a big green organization for living here. But I'm thinking to myself, you go back to the city, you live your extremely extractive lifestyle, and then you chastise us for living in the ecosystem in the most regenerative way we know. We're getting better. It's a decolonial process because y'all white folks forced this other way of life on us.

LJJ: So, they think we should never touch a blade of grass or cut down a tree kind of passive? Is that what you mean?

MBC: Some people are that extreme. They think it should just be left untouched. Other people think we should burn and then not touch anything. Don't live there. This is crazy.

Some people say, "You need to cut these big trees." What we were taught in forestry was [the old growth trees] are not working as hard as these 30-year-old trees to sequester carbon. So just harvest the old trees before they die. But in our culture, we go to those old trees to seek answers. We fast and go stand or sit in front of them. They're the ones that were here when our Ancestors were here. They're the ones that have answers because of their old wisdom.

It kind of correlates to that American mentality that if somebody gets old, throw them in the nursing home. We don't take care of them anymore because they're not productive. Where for our people, no, you go to them, they have an active role as an Elder, and that's what keeps them going. In Western society, you throw them away. When you throw somebody away, they don't have a purpose and they're going to die.

LJJ: You were driving up north to Montana. We were on the phone and you said, "Oh, there's this plant on the side of the road. I really want to see if that's the one we need. We want to plant it here." Is that an example of being active on the land?

MBC: That's exactly right. I got several hundred trees, plants, in my vocabulary that are culturally significant to us. My goal is to have all of them around here to keep those names alive across generations. Just like the verbs. We want to keep the verbs alive that make us who we are.

A number of those things we have not seen volunteer here. So then, we know our Ancestors went to other [Maskoke Language] [to get them]. They traveled on the rivers. Because you can drive north fifty to a hundred miles and find things that volunteer that

do not volunteer here. Our Ancestors would have gone north or south and collected them and brought them back. We don't know what this place looked like 300 years ago. There may have been that plant [Maskoke Language]. Every now and then we see one around here volunteering but we propagated them to bring them here more. That's *Asclepias tuberosa*, very ecologically important. But nobody was stewarding this land in such a way that encouraged the growth of that. Or a million other species [*laughter*]—or at least several hundred other species—that are important to our people.

So, we were not passive like, "Just let this thing come up." We went to propagate. But we want to go for the ones that volunteer. We didn't grow from seed or anything.

LJJ: Do you think there was any active management or stewardship of the sturgeon? Ways we would support them and help them?

MBC: We believe that our dances are what do that. To honor them. We believe that it reverberates to them, to encourage them. The Elders said that they were so plentiful that when they came in to spawn, you could walk across the Coosa River on the backs of those sturgeons. I know you don't go and fish with a river cane pole to get a sturgeon. You take a spear to get a sturgeon. So, it was good eating.

We're in the Coosa watershed here, but we're along a tributary. I'm assuming the sturgeon did come into this tributary back when the water levels [were high enough]. Maybe even to spawn. But it wasn't an everyday food. They were ancient fish, living dinosaurs, you know? So, they respected them for their ancient knowledge that they carried.

One of my great, great, great, great grandfathers was a white man who married an Indian woman. He grew up here in Alabama. This is pre-removal. In his diary he wrote that as a boy he loved going down to the river to watch and play with the Maskoke boys—he called them "Creek Indians"—fishing. He said they were always fishing and could catch fish with their bare hands and quick reflexes. Then married a Maskoke woman. I always think about how "every day" he says they were down there fishing and he liked to play with the "Creek Indian" boys while they were fishing. Even the kids are very involved at a young age fishing.

I love to see my son Mekkaneko down there fishing everyday. I wonder, is that in our genetic memory that he wants to be fishing every day. You know, we were up north last week with our relatives at Ft. Belknap and that's the thing he said to me in our language: "Daddy, when we get back to the village we are going to go fish," he said. "Let's go

fish."

We've got protocols for that too. We still have that traditional knowledge for fishing. They always made nets and fish traps. That was a big thing, a big practice, fishing. It's the American influence that now people don't eat a lot of fish. They say things like, "I don't like that, because it tastes too fishy." I'm like: "It's fish! It's supposed to taste fishy. Embrace the fishy!" [*Laughter*].

LJJ: You mentioned the cane [Indigenous bamboo]. Would you be open to sharing anything about cane stewardship?

MBC: Well, there were huge cane breaks. Now, the *Arundinaria gigantea*—which we call [Maskoke Language]—is a critically endangered species. We use it for many things. To make baskets with. The medicine people use it to blow through to make the medicine. It's always been a very, very important species. But those cane breaks were all destroyed largely by agricultural development. My late uncle used to say that folks would sneak off to the cane stands to do things, if you know what I mean [*laughter*]. Very important social function, and good reason to make sure fire is on the ground to maintain healthy cane breaks [*laughter*].

I've been thinking about restoration of canebrakes. People say, "Well, rivercane [giant cane] didn't grow here. Only switch cane." You might think this because you're not seeing it volunteer here. But our Ancestors depended on river cane and there was a village site right here. So, I know that they went to get river cane to propagate it if it wasn't volunteering here. No doubt. It does take a very long time to grow though. We need to be actively propagating rivercane in these bottoms, especially thinking about the benefits of it serving as a riparian buffer and slowing down nitrogen and phosphorous inputs into the stream and help prevent eutrophication.

LJJ: Was there any firing of the cane?

MBC: There would've had to have been. Because when the [prescribed] fire takes off it's going to hit the cane too. And it was resilient to withstand. In fact, rivercane needs a regular fire regime and our Ancestors knew that, which gave them more reason to burn, for the proliferation of this cultural significant species. My partner and her family all know how to work with it. They know how to harvest it and strip it and make baskets. All the women in her family are basket makers.

LJJ: I did research that after fire, cane grows back stronger. It opens the canopy of the cane

so that the shoots can grow. Many cane ecologists go so far to say it's disturbance-dependent. It needs constant disturbance or else it chokes itself out.

MBC: Yes, and the fire helps burn off other plants in the understory that might be competing, as Western ecologists often say, with the cane.

LJJ: Y'all burned hundreds of acres, right?

MBC: We burned close to 1200 acres.

LJJ: Had you done it before or was this your first time?

MBC: We burned out in the pasture on 40 acres by ourselves. But this one over here, it was our first time. We did it with the Nature Conservancy and that was cool. You have to get into the stream on kayak and shoot fire from the stream up the mountain side. We were going around looking at the drainages to serve as fire breaks. We're feeling a little nervous because it's the first time and a huge project. We have to follow the traditional protocols with the medicine and all that to stay in tune with the fire through the whole process. We will burn on about 1,400 acres this winter. We we looking at the duff last week. If the leaf litter hasn't been burned in a long time, you don't want to burn too intensely. You have to take it lightly on the land.

LJJ: Did you notice any interesting things on the land after the fire?

MBC: Oh, many. For one, birds started coming back. That was really interesting to me. More culturally significant under story plants started coming up. The under story was really pitiful before the burn. It was eerie around here with no bird sounds and we started to hear them come back. Other species started to come back. The longleaf is definitely coming up.

LJJ: Did you see any way that it supported grazing animals? I know it's probably early in the game for that.

MBC: Only in the pasture. The burn in the pasture. We saw some of the dormant native perennial grasses come up from that burn and likely in concert with bison disturbance on the landscape.

We are converting it to silvopasture so that we can put animals in there. Basically, doing what our Ancestors did. We also want to stabilize the soil. We don't want water erosion to take everything. We are also creating silvopasture for carbon sequestration and an improved small-scale hydrological cycle, and it provides shade for the animals. There's

no point in cutting all the trees down for pasture. Some people make comments about the challenges of seeding in the pasture, but the long-term goal is to not have to seed and through holistic management, intensive rotational grazing, we will see an increase in the ratio of native perennial grasses to legumes to forbs in the pasture.

But wow, it's hard to continue burning when you have fence posts. We learned that [*laughter*]. It's not like burning in the forest with natural drainages serving as fire breaks. You gotta make good fire breaks inside a fenced pasture.

LJJ: So, the meadows of the Ancestors weren't always treeless?

MBC: That's right.

LJJ: They were dappled?

MBC: Pretty much. Yeah.

LJJ: You mentioned the bottomlands. Were the cane breaks primarily in the bottoms? Would they serve as some kind of soil stabilizer?

MBC: Oh, certainly. Because of their dense and incredibly networked root system. No doubt. The cane roots extend like four feet deep and ensure that erosion doesn't happen in the bottoms. They're also adapted to withstand some flooding, which notably also brings nutrients in.

LJJ: What were some of the values that guided the process of land care, food care, people care? From the outside you could look at and say, "Okay, they're burning." But what is going on in the invisible world inside? Some people have answered this question saying reciprocity, reverence, respect, for example.

MBC: There's definitely a spiritual component, I think at the core people appreciated what they saw when they did these things. It was to benefit them and their future generations. They don't overstep their boundaries, they have taboos. They have fears about not doing it correctly and how the spirits will come down on them. That the tree people will get mad at them or the animals get mad at them. We have a story about that too: the origin of sickness comes from not living in right relationships. So, we know we're not supposed to fall back into that. It's not all about the human self. There's definitely built-in reciprocal relationship between the natural world and the people. There was a societal gain from burning in a number of ways.

LJJ: One thing I've found in almost every Indigenous community I've visited is this notion

that we were assigned to a place by the Creator to take care of. Does that resonate with your people?

MBC: We were told that our Ancestors made this covenant with the Creator that we were supposed to take care of this land. In fact, to many of our people, the Mound Civilizations were a proud thing to be a descendant of. My grandma, on the other hand, talked about how the mound people were getting really egotistical, trying to get higher and higher. They said, "To see the Creator." There were slaves. I mean, people were doing nasty things. There was social stratification. And the Creator appeared to them and scolded the people and said, "You forgot how you're supposed to live. This isn't the way you're supposed to live." Basically, the original instructions, [Maskoke language], the cultural laws, you've forgotten.

After that moment, some catastrophic events happened. Everybody was affected by it. People started moving out of these mound cultures and moving into the *Etvlwv* system. There were other small-scale societies that we don't know a lot about. What we do know about them is that they didn't wanna live in that big Mound Society. The others moved out into the country sides to start these *Etvlwv* systems, these villages, based on egalitarian relations. That is what has existed up until colonization. We still have it today, except people don't live in their villages anymore.

So, the reason we came back here to *Ekvn-Yefolecv* is because this is where we have established a covenant with Creator. Not somewhere else. [Maskoke Language]. This is the place that we are supposed to be. And so therefore we're gonna stay here to care for this land.

If you're entrenched in these traditional foodways, the traditional cosmological worldview, the ceremonial cycle, your lifeway is inherently communal. A communally light, carbon footprint.

How do people call themselves Indigenous? You don't just honor your original covenant, the cultural laws, those original instructions on a weekend at a ceremony. You have to do it every day. So if you're not burning on the land, if you're not collecting the acorns, if you're not raising the animals while regenerating soil at the same time, if you're not putting seeds in the ground, if you're not collecting the medicines in a sustainable way. (And it's not just about collecting the medicines. It's about talking to them. It's about the process of the collection. That's how they will keep coming. Our prophecy says, when we stop depending on them, then they will all disappear.) That lifestyle is what makes

you Indigenous. Not living on a reservation, having a tribal card, in a HUD home, going to a ceremony on a weekend. I'm not trying to be mean and judgmental. It's about re-indigenizing. So many people have just settled for the colonial status-quo. They think that's being Indian, but yet they're quick to jump on folks that claim they're part Cherokee; I think to myself, our Ancestors would hardly recognize anything we do and say as Indian, so why are folks jumping on these other folks about claiming to be Cherokee. The root of it usually has some economic link. People are territorial when it comes to economic threats, but they aren't springing forth to make sure the forest is burned and the acorns are processed and the corn is grown and the medicines harvested, and ensure that it is all done in their language. Colonial impacts are real, but re-prioritizing where we put our energy is key. I'd rather be daily living those cultural aspects of Maskoke life and doing them in Maskoke language than wasting time on policing other peoples' claims to certain identities. I also hear folks say things like "not everyone is meant to grow corn" or "not everyone is meant to know how to harvest medicines." On the contrary, everyone is supposed to do those things because growing corn is a communal effort and collecting medicines is something everyone is supposed to be familiar with because everyone will need to see a medicine person at some point and they need to know what plants to go collect per the instructions from that medicine person. Nowadays folks rely on just a handful of folks to keep that knowledge going, but historically everyone participated in those things. Not everyone is a medicine practitioner, but gathering plants was common knowledge. There is so much that everyone is supposed to know to be a Maskoke person. I often wonder how folks have time to do anything else, because we have so many things we're supposed to learn and to do year round that make us Maksoke.

This late Elder, Philip Deer—he was a Maskoke medicine person—he was raising that point in the 1970s and 80s and there is a public interview of him saying: What makes you an Indian? He was saying that to our people. For some of our people, you can't speak your language. You don't know your traditional lifeways. To you being an Indian is going down to BIA to see if they've got some paperwork on you. Do you have a card and a number and all that? Do you get a per capita distribution? That's being an Indian for a lot of people, too many people.

Then sometimes what it means to be Indigenous in the mainstream is all about representation. It's all about who's got a seat at the table for a business deal, again economics.

Philanthropy or a minority business status. It's about socio-economic equity. In my book that doesn't have anything to do with the core of being Indigenous. We shouldn't get distracted That mainstream discourse of representation is defining indigeneity in relationship to the colonizer. The real grassroots Indigenous lifeway? That's hard and that's a totally different conversation. It's rooted in our relationship to bioregional ecology.

LJJ: You're revolving around the ceremonial cycle instead of the colonial cycle?

MBC: Yeah, because you're dictated by the natural rhythms, the lunar calendar, the movements of the ecology. That's what you have to live by. Not starting a new company and making sure there's an Indigenous voice there. They want somebody that's a box-checker that might be a full blood, might be a mixed blood, but has the legal status. Most of these folks don't speak their languages, or know the sounds of various birds to know what messages are being shared, or protocols in the garden or ceremonies to give thanks etcetera. If they did, they would recognize the importance of intergenerational transmission of that knowledge and their responsibility to keep it going in their communities. Our Elders tell us that you're supposed to know these cultural lifeways, but you're also supposed to make sure other people in the community know too, namely your clan relatives.

LJJ: It's interesting how the archeologists are so excited about the Mound Builders and Chaco Canyon and the Mayan civilization. But like you said, there were so many other groups who were actually Indigenous. And these Chaco Canyon episodes or the Mound Building episodes were really just brief exits off the interstate of being Indigenous.

MBC: That's right.

LJJ: And they rose and fell like every empire does. It's fascinating to me that they were trying to reach Creator.

MBC: They were wanting to do it for the power. They were really obsessed with power, even spiritual power. But we have enough of the other, the good, to outweigh that. That knowledge of the good was contained in those small scale societies that always rejected the mounds.

It's like this all over. In the Yucatán, for example, people think Indigenous People always lived these really balanced lives and they were always really ecological. But I think it's important to remember that people got outta sync and got back in sync. That's where white people are not doing this. The whole Mound Civilization fell, and people got back

to those original instructions and that's not happening today. You've got these pockets of people coming up with legislation for green new deal, people wanting a regenerative economy, a circular economy, but these are minorities compared to the ones that have all this power that are saying, "No, we gotta keep blazing in this industrialized way." And so, when the fall happens, it's no longer in these pockets—it's a globalized fall. That's so different than what our people ever saw.

Our prophecies tell us that the only people that are gonna survive are the ones that know how to live close to the earth. But then what happens with the people that can't eat? At the beginning of the pandemic, people in town said, "Oh well. If things get really bad, we'll just go down there with the Indians because we know they'll have food."

LJJ: This might not be appropriate to answer in this context, but the question is, what are some of the protocols, rules or principles that guided the land care process?

MBC: [Maskoke Language]. It goes back to that covenant, our original instructions, [Maskoke Language], the cultural laws. The agreement that they made. Our language constrains our participation in capitalist consumerism. We have two different kinds of pronouns. Those that are applied to inalienable and those that are applied to alienable nouns. Per our socio-cultural protocols, one has a mediated relationship with alienable nouns. You can't be invasive toward the alienable noun. There's an immediate wall of respect that is up. You can't impose on the alienable noun. Inalienable is more informal. You can just say, "What's up?" and pat them on the back. If you say something that offends a person within your circle of inalienable nouns that you have this unmediated relationship with, there are no consequences. If you offend somebody that's outside that circle, an alienable noun that you have a mediated relationship with, there are consequences. They can take something from your clan. They can take you to trial, whatever. And this was very strict at one time.

When we look at the pronoun prefixes for the term "earth," it reveals the relationship with earth is alienable, which means it's a more mediated relationship. Earth being an alienable entity in Maskoke society means we have a wall of respect up. We don't do things without asking permission, such as mining and deforestation. When we're doing that, then we're not living in appropriate relationship, and there are consequences.

LJJ: So probably all the organisms of the earth are alienable?

MBC: Yes. All the organisms of the earth are alienable except the human ones that are in your

circle. The inalienable pronoun prefix markers bear more connotative weight of possession than the alienable ones do. So, to say "my land" or "my earth" doesn't suggest that you actually have ownership over it like it does in English, wherein an ideology of private property can be articulated.

LJJ: So, was there any active management of pawpaws or those potatoes you showed to us on the drive that you know of?

MBC: I don't know that there would have to be any active management of either of those. However, that plant really started to proliferate after the burn.

LJJ: What are your thoughts on the Western concept of eco engineering? What some Western scientists call humanized landscapes, anthropogenic ecosystems, ecosystems engineering, bioregional design, that kind of stuff?

MBC: What are my thoughts? Just that people have always done it [*laughter*]. But they did it in ways that were regenerative. They didn't do it in ways that destroyed biota. There's a big difference. People sometimes say things like how could you possibly know 500 species of plants? It's because you deal with them every day. If it's just something you do from an office or you did a scavenger hunt when you're at Indian camp, you're not going to know these things because you have to know what they look like in all the different seasons. You have to know the stages of growth. You have to know when to harvest. You have to know how to harvest. You have to know what plants work with other plants. And of course you have to know when you need what and the sicknesses that come upon people. Every bioregion has all the medicines that you need because your body is evolving pretty quickly with the bioregion in which you live. When you got an ailment, or you got a sickness, there's something in that area for you.

When you engineer all of the landscape at a mass scale, like messing with the soil profile, you're wiping something out that you need. Like the way that they converted all of these to monoculture pine plantations. They just knocked off all the species that we need. Our People have always depended on biodiversity. What I mean is, if it's not important to you as a People, it becomes disposable. As people say in English "you don't bite the hand that feeds you" and "you don't put all your eggs in one basket." You have diverse areas where you can find things.

Sometimes if we're creating forest edges, for instance, we're selecting trees based on species' population densities in a basal area, for our timber framing building construc-

tion technique, I'm always looking at that. Then when we put the offering down, we communicate with the tree. You have to ask their permission to be cut and you tell them what's gonna be happening to them. If they don't want to be cut, they communicate. We have a protocol for it, but I can't talk about that here. If they say no, then we don't cut the tree. We don't wanna lodge the negativity into the building. If a tree that didn't wanna be cut, why would you put that tree into building? It's as if there are 10 people at a gathering and one doesn't want to be there. Their parents made them go. They bring all that negativity into it. It really disturbs the energy.

LJJ: So you're saying in this ecosystems engineering, there's a right way to do it and a wrong way.

MBC: That's right. Let me say that the word ecosystem is inherently holistic. You can't compartmentalize one piece of the ecosystem without considering all the other pieces. Ecosystem engineering people in antiquity approached this from an Indigenous perspective. These entities that burn, that's what they specialize in. Why are you just specializing in this one thing? You don't even live here. You don't live in this ecosystem. You don't communicate with this ecosystem. All you do is show up to put fire on the ground and say, "Oh, I'm trained." You're trained to put fire on the ground, but you're not trained in these other interconnected components. In our culture, we believe you have to have the whole picture in order to be a good steward of the earth. You have to know how things work together. We take the concepts we already know that have been handed down to us that are inherently holistic. We take the concept of approaching anything through a holistic lens very seriously. We apply that to the relearning of this ecology that we were displaced from in 1836.

So yeah. Ecosystem engineering. What I'm getting at is, first, they don't give us credit for having made a historical impact. Which leads to the problematic displacement of Indigenous Peoples to make national parks. Then they say, "Oh my gosh! The ecology is different. It's not doing what we thought it would do!" That's because you took the people out who were actually doing stuff to the landscape. So, you got people that don't give us credit.

Then you got people that say, "We can do this. We can engineer this because Indigenous People always did it." But they don't approach it from the same holistic lens that we always did. That's the caution that I am giving. I don't like to say ecosystem engineering is all bad or all good. Look at Big Ag. Monoculture. Industrial Ag. That's ecosystem

engineering. That is not good.

The nomenclature here is probably the problem. Semantics. We could better describe what some people call ecosystem engineering. We could call it ecosystem domination. Engineering is a weird term too. It's just so ego-human-centric: "We can manipulate anything we want to with the proper engineering lens." That's often an engineer's response.

LJJ: Did I forget to ask anything?

MBC: The Land Back movement is potentially a positive thing. Just because someone says they're Indigenous doesn't mean they have the best interest of the land at heart. Tribal governments, for example, are probably super dangerous entities to whom one could entrust land. Unless they explicitly agree to not exploit the land, I don't know why folks would consider land rematriation. We sometimes hear from folks, "I own a hundred acres. I want to give it back to a tribe." In many cases, some white, black or other brown collective may be able to care for that land in a more regenerative way than the industrial capitalized mind of the so-called Indigenous government one assumes should have first right to reclaim the land.

What we do here in our ecovillage is we try to live very simply. The way we can do that is by bringing in very little capital, very little revenue. So, everybody makes $400 a month as a stipend and that prevents us from buying a whole bunch of things that we don't need like all the single-use stuff that people buy on the regular. It's all single-use stuff that people buy on the regular.

The lens of the language is really important. We're seeing lots of language gatherings. They're trying to get all the language speakers and teachers to gather up. That's good, but they speak in English about the language. They seldom identify goals. They don't say, "How can we make a fluent speaker?" They're not saying, "We will do anything we have to do to create new fluent speakers." It appears as an extreme to make it really happen. We have to be humble, and I can't say that we are doing things right or better here. The only thing I can assert is that we have fluent speaking children here, and that's what I always wanted. And we couldn't have done that outside of this village. Everything we do here is driven by what's happening in the natural and agricultural worlds. That's what affords us the ability to remain speaking our language all-day, everyday.

To be a "tribe" or a member, if you will, of a tribe I think you should have to adhere to those collective original instructions. We're so messed up because of these settler-colonial

puppet governments. The only thing that holds them together is the budget. They're corporate entities. If those budgets didn't exist, there would be no tribal governments. People would just be organizing on their own. The Native-to-the-bone folks would still be doing their Indigenous thing, like they did precolonial times, without the budget dictating how Indian they're going to be any given time. They'd have their own communities and it would be fluid. We don't know what folks 1,000 years ago referred to themselves as. But since the government politically knows us as something, that may be the name we know until the fall of the empire. We have other words that we called ourselves too, organized in a really complex way according to *Etvlwv* which has both ecological and political implications. Sadly, few today seek to adhere to the traditional laws as a means of defining our identity. That's what we are attempting here in our community. We seldom talk about tribal government politics here. We're just interested in living into the cultural laws, because when we pass away and go to our camp fires in the sky, that's all that matters. We don't know everything, and we don't have all the answers, but we're always striving for more Maskoke integrity with our virtues.

LJJ: I want to ask you about the word meek and meekness. Maskoke People talk about this a lot.

MBC: That's one of our Maskoke virtues. If you can't be meek, then you can't be Maskoke. In our speeches, our ceremonial speeches, they say [Maskoke Language]. [Maskoke Language] means very lowly and meek. To be close to the earth is our word for meek. [Maskoke Language]. Low to the ground. Low to the earth.

LJJ: Am I allowed to ask what the virtues are?

MBC: [Maskoke Language]. Love, humility, meekness, and truth are some virtues.

LJJ: Do you feel those virtues are involved when we interact with the earth and the foods?

MBC: We went down there to the corn. We have to be meek in the presence of the corn. She's an old woman. She's an Elder. You don't scold your kids. You don't act out in the presence of the corn.

Then when you go into another village, you say, "How's the corn growing?" You decenter the human. We're always at the mercy of the natural world. What's happening is what dictates how we live. We have to be this living meekness.

We also know how to work with the natural world. Some people might view it as a form of manipulation, but we view it as a form of partnering with to alter certain things.

When we need to call the rain, there has to be a very serious situation. We've been given that knowledge on how to partner to activate rain. But you got to be meek. If you get boastful about it, and say, "I can heal this. I can doctor this. I can do whatever." It's not that; you're partnering with all these other things.

You're partnering with the plants, with the water, with the spirits that you're calling on. You're just the vessel. If you don't carry yourself in a meek way in those spaces, then you're not going to be effective. But I don't want to say anything more about that.

Celebrity culture is a white syndrome. Someone recently told me they nominated me for an award. I said, "I wish you would've told me this ahead of time because I would've told you no." If they ask me for an interview or something, then I gotta say no. How can one person bring us together? It's the people, not one person.

And he's like, "But it's so much money." And I said, "Yeah, but then they publish it in the media as an individual, not as a collective." What kind of message are we sending here? White society has this celebrity culture and it's really unhealthy to lift one person up. In our culture you don't say, "Oh, that food tasted really good," when somebody cooked it. You give thanks to the earth for the food it provided. You don't want to hurt one cook's feelings by complimenting one over another. We always give thanks to the [Maskoke Language], the food makers, but not because of the taste of their cooking, just for them regularly fulfilling their role that makes the village continue to thrive. It's vital.

When someone compliments me as an individual with words like "what you're doing is so brilliant," it gives me an opportunity to correct people. They need to learn to shift that and say: "What your people are doing is. . . ." It's about the collective consciousness and action, not the individual action. We just live according to the core teachings we inherited from countless generations before us.

Our leaders were always servants of the people. Not for notoriety. It's actually really, really difficult work. The ego thing is very dangerous. Thinking as an individual and not the group is actually a sickness. Ultimately, individualism is analogous to free enterprise, which is what leads to ecological destruction in a global culture that does not recognize the sacredness of [Maskoke Language], Earth.

LJJ: As it pertains to land management, it even goes beyond that. Not just about the human, it's about the whole. You were talking about industrialized capitalism. A lot of that is because a guy decided he wanted to make a name for himself. He wanted to be the one

to engineer Hoover Dam. He wanted to be the one to make the first national park. And our parents train us to do this thing.

MBC: "You can be anything. You could be the president of the United States [*laughter*]. You could be a doctor with a three-story house. You can be the pastor of the church." That kind of stuff. When I got back from Harvard, some people really did lift me up for going to Harvard. And I said, "What about the people that are at home learning these songs to keep these ceremonies going? The people that are sitting down with Elders to keep these stories going, to ensure that they can be told in the ceremonies?"

If you're a dance leader you're supposed to still be humble. Nobody's saying, "I want my grandson to be a medicine person." Because there's no widespread fame in that. No, they say, "I want my child to go to college to make money so they can get a good job and make money I can brag about that."

People pay photographers to make head shots of them. I only have one headshot. It's probably like seven years old. My cousin said, I want to take your photo when we were in New York City of all places, by this dumpster thing, but you can see a tree in the back.

LJJ: I know that one. You look real stoic and mean [*laughter*].

MBC: Well, it's because the sun was in my eyes on that day [*laughter*]. I hear people tell me, "You need to get somebody to make some head shots for you." I have, in the past, used group photos. That came to my mind when folks ask for these headshots. It's part of that celebrity culture, I think. Making a name for yourself, promoting yourself: "This person was a really accomplished academic. This person was a really accomplished entrepreneur"—those kinds of things. Instead of saying "this person was a really integral part of their community. They made sure that their children or their nephews and nieces or their grandkids were carrying it on."

I had applied for this fellowship. It was like $175,000 and we really needed the money here to rescue a parcel of land from being clearcut by a timber company. I made it to the third round as a finalist and I sent them a message saying I can't go through with this. I said, I can't go through with this. They ended up giving us a grant for $85,000 directly to the community. It went to *Ekvn-Yefolecv* and there was no Marcus Briggs-Cloud associated with it at all. If there's a lot of ego wrapped up in it, it will not last because it's not true.

The last thing I want to point out is that throughout this interview, we've been walking

the tight-rope of utilizing past and present tenses, in terms of our Maskoke practices and contributions to a bioregional ecology. I think we too often talk about Indigenous relationships to ecology in a past tense instead of how contemporary Indigenous People still steward lands in our culturally specific ways. If we are not a part of the continuum, or at least actively trying to be, I kind of think we forfeit our right to all ourselves Maskoke. My hope is that our grandchildren's grandchildren's grandchildren will continue to remark on our rich ecologically intimate and regenerative lifeways, always speaking in present tense.

LJJ: Thank you.

5.7 Interview 4: Pomo Perspectives on Mediterranean Ecosystems Management

5.7.1 Introduction

This interview was carried out at Heron Shadow on July 17, 2022. This area is described by the Cultural Conservancy as an "Indigenous biocultural heritage oasis." These 7.6 acres of land are situated in the ancestral lands of the Southern Pomo, also known as Sonoma County, California.

A large part of the leadership of how to work with the land has been placed in the hands of Redbird Edward Willie. I had met Redbird years prior when he was speaking to a group of young Native People at Heron Shadow. He spoke on the topic of Indigenous fire management of California ecosystems with great detail. I was moved to request an interview from him for this study, which he generously agreed to do.

Before we recorded the interview, he asked if I would like to, "look around and see what we have done." Of course, I responded that I would like to see what has been done on the land over the years since my last visit. It is a modest amount of land, and yet what they have done with such a small parcel was astounding to me.

In the middle of the parcel a stream cuts through in the dipped portion of the topography. This is an ephemeral stream that comes and goes with the rainy seasons. They have constructed dams and ponds to slow the water so it may, among other things, recharge their localized aquifer and its corresponding well.

We walked out to see many small plots fully seeded with native California plants. He calls them "habitat islands." All around the bees were buzzing and picking up pollen for their honey-soaked homes.

He has meticulously kept record of the health of a local Fox. He has monitored her health,

when she is pregnant, when they are born, and whether or not she looks like she has enough sustenance. He leaves water out for her and when she appears to be hungry after birthing her kits, he also leaves food.

As we walked past the various fruit and nut trees dappling the land, we reach the planted crops—endangered Indigenous seeds from all across the country. We see a wide variety of many different types planted together as a form of complex polyculture. Quapaw Corn grows green and strong, found from a government seed bank and re-claimed by a Quapaw farm manager who works on the land. I saw Squash growing larger than a basketball. I saw Native Hyssop, Native Farewell to Spring. Blue-Speckled Tepary Beans, black beans given by Hopi farmers, and hedgerows of many different species of native California plants.

As we walked the land, a Redtail Hawk dove towards the bean rows.

"I hope he's getting a gopher," Redbird said. "That's a Redtail Hawk who just learned how to fly. He's still learning how to hunt."

The team of land keepers cut off a large branch while pruning a fruit tree, but then realized that it was the site of a woodpecker's nest.

"The woodpeckers had it hollowed out. So, I'm going to seal it on the inside and put it back up so that the woodpecker has a ready-made home."

We walked by a large thistle bush growing right in the middle of the walkway of a crop row. It was a bustling site of activity for many insects and birds. I inquired if it is a native plant species.

"No, it is not," he said. "But when we went to cut it down because it was in the way, the bees attacked us. And so, we decided not to take it down. They like it and we keep it up for them." Just as he said this a yellow finch came to rest on top of the thistle bush, eating out its seeds.

"I'm going to be creating some woodpecker homes," he says. "I researched it. It's like a regular bird box, but you fill it with sawdust, so they feel like they hollowed it out themselves." We both chuckled at the thought of that.

As we sat down for the formal interview, the entire land seemed to be speaking with him including a cacophony of birds.

"That's a bird I don't know," he said. I turned to look but didn't see what he was talking about. "I don't see it," he said. "I just hear it. It's a song I haven't heard before."

Several animals visited our place in the shade of a walnut tree. A large buck deer walked by. We even moved and stretched our bodies as we talked and still, the deer did not flinch but continued its grazing. He seemed to know this is also his home. He behaved more like a dog

than a deer, strolling around the backyard.

As we looked upon this parcel, I couldn't help but notice how it was designed to support so much biodiverse life. The recording instruments were activated, and the interview began.

5.7.2 *Interview Transcription*

LJJ: Would you be open to sharing your name, your nation (or nations), and homeland?

RB: Okay. My name is Redbird. I'm four different tribes from Northern California and Nevada: Pomo, Wailaki, Wintu and Northern Paiute. I'm currently living in Sonoma County, traditional lands of the Southern Pomo.

LJJ: This is a very broad question, so feel free to answer it however you wish. How did your Ancestors—as you understand it, any one of your nations—how did they ensure food for their communities?

RB: Mostly I associate with the Pomo side of my family. I try to learn about all of them but because I live here in this area, that's where my focus is.

One of the things that kept them alive is diversity. You know, they didn't focus on just one thing. They got their food in a lot of different ways. It was always changing and evolving depending on [the] temperature that year, what happened that year, how much rain they got. Things like that. Or how hot it got that summer, [all] would affect what was happening on the land.

Acorns were a big part of their diet. The people that came here would call it their staple. That was their staple. Although that was kind of a simplistic view of what they were really eating. They ate a lot of things.

Another big part of what was eaten was things under the ground. They ate a lot of root crops here in California. There was kind of a derogatory name that was given to California Indians we were called "diggers." But now we want to reclaim that, it's not a bad thing. We did have our hands in the earth. We were farmers. We weren't farmers in the traditional European sense, where we were planting things in rows and mono cropping and all that. But we did have our hands in the ground. We were cultivating and creating flourishing ecosystems for all the people and all the animals.

California was in its best form when moderate disturbance was applied to it. That's what made everything the best. The [root] crops were the best and the acorns were the best and the berries were all the best when moderate disturbance was happening. And that

just means we were interacting with it. We were taking care of it. We were setting things up to be ideal for us and for the future. We were not over-harvesting or doing things that would be detrimental to the environment. We were doing moderate disturbance. That's what was making it fruitful for us.

And moderate disturbance could be just digging a bulb out of the ground, putting some back. You dig up a handful of bulbs and you pick out the ones you want, but you also pick out ones that you're going to put back. So, then you're aerating soil and you're hybridizing. You're picking out the best one to plant in again. You're weeding too at the same time, taking out whatever you don't want to be there.

In this years-long, decades-long process, centuries-long process, you're also developing an ecosystem that is resilient and long lasting. There are beds that were being cultivated for many, many years. And the inertia of their life force is still going on. You could go and find these beds up in the mountains or undeveloped areas. They're still there because of all the work that was put into them. They're still there. It wouldn't take much for us to get in there and pick it up again. Get them going again in a really good way.

LJJ: What kind of roots would they be?

RB: People think about the bulbs—corms that were in the ground. That's one of the main things that was harvested. People call them Indian Potatoes There was a variety. It wasn't just one but sometimes they would call them all Indian Potatoes. There were different things like Yampah, Camas, and Brodiaea.

LJJ: And of course, they weren't actually potatoes but they were called that?

RB: Yeah. Another thing that was harvested a lot by the tribes in this area were seeds. So many different seeds. A lot of different plants. We had developed special ways of caring for them, harvesting them. It takes skill and knowledge to be able to feed yourself by eating seeds because they're just tiny little things. You have to learn how to cultivate and care for it. So, we used baskets for harvesting seeds. We had a special basket; it was called a seed beater that would be used to knock seeds into another basket. What we would be doing with those seeds is grinding them, making flour or pinole out of them.

LJJ: Pinole?

RB: Just like when you grind the seeds up and add water. But they wouldn't just do that. They'd have different recipes, combining different seeds together or different other ingredients to give it special flavors.

RB: One thing that was added sometimes is ashes, certain ashes from certain plants.

LJJ: They're probably really nutrient-dense. Even though they were small, they keep you full. Like the chia is so small, but everyone's realizing...

RB: People call it a super food now. All these different seeds that we had. And then acorn was just the big version of that. Also nutrient-dense.

LJJ: What were some of the values or core beliefs that guided that process? What comes to mind when you think about the values and beliefs that would guide these societies?

RB: One of the good things that would happen in the California societies is they would celebrate and give honor to different things around them. In California it was all about dancing. That was the way to do it. There were dances for everything. Every part of life was honored with a dance or a ceremony.

One of the dances that we had was a flower dance. We would dance for the flowers. Certain times a year here in California the flowers are in bloom. So that was a good time to get these flowers involved in dance. People wear and dance with flowers. Sometimes regalia and head dresses would have flowers in them. It was all about honoring those plants and giving gratitude for them, for the things that they brought.

Another thing that California Indians were known for is their bird dances. They would also honor all the birds. You know, the birds were a big part of their life and lifestyle here in California. Sometimes I like to call California Indians the bird people just because they were so enmeshed in that, that bird life.

Especially in the Sacramento Valley area, but all over. It was a major flyway. All the migratory birds would flock. It would take days for one flock of birds to fly by as they were migrating through. So many different kinds. The sky would just be filled with birds in certain times of year. And there was marsh everywhere. That's not here anymore. San Francisco Bay used to be all marsh. That's where all the birds would come. They would give gratitude and honor for that through dances. They had a dance for particular birds. There would be a Pelican dance or a Quail dance, the Condor dance, a lot of different dances. They had Goose dance. Regalia would be made up of all these different birds depending on the dance. So, they were giving thanks for these birds because it was food too. They were giving thanks for being fed by them, but also for the feathers too. Feathers would be special.

LJJ: The California Condor went down in numbers. When they killed all the Native People,

maybe they killed the people who were taking care of the Condor spaces or the dances or something.

RB: Now they're coming back. They have these sanctuaries they have developed for them. They went and looked for some tribal people and asked them, "Can we start moving these feathers along to you? Or to certain tribal people?" That's like a big deal. It's such a monumental thing for California. For that to be happening again. That was one of their highest regarded dances is the Condor dance. They're not doing that dance yet, but they're getting there. A big, giant step forward to bringing that back.

[Just then a small red bird came to sit on a chair next to us]

RB: [*Laughter*] And the little bird dances too.

LJJ: Can't forget the little people. Is there anything else you want to say about the values that guided your food process?

RB: I would say that one of the big values—among Pomo People anyway—it was all about family and community. Everything was cared for and developed in a way that it was going to take care of the family. That that was the purpose of it.

From what I hear there was no word for "me" or "I" in the Pomo language. I think the smallest denominator was family. Couldn't get smaller than that. So that was a real important value in your life is community, family. How is it going to serve the community? How is it going to serve the family? The practices.

LJJ: What were some of the protocols or principles that kind of guided the process of working with the land and with the food, big or small?

RB: I should add that California Indians were pretty decimated. So much was lost. A lot of what we still have today is just bits and pieces that were slipped through here and there. We don't know the whole story. The whole story was lost. But maybe not forever. We could get it back little by little. I always say that if we have a spark, we could make a fire.

To answer your question, one thing that was done here is that there were ceremonies for the seeds. There were songs and ceremonies done over the seeds before they were planted or as we were getting ready to plant them.

We could extrapolate from that. What does that mean? Or why was that? One thing we could say is that there was respect and honor for those seeds. Also there was magic. It was done for a purpose. This song was going to give that seed power to grow. Give it whatever it needed to help the people that were going eat.

[*Just then a large deer walked up to the level where we were sitting and eats the fallen fruit on the ground*]

RB: Another thing they would do is provide for the animals. Make sure everybody's being fed. Like for the deer, they would burn. They would have late season fires, like late summer when everything's dry and the food's drying up. If you have a burn, it stimulates the growth, and a bunch of new shoots will come up and that'll bring in the deer. To keep the deer families going.

That's the buck. It was a little teen last year now it's bigger. It came back just in the last couple weeks. It's returned. The other little one that would come would sit over there in the bushes at night and sleep over there by itself. It was gone all winter and now it's back.

LJJ: I can only imagine how much the animals missed the Pomo people.

RB: Yeah. I think about that too. Birds will show up and it just seems like they they're waiting for something. Waiting for certain things to happen, but we don't know what they are. We have to figure out, what does this bird want? There could have been times where the Pomo mom and her sisters were here grinding seeds. They would throw some out to the birds and the birds would be there every day waiting for their little share of the seeds. Then these still have that ancestral memory and they're waiting for us to grind and share some seeds with them.

When we have a burn—a prescribed burn on the land—the birds will do certain things right away. They were just waiting for that burn to happen. Once that happens, ancestral memory kicks into gear and they know what to do. Like go roll in the ashes or go after the roasted seeds. So, we see that, we see that. That that ancestral memory is real because there was no fire there in that bird's lifetime.

LJJ: Any other sort of guiding rules, principles, or protocols for the food systems? I know so many of them are kind of no brainers. They're just unspoken. It's hard to put them into words.

RB: So much of what was done was being played off of nature itself. Even beyond fire. Certain things would happen and that means now it's time to go do this. Like a certain butterfly will show up and that means we need to go to the next valley and start cultivating the sedge roots, or whatever needed attention at that time. They would take their cues off of everything in nature because they knew it so well. Generation after generation for thousands of years with the same families living here. So much knowledge was built up

in that time. Intimate knowledge of everything. Everything was interconnected and people would stay in the same place. Here in California, people could live their whole life in one little valley, never leave it. And people did that. Year after year, generation after generation, never wandering out of their valley. Then there were people that did wander too. They said it was pretty common for a person to know five languages. Because they could walk 20 miles and go through those five languages. Especially closer to the bay area. I think it was even more cosmopolitan, all these different tribal groups coming together.

LJJ: What are your thoughts on this concept of bioregional design. Having agency in how the land looks and tastes? For example, the Amazonian relatives who would make these really massive soil systems out of thin air, management of grasslands, etc. What, what's your thoughts on that practice as a whole?

RB: We used fire in a big way here. All throughout California. It was a large area where a lot of different people were forced to follow the same practice out of necessity. They had to do it.

Another area where people were working that had long range effects is in the water and the stream beds. Taking care of the salmon. They were such a keystone species, which means they were supporting whole ecosystems. Supporting not just the people but the Bears and Birds, Ospreys and Eagles. They were all taking part in salmon harvesting. They looked at the chemical makeup of the faraway trees up in the mountains and they found there were nutritious things from the salmon in the tree. Somehow they had made it all the way up there. The Bears taking it up there and the Eagles taking it up there and then, and they're pooping into the ground and that's feeding the tree. It's not just that riparian zone that's getting affected by the salmon. It goes way beyond that. So, when the people are taking care of the salmon, they're taking care of a lot more than just the salmon. They're helping everything.

LJJ: What ways would they take care of the salmon?

RB: I think fire is a good one. You're also helping the streams. It's creating more water. When you're having fires, you're creating more water in the streams. Streams were fuller back then because of fire, before burning stopped. Because it's controlling all the vigorous plants that would take over. One reason people burn is to balance out more aggressive plants. Those aggressive plants are the ones taking in more water. When they're not there, water stays in the water table and feeds the streams more. And that helps them

. . . I'm still not so clear on bioregional. Can you say more about that?

LJJ: We weren't just sitting around having the world happen to us, we were happening to the world, too. This deer is right here. You've created a safe space for him. You've created a safe space for all these native bees. You've created a safe space for the hawk. You're going to make woodpecker boxes. The deer is like your friend, your dear dog.

RB: One thing that happens when you engage your surroundings, there's exponential ripple effects. If you're doing positive things to the environment, there's exponential, positive ripple effects. We don't even know. It gets too complicated. It just ripples out and goes all over. Some day a year from now, we're going to say, "Wow. Look at that. Look what happened there." We'll be able to step back and figure out, "That's because we did this and this and that."

A lot of what we're doing here is we're "throwing spaghetti at the wall." Our hedges over here, the strategy is to make islands of native habitat. Our hope is that those islands will grow out. But we don't just throw it there and let it go. We're still working at it, we're still adding to it. This elderberry tree is our poster child for placement. We've been putting elderberry trees all over. None of the others are doing this good! It just definitely found its spot. It's seven feet tall already. All the rest of them are still like a foot tall. That's when we find our little golden nuggets of knowledge

LJJ: Sadly, a lot of the Eurocentric scientists didn't think we even did that, or they hid the fact that we did that, because we weren't "supposed" to even have that level of agency and sophistication. Even your riparian zone, how you're actively slowing down the water to bring it into the water table so that you can then recharge your well. That is a prime example.

RB: Yeah. It's all intentional. With knowledge and wisdom. So much knowledge and wisdom in it. The colonizers have to dehumanize us to make themselves feel better. Then they "weren't destroying a flourishing human civilization." It was just something else. Some stone age people that needed to be changed.

LJJ: Do you feel your Ancestors practiced this fire regional influence on the land?

RB: Yes. There were millions of people digging the soil in California in any one year. I just think about what a positive effect that was to the land. Year after year, millions of people aerating the soil.

They say there were less people here than I think there really were. I think there was

a lot of people here in California. They say California was the most densely populated area that didn't have agriculture, in history. Didn't have conventional agriculture.

LJJ: Maybe the whole state was their garden.

RB: Yeah. It was. We pushed the line between horticulture and agriculture. We took horticulture as far as they could. They stopped before it became agriculture. Horticulture is supposed to be one of the most resilient systems for humans. It was probably not recognizable as horticulture; it was horticulture in a grand scale.

LJJ: So, there's this graph. I like to show the people I interview just to see what it inspires in their mind. It's a soil core that they pulled out of a pond in Kentucky, and they analyzed the fossilized pollen in each layer. About 3000 years ago the Chestnut comes out of nowhere. Hickory comes out of nowhere. Black Walnut comes out of nowhere. People have interpreted this to say about 3000 years ago, the Ancestors of the Shawnee started to create this food forest. What comes to mind when you see this, if anything?

RB: Just to see what comes and goes. People always talk about what's native and what's not native. People around here are really strict about what's native and what's not. Like the California Native Plant Society. They'll say, "This plant, that's not native. Why are you planting that?" Then it would be a plant that was here 2000 years ago. I tell people that there's no invasive plants. I get in trouble for that. There are immigrants. We had native plants that are invasive. We just kept them under control. Like the Douglas Fir are just filling up the Yosemite Valley floor. That's a native tree, but it's taking over and destroying habitat in the valley.

It just changes all the time. It's just always changing. What we do is we manipulate that in a way that it's helpful to us. The Oak Savannah, that's not a stable state. But we make it a stable state by tending to it. Otherwise, it would turn into something else if we just let it go and let it play out.

LJJ: It's like a really complex orchard.

RB: Those oaks can take 75 years to get its first fruit, first harvest. Sometimes you have to have a lot of faith. Why are you cultivating an Oak Tree that's going to be producing 70 years from now? There's always the little sprouts that pop up from the acorns that are on the ground. You burn those in the fire, but then you save one or two also. That's going to be the tree that takes its place eventually. We're doing that here now too. We have a lot of good Oaks around, especially this one here. Eventually one of those little sprouts is

going to take over. Twenty years from now we decide, which one is it going to be? And we'll be gone. I'll be gone. But then I'm still going to do it. I'm still going to start the process.

LJJ: I'm so indoctrinated into like, "It's your life, it's your one shot of being here on this earth." So then things that don't directly impact my life don't matter.

RB: And that's the same mindset that makes plants "invasive." If we had a bird's eye view of what's happening, eventually that plant that's coming in and taking over is going to find its niche and settle down. It's going to take 50, 70 years before that happens. It might come in and take over for a minute and it'll draw back. They say that eucalyptus has reached that point now. It was exploding, going everywhere and taking over. But now it's reached that point where it's stopped now. It takes that long range look to see that. We always want instant results. We sometimes want to wipe out plants that are good. Dandelion or plantain, but they're the big hitters in nature's plan. They move in for a reason to take care of the soil. They go to areas that are disturbed and traumatized and move in to take care of it with those tap roots. They're designed for it.

LJJ: Is there anything you want to share on Cali native burning traditions?

RB: The one that happened in Santa Rosa, it's already ready for another one. People have more knowledge these days. The ranger people or whoever they are. There's a state park over here, the Armstrong Redwoods. And they let it burn. They purposely let it burn. Everybody was panicked at first and people were evacuating and stuff. But then when it got down into the valley where the redwoods are, where the park is, they let it burn. They didn't try to put it out. Which is the thing to do. It's not damaging the trees and it's burning off all that extra fuel that's everywhere. They do that a lot now, as long as it's not threatening homes or structures.

LJJ: What is the thing that guides you personally when you go out and work here?

RB: It's a really awesome opportunity to do some things I've been talking about for a long time. One of the first steps in the permaculture process is observation. Before you do anything on the land, you have to observe it. Ideally, you're asked to observe it for a whole year. So, you could see that piece of land and what it goes through over all the seasons. I came on the land February 20, 2020. A month later shelter-in-place started. And so, I was forced to observe the land for a year. Just getting that permission, you know? Okay. I get to observe the land for a year. I was here by myself just checking

things out.

One thing that you do in permaculture is you create maps and sector maps and zones and stuff, just to track all of the different things that you're seeing. It's not normal in permaculture, but I did a wildlife map. A map of the trails that the animals used. It also changes. Mostly it was the Fox, but also Coyotes and Birds and Deer. We had a Weasel here that first year that hung out for a while. It was exciting.

LJJ: It's amazing how you know the Fox has had four litters. You've paid that much attention to this being. Not just one species, but one individual within the species.

RB: She has a name [laughter]. Zorra. It's Fox in Spanish. Last summer she had four kits down in the pond and I could go down there and sit on the edge of the pond, and they would be in the pond. It was a sandy area there. They would hang out there and play around. The mom would be there, and she would let me sit there and watch them.

LJJ: Well, is there anything else you'd like to share with people about this idea of Indigenous food systems, Indigenous land management, fire management, anything at all?

RB: One of the things I struggle with is who needs to know this knowledge? I'm kind of torn. I know a lot of Native People are torn. Is it something you share with everybody or do we keep it to ourselves? Or share some of it? I just think it should be shared as you probably could tell by what I do. They're not ancient tribal secrets or whatever [laughter]. They're things that everybody needs to know in order for earth to be fixed and healthy. I kind of say, if you want to live in Sonoma County, you need to become a Pomo and start acting like a Pomo.

LJJ: [*Laughter*].

RB: Because these people aren't going away. They're not going away. They need to do that. I say that about the immigrant plants, too. They're not going away. They need to find their niche too. If I'm talking to a non-Native audience I'll ask them, "Where's your home?" They think about that for a little bit. "Where's your home?" And then the second part of that is, "You need to go there, wherever it is." If you decide that your home's here, then you better start working on that. A big percentage of the people will say their home is somewhere else than where they're living. And so that keeps them from taking responsibility for where they're living now. If this is my home here, then they'll start thinking, where's my water from? Where's my water coming from? Europeans that come here, I think they're just so mixed up. They have no idea where their home is. Is it New York or

is it England? But to me the solution is simple. It's okay. This is your home. You're not going anywhere. But it's easy for people just to pack up and leave, go somewhere else. Or like those little boxes that you live in, they call that home. That's not your home. It's a little box. That makes it easier for people to switch boxes. Anytime they want.

That Redtail Hawk is out there flying around again. Maybe should feed him too. He's been having rough time out there. Mom's not helping him. The other day the parents were flying way up there, so high. I could barely see them. They were calling down to him and he had the hardest time. He's not really knowledgeable about thermals yet, I guess. He was just flapping really hard, put in a lot of effort to get up there with them. And there was five of them up there. Five Redtails up there flying around together. There's this big thermal spot here. They hang out here a lot, just straight up. There's a big flow of wind coming from the river over there. It comes up from ocean, up the river and then this way.

LJJ: What makes you care about all these little beings? What makes you want to bring them water, food, and pollen?

RB: Some people say it's not the right thing to do. Especially bird people like the Audubon Society. You're not supposed to overly feed them or protect them. Cause they're supposed to be able to survive on their own. That seems kind of ironic to have a white person telling me how to interact with nature.

LJJ: I think what's interesting about this interview is that the land is speaking with you. And it's all self-evident like all the values and principles. I've seen all of them unfold here in this short time. *Acta non verba.* To act instead of to speak.

RB: Everything that we do is hours of dialogue. We'll just be out in the field and, all of a sudden, we need to talk. We'll all sit down out there and talk about that. What I tell people is that talking is an ancestral skill that we've lost. Just to have those good dialogues and to speak in a certain way. We've lost that.

5.8 Interview Analysis

5.8.1 Qualitative Thematic Analysis

Qualitative analysis was carried out to identify patterns and themes across the four interviews. Interestingly, their sentiments are profoundly similar despite being geographically distant.

While there is absolutely no such thing as a "monolith of Indigenous culture," it is striking how their underlying value systems are so alike (with some exceptions, of course). I speculate that this is because there is indeed an absolute set of best practices for living sustainably on the earth and each of their cultures had enough time to find them through trial and error. Some Indigenous People have named these best practices the "Original Instructions" (*e.g.*, Nelson, 2008).

Those most obvious and common themes across the four interviews were identified to be as follows:

- Land management is spiritually rooted

  One of the most prevalent themes was a notion of "the sacred." Let's examine fire as a land management instrument, for example. It is fascinating how a "prescribed burn" carried out by American agencies is more of a mechanical process, whereas for many Indigenous communities it's heavily mediated by prayer and ceremony. V. Lopez states,

  > [T]he fire is sacred. When you burn . . . among the trees and understory of the trees, what you're doing is, that fire is cleansing and blessing and smudging those trees. It's restoring a sacredness to them or helping them maintain their sacredness.

  In this manner, Amah Mutsun Ancestors formed a spiritual and affective relationship with the oak savannas they routinely burned.

  When speaking of his intentional burning of hundreds of acres, as Maskoke People had done for millennia, M. Briggs-Cloud states, "[F]ire is the sacred manifestation of . . . the Creator. So, we have protocols when we're working with fire . . . you have to . . . stay in tune with the fire through the whole thing."

  Similarly, R. Nutlouis shares how, "we all have a really unique perspective of fire. Like for us, fire is a protector and we refer to it as both a *cheii* [grandfather] and a *másani* [grandmother], depending on how we're utilizing fire. If it's going to be for ceremony, we call it grandpa. If it's for nursing, cooking, that kind of use of fire, we call it *shimá* [mother]. So that's our relationship to fire."

  For these interviewees, applying fire to the land can never be separated from the sacredness of fire itself. Not just anthropogenic fire management of landscapes, but many other facets of land management is an expressly reverent act occurring under the assumption that all creation is sacred.

- Observation

Interestingly, all interviewees stressed the importance of long-term observation as a primary driver of the success of a food system. They also positioned this practice as what defines "being Indigenous."

- Human hubris over creation as a threat to sustainability

  Multiple interviewees shared cultural stories of human hubris leading to the collapse of Indigenous civilizations. They share how collapse taught these societies to be humble before creation. Specifically, R. Nutlouis talks about the collapse of Anasazi cultures, and M. Briggs-Cloud speaks of the collapse of Mound Building cultures. In both cases, human groups, as R. Nutlouis says, believed they could "be better than the natural order."

  This reminds me of my pre-research field trips. I was honored and fortunate to be allowed to visit the Omāēqnomenew (Menominee) Nation in what is currently known as Wisconsin. The Director of Agriculture and Food Systems generously took me on a tour of their award-winning sustainable forestry operation (Mausel et al., 2017). The day before I left on a plane to go home, I said, "Well, I will be leaving tomorrow."

  He responded saying, "I know. I put tobacco down on the earth to pray for you today." I asked him why he did this, and he said,

  > You are not supposed to go up there in the air. That is a place for those sacred beings up there. I prayed to ask forgiveness for you for entering a place you are not supposed to go. If you were meant to go there, Creator would have given you wings. (G. Besaw, personal communication, August 13, 2019)

  It is fascinating to contrast this view with the "pioneering spirit" of Western science that sees frontiers as a challenge for the human intellect. One might say we seek to "conquer the unknown" to prove our worth, capability, and strength. From an Indigenous perspective, however, we have learned through the experience of collapse that we must walk humbly upon creation. We must honor that we are not God. We have no need to prove our worth and strength when we understand we are an integral part of sacred creation.

- Individualism vs. collective/community

  Another common theme is the importance of sacrificing for the common good. For example, R. Nutlouis states:

  > the current land tenure that we're under . . . was created by the feds, managed by the BIA, and is very individualistic. Only one person has their name on the grazing permit. Only one person has their name on the farm permit . . . We've all been, to

some extent, indoctrinated with this idea of individualism. "Mine." Our challenge today is to overcome that individualism and come back to the collective.

R. Nutlouis also stresses the practicality of collectivism; it takes many hands to complete the work of a functional land management system.

Similarly, M. Briggs-Cloud says, "Our leaders were always servants of the people. Not for notoriety. It's actually really, really difficult . . . it's about the group, not the individual. [Individualism] is a sickness."

R. Willie corroborates these notions in saying that in traditional Pomo culture "the smallest denominator was family. Couldn't get smaller than that . . . a real important value in your life is community, family. How is it going to serve the community? How is it going to serve the family?"

Each of the interviewees had a strong dedication to their community as members of a collective.

- Creation Narratives/cultural histories

  "Story" was the twelfth most common unprompted concept across the four interviews. It is fascinating how important Creation Narratives and oral histories are such important references for each of the interviewees when they try to provide answers to interview questions. Similar to the notion of "Original Instructions," interviewees position sacred Creation Narratives and cultural histories as guiding blueprints for how to live and what to expect.

- Biodiversity

  Each of the four interviewees expressed ways in which the biodiversity of the land was both valued and augmented through their land management practices.

- Ecological responsibilities to creation/Creator

  V. Lopez, R. Nutlouis, and M. Briggs-Cloud all mentioned that they had sacred covenants with both Higher Powers and the land itself to fulfill certain ecological responsibilities. Each expressed a divine assignment to a specific homeland and certain ecological responsibilities.

  R. Willie expresses a similar sentiment: "A big percentage of the people will say their [true] home is somewhere else than where they're living. And so that keeps them from taking responsibility for where they're living now."

- Land speaking with the interviewee

  This note has more to do with interview process, but I found it very interesting that, when

given ample freedom to choose when, where, and how the interview took place, three interviewees placed us in situations where the entire ecosystem was speaking with them.

Listening to the actual recordings, you will hear a cacophony of lifeforms leaving their mark on the recording. R. Nutlouis has not only the sound of birds and wind in the recording, but the chatter of his community working on the alluvial farm and edible landscape they are constructing. The environment surrounding M. Briggs-Cloud's interview was so full of birds, cicadas, rain, and pets that his words were at times difficult to transcribe. During the interview R. Willie was visited by many forces of nature including diving hawks, buzzing bees, meandering deer, and a red finch landing on the chair next to me.

While more poetic than scientific, it may be worth mentioning that the places chosen by interviewees allowed all of creation to speak with them. It should also be noted that the absence of animal activity in the interview with V. Lopez may be attributed to the fact that his people were completely dispossessed of their lands. For this reason, unfortunately, he must live far away from his specific homeland.

- Innovation/evolution/change/adaptation

  Despite Indigenous People's love of tradition, I was surprised to find that a major theme across all interviews was an emphasis on being adaptative and innovative. This highlights what many Indigenous scholars have emphasized: Indigenous culture is not static. For example, Bryne (2005) has written of Australian Indigenous knowledge as follows:

  > knowledge is at the core of being for Indigenous [P]eoples. It locates individuals precisely and inextricably in their communities and interrelates individuals and communities with their natural and spiritual environments. It is conveyed through language and culture as traditional knowledge which is privileged and required to be used appropriately by those authorised within the knowledge system. It has a coherence and orthodoxy which must be maintained to preserve its integrity and passed on to provide meaning for future generations. But it is not static or frozen, not 'carbon dated', it is alive and in responsive dialogue with vibrant cultural life. (Byrne, 2005, p. 201)

  As R. Nutlouis states in his interview above:

  > Whether we do or don't, the land is going to change. We are going to have to change. It's better to do it now and evolve with it. That's what to me Indigenous means, it's that you evolve with the land. We're trying to learn this new dance that

she's putting forth for us. New rhythms on the landscape.

It appears that one striking element of Indigenous land management is adaptability which then lends itself to resilience as a system.

- Food processing as a community-building activity

  All interviewees stressed the importance of involving community in the process of land management. Akin to the theme of individualism vs. collectivism, research participants expressed that processing food, working on the land, and co-creating landscapes is also an excuse to bring people together and reinforce kinship among community members.

- Sharp critique of industrial Western systems

  "Western" was the thirteenth most common unprompted word among the four interviewees. I suspect this is because each interviewee had a lot to say about Western science, Western food systems, and Western value systems, which they viewed as inefficient.

- Not wanting to share too much information with capitalist culture

  Multiple interviewees expressed an understandable hesitation to "share too much." For one thing it is not considered appropriate to share ceremonial knowledge on recorded devices. It is also not meant to be shared indirectly but should be shared in-person in ceremonial context. Furthermore, several interviewees expressed concern over how Indigenous knowledge could be exploited by both non-governmental environmental organizations and/or corporate entities. This is a reflection of a long history of misappropriation and abuse of Indigenous knowledge by non-Native agencies, businesses, researchers, and organizations. Too many times, for example, non-Native entities have commodified, genetically modified, and even patented certain foods at the expense and exclusion of the Indigenous communities who cultivated them (Holcombe & Janke, 2012; Robinson & Raven, 2017; Raster & Hill, 2017).

  This illuminates that there is a vast reservoir of knowledge that will remain eclipsed from the eyes of Western science until our scientific endeavors can come into deep alignment with the values of respect, reverence, reciprocity, responsibility, and accountability. As such, we as Western scientists will never know the "whole story" of Indigenous knowledge. If we wish to know these things, it will happen in person, after we have proved our trustworthiness and readiness to receive such knowledge.

- Critique of green organizations

  Multiple interviewees mentioned mistrust, disagreement and tensions with Euro-American-led environmental organizations. I conjecture that this is because many of these organizations

do not consider Indigenous People to be a part of the ecological system. They erroneously see only the land, the water, and non-human lifeforms as representative of the system. This omits millennia of constant, adaptive, and mutually beneficial interaction with human beings. Despite their good intentions, these organizations are often outgrowths of a paradigm enmeshed in separation, reductionism, personal gain, secularism, and more.

- Seed blessing ceremonies

  Two interviewees, thousands of miles apart, mentioned the cultural tradition of carrying out seed blessing ceremonies prior to planting.

- Breakdown of relationships causes calamities

  Two interviewees cited a "break down of relationship" as the historical reason for societal collapse. All interviewees stressed, as has been mentioned by many Native scholars, the importance of cultivating a relationship with life on Earth from a kinship perspective. According to these interviewees, without the acknowledgement and maintenance of respectful relationships with life on Earth, civilizations begin to crumble.

- Not just harvesting but talking to plants

  Another fascinating commonality is this notion that the power of plants as medicines is not just in their chemical makeup, but in the way we speak to them and respect them during harvest. In V. Lopez's words:

  > They think that going out, getting that plant, making some tea out of it that that's going to give them some medicinal benefit; but what our Ancestors knew is that it is our relationship that really enhances those medicinal qualities. And so for example in our tribe, our last traditional leader . . . was a traditional healer. She knew you had to have prayer, you had to have ceremony. You have to have a relationship. You have to know how to sing to them, listen to them, and such like that. And that's what made her such an effective healer, is that she knew how to tend to the plants and to care for them so that they would become powerful medicines.

  Similarly, M. Briggs-Cloud expressed the importance of communicating with trees before harvesting to see if they provide their consent to become a part of whatever project they intend to be used for.

The frequency with which certain words occur in interviews can illuminate what is important to the interviewee. At the same time, there are words that may only be said once but still mean

a great deal to a person. Such an analysis is not meant to be the be-all-end-all explanation of interviewee value systems, but a simple lens to detect interesting patterns.

Some "stop words" were omitted from the analysis such as "if" and "the," or any other words that provided little thematic meaning. In this analysis, some words were combined. For instance, "seed" and "seeds" were combined under the joint label of "seeds." "Ceremony," "prayer", and "sacred" were also joined under the umbrella code of "sacred."

The results of this analysis are presented tabularly and graphically, in Tables 5.2–5.1 and Figures 5.1–5.6, respectively. The tables list the number of occurrences of the top ~50 words and concepts in order most to least frequent. "Word cloud" maps are also provided to give a visual take on the proportional frequency of certain words and concepts.

5.8.2 Word Frequency Analysis Results

The word most used across all four interviews was "people." To some extent this is simply because the study is about how people work with land. It has some deeper meanings, however. Most autonyms (names Native People have for themselves) often translate to "The People." It also reflects how the ecologies of Indigenous communities are not devoid of people as we see in the National Park concept. Indigenous ecologies are generally heavily "peopled." Humans are understood to be a strand within the web of nature, rather than passive visitors. Moreover, in my experience a major ethic within Indigenous philosophy is to fight for and serve one's people. There is an associated pride in being a part of "that people" and a strong allegiance to perpetuate its culture and way of life.

M. Briggs-Cloud says, "The fire to our people is a manifestation of the sacred. So, we always have close relationship with the fire in many forms. Now our people did not burn in Florida and Oklahoma for ecological health. That was stopped [by colonial policies]. However, here, our people burned in this ecosystem." All in all, M. Briggs-Cloud says the words "our people" 27 times in the edited interview. Between R. Nutlouis and V. Lopez, the phrase "our people" is said 50 times. This prevalence of the word "people" thus highlights the value of community-mindedness and cultural appreciation of the interviewees.

The second most common word, not surprisingly, was "food."

The third most common word was "plants." This perhaps speaks to the fact that Indigenous land management is very plant-oriented, and the traditional Indigenous diet may be deeply plant-based. This is not to say animals are unimportant. If you combine all of the strictly animal-related terms within the top 50 words, they appear 157 times. A full compilation of

plant-related terms totals 347.

It is also very interesting to examine unprompted words. These are words that would not have any reason to appear based on the topic that is prompted or the nature of the question. For instance, words like "sheep" were omitted because one of the questions was about whether or not Diné People had sheep prior to European contact.

Interestingly, the top unprompted word group was words concerning the "sacred." This is a big finding. It highlights the spiritual nature of Indigenous land and food systems management systems. This contrasts greatly to the mainstream industrial food and land management systems which are not guided by a notion that creation is sacred. Given that these people descend from and speak about historically sustainable systems, we may conjecture that *understanding creation as sacred* is a prerequisite for creating a sustainable land and food management system.

When asked if there were any final words he'd like to give, V. Lopez stated, "All restoration work has to begin with restoring and recognizing the sacredness. You want to restore your language? You have to start with the sacredness, and prayer, and ceremony. You want to restore any part of your culture, your history—you want to restore any of that—it all has to start with sacredness. We have to recognize that. We have to honor that. That is the first word and the last word."

5.9 Conclusion

These four interviews with four Indigenous men from unrelated Indigenous Nations suggest that Indigenous People of Turtle Island generally hold a profound "guidebook" on how to design successful civilizations. It is concluded that these civilizations often times learned from past social and ecological calamities, which ultimately assisted them in the refinement of a science of sustainability. Interviews suggest that this science is rooted in respect for creation, kinship with creation, tactful collaboration with creation, humility before creation, appreciation for creation and an acute sense of the sacredness of creation. An analysis of their cultural traditions suggests that Indigenous People throughout Turtle Island held an active role in sculpting ecosystems on a bioregional level through low intensity prescribed burns, biodiverse cultivars, habitat expansion/enhancement, and active support of complex non-human communities. Contrary to popular belief, their ancestral societies were not primitive, nor passive. Rather, they were deeply engaged in the management of intricate ecosystems for their own benefit as well as for the benefit of beings they felt obligated to through sacred ecological covenant. Lastly, this

study models an ethnographic methodological agenda set forth by Indigenous scholars defined by interactions with research participants that are rooted in respect, relationship, reciprocity, responsibility, accountability, and reverence.

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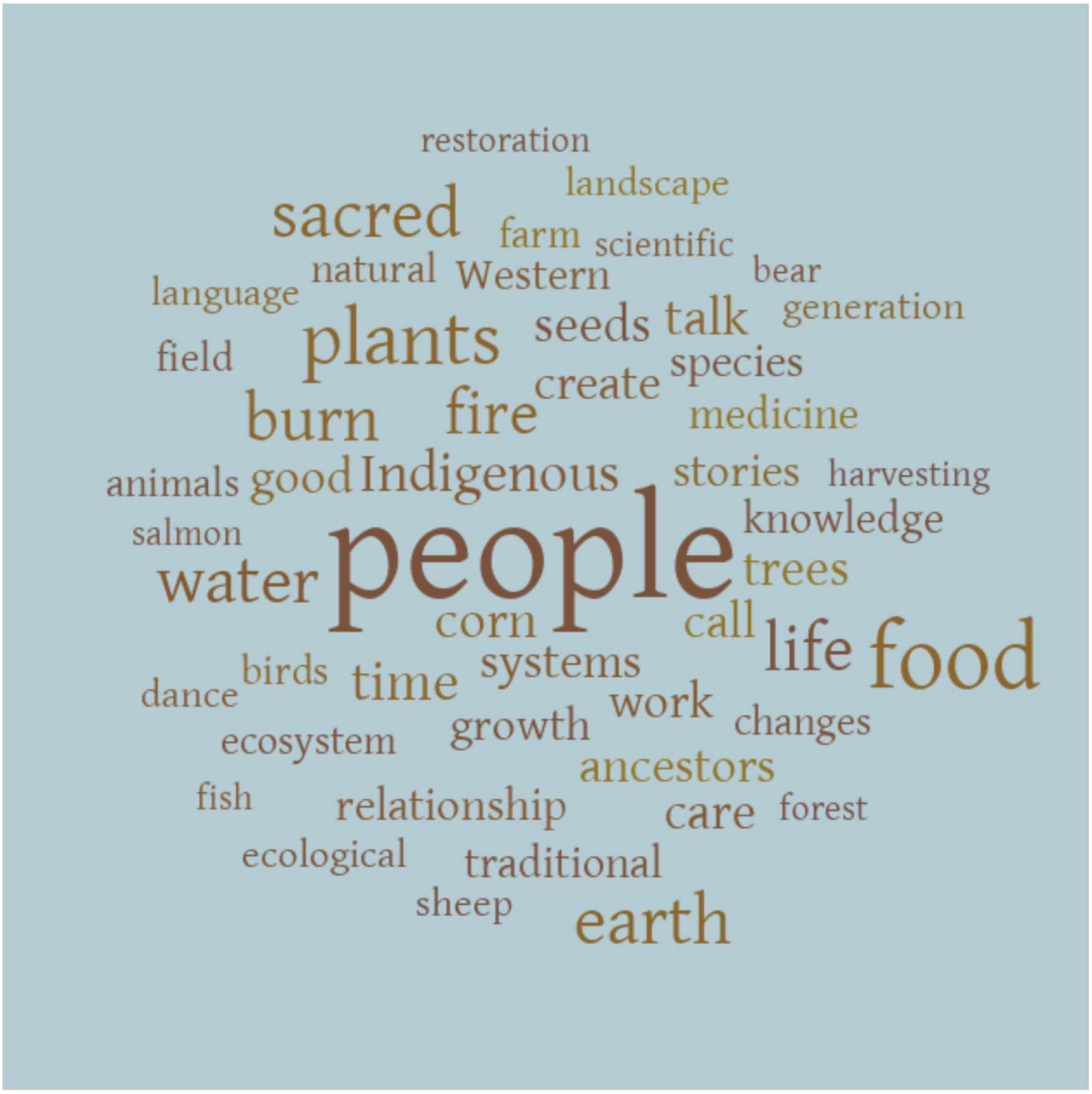

Figure 5.1: "Word cloud" map proportionally representing word frequency of all interviews on Indigenous land and food systems combined

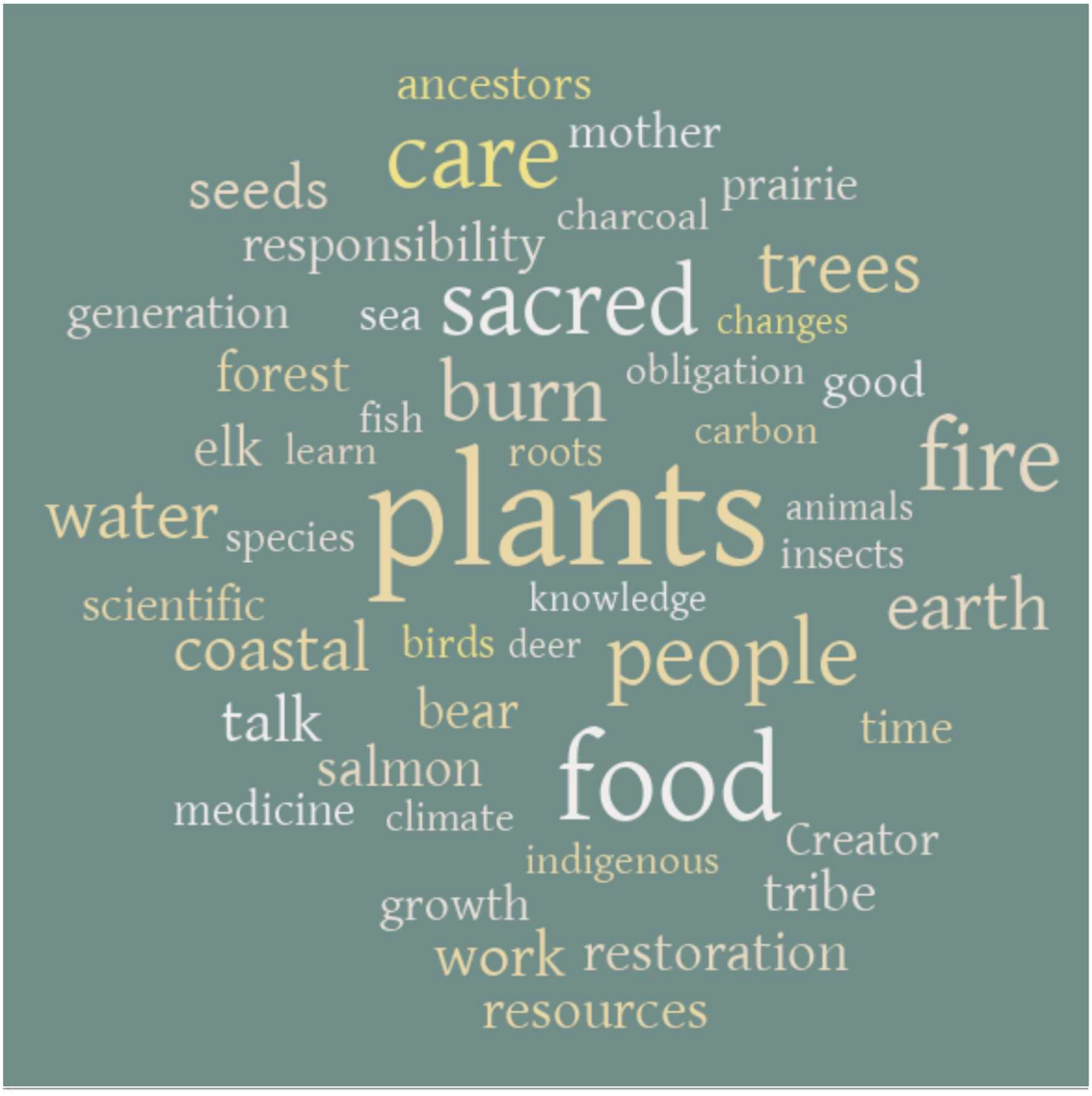

Figure 5.2: "Word cloud" map proportionally representing word frequency of interview with V. Lopez

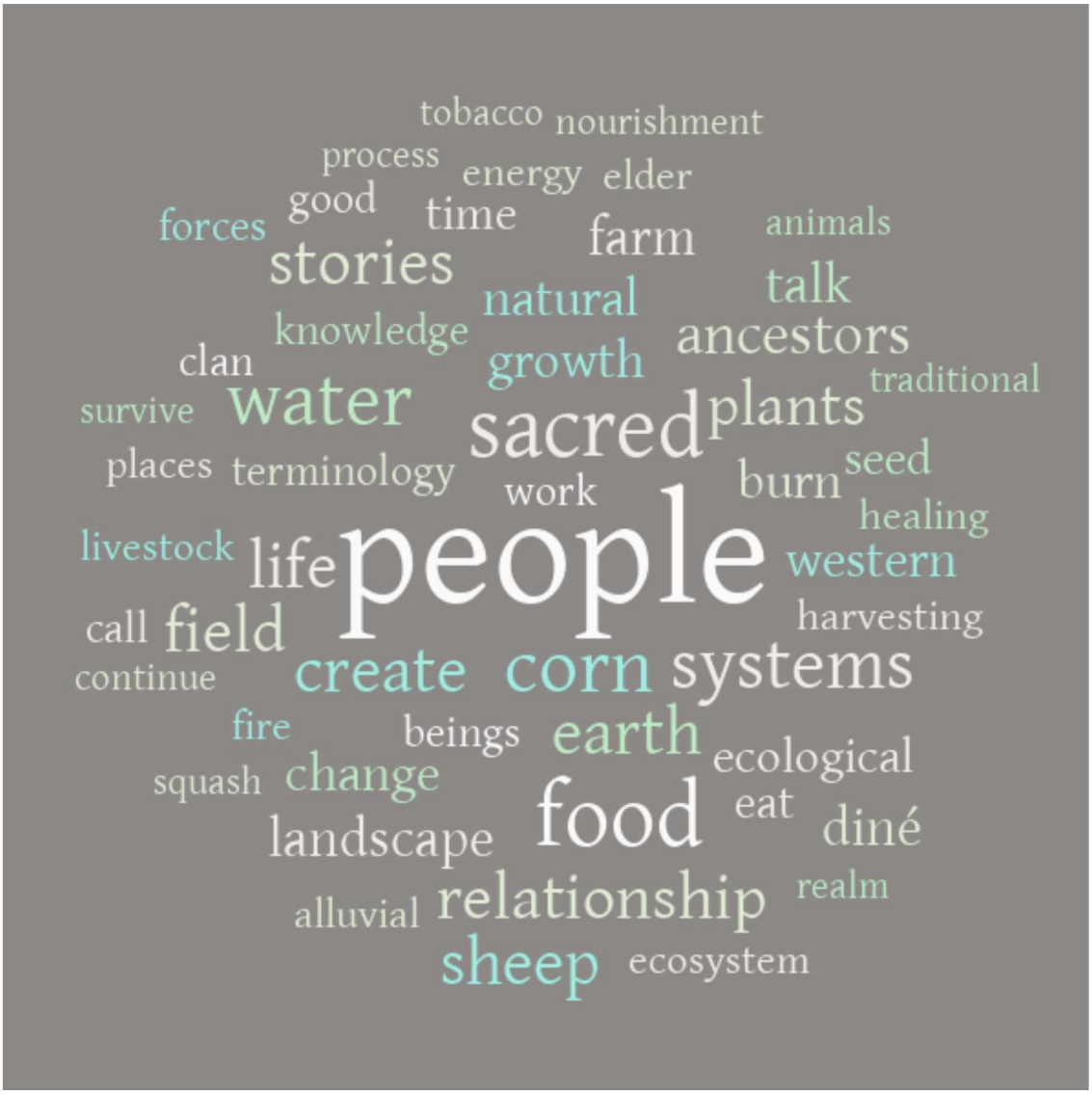

Figure 5.3: "Word cloud" map proportionally representing word frequency of interview with R. Nutlouis

Figure 5.4: "Word cloud" map proportionally representing word frequency of interview with M. Briggs-Cloud

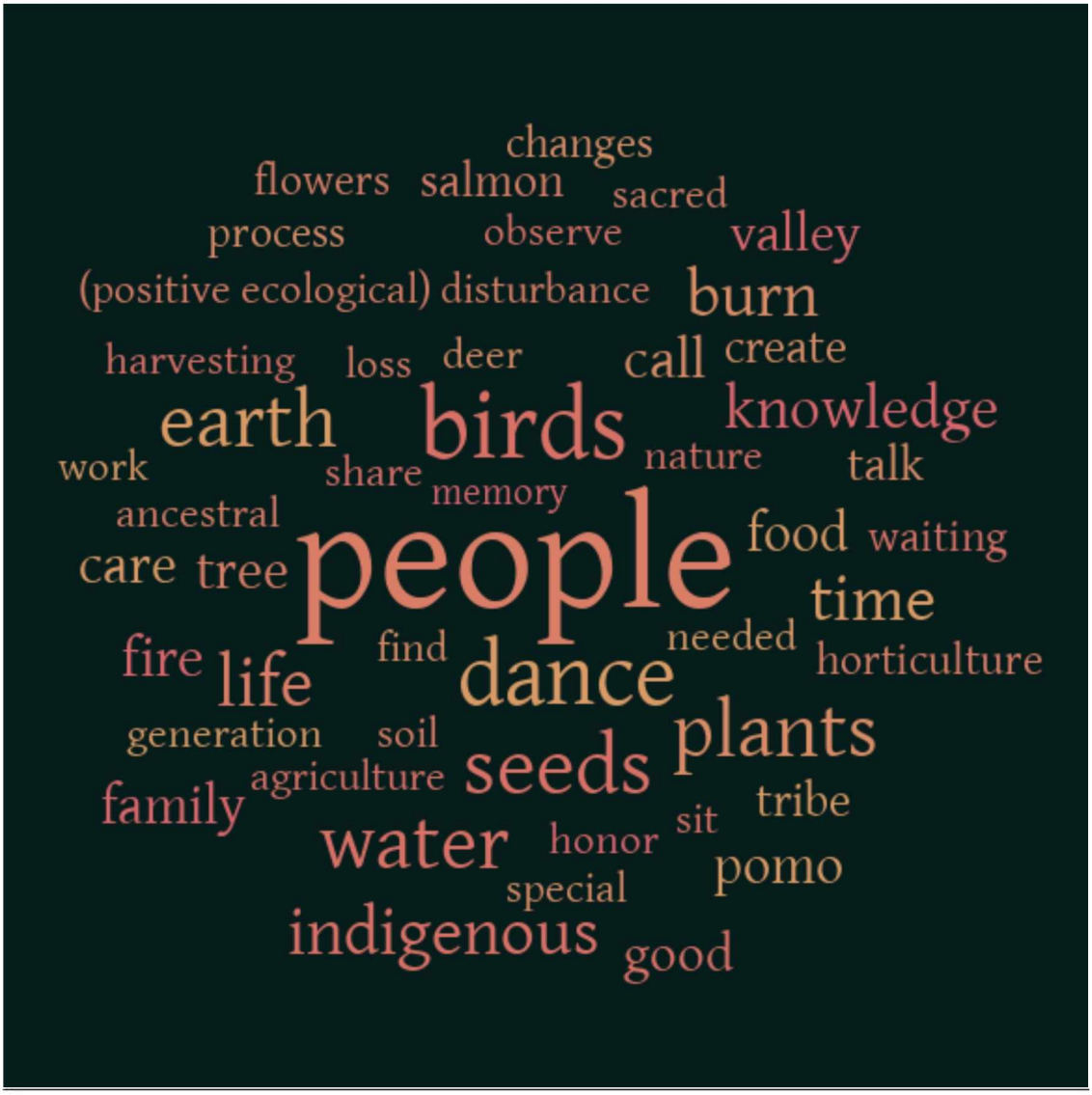

Figure 5.5: "Word cloud" map proportionally representing word frequency of interview with R. Willie

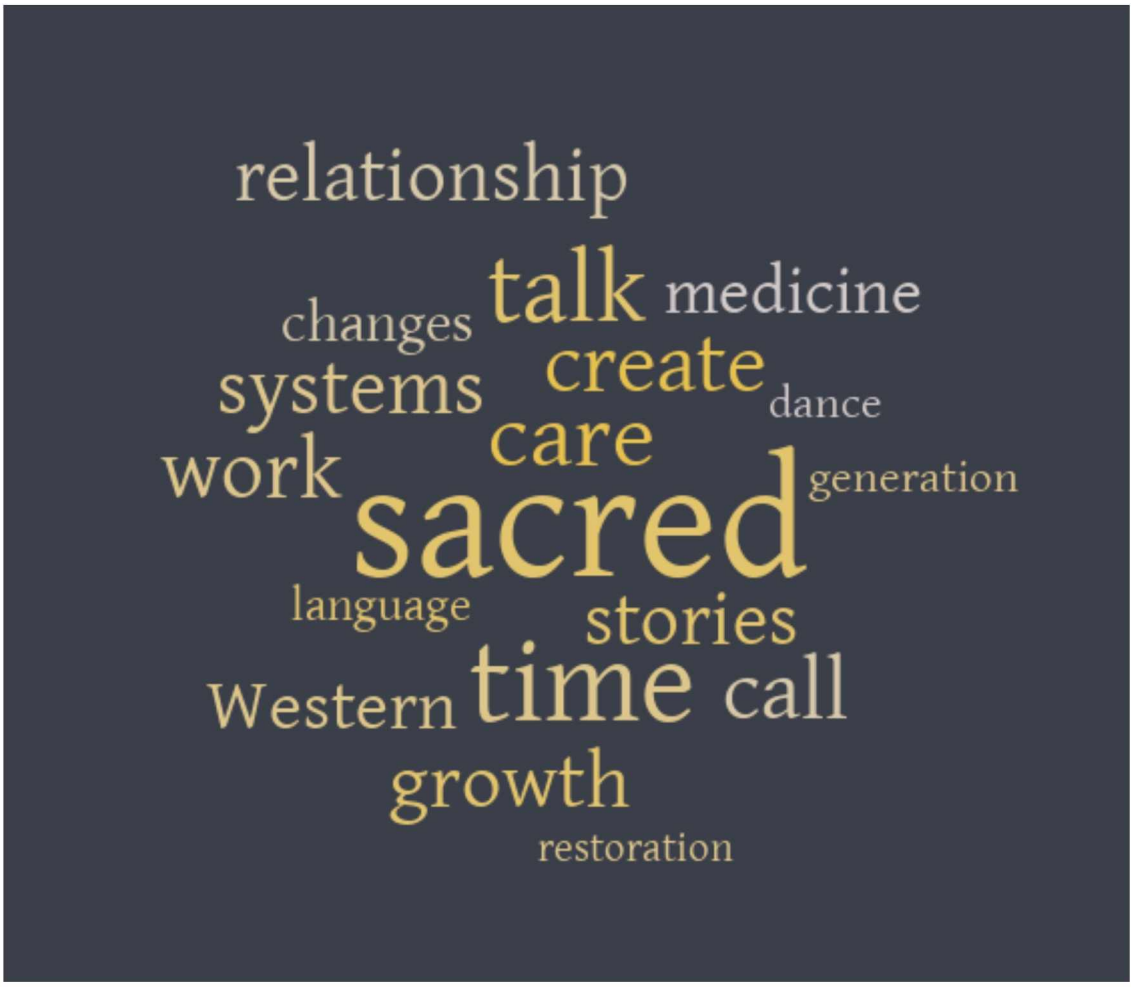

Figure 5.6: "Word cloud" map proportionally representing word frequency of top unprompted words of all interviews

5.12 *Tables*

Word	Frequency	# of participants mentioned
sacred	111	4
time	75	4
talk	63	4
care	59	4
create	54	4
call	54	4
work	52	4
systems	51	4
growth	48	4
stories	47	4
relationship	47	3
Western	43	4
medicine	40	3
changes	33	4
language	26	4
generation	24	4
dance	24	3
restoration	23	3

Table 5.1: Word frequency of unprompted words (all interviews combined)

Word	Frequency	# of participants mentioned
people	316	4
food	174	4
plants	129	4
earth	112	4
sacred	111	4
water	104	4
burn	100	4
life	97	4
fire	93	4
time	75	4
Indigenous	75	4
corn	65	4
talk	63	4
trees	60	3
seeds	59	4
care	59	4
create	54	4
call	54	4
work	52	4
good	52	4
Ancestors	52	3
systems	51	4
growth	48	4
stories	47	4
relationship	47	3
species	46	4
Western	43	4
medicine	40	3
traditional	39	4
knowledge	37	4
birds	36	4
natural	34	4
field	34	3
ecosystem	34	4
changes	33	4
animals	31	4
farm	30	4
sheep	27	2
language	26	4
ecological	25	2
landscape	24	4
generation	24	4
dance	24	3
restoration	23	3
fish	23	2
harvesting	22	3
forest	22	3
scientific	20	3
salmon	20	2
bear	20	4

Table 5.2: Top words found in transcripts of interviews on Indigenous land and food systems

Word	Frequency
plants	68
care	38
food fire	37
sacred	35
people	33
burn	29
tree	26
water earth	24
seed	19
work talk	18
restoration resources	16
tribe	15
salmon forest elk coastal bear	14
responsibility	13
time mother good creator	12
scientific prairie grows generation Ancestors	11
sea medicine	10
species root insects bird	9
climate charcoal	8
pit obligation learn fish coast carbon	7
urchins tobacco provide managed learned knowledge kelp hard deer change animals	6

Table 5.3: Top words found in interview with V. Lopez

Word	Frequency
people	113
food	54
sacred	53
water	44
corn	42
systems	40
life earth create	34
stories sheep	33
field	32
relationship	31
plants	30
Ancestors	27
talk landscape farm	23
Diné	21
western	20
natural growth change burn	19
time	18
seed ecological	17
eat	14
work terminology knowledge call beings	13
good forces clan	12
energy Elder ecosystem	11
places livestock healing harvesting fire alluvial	10
traditional nourishment continue animals	9
tobacco survive squash realm process	8

Table 5.4: Top words found in interview with R. Nutlouis

Word	Frequency
people	136
food	49
burn	40
earth	38
fire	37
time	33
corn	31
live	30
species	29
medicine	28
call	
Indigenous	27
traditional	25
good	21
water	20
western	19
tree	
language	
ecosystem	
sacred	18
work	17
talk	16
fish	
plants	15
growth	
Ancestors	14
animals	13
village	12
society	
relationship	11
create	
buffalo	
tribe	10
natural	9
meekness	
cane	
woman	8
story	
knowledge	
harvesting	
ecological	
culture	
benefit	7
alienable	
systems	6
removal (forced relocation)	
original	
mound	
family	
restoration	

Table 5.5: Top words found in interview with M. Cloud

Word	Frequency
people	43
birds	23
dance	20
seeds	18
water plants earth	16
life	14
Indigenous	13
time burn	12
knowledge	10
fire call	9
tree Pomo food family care	8
valley good	7
tribe talk salmon create	6
waiting process horticulture flowers changes	5
work special soil sit share sacred observe needed nature loss honor harvesting generation find deer agriculture (positive) disturbance	4
memory	3

Table 5.6: Top words found in interview with R. Willie

6

Toward A Theory of Indigenous Regenerative Ecosystem Design (IRED)

6.1 Abstract

Indigenous Nations the world over have intentionally and successfully managed vast marine and terrestrial systems for thousands of years to support both themselves as well as the surrounding biota and natural elements, whom they often view as their own kin. These systems are often millennial scale, regional-scale, and highly biodiverse. While they differ geographically, culturally, and ecologically, they are often governed by a strikingly similar value system rooted in relationality, reciprocity, respect, reverence, regenerative practice, responsibility to homeland, kinship with life, service to life, and a notion that all life is equal. Colonial society has been incentivized to classify Indigenous People as "passive and primitive hunter-gatherers" to legitimize the seizure of land and labor, resulting in the omission and misunderstanding of these systems in many historical records. A wave of interest in Indigenous land management occurred in the late 20th century leading scores of scholars to broach the topic, with very few coming from Indigenous backgrounds. Scholars have mostly treated this phenomenon on a case-by-case basis, resulting in a scattered discussion and a wide array of terms and definitions coming from mostly outsider perspectives. There currently lacks a comprehensive survey of these cases as a whole, the patterns they elucidate, and the lessons they give for contemporary management. Indigenous Regenerative Ecosystem Design (IRED) is proposed as a term and theory to (a) unify the discussion around regional scale Indigenous land management systems, (b) define this phenomenon from both Euro-centric and Indigenous lenses, (c) provide an in-depth and comprehensive definition that reflects the essential aspects of these reciprocal stewardship technique, and (d) create a strong, Indigenous-defined foundation upon which further research can be conducted. Key tenets of this theory are articulated and recommendations for future research and policy steps are offered.

Keywords: Indigenous Regenerative Ecosystem Design (IRED), Kincentric Ecology, Indige-

nous Knowledge (IK), Traditional Ecological Knowledge (TEK), Anthropogenic Ecosystems, Traditional Resource and Environmental Management (TREM), Ecocentrism

6.2 *Introduction*

In the case of many Indigenous anthropogenic systems, humans play a key role in the regenerative management and maintenance of balanced, abundant, biodiverse, millennial-scale ecosystems (*e.g.*, Abrams & Nowacki, 2008; Anderson, 2005; Delcourt et al., 1998; Erlandson et al., 2005). The world over, Indigenous societies wielded (and in many cases continue to wield) a profound yet regenerative influence on ecosystem composition by gardening whole landscapes on regional scales for the benefit of all life (*e.g.*, Barlow et al., 2012; Bell & Johnston, 2008; Brown & Brown, 2009; Lepofsky et al., 2021). While human impact on the earth is generally seen as a negative occurrence, Indigenous Nations have demonstrated that human presence can not only be neutral but can serve to enhance biodiverse life systems whilst feeding human communities. While the ecologically degenerative Anthropocene epoch is considered to have begun with the industrial revolution, it might be said that a positive Anthropocene epoch began thousands of years earlier as Indigenous societies around the world began to influence and enhance environments on regional scales (Bird et al., 2013; Groven & Niklasson, 2005; Maezumi et al., 2018; Rick et al., 2016; Sheuyange et al., 2005; White, 2011; Zúñiga, 2020). These management strategies are generally guided by complex, spiritually based knowledge systems, which evolved through the millennia within ecological context (Berkes, 2017; Cajete, 2000; Kimmerer, 2020; Nelson, 2008; Nelson & Shilling, 2018).

A survey of these Indigenous food and land management systems uncovers that this design strategy is generally not for human benefit but is rather an expression of human reciprocity with the biotic community around them. In this manner, the purpose of Indigenous Regenerative Ecosystem Design (IRED) is to design with and for life. This contrasts with, for example, a hydroelectric dam which sacrifices the smooth functioning of riparian system so that humans can have more water and electricity for themselves. IRED systems, despite being vastly influential, are still faciliatory to ecosystem balance, abundance, and health. Their success is reflected in the fact that Indigenous People oversee 80% of the world's biodiversity while constituting only 5% of the world's population according to a recent UN report (Ogar et al., 2020).

By respectfully researching and revitalizing Indigenous food and land management systems we can help to solve the most pressing and converging issues of our time, including but not

limited to catastrophic fire and flooding, climate instability, biodiversity loss, water shortages, food shortages, dependence on volatile markets, and Indigenous cultural extinction. Some examples of IRED systems are as follows:

- Shawnee chestnut forest management in Kentucky (Delcourt et al., 1998);
- Myaamia grasslands management in the Ohio River Valley (McCoy et al., 2011);
- Pacific Northwest clam garden management in British Columbia, Canada (Lepofsky et al., 2021);
- Náhuatl chinampa management in central Mexico (Merlín-Uribe et al., 2013);
- Piscataway oyster fishery management in the Chesapeake Bay (Rick et al., 2016);
- Bauré floodplain management in Bolivia (Erickson, 2010);
- Pueblo alluvial farming systems in Southwest American deserts (Homburg et al., 2005);
- Maskoke buffalo habitat management in Southeast America (M. Briggs-Cloud, personal communication, July 8, 2022);
- Mebêngôkre (Kayapó) terra preta soil management systems in the Brazilian Amazon (Hecht, 1992);
- Amah Mutsun prairie ecosystems and biodiversity maintenance in Northern California (V. Lopez, personal communication, June 10, 2022);
- Southwest Indigenous fire and soil management in the Ch'ooshgai Mountain range (Johnston, 2022);
- Haíłzaqv kelp forest and herring population management in British Columbia, Canada (Gauvreau et al., 2017);
- Kanaka Maoli management of Ahupua'a watershed systems in Hawai'i (Kagawa & Vitousek, 2012).

This list only scratches the surface of the multitudes of regenerative, regional, and reciprocal Indigenous food and land management systems throughout history and across the globe.

These management systems sometimes worked to achieve a form of "arrested succession" within ecosystems. For example, instead of letting an entire forest be taken over by pine, Native California Nations would apply gentle fire every fall to maintain an oak savannah that supplied predictable acorn harvests (Anderson & Barbour, 2003). For example, "good fire" not only prevents catastrophic fire by keeping fuel loads down (Norgaard, 2014), but also brings nutrient

dense ash into the soil system (Anderson, 2005), stimulates healthy grass growth for grazing animals like bison, elk, and deer (Morrissey, 2019), opens meadows for easy travel (Nuttall, 1821), spaces trees to prevent tree disease (V. Lopez, personal communication, June 10, 2022), suppresses weevil, bark beetle, and other insect populations (Anderson & Barbour, 2003), and prevents sapling and shrub thickets from absorbing limited nutrients, water, and sunlight available in given ecosystems (Stewart, 2002). By applying routine, methodical, patchy, medium-intensive, ecocentric disturbance to their homelands, Indigenous Nations managed to augment biodiversity and ecosystems health on regional scales (*e.g.*, Salmón, 2000).

Colonial institutions the world over have intentionally illustrated Indigenous People as "savage," "passive hunter-gatherers", or "primitive and uncivilized" to justify their seizure of Indigenous lands and labor, as well as to legitimize colonial policies to exterminate Indigenous People (de Vattel, 1835; More & Turner, 1965; Warden, 1975; Opotow, 1990; Denevan, 1992; Diamond, 1997; Daykin, 2006; Goff et al., 2008). Early colonial intellectuals also equated "working the land" with land ownership, belonging, and "civilized culture" (Locke, 1824; More & Turner, 1965). If Indigenous People indeed "worked the land" in highly advanced and complex ways, then by their own standards, colonial powers had to concede the land belonged to a civilized society. The ubiquity and sophistication of complex Indigenous land management systems contradicted the illustration of Indigenous People as "culturally backward," an illustration used to legitimize conquest efforts. All of this incentivized colonial groups to minimize or omit the sophistication and extent of the Indigenous management of these highly sought-after lands (Flanagan, 1989).

In addition to this very intentional omission of Indigenous land management systems from the historical record, we may also surmise that early colonists did not recognize certain landscapes as cultivated because they had no similar management practices in their homelands and therefore no cultural analog with which to identify these manicured landscapes. Instead, they often marveled at the majestic "natural parks" that seemed to magically exist throughout Indigenous homelands (*e.g.*, Beadle, 1873; Savage, 1991). Indigenous lands were instead labeled as "*terra nullius*," "wilderness", and "pristine nature", thereby erasing thousands of years of routine and systematic cultivation of Indigenous biocultural regions (Hendlin, 2014; Watson, 2014). The articulation, encouragement, and practice of IRED will continue to correct the historical record and revitalize these systems for the benefit of all nations and all life.

6.3 *Toward a Theory of Indigenous Regenerative Ecosystem Design*

In the late 20th century, a wave of scholarly interest in regional Indigenous land management proliferated scores of interesting case studies and discussions around the topic, albeit very few coming from Indigenous voices themselves. For example, scholars have named and defined this phenomenon in the following ways: Indigenous bio-engineering, cultural eco-regions (Nelson, 2008), kincentric ecologies (Martinez, 2018; Salmón, 2000), landscape construction (Grier, 2014), biocultural landscapes (Caillon et al., 2017), pre-Columbian landscape modification (de Souza, 2019), Traditional Resource and Environmental Management (TREM) (Lepofsky, 2009; Fowler & Lepofsky, 2011), Native American land-use (Abrams & Nowacki, 2008), cultural niche construction (Laland & O'Brien, 2011), ecological engineering (Martin et al., 2010), engineered landscapes, engineered cultural landscapes (Erickson, 2010), Indigenous "built landscapes" (Denevan, 1992), humanized landscapes (Mann, 2005), domesticated landscapes (Sugiyama et al., 2020), human ecosystems (Delcourt & Delcourt, 2007), resource creation (Erickson, 2000), "tending the wild" (Anderson, 2005), anthropogenic ecosystems (Lepofsky et al., 2021), cultural anthromes, cultural natures, and anthropogenic natures (Ellis et al., 2021), and so on.

The newness and case-by-case nature of this academic field has resulted in a fascinating but scattered discussion of Native land management techniques. Moreover, these studies often focus on the outward characteristics of a system, overlooking the fundamental principles and value systems that drive them. It is proposed below that these inner principles and values—such as reciprocity, reverence, respect, and responsibility to homeland—lie at the root of Indigenous land management success and sustainability. It would be useful then to generate some overarching concepts informed by Indigenous philosophy for a more nuanced, comprehensive, and useful discussion.

Thus, a theory and definition of Indigenous Regenerative Ecosystem Design (IRED) is proposed to unite and deepen the field. This is not meant to add to the confusion, nor reject terms already set forth. Rather, it is meant to (a) provide a theoretical umbrella to explore regional scale Indigenous land management systems, (b) define this phenomenon from both Euro-centric and Indigenous lenses, (c) provide an in-depth and comprehensive definition that reflects some essential aspects of these reciprocal stewardship techniques, and (d) create a strong, Indigenous-informed foundation upon which further research can be conducted.

Continued exploration of Indigenous Regenerative Ecosystem Design with guidance from Indigenous Nations themselves could support the successful application of IRED to address

our world's most pressing issues. By naming and unpacking this phenomenon, IRED recovers it from forgotten or torn out pages of history to breathe new life into their past, presence, and potential.

6.4 Patterns in Indigenous Regenerative Ecosystem Design (IRED)

Through an analysis of hundreds of written studies, seven field visits, four in-depth interviews with Indigenous land managers, as well as my own personal experience growing up within Indigenous cultural practice, a few key tenets were identified:

- IRED driving principles:
  - non-humans are equal to or Elder to humans
  - non-human lifeforms are our relatives
  - all lifeforms have an ecological and spiritual role, including humans
  - humans have a sacred covenant to protect and care for their respective homelands
  - humans have a responsibility to create a home for future generations
  - creation is sacred
- IRED driving values:
  - relationality
  - reciprocity
  - respect
  - reverence
  - restraint
  - regenerative practice
  - responsibility to homeland
  - kinship with life
  - service to life
  - generosity
  - humility
  - efficiency
  - a notion that all life is equal
- IRED system goals:

  - design in cooperation with and in service to life
  - support, feed, and care for all life
  - support, feed, and care for humans
  - help other lifeforms also fulfill their role within creation
- IRED management strategies:
  - intentional habitat expansion and maintenance
  - align/work with forces of nature
  - regenerative disturbance of ecosystem succession
  - design with and for life
  - design for perpetuity
  - design for biodiversity
  - design for efficiency
  - give thanks to and spiritually support life through formal ceremonies and offerings
- IRED system characteristics:
  - place-based
  - millennial scale—often several thousands of years old
  - regional scale
  - anthropogenic—co-created through intentional, human design
  - ecocentric—health of the whole system is privileged (Lawrence, 2017)
  - kincentric—living beings seen as the relatives of human beings (Martinez, 2018; Salmón, 2000)
  - biomimetic—mimicking biological elements and processes
  - ecomimetic—mimicking preexisting ecological conditions
- Historical context of IRED research:
  - IRED systems often been mislabeled as "*terra nullius*", "wilderness," and "pristine nature";
  - Indigenous cultures that managed bioregional systems were often mislabeled as "passive" and "primitive" hunter-gatherers;
  - Because early colonists equated "working the land" with land ownership, belonging, and "civilized culture," colonial society was incentivized to minimize or omit the extent of Indigenous management in lands they desired;

- The majority of IRED research has been done by outside anthropologists, paleoecologists, and archaeologists, which has been helpful but needs to be balanced with more Indigenous voices and perspectives;
- IRED research almost always occurs within Indigenous societies that have been exploited and violated by colonial systems;
- IRED research is most effective when it works to reverse the financial, ideological, historical, and racial power differentials that have been constructed by colonial systems between colonial and Indigenous societies.

- Corresponding policy recommendations of IRED:
  - For federal agencies: (a) initiate pilot projects by placing experimental areas under the management of traditionally trained Indigenous Elders and community members local to that area, (b) engage in meaningful cross-cultural trainings for land management, nutrition, agricultural, and fire departments by traditionally trained Indigenous Elders and community members, (c) design food and land management systems similar to IRED case studies, and (d) study and integrate the same value system that sustains IRED case studies into federal land and food programs;
  - For Indigenous grassroots communities and possibly in partnership with tribal governments: (a) invest in Indigenous-led, culturally-grounded research that recovers and revitalizes our ecological, food system, land management and linguistic sciences, (b) Establish institutions whose campuses house and support this research, recovery and revitalization of traditional Indigenous land care strategies, and (c) Invest in pilot projects on our remaining homelands that embody our traditional food system principles, values, goals, strategies and properties;
  - For non-Indigenous civilian groups: (a) restore lands to traditionally trained Indigenous Elders and community members, (b) consolidate non-civilian land holdings for holistic community management, (c) support, fund, and volunteer for Indigenous-led ecological projects, (d) place the human resources, capital, and equipment of academic institutions at the service of Indigenous principal investigators to fulfill the research agendas of Indigenous communities, and (e) support voluntary land tax programs that forward funds to grassroots Indigenous community projects within given tax districts (*e.g.*, the Shuumi Land Tax program of Oakland, California).

While we can be sure that not all these tenets and contexts are applicable to every Native

land management system worldwide, an extensive review of IRED case studies elucidates that these are indeed some general themes and patterns among their principles, values, goals, strategies, and characteristics. The identification of these patterns beckons researchers to consider and expand this theoretical foundation. It also suggests that respectful and reciprocal research be conducted under the guidance of Indigenous communities themselves to enhance research findings and solve problems for both Indigenous and colonial societies.

6.5 Why "Indigenous Regenerative Ecosystem Design"?

The word "Indigenous" is used within IRED as it seeks to specifically correct a record about Indigenous People. Indigenous Nations are defined as distinct cultural groups, bound by a common language and cosmology, that have lived within a specific geographic locale on a millennial scale (United Nations, 2011). IRED speaks directly to the colonial cannon that both consciously and unconsciously misrepresented Indigenous People for centuries. Terms offered by previous scholars come from studies with Indigenous communities, but they do not explicitly name them as Indigenous systems. This word helps to signify that this research is specifically regarding Indigenous People and their land management techniques. "Regenerative" is used to help the world understand that these practices resulted in positive effects for surrounding ecosystems. These systems did not simply "break even" as the term "sustainable" suggests but rather left places healthier and more biodiverse than they found them. They augmented and renewed living systems through regenerative management techniques, such as selective harvests, nutrient cycling activities, species facilitation, habitat expansion, and genetic diversification. Because these practices are generally guided by a kincentric ethic (Salmón, 2000) versus an anthropocentric ethic, they by definition worked to improve the whole system.

Land is used to hopefully convey the regional scale Indigenous ecosystem management. Indigenous societies did not plant gardens—they managed whole forests (Delcourt et al., 1998). They did not run oyster farms—they managed whole estuaries (Rick et al., 2016). As such, an important element of IRED is the regional extent to which Indigenous People influenced the composition of bioregional landscapes and their corresponding natural processes. Within IRED, the word "Design" is also very important. It recognizes that these systems were intentionally designed. It helps to debunk the myth that Indigenous Nations were, as the Smithsonian Institute wrote, "living as natural elements of the ecosphere ... a world of barely perceptible human disturbance" (Shetler, 1991). The narrative is corrected to reflect how Indigenous People sus-

tainably and reciprocally modified ecosystems with and for life. Without this word embedded in the proposed theory, we stand to (yet again) erase the agency and intention of Indigenous Nations.

IRED posits that humans belong within earth systems and can have a positive effect when guided by refined principles, values, goals, and skill sets. Indeed, when we achieve this, humans become a keystone species, or a species upon which entire ecosystems depend (and our cultures become keystone cultures).

6.6 The Heart of IRED

After a thorough review of various IRED case studies, it was found that their *underlying principles and values* are foundational to their success (Figure 6.1). The implication here is that until industrial society amends its principles and values (and corresponding goals), we will not achieve the level of sophistication, sustainability, and success of IRED cultures. Until our societies are rooted in reciprocity, reverence, responsibility, and respect for life, we may have a new face, but our heart will remain the same. Conversely, it is hypothesized that once societies achieve these inner roots, they will naturally flourish in the ways that mirror that of IRED systems.

Globalized, industrialized culture can achieve these roots by first acknowledging that our current anthropocentric systems are not supporting life, nor ourselves. They have resulted, in fact, in our imminent demise as a culture as food and water shortages loom in the face of biodiversity loss and climate instability. From this place of acknowledgement, industrial cultures can engage in self-education, youth education, organizational education, and state agency education by exploring the ample existing resources regarding IRED and other articulations of Indigenous worldviews. We can also invest more sincerely in cross-cultural dialogue and training to inform, inspire, and transform anthropocentric industrial systems that have reached the end of their lifespan. While collapse can entail great suffering and existential crisis, it can be a powerful impetus for learning and transformation. Collapse has been and can be for us a site of evolution and refinement, as we deeply learn what does not work. We are in the same crucible many human societies have faced before, albeit on a larger scale. The great change facing humanity can be leveraged to catalyze deep reformation and learning—this time, on a global scale.

6.7 Future Research in IRED

The development and understanding of IRED depends on the input of more perspectives, interpretations, and insights of scholars and practitioners of all backgrounds. For deeper understanding of this phenomenon, our exploration needs to be informed by the perspectives and agendas of Indigenous communities themselves. These are more than just theories for past, present, and future Indigenous Nations. They are lived experiences of Indigenous People, expressed through annual ceremonies, songs, spiritual beliefs, cultural narratives, craftsmanship, sensory experience, prayer, and affective kinship to various species, much of which cannot be intellectualized or explained through words. Indigenous research methodologies and ways of knowing can be integrated into our approach to attain a deeper understanding (Smith, 2021).

Here are seven examples of IRED research projects that could elucidate hidden histories, further the health and balance of both Indigenous and colonial populations, and support the vitality ecosystem of a given locale:

- Examining the environmental total effects of livestock care within Maasai pastoral societies versus industrial farms;
- Estimating the net carbon sequestration effects of long-term Indigenous fire management of forest and grassland ecosystems;
- Comparing and contrasting the value systems and water infiltration rates of soils of Indigenous fire managed ecosystems, federally fire managed ecosystems, and non-fire managed ecosystems;
- Semi-structured interviews with Indigenous Elders of a given community around the topic of IRED and how it would be explained or understood through their linguistic and cultural lens;
- Host talking circles with Indigenous Elders and community members to ascertain an exhaustive list of how they would manage a given area of a dispossessed homeland if they were given access to it;
- Examine the fossilized pollen and sedimentology records of areas where Indigenous Nations are working to understand and prove their historical relationship with a given place;
- Examine places that are currently believed to have no prior human management or Indigenous presence and investigate ways in which those environments may have been shaped by pre-colonial cultures.

These and related research questions can help us to understand, share, and apply the lessons of IRED systems at a time when the world deeply needs it. This research needs to of course be carried out in the manner that Indigenous communities are ready for and comfortable with.

6.8 Conclusion

Indigenous Nations extensively have managed and, in some cases, continue to manage millennial scale food and land systems for the benefit of all life, whom they often view as kin. These systems often operate on regional scales and are generally highly biodiverse. While they differ geographically, culturally, and ecologically, they are often governed by a strikingly similar value system rooted in relationality, reciprocity, respect, reverence, regenerative practice, responsibility to homeland, kinship with life, service to life, and a notion that all life is equal.

Colonial society has long been incentivized to classify Indigenous People as "passive and primitive hunter-gatherers" to legitimize the seizure of land and labor, resulting in the omission and misunderstanding of these vast systems in many historical records.

Eventually, Western scholars began to recognize and study Indigenous land management in the late 20th century leading scores of articles and books on the topic, with very few authors coming from Indigenous backgrounds. Because it has mostly been treated on a case-by-case basis, conversations around this phenomenon are scattered and disconnected.

Indigenous Regenerative Ecosystem Design (IRED) is proposed as a term and theory to (a) unify the discussion around regional scale Indigenous land management systems, (b) define this phenomenon from both Euro-centric and Indigenous lenses, (c) provide an in-depth and comprehensive definition that reflects the essential aspects of these reciprocal stewardship technique, and (d) create a strong, Indigenous-defined foundation upon which further research can be conducted. Key tenets of this theory are articulated and recommendations for future research are offered.

Indigenous Regenerative Ecosystem Design theory posits that IRED systems are generally founded on the following principles: non-humans are equal to or Elder to humans, non-human lifeforms are our relatives, all lifeforms have an ecological and spiritual role (including humans), humans have a sacred covenant to protect and care for their respective homelands, humans have a responsibility to create a home for future generations, and creation is sacred. It also posits that IRED systems are often governed by the values of relationality, reciprocity, respect, reverence, restraint, regenerative practice, responsibility to homeland, kinship with life,

service to life, generosity, humility, efficiency, and a notion that all life is equal. IRED systems were also identified to be often place-based, millennial scale, regional scale, constructed with non-synthetic and locally available materials, anthropogenic, ecocentric, and kincentric.

It was found that IRED systems, due to their underlying values and principles often work to achieve the following goals: cooperate with (and be in service to) surrounding life systems, support, feed, and care for all life, support, feed, and care for all humans, and help other lifeforms also fulfill their role within creation. They often employ the following strategies to achieve these goals: expand and maintain preexisting habitat, align and work with larger forces of nature, curb and modify ecosystem succession in a regenerative manner, design for perpetuity, design for biodiversity, design for efficiency, and give thanks to and spiritually support life through formal ceremonies and offerings.

Several IRED examples are shared as well as contemporary issues that IRED systems can help to address such as biodiversity loss, ecological fragmentation, climate instability, soil erosion, water shortages, global food shortages, Indigenous language/cultural/economic loss, unhealed political histories, over-dependence on global markets, catastrophic fire, flooding/floodplain management, and lack of community resilience. Examples of future IRED research questions and projects were identified to help further our understanding of IRED systems, as well as refine solutions to the above contemporary issues. Potential policy steps are recommended to generate federal, tribal, and non-governmental support of IRED research and revitalization.

There is a word in my Diné language: *Hozhó*. *Hozhó* is the joy of being a part of the beauty of all creation. When we understand that humans are an expression of the earth's beauty, we understand that we, too, have an ecological role. *Hozhó* understands that we belong here. *Hozhó* understands that the earth needs us. When we become her friend, her ally, her partner in life—instead of her dominator, her "superior," or her profiteer—we can transform dead systems to living ones. This does not involve isolating national parks and never touching a blade of grass. It involves rolling up our sleeves, living within her processes, becoming a part of the Earth system, and using our evolved brains to serve life, rather than profit from life, on holistic, regional scales. If our Ancestors around the world proved this is possible, there is strong hope that we can do it again.

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6.10 Figures

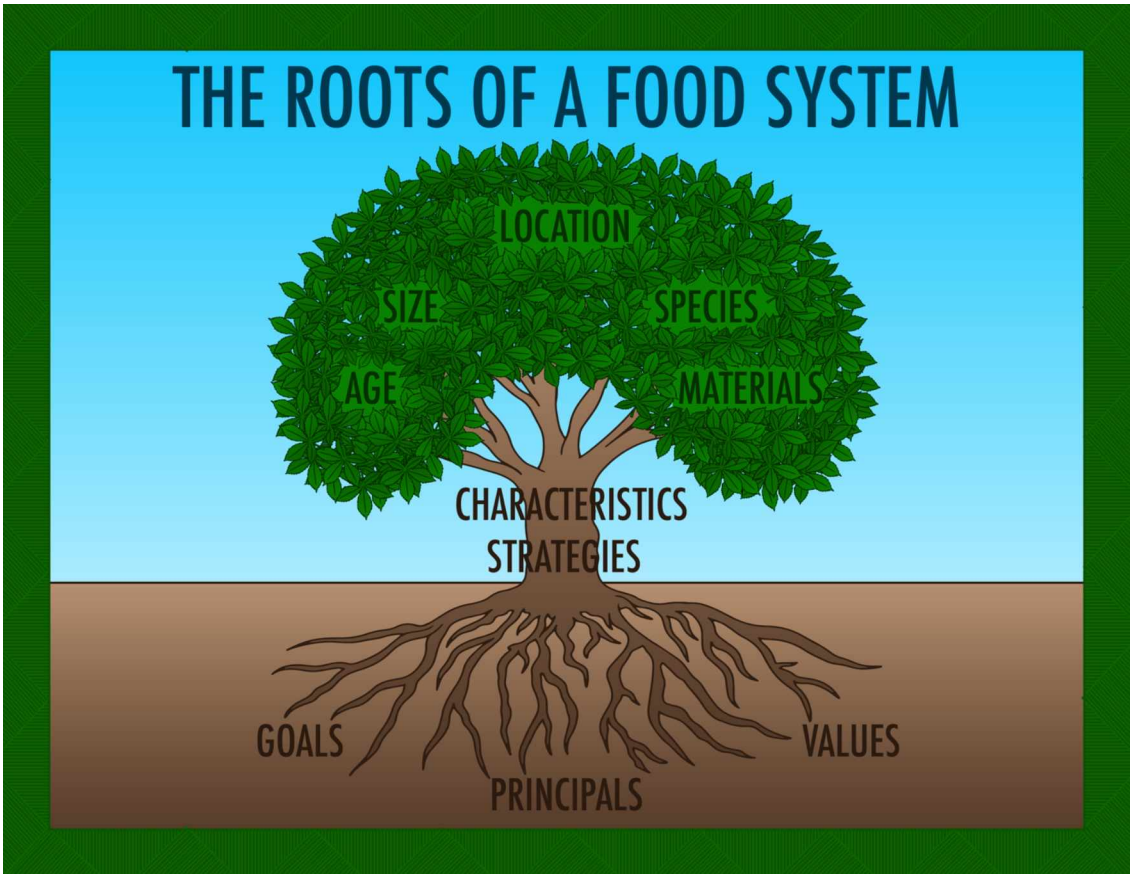

Figure 6.1: The Invisible Roots of Indigenous Regional Food Systems. Courtesy of Marcus Trujillo

7

Policy: Food Security and Land Management in the 21st Century

7.1 Executive Summary

Food and land management policy recommendations are presented here based on an in-depth analysis of 36 sustainable Indigenous food systems and a review of 222 scientific articles pertaining to Indigenous Regenerative Ecosystem Design (IRED). This analysis revealed that successful IRED systems are biodiverse, regional scale, create a mutually beneficial relationship between human societies and their surrounding environments, and are extremely effective and sustainable (often operating on millennial scales). These recommendations are intended to help nations meet their most pressing challenges such as climate instability; food shortages; water shortages; over-dependence on global markets; biodiversity loss; ecological fragmentation; Indigenous linguistic and cultural extinction; unhealed political histories; catastrophic fire; and severe flooding.

These recommendations are directed to three main audiences: (a) federal agencies, (b) grassroots Indigenous organizations, communities, and tribal governments that wish to participate, and (c) non-Indigenous, non-governmental populations. Examples like Scottish Hebrides cultural revitalization, Hawaiian language revitalization, and Australian Indigenous co-management of lands demonstrate how powerful projects become when federal, tribal, and non-Indigenous citizen populations work in unison towards a common goal. Together, these three bodies can create powerful change both for themselves and for each other by integrating Indigenous land management principles and strategies into their policies and agendas.

The three sets of recommendations are summarized as follows:

1. For federal agencies: (a) invest in meaningful cross-cultural dialogue between traditionally trained Indigenous Elders and community members and federal land management, nutrition, agriculture, and fire safety administrations; (b) initiate pilot projects by plac-

ing experimental areas under the management of traditionally trained Indigenous Elders and community members local to that area; (c) design food and land management systems similar to IRED case studies; (d) research and integrate value systems that sustain IRED case studies into federal land and food programs; and (e) enact legislation and issue proclamations that fund, elevate, formalize, and further Indigenous land management institutions.

2. For grassroots Indigenous communities (in partnership with their corresponding tribal governments where possible): (a) invest in pilot projects on remaining Indigenous land bases that employ traditional land and food systems principles, values, goals, and strategies; (b) establish and invest in culturally-grounded institutions whose campuses house and support the research and revitalization of traditional socioecological, spiritual, and land care sciences; and (c) invest in research, development, and implementation of strategic communication plans to cross-culturally educate non-Indigenous society about Indigenous food and land management.

3. For non-Indigenous, non-governmental society: (a) where possible, restore excess private landholdings to traditionally trained Indigenous Elders and community members; (b) consolidate private landholdings for holistic community management; (c) support, fund, and volunteer for Indigenous-led ecological projects; (d) place human resources, capital, and equipment of academic institutions at the service of Indigenous principal investigators to fulfill the research agendas of Indigenous communities; and (e) support voluntary land tax programs that forward funds to grassroots Indigenous community projects within given tax districts (*e.g.*, the Shuumi Land Tax program of Oakland, California).

7.2 *Methodology*

The policy recommendations below are based on an in-depth examination of 36 case studies of sustainable Indigenous food and land management systems. Each of these systems operated sustainably for at least 1000 years and many operated for at least 6,000 years. They were thematically analyzed to detect commonalities in their principles, values, goals, strategies, characteristics, and outcomes. These lessons elucidated by these success stories were then translated into policy recommendations for present-day land and food systems management across various sectors of society.

7.3 Recommendations

7.3.1 Recommendations for Federal Agencies

The White House Council on Environmental Quality (CEQ) and the White House Office of Science Technology Policy (OSTP) recently released a memorandum for the heads of federal departments and agencies of to recognize Indigenous Traditional Ecological Knowledge (ITEK) as critical to federal government decisions (Lander & Mallory, 2021). It also commits these agencies to additional consultation with Tribal communities. The following policy steps could be taken in the United States and within other nation states working to integrate ITEK into their government decisions. These steps may also be taken to support nation states as they work to solve their most pressing problems such as climate instability, biodiversity loss, food shortages, catastrophic fire/flooding, and more. Federal recommendations are as follows:

1. Invest and engage in meaningful, cross-cultural trainings led by traditionally trained Indigenous community members for federal land supervisors as well as agricultural, nutrition, and fire safety administrations;
2. Engage in pilot programs where traditional homelands are fully restored to the leadership of traditionally trained Indigenous Elders and community members for the purposes of applying Traditional land management practices. This would be with the aim of (a) neutralizing the effects of climate change, biodiversity loss, ecological fragmentation, catastrophic fire, and severe flooding caused by dominant culture practices; (b) repairing Indigenous cultural and food systems; and (c) healing unresolved political histories. Prospective sites for piloting this strategy include (but are not limited to):
    - Federal Lands of the Black Hills of South Dakota;
    - Point Conception, Santa Barbara, California;
    - Federally-held Lands of the McCloud River Basin of California;
    - Land Bases under the Auspices of the Hawaiian Department of Land and Natural Resources;
    - "War in the Pacific National Historic Park" in Guåhan (Guam);
    - All or pilot portions of major National Parks such as Yellowstone, Yosemite, Great Smokey Mountains, Blue Ridge Mountains, Saguaro, Mesa Verde, Everglades, Glacier, Great Basin, Wind Cave, Guadalupe Mountains, Shenandoah, Olympic, and Mount Rainier.

3. Based on a survey of the characteristics and strategies of successful Indigenous food systems, it is suggested that federal agencies work to design food and land management systems that:
    - Are ecocentric (designed to benefit both humans and non-human lifeforms);
    - Expand, enhance, and create habitats of selected biotic communities;
    - Generate biodiverse, polycultural systems as opposed to monocultural systems,
    - Tap into, work with, and dovetail with preexisting forces of nature;
    - Involve proactive human participation in the shaping, harvesting, and managing of ecosystems as opposed to hands-off, conservationist approaches;
    - Design for perpetuity;
    - Support ecologically holistic systems that operate on regional, landscape scales;
    - Use local, biotic, organic, non-synthetic materials and inputs to construct and manage these systems.
    - Leverage careful fire to appropriate lands to prevent catastrophic fire, improve grasslands and savannahs for endangered herbivores, space trees to prevent tree disease, sequester carbon, increase biodiversity by maintaining grassland ecosystems, preserve old growth by limiting competing vegetation, and facilitate soil health and nutrient cycling.
    - Rebuild the systems of Indigenous Nations to meet contemporary economic and nutritional needs of Indigenous and non-Indigenous communities, and;
    - Work to repair history through a deeper dedication (both in word and in action) to the health of Indigenous Nations;
4. The sustainable systems analyzed in this study varied in outward appearance and geographic location but were almost universally driven by a similar set of principles and values. It is suggested that federal agencies consider integrating and encouraging these principles and values into their administrations where possible:
    - Non-humans are equal to humans;
    - All lifeforms have an ecological purpose and role, including humans;
    - Humans have a responsibility to care for their respective homelands;
    - Humans have a responsibility to create a home for future generations;
    - Embody the values of relationality, reciprocity, respect, reverence, restraint, regenerative practice, kinship with life, service to life, generosity, humility, efficiency.

5. Enact legislation and issue proclamations that fund, elevate, formalize, and further Indigenous land management institutions. For instance, federal governments could formalize certain areas as "national biocultural regions" where not only ecological systems are preserved, but the cultural and land management practices of local Indigenous Nations are also protected, funded, and instructed. Indigenous-led task forces, committees, and public education efforts could also be endorsed and funded by federal agencies to demonstrate federal backing of Indigenous land management practices.

7.3.2 Recommendations to Indigenous Communities and their Tribal Governments

There are a number of measures Indigenous Nations worldwide can take to advance their traditional food and land management systems. Native People have enormous capacity within their societies and remaining land bases to heal their communities and change the way the world thinks about food and water. Despite assimilationist policies and attempted genocide, Indigenous traditional knowledge has not been lost. It is with great urgency that Indigenous Nations must research and revitalize their systems of land care, food production, and community health. Based on an in-depth review of the values, characteristics, principles, and strategies of 36 sustainable Indigenous food systems, combined with the obvious failings of dominant culture systems, it is recommended that Native Nations enact the following capacity building and information dissemination policies:

1. Invest in pilot projects that employ traditional, landscape-scale management of ecosystems with the aim of (a) working in cooperation with life and natural systems; (b) supporting, feeding, and caring for all life, including the human community; (c) helping other lifeforms also fulfill their role within creation; (d) expanding habitat for non-human relatives; (e) designing perpetual systems; (f) living in reciprocity, reverence, and respect for Earth and all life; and (g) any other appropriate community management goals and strategies.
2. Invest in community-led research institutions/campuses that work to archive and revitalize traditional food and land management sciences. Ensure these are prioritized, incubated, encouraged, formalized, funded, and supported. These could support the following types of research:
    (a) fossilized pollen analysis;
    (b) interviews with Elders;

(c) creation of new technology to measure Indigenous scientific principles and systems;

(d) design "action research" projects that generate data/knowledge and concurrently fulfill community needs;

(e) linguistic revitalization and analysis;

(f) sedimentology;

(g) genetic and Ancient DNA analysis, and;

(h) archival research.

3. Invest in research, development, and implementation of strategic communication plans to cross-culturally educate non-Indigenous society about the importance and viability of Indigenous food and land management systems. This policy step will help Native Nations develop effective and appropriate means of information dissemination to uplift and legitimize Indigenous sciences, as well as support the world in a time of converging crises.

7.3.3 *Recommendations for Non-Indigenous Civilian Society*

Non-Indigenous society includes diasporas, settler societies, and immigrant communities and the social institutions they control. Non-Indigenous populations have great power and capacity to engage with Native Nations in ways that effectuate change and are mutually beneficial. Contemporary multi-cultural societies often recognize the historical suppression of Indigenous communities and cultures and are eager to contribute to processes of repair. These recommendations are written with the conviction that we can collectively create a new legacy founded on integrity and mutual respect. In that spirit, the following pragmatic strategies are recommended:

1. Place private academic institutions and/or departments in service of Indigenous food and land management revitalization: Indigenous food and land management systems offer powerful alternatives to failing dominant management strategies. By putting the power, resources, and networks of academic institutions behind Indigenous research agendas we can address social problems such as climate instability, catastrophic fire, food shortages, over-dependence on global markets, biodiversity loss, and severe flooding. This can enhance the viability and resilience of Indigenous and non-Indigenous populations.

2. Financially support Indigenous-led ecological projects: By definition, Indigenous People and cultures have existed sustainably in one place for thousands of years. Roughly 80% of Earth's remaining biodiversity is on lands overseen by Indigenous People who comprise

only 5% of the global population. By steering philanthropy, private wealth, and community dollars towards projects of traditionally trained Indigenous Elders and community members we can revitalize these regenerative systems for the benefit of Indigenous and non-Indigenous populations.

3. Return excess private landholdings to grassroots Indigenous organizations and community members: There are many inherited landholdings and organizational landholdings that are not entirely needed to support non-Indigenous families and institutions. By restoring excess landholdings to grassroots Indigenous organizations, Elders, and community members, these lands can become sites of repair and inspiration. They can also be leveraged to demonstrate certain food and land practices that could help address the issues of both Indigenous and non-Indigenous populations.

4. Consolidate lands for community management: Holistic Indigenous land management techniques encourage us to manage ecoregions collectively instead of managing siloes within compartmentalized ecological systems. A survey of 36 sustainable Indigenous food systems revealed that by tapping into regional ecological processes—such as preexisting topography, tides, contiguous prairie systems, animal migration, soil and mycelial systems, and hydrological systems—we can more easily create abundant food sources for humans and all life. This can be piloted on smaller scales to build community buy-in.

7.4 Conclusion

To help address the world's most pressing issues and revitalize Indigenous land care practices, a number of policy recommendations are offered for three sectors of society: (a) federal agencies; (b) grassroots Indigenous organizations, communities, and governments; and (c) non-Indigenous populations (diasporas, immigrant populations, and settler societies).

Federal agencies are encouraged to (a) invest in cross-cultural dialogue between traditional Indigenous land managers and federal land management, nutrition, agriculture, and fire safety administrations; (b) run pilot projects where certain federally held lands are placed under the care of traditionally trained Indigenous land stewards; (c) learn and implement traditional Indigenous food and land management strategies; (d) research and integrate value systems that sustain traditional Indigenous food and land management; and (e) enact legislation and issue proclamations that fund, elevate, formalize, and further Indigenous land management institutions.

It is suggested that grassroots Indigenous organization and communities (as well as their corresponding tribal governments where possible): (a) invest in traditional land management pilot projects on remaining land bases; (b) establish culturally grounded research institutions that revitalize these practices; and (c) develop strategic communication plans to spark effective cross-cultural dialogue with non-Indigenous society about Native land management strategies.

Non-Indigenous/non-governmental populations are encouraged to take the following steps: (a) where possible, restore excess private landholdings to traditionally trained Indigenous Elders and community members; (b) consolidate private landholdings for holistic community management; (c) support Indigenous-led ecological projects; (d) place academic institutions and resources behind the research agendas of Indigenous communities; and (e) support voluntary land tax programs that help fund grassroots Indigenous community projects.

Working in unison, these three sectors of have the capacity to revitalize, support, and learn from Indigenous food and land management strategies thereby helping to address the following important issues: climate instability; food shortages; water shortages; over-dependence on volatile global markets; biodiversity loss; catastrophic fire and flooding; ecological fragmentation; unhealed political histories; and Indigenous linguistic and cultural extinction.

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8

Colonial Erasure of Indigenous Food and Land Management History[1]

> Pre-Columbian America was still the First Eden, a pristine natural kingdom. The native people were transparent in the landscape, living as natural elements of the ecosphere. Their world, the New World of Columbus, was a world of barely perceptible human disturbance.
>
> *–Stanwyn Shetler, Smithsonian Publication, 1991*

> Every nation is then obliged by the law of nature to cultivate the land that has fallen to its share ... Those nations ... who inhabit fertile countries, but disdain to cultivate their lands ... are injurious to all their neighbours, and deserve to be extirpated as savage and pernicious beasts.
>
> *–Emer de Vattel, French Colonial Intellectual, 1798*

> ... the Indians did not need all the land of the Americas, were not using most of it and did not really own it because they were hunters rather than agriculturalists ... this "agricultural argument" ... has taken several forms, but all versions purport to legitimize the European appropriation of American lands.
>
> *–Thomas Flanagan, University of Calgary, 1989*

8.1 Abstract

Successful management of regional scale food systems by Indigenous People is a widespread global phenomenon yet has only recently been recognized by colonial historians and scientists and continues to be poorly understood in mainstream society. It is proposed and supported by historical evidence that indicators of Indigenous cultural sophistication, including Indigenous land management techniques, are purposefully minimized in the historical record because

[1] This chapter treats very tragic and upsetting periods of human history.

they contradict narratives of colonial cultural superiority used to justify the seizure of lands and labor. Moreover, because land management was both the symbolic and legal marker of belonging, civilization, and land ownership for early colonial society, Indigenous land management systems became all the more important to minimize or erase. Taking a global perspective, this chapter demonstrates how colonial groups the world over have methodically and arbitrarily dehumanized those they seek to displace. Colonial powers later become the jurors of what counts as knowledge, leading to the erasure and distortion of Indigenous cultural institutions. Indigenous history becomes "prehistoric." Oral history becomes "myth." Vast and complex civilizations are reduced to "Indian tribes" or "nomads." Indigenous science becomes "folklore" or "ethnoscience" and most importantly to this study, ancient architects of regional-scale food systems are reduced to "hunter-gatherers."

8.2 Introduction

If the extensive management of ecosystems by Indigenous People was so prevalent, why is this still unknown to the average person? For the American context, why is this not taught in the "Woodland Indians" unit for elementary school students today? If Native People wielded such immense agency in their respective environments and in so many places, why did it take so long for Western scientists to start discussing this phenomenon? In this chapter, the following line of reasoning is proposed and supported through historical evidence as to why this phenomenon remained hidden from the public conscious for so long:

1. Colonizing groups have seized lands and labor of Indigenous groups throughout time and across the globe;
2. Colonial systems have a need to sanitize their past mistakes to legitimize their imprints;
3. Colonial powers throughout time and across the globe have rationalized their violent actions by deeming themselves religiously, culturally, racially, and technologically superior, while framing those they displace or enslave as "primitive," "savage," "subhuman," "uncivilized," and "cultureless";
4. These designations are not genuine but are contrived to provide colonial systems with a license to seize land and labor;
5. Indicators of Indigenous social complexity or sophistication contradict colonial narratives of their own cultural superiority used to seize land and labor;

6. The sophistication and extent of Indigenous land management is one of many things hidden or minimized by colonial systems as it disproves the narrative that Indigenous groups are "primitive" and inferior;
7. Influential colonial groups have categorized highly civilized and functional land management systems as "uncivilized." The distortion and erasure of Indigenous land management systems has impoverished humanity and the planet as a whole.

While these may seem like bold statements to some, we must remember that the 16th–20th centuries saw incredibly heinous acts towards African People, Jewish People, Indigenous People across the globe—all justified by the premise that they were simply not civilized or worthy of life and liberty.

For example, the Thai Kingdom justifies the seizure of Karen lands and labor because they are a "non-Buddhist, primitive forest people" (Tanabe, 2000). Hitler justified his plunder of Jewish financial resources by saying they were a "biologically inferior race" and undeserving of their very existence (Aly, 2007). European powers justified the enslavement of African People because they were supposedly culturally, biologically, and religiously subhuman. Many Euro-Americans justified (and continue to justify) the seizure of Turtle Island[2] by saying that Native People are not fully human, but rather descendants of primitive savages.

Hechter (2017) studied British colonization of Celtic cultures and a variety of other cases and concluded that a defining characteristic of imperial expansion is that the colonial "center" must disparage the Indigenous "periphery":

> [Colonization] must involve the interaction of at least two cultures—that of the conquering metropolitan élite (cosmopolitan culture) and of the indigenes (native culture)—and that the former is promulgated by the colonial authorities as being vastly superior
> ....
> One of the consequences of this denigration of [I]ndigenous culture is to undermine the native's will to resist the colonial régime. If he is defined as barbarian, perhaps he should try to reform himself by becoming more cosmopolitan. Failure to win high position within the colonial structure tends to be blamed on personal inadequacy, rather than any particular shortcomings of the system itself. The native's internalization of

[2] Turtle Island is an Indigenous term for North America and comes from a Creation Narrative shared by the Haudenosaunee, Anishinaabeg and other Indigenous Nations. This story honors women, honors the smallest animals, and depicts humans and animals working together symbiotically. The word America comes from an historical figure—Amerigo Vespucci—a European explorer commissioned to look for people to enslave and gold to extract. I and many others do not feel it is appropriate to name these lands for a man whose life was dedicated to and symbolized atrocity and avarice.

> the colonist's view of him makes the realization of social control less problematic. Conversely, the renaissance of [I]ndigenous culture implies a serious threat to continued colonial domination. (Hechter, 2017, p. 73)

In this manner, many scholars argue that the tendency of aspiring empires to minimize, debase, discredit, and demean Indigenous cultures is not based on factual truth, but political expediency. It provides colonial powers with a much-coveted license to dispossess the Indigenous civilizations of vast tracts of land and wealth because "they aren't really human anyways."

Consequently, any indicator of Indigenous intricacy becomes a troublesome fly in the ointment of colonial "superiority." This especially includes the ways in which Indigenous "Americans" had an active and advanced role in sculpting the continent.

8.3 "Cultural Supremacism" as an Ancient Justification for Land Seizure

It is important to note that the human tradition of degrading those we seek to conquer is an ancient practice that far predates American colonization and slavery. For example, the Roman poet Prudentius wrote of the "Pagan" Symmachi family in the 4th century: "As different is the Roman from the barbarian as man is different from the animal or the speaking person from the mute, and as they who follow the teachings of God differ from those who follow senseless cults and superstitions" (as cited in Thomson, 1953, p. 816). This ableist and othering statement demonstrates how long humans have leveraged notions of savagery and civilization as a means of gaining power.

Similarly, Norman-inspired English invaders long minimized the dignity of the Indigenous People of Wales, Scotland, and Ireland. This cultural denigration was conveniently applied whenever the English wanted their land. It always involved placing the "other" at an inferior point in a spectrum between barbarism and civilization. For instance, twelfth century English historian William of Malmesbury, wrote that King David I of Scotland was "made civilised by his upbringing amongst us. In consequence the rust of his native barbarism was polished away" (as cited in Gillingham, 1992, p. 142). Authors of the *Gesta Stephani* (or Deeds of King Stephen) wrote in the 1140s that England was "the seat of justice, the abode of peace, the apex of piety, the mirror of religion" while Wales was "a country of woodland and pasture . . . breeding a bestial type of man" (as cited in Gillingham, 1992, p. 142).

Despite the English's self-designation as the apex of civility, the Welsh maintained them as brutal and cruel, justifying their defense against King Edward I's invasion of Wales (Prestwich,

2008).

A similar story unfolds in present-day Thailand where only decades ago the Thai elite forcefully converted rural communities to Buddhism as well as forced rural children to speak Thai in school. Tanabe (2000) traces the roots of Thai imperial expansion by examining a popular motif disseminated in the region since the fifteenth century:

> The encounter with an autochthonous group, represented as uncivilized non-Buddhist cannibals and civilized Buddhists is a common motif in Buddhist literature.... Lua' as an autochthonous category came into being during the conquest of [I]ndigenous people by the Tai, and was consolidated by Buddhist missionary discourse that regards non-Buddhist aborigines as living in a state of nature close to animality, but as capable of being civilized through Buddhist moral precepts and practices. (p. 297)

Similarly, Thongchai (2000) studied the ways in which the Thai Kindgom placed people in a lower caste simply because of where they lived geographically:

> this ethno-spatial ordering and relationship gave the Siamese elite a sense of its superior place within Siam and in relation to the world beyond. In other words, since its inception Siam has always been a hierarchical domain, differentiated not only by class and status, but by ethno-geography as well. (Thongchai, 2000, p. 41)

Wittayapak (2008) chronicles how the Thai elite desired to absorb ethnically different people into the Thai nation-state and gain land, taxes, and labor in the process. To do this, the Thai Kingdom minimized the dignity of those they sought to displace:

> It has nothing to do with the inner qualities of the people or cultural attributes or historical development. It was similar to the Western colonial project to formulate and control the 'Others'. It is simply an ethnic classification by powerful outsiders based on geographic location ... the descriptions of wild people in the early ethnographic writings of Siamese rulers documented uncivilised and un-Thai attributes as strangeness. These characteristics included physical appearances such as colour of skin, curliness of hair, length and quantity of body hair, and thickness of lips. These wild or forest people are marginal subjects in every sense. The notion of *Pa* (forest) was deemed to be marginal space and *Khon Pa* to be marginal people in this space ... In the making of the modern Thai nation-state through internal territorialisation, the space of *Chao Bannok* was administered, domesticated, and exploited for natural and human resources. (Wittayapak, 2008, pp. 113–114)

Just as with Wales and Ireland, Thai colonists demeaned certain groups simply because they lived in the forest. They are arbitrarily labeled as "uncivilized" and the seizure of land begins as a "civilizing" campaign.

We also see an exaggerated obsession with physical difference which is then fashioned into a license to dominate, as in with the subjugation of African People by Europe. In this context, it is highly important for the Thai elite to hide and diminish any beauty of forest culture, while concurrently elevating their own culture, lest their fragile rationale be compromised. As an aside, it is interesting to note that the translation of the true name of the Karen Nation (Indigenous to present-day Thailand) means, "The People," just like that of many Native Nations of Turtle Island.

Buddhism is one of many beautiful spiritual traditions weaponized and fashioned into a "righteous" rationale for colonization. In the 4th century, the Roman emperor Constantine was the first to appropriate Christ and Christian culture to form a license to dominate (*in hoc signo vinces*) and to construct his own religious superiority. Thus, it has long been a practice to contrive "spiritual" justifications for the seizure of Indigenous lands and labor. This is evident in the "holy" wars of Europe as well as in the Spanish Conquista of Turtle Island and Abya Yala[3], which were carried out "in the name of Christ." As Jones writes, "When the ambition or arrogance of ... men coincides with specific political, military, or religious objectives such antagonisms might be concealed behind the idealistic ventures of a civilizing or missionizing kind" (Jones, 1971, p. 378).

In addition to religious justifications, there are also "biological" justifications for land seizure. These rest on the premise that some humans are "naturally" better than others and will "inevitably" come to overtake their lands and resources. Darwin's Origin of Species, published in 1859, provided a new citation for those seeking to formalize their biological superiority. The theory of natural selection was weaponized to deem certain human groups as "biologically" inferior, and therefore less able to properly "use" their lands compared to "the higher races of men." It provided "scientific" evidence for various justifications that were already in play. For instance, the first Governor of California addressed the State Legislature in 1851 saying:

> war and theft are established customs among the Indian races generally, as they are among all poor and savage tribes of men ... brought into contact with a civilized race

[3] Abya Yala is an Indigenous term for Central and South America. It comes from the Dule People of Panama and Columbia and means "land in its full maturity." This has come to be a more accepted term in Native communities for the same reasons Turtle Island has become more frequently used.

of men ...

> [A] war of extermination will continue to be waged between the races until the Indian race becomes extinct .... While we cannot anticipate this result but with painful regret, the inevitable destiny of the race is beyond the power or wisdom of man to avert.

Governor Burnett named this "inevitable" and in the same breath called for increased military funding for the annihilation of said people. A bounty was set for the scalps of Indigenous Californians and the barbaric hunting of human beings in California commenced. Burnett thus frames the destruction of Indigenous human beings as an inevitable consequence of a kind of "survival of the fittest" axiom.

Similarly, California's Mount Shasta Herald reported in 1888 that a "meeting of citizens was held a day or two before ... and measures taken to raise a fund, to be disbursed in payment of Indian scalps, for which a bounty is offered!" (as cited in Lindsay, 2012, p. 212). The hidden thread among all justifications—whether religious, cultural, or "natural"—is the justifier's strong desire for land.

In some cases, it is not just land, but labor as well. Goff et al. (2008) conducted a survey of ways Indigenous African Nations were likened to animals as a justification for the violence of slavery:

> Historians, linguists, and philosophers have engaged in scholarship on dehumanization for the better part of two centuries. From this scholarship, we know that associations between humans and nonhuman animals have been used to justify slavery in the United States, the Jewish Holocaust of World War II, and widespread violence against immigrants around the world (Chalk & Jonassohn, 1990; Lott, 1999; O'Brien, 2003; Ana, 2002). Dehumanization is viewed as a central component to intergroup violence because it is frequently the most important precursor to moral exclusion, the process by which stigmatized groups are placed "outside the boundary in which moral values, rules, and considerations of fairness apply" (Opotow, 1990, p. 1). Groups that are morally excluded do not count in a moral sense. Consequently, anything that is done to someone who is morally excluded is permissible, no matter how heinous the action. (Goff et al., 2008, p. 293; authors' original citations included in the reference section of this chapter)

Grills et al. (2016) added to this deconstruction in saying:

> the lie of Black inferiority (and by implication the lie of White superiority), devised

> four hundred years ago to justify the enslavement, colonization, and subjugation of African People, has remained virtually unchallenged .... Black people were not "slaves." They were "enslaved." Black people were human victims of the heinous act of enslavement. One of the most brutal inventions of civilization was the creation of a thing called "slave." In the United States, the thing called slave was invented to resolve the cognitive dissonance inherent in a society that proclaimed that all men are created equal and yet treated African People as commodities. It turned human beings into objects who were bought and sold. It rationalized the objectification and commodification of African People by branding them as inferior and sub-human .... Over time, the lie was used to paint Black people as Godless, dangerous, uncivilized, child-like, lazy, stupid beasts, in need of supervision and control by the superior White race. It characterized Africa and African People as primitive, *having contributed nothing to human civilization.* It deemed Black people not valuable and not worthy of human dignity, equal rights, and fair treatment, and "less than human." (pp. 334–335) [emphasis added, as this is very pertinent to the erasure of Indigenous land management history]

The enslavement of dignified African People is one of countless examples where human groups justify their immoral behavior through "biological" explanations.

It is important to note that colonial dehumanization is also fashioned into an "ethical" license to kill. In 1826, British settlers of Tasmania wrote in the Colonial Times, "The government must remove the natives—if not, they will be hunted down like wild beasts and destroyed!" (Turnbull, 1974, p.76).

Editors of the newspaper asserted the inferiority of Indigenous Tasmanians as grounds for slaughter when they said "[the Indigenous must] acquire some slight habits of industry, which is the first step of civilisation [or be killed]," and "until the aborigines are sent out of the Island ... there will be continual slaughter on both sides which no human hand can possibly prevent" (as cited in Turnbull, 1974, p. 77).

Colonists did not attempt to prevent the slaughter of others, but instead hastened it: martial law was announced throughout the entire island. A bounty was set for £5 per adult Tasmanian person and £2 per Tasmanian child captured (Robinson, 2017). Tragically, Tasmania was almost entirely and murderously emptied of its Indigenous People by 1876. English colonists came to control (and continue to control) the entire island they so desperately coveted (Breen, 2011, p. 71).

We hear similar rhetoric 600 years earlier when Gerald de Barri of Norman aristocracy wrote in 1223 A.D. that the Irish "are so barbarous that they cannot be said to have any culture . . . they are a wild people, living like beasts, who have not progressed at all from the primitive habits of pastoral farming" (of Wales, 1982, p. 101). This was written "coincidentally" as Gerald's overseer, King Henry II, was actively working to absorb Irish homelands into his empire. Gerald went on to define the "savage to civilized" spectrum as "rural to urban," "forest to field," "non-commercial to commercial", and "decentralized governance to polity" when he wrote:

> while mankind usually progresses from the woods, and then from fields to settlements and communities of citizens, this Irish people scorns work on the land, has little use for the money making of towns and despises the rights and privileges of the civil life. (p. 101)

This sentiment was echoed almost verbatim 600 years later by John Oberly, Superintendent of "Indian Schools" for the American Government in 1885:

> I would first teach the Indian how to work, then I would teach him our ideas of the rights of property, and give him lands in severalty, then I would abolish the reservation system, and then make the Indian a citizen and enfranchise him. (as cited in Adams, 1995, p. 20)

Thus, as with the enslavement of African People, Indigenous People of Turtle Island were cast as hopeless, culturally inferior simpletons, not deserving of their lands and autonomy.

The last justification mentioned here is that of "technological superiority." This method of historical sanitation is similar to the biological explanation, in that it exonerates colonial violence through a "survival of the fittest" principle. It assumes that all humans are warlike and thus any power differential depends on who had access to bigger and better weapons.

This plays out in Diamond's Pulitzer Prize-winning, "scientific" work *Guns, Germs, and Steel* (1997). The book opens by positioning Yali—Diamond's Indigenous guide in New Guinea—as an unfortunate victim of accidental circumstance. The author takes the liberty of "educating" Yali about why he is so impoverished and why Diamond is so wealthy:

> You see Yali, if your ancestors had come from here in the northern hemisphere instead of there in the southern hemisphere, you might have found yourself on the other end of our equation of inequality . . . Were it not for geography, you might be explaining my unfortunate fate to me. (pp. 122–123)

Throughout the book Diamond erroneously sanitizes the brutalization of Indigenous Societies

by European colonists as mere "geographic and technological determinism." He writes that there were:

> the immediate factors that enabled Europeans to kill or conquer other peoples—especially European guns, infectious diseases, steel tools, and manufactured products. Such an explanation is on the right track, as those factors demonstrably were directly responsible for European conquests .... And what accounts for the failure of Aboriginal Australians to pass beyond the stage of hunter-gatherers with stone tools? (p. 23)

The subtle but important message here is that Europe slaughtered others not because they were morally bankrupt but because they "simply had better weapons." An underlying assumption in this argument is that humans will "naturally" want to conquer one another and whoever has the bigger guns will be the victor. Diamond does not understand or admit that many Indigenous groups had evolved beyond warfare or the desire to dominate. After learning from their own pre-contact histories of warfare, many had decided that war was not the answer (*e.g.*, Juhnke & Schrag, 2001; Buck, 2015; Tuso & Faherty, 2016; Coon, 2020). With the stroke of a highly influential pen, Diamond expunges from the record the truth that environments of Indigenous People the world over are not "wild," but highly cultivated, intentional, and successful food systems.

In addition to Diamond's technological sanitization of Europe's misdeeds, he also casually erases thousands of years of Indigenous land management history:

> For most of the time since the ancestors of modern humans diverged from the ancestors of the living great apes, around 7 million years ago, all humans on Earth fed themselves exclusively by hunting wild animals and gathering wild plants, as the Blackfeet still did in the 19th century. (p. 86)

It is unfortunate that Diamond's book was so widely read. For hundreds of thousands of readers, it inadvertently eclipsed the ways in which Niitsitapi (Blackfeet) People and other Plains Nations systematically enriched soil systems on regional scales, as well as how they intentionally augmented buffalo populations through their facilitation of pyro-adapted grasslands (*e.g.*, Stewart, 2002; Roos et al., 2018; Morrissey, 2019).

Moreover, Diamond writes:

> as we'll see, food production was indirectly a prerequisite for the development of guns, germs, and steel. Hence geographic variation in whether, or when, the peoples

> of different continents became farmers and herders explains to a large extent their subsequent contrasting fates. (p. 86)

Diamond argues that with stable food systems, humans had more time to develop weaponry, thereby making them a greater adversary when the time came for to battle. The hole in this argument, however, is that Indigenous farming systems were as old as, if not older than, European farming systems (*e.g.*, Delcourt et al., 1998; Rick et al., 2016; Lepofsky et al., 2021), yet Native Nations did not come to Europe to seize lands. It is proposed here that the reason these groups did not succeed in colonizing Europe militarily is not because of a lack of technology, but a lack of desire to do so.

Perhaps the popularity of Diamond's work is not owing to its scientific rigor, but its effectiveness in assuaging the guilt of colonial society. It neatly sanctions our past transgressions and subtly convinces us that humanity is inherently warlike: "inevitably," the "fittest" will destroy the "weak."

Diamond's wildly popular work is assigned for American students in AP history classes, was edified in New York State's common core curriculum in 2015, and has been cited innumerable times in scientific literature. As Wilcox (2010) remarks:

> Diamond's grand narrative cleverly rejects the racism and naked triumphalism of our not so distant forebears and embraces a nouveau-democratic narrative which speaks to the logical sensibilities and sympathies of modern readers: successful colonization was an accident. Conquest was an accident accomplished by randomly apportioned technologies and the invisible hand of fate .... A reader of Diamond's story, perhaps lounging in the tropics on his holidays, glances at the hired help and drifts off into a sleep made more peaceful by the notion that his fortunate fate, and indeed the fates of human societies, were settled long ago. (p. 100)

One reviewer of the book from India's Academy of Sciences summarized their takeaways as follows:

> Why did wealth and power get distributed in the way they now are and not in some other way? Why is it that the native Americans, Africans and Australian aborigines were not the ones who conquered Europe? ...
>
> The author, a highly regarded evolutionary ecologist, brings a refreshing new approach to these questions which have for long been considered intractable by historians ....

> Diamond's search for ultimate causes begins with the rise and spread of food production. Food production as opposed to food gathering led to the availability of much more food resulting in denser human populations. It is from within these densely populated human settlements that politically centralized, socially stratified, economically complex, literate societies arose ....
>
> These proximate causes acting at different rates and in concert with each other to varying extents finally determined whether a given society became the conqueror or the conquered. These outcomes, in turn have finally determined the present configuration of the people of the world. (Venkatachalam, 2001, pp. 84 & 87)

Of course, this history is not "intractable" due to lack of evidence, but due to the courage it takes to examine the abundant (albeit painful) evidence all around us, which shows our global configuration is a creation of our past mistakes.

While Diamond was not being purposefully insidious or racist in his publication, the subtlety of his underlying assumptions makes it an especially harmful piece of literature. Those harmful assumptions include (but are not limited to) that Indigenous People had no: (a) sophisticated technology, (b) densely populated polities, (c) forms of literacy, (d) ancient farming or domestication of animals, and (e) (most importantly for this study) no effective or systematic methods of food production. All of these assumptions have been unequivocally and extensively disproven for various contexts around the globe (*e.g.*, Jiménez & Smith, 1986; Justeson, 1986; Kolata, 1991; Denevan, 1992; Sugiyama et al., 2020). All the while, the book distracts our gaze from the true cause of Eurocentric culture's present situation: an unjust and violent willingness to overtake land and labor.

Meanwhile, global digestion of Diamond's misinformation has set the work of historical ecologists back many decades in our effort to help the world understand the profundity of pre-contact Indigenous food and land management systems the world over. It has given the colonial system yet another diversion from the truth of our unpleasant past. This truth would be helpful to look at, not just for the benefit of those we continue harm with distorted narratives, but for our own healing, learning, and evolution as a species.

In sum, Euro-American politicians, merchants, pirates, conquistadors, and scientists are not original in their denigration of the Indigenous People of Turtle Island—they are merely continuing an ancient human tradition employed around the world to degrade those we seek to displace.

The patterns we see across cases are as follows: (a) assertions of religious superiority; (b)

assertions of cultural superiority; (c) assertions of "biological" superiority; (d) the designation of Indigenous land use as "primitive"; (e) the likening of Native People to animals, (f) blindness to the dignity of nature (called wild), animals (called beasts), and humans who live among these things (called savage), (g) exaggerated emphases on differences between "us" and "them"; (h) the casting of Native People as lazy (see Daykin, 2006); and last, but certainly not least, (i) land and labor is coved by the "superior culture" for political and economic expediency.

Thus, the minimization of Indigenous People, throughout time and across the globe, is almost always driver by a hunger for land, labor, and resources. For if a people whose homeland we wish to attain are "not really 'people," then we are "not really stealing" from anyone. If they are more animal than human and we happen to massacre scores of them, then we are committing "no greater crime than hunting some deer." If we take those lands from "savages," we are innocently bringing "wasted" land into the hands of "true people." In this "logical" scheme, one must not only say Indigenous groups are lacking some humanity, but that they are wholly and entirely devoid of humanity. The greater our desire for land and "resources," the more imperative it becomes to strip Indigenous People of all worth. Given the constant coincidence of dehumanization with human greed, many scholars argue this denigration is merely a smoke screen—a fake moral justification for the immoral act of land theft. The pain, guilt, and grief settle in decades later when we can no longer deny that these people were, of course, human all along. This can all be healed by forgiveness, accountability, and time spent sitting with the truth.

Ironically, while we as humans can be unfathomably unjust, we have an astonishing consistency in our desire to "be just" (perhaps to convince ourselves of our goodness as much as anyone else). These brutal patterns are not proof of humanity's "inherent brokenness." It is proposed here that these patterns of justification are actually proof of our need for morality. In other words, it is our inherent humanity—which by nature demands morality—that leads us to grasp for moral justifications to cloak our inhumane behavior. If we truly did not care, we would simply massacre others and move on with life and skip all the theorizing and rationalizing. This proposal should not be interpreted as an excuse or condonement of this violent pattern. We can do better, we must do better, and we must push each other to do better until better is achieved.

Moreover, from these examples we can see this pattern of dehumanization and displacement is not an entirely "European" practice. What can be said with some confidence, however, is that Eurocentric powers have applied this dissonance in more places around the globe than any

other culture in world history. In this process we have enriched ourselves materially and impoverished ourselves spiritually. Scarcely any land and its corresponding Indigenous culture—be it New Guinea, New South Wales, Japan, Syria, South Africa, China, Brazil, or Iraq—has escaped the unnerving pressure to be more "like Europe."

Lastly, while there are many examples of this pattern throughout history, we must wholly reject the notion that this is "just human nature." Violence is often explained in saying it is "just how we are." Yet people who hold this notion also call for "law and order" in their homelands to protect others from violence and social discord. Eisler (1991) has disproven this notion that humans are inherently violent. Her extensive archaeological survey of "pre-historic" European societies shows that many were not warlike for thousands of years. As an autoethnographic aside, I have met many peaceable Indigenous societies throughout Turtle Island and Abya Yala, and wholeheartedly believe we are capable of the humane treatment of others—the true marker of civilization.

8.4 The Aftermath of Conquest

In the process of colonization, unbiased history becomes a casualty. Once the conquest of "barbarians" is carried out in, ironically, a very barbaric fashion, the narrative of Indigenous inferiority and conqueror superiority becomes the accepted reality. This is not owing to its merit or historical accuracy, of course, but to the simple fact that those who sought conquest are now in control of universities, newspapers, cinema, and other engines of narrative production (Katriel, 2013). Moreover, the process of colonization enriches the colonizer and robs the colonized, thus entrenching illusions of superiority and inferiority. Indigenous survivors of the landgrab are immediately placed at the short end of a pervasive power differential within every realm of "mainstream society."

Importantly, colonial powers also become the jurors of "what counts as knowledge" (Apple, 2004; Martinez, 2010). This leads to the erasure and distortion of Indigenous cultural institutions. Indigenous history becomes "prehistoric." Oral history becomes "myth." Vast and complex civilizations are reduced to "Indian tribes" or "nomads." Indigenous science becomes "folklore" and "ethnoscience." And—most importantly to this study—intentional architects of vast gardens are reduced to mere "hunter-gatherers." All the while, the beliefs and cultural narratives of the conquering culture are consecrated and exalted as "true science" and "true history."

Consequently, universities and their scientific outputs can become arms of colonization, its ongoing venture, and its need for self-validation. Mi'kMaq scholar Marie Battiste observes:

> For as long as Europeans have sought to colonize Indigenous People, Indigenous Knowledge has been understood as being in binary opposition to "scientific," "western," "Eurocentric", or "modern" knowledge. Eurocentric thinkers dismissed Indigenous Knowledge in the same way they dismissed any socio-political cultural life they did not understand. (Battiste, 2002 , p. 5)

Departments of anthropology and human ecology were entrenched in this political venture, both consciously and not. Young students eager for promotion and academic success often followed the paths of their predecessors and toed the line of current ideological trends. Other scientists were nearer to their very real need to "disprove" the humanity of others [4]. Within this context, science can often (not always) become a branch of colonization, a means of justifying the inferiority of others and supporting various threads of the colonial narrative.

The aftermath of colonization thus generates conditions lending to extreme bias: (a) colonial culture inherits a vested interest in justifying their violent mistakes and (b) colonial culture now has near complete control of "science," "history," and media. These realities lie at the heart and foundation of the colonial eclipse of nations that stand in their way physically, culturally, and ideologically.

8.5 Indigenous People of Turtle Island Become Targets of Dehumanization

Turning our gaze from the global to the local, we can see that the Indigenous societies of Turtle Island and Abya Yala did not escape the grip of this harmful pattern. I now give a few examples of ways these kinds of attitudes were applied to the Indigenous People of Turtle Island and Abya Yala by European colonizing groups for the same reasons explained above. At risk of oversimplifying a very long and complex process of colonization, it seems that European groups have managed to (a) nearly empty these continents of their Indigenous People; (b) plunder and extract any material "wealth" they could attain from them; (c) humiliate, assimilate, and dehumanize their survivors; (d) distort the true history of their Ancestors through "science," "history," cinema, literature, and other forms of narrative production; (e) feed this distorted narrative to Indigenous children of these survivors through boarding schools and other

[4] For example, many 19th century eugenicists in academia also directly benefited economically from the subjugation and enslavement of African People (Lombardo, 2011).

educational institutions; and (f) sanitize a history of attempted genocide and theft with religious, cultural, biological, and biological explanations.

Dr. John Francis Snyder, who was born in 1830 and died in 1921, was a celebrated archaeologist of his time and carried similarly erroneous attitudes towards the Indigenous People of Turtle Island. He robbed many of our grandmothers' and grandfathers' skeletons from our cemeteries, studied them, and later sold their bones to the Archaeological Institute and the Museum of Natural History for profit as "scientific" specimens (Black, 1944). He followed the tradition of "proving" the inferiority of human groups with "biological" explanations. In speaking of the Indigenous People of present-day Illinois he says:

> Their anthropometric standard was low. Barely above medium height, their skeletons are distinguished by certain amorphous peculiarities. The plantar arch is well-nigh absent ... and the humerus perforated at its distal extremity-presenting in these respects resemblance to the corresponding bones of the ape. A further resemblance to lower animals of anthropoid type is observed in the conformation of their crania ... the protruding supraorbital ridges, the narrow, retreating forehead, low facial angle, and face strongly phognathus [sic]. (Black, 1944, pp. 295–296)

Snyder was thus just one of innumerable "scientists" to weaponize Darwin's theory of natural selection to position himself within an elevated race, thereby justifying their current and past seizure of lands from mere "animals."

Upon his arrival in the Caribbean Sea, Columbus wrote that Taino people were, "very well made, with very handsome bodies ... They should be good servants ... I, our Lord being pleased, will take hence, at the time of my departure, six natives for your Highness" (Columbus et al., 1893, p. 38). Unlike Snyder who was incentivized to degrade the stature and structure of those he displaced, Columbus had an incentive to commend Indigenous bodies. For at this time, pirates judged the importance of a place largely based on whether there were people to enslave or gold to extract for their financiers in Europe. He wrote in the same journal, "I was attentive, and took some trouble to ascertain if there was gold" and "I believe with the force I have I could subjugate the whole island, which I believe to be larger than Portugal" (p. 39 & 138).

Leonardo Olschki was an acclaimed scholar of his time (1885-1961) and carried Columbus' attitude into the 20th century. As he frequented and lectured at many universities, including Harvard and UC Berkeley, he wrote many articles including, "What Columbus Saw on Landing in the West Indies" (Olschki, 1941). In it he describes Indigenous Nations of the Caribbean as "primitive or savage tribes who lived in a state of nature" (p. 648). He also writes that In-

digenous People "soon appeared to [Columbus] for what they really were—that is, 'a race of people very poor in everything' and having no religion" (p. 648). Any student of Indigenous culture in Turtle Island and Abya Yala knows these cultures are replete with complex spiritual institutions, protocols, as well as complex governance structures, making the motives of these not-too-distant assertions all the more suspicious.

George Bancroft was the United States Secretary of the Navy, an American diplomat to Europe, and a celebrated historian of his time (19th century). He wrote of the thousands of mounds in the Mississippi watershed that are now universally understood to be creations of former Indigenous civilizations. He argued that these were not constructed by Indigenous People because they were not intellectually capable of doing so. He instead argues that these thousands of mounds were simply accidental creations of natural geological and hydrological forces:

> The red man has aptitude at imitation rather than invention; he learns easily ... But he is deficient in the power of imagination ... and in the faculty of abstraction ... he is inferior in reason and the moral qualities .... The facial angle of the European is assumed to be eighty-seven; that of the [Indigenous] American, by induction from many admeasurements, is declared to be seventy-five. The mean internal capacity of the skull of the former is eighty-seven cubic inches; of the barbarous tribes of the latter, it is found to be, at least, eighty-two ... the numerous mounds which have been discovered in the alluvial valleys of the west, have by some been regarded as the works of an earlier and more cultivated race of men ... Where imagination fashions relics of artificial walls, geology sees but crumbs of decaying sandstone ... it explains the tessellated pavement to be but a layer of pebbles aptly joined by water; and, on examining the mounds, and finding them composed of different strata of earth, arranged horizontally to their very edge, it ascribes their creation to the Power that shaped the globe in vales and hillocks. (Bancroft, 1841, pp. 301, 305, & 307)

In this manner, Bancroft argues that the vast network of earthen mounds constructed by Indigenous Mississippian cultures were simply a byproduct of natural geological and hydrological processes. He was perhaps able to make such a bold statement simply due to his social caste within the same colonial state that is empowered by such arguments.

It is coupled by attempts at minimizing the Indigenous Nations of Turtle Island through "biological" and "natural" explanations. It should come as no surprise that the mounds were a point of "scientific" contention: they represented a major "fly in the ointment" for Bancroft's

generation in that they disproved an important tenet in their narrative of cultural superiority: they proved Indigenous People had imagination, agency, and creative power.

On a related note, Bancroft had the same agenda in his degradation of African People (inappropriate words omitted):

> The concurrent testimony of tradition represents the [Indigenous Africans], at their arrival, to have been gross and stupid, having memory and physical strength, but undisciplined in the exercise of reason and imagination ... Their organization seemed analogous to their barbarism. But, at the end of a generation, all observers affirmed the marked progress of the [Indigenous African]. In the midst of the horrors of slavery and the slave trade, the masters had, in part at least, performed the office of advancing and civilizing the [Indigenous African]. (Bancroft, 1841, p. 408)

Bancroft somehow managed to deny that both Indigenous People of Turtle Island and Abya Yala and Indigenous People of Africa have an "imagination" or intellectual ability. Further, he argues that any semblance of these things is merely a derivative of their colonizers/traffickers. It should be noted that throughout this book Bancroft has a very clear political agenda: to monopolize any trace of civilization in the "Americas" as being born of the European. This, one could imagine, is an effort to further sanitize and justify the seizure of land and labor by an "culturally superior" human group.

My goal in providing these examples is to instill within the reader a healthy distrust of Euro-American illustrations of Indigenous People. My goal is to rattle our confidence in Western anthropology and archaeology, to help us remember that they were not and are not expressions of unbiased science, but political pursuits, reflecting the meta-agendas of the same Euro-American cultures who contrived their tenets and praxes. These are just a few examples of thousands.

On the other hand, it must be said that throughout time there have plenty of exceptions to these racist attitudes. Spanish Dominican father Antonio Montesino, for example, passionately defended the rights of Indigenous People as he preached to Spanish settlers of Hispaniola in 1511:

> Tell me: with what right and with what justice do you subject the Indians to so cruel and to so horrible a slavery? With what authority do you wage your abominable wars against these people, who were living peaceably in their own countries, where you caused infinite numbers of them to die by your unheard of barbarities and slaughter? Why do you overwhelm them with work, and give them not sufficient food to keep

> them from starving .... Nay, why do you kill them daily with excessive labor that they may bring you gold? (Dutto, 1902, pp. 52–53).

Likewise, U.S. Army officer Dillon defended Native Californians in his official reports. Historians document how Dillon stood up to say:

> settlers, not Indigenous populations, caused the disturbances in Round Valley and Eden Valley. His reports also belied the wild claims of settlers that many whites had been killed. In fact, in 1859 he reported that only one white man had died by Native American actions, and that was when he tried to abduct a Native woman. This contradicted the vague claims of settlers and ranchers, whose petitions rarely identified by name, people killed by [Natives]. (Lindsay, 2012, p. 209)

Despite this minority of sympathetic people, a lust for gold, land and power consumed the majority and became the defining feature of colonial society in Turtle Island and Abya Yala.

8.6 Indigenous Land Management Histories Eclipsed to Uphold Colonial Narratives

Several examples of ways in which Euro-American institutions omitted Indigenous land and food management systems are now offered. These examples are meant to emphasize an important point: the sophistication of Indigenous ecological history was eclipsed from the world because it contradicts the primitive representations of Indigenous People used to justify land seizure and attempted genocide.

Before these examples are listed, it is useful to share the writings of John Locke, who profoundly influenced British conceptions of property, belonging, nationhood, and what defines "civilized" land-use. He wrote in 1689:

> Though the earth, and all inferior creatures, being common to all men, yet every man has a property in his own person: this nobody has any right to but himself. The labour of his body, and the work of his hands, we may say, are properly his. Whatsoever then he removes out of the state that nature hath provided, and left in it, he has mixed his labor with, and joined to something that is his own, and thereby makes it his property. It being by him removed from the common state nature has placed it in, it hath by this labour something annexed to it, that excludes the common right of other men: for this labour being the unquestionable property of the labourer, no man but he can have a right to ... at least where there is enough, and as good, left in common for others. (Locke, 1824, pp. 145–146)

Locke is saying here that nobody truly owns the earth, but if someone applies their labor to it, it becomes "theirs." We see here how land-use (as defined by British agricultural standards) becomes a metaphor for belonging and land ownership. Therefore, any place where Indigenous labor and intention is set, by Britain's own rules, would be "properly theirs." Intentional Indigenous cultivation of land is therefore a threat to colonial claims to land, as we will see below. We may also rightfully assume that distorting the number of Indigenous People present on the land and the scale with which they managed the land, would be beneficial to the rational foundation of colonial society.

Furthermore, just as European agriculture was seen by early colonists as a symbol of civilization, its absence was a symbol of cultural "backwardness." Francis Snyder (the aforementioned purveyor of Indigenous bones) makes the same distinction by conflating buffalo hunting with savagery: "the incoming herds of buffalos affording the sedentary mound builders a new element of food, so bountiful and easily secured, that they abandoned their mounds and agriculture, and degenerated to wild savage hunters" (Snyder, 1911, pp. 300–301). With a swift stroke of a pen Snyder both elevates agriculture, as well as frames bison herds as "wild" instead of the carefully and intentionally managed herds they were. He either doesn't understand or knowingly denies how Indigenous People cultivated biodiverse grasslands with methodical burning—an agricultural system that was arguably many orders of magnitude more sophisticated than Britain's monocrop plots of wheat. Nevertheless, Snyder and his counterparts frame Indigenous land-use as "roaming," "wild," and "uncultivated."

As we saw in the examples of Welsh and Irish denigration, "civilization" was conflated with the practice of "working the land." Nevertheless, and as my dissertation attests, many Indigenous People of Turtle Island and Abya Yala certainly did "work the land" in incredibly intensive and extensive ways. As we will see, this was a threat to colonial conceptions of "virgin land" and "*terra nullius*" that so conveniently support the seizure of said lands.

We must concede that if there were great numbers of Indigenous People, and if they managed and cultivated the land through their own labor, then by European legal standards, the land in question was indeed owned by another sovereign and civilized nation. This would be a great pain for a colonizing group working to justify their wholesale usurpation of a continent. Conversely, if Natives were "victims of circumstance" or wandering and impoverished nomads, they would fit the category settlers conveniently deemed a "subhuman race." To a great extent, this narrative and its mischaracterization of Native People persists today. The proposition that Natives were impotent on the land, "living in a state of nature," and indolent, supported the

colonial justification for land seizure. The Indigenous ability to landscape whole bioregions was a marker of civilization, humanity, sophistication, and belonging.

European Nations at the time were heavily influenced by three important tenets: (a) things can and should be "owned" by human beings (as defined by European law); (b) ownership of land depended on "proper use" of that land (as defined by European agricultural practice); and (c) land exists for the exploitation of human beings. This is reflected in other passages of John Locke's influential 17th century writings:

> God when he gave the World in common to all mankind, commanded Man also to labour ... God and his Reason Commanded him to subdue the Earth, *i.e.*, improve it for the benefit of Life ... He that in Obedience to this Command of God, subdued, tilled and sowed any part of it thereby annexed to it something that was his Property. (Locke, 1824, p. 147)

It is interesting to note that Locke's sentiments are rooted in Roman law (and also that food is an important mediator of belonging and ownership for European Nations). This is reflected in the Roman Institutes of Justinian:

> Now things become the property of individuals in many ways: for of some things ownership arises by natural law which, as we have said is called the law of nations [*ius gentium*] ... Hence, wild animals, birds and fish, *i.e.*, all animals born on land or in the sea or air, as soon as they are caught by anyone, forthwith fall into his ownership by the law of nations: for what previously belonged to no one is, by natural reason, accorded to its captor [*quod enim ante nullius est id naturali ratione occupanti conceditur*]. (as cited in Thomas, 1975, pp. 11–12)

These Roman legal formations also provided the foundation for colonial intellectual Emer de Vattel to justify their seizure of Turtle Island. He writes in his *Principles of the law of nature* (originally published in 1758):

> There is another celebrated question, to which the discovery of the new world has principally given rise. It is asked whether a nation may lawfully take possession of some part of a vast country, in which there are none but erratic nations whose scanty population is incapable of occupying the whole? ... Their unsettled habitation in those immense regions cannot be accounted a true and legal possession; and the people of Europe, too closely pent up at home, finding land of which the savages stood in no particular need, and of which they made no actual and constant use, were lawfully

> entitled to take possession of it, and settle it with colonies ... that the people might live only by hunting, fishing, and wild fruits, our globe would not be sufficient to maintain a tenth part of its present inhabitants. We do not, therefore, deviate from the views of nature in confining the Indians within narrower limits. However, we cannot help praising the moderation of the English puritans who first settled in New England; who, notwithstanding their being furnished with a charter from their sovereign, purchased of the Indians the land of which they intended to take possession. This laudable example was followed by William Penn, and the colony of quakers that he conducted to Pennsylvania. (de Vattel, 1835, p. 100)

In this paragraph we see several important things. De Vattel reaffirms Roman and British sentiments that "working the land" as defined by European agricultural practice is a metaphor for ownership, belonging, and "civilized culture" (for more see Flanagan, 1989). De Vattel concurrently frames Turtle Island as "naturally" empty of dense populations without pointing to the 700 years of Norse and Spanish disease and violence as the true cause of precipitous depopulation (*e.g.*, Denevan, 1992; Erlandson et al., 2001; Koch et al., 2019). As is still done today, de Vattel justifies colonial control of land by framing Indigenous land-use as "insufficient to feed current populations." Indigenous land management was (and is) arguably more efficient, sustainable, and capable of supporting larger numbers per acre than Europe's struggling food system. Lastly, de Vattel notes that Native Nations should be "grateful" that colonizers offered them any payment at all for lands, given that they are only mere "beasts." De Vattel goes so far as to say:

> Every nation is then obliged by the law of nature to cultivate the land that has fallen to its share ... Those nations ... who inhabit fertile countries, but disdain to cultivate their lands ... are injurious to all their neighbours, and deserve to be extirpated as savage and pernicious beasts. (de Vattel, 1835, p. 35)

This further proves that the extensive and intentional cultivation of land by Indigenous People was (and still is) a great threat to colonial frameworks that justify land seizure and attempted genocide. "Proper land-use" is one of many threads that create the tapestry of colonial self-validation we see throughout time and across the globe. It is the justification that if people are not "using" the land they are therefore undeserving of it whatsoever.

Were Indigenous People simply using the land in ways colonial groups did not recognize? Or was it abundantly clear but colonial groups knowingly chose to diminish its true extent to

justify colonization? These questions are hard to answer with certainty, but it would be strange for colonizers to see lavish gardens all around them and not make greater consideration of how they were a creation of civilized people. Fowler & Lepofsky (2011) perhaps generously propose that, "because [Indigenous] management systems had few parallels in Europe, managed land and seascapes were seen as natural" (p. 287). What is known is that Indigenous management of lands is automatically a bothersome thorn in the myth of the "primitive Indian."

Some specific examples of instances where Euro-American institutions denied the presence of large-scale Indigenous land management are now examined. For example, John Winthrop, first governor of Massachusetts illustrated Indigenous Nations there as follows:

> [T]hat which is common to all is proper to none. This savage people ruleth over many lands without title or property; for they enclose no ground, neither have they cattle to maintain it, but remove their dwellings as they have occasion .... And why may not Christians have liberty to go and dwell amongst them in their waste lands and woods, (leaving them such places as they have manured for their corn,) as lawfully as Abraham did amongst the Sodomites?

Winthrop does many things here. First, he claims that the lands under Native management were "wasted" because they "enclosed" no land, held no cattle, nor established permanent settlements. In fact, Indigenous People intensively farmed much land (*e.g.*, Neal, 2017), managed herds of deer instead of cattle (Abrams & Nowacki, 2008), and did in fact have permanent settlements, in addition to some who practiced seasonal rotation (*e.g.*, Delormier et al., 1998). Winthrop implies that Indigenous Nations in the area did not truly use the lands that surrounded them but wondered like nomads. He could not freely use the "agricultural argument" because they clearly grew corn, so it seems he instead denigrated their use of fish fertilizers to "manure the land," which, by all accounts, is an effective means of soil management. Most importantly, he reifies the notion that Native People did not systematically cultivate the Northeast, whereas this cultivation has been thoroughly demonstrated (*e.g.*, Abrams & Nowacki, 2008; McCoy et al., 2011; Nanavati & Grimm, 2020; Hoffman et al., 2021).

Ceci (1975) would later deny altogether that Indigenous People fertilized their fields with fish. She proposed that Tisquantum's ("Squanto") use of fish fertilizer was simply something he learned from his colonial peers. She also comments that Indigenous People have/had no understanding that routine burning of grasslands had a fertilizing effect:

> Fish, an excellent fertilizer for corn, was available in sufficient quantities during the

> spring planting period in one geographic zone but, according to extant documentation, [N]atives did not employ fertilizers of any kind in this area .... These [N]atives did not know how to use ashes "to better the grounde" ... the ashes produced and their beneficial effects on the soil were incidental. In short, the opportunity to discover the cause-and-effect relationship between application of various fertilizers and better harvests was somehow limited, was apparently not recognized .... (Ceci, 1975, p. 28)

Here Ceci both denies Indigenous People's intellectual capacity to see how their burning methods fertilized the ground, as well as effectively erases the notion that Indigenous People intentionally used fish as fertilizer.

Her scholarship was not without critics, however. Warden, her peer at Yale University, offered the following rebuttal:

> The author ... fails to mention an important legal technicality .... The colonists had not conquered the land or purchased it, nor was it vacant—the usual standards for appropriation. The promoters of colonization resorted to a flimsy and preposterous justification for dispossessing the Indians: they had violated the Biblical injunction to make the earth "fruitful," by not manuring and cultivating in the European manner; therefore, the first (English) taker could dispossess the Indians at will. It is little wonder then that the English sources are silent on the matter or deny that the Indians used fertilizer .... Contrary to the author's implications, the Indians had the resources and the technology to use fish fertilizer .... And, in terms of cultural adaptiveness, should the Indians be invidiously compared with the Pilgrims, who ... did not plan ahead enough to bring necessary animals with them, and somehow managed to starve while fish and game abounded all around them? (Warden, 1975, p. 946).

Perhaps one warranted critique of Warden's analysis, however, is that the "agricultural argument" was not a "last resort" justification but had been in play for centuries in different parts of the world. As we saw in the above sections, various colonial groups creatively used virtually any cultural difference to devise justifications for land seizure.

Hugh Raup was another Northeasterner, an authority on forestry for his time, and director of the Harvard Forest from 1946 to 1967. He directly denied that Native People burned forest systems as a management strategy on a large scale:

> The reasons assumed by the early colonists for the firing of the forests are also of interest. They appear to have been impressed first, not by the fires, but by the openness

> and park-like character of the woods. They attributed it at once to the efforts of the natives, usually giving as purposes either the improvement of visibility and travel by eliminating the undergrowth, or the "improvement" of pasturage for game by encouraging the growth of grasses and other herbage in the forest ....
>
> No one will doubt that fire has had a significant influence in determining the presence of park-land, but wherever detailed and careful studies have been possible, fire has been slowly forced into the background as an actual causative factor, and fundamental climatic, edaphic, and factors take their rightful precedence. (Raup & Carlson, 1941, pp. 85–86)

Widespread Indigenous fire in the eastern woodlands as the cause of the open, meadowed ecosystems encountered by European colonists has been thoroughly demonstrated (*e.g.*, Delcourt et al., 1998; Pyne, 1998; Boyd, 2002; Stewart, 2002; Williams, 2002; Hutchinson et al., 2003; Fuhlendorf & Engle, 2004). As with Bancroft, Raup and Carlson erase Indigenous agency by attributing manicured landscapes as a coincidental phenomenon of Nature. In other work, Raup deems Indigenous People as "the least civilized on the continent" (Raup, 1939, p. 69), while in others he applies the racial slur of "Injun" to Native People (Raup & Carlson, 1941, p. 23). This may help us understand that his "science" is deeply rooted in the biased attitude of his time.

Sadly, and despite overwhelming evidence, ecologists continue to erase Indigenous fire management histories consciously and unconsciously by asserting climatic explanations for Indigenous fire regimes (Russell, 1983; Guiterman et al., 2019; Oswald et al., 2020; see critique by Abrams & Nowacki, 2020).

This erasure of Indigenous agency upon the land continued long after Raup's generation. As recently as 1991, a Smithsonian Institute publication asserted that:

> pre-Columbian America was still the First Eden, a pristine natural kingdom. The native people were transparent in the landscape, living as natural elements of the ecosphere. Their world, the New World of Columbus, was a world of barely perceptible human disturbance. (Shetler, 1991, p. 226)

In this view, Indigenous People were so non-existent in their worlds, they were "transparent." One could imagine how such a representation could calmly soothe the pain of a nation that violently dismantled thousands of diverse institutions of human heritage that were thousands of years in the making.

It is proposed here that colonial society, and its "scientific" portrayals of Indigenous People

ultimately feed from the roots of earlier colonial justifiers, spanning from the Romans to Sir Thomas More who wrote in 1516:

> If the natives won't do what they're told, they're expelled from the area marked out for annexation. If they try to resist, the Utopians declare war—for they consider war perfectly justifiable, when one country denies another its natural right to derive nourishment from any soil which the original owners are not using themselves, but are merely holding to as a worthless piece of property. (More & Turner, 1965, pp. 79–80).

Thus, Indigenous land management was targeted and erased by colonial settlers and scientists to maintain an intellectual "greenlight" for land seizure.

8.7 Conflicting Definitions of Cultural Progression/Regression

It is important to discuss here contrasting definitions of civilization. Through experiences of collapse, many Indigenous societies concluded that a humbler life was the most civilized. Conversely, European settler society still believed that the ability to subdue creation was the true marker of civilization.

In our effort to prove that Indigenous People did all the "civilized" things Europe could do (such as agriculture, writing systems, and dense city centers), we may accidentally normalize Europe's deeply flawed definition of civilization.

Moreover, if we understand the world from the view of a post-collapse Mayan person, or a post-collapse Maskoke person, we will understand that many Native groups chose to let go of the things Europeans deemed such important markers of civilization, because they learned it was not spiritually or ecologically sophisticated. To illustrate my point, let us first consider Snyder's telling quotation:

> "Progress, on the whole," says Ex-President Roosevelt, "has been rhythmic, long periods of retrogression succeeding the periods when the world has gone forward." This is especially true so far as relates to the history of primitive American Indians ... its progress from pristine savagery on through the grades of barbarism to incipient civilization, was often interrupted by long periods of stagnation, if not positive retrogression .... The majestic pyramids and cities of Mexico had long been deserted. A remnant of the once powerful and cultured Mayas still lingered about the wonderful stone edifices of Uxmal and Kabah, but Palenque was tenanted only by bats and snakes, and the great palaces of Copan, with their carved altars and weird megalithic

> monuments, were a mass of ruins buried in dense tangled tropical vegetation. (Snyder, 1911, p. 298)

Snyder keenly observes that Indigenous Nations at one point indulged in lavish civilizations but misinterprets their abandonment of these places as mere "cultural regression."

An excerpt from the interview with Briggs-Cloud (a research collaborator with the present study) gives us a clearer understanding of why such civilizations were abandoned:

> My grandma ... talked about how the [Mound Builder Civilizations] were getting really egotistical, trying to get higher and higher. They said, "To see the Creator." There were slaves. I mean, people were doing nasty things. There was social stratification. And the Creator appeared to them and scolded the people and said, "You forgot how you're supposed to live. This isn't the way you're supposed to live." Basically, the original instructions, "you've forgotten." After that moment, some catastrophic events happened. Everybody was affected by it. People started moving out of these mound cultures and moving into the *Etvlwv* [decentralized] system.
>
> There were other small-scale societies that we don't know a lot about. What we do know about them is that they didn't wanna live in that big Mound Society. The others moved out into the country sides to start these *Etvlwv* systems, these villages, based on egalitarian relations. That is what has existed up until colonization. (M. Briggs-Cloud, personal communication, July 8, 2022)

Briggs-Cloud echoes the sentiments of many Indigenous Nations I have met who say that human technological advancement is often a byproduct of a human desire to "outdo" nature. This is often coupled with a desire to outdo others and gain power, hence the social stratification. These things come to a head in many examples and result in the collapse of such nations. Their abandonment of these cities and their associated hubris, from an Indigenous perspective, is cultural regression but rather an act of societal refinement.

A similar story is shared by Nutlouis, another collaborator and interviewee of the present work:

> The Ancestors were not perfect. That's why we have the stories of the worlds collapsing, the calamities that our people had to go through, the Ancestors, and the Holy People had to go through. In those narratives, it really talks about how relationships get disrupted. Either amongst each other as human beings or with the land ... things get out balance.

> . . . like tattoos . . . When you begin to add things to your body, you're beginning to think that you can be better than the natural order.
>
> [My grandma] always used to use tattoo as an example . . . . She would say that's why the Anasazi succumbed to their calamity is they started doing these things: marking themselves up and building these things, thinking that they could dominate [the natural order]. There are different social indicators that Elders will say show that society is in a state of unraveling.

Nutlouis echoes Briggs-Cloud's sentiments almost exactly even though they descend from nations living on opposite sides of the continent.

Other Indigenous Nations with this narrative of "collapse as a refining crucible" include (but are not limited to) the Maya (technological advancement abandoned for simpler forest life), the Lakota (famine leading to arrival of White Buffalo Calf Woman), and the Haudenosaunee (hubris and war lead to arrival of the Peacemaker). Yvette Running Horse Collin of the Ogalala Lakota Nation states that her people abandoned the systems of writing because it was "too easy to lie through the written word" (Y. R. H. Collin, personal communication, November 23, 2010).

In this paradigm, to relinquish power—over nature, over people, over religion—is not a sign of weakness or stupidity, but a form of human evolution to gentler and humbler states of being.

8.8 Conclusion

Through an in-depth analysis of historical documents, it is concluded that European colonization of Turtle Island and Abya Yala necessitated that European powers diminish, ignore, or erase any Indigenous behavior they deemed "civilized." By and large, indicators of Indigenous sophistication were a bothersome contradiction to the narrative that Indigenous People were not truly human and therefore did not deserve their lands or their lives. This license to destroy Indigenous People and seize Indigenous lands was highly prized as it opened the door to materials that were profitable in the colonial world.

It is also concluded that the practice of dehumanizing those we seek to overtake and displace is a common historical pattern repeated throughout time and across the globe regardless of race, geographic location, or religion. While this is an unfortunate pattern, it must be wholly rejected that it is our "natural destiny" as humans to conquer one another. Many peaceable human societies demonstrate that another dynamic is possible. Moreover, it is upon our generation to correct these historical mistakes and heal the wounds of the past. We must place the

value of every single human life above any material wealth we may gain by disingenuously dehumanizing others.

This analysis also illuminates contrasting definitions of "civilization" between some Indigenous and European groups. Some Indigenous Nations mention purposefully abandoning their city centers in pre-Columbian times because they realized they were not living with humility (Weiner, 2018; M. Briggs-Cloud, personal communication, July 8, 2022). This exodus, often prompted by calamities wrought by their unsustainable behavior, is seen as a form of cultural evolution. By returning to simpler lifestyles, Indigenous Nations believe they became more civilized. By contrast, European powers see this loss of city centers as a form of cultural regression. This paradigm glorifies human groups that become dominators of creation, while pitting those who live humbly as "uncivilized." Ironically, European powers came to despise and destroy human groups who were arguably more civilized due to their humility, respect, generosity, and reverence for creation while at the same time deeming them uncivilized and savage.

Despite the alarming amount of violence, dispossession, and dehumanization we have inflicted on Indigenous People, their food and land management systems persist today. They offer incredible hope, guidance, and inspiration for the ways in which human beings can reassume their role as friends, allies, and partners of non-humans and larger Earth systems.

8.9 References

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9

General Conclusion

Pre-Columbian Indigenous People of North and South America (referred to as Turtle Island and Abya Yala) extensively managed ecosystems to produce prolific and predictable food systems for themselves and non-human lifeforms. Water, earth, and fire themes were explored to analyze Indigenous aquaculture, soil cultivation, and prescribed burns as an ancient management tool. The theme of air was correlated with the spoken word through a synthesis of interviews with contemporary Indigenous land managers. It was found that, contrary to popular belief, traditional Indigenous People are not passive observers of nature but are instead intentional architects of biodiverse abundance.

9.1 Earth: Lessons from Indigenous Soil Management

A review of four Indigenous societies and their soil management techniques demonstrate that Native Nations managed soil systems on regional scales using highly specialized knowledge. A:shiwi (Zuni Pueblo) and well as other Southwest Nations practice an alluvial farming technique whereby cultivated fields are positioned at the base of small watersheds to catch nutrient dense floodwaters following monsoon episodes. Indigenous soil science (pedology) also involves the protection and maintenance of upland soils that ultimately provide this regenerative source of nutrients.

Southeast Indigenous Nations proliferated canebrake ecosystems by applying fire to the canebrakes on a periodic basis. This disturbance-dependent species thrives after fire and in turn would nourish Southeast buffalo populations who used the cane as forage. This maintenance of canebrakes in turn had positive effects on surrounding soil systems. The presence of canebrakes increases (a) soil organic matter, (b) water stable aggregates, (c) soil porosity, (d) soil productivity, and (e) soil infiltration rates. Canebrakes also enhance water quality by stabilizing the banks of riparian ecosystems and absorbing excess sediments and nutrients during flooding events. Mebêngôkre (Kayapó) soil management practices are then reviewed revealing the innovative and diverse nourishment and upkeep of otherwise nutrient-poor Amazonian soils. Mebêngôkre

agroforesters are able to generate nutrient dense soils, nutrient dense crops, and long production cycles on a single soil system. This is owed to the constant tending of soils through infield burning, innovative mulching/soil amendment practices, creative spatial and temporal planning of crops and a reciprocal ethic in relation to the soil and surrounding landscape.

The final soil management system reviewed was the maintenance of grassland soil systems in the Great Plains and the Midwest. This was done through routine, dormant-season burning of grasslands. Light, patchy burning in dormant seasons can increase overall soil health through the addition of nutrients through ash, heating of soil organic matter, increased nitrogen and phosphorus mineralization rates, increased species richness and increased pH levels of soils. Depending on a number of factors—including time of year, fire intensity and ecosystem type—fire can positively hasten the chemical conversion of expired plant tissues into bioavailable nutrients and stimulate soil macro- and microbiological processes.

None of these systems required outside fertilizer or irrigation yet remained productive for thousands of years. Each Nation adapted to their unique hydrological and pedological contexts whether it be heavy rains, arid environments, nutrient poor soils, or encroaching woody thickets. None of these traditional approaches employed the plow or extensive tillage. Interestingly (and encouragingly), all four of these contexts supported highly productive food systems using only locally available inputs, implements and skillsets. This suggests that any given system has the potential to be free/standing, independent of geopolitical occurrences beyond the local hydrological and pedological system. In addition, each of these systems operated on regional scales as opposed to contemporary Western farming techniques that often operate divorced from ecological processes beyond the property line. This implies that the division of lands into distinct parcels revokes from the farmer and her community the ability to tap into the larger and more powerful advantages of landscape/scale inputs, hydrological cycles, and ecosystems connectivity.

Active soil management by Indigenous Nations contradicts an unfortunate yet prevailing narrative that Indigenous People were impotent and indolent on the land, making no use of it. This narrative was used to legitimize land seizure and genocide by early colonists. This foundational narrative persists in many ways today but is brought into question by case studies such as these.

It was recommended that contemporary soil managers not only learn from these strategies, but also work to restore landholdings and decision/making power to dispossessed Native Nations, for in addition to healing the soil we must also heal history.

9.2 *Water: Lessons from Sustainable Indigenous Aquaculture*

An exploration of six sustainable Indigenous aquaculture systems revealed that these societies operate on regional/scales, millennial/scales, are constructed using local, organic materials, are highly biodiverse, and are anthropogenic in nature.

Common strategies across the case studies include intentional augmentation of habitat for key species, augmentation of lower trophic levels, diversification of species, and tapping into preexisting forces of nature.

A causal chain from fishery principles, values, goals, strategies, and characteristics was identified, thereby placing great weight on the deeper roots of a fishery: principles and values. It was found that these sustainable fisheries held the following principles in common: non/humans are equal to or greater than humans, non/humans are the sacred relatives of humans, and humans are divinely assigned to a particular homeland to take care of and protect it. This gave rise to a similar set of values as well: human agency on the land, reverence for the sacredness of creation, reciprocity with creation, restrain in harvest, service to non/human lifeforms, efficiency of systems, circularity, responsibility to past and future generations, and kinship with creation.

These principles and values gave rise to their corresponding fishery goals: feed and care for non/humans, feed and care for humans, design for perpetuity, diversify biota, enhance, expand, or improve preexisting systems, and maintain ecosystems balance.

Thus, a review of Kwakwaka'wakw clam gardens, Bauré floodplain management, Haíłzaqv herring fisheries, the Gunditjmara eel fishery, the Chumash channel island fishery, and the Piscataway Chesapeake Bay fishery reveals many lessons for contemporary fishery management. The most urgent recommendation arising from this analysis is to revise the core principles and values that drive our fisheries today. If they move from human-centric to eco-centric, we too could experience this level of fishery sophistication and success.

9.3 *Fire: Diné and Pueblo Pyro-Management of the Ch'ooshgai Mountains*

Throughout the world and for tens of thousands of years, human beings have applied fire to the land to steward a variety of food systems and bioregions. Despite the documented ubiquity of this practice across Turtle Island (also known as North America), the Western scientific community does not agree that Diné (also known as Navajo) and Puebloan societies managed

the Ch'ooshgai (Chuska) Mountains of the Southwest in this manner. A synthesis of journal entries from early observers, tree ring data, ethnographic evidence, fossilized charcoal records, fire practices of neighboring nations, and auto/ethnographic data strongly support the hypothesis that this area was managed with routine, low/severity, anthropogenic burning. This would have significant implications for Southwest historical ecology, contemporary forest management, fire safety, and the representation of Indigenous People in Western scientific narratives. Future palynological analysis, lightning density analysis, and community/based participatory research could further illuminate the issue of Holocene anthropogenic burning in the Ch'ooshgai Mountains. This calls into question arguments that these regimes were due to lightning ignition.

9.4 Air: Honoring the Voices of Contemporary Indigenous Land Managers

A synthesis of interviews with four contemporary Indigenous land managers indicate that their cultural groups are active managers of local ecosystems. An interview with Valentin Lopez, Tribal Chairman of the Amah Mutsun Indigenous Nation shows how their ancestral practices worked to fulfill their sacred obligations to their homelands and the species they shared them with. He also shared the ways in which they are continuing that tradition today with an extreme focus on honoring the sacredness of the land.

Another interview with Roberto Nutlouis covers a variety of Indigenous regional ecosystems management techniques employed by Diné (Navajo) People. Specifically, we discuss underlying principles and value systems that drive his alluvial farming techniques.

A third interview with M. Briggs-Cloud provides an in/depth view into traditional Maskoke ecosystems facilitation. We discuss his recent experience burning over 1000 acres of the forest floor in present/day Alabama, as well as the principles and ethics that guide Maskoke land/care practices.

The final interview is with Redbird Willie, who descends from the Pomo Nation and practices Pomo land/care ethics in Northern California. He discusses the ways in which Pomo People traditionally augmented the abundance of their Mediterranean ecosystem as well as the underlying values that drive his current land/care strategies.

While they work in unrelated locations and manage diverse biomes, they are driven by strikingly similar principles: reverence for the sacred and a belief they are divinely assigned to care for their respective homelands. Across all case studies, the notion that non/human lifeforms

are equal to or greater than humans, and are the sacred relatives of humans, was an important driver of management goals and strategies.

9.5 Theory: Indigenous Regenerative Ecosystem Design

A theory of Indigenous Regenerative Ecosystem Design (IRED) is proposed to (a) unify the discussion of this phenomenon as defined by Indigenous People themselves, (b) provide a refined and accurate definition that reflects the essential aspects of this stewardship technique, and (c) create a strong foundation upon which more targeted research can be conducted. The following tenets of this theory are offered:

- IRED driving principles:
  - non-humans are equal to or Elder to humans
  - non-human lifeforms are our relatives
  - all lifeforms have an ecological and spiritual role, including humans
  - humans have a sacred covenant to protect and care for their respective homelands
  - humans have a responsibility to create a home for future generations
  - creation is sacred
- IRED driving values:
  - relationality
  - reciprocity
  - respect
  - reverence
  - restraint
  - regenerative practice
  - responsibility to homeland
  - kinship with life
  - service to life
  - generosity
  - humility
  - efficiency
  - a notion that all life is equal

- IRED system goals:
  - design in cooperation with and in service to life
  - support, feed, and care for all life
  - support, feed, and care for humans
  - help other lifeforms also fulfill their role within creation
- IRED management strategies:
  - intentional habitat expansion and maintenance
  - align/work with forces of nature
  - regenerative disturbance of ecosystem succession
  - design with and for life
  - design for perpetuity
  - design for biodiversity
  - design for efficiency
  - give thanks to and spiritually support life through formal ceremonies and offerings
- IRED system characteristics:
  - place-based
  - millennial scale—often several thousands of years old
  - regional scale
  - constructed with non-synthetic, locally available materials
  - anthropogenic—co-created through intentional, human design
  - ecocentric—health of the whole system is privileged (**?**)
  - kincentric—living beings seen as the relatives of human beings (**??**)
  - biomimetic (mimicking biological elements and processes)
  - ecomimetic (mimicking preexisting ecological conditions)

Recommendations for further IRED research are offered, namely that we honor Indigenous leadership and research agendas as we refine the field.

9.6 Policy: Solving Global Problems, Restoring Indigenous Leadership

Policy recommendations were devised based on an analysis of hundreds of Indigenous land management systems for federal, tribal, and civilian agencies. An overview of the recommendations is as follows:

1. For federal agencies: (a) invest in meaningful cross-cultural dialogue between traditionally trained Indigenous Elders and community members and federal land management, nutrition, agriculture, and fire safety administrations; (b) initiate pilot projects by placing experimental areas under the management of traditionally trained Indigenous Elders and community members local to that area; (c) design food and land management systems similar to IRED case studies; (d) research and integrate value systems that sustain IRED case studies into federal land and food programs; and (e) enact legislation and issue proclamations that fund, elevate, formalize, and further Indigenous land management institutions.
2. For grassroots Indigenous communities (in partnership with their corresponding tribal governments where possible): (a) invest in pilot projects on remaining Indigenous land bases that employ traditional land and food systems principles, values, goals, and strategies; (b) establish and invest in culturally-grounded institutions whose campuses house and support the research and revitalization of traditional socioecological, spiritual, and land care sciences; and (c) invest in research, development, and implementation of strategic communication plans to cross-culturally educate non-Indigenous society about Indigenous food and land management.
3. For non-Indigenous, non-governmental society: (a) where possible, restore excess private landholdings to traditionally trained Indigenous Elders and community members; (b) consolidate private landholdings for holistic community management; (c) support, fund, and volunteer for Indigenous-led ecological projects; (d) place human resources, capital, and equipment of academic institutions at the service of Indigenous principal investigators to fulfill the research agendas of Indigenous communities; and (e) support voluntary land tax programs that forward funds to grassroots Indigenous community projects within given tax districts (*e.g.*, the Shuumi Land Tax program of Oakland, California).

Within these recommendations there is a heavy emphasis on creating spaces where IRED can be revitalized, remembered, and applied.

9.7 *Why Indigenous Ecological Histories are Hidden*

The study closes with an explanation of why colonial powers minimized the extent and sophistication of Indigenous food systems: they are a living contradiction to supposed colonial cultural superiority, applied throughout history to legitimize land seizure and attempted geno-

cide.

9.8 Conclusion

The general conclusion of this dissertation is that pre-Columbian Indigenous People of North and South America (referred to as Turtle Island and Abya Yala) extensively managed ecosystems to produce prolific and predictable food systems for themselves and non-human lifeforms. In many cases these systems persist today. These management systems are made possible through their dedication to a value system centered around respect for all life, reverence for the sacredness of creation, reciprocity with non-human beings, responsibility to homeland, Ancestors, and future generations, working with preexisting natural systems, and restraint in what and how is harvested from the earth.

Appendices

Appendix 1. Questionnaire for Semi-Structured Interview

(Subject to change through collaboration with research participants)

1. Name
2. Tribal affiliation(s)
3. Homeland location
4. What are some of the ways your Ancestors worked with the land to ensure there would be food for the community and future generations?
5. What are your thoughts on the Western concept of eco-systems engineering, for example clam gardens, hand planted kelp forests, prescribed fires to manage forests, black earth soil systems in the Amazon, the creation of food forests, management of grasslands to attract buffalo, etc.?
6. Why did our Ancestors do the things stated in question number 5?
7. What were some of the principles and values that guided this process?
8. How do you say food in your language and how is this different from the English word?
9. When you look at this graph, what comes to your mind? (*e.g.*, graph of fossilized pollen found in Kentucky pond showing Shawnee management of black walnut, hickory nut, chestnut food forest for 3,000 years).
10. When you read this abstract what comes to mind? I ask this question because I think that, even though these scientists are "on to something," we as Indigenous People can add a lot of color to what they are saying and bring a fresh perspective (*e.g.*, the abstract of a paper entitled: *Better homes and pastures: Human agency and the construction of place in communal bison hunting on the Northern Plains*).
11. When you hear this statistic what comes to mind? (*e.g.*, Indigenous People built clam garden walls on 35% of the shoreline of Quadra Island, British Columbia.)
12. Is there anything you have shared that you would like to not be published?
13. Is there anything else you'd like to share on this topic?

Appendix 2. IRB Approval Letter

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909 N Koyukuk Dr. Suite 212, P.O. Box 757270, Fairbanks, Alaska 99775-7270

April 5, 2022

To:	Jessica Black, Ph.D. Principal Investigator
From:	University of Alaska Fairbanks IRB
Re:	[1706499-1] PhD Dissertation: Habitat Stewardship and Expansion as an Indigenous Holistic Food Systems Management Technique

Thank you for submitting the New Project referenced below. The submission was handled by Expedited Review under the requirements of 45 CFR 46.110, which identifies the categories of research eligible for expedited review.

Title:	PhD Dissertation: Habitat Stewardship and Expansion as an Indigenous Holistic Food Systems Management Technique
Received:	November 26, 2021
Expedited Category:	*6 & 7*
Action:	APPROVED
Effective Date:	April 5, 2022
Expiration Date:	April 5, 2023

This action is included on the May 4, 2022 IRB Agenda.

No changes may be made to this project without the prior review and approval of the IRB. This includes, but is not limited to, changes in research scope, research tools, consent documents, personnel, or record storage location.