

# Ecocultural Species of Vernal Pool Ecosystems: Case Study from the Miwko? Waali?

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**ABSTRACT.** Vernal pool ecosystems are frequently considered in relationship to endemic and rare species, hydrologic processes, and rangeland; but what deeper cultural connection is entwined with vernal pools? Vernal pool ecosystems are integral to traditional cultural properties of many California Indian tribes. They provide traditional foods, medicines, fibers, and functional attributes that are rooted in a reciprocal relationship between people and their ancestral landscapes and cultures. The significance of vernal pools in this context has largely been overlooked in their conservation and stewardship. Recent project-specific threats to vernal pools has created an opportunity to draw upon this knowledge to further trust responsibilities to promote a broader understanding and support for ecocultural conservation and stewardship objectives. Here the unique ecocultural relationship of vernal pools species within the *Miwko? Waali?* (Plains Miwok homelands of the Delta region) is illustrated to discuss how these relationships are being utilized to uphold cultural obligations to the landscape.

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## INTRODUCTION

Conservation of vernal pool ecosystems has been largely hinged upon success in regulatory and stewardship actions, but there is continued decline in baseline conditions through habitat conversion, fragmentation, and loss. To overcome shortcomings in these mechanisms, many areas of environmental stewardship are beginning to appreciate the value of Indigenous peoples and knowledge to further conservation objectives. However, the integration of Indigenous knowledge regarding vernal pool ecosystems is limited.

Globally, the loss of wetlands of all types is believed to be around 50 percent (Zedler and Kercher, 2005). Vernal pools represent a unique type of wetland, and in California, approximately 90 percent of vernal pools have been lost (Witham, 2007). Much of this loss is

attributable to land use changes via agricultural or urban land conversion among other impacts. Despite the ecological importance of vernal pools, existing policy and conservation measures have not achieved long-term conservation outcomes. For instance, the Endangered Species Act of the United States is intended to protect the ecosystems upon which endangered and threatened species depend by listing species and critical habitat concurrently with the development of a recovery plan, but the process often focuses on the species instead of its habitat. The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Recovery Plan) addresses recovery objectives for 33 species occurring across 22 vernal pool regions (USFWS, 2005). In this Recovery Plan ecosystems are the primary focus, but species form a crucial component in the establishment core recovery areas. Recovery plans outline measurable and achievable actions which are

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voluntary. All federal agencies are required to use their legal authority to further conservation of species, and there are many opportunities to implement recovery via regulatory actions. For instance, authorizations pursuant to section 404 of the Clean Water Act and section 7 of the Endangered Species Act are typically required for many projects impacting vernal pools. However, positive contributions to recovery are frequently lacking, and the resultant biological opinions rarely concludes in a jeopardy finding.

While federal and state policies in the United States recognize the importance of clean water and species in concept, there is a disconnect when permit authorizations or agency actions result in direct, indirect, and/or cumulative vernal pool ecosystem impacts. Without ecosystem protections across their geographic distribution, loss of vernal pools continues, and additional species become listed. In part the conservation shortcomings for vernal pool ecosystems stems from the compartmentalization of resources among agencies with differing mandates for implementation pursuant to their guiding policies. Compartmentalization exists through placing various resources among independent entities (e.g., U.S. Fish and Wildlife Service oversees plants and freshwater aquatic organisms, U.S. Environmental Protection Agency and U.S. Army Corps of Engineers oversees waters). In this example, the regulation of waters separate from the ecosystem has contributed to a continued decline in baseline for the species and ecosystems.

Perhaps an improved scenario is one that does not compartmentalize nature, but recognizes the relationships within nature. In consideration of the diversity of cultures in the world, there are many examples of alternative approaches to nature conservation that could enrich the approach to vernal pool conservation. In Germany, for instance, there is larger recognition that humans are part of nature, with less

emphasis on the wilderness concept and rare species. The 2010 Federal Nature Conservation Act (Bundesnaturschutzgesetz) places emphasis on landscape function, including human-dominated landscapes as a place for biodiversity (see Heise, 2016 for a summary).

Despite human interdependence with nature, the legal recognition of nature has been an afterthought in many developed countries including the United States. However, the recognition of nature as having its own rights is gaining momentum, and in many cases, it is promulgated by Indigenous peoples. The Global Alliance for the Rights of Nature (2019) chronicles the development of this concept with current applications. Notably, the governments of Bolivia and Ecuador have created constitutional amendments providing rights for the protection of nature, and several independent cases have come from Maori Iwi in Aotearoa (New Zealand) to provide landscape features rights. Similarly, the Yurok Tribe (2019) passed resolution 19-40, which highlights the interdependent nature of people, species, and land and seascape by recognizing the rights of the Klamath River. While the concept to recognize the rights of nature is logical, in some instances decline of species and their habitats continues from lack of enforcement. These instances of Indigenous peoples seeking to protect nature and their connections to nature demonstrate shortcomings in existing policies established within the dominant governance structures imposed by colonizing governments.

Considering the variety of models for achieving conservation of nature, it is important to recognize how and where improvements could be made. It is also important to recognize the voices not present in the development of such policies, particularly Indigenous peoples with deep ecocultural connections to their ancestral homelands. While federal, state, and local agencies have responsibilities to uphold their responsibilities to resources, they also have

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specific tribal trust responsibilities to uphold. Tribal trust responsibilities are inclusive of transient resources including water, fish, wildlife, and plants within the aboriginal territory of tribes and tribal individuals. Moreover, there is a tremendous unrealized opportunity for using tribal self-determination (P.L. 93-638 and California Resource Code 16000) to further conservation through ecocultural approaches to conservation.

### ECOCULTURAL CONSERVATION

Conservation and restoration often neglect the role of Indigenous peoples as stewards of ecosystems (Hobbs et al., 2011). While Indigenous peoples are underrepresented globally, they steward an astounding amount of biodiversity on approximately 1/5 of the earth's surface (Raygorodetsky, 2017). Given the global declines of biodiversity, it is critical to consider alternative means to achieve biodiversity conservation. Heise (2016) discusses how multi-species ethnographies could be used to achieve conservation through multi-species justice in a manner similar to social justice. In the context of Indigenous cultures, Heise's proposal is equitable due to the interrelated and interdependent relationships people have established through kinship with species (Hankins, 2018). Kinship with species is reflected in various ways including recognition as totems, ceremonial relationships, and reciprocal relationships maintained through harvesting. Where Indigenous peoples have established and maintained multi-species kinship relationships, the ecological integrity of systems is enhanced (Nabhan, 2000; Salmón, 2000; Kimmerer, 2011, 2013). Rose (2011) suggests such kinship systems create accountability, and notes that the population decimation of many Indigenous peoples create a relatable experience to declining species. By looking at ecocultural equality through this lens, the discussion focus becomes more inclusive of multi- and inter-species relationships.

The relationship between species and cultures is inextricably intertwined at many levels. Many of the world's biodiversity hotspots are also areas of cultural diversity. For instance, Papua New Guinea and California are two examples of places that harbor significant biodiversity and also richness of Indigenous cultures and languages. Aside from physical landscape features, some of this richness in species and habitat heterogeneity may be attributed to ecocultural processes inclusive of cultural burning and digging for plant materials by Indigenous peoples. For instance, Martin and Sapsis (1992) attribute the traditional burning practices of California Indians to higher levels of biodiversity. Many centers of biodiversity hotspots coincide with recognized sacred sites or places of importance among regional cultures (Gorenflo et al., 2012), and may also serve as conservation areas traditionally recognized by those cultures. Frequently, such places are noted in traditional stories of Indigenous peoples as places of significance. These stories convey the cultural understanding of place and interspecific and social interactions as the basis of traditional law, which is rooted in an understanding of ecological interdependence (Austin, 2009; Black, 2011; Hankins, 2018). Thus, these locations might serve as logical points of conservation interest for both ecological and cultural values.

Recognition of ecological interdependence is central to the concepts of ecocultural conservation. In this context the relationship between culture and biodiversity is established through the significance of their interaction or reliance on each other. Consider a feathered belt as an example of this relationship in central California. The belt is woven from Indian milkweed (*Asclepias eriocarpa*) fibers and geometrically patterned with colorful feathers from western meadowlark (*Sturnella neglecta*), mallard (*Anas platyrhynchos*), and redwing blackbird (*Agelaius phoeniceus*). In this instance, the relationship extends between the mentioned

species, the species they are associated with, and the person collecting them to make the feathered belt for use in ceremony or as a trade item. Often the acknowledgement of this relationship at the time of collection is made via an offering to that species or individual. Many traditional cultural practitioners maintain that in order to take something, something must be given in return. The collection of resources (e.g., plant materials, fish, wildlife) is founded in a reciprocal relationship with species (Kimmerer, 2013; Hankins, 2018). As Kimmerer (2011) describes, a landscape that is ecologically sound and considered flourishing is one that is capable of sustaining subsistence activities and sharing of derived resources. Maintaining reciprocal relationships with species requires continuity of culture and access to resources. In the context of Indigenous California, the settlement period initiated a disconnect between people and the landscape due to privatization of land and subsequent policies. Thus, leading to limited opportunities to maintain relationships with the landscape and species, reduction of traditional knowledge base, and a cascade of ecocultural impacts.

To better address the ecocultural conservation needs of the landscape, it is important to engage Indigenous knowledge and practice from that landscape. This includes engagement of non-Indigenous people to work with, and support Indigenous peoples in caring for that landscape. To achieve this, Kimmerer (2011) urges becoming familiar with Indigenous cultural practices and beliefs relative to stewardship, but cautions against cultural appropriation. Black (2011) suggests that when one becomes familiar with the landscape through a cultural lens, the land will begin to communicate its needs to the observer. This might lead to refined approaches to current conservation efforts or stewardship actions. For instance, the timing of certain stewardship activities, such as burning, may shift to better meet ecocultural objectives.

The specific relationship between Indigenous peoples and vernal pools has not been widely documented. However, there is a deep relationship between Indigenous peoples and vernal pool ecosystems. Culbert (1996) exemplifies this through ethnobotanical work with the late Kumeyaay herbalist Jane Dumas and her apprentice Richard Bugby to identify and classify vernal pool associated flora in Southern California into use categories (medicinal, subsistence, utilitarian, and ceremonial). However, the cultural significance of vernal pools extends beyond ethnobotany. It is understandable that vernal pools harbor biota that are culturally important to Indigenous peoples, and the conservation and stewardship of vernal pool ecosystems could be further enhanced through the inclusion of Indigenous perspectives.

### MIWKO? WAALI?

Since time immemorial Miwko? (Plains Miwok or Valley Miwok) have lived in association with the region centered upon Mt. Diablo (see Hankins 2018 for a more detailed description of Miwko? cultural affiliation and ecocultural relations). Miwko? waali?<sup>1</sup> have undergone tremendous changes in geologic time including sea level rise following the last glacial maximum. Throughout this time, Miwko? have actively stewarded their homelands and affiliated ecosystems, inclusive of vernal pools, as had been established by ancestors for the benefit of unborn generations. From this understanding stewardship is an obligation handed down from generation to generation, and backed by traditional laws linked to creation accounts and conveyed through nature itself (see Black, 2011). Miwko? waali? includes landforms categorized into five geographically distinct vernal pool regions (Livermore,

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<sup>1</sup> Waali? is a term that encompasses Earth, land, homelands, and related concepts. Here, I use it to emphasize the understanding of place within homelands and storyscape.

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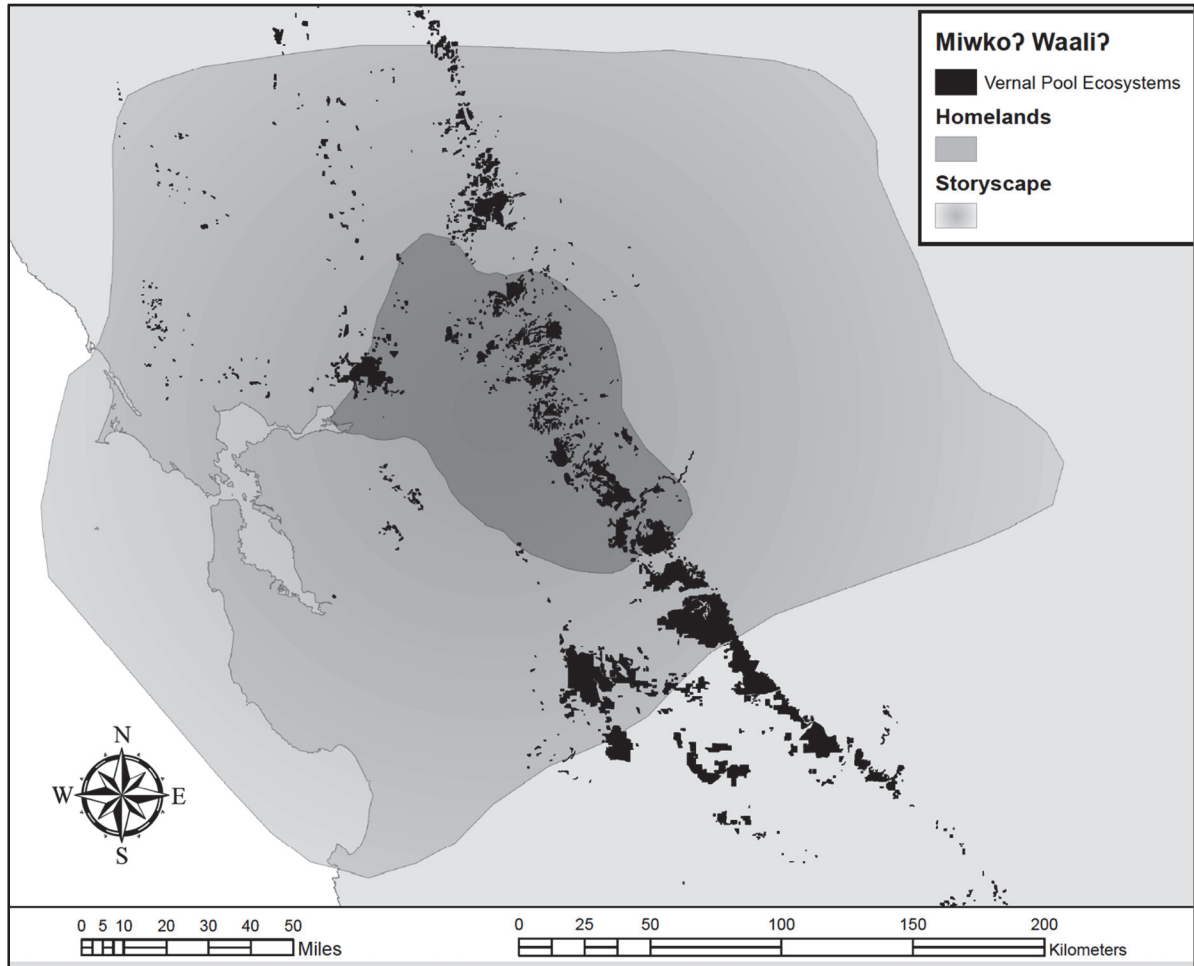


FIGURE 1. Map depicting the distribution of vernal pool ecosystems (source USFWSVP2) situated throughout Miwko? homelands and storyscape. Miwko? homelands and storyscape are depicted relative to the outline of central California extending from the Pacific Ocean into the Great Basin.

Solano-Colusa, southeastern Sacramento Valley, southern Sierra Foothills, and San Joaquin Valley) (Figure 1). The Livermore Vernal Pool Region falls within an area of particular significance due to the inclusion of many sites associated with the sacred geography of Miwko? creation and traditional law. Out of respect for restricted knowledge of these places, such vernal pool sites will go unreferenced here. These sites are not only of significance due to cultural affiliation, but also due to the associated biodiversity, which is loosely noted in Miwko? traditional stories. They are also areas with restricted access as recognized by traditional use; some of these (as exists elsewhere within the

broader landscape) are zones where no collection (particularly fish or wildlife) is allowed. Such areas where no collection is allowed might be some of the most productive parts of the landscape or primary breeding sites, and serve as source populations for the surrounding region. However, elsewhere within the landscape are places where an individual or family may have rights or responsibilities for resource stewardship or harvesting from a given area. Access to such sites might only be given upon invitation or permission. In this context it is clear that traditional knowledge and practice established a complex set of rules for engagement within the landscape.

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Stewarding the land is one way in which Miwko? have upheld obligations and relationships to ecocultural species. Ecocultural species are those which are culturally significant for reasons including kinship associations, utility, and relationship to story. Stewardship activities across the landscape has been traditionally achieved through collection methods like tilling and pruning, but most significantly burning within resource patches or to a landscape scale as appropriate. As Lewis (1973) reported, there were many reasons why California Indians used fire. Among the primary reasons for burning are the need to clean the landscape and make it more productive, maintaining access corridors, and enhancing conditions for certain species. Virtually all vegetated ecosystems within the Miwko? waali? were stewarded with fire, including vernal pools. Fire could be applied across the seasons depending on specific burn objectives such as enhancing or controlling plant populations and conservation (Hankins, 2013, 2015). Many ecocultural species have declined due to pressures associated with American settlement (e.g., habitat loss, poor stewardship, and weak environmental policy). The loss of species, environmental change, and impacts to livelihood and lifestyles are a source of ecological grief (Consolo and Ellis, 2018). Such impacts have been noted across generations for many Indigenous communities (Whitbeck et al., 2009). Certainly, these conditions have persisted for Miwko? traditional cultural practitioners, and concerns for environmental policy and stewardship have become important issues to be addressed.

While some ethnobiology has been reported from various Miwok peoples (Barrett and Gifford, 1933; Anderson, 2005), no published work has focused on vernal pool species. The opportunity to identify Miwko? ecocultural vernal pool species initially came through consultation between Miwko? traditional cultural practitioners and the U.S. Army Corps of Engi-

neers for a project with vernal pool impacts in Sacramento County, California, but has since been utilized for similar consultations elsewhere within the Miwko? waali?. Through the consultation process it was determined that an ecocultural species account, similar to those used by U.S. Fish and Wildlife Service in developing biological opinions, would be a useful tool in addressing impacts to ecocultural species. Historically, consultation for such projects has tended to focus on archaeological cultural resources. Here, Miwko? traditional cultural practitioners determined that environmental impact assessment should be furthered to address impacts to living cultural resources identified as ecocultural species. The list was not intended to be exhaustive, but served as a means to illustrate the interrelated and interconnected nature of these ecocultural species, with a hope to further environmental impact analysis, and leverage tribal trust responsibilities of agencies responsible for regulatory and conservation actions. For each ecocultural species the narrative included the cultural significance of the species (e.g., cultural use, featured in story, and kinship ties), and the life history and ecological requirements for the species. The narrative also includes a status of the species to illustrate the importance of taking conservation and stewardship actions. The narrative provides a connection between species including people. Some of the ecocultural species identified include California tiger salamander (*Ambystoma californiense*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Linderiella occidentalis*), Contra Costa goldfields (*Lasthenia conjugens*), fleshy owl's clover (*Castilleja campestris* spp. *succulenta*), and more typically upland species including burrowing owl (*Athene cunicularia*). The narrative below provides a broad sense of how each species was addressed in this process, and these narratives were followed with life history narratives and habitat associations typical for environmental analysis.

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### California tiger salamander

#### *Ambystoma californiense*

*?Appanta? (tiger salamanders) and sunuunu? (larval salamanders) are an important part of the traditional Miwko? diet. The larvae were harvested from vernal pools throughout the Sacramento vernal pool region. One important gathering area was in the vicinity of the historic village of Sunulumne? (place of the tiger salamander larvae) near Herald, California, where larger vernal pool complexes were known to occur.*

While the narrative is not comprehensive, it exemplifies the cultural connection to the species, and highlights a location of significance. Referenced locations or uses of resources could easily be extrapolated to other sites bearing the species or habitat elsewhere within the waali?. The focal species for discussion here are all special status species, but there are many more common species also of importance that could similarly be addressed, and some of those species are considered culturally rare. Examples of culturally rare species include species that would be considered common (e.g., salt grass, *Distichlis spicata*), but are not available in abundance or at accessible places to yield sustainable populations under traditional subsistence gathering or similar cultural use within Miwko? waali?. This is an important factor in understanding how interspecies relationships with these cultural species can be maintained. Harvesting a species is a reciprocal action that is contingent upon the relationship with a given species, and when this relationship doesn't exist, the species is vulnerable to extinction (Hankins, 2018).

The ecocultural species accounts bring some awareness to impacts to biota as living cultural resources not typically considered in environmental impact analysis. It serves as a bridge between understanding species, aquatic resources, cultural significance, and historical

preservation, which collectively build a deeper alignment of regulations to achieve broader conservation outcomes. However, there is more that could be assessed, including deeper cultural/social and metaphysical (e.g., spiritual) considerations. In this sense, assessing impacts solely based on the parameters typically used in environmental impact analysis do not provide a means of addressing impacts in an equitable manner to Miwko? understanding. At present, there is no Miwko? tool available for this deeper level of impact analysis. However, the Mauri-o-meter (<http://mauriometer.com>) assesses environmental, cultural, social, and economic wellbeing based on Maori concepts, and has been utilized by Indigenous and non-Indigenous peoples to assess a broader range of environmental impacts (Morgan, 2008; Fa'au'i and Morgan, 2014; Wambrauw and Morgan, 2015). The term 'mauri' refers to the life force or metaphysical properties. The use of this tool is a good alternative to begin assessing such impacts through environmental planning and review.

### CONCLUSION

There is a current opportunity to address ecocultural species, relationships with the landscape, and assertion of traditional laws that have been time tested in this landscape as a means to achieve conservation and stewardship objectives. The integration of sites of ecocultural significance and focal points of traditional law are suitable points for guiding such efforts. Indigenous traditional laws convey the interrelated nature of matter, and that can be read from the landscape if one is open to understanding those needs (Black, 2011). Through this understanding, Miwko? traditional law is rooted in nature and this landscape, and those laws should be incorporated into modern policy, regulation, and stewardship. Integration of Indigenous knowledge and practice into conservation planning and stewardship may offer insights not considered within non-Indigenous

approaches (Berkes, 2004; Hobbs et al., 2011). The inclusion of Indigenous peoples in stewardship can facilitate restoration of ecocultural relationships and landscape health while also mitigating ecological grief and intergenerational trauma (Hobson Haggerty et al., 2018).

Certain international laws recognize the rights of Indigenous peoples in these matters, and there are programs established to support Indigenous peoples and organizations. For instance, the United Nations (2007) Declaration on the Rights of Indigenous People (UNDRIP) includes several references to Indigenous lands and resources (see Articles 25, 26, 27, 29, and 36), which are of particular significance to support the integration of Indigenous conservation and stewardship objectives. Since the United States became a signatory to UNDRIP in 2010, there has been growing reference to it among Indigenous peoples. For example, the Yurok Tribe (2019) specifically cites UNDRIP article 29, which relates to the conservation of the environment, lands, and resources. However, there is not a broader acknowledgement of this declaration among federal, state, local government or non-governmental organizations to engage and support Indigenous peoples to recognize and uphold traditional responsibilities to nature within their homelands. One way this could be fulfilled is through the establishment of Indigenous protected areas designated to recognize landscapes enhanced by cultural interactions that through time have enhanced biodiversity within them (see Dudley, 2008). Such approaches are viable within the Miwko? waali?, and may offer a better ability to achieve long-term outcomes through establishment of reciprocal relationships with vernal pools to further ecocultural conservation.

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