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Decentering Watersheds and Decolonising Watershed Governance: Towards an Ecocultural Politics of Scale in the Klamath Basin

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ABSTRACT: The watershed has long captured political and scientific imaginations and served as a primary socio-spatial unit of water governance and ecosystem restoration. However, uncritically deploying watersheds for collaborative environmental governance in indigenous territories may inappropriately frame sociocultural, political-economic, and ecological processes, and overlook questions related to power and scale. We analyse how members of the Karuk Tribe's Department of Natural Resources have leveraged and critiqued collaborative watershed governance initiatives to push for 'ecocultural revitalisation' – the linked processes of ecosystem repair and cultural revitalisation – in Karuk Aboriginal Territory in the Klamath River Basin. We argue for decentering watersheds in relation to other socio-spatial formations that are generated through indigenous-led processes and grounded in indigenous knowledge and values. We explore two scalar frameworks – firesheds and foodsheds – that are emerging as alternatives to the watershed for collaborative natural resources management, and consider their implications for Karuk ecocultural revitalisation. We attempt to bring watersheds, firesheds, and foodsheds together through an ecocultural approach to scale in which water is one among many cultural and natural resources that are interconnected and managed across multiple socio-spatial formations and temporal ranges. We emphasise 'decolonising scale' to foreground indigenous knowledge and to support indigenous sovereignty and self-determination.

KEYWORDS: Watershed governance, Integrated Water Resources Management, politics of scale, tribal sovereignty, Klamath River Basin, California

INTRODUCTION: WATERSHED POLITICS IN THE KLAMATH RIVER BASIN

For the past three decades, the Klamath River Basin has been at the forefront of resource conflicts related to fisheries, logging, fire management, and dams. It has also been at the forefront of experiments in collaborative watershed governance involving numerous state, federal, indigenous, and

civil society organisations. The Klamath River drains a 40,500 sq. km. basin and supports one of the most biologically diverse ecoregions in the western United States (DellaSala et al., 1999). The water of the Klamath is shared between California and Oregon, indigenous communities – including the Hoopa Tribe, Yurok Tribe, Karuk Tribe, Quartz Valley Indian Reservation, Resighini Rancheria, Shasta Indian Nation, and Klamath Tribes – as well as farmers, ranchers, fisheries, hydroelectric facilities, and municipal and domestic water systems. Upstream diversions for large-scale irrigation and impoundments to generate electricity shape the timing, quantity, and quality of water flowing downstream to aquatic ecosystems and human communities. Application of fertilisers and herbicides, road building, logging, and fire management in the upslope and upstream regions of the Klamath also impact in-stream water quality conditions (NRC, 2004).

Since the mid-1980s, watersheds – areas of land that drain water to a common outlet (Leopold et al., 1992) – have served as the primary scalar frameworks through which collaborative water governance has been organised and ecosystem restoration has been implemented in the Klamath. Because of the watershed's ability to bridge cultural and epistemic divides, integrate data on terrestrial and aquatic ecological conditions, and cultivate a shared sense of place among Klamath watershed inhabitants, numerous resource management institutions have engaged the watershed framework to resolve conflict and recover critical ecosystem functions. In this article, we analyse the Karuk Tribe's ability to engage in collaborative watershed management to shape knowledge production and decision-making, revitalise cultural practices, support tribal sovereignty, and rehabilitate the ecosystems and water bodies of their aboriginal territory.

Since time immemorial, Karuk people have inhabited the middle section of the Klamath Basin (Figure 1) and managed its landscapes for cultural resources including food, fibres, basketry materials, medicines, and regalia (Salter, 2003). The Karuk's 1851 treaty with the federal government was never ratified, and questions related to their treaty rights remain un-litigated (Heizer, 1972; KDNR, 2010). Following the formation of the Klamath National Forest in 1905, and the Six Rivers National Forest in 1947, approximately 95 percent of Karuk Aboriginal Territory now overlaps with lands administered by the US Forest Service (USFS) (Tripp, 2014). Early USFS management of Karuk lands resulted in criminalisation of traditional practices such as prescribed burning, fishing, hunting, and gathering of cultural resources (Noorgard, 2005). Though over a century and a half of settler colonialism and resource extraction has degraded Karuk lands and waterbodies (Doremus and Tarlock, 2008; KDNR 2010), the Karuk Tribe fought to regain federal recognition in 1978, and today exercises sovereignty over nearly 4000 members and their entire aboriginal territory. The Karuk Tribe's Aboriginal Territory was mapped as part of the federal determination process for tribal recognition, and includes an estimated 5585 sq. km (Figure 2).

Through the Karuk Tribe-UC Berkeley Research Collaborative, we have been engaged since 2007 in participatory research on initiatives related to water governance, fire and wildlife ecology, food sovereignty, youth empowerment, and cultural revitalisation.¹ In the course of these research collaborations we have learned how scale can determine whose knowledge and values are recognised as valid and allowed to shape environmental governance in indigenous territories. In this article, we examine whether the watershed is an appropriate scalar and socio-spatial framework² for supporting

¹ Karuk-Berkeley Collaborative website: <https://nature.berkeley.edu/karuk-collaborative/>

² The term 'socio-spatial formation' refers to the feedback between scalar framings or spatial configurations, and processes or patterns of social organisation. It draws on literature in geography and political ecology that addresses the mutually constitutive relationships between knowledge, political economy, ideology, culture, social relations and the organisation of space. See, for example, Brenner and Elden, 2009; Soja, 1980; Swyngedouw, 2004).

Karuk tribal self-determination and ecocultural revitalisation – the linked processes of ecosystem repair and cultural revitalisation³ – in Karuk Aboriginal Territory.

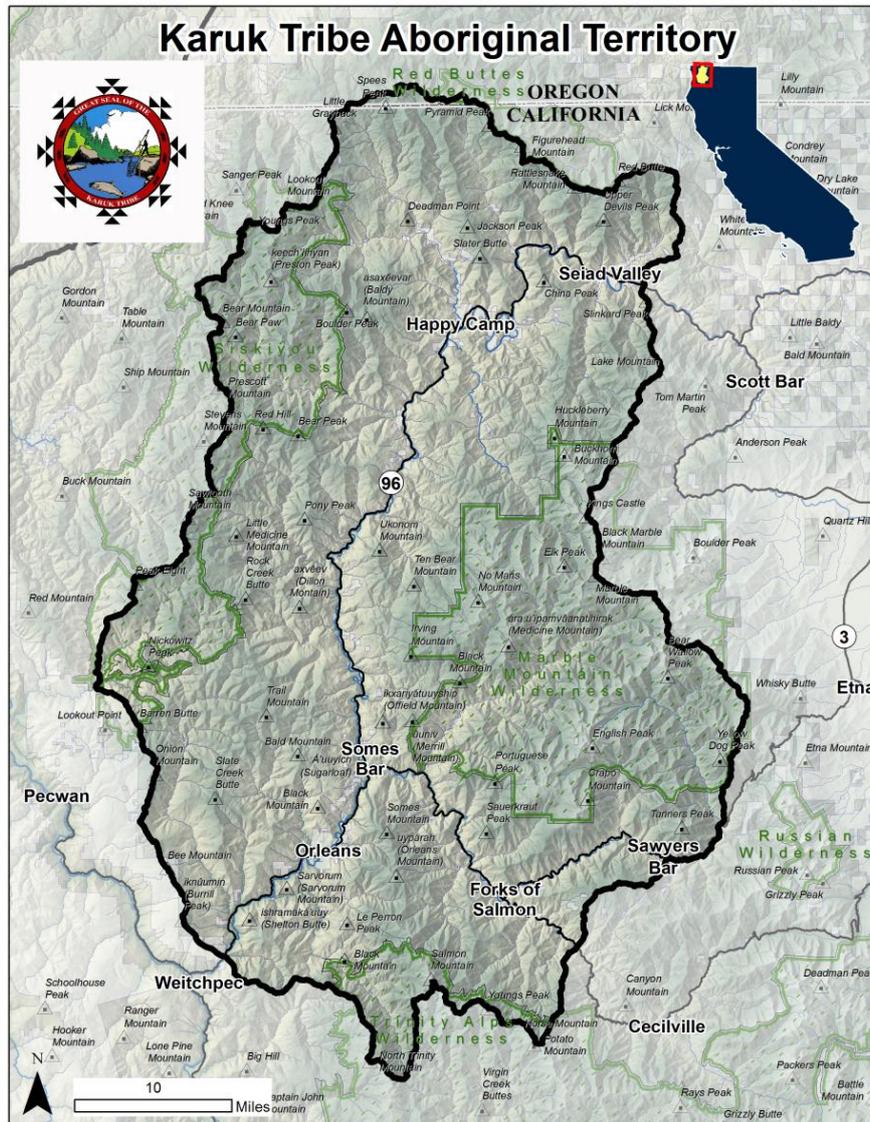
Figure 1. Klamath Basin boundary.



We argue that watersheds are in many instances a 'spatial misfit' or a 'scalar mismatch' (see, for example, Borowski et al., 2008; Cumming et al., 2006; Saldías et al., 2012) for Karuk ecocultural revitalisation, meaning that: a) the scale of knowledge making and governance doesn't align with the complex spatialities of ecosystem processes or with the appropriate scale for collective action in rehabilitating the ecosystems, habitats, and water bodies of Karuk Aboriginal Territory; and b) that collaborative watershed forums can exclude Karuk cultural stewardship principles and concerns related to local jobs, protecting sacred sites, revitalising cultural knowledges and practices, and ultimately supporting tribal sovereignty and self-determination.

³ The concept of ecocultural restoration entails what indigenous ethnobotanist Robin Kimmerer (2011) considers "reciprocal restoration", or a "mutually reinforcing restoration of land and culture, such that repair of ecosystem services contributes to cultural revitalization, and renewal of culture promotes restoration of ecological integrity". The Karuk Department of Natural Resources foregrounds this concept in their Eco-Cultural Resource Management Plan: "The relationships we have with the land are guided by our elaborate religious foundation (...) We share our existence with plants, animals, fish, insects, and the land and waters. We are responsible for their wellbeing. Our ancestral landscapes overflow with stories and expressions from the past which remind us of who we are and direct us to implement sound traditional management practices in a traditional, yet contemporary context" (KDNR, 2010: 7).

Figure 2. Karuk Tribe Aboriginal Territory.



Source: Jill Beckman, Karuk Department of Natural Resources.

Echoing critiques of the watershed as a scalar framework for integrated water governance and community-based ecosystem restoration (Cohen and Davidson, 2011; Norman et al., 2012, 2015; Warner et al., 2008) we argue that uncritically relying on the watershed can lead to what Mollinga et al. (2007) term 'watershed centrism', whereby the boundaries of a given environmental governance issue are predefined "in space, in time and socially (...) through the primacy of water". Watershed centrism precludes debate about other scales, socio-spatial formations, and cross-scale linkages important to ecosystem restoration and indigenous self-determination. Rather than abandoning them, we argue for decentring watersheds (Davidson and de Loë, 2014: 368, 381), or limiting their focus in relation to other scales of natural resource governance that are grounded in indigenous cultural perspectives and generated through indigenous-led processes.

To that effect, we compare the watershed with two socio-spatial formations – 'firesheds' and 'foodsheds' – which are emerging as scalar frameworks that are alternative and complementary to the

watershed for collaborative natural resource management in the Klamath. Firesheds are being developed as community-based fire management units that are patterned according to the way fire burns across the western Klamath landscape. The foodsheds concept embraces spatial and temporal characteristics of indigenous cultural food resources and their associated management practices in forest ecosystems. We compare watersheds, firesheds, and foodsheds as distinct-but-intertwined socio-spatial formations for grounding collaborative environmental governance in the particular social and ecological dynamics of the Klamath. The complex multiscale interactions between water, fire, and food are important drivers of ecosystem resilience, sustainable livelihoods, and cultural well-being. As alternative scalar frameworks to watersheds, both firesheds and foodsheds, while defined against watersheds, also help target the dimensions of watershed governance and ecosystem rehabilitation that are most important to the local indigenous community. Karuk mobilisations around watersheds, firesheds, and foodsheds call for renewed debate about co-constructing appropriate scales for knowledge production, decision-making, and collective action in ecosystem rehabilitation and environmental governance in indigenous territories.

In decentring the watershed in relation to other relevant socio-spatial frameworks, we argue that even within 'collaborative' approaches, scale must be 'decolonised' in order to support tribal sovereignty and ensure adequate inclusion of indigenous knowledge and cultural values. A 'decolonial' socio-spatial framework actively confronts the legacies and contemporary manifestations of colonialism that are shaping the ways that social-ecological systems are understood and governed. Drawing on scholarship that describes indigenous groups' strategic use of scale to exercise sovereignty (Norman, 2012; Norman et al., 2015; Turnbull, 2007; Howitt, 2002, 2003), we propose an 'ecocultural' approach to scale that builds from indigenous perspectives on the complex spatial and temporal dynamics of water, fire, and food, and their embeddedness in place-based ecological and sociocultural relations. We argue that scalar frameworks defined through indigenous-led processes and grounded in indigenous knowledge and values should guide collaborative water governance and ecosystem repair in indigenous territories.

FROM 'WATERSHED CENTRISM' TO 'DECENTRING WATERSHEDS'

Over the last century, the watershed has become a dominant scalar framework for understanding and managing water, as well as for implementing collaborative environmental governance and ecosystem restoration (Cohen and Davidson, 2011; Sabatier et al., 2006; Schlager and Bloomquist, 2008; Warner et al., 2008).⁴ The watershed provides a spatial unit well-suited for analysing the specific hydrogeomorphic, biogeochemical, and ecological dynamics within a hydrologically-defined area (Leopold et al., 1992). The watershed also provides a nested scalar template for ecosystem research and management, spatially defining relationships between abiotic elements (such as water, sediment, and nutrients) and the plant, animal, and human communities that interact with and depend on them (Lotspeich, 1980). Furthermore, the watershed bridges social and ecological systems by linking upslope and upstream land- and water-use activity with downstream flow regimes and water quality conditions (Sabatier et al., 2006).

Water scholars and historians have classified roughly three recent 'waves' of watershed governance. The first wave included the basin-wide engineering projects around the globe at the turn of the 20th century; the second wave covered the Tennessee Valley Authority-inspired river-basin development projects of the mid-20th century (Ekbladh, 2002; Warner et al., 2008: 122; Sabatier et al., 2006); and

⁴ It is important to note that watershed management is not new. For example, Berkes et al. (1998) present numerous examples of the watershed concept and associated regulatory mechanisms among ancient and living indigenous communities in the Pacific Northwest, British Columbia, Alaska, Southeast Asia, Oceania, Japan, and Mali. See also Teclaff (1967) for early European examples of river basin governance.

the so-called third wave of watershed governance emerged in the late 1960s as a rejection of unsustainable and technocratic river-basin development controlled by engineers and elites (Woolley et al., 2002; Worster, 2003). In the third wave, watershed management initiatives began prioritising environmental sustainability, collaboration, and broad citizen inclusion in both science and governance (Molle, 2009; Sabatier et al., 2006; Warner et al., 2008). The number of collaborative watershed management institutions dramatically increased across the United States and in California beginning in the 1980s, and accelerated through the 1990s.⁵

Scholarship over the last decade has begun to challenge the primacy of watershed-based governance for its inability to capture biophysical, sociocultural, and economic processes that shape water flows and water quality conditions at scales other than catchments, such as roads and irrigation networks, riparian corridors, hillslopes, bioregions, food and energy systems, commodity chains, and jurisdictional boundaries (See, for example, Adams et al., 2005; Budds and Hinojosa, 2012; Norman et al., 2015; Saldías et al., 2012). Collaborative watershed governance has also been critiqued for its inability to deliver the material ecological results of improved aquatic habitat and water quality conditions, or facilitate effective popular participation in water governance (see, for example, Griffin, 1999; Vogel, 2012).

Of particular relevance to this article, collaborative watershed forums have been critiqued for their handling of indigenous knowledge and sovereignty. In a survey of 76 watershed partnerships in California and Washington, Lubell and Leach (2005) revealed exclusionary practices that systematically prevented indigenous communities from participating in watershed collaborations. Cronin and Ostergren (2007) similarly found infrequent and inadequate engagement of indigenous communities and governments in collaborative watershed management initiatives in the Pacific Northwest. Other scholars have remarked on the inability of water governance forums to adequately empower indigenous representatives or include indigenous community perspectives and values (Norman, 2012; Norman et al., 2015; Vogel, 2012). We consider how the watershed may systematically exclude indigenous knowledge and cultural values related to water governance and ecosystem rehabilitation, as well as preclude important scalar considerations related to tribal sovereignty and the spatial and geopolitical complexities entailed in managing ecosystems and water bodies across indigenous territories.

The cultural politics of scale and decolonial rescaling

Critiques of watershed-based governance published over the last decade have called attention to the 'cultural politics of scale', or the ways in which cultural values influence the construction of scalar formations that determine whose knowledge is considered valid or relevant in relation to particular decision-making or governance processes (Norman et al., 2012; 2015). Scales provide templates for arranging and segmenting space and time in order to bring particular relationships into focus (Sayre, 2005, 2009). Attention to the cultural politics of scale allows us to see how watershed scalar frameworks shape understandings of the spatial patterns and temporal rhythms of water flows, as well as the way in which they influence the distribution of power and assignment of authority in the governance of hydrosocial relations (Budds and Hinojosa, 2012; Cohen and Davidson, 2011; Norman et al., 2015).

Seeing the watershed as a unit "mandated by nature" and devoid of any cultural or political influences, allows it to acquire an "untouchable legitimacy" as the primary seat of environmental governance (Warner et al., 2008: 133). This 'naturalises' the watershed as the optimal scale of conflict

⁵ According to Lubell et al. (2002), 75.8% of collaborative watershed institutions in the US were formed between 1990 and 2000. According to Woolley et al. (2002), the number of collaborative watershed organisations in California doubled between 1994 and 2000.

resolution, water management, and environmental governance, and accomplishes what Cohen and Bakker (2014) term an 'eco-scalar fix'.⁶ This forecloses important political choices and collective discussions about what scales and institutional arrangements are appropriate for community and place, which social, economic, and ecological processes matter most, and who has power to set priorities for ecosystem management and restoration (See also Warner et al., 2008: 134). Watershed-centric governance can diminish the effectiveness of alternative channels of communication and social organisation, and ignore difficult questions of inclusion, rights, and responsibilities implicated in alternative scalar framings (Barham, 2001: 190).

Analysing the relationships between power and scale is particularly important for natural resource governance in indigenous territories, as scale has been a medium through which settler-colonial institutions have delegitimised indigenous communities' territorial and resource claims (Howitt, 2003; Norman, 2012; Silvern, 1999). As Silvern (1999: 639) has noted, the organisation and implementation of socio-spatial constructions such as 'Indian country', the reservation, and the allotment have "served to facilitate the power of the dominant society to control, exclude and marginalize indigenous populations". However, indigenous communities have also used scale as a medium for disentangling colonial legacies embedded in scalar frameworks for understanding and governing nature and society. Geographers and political ecologists such as Norman (2012), Silvern (1999), Howitt (2003), and Turnbull (2007), present examples of decolonial rescaling efforts, such as the organisation of the Coast Salish Aboriginal Council around the cultural geography of the Salish Sea (Norman, 2012). This challenged normative scalar structures in order to regain control over political arenas and to assert sovereignty over natural and cultural resources. According to Howitt (2003), "indigenous politics provides many examples of the harnessing of scale analysis to the purposes of social transformation – to simultaneously pursue the economic politics of redistribution, the cultural politics of recognition, and the environmental politics of sustainability". In this paper we demonstrate how the Karuk Department of Natural Resources (KDNR) is similarly engaged in decolonial rescaling efforts in relation to the watershed and alternative socio-spatial formations, in order to foreground indigenous knowledge and support tribal sovereignty.

Decentring watersheds through an ecocultural politics of scale

Decentring the watershed in relation to other scales of natural resource governance raises important questions regarding the appropriate sizes, shapes, and nesting patterns of scalar formations, and also about the processes through which these scalar formations are defined for indigenous environmental governance, and – importantly – by whom (Howitt, 2003; Norman et al., 2012). As an alternative to watershed centrism, Mollinga et al. (2007) advocate a 'problemshed' approach, whereby the boundaries of a given resource management issue are treated as an open, empirical question. Cohen and Davidson (2011) similarly advocate attention to problemsheds (the complex biophysical, economic, and socio-spatial formations pertaining to a particular problem), and 'policysheds' pertaining to scales of resource governance that are appropriate for environmental policy and decision-making.

While we agree that scale-making should occur through inclusive public deliberation in relation to pressing social and environmental justice issues, scholars such as Budds and Hinojosa (2012), McCarthy (2005), Norman et al. (2015), Sayre (2005), and Sneddon (2002) remind us that human scalar politics are always articulated in dialogue with the specific materialities of biophysical scalar formations or, in Sneddon's (2002) terms, with 'ecological constructions of scale'. We therefore need alternatives to watershed centrism that resist 'naturalisation' and the 'eco-scalar fix' but that are simultaneously responsive to the specific spatialities and temporalities of the more-than-human places we inhabit and

⁶ Cook and Bakker (2014: 132) define "eco-scalar fix" as "a process of rescaling and reorganizing governance as a strategy of (...) displacing conflicts and crises, often through the construction of (purportedly 'natural') ecological scales".

the nonhuman communities we co-inhabit them with. In indigenous lands and communities in particular, problemsheds and policysheds must be defined through indigenous-led process and grounded in indigenous knowledge and cultural values, in order to support indigenous sovereignty and self-determination.

We propose an 'ecocultural politics of scale' as a framework for making socio-spatial formations through inclusive indigenous community-led and place-based processes. Engaging indigenous knowledge and values, cultural practices, and an underlying ethic of stewardship illuminates more culturally relevant and ecologically nuanced scalar configurations for environmental governance in indigenous territories. An ecocultural approach to scalar politics considers interrelations among complex sociocultural, political-economic, and biophysical dynamics, in defining scalar formations to support the stewardship of terrestrial and aquatic habitats for cultural resources and diverse species assemblages. In an ecocultural approach to scale, water is positioned as one among many cultural and natural resources that are interconnected and managed relationally across multiple spatial and temporal scales. Similar to social-ecological systems (SES) approaches to scale-building, ecocultural scalar formations are multiscalar, nested, and adaptive to multiple disturbance regimes through iterative social learning and experimentation (see, for example, Cumming et al., 2006; Folke, 2006; Gunderson and Holling, 2002; Olsson et al., 2004). Ecocultural approaches to scale-building, however, are distinct in that they foreground indigenous knowledge in defining scalar formations and the linkages between them, highlighting the reciprocal and mutually constitutive relationships between place-based cultural practices and ecosystem processes. Ecocultural scalar approaches also aim to revitalise traditional economies of place to counter the legacies of settler-colonial and extractive resource economies, address demands for culturally appropriate local employment, and establish permanent and reliable support for Karuk ecocultural revitalisation initiatives.⁷

Multiscale approaches have been widely endorsed in the literature on adaptive ecosystem management (see, for example, Lebel et al., 2005, 2007; Swallow et al., 2002; Merrey and Cook, 2012). We argue for a relational, rather than hierarchical, approach to working across multiple scales and identifying differences and points of connection among various socio-spatial approaches (Howitt, 1998, 2002). Relational approaches to scale resist 'eco-scalar fixes' by treating scales as continually co-produced in relation to one another and to the dynamic relationships and feedbacks among diverse cultural, political-economic, and biophysical processes, across multiple spatial and temporal ranges (Howitt, 1998; McCarthy, 2005; Sayre and Di Vittorio, 2009).

An ecocultural scalar approach further emphasises scalar frameworks that are both 'adaptive' and 'responsive' to the needs of humans and nonhumans across space and time. An adaptive approach to scale builds feedback loops and opportunities for social learning and systematic experimentation with scalar formations into planning and management processes (Davidson and de Loë, 2014). An adaptive approach is attentive to the 'unknown scale' (ibid), and to different ways of framing problemsheds and policysheds in relation to the diverse concerns of human communities and dynamically shifting ecosystem conditions. A responsive approach remains ethically committed to thinking and living with nonhuman others through practices of care, generating scales in response to the habitat needs of multiple species in order to help them flourish, rather than be solely in instrumental service to human needs (see, for example, Haraway, 2012; de la Bellacasa, 2012). The following sections provide an account of the history and cultural politics of watershed-based governance in the Klamath, and the

⁷ An alternative mode of crowdsourced funding, the Endowment for Eco-Cultural Revitalization, is currently being developed by the Karuk Tribe's Department of Natural Resources (through the Humboldt Area Foundation) for the purposes of funding Karuk ecocultural revitalisation initiatives. (See www.hafoundation.org/Giving/Make-a-Gift-Today/Give-Now?fn=Endowment+for+Eco-Cultural+Revitalization+Fund for more information and/or to donate in support of Karuk ecocultural revitalisation).

emergence of two alternative scalar formations (firesheds and foodsheds) for collaborative environmental governance.

THE HISTORY AND CULTURAL POLITICS OF COLLABORATIVE WATERSHED GOVERNANCE IN THE KLAMATH

The first two waves of watershed governance overlapped with the period of settler – colonialism and resource extraction in the Klamath that occurred between about 1826 and 1986. Watershed politics played out through the negotiation of treaties, the drawing of county boundaries, and the allocation and management of water, mineral, timber, fish, and wildlife resources (Sarna-Wojcicki, 2015). These actions not only removed indigenous communities from their ancestral lands and criminalised their ability to access and manage natural and cultural resources, but also set the stage for widespread ecological degradation. Each 'wave' of resource extraction resulted in sweeping hydrologic and ecological changes, beginning with the fur-rush in the 1820s which (through beaver removal) shifted the hydrologic regimes of many rivers and floodplains in the mid and upper Klamath (CDFW, 2009). The gold rush, which began in the 1850s, introduced techniques such as bank sluicing and hydraulic mining, which entailed damming and diverting entire creeks, sluicing away river bottoms, and depositing tailings hundreds of yards from their former channels (Stumpf, 1998). As a result, many river channels in the Klamath are still separated from their floodplains, depriving salmon and steelhead trout of critical spawning and rearing habitat.

In the early decades of the 20th century, first wave watershed reclamation projects undertaken by the newly formed Bureau of Reclamation in the Upper Basin converted lake fringes, riparian areas, and wetland marshes to farms and cattle ranches through damming and diking (USFWS, 2010). In addition, seven dams were built between 1902 and 1962, in a series of hydroelectric development projects in the middle and upper stretches of the Klamath. Following the gold rush, the settler economy has been grounded in timber, agriculture, and ranching, resulting in cumulative ecosystem and water quality degradation through nutrient loading, toxic algae blooms, and an overall loss of fish passage, riparian habitat, and cold water refugia (NRC, 2004; USFWS, 2010).

A second wave of watershed governance impacted the middle stretches of the Klamath directly between 1945 and 1991, as the Klamath and Six River National Forests harvested timber to feed housing booms around the world (Gallo et al., 2005). The management of Klamath watersheds for timber production resulted in reduced biodiversity, habitat loss and fragmentation, the spread of invasive species, widespread herbicide use, fire suppression, reduced terrestrial and aquatic habitat complexity, loss of plant and animal diversity, increased rates of erosion, and reduced access to traditional foods and cultural resources for indigenous communities (Coats and Miller, 1981; KDNR, 2010). Particularly devastating to the Karuk people has been systematic fire suppression, which began in the Klamath in 1911 (Davies and Florice, 1992), and has dramatically reduced access to cultural foods and fibre resources, many of which are fire-adapted or fire-dependent (Norgaard, 2014a).

A series of resource conflicts precipitated a paradigm shift which brought the watershed into the centre of environmental debates during the third wave of watershed governance in the mid-1980s. New scientific understandings of watershed processes converged with political mobilisation from indigenous activists, hippie communes, environmentalists, and local schools. In the 1960s and 1970s, tribes began to win court cases related to water, hunting and fishing rights.⁸ This culminated in the 'fish wars' of the late-1970s, a series of clashes between traditional and commercial fishers and regulatory

⁸ For example, in *Mattz vs. Arnett*, 412 U.S. 481 (1973), the Supreme Court reaffirmed the continued existence of the Yurok land base and fishing rights, and in *Kimball (tribal members) vs. Callahan* (Oregon State Game Commission members), 493 F.2d 564 (9th Cir. 1974) (Kimball I), and *Kimball vs. Callahan*, 590 F.2d 768 (9th Cir. 1979) (Kimball II), the Ninth Circuit held that the Klamath Tribe should retain their treaty hunting, fishing, and trapping rights on the former Klamath Reservation as it existed at the time of termination (1954).

agencies related to salmon harvest regulations (Most, 2004). The 'herbicide wars' in the early-1980s pitted hippie communes, environmentalists and Tribes against the USFS over their aerial herbicide spraying operations.⁹ The herbicide wars were followed by the 'timber wars' in the 1990s, which erupted around the effects of timber production on Spotted Owl habitat. The 'timber wars' were followed in turn by the 'Klamath water wars', conflicts in the early 2000s between farmers, fishers, tribes, environmental NGOs, and hydropower dam operators over the minimum in-stream flows needed to support endangered coho salmon (Doremus and Tarlock, 2003, 2008). The Karuk Tribe's Department of Natural Resources (KDNR), local watershed councils and schools, began collecting streamflow, temperature, water quality, and fisheries data in the mid-1980s. The KDNR, founded by Karuk ceremonial leader Leaf Hillman in the late 1980s, produced some of the first detailed salmon population, habitat, and water quality studies in the Salmon and mid-Klamath basins (see, for example, KDNR, 1991, 1997; KDNR et al., 1994).

The politics of building and decommissioning roads also played a significant role in animating watershed relations in the Klamath region during the third wave, raising questions around the local concentration of cultural, economic, and environmental burdens of USFS management of watersheds for timber. In the Gasquet-Orleans (G-O) road controversy (1978-1987), the USFS attempted to build a logging road through an intertribal sacred site. The US Supreme Court ruled in favour of the USFS,¹⁰ but Congress ended up halting the road by passing the California Wilderness Act and creating the Smith River Recreation Area (Bowers and Carpenter, 2011). This was followed by a standoff over a timber sale and road-building project on Offield Mountain (1977-1984), in which Karuk tribal members blockaded roads, successfully stopping the timber sale from desecrating sacred sites and trails (Sutton, 1984). Some of the first watershed restoration collaborations between the USFS and the Karuk Department of Natural Resources were through decommissioning roads and re-sloping drainages in Karuk Aboriginal Territory (KDNR, 2006). The process of decommissioning roads has since become an important component of decolonisation in mitigating adverse hydrogeomorphic and water quality impacts, restoring fisheries habitats, and employing tribal members in watershed restoration (Karuk Tribe, 2001).

From this mangle of cultural politics and resource conflicts related to roads built through sacred sites, as well as from activism around herbicide spraying and regulatory conflicts around fisheries, the watershed emerged as a primary unit of conflict resolution across multiple natural resource management arenas. It also became a unit for organising integrated water resources management and for collaborative ecosystem restoration in the Klamath from the mid-1980s through the first decade of the 21st century. This section focuses on three particular regulatory processes that constitute episodes in the third, 'collaborative', wave of watershed governance in the Klamath Basin: the Klamath Fisheries Task Force, the Northwest Forest Plan, and the Federal Energy Regulatory Commission's dam relicensing process. We demonstrate how members of the Karuk Tribe have leveraged and challenged the epistemology, ontology, and political spatiality of the watershed to push for ecocultural revitalisation in Karuk Aboriginal Territory. These examples demonstrate how the watershed is deployed as a socio-spatial unit by different federal agencies to resolve resource conflicts in relation to three different resource management issues – fisheries, forest management, and dam relicensing. In each example, we demonstrate how the watershed is a scalar mismatch, as Karuk representatives critique and leverage the watershed scalar framing in relation to other scales and socio-spatial formations to accomplish ecocultural revitalisation in Karuk Aboriginal Territory.

⁹ *Salmon River Concerned Citizens et al. vs. Robertson*, 798 F. Supp. 1434, 1442 (E.Dist.Cal.1992).

¹⁰ *Lyng vs. Northwest Indian Cemetery Protective Association* 485 U.S. 439 (1988).

Klamath Fisheries Task Force: Watersheds and scales of sovereignty

In response to diminishing salmon populations, Congress passed the 1986 *Klamath River Basin Fishery Resources Restoration Act*, which chartered the first collaborative watershed management forum in the Klamath Basin by creating an interagency management council and a 'task force' advisory body made up of tribal representatives, fishermen, county governments, and local environmental groups.¹¹ Congress charged the task force with developing basin-wide restoration plans, and appropriated US\$40 million over 20 years for watershed restoration initiatives. The Karuk Tribe was left out of both the management council and the task force. Tribal officials petitioned Congress for an amendment and, in 1988, a seat was added for a Karuk representative on the 14-member Klamath River Basin Fisheries Task Force (KRBFTF).

The division of the Klamath River Basin into management units based on sub-basin catchments brought up issues regarding scale and sovereignty in some of the very first KRBFTF meetings. Though the task force agreed generally on a watershed-based approach to restoration in their 'long term plan', the Karuk representative, Leaf Hillman, objected to a table that displayed agency jurisdiction over specific sub-basin watersheds. He remarked, "This Plan is not the proper forum to discuss jurisdictional issues, nor should the author interpret who has jurisdiction" (KRBFTF, 1990a: 23). Hillman argued "there is not only overlapping jurisdiction, there is *unresolved* jurisdiction. It is so complex and interpretable in so many ways" (ibid: 24). In their long-range plan, rather than simply mapping out jurisdiction over drainage basins, the task force included a disclaimer protecting tribal sovereignty within task force proceedings (KRBFTF, 1990b: 7.13-7.25).

Overall, the task force instituted a new way in which knowledge production and ecosystem restoration were organised in the Klamath. Restoration planning, monitoring, and community-building activities were operationalised around watershed and sub-basin boundaries (KRBFTF, 1990b). For the first time, tribal representatives, government officials, ranchers, loggers, and fishermen from around the basin exchanged viewpoints, pooled knowledge, and collectively deliberated water and fisheries management issues. However, scales of sovereignty did not align neatly with watershed boundaries, meaning that the jurisdictional boundaries of government entities (both tribal and non-tribal) and spatial relations of power and authority were not contiguous with drainage basin formations. The process of deciding how to bound, manage, and restore Klamath watersheds brought up complex issues regarding the power to govern territory and natural resources. Task force recommendations, as voiced in the long-range plan and mid-term evaluation, were not binding (KRBFTF, 1990b, 2002). Though the task force charted a significant departure from top-down and 'expert-driven' modes of resource governance, the management council and the federal and state agencies ultimately still retained power and control of decision-making processes. However, those processes had been opened up by Karuk representatives who had, up until that point, not been able to participate in agency-led proceedings.

Northwest Forest Plan: Asymmetries between watersheds and the spotted owl 'problemshed'

In 1991, the Ninth Circuit US Court of Appeals ruled that the USFS did not sufficiently support the northern spotted owl populations and their habitat, which effectively shut down logging on federal lands across the entire Pacific Northwest.¹² The Northwest Forest Plan (NWFP) was developed in response, and released by the USFS in 1994. Through the NWFP, the watershed became the cornerstone for USFS's adaptive ecosystem restoration process, guiding baseline research, management, and monitoring in national forests (Reid et al., 1994). Interagency 'watershed analysis' became a required step in federal land management planning.

¹¹ 1986 *Klamath River Basin Fishery Resources Restoration Act* (16 USC sec 460ss, Oct 27, 1986, amended 1988).

¹² Ninth Circuit US Court of Appeals - 952 F.2d 297 (9th Cir. 1991).

Fifteen watersheds were selected for pilot analysis, and federal lands were divided into 'key watersheds' and 'non-key watersheds' based on their strategic importance to the restoration of spotted owl populations. The Salmon River, a major tributary of the Klamath River within Karuk Aboriginal Territory, was identified as a 'critical watershed' in the NWFP, and the Salmon River Watershed Assessment (WA) process was initiated. The Karuk Tribe was invited to participate in this planning process and immediately raised objections about the propriety of having agency archaeologists drafting the cultural resources section of the WA. USFS budgets were being driven by NWFP implementation, and therefore included a budget line item for WA development. The Karuk Tribe took the position that, since an estimated 85 percent of the cultural resources sites were deemed prehistoric and therefore inherently indigenous, the Tribe should receive 85 percent of the funds allocated within the USFS budget for developing this section of the WA. Following an extensive negotiating process, an agreement was reached, and a portion of the funding was reallocated to allow for the development of a Karuk Tribal Module within the WA. This module provided the Tribe with the first opportunity to meaningfully participate in USFS planning processes (KDNR, 1996: I-2).

The "Karuk Tribal Module for the Main Stem Salmon River Watershed Analysis" (referred to henceforth as 'Tribal Module') critiques the USFS draft WA, specifically its use of the watershed to conceptualise sociocultural and ecological processes. It counters the USFS's portrayal of the Salmon River watershed by outlining the key features of an 'indigenous reference ecosystem', "an eco-cultural model describing some of the ways in which cultural practices shaped ecological relationships in the pre-Euro-American landscape" (KDNR, 1996: I-3). This indigenous reference ecosystem details the distribution of plants and animals across the landscape and water bodies of the Salmon watershed, as well as the cultural practices that "maintained and in turn were sustained" by those plant and animal communities (ibid: III-8). The Tribal Module also compares and contrasts the Karuk indigenous reference ecosystem with the "conceptually reconstructed (pre)historic Forest presented in the USFS WA" and "outline(s) management directions for implementation of eco-cultural restoration based on the Karuk reference ecosystem as a model for ecosystem management" (KDNR, 1995: III-13).

The Tribal Module pivots on the difference between Karuk and USFS conceptualisations of the watershed to launch a broader epistemological critique of western technoscientific approaches to watershed-based management. The Tribal Module maintains that the Salmon watershed is itself the product of a "historically-specific, culturally patterned relationship between land and people" (KDNR, 1996: III-3) and demonstrates how biophysical processes such as forest stand dynamics, habitat conditions, and species distributions have been affected by tribal management across the entire watershed, providing detailed descriptions of intentional burning and cultural resource management across a range of habitat types. Significantly, for the first time this introduced indigenous knowledge and fire ecology into the federal watershed analysis and forest management focus.

Importantly, the Tribal Module also argues for restoring Karuk people as stewards of their ancestral watersheds (KDNR, 1996: III-4). The module emphasises the importance of including tribal representatives and indigenous knowledge in planning and restoration processes, and lays out a Karuk watershed stewardship ethic, which positions plants and animals as "co-creators with humans in both the maintenance of ecosystem function and through spiritual ceremonies of world renewal" (ibid: III-18). As the Karuk Tribe's Pikyav Field Institute Program Manager Lisa Hillman further states:

We recognise the inability to provide 'technical' answers to forest management questions as they pertain to system approaches. These do not include the sacred or connection to place, which are intrinsic to our sensibilities and value systems. By only regarding that what you can measure, one fails to acknowledge the multi-levelled complexity of natural systems (Hillman, 2017).

How the watershed can or should be known was contested through the Tribal Module. Implied was also a political manoeuvre positioning the Karuk tribal community as rightful sovereign stewards with a responsibility to revitalise and manage the watersheds of their ancestral territory. While the USFS

assumed that the watershed could integrate multiple ecological and hydrologic sciences as well as indigenous knowledges, the KDNR did not agree with the USFS approach to understanding and managing watersheds without incorporating indigenous value systems and cosmologies (see also Diver, 2016). Importantly, Karuk representatives questioned whether the watershed scale provides the right 'problemshed' for protecting and enhancing spotted owl populations. According to the deputy director of KDNR, Bill Tripp, the watershed-centric approach of the USFS to managing spotted owl populations ignores important ecological dynamics taking place in the understory and across drainage divides:

You can't manage for the Spotted Owl at the watershed scale. You need to achieve a multilayer canopy with a large tree component – in places that make sense for thermal cover, foraging dynamics, and dispersal habitat connectivity. The focus for this species has to be on their dispersal corridors and ability to find prey, while recognizing that there has to be enough nesting and roosting space for new breeding pairs to occupy in areas that will not be completely consumed by stand replacing fire. Wildlife Biologists are finding that the dispersal range for males can be up to 15 miles (~24 km) and for females up to 10 miles (~16 km). So watershed boundaries are just too small to capture the entirety of their range (Tripp, 2017).

Tripp points out that management perimeters specific to one species may be very different from or overlap with those of other species:

The Pacific Fisher and Spotted Owl share many of the same habitat features, but the range of the Pacific Fisher is about 25 square miles (~65 square kilometres). This is a scale size more conducive of analyses in regard to a lot of species. I don't believe it to be a coincidence that the Pacific Fisher is represented in our ceremonies, not the Spotted Owl. The Pacific Fisher needs a more dynamic setting. This setting correlates with the patch dynamics needed for proliferation of the Spotted Owl, as well as the cultural resources of the Karuk People through supply of a wide range of traditional food, fiber, and medicinal resources (ibid).

Tripp further critiqued the spotted owl management zoning impact on tribal sovereignty and cultural practices:

The Spotted Owl critical habitat designations and management plans diminishes Tribal ability to perform cultural burns at certain times of year. It diminishes our ability to formulate effective management solutions that are place-based and consistent with our cultural responsibility. (Tripp, 2014: 13)

This quote shows how ecocultural revitalisation requires engagement with scales other than the watershed, and emphasises the necessity of considering place-based indigenous cultural knowledge, values, and practices when designing appropriate spatial units of ecosystem repair, and doing so in a way that supports tribal sovereignty and self-determination. In summary, the watershed scale presented a 'spatial mismatch' for designing a 'problemshed' suitable for recovering Spotted Owl populations and rehabilitating their habitat, as well as for facilitating eco-cultural revitalization in Karuk Aboriginal Territory.

Dam-relicensing and the cultural riverscape

After decades of water-related conflict, the so-called 'Klamath Water Wars' flared up in 2001 when irrigation deliveries to Upper Basin farmers and ranchers were curtailed to deliver minimum in-stream flows needed to support habitat for culturally significant and federally listed coho salmon and two species of Endangered sucker species in the upper basin – the Lost River sucker (*Deltistes luxatus*) and shortnose sucker (*Chasmistes brevirostris*). The curtailment occurred during a drought, prompting farmers in the Upper Basin to organise protests and a 'bucket brigade' (Chaffin et al., 2014; Doremus and Tarlock, 2003, 2008). The following year, a massive fish die-off resulted from a combination of

lowered dam release flows, low rainfall, and an outbreak of an algae-related fish pathogen caused by anoxic conditions conducive to the rapid spread of disease. According to the US Fish and Wildlife Service's estimate, around 34,000 carcasses¹³ lined the banks of the Klamath, costing the Klamath fishers an estimated US\$82 million (CDFW, 2004; USFWS, 2003). The fish kills coincided with numerous social, political, and legal-regulatory factors that converged around the same time that the licenses of the Klamath dams came up for renewal.

In 2004, dam owners PacifiCorp applied to the Federal Energy Regulatory Commission (FERC) to renew the licenses of their hydroelectric facilities on the Klamath, which were set to expire in 2006. Frustrated with the outcomes of court cases and regulatory hearings, Karuk tribal members organised grassroots measures to block the dam relicensing. For example, tribal members travelled to the shareholder meetings of companies that owned the Klamath dams – Scottish Power in Scotland, and Berkshire Hathaway in Nebraska (BBC, 2004; Karuk Tribe, 2008). They picketed outside shareholder meetings and cooked salmon in traditional pits for shareholders (Reed and Norgaard, 2010). The FERC relicensing process also coincided with the 'Chadwick talks', a series of conflict resolution discussions that helped build trust among diverse stakeholders and provided momentum for deeper conversations about the underlying dynamics of resource conflict that continued through the FERC negotiations (Chaffin et al., 2014).

As part of the environmental impact statement for dam relicensing, the Klamath River Inter-Tribal Fish and Water Commission submitted a document titled *First Salmon: The Klamath Cultural Riverscape and the Klamath River Hydroelectric Project* on behalf of the Yurok, Karuk, Hoopa, and Shasta Tribes (King, 2004; Salter, 2003). The document elaborated a new scalar formation by framing the river as a 'cultural riverscape', an integrated cultural landscape and waterscape that includes "villages, hunting, gathering, fishing, and spiritual locations on terraces and benches along the river, as well as the river itself and its natural resources" (USDol, 2011: 3.13-37). It lays out a wealth of ethnographic material and interviews with elders to illustrate cultural relationships with the river and to demonstrate that the "Klamath river is a deeply significant cultural resource whose health is critical to the lives and cultures of the Klamath tribes" (King, 2004: 2).

In addition to drawing the focus of the dam-removal analysis upslope from the river corridor to include cultural management practices in the floodplains, river terraces, riparian areas, and bottomland forest ecosystems, framing the Klamath as a cultural riverscape makes the claim that the Klamath watershed is more than a biophysical unit and must be analysed in the context of the historical relationships between people and place. Reframing the Klamath watershed as a cultural riverscape also makes the case that the watershed is itself a 'traditional cultural property' and thus eligible for nomination to the National Register of Historic Places, requiring FERC to consider impacts of its dam operations on indigenous people's relation to the river. The report details cumulative adverse damage caused by the hydroelectric project, such as alterations in water quality, flow regimes, and temperature, and associated impacts to fish, plant life, habitat, and cultural uses of the river corridor. Citing a trove of ethnographic, hydrologic, and water quality data, the report claims that "the effects of the dams damage tribal use of and relationships to the riverscape and diminish its cultural integrity" (ibid: 4).

The cultural riverscape report, combined with lawsuits citing infringements upon the *Endangered Species Act*¹⁴ and protests at the hydropower company's shareholder meetings, put significant public and legal pressure on PacifiCorp to reconsider its application to relicense dam operations. A significant factor was the requirement of expensive "mandatory fishway prescriptions" on the four lower dams

¹³ This is considered in many accounts to be an underestimate of the actual number of carcasses, and in some accounts to be barely even half. See, for example, Pedery, 2007.

¹⁴ Endangered Species Act of 1973 (ESA; 16 U.S.C. § 1531 et seq.)

(Chaffin and Gosnell, 2017: 829). After exhausting all legal appeals, FERC opted to support PacifiCorp's decision that it would actually be cheaper and in the ratepayers' best interests to take down the Klamath dams rather than remodel them to comply with the fishway prescriptions (Chaffin and Gosnell, 2017; Gosnell and Kelly, 2010; Tucker, 2010). In 2010, the governors of California and Oregon, numerous federal and state agencies, tribes, and environmental groups signed the Klamath Hydroelectric Settlement, which proposed to decommission four of the dams on the Klamath (Allen, 2010). Legislation was introduced in the US Senate in December 2014,¹⁵ but it fell through in 2015, and a new agreement was signed in April, 2016. Unlike the 2010 version, the 2016 agreement does not require congressional action or additional funding in order to be carried to completion. In addition, unlike its predecessor, the new agreement is not accompanied by a basin-wide watershed restoration and economic development program. If completed, it would represent the largest dam removal to date in the United States (ibid).

This episode demonstrates how tribal members and representatives created and organised around an alternative scalar framework, the cultural riverscape, to reframe the Klamath River corridor in a way that incorporates indigenous knowledge and values beyond exclusively biophysical or economic concerns, and to enact policy and collective action around dam removal and ecosystem recovery at the basin-wide scale. The cultural riverscape is still intimately tied to water and its movements through the drainage system, but includes riparian and upslope cultural practices beyond a narrow focus on the river channel.

Karuk critiques of watershed centrism

Karuk representatives and tribal members actively fought to gain access to collaborative watershed forums and to influence federal and state agency – sponsored knowledge production and management policy. Experiments in collaborative watershed management provoked debates about what constitutes credible knowledge, how to bound watersheds and sub-basin boundaries, who has the authority to represent the social, economic, and ecological values of watersheds, and how to distribute the benefits of watershed restoration projects. Our Karuk colleagues' critiques of watershed-centric governance demonstrated the ways in which the watershed scale can itself occlude tribal perspectives on important social and biophysical dynamics for managing water and water quality, rehabilitating ecosystems, revitalising cultural practices, and facilitating tribal self-governance, thus reinforcing colonial and expert-driven modes of resource governance.

Watersheds were critiqued by Karuk representatives and tribal members for not registering the spatial and temporal dynamics of fire, wildlife habitats, or soil-vegetation associations. From a sociocultural perspective, watershed-based science and policy often excluded as irrelevant the spiritual and cultural dimensions of Karuk worldviews. Collaborative watershed management forums were critiqued for discounting issues that the Karuk community considered central to watershed restoration, such as youth empowerment, local jobs, protection of sacred sites, and healing of intergenerational trauma. Watersheds, in effect, were seen as imposed by outside experts, rather than composed by the local indigenous community. As cultural biologist Ron Reed (2012) put it:

You can't just drop management zones down on us. It has to be about what's important to us in each place, based on ancestral management areas. You need to understand the landscape and the history that ties it into where we're at now.

As the quote above demonstrates, uncritically applying watershed boundaries overlooks the cultural context and historical connections between the Karuk community and place-based ceremonial sites and

¹⁵ *Klamath Basin Water Recovery and Economic Restoration Act of 2014* (S.R. 2379).

ancestral cultural management areas connected to families across generations, as well as the cultural practices of maintaining these places and the human and non-human relationships they support. Karuk Deputy Director of Eco-Cultural Revitalization Bill Tripp sums the many reasons why watersheds do not provide an appropriate scale for Karuk eco-cultural revitalization:

Tribal issues are not well captured at the watershed scale. It misses ecological and social dynamics that are important to us and it limits the management perspective. You have to look both smaller, within watersheds, as well as at connectivity across the landscape. You have to look at the diversity dynamics within a watershed and the key cultural values inside and across these drainages, at understory dynamics, different elevation bands and variation within a band. Including other scales will allow you to look at multiple cultural and ecological processes and better address all our needs related to fire, food security and local economic capacity – it's all tied together (Tripp, 2017).

Furthermore, as Tripp has stated, this scalar formation has implications for tribal sovereignty and self-determination:

We need new scales of management that are symbiotic with the tribal perspective. We need to make practices applicable across our whole territory, not just confined to particular watersheds. The scale of management is also a political scale; it's all about sovereignty (ibid).

If not the watershed, what are more appropriate scalar frameworks for approaching eco-cultural revitalization in Karuk country, and how is the watershed positioned in relation to them? The next section describes how Karuk scientists and representatives translate indigenous socio-spatial perspectives into management units through two interrelated multiscale frameworks – firesheds and foodsheds – as both alternatives and complements to the watershed.

DECENTRING THE WATERSHED: FIRESHEDS AND FOODSHEDS

Firesheds: Democratising scale

Community mobilisation around fire issues over the last decade has opened up a new bioregional scale of collective action, and new institutional configurations that are coalescing around firesheds, defined according to the way that fire moves and is managed across the landscape, rather than according to flows of water through drainages. For Karuk tribal members, whose origin stories and knowledge systems centre fire as medicine, fire has always been integral to ecosystem stewardship as the Tribe's most powerful management tool. As mentioned earlier, the long history of fire suppression and criminalisation of indigenous cultural burning has made the prescriptive use of fire to manage cultural resources and habitats difficult. Collaboration in fire management has required a new scale of management and collective action, as a watershed-centric gaze does not respond well to the way fire spreads across landscapes (see, for example, Taylor and Skinner, 2003). However, fire does intersect with watershed dynamics in important ways, influencing vegetation composition and evapotranspiration, stream discharge, sediment and nutrient fluxes, as well as water temperature, water quality, and aquatic habitat conditions (Bixby et al., 2015; Gresswell, 1999; Rieman et al., 2012).

Following an expensive fire season in 1999-2000, the National Fire Plan instructed federal agencies to work with community groups to manage fire along the Wildland-Urban Interface (WUI). The *Healthy Forests Restoration Act*¹⁶ then incentivized the development of Community Wildfire Protection Plans (Communities Committee, 2004). In Karuk Aboriginal Territory, the Orleans/Somes Bar Fire Safe Council was established in 2001, and a Community Wildfire Protection Plan was developed in 2009 to

¹⁶ Healthy Forests Restoration Act of 2003 (P.L. 108-148).

strategically treat fuels and manage fire around the communities of Somes Bar and Orleans (OSBFSC, 2009). The Salmon River Fire Safe Council was started in December 2000, and a Community Wildfire Protection Plan was finalised for the Salmon River in 2007 (SRFSC, 2007). Around the same time, the USFS began advocating 'Stewardship and Fireshed Assessment (SFA)', an interdisciplinary, collaborative approach to designing and implementing fuels treatments to achieve multiple ecological and social goals (Bahro et al., 2007). SFA advocated ways of delineating firesheds to frame fuels assessments with multiple stakeholders, and to implement and monitor fuels treatments across large landscapes. SFAs defined firesheds according to fire-spread dynamics based on fuels, topography, and ecosystem conditions, as well as management goals and community values (ibid: 48-49).

Locally, around 2007, a number of scientists, administrators, and technical specialists from NGOs, as well as federal, tribal, and state environmental agencies, and local stakeholders began meeting informally to tackle local fire issues. They termed their efforts 'the Upslope Working Group' to deliberately rescale their focus away from 'in-stream' issues such as water quality and salmon habitat, and focus instead on contested issues related to wildland fire management in the 'upslope' reaches of local watersheds (WKRK, 2014). The Upslope Working Group eventually became the 'Western Klamath Restoration Partnership' (WKRK) in 2013, with funding to support a social learning process facilitated by the Nature Conservancy's 'Fire Learning Network'. The WKRK brought together a diverse group of KDNR, federal, and local agency representatives, scientists, local residents, and environmental advocates to identify mutual 'Zones of Agreement' – or areas where they believed "fuels treatments and upslope restoration could and should occur" (WKRK, 2014). The process through which the group defined firesheds and focal areas for their pilot projects provides a good example of 'democratising scale': a process for inclusive deliberation about the appropriate scalar formation for identifying and addressing community natural resource management issues, that doesn't marginalise indigenous knowledge or sovereignty. Though providing an open and inclusive setting for diverse stakeholders to participate, the Partnership positions the Tribe as a central leader and decision-maker both in the definition of fire management boundaries and in the planning and implementation of collaborative fire management initiatives.

In particular, the Partnership's boundary 'scoping exercise', through which participants articulated a geographic and thematic 'scope' to align their collective vision around the group's fire management and ecosystem restoration goals, is a good example of an inclusive and deliberative approach to scale-making that foregrounds Karuk indigenous knowledge and cultural values. Through a participatory mapping exercise, different visions for where the project boundaries should fall were discussed among subgroups, with some proposals calling for boundaries at drainage divides or river channels, some for scopes around recent fire footprints or certain plant communities, and others for boundaries around forest districts or neighbourhoods (WKRK, 2013). After extensive discussions about the pros and cons of different boundaries, a 'working group' combined the different ideas for proposed boundaries and eventually settled on a final scope for the WKRK that incorporated administrative and private property boundaries, access and egress routes, and community infrastructure, as well as topographical, fuels, watershed, and wildlife habitat features (WKRK, 2014). The resulting firesheds attempt to accommodate multiple forms of knowledge, resource values, livelihood practices, and restoration priorities into a collectively composed view of fire management dynamics at a landscape scale.

Firesheds were defined as areas where fires, both controlled and wild, can be confined and safely managed (WKRK, 2014). Within each community, the working group delineated firesheds based on a range of factors including local fire history, topographical features such as ridgelines and river channels, wildlife habitat, community wildfire protection needs, Karuk cultural resources, and the restoration vision and values of the WKRK. The working group also ran a series of GIS and FlamMap exercises to help delineate firesheds by modelling features that influence fire dynamics, such as spread rates, intensity, and flame length at different moisture levels. The working group awarded points to areas based on a 'prioritisation matrix' – a ranking scheme that targeted the most strategic areas for fuels

treatment by giving 'points' to areas for different objectives such as fire management, protection of lives and homes, wildlife habitat enhancement, and cultural resources management. For example, points were awarded to areas based on the distribution of Karuk cultural resources such as elk winter range habitat, hazel (*Corylus cornuta* ssp. *Californica*), bear grass (*Xerophyllum tenax*) and huckleberry (*Vaccinium ovatum*).

The boundary scoping exercise was a good first step towards bringing together diverse perspectives and priorities through a community-based scalar framework. As opposed to an externally imposed watershed boundary, the fireshed was defined through an inclusive deliberative process that prioritised Karuk knowledge and sovereignty. The delineation of firesheds elucidates strategic cross-scale linkages across jurisdictional boundaries, focusing collective place-based vision and action around social, cultural, and biophysical dynamics that intersect with, but are not confined by, watershed boundaries. Firesheds broaden the focus of watershed-centric governance to include upslope areas of local watersheds, which contain some of the most politicised and gridlocked issues for watershed management in the region. In rescaling from watersheds to firesheds, Karuk tribal members active in the WKRP have been able to co-create scalar frameworks with multiple state and federal agencies, NGOs, and community members – frameworks that are inclusive of cultural values and principles of cultural resource stewardship.

Foodsheds: Decolonising scale

In 2012, the Karuk, Yurok, and Klamath Tribes, and UC Berkeley researchers initiated a food security initiative to increase access to food among indigenous communities in the Klamath Basin (Sowerwine, 2012). We argue that community mobilisations around food sovereignty have inspired decolonial socio-spatial formations that attempt to reconnect people to place through indigenous foodways. As a newspaper article on the initiative remarked, the Klamath Basin Tribal Food Security initiative aims to 'decolonise diet' in the Klamath by revitalising indigenous foodways and non-agrarian cultural agroecosystems (Klamath Riverkeeper News, 2013). Other scholars have remarked that food is an optimal site for initiating the process of decolonisation, as food connects our bodies, families, social relations, culinary traditions, and cultural practices to relationships with the nonhuman ecosystems and waterscapes that support our food systems (Esquibel and Calvo, 2013; Salmón, 2012).

The related concepts of 'foodsheds' and 'cultural foodscapes' are emerging from conversations between KDNR, the Mid-Klamath Watershed Council, and other tribal organisations, to conceptualise the spatiality and seasonality of local food resources and the ways they are managed, accessed, processed, distributed, and consumed. Foodsheds strategically visualise patterns of 'food flows' and historic, contemporary, and desired conditions of access to food resources (Kloppenburger et al., 1996; Peters, 2009). Foodsheds, as they are being brought to life by the local community, reside at the intersection of variously scaled biophysical and social processes related to the production, distribution, and consumption of both cultural and conventional foods.¹⁷ Foodscapes evoke the connections between culture, food, and place (Miewald and McCann, 2014) and describe where a particular family, community or neighbourhood's food is sourced, the moral, ethical, and social values attached to cultural foodways, and the spatial extents and timing of the practices through which a particular food resource, such as a tanoak orchard or elk meadow, is managed. Together, foodsheds and cultural foodscapes attempt to 'decolonise scale' by reorienting the spatiality of Klamath resource management away from a focus on export-oriented timber, ranching, and agriculture, and towards a scalar orientation based on the revitalisation of indigenous foodways, cultural agroecosystem management, and stewardship of traditional foods throughout the Klamath.

¹⁷ See, for example, MKWC Community Foodsheds Program, *Mid Klamath Watershed Council*, www.mkwc.org/programs/foodsheds/about-foodsheds-program/

The ability to hunt, harvest, or fish at a particular location depends on the spatial and temporal characteristics of each food resource, as well as the many-layered sets of institutions and social relations that condition access to cultural foods at a particular place and time. Cultural foods such as tanoak acorns (*Notholithocarpus densiflorus*), matsutake mushrooms (*Tricholoma matsutake*), Chinook salmon (*Oncorhynchus tshawytscha*), Pacific lamprey (*Entosphenus tridentatus*), and Roosevelt elk (*Cervus elaphus roosevelti*), all have distinct habitat requirements and life cycles that require differently scaled stewardship practices. Food sources are linked to site characteristics such as slope, aspect, elevation, soil type, precipitation, and temperature, or to particular stream conditions related to flow regime, water quality, stream temperature, and geomorphology. Each resource is surrounded by a meshwork of institutions that regulate access, management, and harvest based upon various sources of legitimacy, from statutory charges, implementation regulations, and court rulings, to cultural practices and ceremonies. To protect cultural knowledge about the location of traditional foods and harvest practices, thinking about foodsheds and foodscapes has also entailed discussions about 'knowledge sovereignty' and strategies for protecting culturally sensitive and spatially explicit information (Norgaard, 2014b).

Foodsheds and foodscapes lay down a different kind of spatial fabric than does the watershed for grounding the formation of political collectives in the Klamath. Foodsheds and foodscapes are patterned around collectively identified social and ecological dynamics of interest, and are framed in dialogue with the seasonal habitat needs of multiple plant, animal, fish, and fungi species. This reveals a scalar perspective that is relational, seasonally adaptive, and defined by the community, based on social, cultural, and ecological values particular to place. However, rather than a separate and discrete scalar formation, foodsheds are intimately intertwined with both watersheds and firesheds, and are designed to guide the management of both water and fire to restore cultural agroecosystems and support tribal sovereignty in the Klamath. Foodsheds and cultural foodscapes directly confront the colonial histories and legacies that shape the food system at multiple scales, while defining the spatial and temporal dimensions of cultural agroecosystems and the management units required to steward them throughout the seasons.

CONCLUSION: TOWARDS AN ECOCULTURAL POLITICS OF SCALE

In addition to watersheds, firesheds, and foodsheds, there are myriad other scales and complex socio-spatial and temporal dynamics implicated in Karuk ecocultural revitalisation efforts. These include, for example, airsheds and air management districts, transportation routes, sacred sites and trail networks, cultural management areas in national forests, traditional cultural properties and places listed in the National Register of Historic Places. Other scales relate to the biophysical dynamics and regulatory policies shaping access to, and management of, hunting, fishing, and gathering sites, or to the social networks of relations that connect people to place, across and beyond Karuk Aboriginal Territory. Karuk representatives work across this tapestry of biophysical, sociocultural, jurisdictional, and political-economic scalar formations to support tribal sovereignty and decolonisation. Conceptualising this relational mosaic of intersecting scales that are woven together across the communities and habitats of Karuk Aboriginal Territory requires multiple ways of making scales and forging connections between them, through processes grounded in Karuk knowledge and led by Karuk people. Bill Tripp (2017) elaborates on the links between cultural and ceremonial practices, sacred sites, historical Karuk landscape management, and relevant scales for Karuk ecocultural revitalisation:

We need to define the boundaries of collaboration based on cultural and ecological boundaries, not administrative boundaries. We need a scale framework that is conducive to habitat mosaics. For us, nature in a range of particular conditions, within a dynamic setting is a cultural resource. The forest – its composition, diversity and dynamics – is a cultural artefact. Sacred sites connect and relate to one

another. They form a bridge to areas important for resource utilization by people of place. You need the management unit to reflect this.

An ecocultural approach to scale offers a framework for making scale through indigenous-led and place-based processes, in ways that support Karuk sovereignty and ecocultural revitalisation in Karuk Aboriginal Territory and beyond. An ecocultural scalar approach remains attentive to complex habitat mosaics that support multiple cultural resources while addressing needs related to decolonisation, sovereignty, and self-determination, cultural stewardship practices, and culturally appropriate education and training.

Through resituating watersheds within a multiscale framework and defining them in relation to other scales such as fireheds and foodsheds, watersheds were 'decentred' by our Karuk community partners. Decentring watersheds does not require abandoning the watershed as a unit of knowledge generation, decision-making, or collective action in environmental governance, for it remains valuable in its ability to bring communities of water users together around a hydrologically meaningful scale and to link upslope land use and terrestrial ecosystem dynamics with in-stream water quality conditions. Decentring watersheds rather allows the Karuk community to decide when and where watershed management is appropriate and to define watersheds in relation to other scales and socio-spatial formations that are grounded in place-based indigenous knowledge and values.

We emphasise the importance of collective deliberative inquiry – such as the fireshed scoping exercise mentioned earlier – to define appropriate scalar framings for resource governance in indigenous lands and communities. In order to accommodate diverse ways of knowing and valuing nature, collaborative environmental governance must also be able to find common ground among the different scales through which people produce knowledge, bound space and time, and act collectively to manage natural and cultural resources. However, to avoid treating indigenous representatives merely as additional stakeholders in a collaborative process, an ecocultural approach to making scales emphasises indigenous-led experimentation and dialogue, and foregrounds indigenous knowledge and cultural values in defining spatial and temporal boundaries, while also ensuring that appropriate protections are in place to guard potentially sensitive and spatially explicit cultural information (Norgaard, 2014b).

An ecocultural scalar approach to ecosystem rehabilitation in indigenous territories works to decolonise scale in order to address legacies and contemporary manifestations of colonialism, revitalise traditional place-based economies, ensure appropriate inclusion of indigenous knowledges, and support tribal sovereignty. We have demonstrated how cultural foodscapes and riverscapes attempt to decolonise scale by spatially reorienting the management of water, forests, and food around the revitalisation of indigenous foodways and cultural agroecosystems. Ecocultural scalar formations aim to facilitate decolonisation at multiple scales of intertwined sociocultural, political-economic, and biophysical processes, while supporting Karuk sovereignty over members and territory. Ultimately, indigenous knowledge and values must be foregrounded, and indigenous representatives should control processes for building scalar frameworks to guide collaborative environmental governance and ecosystem repair in indigenous territories.

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