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MISMATCHED PROPERTY RIGHTS

Biodiversity Loss, Viewed Through the Lens of Mismatched Property Rights

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Property theory is undergoing a revolution. For decades, theorists have envisioned rights as bilateral, focusing on intersections between directly adjacent landowners, or landowners and government actors. This over-simplified, two-dimensional model of property rights has resulted in laws that facilitate epic socio-ecological imbalances. In this paper, we apply the emergent theory of mismatched property rights to the problem of biodiversity loss. We observe that wildlife habitat for a single species can consist of tens of thousands of acres. Land parceling systems artificially divide wildlife habitat, fragmenting ownership of landscape-level resources. Managing large-scale habitats requires coordinating the interests of many property owners, often with divergent views on habitat management. Public lands' landscape scale avoids this feature, but, nevertheless, still have competing resource users seeking to maximize allocation of natural resources rights. Wildlife habitat provides a particularly challenging variation on the theme of mismatched property rights. In this context, a primary stakeholder—wildlife—does not own property. We suggest that stakeholder collaborations are one understudied tool that functionally reincorporates wildlife resource uses into the existing property regime. Collaborations serve to re-scale resources so that they can be efficiently managed at their natural scale. Stakeholder collaborations cross administrative and property boundaries to create landscape-level management plans, which accommodates overlapping rights within differing boundaries. In this way, stakeholder collaborations appear to be playing a crucial, under-appreciated role in stemming biodiversity loss.

Keywords: Property Rights; Wildlife; Biodiversity; Stakeholders; Collaboration

1. Introduction

Wildlife is the great paradox of American land use policy. Everyone loves eagles soaring above forests and wild horse running across the prairie. Yet, few appreciate the deer in their garden or the mosquito on their arm. We at once idealize wildlife and yet refuse to incur the costs of the millions of incremental choices affecting biodiversity and species preservation. As a result, biodiversity loss is occurring at a breath-taking rate.

Conventional wisdom holds that land development is a key contributor to biodiversity loss. The narrative is this: land development leads to habitat loss, which in turn leads to biodiversity loss. This paper provides a different take on the problem. We suggest that land development is not *per se* the problem, but rather that it is one example of the broader issue of competing resource uses among humans and wildlife. From a resource-use perspective, fisherman fishing, foresters cutting down trees, and livestock eating forage each diminish the associate resources of food and shelter for wildlife—just as land development removes habitat.

In a state of nature, human and (other) animals share air, space, water, food, and shelter. In conditions of resource scarcity, human and wildlife directly compete for resources. Property regimes formalize human resource uses by granting exclusive use rights to people. Animals lack rights under such regimes. In general, humans may summarily exclude most wildlife species from their land and resources—fencing out, shooing away, and killing animal interlopers on private land. Indeed, humans *must* exclude wildlife species from their land to profitably pursue certain commercial uses. Statutory efforts to preserve the public good of

biodiversity involve backing in animal uses into now-private land and resources; they are often cast as encroachments on private rights.

The theory of mismatched property rights offers one opportunity to reevaluate human/wildlife resource conflict (Bradshaw and Lueck, 2015). It displaces conceptions of property as bilateral exchanges between landowners and the government. It incorporates a broad array of resource-users and governance options. Adding a third dimension—and associated overlapping rights and governance systems—complicates theory. However, it also holds powerful implications for understanding dynamics that occur in the real world, which theory did not previously capture. We believe this innovation is particularly important for wildlife interests, which are relegated to nearly non-existent under the dominant, two-dimensional view.

Legal and economic understanding of property rights artificially removes animals as resource users on a landscape. As a result, scholars and policymakers alike generally do not conceptualize wildlife as having use-rights to the resources on which their survival depends. Humans can generally exclude wildlife from land and resources without process.

Ironically, landowners frequently view government intervention to formalize animal resource use rights as an encroachment on private property, forgetting that humans unwittingly assumed away animal uses in a prior period when rights were defined. Law and economics can rectify this fundamental misunderstanding by showing that inevitable overlap between human and wildlife competition for shared resources of land, vegetation, and water. Just as oil and gas rights, airspace rights, water rights, and mineral rights co-exist with surface (land) rights, so too should wildlife resource uses be incorporated into accurate models of property rights.

In practice, however, competing rights-holders appear to be incorporating animal resource uses into considerations without direct judicial intervention. This paper explores the use of stakeholder collaborations as a mechanism for negotiating space for animal resource uses into a property system that ostensibly does not consider them—showing that although theory does not recognize any room for such rights, practice tends to accommodate animal interests. We consider how to extend and formalize these approaches.

Wildlife is a synecdoche of nature. Addressing the coordination failures incumbent in the conservation of wildlife habitat sheds light into conservation questions for other, less-well-known landscape-level resources. By exploring resource conflicts involving wild horse and salmon one can identify dynamics and solutions that might equally extend to oceanic, vegetative, and geological features.[1]

2. Theory

Garett Hardin (1969) famously theorized that humans have incentives to over-use common pool resources in an open-access regime, leading to resource exhaustion. Hardin presented an example of herdsmen adding livestock to open-access grassland to show the relative benefit of private land ownership regimes. He proposed privatization as a solution to resource exhaustion, with the two-fold effects of: (1) ending open access to common pool resources; and (2) creating incentives for individual landowners to moderate resource use because they would internalize the costs of overuse. Contemporaneously, Harold Demsetz suggested that privatization encouraged internalization of the cost of externalities (1967).

Although Hardin and Demsetz present important observations, their analysis suffers from three interrelated oversights. First, they began at a single degree of geographic abstraction—an individual landowner—and did not zoom in or out. By focusing only on land, which could be managed at the level of an individual landowner, they overlooked the spillover effects of individual landowners on resources operating at a larger, landscape scale. Noting the effects on property rights at varying scales provides important insight into the implications of privatization on landscape-level resources, including wildlife habitat. Second, Hardin and Demsetz overlooked resources that co-exist with land in vertical space. A parcel map depicts only boundaries between land, but ignores that oil and gas, water, airspace, timber and a plethora of other rights are associated with the same lines on the map. Third, Demsetz overlooked that the very process of creating private rights stripped customary resource users of use rights without compensation or process. Many land titling regimes disenfranchise groups of customary resource users in the process.[2]

[1] We observe that a model of property with the capacity to account for land users who are not formal rights-holders has the potential to radically re-shape understandings of property distribution among people, within the confines of existing property structures.

[2] Because Hardin did not address this point, it is difficult to know which customary wildlife users were already excluded under the communal model, and to what degree. Empirical data about the maintenance of grazing rights elsewhere would suggest that predators—such as wolves—must be excluded from any grazing operation, public and private. We suspect, without knowing, that the incentive to exclude other wildlife species that diminish grazing resources increase in private titling regimes. This might include ungulate species and prairie dogs.

In this paper, we argue that the work of Elinor Ostrom implicitly addressed the problems present in Hardin and Demsetz's theories. Ostrom showed that the commons did not automatically result in the resource exhaustion Hardin predicted; in practice, communities craft institutions to govern resource use and avoid resource exhaustion (Ostrom, 1990; Ostrom et al., 1994). Ostrom's observations are necessarily focused on resources large enough to warrant community control, which tracks larger-scale, landscape-level resources. Relatedly, larger-scale management facilitates the interests of resource users who would not receive formal rights in a titling process. This may accommodate a greater number of resource users and animal users and embed interests in managing wildlife, since the landholding encapsulates more species habitats.

In 2015, Bradshaw and Lueck challenged conventional models of property as operating in two-dimensions. They added a third, vertical dimension to property by uncovering the plural property rights running in tandem on a landscape.[3] They observed overlapping vertical resources with associated rights and governance regimes. This effectively updated property theory to reflect the previously unaccounted-for scientific innovation of ecosystem theory. Various resources operate at differing scales of efficient management. This creates the need for parallel systems of governance operating at differing scales. To illustrate this point, Bradshaw and Lueck presented case studies of wildlife, water, oil and gas, and wildfire to show that entire bodies of laws treated in a vacuum in fact intersect routinely in the real world. This model reflects the interconnectedness of ecosystems, rights, and governance in a way that existing legal doctrine and scholarship did not.

The Bradshaw and Lueck approach disrupted bilateral, binary conceptions of property by arguing that property theory must reflect that the land at issue is not merely land, but instead a complex system that operates in biological reality (2015). In writing for this symposium, *mismatched Property Rights*, we join an esteemed group of scholars undertaking the collective task of reimagining property rights not as vested in a single person, but instead the product of multiple, overlapping resources, rights, and governance structures.

Our primary focus is situating wildlife governance within the theory of mismatched property rights. Secondarily, we note the lesser-studied implications of overlapping resources on property ownership, suggesting that it represents a departure from the binary "owner" and "non-owner" categories of property ownership. Conceiving of landscapes as overlapping resources with mismatched property rights (and interests) provides a spectrum of ownership rights. Property is relational not in the narrow traditional sense of the landowner versus the rest of the world, but instead exists as a dense interconnected web of interests and rights, none of which can be wholly extricated from the complicated whole.

Expanding rights in this way allows property models to incorporate resource users without formal title to the land and resources. (A two-dimensional model of property only incorporates owners—people with formal, legally recognized rights.) Thus, the theory of mismatched property rights forces re-examination of excluded resource-users, which may include wildlife that rely on resources which they cannot own.

3. Identifying Human-Wildlife Resource Conflict

The lens of overlapping property rights opens the door to re-imagining biodiversity loss as a problem of resource competition between humans and wildlife. Conflict between humans and wildlife is woven into the fabric of the western United States. Systems of overlapping resources and the rights ascribed to them have embedded inevitable tension between people who want to conserve wildlife and people who received or bought property rights that conflict with wildlife resource uses. Wildlife interests' in land and resources are seldom framed in these terms (Peterson et al., 2010; Madden, 2004; Matthiopoulos et al., 2008). However, casting environmentalists and landowners in opposition makes for much better headlines then tracing disputes to resource competition or the establishing of anthropocentric property rights. Revealing the hidden dynamic of conflict use rights is the crux of this paper.

Judges and legislators have mediated interspecies resource competition since time immemorial, including many modern cases and legislation. To illustrate interspecies resource competition, we create below simplified diagrams (see **Figure 1**) of human and non-human animals competing for the same resources.[4]

[3] In this symposium volume, scholars expand the three dimensional model to include the fourth dimension of time (Bradshaw and Leonard 2020).

[4] These diagrams are tremendously simplified among several dimensions. Many life forms are at once predator and prey. Whales, for example, both eat fish and are themselves hunted. Cattle both eat forage and are eaten by wolves. The simple resource maps above do not capture the nested dynamic. Moreover, multiple animals participate in direct interspecies resource competition, as with Barred Owls and Spotted Owls competing for the same food and shelter. Similarly, many human stakeholders compete to control uses of the same resource – a point that we expand upon below.

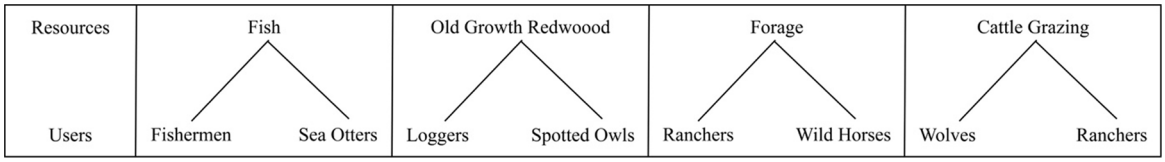

Figure 1: Resource Use Triads.[4] To illustrate these conflicts, consider competition between human and wildlife for the same resources. Fisherman and sea otters compete for fish. Loggers and spotted owls compete for old growth redwood.

Human/wildlife resource competition is hidden from our view, creating invisible property rights (Ehrman 2020). Yet, courts are frequently pressed into adjudicating the pervasive conflicts between property owners and wildlife advocates (e.g., *Gibbs v Babbitt, United States v. McKittrick*). Private action silently ends many conflicts when humans kill competing wildlife (Wyman, 2008). Some landowners intentionally destroy habitat to discourage animal uses of their land (Adler, 2011).

Government intervention in human resource uses on behalf of animal interests is understandably unpopular with property owners. Although states manage most wildlife species, this authority generally extends to the species itself and not to the habitat on which its survival relies. Thus, there exists little formal consolidated management of the habitat of wildlife species, except for species for which Congress has specifically asserted federal control.

Two categories of solutions have emerged to solve this property-rights problem.

The first property-rights approach to wildlife preservation is securing formal, legal rights to land for animal users (Lueck, 1989). Public lands—state and federal—are the primary habitat for an increasing number of species. Over one hundred million acres in the United States are managed primarily for wildlife preservation through the National Wildlife Refuge System. Additionally, hundreds of millions of acres of public lands with other administrative designations also serve as key wildlife habitat. In fact, the primary function of government in providing resources for non-endangered species appears to be public land—repositories of land and associated resources in which animals are encouraged to share. Private efforts to formally secure resources for wildlife has also increased. Conservation easements, thought generally to benefit wildlife by limiting intensive land uses, cover over fifty million acres of American land. An example of non-land resource measures include conservation groups paying farmers to flood fields seasonally to provide migratory waterways for flying fowl (a classic long and skinny resource, much like habitat corridors) (Bradshaw & Lueck, 2015).

The second property-rights approach to wildlife preservation is creating communal governance of landscape-level wildlife habitat, management responsibility for which is shared between public and private stakeholders. Several iterations on this theme exist. In the gaps between law-on-the-books and practice, pragmatic agencies have increasingly embraced public-private solutions to navigate resource sharing among humans and (other) animals (Bradshaw, 2018). The agencies tasked with administering the Endangered Species Act have navigated around heavy-handing listings which controversy stalls. The agencies have instead employed the more flexible mechanism of contract-based recovery planning and candidate conservation listings.

4. Stakeholder Collaborations

Stakeholder collaborations are working groups, comprised of people with different interests in land and resources working together to negotiate how those resources will be used (Bradshaw, 2018; Bradshaw, 2019; Follman et al., 2016; Gray, 1989; Jawahar & McLaughlin, 2001; Leong et al., 2011; Orr, 2013; Savage et al., 2008; Schwilch et al., 2012).[6] Collaborations are used in thousands of diverse contexts. In this paper, we explore how and why people are using stakeholder collaborations to negotiate human/wildlife resource competition. We outline how the issue of overlapping rights—and perception of rights to control various resources—embedded in wildlife habitats and overlapping landscapes are particularly well-suited to collaborative solutions.

[5] The examples in this figure are pulled from cases such as Northern Spotted Owl v. Hodel, 716 F. Supp. 479 (W.D. Wash. 1988), US v. Kleppe, and US v. McKittrick.

[6] Stakeholders—broadly defined as those with an interest in a landscape—tend to fall into the following categories: landowners and industry groups, nongovernmental organizations, indigenous peoples and governments, states, and federal land and resource management agencies.

We argue that a key feature of stakeholder collaborations is that they capture the many rights-holders who co-exist in shared space, which that are often overlooked by laws' myopic focus on landowners.[7] Collaborations facilitate negotiations between landowners and other resource-users, allowing parties to produce resource-sharing regimes. In this way, ownership disputes can be resolved not through the kind of winners-and-losers outcome achieved by judicial resolution, but instead in a resource-spreading outcome that reflects the biological reality of landscapes. Healthy ecosystems—indeed, human survival—requires sharing resources.

Many wildlife species' habitat, food resources, and water supply operate at a landscape-level, extending across thousands of acres. These uses extend across many land parcels held by landowners. Landowners have diverse land use preferences, many of which may conflict with wildlife resource use needs. Landowners tend to manage property for their individual welfare maximization, without consideration of landscape-level effects. Individual welfare maximization will lead landowners to undertake actions which will diminish habitat on their landholdings over time. In a system in which animal resource-users do not have legal rights, they are functionally excluded from this system. (Importantly, wildlife interests will be channeled through human advocates under a collaborative model.)

Congress has attempted to resolve the issue of land development fragmenting wildlife habitat through legislation, most notably the Endangered Species Act (1973). From a property-rights perspective, this legislation vests federal agencies with the capacity to assert resource use rights for endangered wildlife through critical habitat designation and related provisions. Yet backlash among human landowners and resource users has rendered the law increasingly less powerful over time. Controversy has stymied agencies' efforts to satisfy their mandate.

We illustrate these dynamics by presenting two case studies of mismatched property rights creating coordination failures that could potentially force wildlife off landscape-level habitat. In these contexts, government agencies are deploying stakeholder collaborations to overcome coordination failures that would otherwise accrue from competing resource uses managed at differing scales. We are specifically interested in the solutions that people have crafted to resolve the apparent contradictions between Hardin and Ostrom with respect to customary rights holders and the scale of rights. Existing economic accounts of common pool resources focus only on human resource uses.

Our first case study considers wild horse advocates and cattle ranchers competing for forage (vegetation ungulates eat) on public lands in the Southwestern United States. The long history of this resource competition shows federal legislation and Supreme Court decisions devoted to resolving human-wildlife resource conflict. However, "resolution" has yet to be achieved—something that an agency is attempting to address at a highly localized level. Our second case study explores orcas competing with fishermen for Chinook salmon in Puget Sound. This example highlights the difficulty of prioritizing simultaneously existing property rights, such as treaty rights to fishing and whaling.

These case studies provide two core insights. First, we draw upon the theory of overlapping resources on a landscape operating at differing levels of efficiency to provide the framework of resource competition among humans and animals. This provides a vocabulary for analyzing virtually any wildlife habitat preservation issue, which facilitates both analytical and practical insights. Second, we reveal the potential and limitations of stakeholder collaborations as a tool to address resource-conflicts. A key component of collaborations is creating localized and flexible responses to property rights conflicts relative to win-or-lose judicial or statutory interventions.

5. Case Studies

5.1. Competition between wild horse advocates and cattle ranchers for forage in the Western regions of the United States

Subject. This case study considers competition between wild horses and cattle ranchers for grazing rights on public lands in the American West.[8]

[7] Several statutes capture the reality of overlapping rights, as with stakeholder participation and citizen-suits, which create legal venues for non-owners to assert their rights. Courts also rule in favor of resource-users over landowners, occasionally even favoring some wildlife above landowners in the absence of a statutory dictate to do so.

[8] A similar story could be told about wild horses and hunters, who seek to harvest wildlife—such as deer—that compete for the same range resources as do wild horses. Livestock cattle rancher graze—such as sheep, or cattle—are animals. We envision here the livestock acting at the direction of ranchers, who control where they graze, and for their ultimate benefit. Thus, the livestock in this example are the agents of their human owners.

We begin with a disclaimer. Wild horses appear to be an odd choice to represent "wildlife" – they are non-native (some would say feral or invasive), charismatic megafauna that receive disproportionate amounts of public attention. [9] The co-evolution of horse and human has created an emotional responsiveness rarely present for other wildlife. Yet, these features are precisely why we chose the horse– it represents the high-point of human recognition of wildlife rights, thus creating enough concern to highlight the broader point, which extends to species with less concern. To make a point as bold as ours, we intentionally chose to depict resource conflicts with the wild horse, which we acknowledge is not representative of typical wildlife species.

Resource mix.[10] This analysis focuses on Western public lands, primarily those managed by the Bureau of Land Management (BLM).[11] We focus on forage—vegetation including a mix of grasses, frobs, and shrubs.[12] The amount of forage on a range is dynamic, depending upon a variety of climatic, geographic, and sociopolitical factors. For example, forage decreases in drought condition. Consistent over-use of the range can cause long-term depletion of soil resources, lessening the available forage over time.

Resource history.[13] Wild horses have roamed the American West since domestic horses escaped from Spanish Conquistadors in the 1500s. In early open-access property regimes, herds of wild horses and escaped domestic horses presumably disbursed across unfenced, indigenous-owned lands. As human population in the West increased, so too did livestock, including cattle and sheep.

Privatization initially gave landowners the right to exclude wild horses from their land at any point in the future. As human population increased, the grassland resource became increasingly scarce. Thus, the incentives increased for landowners to exclude wild horses. To reduce competition for finite forage, ranchers poisoned, hunted, and captured wild horses (Pitt, 1985).

Wild horse populations dwindled in response to reduced range and attempts at extermination. Conservationists eventually formed a social movement to highlight the plight of wild horses. In response, Congress enacted The Wild Free-Roaming Horses and Burros Act. The Act set aside public lands as exclusively managed for the use of wild horses, creating a possessory right for wild horses across millions of acres of public land. It further created a functional easement for wild horses to enter, although not use, private land without harassment (essentially creating a flow through regime). The Act further criminalized the taking, harassing, or harming wild horses.

State public land managers challenged the Act, claiming that the Property Clause of the Constitution allowed Congress to regulate only "wild" animals, a status for which wild horses did not qualify (Wild Free-Roaming Horses and Burros Act, 1971). In *Kleppe v. New Mexico*, the Supreme Court unanimously ruled that Congress had expansive constitutional authority to manage wildlife—broadly defined—on public land.

Resource management. BLM is statutorily obligated to maintain the long-term health of the range on public lands to avoid resource exhaustion (The Federal Land Policy and Management Act, 1976). If the demand for forage exceeds the supply, exhaustion occurs. Thus, the number of animals consuming forage directly relates to the health of the range. It follows that the key mechanism for restoring the health of depleted rangelands is to restrict the number of animals foraging.

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[9] Prehistoric predecessors to the modern horse lived in the American West prior to human settlement. The modern terminology for wild horses includes "mustangs" and categories such as "feral" and "non-native," usage of which gives rise to a dizzying array of public opinion and legal consequence, which is outside the scope of this Article but, nonetheless, reached the Supreme Court and continues to occupy the legislatures of Western states.

[10] Different geographic locations have different resource mixes, ranging from deserts to forests to oceans. Various species compete for these resources. To fully analyze the property rights dynamic affecting a particular species, one would want to understand the resource needs of the species, the resource mix of the landscape, the resource users on the landscape, the rights-holders on the landscape, and the legal and customary prioritization among conflicting rights-holders.

[11] US Forest Service also managed Western public lands with wild horse populations and grazing permits for cattle ranching.

[12] Forage is both a noun describing the vegetative mix on rangelands and a verb discuss the act of animals searching for and eating sparse food sources.

[13] Notably, resource governance can occur at the international, federal, regional, state, tribal, local level through either law or private governance mechanisms. This array of potential governance tools is complicated by the fact that many rules and enforcement measures may overlap – either at a single level or across levels of governance.

The many scales of governance create flexibility and mechanism choice well-suited to the dynamic nature of natural resources. It contributes, however, to confusion about property rights, with various sources sometimes pointing in different directions. For example, grazing on public lands is a property right from a customary perspective but not as a matter of federal law. There is not a clear system for prioritizing which of two conflict resource use "rights" dominates. Moreover, rights appear to be a natural system which is itself forever in a state of flux, driven by the economic value of the resources, the sociopolitical composition of rights-holders, and the biological features of rights shifting over time.

State and federal resource management agencies limit the number of livestock, wild horses, or wildlife on the range. BLM controls livestock through the number of grazing permits issued annually. BLM controls wild horse populations by limiting the number of births within a herd and culling the herd by removing a portion of the horses from the range. State game and fish agencies manage wildlife populations through the issuance of hunting permits and culling of natural predators to ungulates.

Resource competition. We explore the bilateral conflict between horse advocates and ranchers for forage on BLM lands. For the sake of simplicity, we aside wildlife for the remainder of this analysis.

Competition between horse advocates and ranchers is quantifiable. Every wild horse on the range results in the BLM allowing one fewer cow on the range.[14] The value of a cow on BLM range is at least $216 a year—the cost difference for grazing an animal on lower-priced federal lands relative to higher-priced grazing permits on state lands.[15]

In practice, ranching operations are highly dependent upon grazing permits. Although permits are ostensibly flexible on an annual basis in response to range conditions, the political economy of ranching has rendered this to be less the case of practice. Private ranchers include grazing permits in the sale of ranches, although the language of the Taylor Grazing Act (1934) explicitly specifies that they are not a property right.

The BLM manages many public lands that private ranchers use for grazing their cattle. Ranchers' ability to graze cattle on public lands are a but-for condition for profitably ranching in many regions of the United States. Each additional wild horse per an acre produces a one-unit deduction in the available grazing permits. Note the direct correlation between profit and wild horse resource use.

Stakeholders. A facial reading of The Wild Horse Act seemingly requires BLM to grant wild horse first-in-time access to public lands. After wild horses exhausted their first-in-time, open access rights, then surplus forage would be sold through a restricted-access regime in the form of grazing permits sold by auction to ranchers.

In practice, ranchers have limited competition for forage by lobbying for a lower "appropriate management level" of wild horses allowed on the range.[16] In 2006, cattle and sheep consumed twenty times the forage consumed by wild horses and burros on BLM land (Fuller, 2009). The BLM achieves this population level by rounding up herds using helicopters and selling wild horses at auction. Presently, there are more wild horses in captivity than roaming on public lands. On August 16, 2016, the front page of *The New York Times* noted that the BLM had ultimately overturned a suggestion by the wild horse advisory board that the government agency should kill 45,000 wild horses in captivity (Chokshi, 2016).

At a national level, BLM advisory boards are comprised largely of ranching interests. BLM is statutorily obligated to consider the recommendations of these boards. Wild horse advocates advocate for use rights against the closely aligned interests of BLM and ranchers. This is an uphill battle, as evidenced by the statistics showing that more wild horses are in captivity than on the range. Advocates have the heartstrings of the public, however. Few other species would receive front-page attention of the New York Times or a specific Congressional Act for their benefit. Given these entrenched and uncompromising positions at a national level, it is difficult for BLM to promulgate a socially acceptable policy.

Collaboration. The US Forest Service ("USFS")–a land-management agency with a different political economy and statutory mandate from BLM–is using stakeholder collaborations to manage the parallel problem of wild horses on its lands. USFS is a leader among agencies in its use of collaborations for

[14] Forage depletion caused on animal consumption is measured in terms of Animal Unit or an Animal Unit Month (AUM). Each AUM represents a depletion of twenty-six pounds of forage in a day. This is defined in regulation as: (1) one 1000-pound cow with or without an unweaned calf; (2) one horse; (3) five sheep; or (4) five goats. The BLM can also allow seasonal range access—for example, requiring ranchers to removing cattle from public lands in winter months to allow the range to restore.

[15] Federal grazing permits are markedly underpriced relative to state or public permits. The Bureau of Land Management currently charges $2.11 per AUM, compared to an average $20 per AUM on state lands. The nearly ten-fold difference in price between federal and state grazing permit prices means that the federal government essentially offers a federal subsidy to ranchers (Oppenheimer, 1996).

[16] Wild horses may indirectly overburden the range by overbreeding—producing a population that exceeds the number of animal units that the range can support. Without human intervention, complex natural systems would reduce the wild horse or wildlife systems. Human intervention has unwittingly displaced this system, however. Ranchers and state land managers aggressively eliminate the natural predators of wild horses—creatures such as the mountain lion, wolves, and jaguars—because they kill livestock. Through bounty programs and private hunters, the number of predators able to kill wild horses has decreased. Moreover, fencing and development of historic grazing land has reduced the available range of wild horses, lessening the possibility for moving in poor range conditions.

managing fraught issues such as wildfire. It now is using the tool to manage wild horse issues. Through the USFS collaborative model, diverse stakeholders are invited to participate in a series of meetings to promulgate solutions to perceived wild horse over-population. Scholars embedded in the project are engaged in ongoing research about its efficacy. Many open questions exist, including the adaptability of collaborations to situations and agencies that are markedly different. Conceptually, however, the idea of coalescing competing resource-users to craft solutions to balance different uses makes sense. It essentially re-bundles wild horse advocate and vests control of it in the users of concurrent resources with the backdrop of the federal land manager.

5.2. Competition between orca advocates and fisherman for Chinook salmon in Puget Sound

Resource Mix. This case study considers resource competition for the resource of Chinook salmon ("Chinook") in the waterways of the Pacific Northwest. Chinook are a native fish in the waters of Puget Sound and Strait of Juan de Fuca. They face direct consumption by fishermen and predation by marine mammals. Energy users, boaters, and industrial polluters indirectly affect Chinook population levels by affecting the suitability of the water habitat for fish.

Resource History. Indigenous governments entered into treaties trading the land for perpetual treaty rights to fish and whale in the surrounding oceans.[17] Seattle, Victoria, and Vancouver have since grown exponentially. Today, the Strait of Juan de Fuca is a busy shipping route with heavy boat and ferry traffic.

Indigenous governments own fifty percent of the available fish in the waters of the area, as defined by treaty rights (Hollowed, ND; Treaty with the Nisqualli, Puyallup, Etc., 1854; Treaty with the Makah, 1855; Treaty with the Dwamish, Suquamish, Etc., 1855; Treaty of Point No Point, 1855; The Treaty of Olympia, 1856). Commercial fishermen economically rely upon salmon and other species. Recreationists and tour guides do not want to lose access to the waters. Ferry users also do not want to lose access to the waters as many rely on the ferries as transportation to and from work. The National Oceanic and Atmospheric Association (NOAA) and the US Fish and Wildlife Service (USFWS) are invested in habitat and endangered species protection. A variety of nonprofits are invested in Chinook recovery. Washington State, the city of Seattle, and a variety of towns and cities on both the US and Canadian side of the waters have a complicated set of interests in these waters.

Whale advocates and indigenous governments (who hold whales in their traditions and beliefs) form two key stakeholders. In the spring, the Southern Resident Killer Whales occupy the Salish Sea[18] and consume Chinook almost exclusively (Marine Mammal Commission, 2019). In 2003, NOAA designated the whales depleted under the Marine Mammal Protection Act (NOAA, 2014). NOAA further designated the whales as an endangered distinct population segment under the ESA in 2005. Since its listing the population has declined (NOAA, 2014). Whale advocates, including NOAA, represent the whale interests in Chinook consumption to other stakeholders.

Resource management. Chinook populations have notably declined in the past several decades due to river damming for hydroelectric uses,[19] commercial fishing, predation by marine mammals, and exposure to pollution and other contaminants (Dunagan, 2017; NOAA, 2014).

Resource competition. Various government entities have convened stakeholder groups to oversee recovery of the Chinook populations. Across Puget Sound and the waterways in Washington and British Columbia there are state and city agencies working on Chinook recovery. NOAA, in collaboration with state agencies, convened a group of scientists to address the problem in 2000 that is still working on this issue. Local indigenous governments are heavily invested in Chinook recovery and very active in conservation efforts. Finally, local nonprofits and populations are interested in engaging in Chinook recovery.

In 2019, the international Pacific Salmon Treaty was renewed. This Treaty determines the catch limits of each species of salmon that the U.S. and Canada may take at a national level. In the press release for the new

[17] The treaties that were signed gave the land to settlers and gave the indigenous governments reservation areas and domain to take from all waters so that they could continue to sustain themselves in traditional ways.

[18] This habitat includes the southern portion of the Strait of Georgia (near Vancouver B.C. and south of there), the Northwest Straits (along the northern Washington coastline), and Puget Sound (the waterway between the Strait of Juan de Fuca and Tacoma, running along Seattle).

[19] Chinook are born in rivers, swim to the ocean, then return to the precise spot in the river in which they were born to spawn (lay eggs). When rivers were dammed, Chinook were separated from their spawning grounds (The National Wildlife Federation, ND).

treaty (which runs through 2028) the Secretary of the Pacific Salmon Commission noted that there will be significant reductions in Chinook take on both sides (Pacific Salmon Commission, 2018). This reduction will not only help the orcas and meet requirements as the Chinook is listed as endangered in the U.S. and is listed as endangered under Canada's Species at Risk Act (Government of Canada, Species at Risk, 2019).

In 2018, Governor Jay Inslee of Washington, established the Southern Resident Orca Task Force, which also focused on Chinook recovery as these two species are vitally linked (Good Stefani, 2018). This taskforce unifies several state agencies to collaborate to aid whale recovery. A 2018 report released by the task force recommended a wide variety of protections for the orcas, including rehabilitating habitat for the Chinook and protect it from predation by non-native species and human activities (Southern Resident Orca Task Force, 2018). The Washington legislature has already acted to implement part of this report, introducing a bill to eliminate catch limits on non-native species in order to help restore forage and habitat to Chinook.

The nonprofits and the indigenous governments of the area are both invested in the recovery of both the Chinook and the SRKW populations. The indigenous governments in particular have an interest in the entire aquatic ecosystem. When the indigenous governments negotiated for the ability to take fish from all waters that included any ocean life (including mammals, but not including farmed shellfish). So, the indigenous governments all have rights to the orcas and to advocate for their protection and the Chinook protection.[20] According to one legal policy advisor the indigenous governments "were conserving the water ecosystems in the treaty for the health of the fish (all ocean life) and their own livelihood."[21] Given this, the indigenous governments have long been looking out for the health and resilience of the aquatic ecosystems. They thrived in tandem with these ecosystems and are invested in all of the residents of the aquatic ecosystems thriving. Their livelihood is tied to the Chinook as a traditional food source, but also as the prey that sustains the orcas (a traditional food and an important animal in their religion and culture).

Collaboration. The stakeholders of the waterways are beginning to collaborate on a large scale to prevent resource exhaustion while preserving property rights. International groups, NOAA and state agencies, indigenous governments and nongovernmental organizations are working together to form an action plan. The State of Washington has worked with Canada to develop a fishing treaty focused on Chinook recovery (The Government of Canada, Salmon Treaty, 2019). Thus far commercial fishing interests have been slower to weigh in on the proposals. If they combine with other industrial interests in the region, such as oil and tourism, the state will have a difficult time implementing the action plan. Incorporating these competing interests into the action plan will necessarily mean trade-offs and compromise for the existing collaborators. However, it might also increase the likelihood of creating a socially acceptable plan and decrease the likelihood of litigation. The removal of catch limits on non-native species represents one such mutually acceptable compromise that serves the common goal of restoring Chinook populations. The implementation, and success, of other measures has yet to be seen, but will be carefully watched.[22]

Federal, state, tribal, and nonprofit interests provide the orcas with some representation in resource negotiations. Orcas do not, however, have direct representation in the form of a human advocate specifically and only considering their interests. Giving orcas formal stakeholder representation in the matter of Chinook conservation is arguably appropriate as they are a resource user and their lives depend upon the fish. This would also strengthen the interests of resource users with aligned interests, by adding an additional seat at the table and lessening the dilution of human interests for wildlife interests. Of course, other stakeholders would likely oppose direct representation for wildlife interests, most notably groups with opposing interests. The appropriateness of consistent, formalized recognition for wildlife presentation presents a rapidly developing set of open legal questions.

This case presents an emerging collaboration to save a sharply limited resource. Our analysis includes a discussion of the parties who must be included in order to bring all stakeholders in to discussions about how to manage the waterways of Puget Sound and the Strait of Juan de Fuca. The land management agencies on the Olympic Peninsula have been collaborating on landscape-level management and have been collaborating with their Canadian counterparts on common landscape problems. The land management agencies have also been working with NOAA and the local indigenous governments on river maintenance and Chinook

[20] *United States v. Washington*, 88 F. Supp. 3d 1203, 129 F.Supp.3d 1069 (W.D. Wash. 2015) ("Quileute I"), *sub. nom.* 2015 WL 10853926 (W.D. Wash. 2015), rev. by *Makah Indian Tribe v. Quileute Indian Tribe*, 873 F.3d 1157 (9th Cir 2018) (Quileute II), *reh. den.* 2018 WL 3964238 (9th Cir. 2018), *cert. pet.* May 21, 2018.

[21] Facemire, telephonic interview with legal policy specialist on fisheries, February 4, 2019.

[22] Challie Facemire is writing her Ph.D. dissertation in part on this controversy and has traveled to Washington and Alaska to conduct interviews with the stakeholders.

habitat preservation. The collaborations between these agencies, the indigenous governments, local NGOs, and the state are pushing towards a true landscape-level management model. If local industrial interests and specific representation for impacted species (like the orcas) are incorporated into the collaboration, this example may prove to be a useful management model for how to achieve effective collaborations for ecosystem and wildlife management that represents the interests of those ecosystems and wildlife.

6. Implications and Conclusion

Should forage on public lands be allocated to wild horses or grazing permits for cattle ranchers? Should Chinook salmon be allocated to satisfy treaty rights, economic interests, or marine mammals?

Property theory has complicated answering such questions by creating models of property rights that exclude animal users. This makes animal uses opaque to theorists and policymakers. Theory therefore captures an artificial reality in which there exists only horizontal resource competition among humans. In reality, there also exists vital—but under-theorized—overlapping resource competition between all living things within an ecosystem. However, theoretical constructs persist.

Many competing humans resource users believe they have a near-sacred, inviolable property interest in the resource at interest. Some ranchers, for example, insist that grazing on public land is a property right. Whether one holds that right, or merely believes themselves to, appears to be somewhat incidental. With such belief in the righteousness of one's position the cost of waging a fight to enforce the formal law may pose too high a cost. Given the high stakes to the players in these conflicts, settlement is rare. Each believes their positions sacrosanct. The costs of litigation are high and the potential for losing perhaps even greater.

Against this fraught backdrop, the potential for stakeholder collaborations of landscape-level wildlife habitat emerge. Among wild horse advocates and ranchers, the problem is large and diffuse on a national scale. Collaborations depend upon highly localized interests as they draw upon preexisting social relationships and shared social networks. As a result, meaningful stakeholder collaboration must happen at the scale of habitat that is at issue; this is precisely what is occurring in pockets of controversy. Interesting questions for future research include analyzing variations dependent upon whether a single or multiple resource is being managed. For example, orcas and salmon present resources with aligned resource needs, but one can imagine two sensitive species with competing needs.

Stakeholder collaborations appear to follow Ostrom's model of resource-user-lead management of local resources extended to heterogenous interests. Wildlife collaborations, however, incorporate human advocates of wildlife, giving a voice to animal interests that are presently absent from a purely property-rights model. In this way, collaborations provide another example of what appears to be a growing trend of cooperative governance of wildlife interests.

The promise of this strategy to conflicting users is that their participation will help secure for them some portion of the right to the resource. Conversely, the interests of stakeholders who decline to participate in agency-sponsored collaborations will not be represented in the process of allocating and prioritizing rights. This stick-and-carrot approach serves to force warring parties to the table to negotiate solutions, the final outcome of which will likely form compromises to both sides. Although resource users cannot score clear "wins" through collaboration, the process may be faster and less expensive than litigation. (Eventually, trickle-up policies may generalize localized solutions to a regional or national scale, which may reduce the cost and time.)

Notably, incorporating animal uses into a property rights model is a descriptive task. Creating a more accurate, scientific model of rights. We are agnostic as to the relative prioritization of rights in shared space. As with any disagreement between holders of property rights, adjudicating disputes between rights-holders is for judges. Just as law navigates the vertical rights of the homeowner against that of the person who wants to drill for oil under her house, so too does the law determine whether a rancher may fence-out prong horned sheep from its migration corridor. In practice, courts already make precisely such determinations (*U.S. v. Bergen*) and are well poised to make more.

Competing Interests

The authors have no competing interests to declare.

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