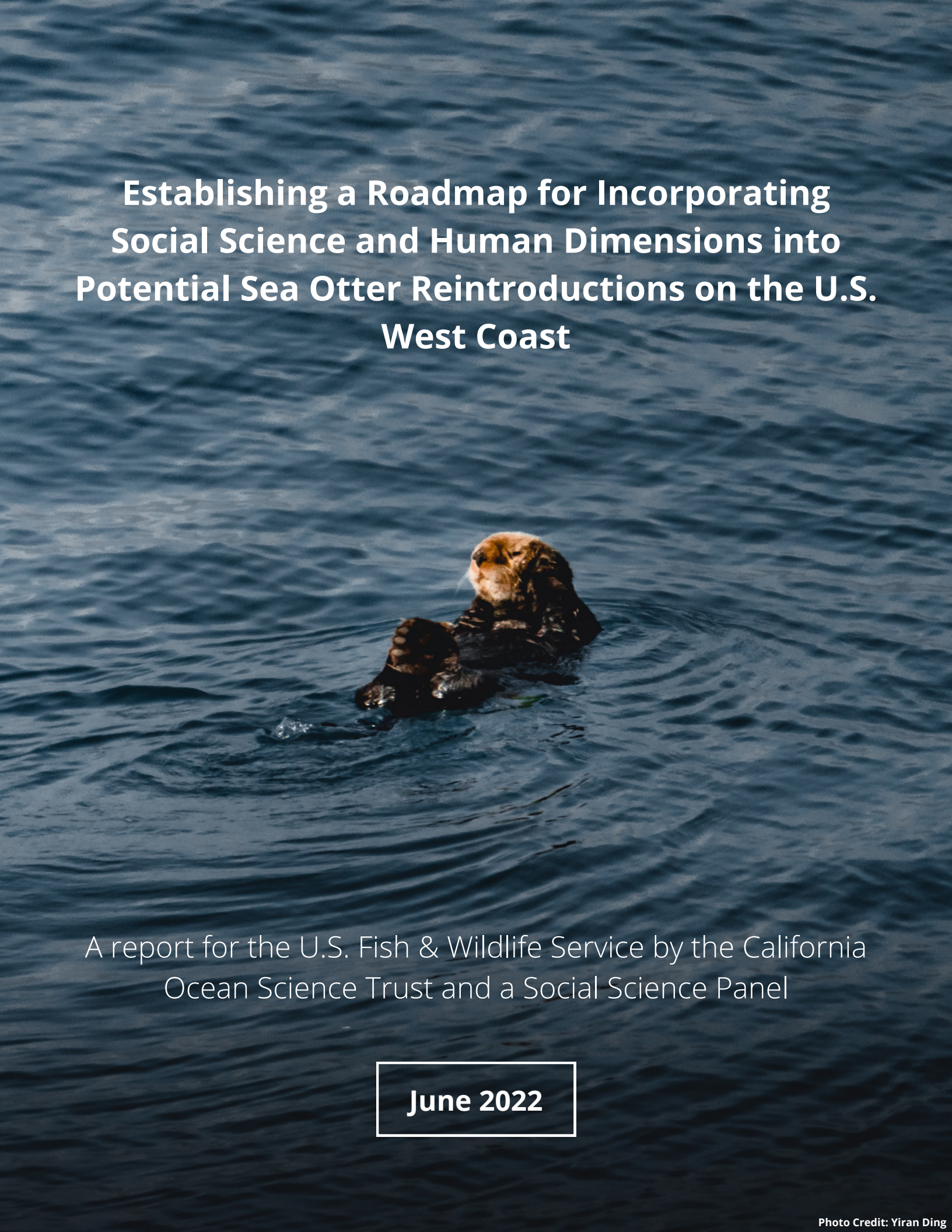
Establishing a Roadmap for Incorporating Social Science and Human Dimensions into Potential Sea Otter Reintroductions on the U.S. West Coast



A report for the U.S. Fish & Wildlife Service by the California Ocean Science Trust and a Social Science Panel

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Photo Credit: Yiran Ding

About this Report

At the request of the U.S. Fish & Wildlife Service, the California Ocean Science Trust developed this report to provide scientific guidance for incorporating social science and human dimensions into the consideration of potential sea otter reintroductions. This report represents the contributions from an interdisciplinary panel of social scientists (Social Science Panel) and key stakeholder groups in Oregon and California.

About California Ocean Science Trust

California Ocean Science Trust is a non-profit organization dedicated to accelerating progress towards a healthy and productive ocean future for California. Created by state legislation, OST bridges the gap between cutting-edge scientific research and sound ocean management. To learn more, visit www.oceansciencetrust.org

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About U.S. Fish & Wildlife Service

The U.S. Fish and Wildlife Service, within the Department of Interior, is the federal government agency dedicated to the conservation, protection, and enhancement of fish, wildlife, plants, and their habitats for the continuing benefit of the American people. To learn more, visit www.fws.gov

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Executive Summary

In response to calls to better understand the feasibility of sea otter reintroduction in Oregon and Northern California, we, the California Ocean Science Trust synthesized scientific guidance from social scientists, select stakeholder groups, and literature sources for incorporating social science and human dimension considerations into potential future sea otter reintroductions. The objectives of this project were to:

1. Identify the range of social science and human dimensions considerations that could and/or should be assessed for sea otter reintroductions,
2. Explore the diversity of stakeholder perspectives, interests, and opinions of sea otter reintroduction in Oregon and Northern California, and
3. Provide guidance on potential strategies for engaging stakeholders in future sea otter reintroduction efforts and discussions.

To support an ethical and equitable reintroduction decision-making process, the scientific literature recommends social science and human dimensions knowledge should be considered as early as possible in the reintroduction process. Previous reintroduction case studies have assessed a range of social science and human dimensions considerations, including: attitudes, social feasibility, acceptance capacity, risk perception and concerns, and socioeconomic circumstances. These considerations provide a potential starting point for sea otter reintroduction, yet resource managers may consider further engaging social scientists, stakeholders, and tribes to obtain a more expansive list of considerations. Activities that engage early and often with tribal communities focusing on meaningful consultation, that upholds sovereignty and builds broad stakeholder participation into reintroduction and decision-making processes, collectively, were seen as critical for these early considerations of sea otter reintroduction.

Stakeholders (i.e. from commercial and recreational fisheries, seafood supply chain, ports, conservation interests, and tourism and recreation) identified a diversity of perspectives on sea otter reintroduction (a full description of all perspectives provided on pages 16 - 20), distilled into the following common themes:

1. The need to establish a management plan to respond to unintended consequences before a reintroduction is conducted;
2. Sea otter reintroduction may negatively impact fisheries reliant on shellfish via sea otter predation;
3. There may be additional restrictions and exacerbated challenges to fisheries with sea otter presence;
4. Sea otter reintroduction may provide benefits and ecosystem services via kelp restoration and increasing ecosystem resilience; and
5. Sea otter reintroduction may provide tourism and existence benefits.

Many of these stakeholder perspectives were nuanced. For example, most stakeholders that expressed interest in increased ecosystem resilience also recognized concerns over potential impacts to fisheries, and vice versa. While these themes represent some of the common perspectives of sea otter reintroduction, they do not represent all. To solicit additional perspectives

going forward, resource managers may consider engaging other groups (e.g. coastal businesses) and decision-making entities (e.g. tribal communities, resource agencies) not engaged in this effort.

An interdisciplinary team of social scientists (i.e. Social Science Panel) provided 29 research recommendations (all research recommendations are on pages 21 - 25), categorized into the following strategies for understanding the social science considerations of sea otter reintroduction:

1. Conceptualization: an understanding of the policy and community landscape (i.e. policies, laws, stakeholders, discourse) and key considerations for reintroduction planning (i.e. perspectives, strategies, success criteria, etc.);
2. Sociocultural Effects & Management Capabilities: assessments of potential effects (e.g. benefits, costs, risk) and implications of sea otter reintroduction on people and communities, as well as management opportunities of the species and for responding to potential consequences of the reintroduction; and
3. Attitudes & Acceptance Capacity: assessments of the acceptance capacity and attitudes, as well as potential drivers of acceptance (e.g. beliefs, norms, feelings, etc.), for sea otter reintroduction.

By combining feedback from the Social Science Panel and stakeholders, we synthesized 25 stakeholder and tribal engagement recommendations (all engagement recommendations are on pages 26 - 29), categorized into the following strategies for ensuring broad, equitable, and inclusive participation:

1. Engage with tribal communities focusing on meaningful consultation that upholds sovereignty;
2. Build broad stakeholder participation into reintroduction and decision-making processes;
3. Co-develop reintroduction goals, interventions, and management and mitigation plans with stakeholders and tribes; and
4. Conduct outreach and education activities to raise awareness among stakeholders.

Social science research and engagement activities can and should be conducted in parallel, as many of these activities can simultaneously fill critical knowledge gaps while helping to facilitate an inclusive and broad participatory process. These activities will help ensure a well-informed and equitable reintroduction decision-making process is made. Given the current state of, and interest in, sea otter reintroduction in Oregon and Northern California, the Social Science Panel recommends addressing the following research and engagement recommendations first in Table ES-1. Social scientists can help identify additional research and engagement recommendations and activities that will advance these decision-making processes, going forward. Resource managers should consider seeking additional opportunities to formally engage tribal communities to better understand how their ways of life may be impacted in the future as well as how they have already been impacted by the absence of sea otters to date.

Table ES-1. Top research and engagement recommendations to advance sea otter reintroduction decision-making processes.

Top Research Recommendations	Top Stakeholder & Tribal Engagement Recommendations
Identify relevant stakeholders, tribes, and sectors (e.g. tribal communities, fisheries, tourism, conservation groups, etc.).	Establish a separate engagement process with tribal communities from stakeholders, but invite tribal communities to other stakeholder engagements.
Assess the range of stakeholder and tribal interests, perspectives, and needs.	Establish and clearly communicate decision-making process and timing to stakeholders and tribes, communicating this process is independent with no predetermined outcomes.
Establish social and ecological reintroduction goals, define success and how to monitor for success, and develop a shared stakeholder engagement process.	Co-develop engagement plans with stakeholders and tribal communities to understand their goals, needs, and opportunities for agency and engagement in decision-making process based on how they would like to be engaged and what local or traditional knowledge they would like considered.

Introduction

Sea otters (*Enhydra lutris*) previously existed along coastlines throughout the North Pacific Ocean. During the maritime fur trade (beginning in 1741), sea otters were extirpated from most of this historical range, including nearly the entire contiguous west coast of the United States. To aid sea otter recovery, from 1965 to 1972, resource managers translocated hundreds of sea otters from Amchitka Island and Prince William Sound to Southeast Alaska, Washington, and Oregon, USA, as well as British Columbia, Canada. Most of these translocations were successful as the founding populations took up residency. Yet, no translocation efforts were made to Northern California, and the Oregon translocation effort failed (Jameson et al. 1982). The surviving sea otter population in California, near Monterey, has experienced limited range expansion (Nicholson et al. 2018, Tinker & Hatfield 2017). Currently, no resident sea otter populations exist in Oregon and Northern California (from San Francisco Bay to the California-Oregon state border), which constitutes the largest remaining gap in the sea otter's historical range.

Some stakeholders see reintroduction as necessary to aid sea otter recovery. Environmental nonprofits (e.g. Elakha Alliance) and tribal communities (e.g. Confederated Tribes of Siletz Indians) in Oregon have been advocating for sea otter reintroduction for several years. In December 2020, Congress approved a federal budget with a directive to the U.S. Fish & Wildlife Service (USFWS) to complete a report on the feasibility and cost of reintroducing sea otters to the contiguous Pacific coast of the United States, by December 2021 (H. R. 133). This report will focus on the potential for sea otter reintroduction to Oregon and Northern California.

There are several reasons why stakeholders and tribes are advocating for sea otter reintroduction. Sea otters play a key ecological role in the structure and function of kelp forests, which provide a suite of ecosystem services to society (Gregr et al. 2020, Watson & Estes 2011, Estes & Duggins 1995). By controlling kelp-grazing sea urchins, sea otters facilitate the growth and expansion of kelp forests (Estes & Duggins 1995, Estes et al. 1982). Generally, kelp forests support more diverse species assemblages when sea otters are present than absent (Estes et al. 2010). Many of these species (e.g. anchovy, herring, rockfish) are key to coastal economies, such as commercial and recreational fisheries (Feder et al. 1974). Sea otters themselves are directly valuable and important to tribes and Indigenous communities for cultural and subsistence practices, as well as coastal businesses that rely on ecotourism (Martone et al. 2020, Gregr et al. 2020, Erlandson et al. 2005, Lyman 1988).

Because of sea otter predation on shellfish (e.g. Dungeness crabs, abalone, red sea urchins, clams), some stakeholders are also concerned about the potential negative effects of sea otter reintroduction on fisheries. There is strong evidence demonstrating that sea otters, via predation, reduce the average size and abundance of shellfish (Estes & Duggins 1995, Kvitek et al. 1992, Garshelis et al. 1986). One such study found reductions in crab numbers following expansion of sea otters into local fishing grounds in Alaska, causing the closure of the local commercial crab fishery (Garshelis & Garshelis 1984). Other studies have shown sea otters to reduce local clam numbers in Alaska, which recreational fisherman depend upon (Bodkin et al. 2001, Kvitek et al. 1992).

These findings highlight potential tradeoffs of sea otter reintroduction across stakeholder groups. While there is adequate knowledge on the potential ecological impacts and implications of sea otter reintroduction, there is a lack in understanding of the potential social, cultural, and economic ramifications. Previous and ongoing efforts shed light on these potential impacts. One such study found substantial economic benefits ($53.6 million Canadian dollars in annual gains to the value of finfish, carbon sequestration, and ecotourism) and costs ($7.3 million Canadian dollars in annual losses to shellfish fisheries) of sea otter presence in British Columbia, Canada (Gregr et al. 2020). An ongoing economic analysis, funded by the Elakha Alliance, will seek to predict similar economic impacts in Oregon from sea otter reintroduction. Further studies will be needed to continue to build our understanding of the implications of sea otter reintroduction for people and coastal communities.

These tradeoffs create challenges for decision-makers who may be faced with arriving at a proposal and ultimately an agreed-upon decision for sea otter reintroduction. To ensure a transparent and thorough decision-making process should consideration of sea otter reintroduction continue, it will be crucial to engage stakeholders in reintroduction discussions so the full range of stakeholder priorities, perspectives, and concerns are considered. Stakeholder engagements can help resource managers understand these perspectives, and illuminate the political, economic, and social contexts and circumstances driving different levels of support or opposition. The incorporation of stakeholder knowledge and perspectives can increase the equity of resulting management decisions and create public trust in the findings of research and decisions, reducing the chance for future disagreement (Bennett et al. 2017, Friedlander et al. 2013). USFWS recognizes strong interests in sea otter reintroduction and has committed to meaningful stakeholder and tribal engagement going forward.

To inform future decisions surrounding possible sea otter reintroductions, the objectives of this project were to: (1) identify the range of social science and human dimensions considerations that could and/or should be assessed specifically for sea otter reintroductions, (2) explore the diversity of stakeholder perspectives, interests, and opinions of sea otter reintroduction in Oregon and Northern California, and (3) provide guidance on potential strategies for engaging stakeholders in future sea otter reintroduction efforts and discussions. To accomplish these objectives, we carried out a range of activities, including convening an interdisciplinary panel of social scientists to develop social science research recommendations, informally engaging select stakeholders in Oregon and California to understand their perspectives, and integrating this information and advice with supporting information from a literature review of social science and species reintroductions into actionable stakeholder and tribal engagement strategies. This report represents the culmination of these efforts and serves as a roadmap for decision-makers and scientific experts to incorporate social science and human dimension considerations into any future sea otter reintroduction discussions and assessments.

While this report does address critical social science knowledge gaps and activities of sea otter reintroduction, it is not intended to fully consider the importance and implications of this topic to tribal communities. As we look to the future to understand what sea otter reintroduction might

mean for people and communities, we need to recognize that Indigenous Peoples' ways of life have already been altered. Through colonial policies and actions, connections between tribal communities, the environment, and sea otters were severely threatened and lost. Therefore, while this report aims to understand people's perspectives and how social science can provide us with a better understanding of this issue, these approaches and recommendations are based on western colonial ideals that do not represent and are not adequately designed to represent and consider tribal values, rights, history, and ways of life. We attempts to remedy this issue by including some recommendations specifically centered on tribal communities, but much more could and should be done to fully understand what sea otter reintroduction will mean for Indigenous Peoples.

Social Science Considerations of Species Reintroductions

Social science and human dimensions considerations can help decision-makers understand the public's opinion and potential level of support for species reintroduction, which is necessary for a socially sustainable effort (Riley & Sandström 2016, Clark et al. 2002, Kleimen et al. 1994). To understand what social science could be considered in future sea otter reintroductions, we collected and reviewed a handful of studies (total = 11) to assess what social science has been conducted in previous reintroduction efforts. These studies enlisted methodologies and approaches based on western ideals and should not be assumed to be applicable to or appropriate for fully understanding tribal values and sources of knowledge. Below, we summarized findings across studies, and provide a full list of included studies in the Appendices (Appendix 1).

Guidelines & Frameworks

We collected and reviewed 2 studies that provided guidance for incorporating social science and human dimensions into species reintroductions (Riley & Sandström 2016, IUCN/SSC 2013). These reports established four recommended stages of species reintroductions and detailed key social science and human dimensions considerations at each stage: Conceptualization, Feasibility, Implementation, and Learning (Fig. 1).

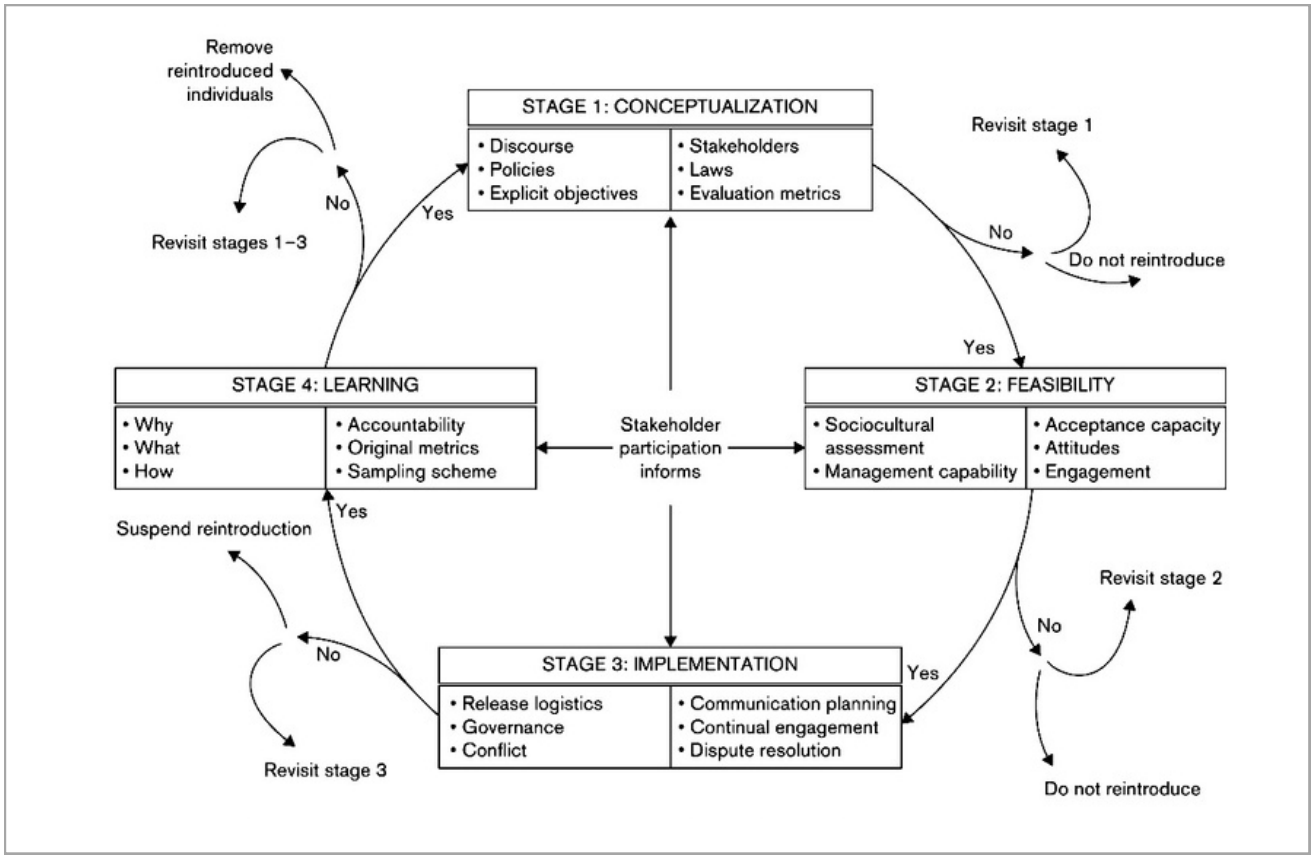

Figure 1. An adaptive process for reintroduction of fish and wildlife populations, with attention to human dimensions considerations. Key considerations are bulleted under each stage (Riley & Sandström 2016; expanded upon from IUCN/SSC 2013).

For this report, we focus on key social science and human dimension considerations in the early stages of species reintroduction (Conceptualization and Feasibility, to align with the current context resource managers face in considering stakeholder interests and feasibility of sea otter reintroduction. Further, the literature suggests human dimension considerations may be most critical at these early stages for sustained and ethical species reintroductions, which supports our attention on these early stages (Riley & Sandström 2016, Bekoff 1999, Kleiman et al. 1994).

Case Studies

We collected and reviewed 9 studies that assessed social science and human dimension considerations in species reintroductions. Below, we summarize the most common considerations across studies and discuss their significance in informing species reintroduction efforts and decisions.

Social Feasibility

Multiple studies assessed social feasibility. Feasibility, from a human dimensions perspective, includes a range of considerations, such as: sociocultural effects; a society's capacity to allow, support, and sustain a reintroduction; legal requirements; development of stakeholder participatory processes; and attitudes (Riley & Sandström 2016, IUCN/SSC 2013). The reviewed studies assessed social feasibility in several ways, such as a community's capacity to identify benefits of reintroduction and mitigate negative consequences, capacity to respond to change, and attitudes toward reintroduction and associated impacts, to name a few (Mayhew et al. 2016, Hiller 2015, Enck & Brown 2000, Enck & Decker 1999). Social feasibility is, itself, a stage of conducting species reintroductions with other human dimension considerations (e.g. attitudes, acceptance capacity) as core components of social feasibility (Riley & Sandström 2016). Below, we highlight these other considerations as standalone considerations, but highlight that these considerations can be used to understand the broader concept of social feasibility.

Attitudes

Attitudes were the most common consideration assessed in previous studies. Attitudes are psychological tendencies that are expressed by evaluating an entity with some degree of favor or disfavor (Eagly & Chaiken 1999). Assessments of attitudes, earlier rather than later in the reintroduction process, can (1) help identify potential conflicts, (2) forecast potential levels of support or opposition for reintroduction, and (3) provide an understanding of how people may adapt or respond to a reintroduction, which can all strengthen the design and guidance of the reintroduction effort (e.g. development of conflict mitigation measures and public relations activities) (Riley & Sandström 2016, IUCN/SSC 2013, Browne-Nunez & Taylor 2002). In the reviewed studies, attitudes were assessed for: the reintroduction effort or species, possible impacts of reintroduction, legal protections and management responsibilities, natural expansion versus reintroduction, and prior experiences with wildlife (Auster et al. 2020a, Auster et al. 2020b, Ma et al. 2016, Mayhew et al. 2016, Nilsen et al. 2007, Morzillo et al. 2007, Enck & Brown 2000).

Acceptance Capacity

Acceptance capacity was another common consideration. The capacity of society to allow, support, and sustain a reintroduction are critical considerations in social feasibility (Riley & Sandström 2016,

MacDonald 2009). Across the reviewed studies, acceptance capacity was often defined as a community's ability to respond to reintroduction, but also their level of support for reintroduction and management strategies, as well as their capacity to identify benefits of and mitigate consequences of reintroduction (Auster et al. 2020a, Ma et al. 2016, Enck & Brown 2000, Enck & Decker 1999). To measure acceptance capacity, these studies used proxies of social and physical community characteristics, such as community relations, regulations (e.g. legislation, public access), economic impacts, and social infrastructure (e.g. decision-making mechanisms, education and community infrastructure expenditures).

Risk Perception and Concern

Perceived risk is the degree to which people believe they are threatened by a hazard or danger (Siegrist & Cvetkovich 2000). From a species reintroduction perspective, these concerns often relate to potential impacts, damages, or costs from the effort and/or species being reintroduced. When concerns or risk perceptions are high, acceptance for the reintroduction tends to be low (Williams et al. 2002). Risk perception is highly correlated with attitudes, and previous efforts have found people tend to be less positive toward species (e.g. wolves) when they perceive threats to human safety, economics, and their ways of life (Riley & Sandström 2016, Browne-Nunez & Taylor 2002). Within the reviewed literature, risk perceptions were assessed to better understand these potential impacts to entities important to communities, such as economic gains, property, tourism visitation, human-wildlife interactions, cultural practices, and agency (Watkins & Poudyal 2021, Auster et al. 2020a, Auster et al. 2020b, Clark et al. 2016, Nilsen et al. 2007, Enck & Brown 2000).

Socioeconomic Circumstances

Lastly, almost all reviewed studies incorporated some set of social, economic, cultural, or legal factors as key drivers of the previous considerations discussed above: social feasibility, acceptance capacity, attitudes, risk perceptions and concerns, and level of support. For example, one study used demographic data to understand whether there were differences in public support for giant panda reintroduction between rural and urban residents in China. They found less support for reintroduction among rural residents, as opposed to urban, due to concerns over potential negative impacts to key livelihoods (e.g. farming) (Ma et al. 2016). Other common circumstances and factors included property values, presence of formal community and management decision-making mechanisms, economic impacts (e.g. market and non-market values), and expenditures (Watkins & Poudyal 2021, Clark et al. 2016, Ma et al. 2016, Hiller 2015, Morzillo et al. 2007, Enck & Brown 2000, Enck & Decker 1999).

Key Recommendations & Takeaways

- To support an ethical and equitable reintroduction decision-making process, the scientific literature recommends social science and human dimensions knowledge should be considered as early as possible in the reintroduction process (i.e. Conceptualization and Feasibility stages).
- Attitudes, social feasibility, acceptance capacity, risk perception and concerns, and socioeconomic circumstances, have all been commonly assessed in previous reintroduction efforts, and could be highly informative for future sea otter reintroductions.
- These findings represent a sample of common social science and human dimensions considerations assessed in previous efforts. To more fully understand potential considerations, it will be important to engage social scientists, stakeholders, and tribes to ensure the full spectrum of considerations (e.g. management capabilities, relevant policies, perspectives, and objectives) are represented.

Stakeholder Perspectives

The way reintroduction efforts are framed, discussed, and viewed (i.e. discourse) in the early stages of reintroduction can ultimately influence the feasibility of the effort. Discourse influences people's attitudes toward a reintroduction, and if discussions between groups with opposing views or attitudes is not facilitated or managed appropriately, this discourse can stall or hinder reintroduction decision-making. Understanding these views and perspectives early in the reintroduction decision-making process can help ensure the reintroduction meets societal needs (Riley & Sandström 2016). To assess the range of stakeholder perspectives regarding sea otter reintroduction, OST collaborated with USFWS to informally interview select individuals (referred hereafter as "interviewees") from diverse stakeholder groups (i.e. categories of individuals based on interests or ways of life) in Oregon and Northern California. To select stakeholder groups, we considered groups identified in the Southeast Sea Otter Stakeholder Meeting (Juneau, Alaska 2019). We made a final selection of stakeholder groups based on those groups likely to be affected by or concerned about sea otter reintroduction within the area of interest (IUCN/SSC 2013).

In total, 32 interviews were conducted from across the following stakeholder groups (Table 1): commercial fisheries (i.e. Dungeness crab, red sea urchin, fishing associations), recreational fisheries (i.e. charter organizations, sport fishing associations, abalone), seafood supply chain (i.e. processors, handlers, Commissions), ports, conservation interests (i.e. non-profits), and tourism and recreation (i.e. wildlife viewing, visitors associations). We did not interview every individual or group identified as potentially relevant to sea otter reintroduction. Most notably, we did not include key decision entities, such as tribal communities or resource agencies, in order to respect sovereignty and government-to-government or agency-to-agency relationships, respectively. While there are both formal and informal modes of the government to communicate and coordinate with tribes, tribes should not be considered as stakeholders and should, at minimum, be engaged in tribal consultation.

Table 1. Interviewees engaged from each stakeholder group from Oregon and California, combined.

Stakeholder Group	Number of Interviewees
Commercial Fisheries	9
Recreational Fisheries	5
Seafood Supply Chain	6
Port	3
Conservation Interests	5
Tourism & Recreation	4
TOTAL	**32**

During these engagements, we asked interviewees about their opinions of sea otter reintroduction, what information they would like to receive or see reflected in these discussions, and any recommendations for engaging stakeholders in future deliberations. We additionally asked interviewees who else we should engage as part of these conversations, and used a snowball sampling method to engage additional interviewees. Questions are included in Appendix 2.

Below, we summarize common perspectives, opinions, and interests across each stakeholder group. These perspectives do not necessarily reflect all potential opinions amongst stakeholders, only those of the interviewees, and are not intended to serve as a representation of each group's opinion. We note the majority of interviewees (62%; 20 out of 32 interviewees) represent fishing interests; therefore, there are likely to be other perspectives not reflected in this report that additional groups and decision entities (i.e. tribal communities, agencies, other coastal businesses) could provide in the future. While fisheries participants are undoubtedly an important stakeholder group, without broad public stakeholder engagement or interview approaches (i.e. formal social science research), we acknowledge the potential for this group's opinion to be over-represented. These initial engagements are instead meant to be a starting point for further stakeholder and tribal engagements by USFWS, and will not be the only opportunity for stakeholders to engage in these discussions going forward.

Management Plan(s) Prior to Reintroduction

One of the most common perspectives reported across all stakeholder groups was the need to have a management plan in place to respond to or mitigate unintended consequences, before any reintroduction efforts take place. Interviewees provided suggestions for these plans, such as establishing metrics of reintroduction success or failure, or setting population thresholds beyond which any exceedance of these thresholds would trigger and allow for management interventions, such as cullings. Some interviewees questioned the ability of managers to effectively control sea otter populations if consequences occurred, noting the inability to prevent sea otters from dispersing into "No Otter" zones during the previous San Nicolas Island sea otter translocation effort. Many interviewees, particularly those from commercial fisheries, raised concerns about proceeding with a reintroduction without any authority or ability to implement control measures, noting the Marine Mammal Protection Act (MMPA) as the main restriction.

Interviewees expressed interest in exploring tribal co-management opportunities to permit population control measures, such as tribal take rights and/or cullings or take. Other interviewees expressed interest in exploring reintroduction pilot projects or programs, where a small population of sea otters would be reintroduced at one or few locations as a test to see how reintroduction might play out, but interviewees mentioned that control measures would still need to be implemented in those instances.

Impacts on Fisheries

Several interviewees - particularly those within the commercial fisheries, seafood supply chain, and ports stakeholder groups - raised concerns over the potential impacts to fisheries and dependent livelihoods due to sea otter consumption of shellfish. Multiple interviewees, particularly those within Oregon, pointed to sea otter impacts to Dungeness crab and clam fisheries in Alaska and Washington as examples. In Northern California, most interviewees from commercial fisheries, recreational fisheries, seafood supply chain, and ports, raised concerns over potential impacts to abalone and red sea urchin populations, which are currently depleted due to kelp forest loss. These interviewees expressed concerns over returning a top predator into an already degraded ecosystem, noting the sea otter's return might threaten the chances for abalone and urchin recovery. Interviewees also noted potential "trickle down" effects on related coastal economies. This concern was raised especially for industries and economies dependent on commercial Dungeness crab fisheries, as the seafood supply chain is highly dependent on this fishery to operate year-round.

Other interviewees wanted to raise awareness that some impacts from sea otter reintroduction may not be experienced directly on the fishery or be economic in nature. These interviewees raised doubts over the ability to sustainably manage the commercial Dungeness crab fishery if sea otters depleted crab numbers, as well as potential harm to fishing cultures and traditions, which some interviewees felt were being overlooked in these conversations, but are nonetheless valuable to fishing communities. While most interviewees raised concerns over impacts to fisheries, some also recognized and appreciated sea otters for their ecological role and charisma. Given these concerns, some interviewees were amenable to unassisted sea otter expansion into historical habitats, but were not supportive of managers conducting reintroductions. In contrast, some interviewees (i.e. from recreational fisheries, conservation, tourism, and recreation groups) expressed doubt that sea otter numbers would be high enough to result in significant impacts to fisheries. Regardless, these interviewees acknowledged the importance of addressing these concerns.

Other Challenges to Fisheries

Interviewees, particularly from commercial and recreational fisheries, seafood supply chain, and ports, felt they were already over-regulated by current management and policy structures, and reintroducing sea otters might introduce additional restrictions to their operations and way of life. Some of these individuals pointed to previous examples, such as having to shift fishing grounds to avoid whale entanglements and limited or fully-prohibited fishing activity within marine reserves. Interviewees from Oregon noted additional concerns over potential restrictions due to offshore wind development. Interviewees also expressed apprehensions about the potential for accidental harm or mortality to sea otters from entanglement or entrapment in fishing nets or pots, and whether those interactions might result in penalties and/or additional gear restrictions. Interviewees raised other challenges for fisheries, such as climate change. Interviewees in Northern California were specifically concerned about returning a top predator that might add additional pressure on already depleted shellfish populations following kelp forest declines.

Ecosystem Restoration and Resilience

Most stakeholders representing recreational fisheries, tourism, conservation interests, and ports expressed support for reintroducing sea otters to restore the integrity of kelp forest ecosystems and benefit from associated ecosystem services. These interviewees also mentioned the potential to restore sea otters to their natural and rightful place in the ecosystem. Most interviewees were familiar and aware of the sea otter's ecological role in kelp forests and understood the rationale behind reintroducing sea otters to restore ecosystem health and function. Some interviewees from the recreational fisheries group were appreciative of these potential benefits for kelp-dependent finfish species they rely upon (e.g. rockfish, lingcod, and salmon) as part of their charter operations. Some of these charters also target Dungeness crabs within bays and estuaries, but they did not share the same concerns over depleting these populations as other interviewees. These views were not shared by all, and some interviewees were concerned about returning a top predator to an ecosystem where they have been absent for so long; noting there is likely a good reason why sea otters have not been able to return to these ecosystems by themselves.

Multiple interviewees - particularly within commercial fisheries, recreational fisheries, and conservation groups in Northern California – questioned whether sea otters would have the expected restorative effects on kelp forests given the presence of urchin barrens with poor prey quality (i.e. reduced gonads). They suggested that sea otters might be capable of maintaining function in the ecosystem once the initial causes of kelp collapse have been addressed, but not currently while the ecosystem is already degraded.

Tourism and Existence Values

Almost all interviewees recognized sea otters as charismatic species that many people value for both existence or intrinsic purposes. Several interviewees from the tourism and recreation, conservation interests, and ports believed sea otters would provide economic benefits by attracting visitors and tourists to coastal communities. Interviewees believed these benefits would be particularly fruitful for wildlife viewing operators, such as charter boats or kayak tours. Several interviewees expressed support for restoring sea otters as a means to return this top predator into its natural habitat and make the ecosystem whole once again. Most of these views came from the tourism and recreation and conservation interest groups. Some interviewees mentioned a sense of personal satisfaction in knowing that actions were being considered to return a species that had been eliminated through anthropogenic causes to its rightful place in the marine environment. They mentioned that this was the type of non-monetary value that often gets overlooked in evaluating benefits of reintroductions.

Key Recommendations & Takeaways

- The interviewees identified a range of perspectives of sea otter reintroduction in Oregon and Northern California, and are distilled into the following common themes:
  - The need to establish a management plan to respond to unintended consequences before a reintroduction is conducted;
  - Sea otter reintroduction may negatively impact fisheries reliant on shellfish via sea otter predation;
  - There may be additional restrictions and exacerbated challenges to fisheries with sea otter presence;
  - Sea otter reintroduction may provide benefits and ecosystem services via kelp restoration and increasing ecosystem resilience; and
  - Sea otter reintroduction may provide tourism and existence benefits.
- These perspectives represent some of the common opinions, but not all. To solicit additional perspectives going forward, resource managers may consider engaging other groups (e.g. coastal businesses) and decision-making entities (e.g. tribal communities, resource agencies) not engaged in this effort.

Social Science Research Recommendations

We convened an interdisciplinary team of social scientists (Social Science Panel) to provide scientific recommendations on what social science and human dimensions considerations should be assessed in future sea otter reintroductions. Members of the Social Science Panel, and their expertise, include: Dr. Kelly Biedenweg (Human Dimensions), Dr. Angee Doerr (Outreach & Engagement), Dr. Steven Dundas (Environmental and Natural Resource Economics), Dr. Peter Nelson (Anthropology, Indigenous & Native American Studies), Dr. Rebecca Niemiec (Social Psychology, Engagement). Below, we summarize those research recommendations and organize them into three strategies: (1) Conceptualization, (2) Sociocultural Effects & Management Capabilities, and (3) Acceptance Capacity & Attitudes. For each recommendation, we identify what social science should be considered and how (i.e. methods and approaches).

Conceptualization
The Social Science Panel first identified research recommendations to gain a better understanding of the policy, management, and community landscape (i.e. policies, laws, stakeholders, discourse) and key considerations for initial reintroduction planning (i.e. perspectives, needs, strategies, objectives, success criteria, etc.) (Table 2).

Sociocultural Effects & Management Capabilities
Next, the Social Science Panel provided research recommendations for assessing the potential effects (e.g. benefits, costs, risk) and implications of sea otter reintroduction on people and communities, as well as management opportunities of the species and for responding to potential consequences of the reintroduction (Table 3).

Acceptance Capacity & Attitudes
Lastly, to gain a full understanding of feasibility, the Social Science Panel identified research recommendations for understanding the acceptance capacity and attitudes, as well as potential drivers of acceptance (e.g. beliefs, norms, feelings, etc.), for sea otter reintroduction (Table 4).

Table 2. Conceptualization research recommendations.

No.	What (i.e. considerations)	How (i.e. methods, approaches)
1	Identify relevant stakeholders, tribes, and sectors (e.g. tribal communities, fisheries, tourism, conservation groups, etc.)	Network Analysis, Snowball interviews
2	Assess the range of stakeholder and tribal interests, perspectives, and needs	Surveys, Stakeholder & Community Meetings, Tribal Consultation
3	Determine tribal relationship(s) to sea otters to inform management and stewardship; integrate into 2*	Tribal Consultation, Focus Groups with multiple tribes, Historical Document Reviews
4	Assess traditional knowledge (TK) (e.g. stories, history, culture, health, and hunting practices); integrate into 2*	Tribal Consultation, Focus Groups with multiple tribes
5	Assess traditional ecological knowledge (TEK) (e.g. ID important species); integrate into 2*	Tribal Consultation, Focus Groups with multiple tribes, Systematic TEK Documentation
6	Identify long-term stakeholder and tribal information and planning needs	Surveys, Interviews
7	Establish social and ecological reintroduction goals, define success and how to monitor for success, and develop a shared stakeholder engagement process	Stakeholder Participatory Processes (e.g., Structured Decision-Making), Indicator Development and Ranking
8	Identify the range of possible reintroduction strategies, including objectives, barriers, motivations, and economic value for each	Non-Market Valuation Surveys, Focus Groups, Scenario Planning, Surveys, Vignettes & Stories, Structured Decision-Making
9	Determine which policies might facilitate or hinder reintroduction	Policy Analysis

* Any research, collection, or sharing of tribal data, information, or knowledge should include careful consideration and discussion around confidentiality so that Tribes can ensure information is used and represented appropriately. TK is distinct from TEK. TK generally relates to the knowledge, practices, beliefs, and cultures of Indigenous Peoples passed down through generations. While TEK generally relates to those same types of knowledge, practices, and beliefs specifically about the relationship between Indigenous Peoples and the environment or nature. TEK is its own ecological knowledge, and is not necessarily a social science and human dimensions source of knowledge.

Table 3. Sociocultural Effects & Management Capabilities research recommendations.

No.	What (i.e. considerations)	How (i.e. methods, approaches)
10	Determine aspects of reintroduction that people value (e.g. existence, ecosystem services & benefits, use, recreation)	Surveys, Focus Groups, Key Informant Interviews, Participatory Processes
11	Assess the spatial and temporal overlap between sea otters and human activities (e.g. fishing, renewable energy, tourism)	Participatory Mapping
12	Identify and quantify the potential impacts on tribal practices, activities, and opportunities (e.g. cultural, social, hunting, important species)	Tribal Consultation & Focus Groups, Surveys, Semi-Structured Interviews
13	Identify and quantify the potential impacts on fisheries and associated fishing communities and industries (e.g. Dungeness crab fishery, seafood supply chain)	Bioeconomic Modeling of important stocks in response to increased predation, Economic Analyses, Surveys, Semi-Structured Interviews
14	Determine tangible and intangible impacts of sea otter reintroduction (i.e. how people feel being connected to nature or engaging in social and cultural activities)	Holistic Wellbeing Assessment via Surveys and Interviews, Participatory Mapping
15	Assess and determine tribal values, rights, and importance of reintroduction, sea otters, and associated habitats and species (e.g. abalone, treaty rights, costs and benefits of power dynamics)	Tribal Consultation, Impact Assessments as part of Tribal Consultation
16	Assess the historical and cumulative impacts of sea otter absence and colonialism on tribes	Tribal Consultation
17	Quantify the economic value and costs of reintroduction, including willingness-to-pay, use values (i.e. recreation), and non-use values (i.e. existence, ecosystem health) *	Cost-Benefit Analysis, Non-Market Valuation Surveys, Surveys (i.e. cultural and social considerations), Economic Impact Analysis, Contingent Behavior Survey
18	Assess immediate and long-term tradeoffs between sectors, communities, and stakeholders informed by 15, 16, and 17 (e.g. tourism vs fishing; monetary costs to livelihoods vs existence benefits)	Multi-Criteria Decision Analysis, Cost-Benefit Analysis
19	Develop management plans for managing sea otters (e.g. population size, dispersal) and responding to effects (i.e. impacts, benefits, costs), including an assessment of management capacity to uphold these plans	Scenario Planning
20	Identify opportunities for tribal co-management activities (e.g. take rights, hunting, MMPA amendments, access to resources)	Tribal Consultation with individual tribes and resource agencies
21	Identify (and/or identify the need to establish) financial or policy mechanisms to funnel reintroduction value to communities	Governance Analysis

*** Table 3 on previous page:** Economic analyses, which typically use monetary values as a common currency, may not be appropriate for incorporating tribal values. An economic analysis should be conducted and compared alongside tribal consultation and assessments of tribal values, instead of integrated together. These assessments should focus on both the historical and cumulative impacts to tribal communities, as described in 16.

Table 4. Acceptance Capacity & Attitudes research recommendations.

No.	What (i.e. considerations)	How (i.e. methods, approaches)
22	Determine level of support or opposition for reintroduction, interventions, and decision-making and engagement processes	Surveys, Interviews, Focus Groups
23	Assess attitudes, values, beliefs (e.g. trust, transparency), perceptions, and norms influencing reintroduction support	Surveys, Interviews, Workshops
24	Evaluate social conflict and drivers of conflict	Surveys, Interviews, Participatory Stakeholder Engagement Processes
25	Evaluate sense of agency, and needs and opportunities for agency	Surveys, Interviews, Participatory Stakeholder Engagement Processes
26	Quantify risk & uncertainty (perceptive and objective)	Surveys, Interviews, Focus Groups
27	Evaluate behavioral responses to reintroduction, and drivers of responses (e.g. power dynamics, uncertainty & risk, attitudes, values, motivations, barriers)	Surveys, Focus Groups, Ethnographic Techniques, Interviews, Community- & Individual-Level Risk Perceptions
28	Assess outreach behavior change (i.e. how people respond to and interpret messaging)	Focus Groups, Field & Online Experiments

Key Recommendations & Takeaways

- The Social Science Panel provided 29 research recommendations, categorized into the following strategies for understanding the human dimensions of sea otter reintroduction:
  - Conceptualization: understand the policy, management, and community landscape (i.e. policies, laws, stakeholders, discourse) and key considerations for initial reintroduction planning (i.e. perspectives, needs, strategies, objectives, success criteria, etc.);
  - Sociocultural Effects & Management Capabilities: assess potential effects (e.g. benefits, costs, risk) and implications of sea otter reintroduction on people and communities, as well as management opportunities of the species and for responding to potential consequences of the reintroduction; and
  - Attitudes & Acceptance Capacity: assess the acceptance capacity and attitudes, as well as potential drivers of acceptance (e.g. beliefs, norms, feelings, etc.), for sea otter reintroduction.

Stakeholder & Tribal Engagement Recommendations

Engaging stakeholders, and purposefully building stakeholder participatory activities into decision-making, can improve the quality and legitimacy of the reintroduction process (Riley & Sandström 2016, Chase et al. 2004). To develop guidance on potential practices for engaging stakeholders and tribes in future sea otter reintroduction discussions, we combined recommendations provided by the Social Science Panel and interviewees from each stakeholder group. Using this feedback, we developed suggested stakeholder and tribal engagement recommendations (total = 24) that could be conducted in future sea otter reintroduction efforts, discussions, and deliberations. Engagement recommendations are categorized according to following strategies (Tables 5 - 8): (1) Engage early and often with tribal communities focusing on meaningful consultation that upholds sovereignty, (2) Co-develop reintroduction goals, interventions, and management and mitigation plans with stakeholders and tribes, (3) Build broad stakeholder participation into reintroduction and decision-making processes, and (4) Conduct outreach and education activities to raise awareness among stakeholders.

Engage early and often with tribal communities focusing on meaningful consultation that upholds sovereignty

Table 5. Engagement recommendations for engaging and consulting tribal communities.

No.	Recommendation
1	Federal resource agencies and government work alongside tribes to make decisions together, but trust will need to be established first
2	Establish a separate engagement process with tribal communities from stakeholders, but invite tribal communities to other stakeholder engagements
3	Consider each tribe's input as a unique sovereignty, not as a combined conglomerate
4	Ensure tribes not formally recognized by the federal government are included in these discussions
5	Respect sovereignty and confidentiality with data ownership and sharing (i.e. tribes own their own data; do not share data without tribal approval)
6	Establish confidentiality and data ownership and use agreements with tribal communities
7	Emphasize discussions on reclaiming and/or reviving cultural practices, as well as access to land and resources

Build broad stakeholder participation into reintroduction and decision-making processes

Table 6. Engagement recommendations to build broad stakeholder participation.

No.	Recommendation
8	Establish and clearly communicate decision-making process and timing to stakeholders and tribes, communicating this process is independent with no predetermined outcomes
9	Select stakeholder participants in a systematic and transparent manner, starting with an open call for applications, then selecting final stakeholder participants using a clear and communicated inclusion criteria
10	Focus on engaging stakeholders likely to be affected by or perceived to be affected by sea otter reintroduction; prioritizing fisheries, seafood supply chain, aquaculture farming, tourism and recreation, offshore wind, tribal communities, and state agencies
11	Build relationships and partnerships with organizations and agencies* that can help identify stakeholder participants and how best to contact them (e.g. email, phone, newsletter, etc.)
12	Co-develop engagement plans with stakeholders and tribal communities to understand their goals, needs, and opportunities for agency and engagement in decision-making process based on how they would like to be engaged and what local or traditional knowledge they would like considered
13	Design reintroduction in an adaptive manner to provide opportunities for broad stakeholder participation and engagement based on their interests, needs, and concerns, and break down social conflicts

*Recommended organizations in Appendix 4.

Co-develop reintroduction goals, interventions, and management and mitigation plans with stakeholders and tribes

Table 7. Engagement recommendations to co-develop goals, intervention, and plans.

No.	Recommendation
14	Conduct a combination of stakeholder- and community-specific engagement meetings and workshops to establish reintroduction goals and understand their perspectives, needs, and questions according to recommendation 13
15	Co-lead engagements with a trusted neutral facilitator who does not have a stake or vested interest in the reintroduction outcomes, interventions, or policy options
16	Explore engagement venues and settings best suited for stakeholder groups involved (e.g. meeting fishermen at dock, ports, and established meeting venues*)
17	Co-develop a diverse set of interventions and mitigation solutions with stakeholders and tribes using scenario-based planning exercises; especially the commercial Dungeness crab fishery
18	Engage stakeholders in a participatory mapping exercise to identify potential overlaps in sea otter habitat and areas important to communities to inform potential reintroduction or pilot study sites; prioritize this exercise for fisheries
19	If potential reintroduction or pilot sites are identified, enlist a structured decision-making process to allow stakeholders to see how their feedback leads to potential interventions, solutions, and actions

* Meeting venues recommended (but are not limited to): Pacific Fisheries Management Council, Ocean Protection Council, California Fish & Game Commission, Tillamook Bay Clam Advisory Committee (ODFW)

Conduct outreach and education activities to raise awareness among stakeholders

Table 8. Engagement recommendations to conduct outreach and education activities.

No.	Recommendation
20	Develop messages and structure conversations based on research that identifies stakeholder communication preferences and needs
21	Engage tribes and stakeholders, as active participants, in scientific research and educational outreach to build trust around scientific results; prioritize fishing participants
22	Conduct a pro-science interactive education outreach campaign, focusing on communicating and providing information needs identified by tribes and stakeholders
23	Target outreach and education activities in areas where sea otters are anticipated to occur
24	Target port and county commissioners for outreach and education activities (via public meetings, presentations, one-on-one meetings) as they will likely discuss sea otter reintroduction with community members
25	If reintroduction is conducted, engage community members in citizen science activities for shared stewardship responsibilities

* Meeting venues recommended (but are not limited to): Pacific Fisheries Management Council, Ocean Protection Council, California Fish & Game Commission, Tillamook Bay Clam Advisory Committee (ODFW)

Key Recommendations & Takeaways

- By combining feedback from the Social Science Panel and stakeholders, we synthesized 25 stakeholder and tribal engagement recommendations, categorized into the following strategies for ensuring broad, equitable, and inclusive participation:
  - Engage with tribal communities focusing on meaningful consultation that upholds sovereignty;
  - Build broad stakeholder participation into reintroduction and decision-making processes;
  - Co-develop reintroduction goals, interventions, and management and mitigation plans with stakeholders and tribes; and
  - Conduct outreach and education activities to raise awareness among stakeholders.
- Any activities and recommendations that engage early and often with tribal communities focusing on meaningful consultation that upholds sovereignty (Tables 5) and build broad stakeholder participation into reintroduction and decision-making processes (Table 6), collectively, were seen as critical for these early considerations of sea otter reintroduction.

Discussion

Resource managers are currently responding to interests and calls for understanding the feasibility of sea otter reintroduction to Oregon and Northern California, but have not yet proposed or decided whether they will proceed with such efforts. Given the potential tradeoffs of sea otter reintroduction and diversity of stakeholder perspectives, there is a need to advance social science research and engage stakeholders and tribes to fully understand what sea otter reintroduction might mean for stakeholders and tribal communities. To address this need, this project (1) identified the range of social science and human dimensions considerations that could and/or should be assessed specifically for sea otter reintroductions, (2) explored the diversity of stakeholder perspectives, interests, and opinions of sea otter reintroduction in Oregon and Northern California, and (3) provided guidance on potential strategies for engaging stakeholders in future sea otter reintroduction efforts and discussions.

Environmental nonprofits and tribal communities have been advocating for sea otter reintroduction for several years in Oregon, and other interests have responded with concerns over the potential negative impacts to fisheries and other coastal economies. We engaged a diverse group of stakeholders to more fully understand these perspectives on this issue. Across all stakeholder groups engaged in this project, we identified some common perspectives of sea otter reintroduction, including concerns of potential impacts to fisheries via sea otter predation on shellfish and potential additional restrictions on fishing practices due to stringent federal laws (i.e. MMPA). In contrast, stakeholders also reported potential benefits and ecosystem services of sea otter reintroduction, notably restoration of kelp forests, increased ecosystem resilience and health, and boosts in tourism. Despite these differing perspectives, several stakeholders commonly expressed the need to establish a clear management plan to respond to unintended consequences. These perspectives present an opportunity for resource managers to bring stakeholders together in a collaborative manner to identify management plans and interventions for how to respond to sea otter reintroduction outcomes, even if they hold different perspectives.

There are several social science approaches and strategies that can help resource managers better understand stakeholder perspectives and potential levels of support for sea otter reintroduction, yet little social science research has been conducted on this specific topic to date. Now is an opportune time to invest in and advance social science research, as consideration of human dimensions at this early stage of sea otter reintroduction will help facilitate a more sustainable and ethical decision-making process. Previous reintroduction efforts for other species have included several social science and human dimensions considerations (i.e. attitudes, social feasibility, acceptance capacity, risk perception and concerns, and socioeconomic circumstances). These considerations will be informative for sea otter reintroduction, but they do not represent the full range of considerations that should be incorporated. In particular, given the likely tradeoffs of sea otter reintroduction impacts, as well as stakeholder concerns, interests, and needs for pre-reintroduction management plans, resource managers should consider assessing the range of social science and human dimension considerations recommended by the Social Science Panel.

Immediate investment in advancing social science research and stakeholder and tribal engagement is a top priority for resource managers. The Social Science Panel made a total of 29 social science and human dimension research recommendations, and several additional recommendations for engaging stakeholders and tribes in future sea otter reintroductions. After combining the Panel's input with stakeholder feedback, we synthesized 25 stakeholder and tribal engagement recommendations for resource managers. Research recommendations addressed several critical knowledge gaps to increase our understanding of the policy and community landscapes, reintroduction planning needs, effects, management capabilities, acceptance capacity, and attitudes. Stakeholder and tribal engagements, on the other hand, will help resource managers engage in meaningful tribal consultation, build broad stakeholder participatory processes, co-develop reintroduction goals and management plans, and conduct outreach and education activities. To better align these recommendations with the current state of potential sea otter reintroduction deliberations, the Social Science Panel recommends that resource managers prioritize the following recommendations at this moment in time (Table 9):

Table 9. Top research and engagement recommendations to advance sea otter reintroduction decision-making processes.

Top Research Recommendations	Top Stakeholder & Tribal Engagement Recommendations
Identify relevant stakeholders, tribes, and sectors (e.g. tribal communities, fisheries, tourism, conservation groups, etc.).	Establish a separate engagement process with tribal communities from stakeholders, but invite tribal communities to other stakeholder engagements.
Assess the range of stakeholder and tribal interests, perspectives, and needs.	Establish and clearly communicate decision-making process and timing to stakeholders and tribes, communicating this process is independent with no predetermined outcomes.
Establish social and ecological reintroduction goals, define success and how to monitor for success, and develop a shared stakeholder engagement process.	Co-develop engagement plans with stakeholders and tribal communities to understand their goals, needs, and opportunities for agency and engagement in decision-making process based on how they would like to be engaged and what local or traditional knowledge they would like considered.

Taken together, these top recommendations will advance key considerations and activities of sea otter reintroduction decision-making in a well-informed and inclusive manner. By first assessing the diversity of perspectives across stakeholders and tribes, resource managers will be well-positioned to co-develop an engagement process that adequately provides opportunities for meaningful

stakeholder input in the decision-making process. These engagement processes will need to account for the range of perspectives, interests, and needs, including potential social conflict that may arise. Not accounting for these conflicting views may ultimately derail or delay the decision-making process later on. Therefore, it will be crucial to deliberately build in engagement activities to break down the drivers and assumptions of social conflict, focusing on productive conversations about the hopes, values, and even fears of the reintroduction effort itself and other participants. These conversations will ultimately facilitate trust and transparency in the decision-making process and future conversations around the accuracy of scientific information.

Addressing these recommendations first will also directly inform which subsequent research and engagement recommendations should be tackled next (e.g. economic analyses, developing scientific messages for the broader public). Social scientists can help prioritize which additional research and engagement activities will best advance understanding of societal implications for sea otter reintroduction. Many of these research and engagement activities can and should be conducted simultaneously, as they will inform and reinforce each other; research to better understand a community's desired outcomes of a potential reintroduction, for example, will also contribute to the overall sense of the community in being engaged.

As previously discussed, some of these activities may fall short in addressing the full spectrum of tribal values, rights, and experiences that should be considered for this topic. As such, resource managers should consider formally engaging tribal communities in meaningful consultation to understand not just how their ways of life may change in the future, but also how they have already been impacted by the absence of sea otters to date. Ultimately, these activities will fill critical knowledge gaps around the key social dimensions of sea otter reintroductions, and aid in the development of an inclusive and equitable decision-making process.

Key Recommendations & Takeaways

- Given the current state of, and interest in, sea otter reintroduction in Oregon and Northern California, the Social Science Panel recommends addressing the following research and engagement recommendations first in Table 9. Social scientists can help identify additional research and engagement recommendations and activities that will advance these decision-making processes, going forward.
- Social science research and engagement activities can and should be conducted in parallel, as many of these activities can simultaneously fill critical knowledge gaps while helping to facilitate an inclusive and broad participatory process. These activities will help ensure a well-informed and equitable reintroduction decision-making process is made.
- Resource managers should consider seeking additional opportunities to formally engage tribal communities to better understand how their ways of life may be impacted in the future as well as how they have already been impacted by the absence of sea otters to date.

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Appendices

Appendix 1. References for guidance and frameworks and case studies within the Social Science Considerations of Species Reintroductions report section.

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Appendix 2. Questions posed to interviewees to understand stakeholder perspectives. Each interviewee was asked these same set of questions, but we allowed for the conversation to deviate to other topics raised by the interviewees.

1. What are your initial reactions or thoughts on the idea of potentially reintroducing sea otters? What does this topic bring up for you?

2. If scientists and managers were to further explore this issue, what would you like to see? What information would you want to hear?

3. Do you have any recommendations for us on how scientists and/or managers can engage and involve stakeholders?

4. Is there anyone else we should talk with?

Appendix 3. Glossary with definitions of social science methods and approaches detailed in Social Science Research Recommendations (Tables 1 - 3).

Bioeconomic Model: analytical tools that integrate biophysical and economic models and allow for analysis of biological and economic changes caused by human activity.

Community-Level Assessment: the process of identifying the strengths, assets, needs and challenges of a specified community.

Contingent Behavior Survey: a survey-based approach to assess willingness-to-pay or valuation of resources or a suite of policy options.

Cost-Benefit Analysis (CBA): a method for assessing the economic efficiency of proposed public policies through the systematic prediction of social costs and social benefits; CBAs enable a direct comparison of the costs and benefits of an alternative or a comparison of their magnitudes with those of other types of social investments.

Economic Impact Analysis (EIA): a methodology for evaluating the impacts of a project, program or policy on the economy of a specified region.

Ethnographic Techniques: research approaches that study people from within their own cultural setting, with the goal of producing an in-depth account of people within a group or organization.

Focus Groups: a form of group interview that is based on communication between research participants in order to generate data, and explicitly uses group interaction as part of the interview approach.

Governance Analysis: examines key aspects of the processes of governance (political, economic, civil society) and focuses in on the dynamics of these relationships

Holistic Wellbeing Assessment: assessments of both subjective wellbeing, which is defined by each individual (e.g. personal happiness, values, preferences), and objective wellbeing, which is defined by others (e.g. Gross Domestic Product, Human Development Index).

Indicator Development and Ranking: exercises to develop and rank indicators of success using established criteria.

Interviews: a method of data collection that involves two or more people exchanging information through a series of questions and answers.

Key Informant Interviews: interviewing a select group of individuals who are likely to provide needed information, ideas, and insights on a particular subject or community.

Multi-Criteria Decision Analysis: systematic methodology to combine multiple inputs, considerations, and factors (non-monetary in many cases) to compare alternative courses of action and solutions (e.g. policy decisions).

Network Analysis: a set of integrated techniques to depict relations among actors and to analyze the social structures that emerge from the recurrence of these relations.

Non-Market Valuation Surveys: survey approach to assess the non-monetary value or preference of a suite of options or resources.

Participatory Mapping: a set of approaches and techniques that combines the tools of modern cartography with participatory methods to record and represent the spatial knowledge of local communities.

Policy Analysis: the process of identifying potential policy options that could address an issue and then evaluating those options to choose the most effective, efficient, and feasible one.

Stakeholder Participatory Processes: processes that enable stakeholders to understand, participate, and influence decision-making processes that may interest or affect them.

Scenario Planning: techniques used to articulate mental models about the future with stakeholders in order to jointly make decisions.

Semi-Structured Interviews: a method of data collection that involves two or more people exchanging information through a series of questions and answers, but this exchange is allowed to be flexible and deviate to new topics and issues brought up by the interviewee.

Snowball Interviews (i.e. snowball sampling): is an interview recruitment technique in which research participants are asked to assist researchers in identifying other potential subjects.

Structured Decision-Making: an approach for careful and organized analysis of natural resource management decisions that includes making decisions based on clear objectives, recognizing the role of scientific predictions in decisions, dealing explicitly with uncertainty, and responding transparently to societal values in decision making.

Surveys: a research method involving the use of standardized questionnaires or interviews to collect data about people and their preferences, thoughts, and behaviors in a systematic manner.

Systematic TEK Documentation: documentation of traditional ecological knowledge in various forms (e.g. writings, notes, digitization of manuscripts, photography, film) for varying purposes (e.g. organizing and preserving for future generations, collaborating with partners, positive intellectual property protection).

Tribal Consultation: a formal, two-way, government-to-government dialogue between official representatives of Tribes and federal and state agencies to discuss proposals before the agencies make decisions on those proposals.

Vignettes & Stories: short stories about hypothetical characters in specified circumstances, to whose situation the interviewee is invited to respond to, providing a less threatening way of discussion sensitive topics.

Appendix 4. Organizations recommended, but are not limited to, to help identify stakeholder participants.

California Department of Fish & Wildlife
California MPA Collaborative
California Sea Grant
California Sea Urchin Commission
Coastal Oregon Marine Experiment Station
Dungeness Crab Commission
Elakha Alliance
Greater Farallones Association (GFA)
Kelp Ecosystem Landscape Partnership for Research on Resilience (KELPRR)
Native American Heritage Commission in California
Newport Fishermen's Wives
NOYO Marine Center
Oregon Chapter Surfrider Foundation
Oregon Coast Visitors Association
Oregon Department of Fish & Wildlife
Oregon Kelp Alliance
Oregon Sea Grant
Oregon Shores Conservation Coalition
Port Managers & Commissions
ReefCheck
Sierra Club
Sport Fishing Associations
Watermen's Alliance
West Coast Seafood Processors Association