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Contributed Paper

Sea otters, social justice, and ecosystem-service perceptions in Clayoquot Sound, Canada

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Abstract: *We sought to take a first step toward better integration of social concerns into empirical ecosystem service (ES) work. We did this by adapting cognitive anthropological techniques to study the Clayoquot Sound social-ecological system on the Pacific coast of Canada's Vancouver Island. We used freelisting and ranking exercises to elicit how locals perceive* ESs *and to determine locals' preferred food species. We analyzed these data with the freelist-analysis software package ANTHROPAC. We considered the results in light of an ongoing trophic cascade caused by the government reintroduction of sea otters (*Enhydra lutris*) and their spread along the island's Pacific coast. We interviewed 67 local residents (*n = *29 females,* n = *38 males;* n = *26 self-identified First Nation individuals, and* n = *41 non-First Nation individuals) and 4 government managers responsible for conservation policy in the region. We found that the mental categories participants—including trained ecologists—used to think about ESs, did not match the standard academic ES typology. With reference to the latest ecological model projections for the region, we found that First Nations individuals and women were most likely to perceive the most immediate ES losses from the trophic cascade, with the most certainty. The inverse was found for men and non-First Nations individuals, generally. This suggests that 2 historically disadvantaged groups (i.e., First Nations and women) are poised to experience the immediate impacts of the government-initiated trophic cascade as yet another social injustice in a long line of perceived inequities. Left unaddressed, this could complicate efforts at multistakeholder ecosystem management in the region.*

Keywords: antropología cognitiva, aversión por la pérdida, cercano a la costa, costero, inequidad, personas indígenas, servicios ambientales

Nutrias Marinas, Justicia Social y Percepción de los Servicios Ambientales en la Sonda de Clayoquot, Canadá

Resumen: *Buscamos dar el primer paso hacia la integración de las preocupaciones sociales dentro del trabajo empírico de los servicios ambientales (SA). Hicimos esto al adaptar técnicas antropológicas cognitivas al estudio del sistema socio-ecológico de la Sonda de Clayoquot en la costa del Pacífico de la Isla de Vancouver en Canadá. Utilizamos ejercicios de clasificación y listados libres para obtener la percepción local de los SA y para determinar las especies alimenticias preferidas de habitantes locales. Analizamos estos datos con el paquete de software de análisis de listados libres ANTHROPAC. Consideramos los resultados a la luz de una cascada trófica en desarrollo causada por la reintroducción por parte del gobierno de la nutria marina (*Enhydra lutris*) y su expansión a lo largo de la costa del Pacífico de la isla. Entrevistamos a 67 residentes locales (*n = *29 mujeres,* n = *38 hombres;* n = *26 auto-identificados como individuos de las Primeras Naciones,* n = *41 individuos no pertenecientes a las Primeras Naciones) y a cuatro administradores gubernamentales responsables de la política de conservación en la región. Encontramos que las categorías mentales de los participantes – incluyendo a los ecólogos preparados – utilizadas para pensar sobre los SA no empataban con la tipología académica estándar de los SA. Con referencia a las últimas proyecciones de los modelos ecológicos para la región, encontramos que los individuos de las Primeras Naciones y las mujeres tenían*

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la mayor probabilidad de percibir las pérdidas de SA más inmediatas a partir de la cascada trófica con la mayor certidumbre. En general, se encontró lo inverso con los hombres y los individuos no pertenecientes a las Primeras Naciones. Esto sugiere que los dos grupos en desventaja históricamente (es decir, las Primeras Naciones y las mujeres) están preparados para sufrir los impactos inmediatos de la cascada trófica iniciada por el gobierno como una injusticia social más en una larga línea de inequidades percibidas. Si esto no se trata, podría complicar los esfuerzos del manejo ambiental de multiaccionistas en la región.

Palabras Clave: coastal, cognitive anthropology, ecosystem services, indigenous people, inequality, loss aversion, nearshore

Introduction

Over the past 2 decades, the ostensibly anthropocentric ecosystem service (ES) framework has gained remarkable traction as a tool for mainstreaming conservation. We refer to *ecosystem services* broadly as the things, or processes, nature renders unto humans (as per Daily [1997] and MA [2005]). As the ES framework has grown in popularity, many have written of a need to attend to social, distributional, or equity concerns. This argument takes broadly 2 forms: critiques of an unreflective ES approach (e.g., Menzel & Teng 2009; Kosoy & Corbera 2013; Chan et al. 2012*b*; Schroter et al. 2014) and frameworks and guidelines for how social, cultural (e.g., Chan et al. 2012*b*; Ban et al. 2013; Raymond et al. 2013), and distributional (e.g., Tallis et al. 2008; Daw et al. 2011; McDermott et al. 2013) factors could, in theory, be integrated into ES assessments. Yet, with the exception of some payment for ESs assessments (e.g., Chen et al. 2009; García-Amado et al. 2011), relatively few published ES case studies explicitly focus on what are often interlinked social, cultural, and distributional factors.

We took an initial step toward remedying this knowledge gap. We adapted basic cognitive anthropology methods to an ES study of the Clayoquot Sound UNESCO Biosphere Reserve on the west coast of Vancouver Island (WCVI), Canada. There, a reintroduction and recent boom in the once decimated sea otter (*Enhydra lutris*) population is having substantial, rapidly cascading effects on the local nearshore ecosystem (Markel 2011; Watson & Estes 2011; Singh et al. 2013; Markel & Shurin 2015). As sea otters continue to multiply and spread unimpeded under the protection of Canada's Species at Risk Act, the mammal comes into direct competition with humans for edible shellfish and other marine invertebrates (Levine et al. 2015) (Supporting Information). Specifically, otters are widely perceived by the many coastal Nuu-Chah-Nulth First Nations to target species of clams and sea urchins (*Strongylocentrotus purpuratus*) that have historically been prized foods of these nations (McKechnie 2007; Levine et al. 2015) (Supporting Information).

Yet, without predation pressure from otters, sea urchins tend to decimate kelp beds (Espinosa-Romero et al. 2011). Thus, ecologists and many non-First Nations laypeople see the otters' spread as a normatively positive return to an earlier, more natural and biodiverse equilibrium characterized by denser, more ubiquitous kelp beds (Espinosa-Romero et al. 2011; FOC 2013) (Supporting Information). The imminent shift in ecosystem state initiated by the Canadian government's reintroduction of sea otters constitutes a classic trophic cascade (Markel & Shurin 2015). Because sea otters are a charismatic species, their successful expansion down WCVI has also been lauded by some as a golden opportunity for the local ecotourism industry (FOC 2004; Loomis 2006).

However, such positive assessments are relatively low resolution, meaning they do not reflect the nuance of the region's demographic makeup. They do not, in other words, reveal who is most likely to experience what kinds of gains or losses from the trophic cascade, over what time span. For instance, despite recent signs of increasing integration of First Nations into the wider market economy, few First Nations individuals in Clayoquot Sound are employed in ecotourism. As of 2016, only 1 of over 20 formal-sector ecotourism businesses in the area is First-Nations owned (L. Loucks, personal communication). Rather, the industry is still dominated by nonindigenous owners and transient or seasonal workers (L. Loucks, personal communication).

The projected ecological effects of the sea otter's return fall along a spectrum of scientific uncertainty. Although ecological data strongly suggest that the trophic cascade will foster more biodiversity in kelp beds (Espinosa-Romero et al. 2011; Markel 2011; Markel & Shurin 2015), the ambiguities of current ecological models (Espinosa-Romero et al. 2011; E. Gregr, personal communication) suggest that some projected effects are more certain to materialize than other vaguely hypothesized ones.

There is strong empirical evidence from the local ecosystem that in addition to otters' aforementioned consumption of invertebrates, otter-driven growth in kelp beds leads to greater abundance in demersals such as lingcod (*Ophiodon elongatus*), kelp greenling (*Hexagrammos decagrammus*), and multiple species of rockfish (*Sebastes* and *Scorpaenichthys*) (Markel 2011; Markel & Shurin 2015). Both these effects are reported as relatively certain (Markel 2011; Singh et al. 2013; Markel & Shurin 2015). Less certain is that growth in kelp beds will lead to higher survival rates for juvenile salmon or herring

(E. Gregr, personal communication). All else being equal, some research in otter-absent ecosystems suggests that this latter scenario is plausible (e.g., Shaffer 2004; Mumford 2007). However, as yet, there is no published empirical evidence from otter-populated WCVI to support it. In fact, in the case of herring, there is some evidence from otter-populated Alaska to the contrary (Lee et al. 2009).

When considered through a combined social-ecological lens, the asymmetry in the likelihood of these various effects has social repercussions. Evidence suggests contrasts in how different demographic groups (i.e., First Nation individuals vs. non-First Nation individuals, men vs. women, and local laypeople vs. government managers) perceive (Levine et al. 2015) and value those components of their shared ecosystem likely to be affected by otters (see below and Supporting Information).

This is relevant because relations among First Nations and multiple other stakeholders on the WCVI are already inherently tense due to years of controversial settler-colonial policies and continuing resource-rights litigation (Schreiber & Newell 2006; Okerlund 2007; Harris 2008). Divergent normative interpretations, and perceived inequities, in the benefits and losses wrought by the nascent trophic cascade thus threaten to further strain multistakeholder relations, which could impede effective, socially inclusive management.

We investigated this prospective tension through a multidisciplinary approach. We examined the different valuations of ESs and species among various demographic groups in Clayoquot Sound UNESCO Biosphere Reserve. We chose Clayoquot Sound because of its relatively high population of both First Nations and non-First Nations residents; its status as a biosphere reserve and regional ecotourism hub; and, crucially, because of the imminent spread of sea otters southward throughout Clayoquot Sound. (They are no longer limited to far northwest Vancouver Island, where they were first reintroduced.)

Methods

Prior to the collection and analysis of data reported in this paper, we conducted a limited series of in-depth interviews ($n = 5$ First Nation participants and $n = 4$ non-First Nation participants) and convened a focus group in 2 adjacent remote communities in Kyuquot Sound. Located 140 km northwest of Clayoquot Sound, Kyuquot Sound is where sea otters were first reintroduced in the late 1960s and early 1970s, and is thus where the species has been present the longest. (See Supporting Information for a complete description of methods and key results.) The results of this exploratory round of data collection suggested cultural differences in environmental perception and valuation, particularly around the issue of sea otters and their prey. This outcome led us to query whether a similar pattern existed in the more densely populated communities of Clayoquot Sound, to the south, where otters were, at the time, gradually beginning to spread. This second round of inquiry constitutes the focus of this paper. Our study was conducted under approval of the University of British Columbia's Behavioural Research Ethics Board (H11-00835).

The primary method we applied in Clayoquot Sound was a structured-interview protocol that involved listing and sorting tasks. (See Supporting Information for the complete protocol.) The relevant end products of these tasks were 2-fold. One was a list (known as a freelist) of the local ESs that each participant could bring to mind in the order the services occurred to them. In our interaction with participants, we avoided using the potentially mystifying term *ecosystem services* and instead asked them to list "things that nature does for people, or gives people, here on the west coast of Vancouver Island." Participants were provided a series of blank flash-card sized pieces of paper and asked to write down one ES per piece of paper as the ES occurred to them. The ESs that participants listed were recorded in the order in which participants listed them. Participants were then asked to physically reorder the ESs they had listed from most to least important as defined subjectively by the participant. We asked participants which local species they deemed most important across 4 dimensions of value (personal importance, food preference, economic value, and ecological value) and recorded them in the order they were listed. (See Supporting Information for the full protocol.) The value dimension of concern here was food preference. Although food and its collection have numerous important dimensions of both subsistence and cultural value for ecosystem-dependent communities such as the Nuu-Chah-Nulth (Chan et al. 2012*b*), to be as conservative as possible in our analysis, we focused our elicitation on only the narrowest dimension: consumptive preference or "tastiness " (see Discussion).

We sorted and coded the listed items into a minimally reductive subset of item names to facilitate the inductive value of the subsequent analysis while preserving as much of the participants' original conceptual category structure as possible. We then used the freelist-analysis software package ANTHROPAC to calculate a group-level measure of the relative importance of each of the listed items (i.e., ES and species codes) within the rubric of each respective listing and ranking activity. The software assigned each item a Smith's salience index value (S) on a scale of zero to one. (See Supporting Information for the relevant formula and Smith and Borgatti [1997] for a detailed description.) The group-level results were analyzed across 3 contrasting axes of demographic difference: First Nation versus non-First Nation participants, men versus women, and general public versus government managers. (See Supporting Information for a detailed rationale behind our selection of demographic groups.) The end

results were sets of commensurable quantitative data on the environmental values of each demographic group within each comparative pair (Supporting Information).

To gather further baseline data on locals' relevant environmental preferences, in the course of the interview participants were also asked which of 2 evidence-based scenarios they would prefer: "more otters, more kelp, and fewer shellfish" or "fewer otters, less kelp, and more shellfish." The scenarios were derived conservatively from the published WCVI-specific available evidence at the time and did not include Markel and Shurin's (2015) subsequent documentation of the effects of the trophic cascade on WCVI demersal fish species—such data were being collected at the same time we were developing our protocol. We prompted participants to explain their answers and to elaborate on any further thoughts and opinions they had regarding kelp or sea otters.

We interviewed 71 individuals in and around Clayoquot Sound. Four of these participants were government managers, who we regarded as a distinct group given their professional mandate. There were 67 interviewees from the general public, ranging in age from 20 to 80 years old. There were 29 females and 38 males. Twenty-six participants self-identified as of a First Nation, primarily from the Ahousaht and Toquaht Nations as well as the Tla-oh-qui-aht and Yuułu?iłʔath (Ucluelet) Nations. Participants were recruited through the deployment of posters in the center of town, by Band Council leadership (in the case of Ahousaht and Toquaht Nations) and, occasionally, through word of mouth. (The interviews served multiple research purposes, and otters were not mentioned as a species of emphasis in recruitment materials.) Ahousaht- and Toquaht-member interviews were conducted in their respective territories as per the preferences of the respective band councils and individual participants. All other interviews were conducted at a place of the participants' choosing in and around the Clayoquot towns of Tofino and Ucluelet, outside First Nations-administered territories. All participants were offered financial compensation for their time at a rate of CA$15/h. Recruitment ceased when time and funding limitations were reached.

Our interviews were part of a larger study of several dimensions of ecosystem perception and value. We report only those results most directly relevant to the question of how the trophic cascade is perceived by different demographic groups as sea otters expand their range. For a wider set of results from the interviews, see Supporting Information and Levine et al. (2015).

Results

Relative Salience of Ecosystem Services

In response to "What things does nature do for people, or give people, here on the west coast of Vancouver Island?" food had the highest S score by far among the general public as a whole ($S = 0.540$) and among government managers ($S = 0.929$). Food provision was thus clearly the most cognitively salient (i.e., readily thought of) ES for the majority of Clayoquot Sound respondents (Fig. 1). Among the general public, shelter received the next highest cognitive salience score ($S = 0.161$), followed by water ($S = 0.146$). Many participants also readily listed recreation and employment, although First Nation participants were an exception to this rule, and managers mentioned these terms much earlier and more often than the general public. Clean air and simply air were also 2 relatively universally salient services for all groups examined.

Subjective-Importance Rankings of Ecosystem Services

The pattern of results described above shifted when we moved from looking at the relative salience of ESs for participants to how participants reordered those ESs according to their perceived importance (Figs. 2 & 3; Supporting Information). First Nation participants tended to rank well-being ($S = 0.157$), happiness ($S = 0.129$), tranquility ($S = 0.117$), health ($S = 0.102$), beauty ($S = 0.083$), and community ($S = 0.083$) much more highly than did their non-First Nation counterparts. These above items were all on First Nation participants' collective top-10 list (Fig. 2 & Supporting Information).

With the exception of food, non-First Nation and First Nation participants' top-10 lists did not have a single ES in common. Non-First Nation participants' lists were dominated by provisioning services (water, shelter, and clean air), terms relating to income opportunities (tourism and employment), recreation, and entertainment. These latter cultural services were notably different from those ranked highly by First Nation participants, whose terms of choice reflected more emotional states (e.g., tranquility and happiness).

Food-Preference Rankings

Salmon (*Oncorhynchus* spp.), halibut (*Hippoglossus stenolepis*), and crab (*Metacarcinus* spp.) consistently featured highly in the food-preference rankings of multiple demographic subgroups within our participant sample. Prawns and clams also featured highly, although prawns were notably ranked higher by non-First Nations than by First Nation participants (Supporting Information).

However, First Nation participants also highlighted a substantial number of food species that non-First Nation participants did not mention at all in the context of food preference. These included urchins ($S = 0.168$), herring roe ($S = 0.132$), and herring (*Clupea pallasii*) ($S = 0.040$). First Nation participants also mentioned a greater diversity of specific marine invertebrates than

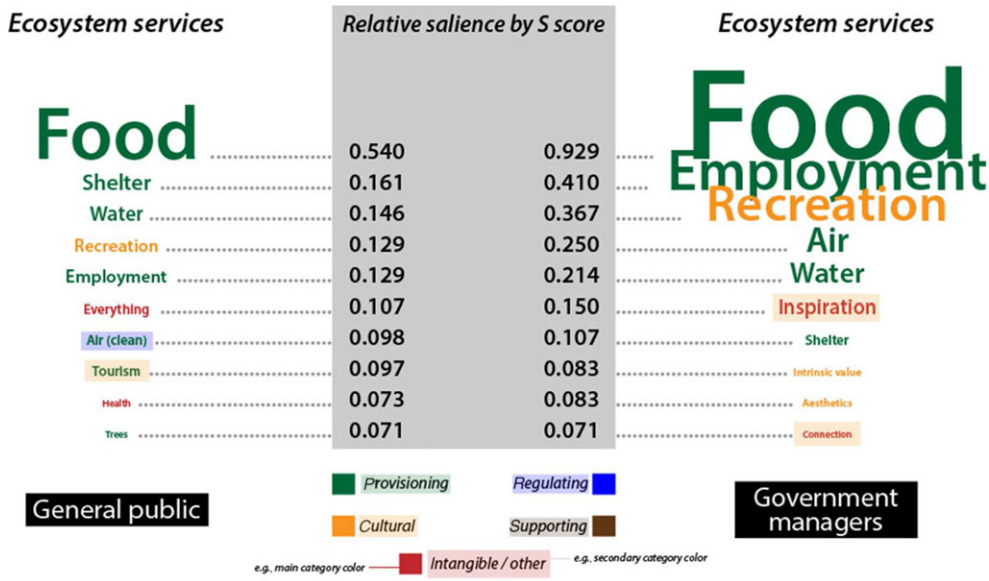

*Figure 1. Relative salience (*S*) (Smith & Borgatti 1997) of the 10 most commonly mentioned ecosystem services (ESs) in interviews with the general public (*n = 47*) and government managers (*n = 4*) in the Clayoquot Sound region (top, most cognitively salient; bottom, least cognitively salient; dark shade, primary ES categories; and light shade, secondary ES categories). Font size is scaled according to the ES* S *score derived from the freelisting order provided by interviewees. The color of the ecosystem service reflects UN-designated ecosystem service categories (MA 2005). Some ESs do not fit obviously into any of the categories. These are coded as intangible/other. In cases when an ecosystem service clearly fits in 2 different categories, the font is highlighted in a lighter shade of the color that corresponds to the secondary category option.*

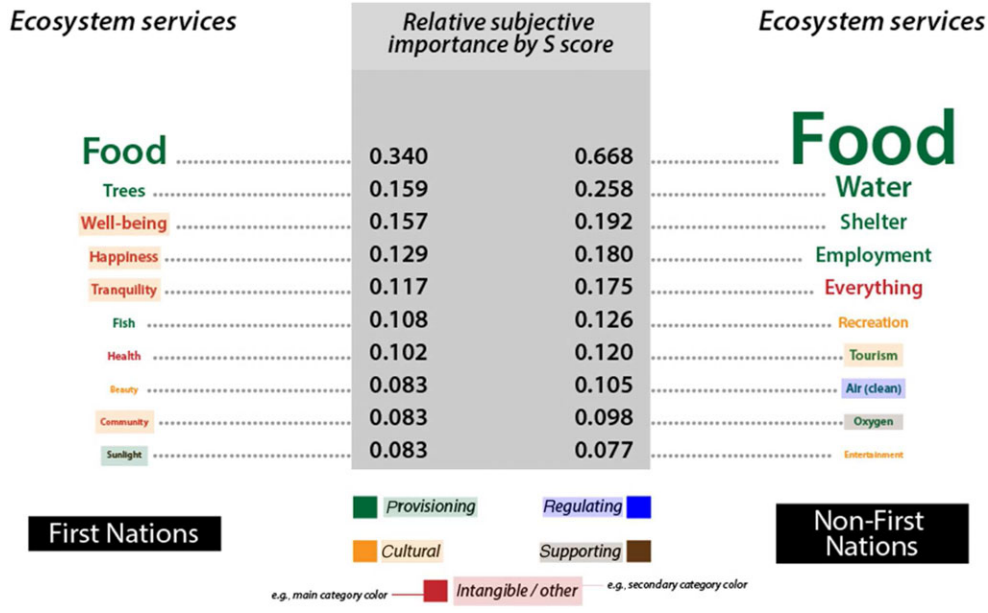

*Figure 2. Ecosystem services (ESs) from Fig. 1 ranked according to relative subjective importance by First Nation (*n = 12*) and non-First Nation (*n = 35*) interviewees in the Clayoquot Sound region (top, most important; bottom, least important; dark shade, primary ES categories; and light shade, secondary ES categories). Relative subjective importance was determined using* S *score analysis (Smith & Borgatti 1997) as applied to the 2 groups' ranking data. Font size is scaled according to the* S *score of each ES as derived from interviewees' subjective importance rankings. See Fig. 1's legend for an explanation of the color of the UN-designated ecosystem service categories (MA 2005).*

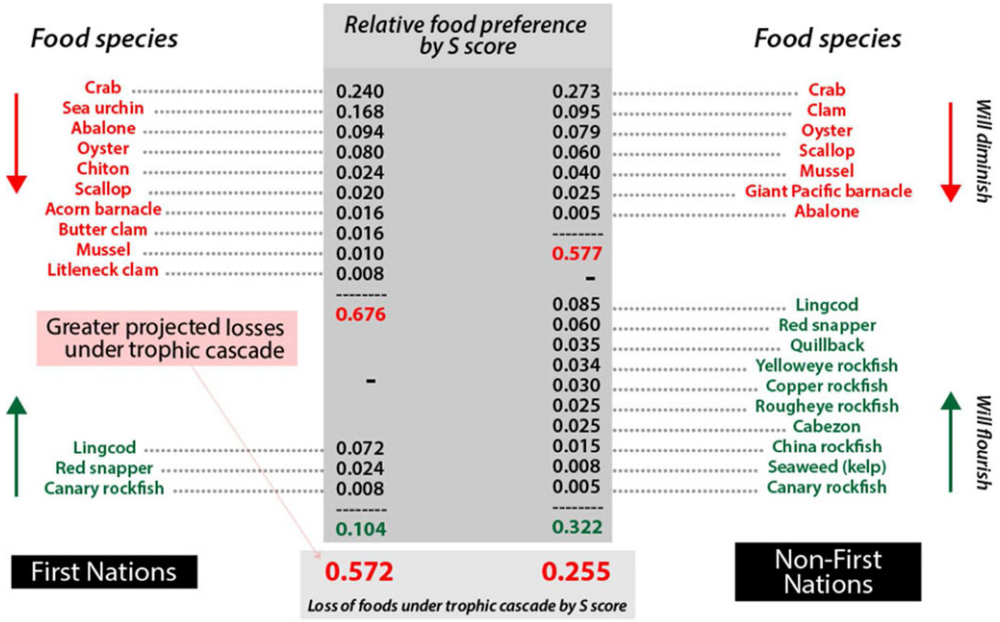

Figure 3. Food items ranked on the basis of preference by First Nation (n = *25) and non-First Nation* (n = *40) interviewees in the Clayoquot Sound region. Relative preferences were determined using* S *score analysis (Smith & Borgatti 1997) as applied to the 2 groups' ranking data. The species listed are those species First Nation and non-First Nation participants ranked as preferred foods that have been empirically demonstrated to either diminish or flourish with the presence of sea otters (Espinosa-Romero et al. 2011; Markel 2011; Watson & Estes 2011; Singh et al. 2013; Markel & Shurin 2015). The difference between the total* S *score of species that will diminish and the total* S *score for species that will flourish indicates losses in preferred foods under trophic cascade conditions.*

did non-First Nation participants: chitons (*Chiton* spp.) ($S = 0.024$), acorn barnacles (Balanomorpha) ($S = 0.016$), butter clams (*Saxidomus gigantea*) ($S = 0.016$), and littleneck clams (*Leukoma staminea*) ($S = 0.008$).

Conversely, non-First Nation participants listed a wide range of rockfish—both as a genus and as specific varieties—that First Nation participants did not (Fig. 3): rockfish (in general) ($S = 0.055$), rock cod (informal name for several *Sebastes* spp.) ($S = 0.050$), quillback (*Sebastes maliger*) ($S = 0.035$), yelloweye rockfish (*Sebastes ruberrimus*) ($S = 0.034$), copper rockfish (*Sebastes caurinus*) ($S = 0.030$), rougheye rockfish (*Sebastes aleutianus*) ($S = 0.025$), cabezon (*Scorpaenichthys marmoratus*) ($S = 0.025$), and China rockfish (*Sebastes nebulosus*) ($S = 0.015$). (None of these species are eaten by otters, and all are anticipated to flourish on WCVI under trophic cascade conditions [Markel 2011; Markel & Shurin 2015]).

The results of our food-preference analysis also demonstrate a gender dimension (Fig. 4). As a group, women ranked clams (Veneridae) more than twice as highly as men ($S = 0.198$ vs. $S = 0.078$, respectively). Women also ranked a range of other shellfish, including urchins, oysters (*Crassostrea* spp.), scallops (Pectinidae), and mussels (Mytilidae) more highly than did men.

Inversely, men mentioned a wide variety of rockfish (*Sebastes* spp.) that—like First Nation participants—women did not mention. Men also ranked lingcod, another kelp-dwelling species, more than 4 times as highly as women ($S = 0.122$ vs. $S = 0.028$, respectively).

Scenario Preferences

The logistic regression we performed on the data pertaining to participants' preference for more otters, more kelp, and fewer shellfish versus fewer otters, less kelp, and more shellfish showed a statistically significant ($p = 0.003$) cultural difference. The probability of a non-First Nation participant favoring the scenario of more rather than fewer otters was 10 times greater than the probability of a First Nation participant selecting this scenario (odds ratio = 0.10, confidence interval (CI) 0.022–0.447). That is, 17 of 32 non-First Nation participants who responded to the question favored more otters, whereas only 3 of 25 First Nation participants stated that preference.

Although non-First Nation participants' qualitative descriptions of kelp were neutral to positive, First Nation participants were more reluctant to offer their views. Among those who did, some expressed neutral to positive assessments, but others expressed more ambivalent views, including assertions that kelp "gummed up boat engines," "smothered [sea]life," or were "taking up all the oxygen" in the water.

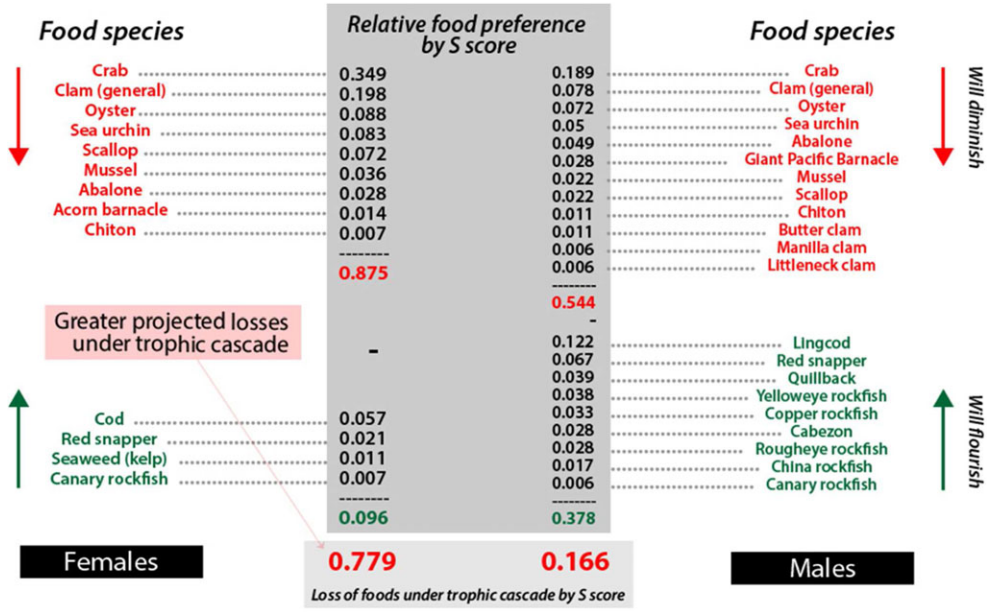

*Figure 4. Food items ranked on the basis of preference by female (*n = *29) and male (*n = *36) interviewees in the Clayoquot Sound region. Relative preferences were determined using* S *score analysis (Smith & Borgatti 1997) as applied to the 2 groups' ranking data. The species listed are those species First Nation and non-First Nation participants ranked as preferred foods that have been empirically demonstrated to either diminish, or flourish, with the presence of sea otters (Espinosa-Romero et al. 2011; Markel 2011; Watson & Estes 2011; Singh et al. 2013; Markel & Shurin 2015). The difference between the total* S *score of species that will diminish and the total* S *score for species that will flourish indicates losses in preferred foods under trophic cascade conditions.*

Discussion

As otters continue to expand their range southward along western Vancouver Island, it appears that Clayoquot First Nations individuals are likely to perceive a number of short-term losses in access to preferred traditional foods (as we conservatively defined them) (Fig. 3). This echoes the experiences of Kyuquot First Nations to the north (Supporting Information). In contrast, non-First Nation participants who enjoy a variety of rockfish (i.e., especially men) (Fig. 4) can expect such losses to be somewhat alleviated by increased abundance in demersals, a phenomenon of high certainty that is supported by locally collected empirical data (Markel 2011; Markel & Shurin 2015).

The range of invertebrate species ranked highly among First Nation participants (Fig. 3) suggests the relatively high resolution at which First Nation individuals tend to think about edible shellfish and, by implication, the relatively prominent position these species play in Nuu-Chah-Nulth culture. Archeological evidence affirms the centrality of many of these foods for the Nuu-Chah-Nulth people before European contact (McKechnie 2007). With reference to the present-day trophic cascade, all these shellfish types (e.g., sea urchins, clams, chitons, mussels, etc.) are eaten by local sea otters (Singh et al. 2013; Levine et al. 2015; Supporting Information).

Local residents and managers assert that, historically, First Nations killed or scared away sea otters in certain areas reserved for mariculture harvest (e.g., so-called clam gardens) (Williams 2006; Supporting Information). However, under Canada's Species at Risk Act, it is illegal to kill, harm, or "harass" sea otters in any way without official federal sanction (CBC 2009).

Our tallying of *S* scores in a commensurable fashion discounted the fact that humans tend to be more averse to loss than they are appreciative of gain (Kahneman et al. 1991). We also discounted the many cultural and personal emotional ties that ecosystem-dependent people tend to have with respect to food species and food collection (Turner et al. 2008; Chan et al. 2012*b*). If we were to take these facts into account, our results would likely suggest an even more pronounced imbalance in how non-First Nation versus First Nation individuals, in particular, experience the effects of the trophic cascade.

Nuu-Chah-Nulth First Nations have historically relied almost entirely on traditional local seafood for sustenance (McKechnie 2007). Even as they have been steadily alienated from their traditional fishing grounds by settler-colonial policies (Harris 2008), Nuu-Chah-Nulth communities continue to place substantial cultural value on access to and collection of edible marine invertebrates. This is particularly the case for Nuu-Chah-Nulth women, who traditionally spend more time on foot

in the nearshore environment than Nuu-Chah-Nulth men. Nuu-Chah-Nulth men, alternatively, spend relatively more time on the open ocean fishing for salmon and halibut. In contrast, non-First Nation residents are relatively recent arrivals in the area, and their livelihoods are more directly connected to the wider settler-colonial market economy. They do not have as deep a history of close dependence on marine invertebrates for subsistence, and subsistence invertebrate harvest is not a central aspect of non-First Nations' cultural identity. Although the ecosystem is still pivotally important for non-First Nation coastal dwellers, the ways and degree to which this is the case differ from their First Nation neighbors by virtue of history (Harris 2008).

A similar pattern to that described above emerges when contrasting the responses of men and women (Fig. 4). Women's relatively high valuation of edible shellfish leaves them vulnerable to experiencing losses as otters expand their range (Watson & Estes 2011; Singh et al. 2013). Men also appear to enjoy a range of edible shellfish, but their loss of the former is likely to be at least partially alleviated by men's relatively high valuation of multiple demersal fish species that flourish in kelp beds and benefit from otters' presence (Markel 2011; Markel & Shurin 2015). This bifurcation of food preference along gender lines may be explained by the fact that fishing for rockfish is a male-dominated activity in the region. Thus, men may have developed a disproportionate taste for their catch, whereas shellfish collection has, historically, involved women to a much greater extent than has offshore fishing.

With respect to our ESs data, the Clayoquot public appears to hold an intuitive typology of ESs ("things that nature does for people, or gives people") that differs considerably from that in the literature (e.g., Daily 1997; MA 2005). Rather than focus on ecological processes, participants appeared to think in terms of phenomenologically derived categories more immediately familiar to human sensory experience. Some of the terms participants used (e.g., *food*, *water*, *shelter*, and *income*) fit fairly well into the academic category of provisioning services. However, a number of terms repeated by participants did not fit as clearly into any one given academic category of ES. For instance, rather than identify processes, such as "the cleaning of water" (a supporting service), as distinct from the provision of end products, such as "drinking water," participants appeared to think in terms that combined both the ecosystem process and the ultimate benefit into a single, efficient, linguistic-mental object that could be readily perceived (e.g., clean water, clean air, good weather, etc.). Neither supporting nor regulating services appeared to be especially obvious as discrete processes to our participants, managers included. This suggests that people may well have a figurative blind spot for the "life-support" (Daily 1997) services that the ES framework is largely designed to highlight. This is an empirical question that could benefit from future inquiry, the answers to which could have implications for multistakeholder management and public engagement in conservation.

Other terms that participants invoked during the ES-ranking exercise specifically referenced gestalt experience or emotion, for example, tranquility, isolation, health, well-being, and depression (the latter an apparent ecosystem disservice). The subjective experiences these terms corresponded to are relatively challenging to operationalize and are thus harder to measure with certainty than are more concrete ES terms such as employment and tourism.

First Nation participants tended to rank such experiential or emotional state-based ESs more highly than non-First Nation participants. Non-First Nation participants, in contrast, tended to rank more concretely observable ESs more highly than did their First Nation counterparts. Several of those ESs ranked highly by non-First Nation participants (e.g., employment, recreation, tourism, and entertainment) can be reasonably expected to increase as the number of sea otters increases in the relative short term, namely, in the form of ecotourism (FOC 2004; Loomis 2006). It is less certain, however, that increased sea otter presence would similarly boost the kinds of ecosystem-based experiences ranked highly by First Nation participants. Such experiences among First Nation participants are both harder to measure and less clearly tied to an increase in ecotourism, particularly given local First Nations' relative noninvolvement in that sector (L. Loucks, personal communication). In fact, as foreshadowed by results from our Kyuquot Sound pilot study, insofar as First Nation participants believe their emotional and physical well-being to be a function of continued access to a variety of traditional foods (see Appendix E in Supporting Information), these data further suggest that Clayoquot Sound First Nation individuals are liable to view a surging sea otter population negatively, at least in the short term.

In Clayoquot Sound, the preferences and experiences of historically disadvantaged demographic groups (Harris 2008) are being either discounted or ignored by current conservation practice. Although there may be good reasons to protect sea otters from humans on an ecological basis (Markel 2011; Markel & Shurin 2015)—or even an animal-rights basis—our results suggest that there are social-equity trade-offs that decision makers should take into account.

Perceptions of environmental injustice can have visceral, real-world consequences for community building and intergroup relations (Kemp-Benedict 2013). We think this citation was actually a mistake. It can be deleted. When these social factors are strained, managing shared resources becomes even more fraught than it might otherwise be (Adger 2000; Andersson & Agrawal 2011).

Although rudimentary, our approach of comparing and tallying *S* scores for both salience and other forms of preference across demographic subgroups provides an example of how to collect a richer data set on the variegated potential social effects of conservation. As has been lamented extensively in the literature, such efforts to integrate social considerations into ES studies are sorely needed (e.g., Daw et al. 2011; Chan et al. 2012*b*; McDermott et al. 2013; Raymond et al. 2013).

We believe that by continuing the present effort to draw on techniques already developed in methodologically relevant fields such as cognitive anthropology (e.g., Medin & Atran 1999; Atran & Medin 2008), psychology (Benet-Martinez et al. 2002; Storbeck & Clore 2008; Henrich et al. 2010), and behavioral and experimental economics (Kahneman & Knetch 1992; Henrich et al. 2001), researchers can go on to better address important social aspects of conservation that have hitherto been neglected as subjects of empirical inquiry.

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Supporting Information

Information regarding the disaggregation of our participant sample (Appendix S1), salience index formulae (Appendix S2), tables of additional results (Appendix S3), the full interview protocol (Appendix S4), and results of a pilot study (Appendix S5) are available online. The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

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