Connecting Marine Ecotourism Values in Northern Vancouver Island with Marine Protected Areas

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Acknowledgements

The authors would like to thank all the dive, kayak, and wildlife viewing tourism operators who participated in this study. We would also like to acknowledge the Underwater Council of British Columbia, the Council of British Columbia Yacht Clubs, the Sea Kayak Guide Association of British Columbia, and the Wilderness Tourism Association for providing invaluable advice on the individual dive, kayak, and wildlife viewing components of this study. We are grateful to Andrew Jones of the North Island Marine Mammal Stewardship Association, and Rick Snowden of the Sea Kayak Guide Alliance of British Columbia, for sharing their wealth of experience on marine nature-based tourism in the region, and connecting us with local tourism operators. Michelle Molnar provided guidance on the economic analyses and Spencer Wood provided advice at several stages in the study. This study was conducted in collaboration with the North Island Marine Mammal Stewardship Association. This research was funded in part by the Gordon and Betty Moore Foundation.

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Executive Summary

Marine planning must take into consideration the reality that we need to account for many of the things in the marine environment that are of immense value to coastal communities and for which we currently pay nothing. British Columbia’s northern Vancouver Island communities derive great economic benefit from the marine ecosystems surrounding them, in part because of a wealth of recreation opportunities. We surveyed businesses and individuals to quantify the economic benefits derived from a subset of marine-based activities that depend upon healthy marine ecosystems and the presence of charismatic marine species. The activities we studied may also be referred to as “non-extractive” or “non-consumptive” because they remove no resources. Ecotourism business activities including scuba diving, kayaking, and wildlife viewing in northern Vancouver Island were valued at $12-16 million for 2013. Self-guided recreation expenditures could easily match that, although a robust estimate requires more accurate visitation data. We estimated that self-guided residents of the area spent $3-5 million on this type of marine recreation. Further, our survey suggested that among self-guided recreationalists, visitors to the area outnumbered residents by at least two to one. The sample size was small but if that ratio holds, the total value of self-guided recreation could range from $9-15 million, bringing the total for these activities in our study area to $21-31 million per year.
Using on-line surveys, personal interviews and some existing data we mapped the locations where eco-friendly marine recreational activities took place to identify the source of these values in the marine environment. Overall, half of our study area held some value to one or more of the activities included, but only 18% of the total economic value fell within the existing coverage of Marine Protected Areas (MPAs), which was insufficient to safeguard the economic value of the ecotourism and recreation industry. When we compared mapped eco-friendly recreation areas to a protected area scenario aimed at encompassing high biodiversity, 77% of the recreation and tourism value was secured. This confirmed a link between high marine biodiversity and areas important to marine recreation and ecotourism.

If we better understand the value of the healthy and intact marine ecosystems we can rationalize the siting of MPAs. Protecting the values that businesses and users depend upon can allow for long-term sustainability of this sector of the regional economy. Currently that is not the case. Establishing a more comprehensive network of MPAs that includes the areas recommended for greater protection would sustain and enhance recreation and tourism benefits as well as other ecological, social and cultural benefits that arise through conserving biodiversity and its associated ecosystem services.

By quantifying some of the economic value of, and degree to which the local economy depends upon, areas of high biodiversity deserving of greater protection, we provide much needed data for marine planning. Assuming that properly managed MPAs do protect biodiversity and help to sustain the charismatic species that attract tourists and recreationalists, designing marine protection with recreation and tourism values in mind makes good sense. Most types of MPAs allow non-extractive economic activities to occur within their bounds. It follows that well-planned and managed MPAs can support and enhance both the local economy and the environment. Our study provides food for thought when it comes to the possibility of a symbiotic relationship between a marine ecotourism industry and an expanded network of MPAs for British Columbia. In 2005, ocean recreation was highlighted as one of three most promising marine sectors for future growth. If we want sustainable growth in this sector, we need to better protect the natural capital upon which it depends. In other words, protecting coastal ecosystems makes good economic sense.
Introduction

Oceans are often the backbone of coastal communities’ economies. A recent study found that as much as $55.2 million in wages and benefits, and 1,340 person years of employment accrued from marine-based industries to residents of the Regional District of Mount Waddington (RDMW) in British Columbia. Economic benefits can be obvious and direct as with income from commercial fishing. On Canada’s Pacific coast the harvest of the commercial fishing sector had a landed value of $330 million and a wholesale value of $844 million in 2010. The natural processes that generate the fish we catch and eat, like the coral forests that serve as the ocean’s nurseries or the currents that sweep nutrients from the deep to form the basis of food webs, also benefit us. But these processes are less obviously beneficial to the economy so they are often taken for granted. Still, without these naturally occurring “ecosystem services” the fish wouldn’t be there and neither would the economic benefits they create.

Canada’s ocean ecosystems provide many things we value but that we don’t pay for directly. A few examples include:

- attractions for tourism
- renewable energy
- climate and natural hazard regulation
- improved health and well-being through recreational opportunities
- the purifying of water
- fulfillment of spiritual and cultural needs
- Earth’s largest natural carbon sink or reservoir. Approximately one-third of carbon dioxide emissions are stored in our oceans via biological and chemical processes such as photosynthesis or calcification to form shells and skeletons.

The value of the goods and services provided by nature is frequently underestimated or simply not taken into account in conventional economics and decision making. As a result, our use of natural capital is ignored or marginalized when it comes to policy development and decision making which may affect the ability of ecosystems to continue to provide these services. As human pressures on the ocean increase, Canada’s ocean health is being put at risk by decisions that do not adequately account for our natural capital. For example, a decision to permit a port expansion or enlarge a marina might have reverberating impacts in the vicinity due to increased vessel traffic, noise or chronic oil spills. Such development could drive marine mammals out of the area or alter shorelines and reduce available fish spawning habitat. Therefore, the better we can quantify the value of ecosystem services and include that value in economic analyses, the better informed our decision making process will be.
There is growing body of scientific research dedicated to assigning monetary value to ecosystem services. To date, more studies have focused on terrestrial ecosystems than marine ones. A prime example found that:

“over 100,000 different animal species—including bats, bees, flies, moths, beetles, birds, and butterflies—provide free pollination services. One third of human food comes from plants pollinated by wild pollinators, and the value of pollination services from wild pollinators in the U.S. alone was estimated at four to six billion dollars per year.”

Canada is an ‘ocean’ nation; it has the longest coastline in the world and is bordered by the Pacific, Atlantic and Arctic oceans. To protect its marine resources, Canada recently made an international commitment to establish a national network of marine protected areas (MPAs) by 2020. MPAs are areas set aside for the “long-term conservation of nature with associated ecosystem services and cultural values.” The Government of Canada and Province of B.C. have established MPAs, with varying objectives and levels of protection, along the B.C. coast. Nevertheless, progress towards Canada’s network goal has been slow. A recent audit by Canada’s Auditor General identified a specific need for ecosystem service assessments to move forward with the commitment especially so that policy makers are better informed on the true costs and benefits associated with existing and proposed MPAs.

Economic study of the importance of the ocean to B.C.’s economy in 2005 estimated that the value of ocean-related recreation was $3.8 billion for all of B.C. The more eco-friendly class of activities (e.g., kayaking, scuba diving, and whale watching) was valued at 63% of the total, or $2.4 billion. That’s about 1.7 times the total revenue of the seafood industry and almost four times total spending on saltwater sport fishing in B.C. in the same year.

In the context of marine planning, the relative economic importance of the eco-friendly ocean recreation sector and its direct reliance on a healthy marine ecosystem is worthy of explicit consideration. This study represents the first steps required to assess the marine recreation and tourism values that draw visitors to northern Vancouver Island, and estimate the value of a healthy, intact marine ecosystem. If we better understand these values, we can make more informed marine planning decisions and rationalize the siting of MPAs. Our research is timely because in B.C., 18 First Nations and the provincial and federal governments are currently collaborating to design a network of MPAs in the region, as they proceed along the path toward ecosystem-based management.

On the Pacific Coast of Canada, several studies have valued ecosystem services. However, only a few of these have focused on marine and coastal values or the economic benefits provided by MPAs. Primary valuation studies are lacking for Canada’s Pacific coast. This study begins to explore that gap.

We identified two goals with this project. First, we wanted to quantify the
economic benefits to local communities derived from areas of high biodiversity via self-guided marine recreation and tourism operations offering non-extractive marine-based activities. Second, we planned to map the relative importance of activity locations and investigate the degree to which these locations were captured within existing and proposed MPAs. Essentially, we aimed to assign a monetary value to recreational areas and measure the extent to which this value is secured for the future through designated protected areas.

**Methods**

The first part of this study focused on determining the dollar value and location of tourism and marine recreation activities that depend upon a healthy marine environment (Table 1). We focused on scuba diving, kayaking, and wildlife viewing activities as they generally don’t remove anything from the environment (i.e. non-extractive activities), are measurable activities, and are growing components of both the marine ecotourism and self-guided marine recreation in the northern Vancouver Island region. We surveyed all northern Vancouver Island eco-tour operators and as many self-guided recreationalists as possible through clubs and websites to collect financial and spatial information. We then tallied and mapped the values we gathered. In the second part of our study, we explored the overlap between locations ‘valued’ for these activities and existing and proposed MPAs.

We wanted to quantify the ‘value’ of a healthy marine environment (i.e., the ecosystem services that we take for granted) to the communities of the region, so we only considered tourism operators that are based locally as their revenues stay in the region. Because ecotourism is defined as responsible travel to natural areas that conserves the environment and improves the well-being of local people, we consider ours a study of ecotourism, even if the businesses and individuals surveyed do not necessarily classify themselves as such.

**Study Area**

Our study area was the North Vancouver Island (NVI) sub-region (Figure 1) of British Columbia, as defined in the Marine Planning Partnership (MaPP) initiative. We selected this region for our study because it is a world class tourism and recreation destination due to its scenic beauty, rich diversity of species and ecosystems and relative accessibility. It is also Living Oceans’ home region. There are many islands, inlets and fjords within the area. Major water bodies include part of Queen Charlotte Sound, Queen Charlotte Strait, Johnstone Strait, Smith Inlet, Seymour Inlet, Knight Inlet and Bute Inlet.
We surveyed local tourism businesses that were based and operated in the region, and whose revenues would therefore be spent in the region as a direct contribution to the local economy. Businesses that originated outside the region, for example from the United States, were not included as their revenues leave the region. Businesses were identified through online research and consultation with local tourism operators and industry associations including North Island Marine Mammal Stewardship Association (NIMMSA), the Sea Kayak Guide Alliance of British Columbia (SKGABC), and the Wilderness Tourism Association (WTA).

Marine recreation has been defined as the “refreshment and stimulation for the human body and mind through the perusal and engagement with living marine organisms in their natural environment.” To estimate the dollar value of such ‘self-guided’ activities, we surveyed individuals on membership lists of recreational associations and clubs who visited the study area, without relying on a tourism operation, to scuba dive, kayak or view wildlife. This group of participants included divers who used their own boat or a dive club’s boat to access dive sites and kayakers who either drove themselves or hired water taxis for transport to their starting points. Attempts to contact marinas and recreational yacht clubs were met with limited success so economic and spatial information on recreational boating was obtained from other studies.
Table 1. Activities Targeted for Valuation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local tourism businesses*</td>
<td>Scuba diving Companies and lodges that offer scuba dive tours, either single or multi-day charters</td>
</tr>
<tr>
<td>Kayaking</td>
<td>Companies and lodges that offered day and multi-day kayak tours</td>
</tr>
<tr>
<td>Marine wildlife viewing</td>
<td>Companies that offer boat-based marine wildlife viewing tours, either single or multi-day excursions</td>
</tr>
<tr>
<td>Grizzly bear viewing</td>
<td>Companies who are primarily involved in providing boat-based grizzly bear viewing tours</td>
</tr>
<tr>
<td>Self-guided individuals</td>
<td>Scuba divers Self-guided divers use their own boat or their dive club boats</td>
</tr>
<tr>
<td>Kayakers</td>
<td>Self-guided kayakers or those who hired a water taxi</td>
</tr>
<tr>
<td>Recreational boaters</td>
<td>Pleasure boat owners who are sailing, yachting, or cruising for personal enjoyment of nature, scenery, and wildlife viewing</td>
</tr>
</tbody>
</table>

*Businesses involved in 2 or more activities were classified based on the activity on which they spent more than 50% of their time.

Five surveys were designed to elicit information for 2013 on the value of diving, kayaking and wildlife viewing activities in the study area (Appendix A). Three surveys focused on local businesses providing dive, kayak and wildlife viewing tours and two were designed for self-guided divers and kayakers. Generally we asked about the frequency, duration and location of activities and dollars spent. Interactive maps were developed using Google Maps and were embedded in the online surveys for dive businesses, self-guided divers and self-guided kayakers. Respondents were asked to identify key sites they visited in 2013 and indicate the number of times they visited each one. Kayakers were asked to indicate routes, launch points and camping sites used in 2013.

We also posed an open-ended question of respondents that allowed them to describe the particular aspects of the marine environment that they value. In addition, respondents were asked to rank their support for MPAs and specify if and how much they would be willing to pay for marine protection on the coast.

In-person interviews were conducted with as many businesses as possible; the rest were completed by telephone or email. Individuals for the self-guided activity surveys were contacted through their recreational clubs by email invitation or in-person at club meetings. We also posted surveys on recreational diving and kayaking to online forums and two websites.

It was not possible to conduct surveys with a representative sample of individual recreational boaters because of the sheer volume of people that participate in the activity and the timing of the surveys outside of the peak period (July and August). None of the recreational yacht clubs or marinas we contacted responded to the survey and only a few results were obtained.
from individual recreational boaters. For these reasons, we gathered financial data for recreational boating from existing literature and used information on routes, anchorages, and marinas from the British Columbia Marine Conservation Analysis (BCMCA)\(^a\) including data sets originally sourced from the Province of British Columbia, the Outdoor Recreation Council, the Council of British Columbia Yacht Clubs, Parks Canada, and the Canadian Coast Guard.

**Putting values on the map**

To help determine the connection between MPAs and areas that ecotourists and businesses value for recreation, we mapped the dollars spent pursuing these activities. We developed a map of the relative importance of sites using the survey data. Greater frequency of use generally equated to greater relative importance in this work because more dollars were spent getting to and enjoying that location. Locations where more costly activities (e.g., bear-watching tours) occur were also showed a greater relative importance due to the amount of dollars spent in those locations or on those routes. Available information on recreational sites and routes and their relative importance from the BCMCA were also used to supplement the participatory mapping exercise with local businesses and recreational users. To generate a map showing the total value for ecotourism, we summed the results from the different sectors.

**Results**

**The Direct Value of Marine Ecotourism Businesses**

Of the 33 businesses identified in the study area, 24 responded to our surveys (Table 2). Five businesses were involved in more than one activity (e.g., provided diving and kayaking tours), so the total number of survey responses was greater than businesses interviewed (Table 2).

The revenue generated by local marine-based ecotourism businesses in the study area totalled $12-$16 million (Table 2). This amount was estimated by summing the gross revenues of the local businesses, as reported in surveys, and extrapolating to include known businesses that did not respond.

Local businesses that provided wildlife viewing tours in the region reported the highest revenue. Four businesses that spent more than 50% of their time providing grizzly bear tours on the water had combined revenues ranging between $4-$5 million. This accounted for approximately 40% of the total

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\(^{a}\) The BCMCA Marine Atlas of Pacific Canada (www bcmca.ca), developed through a collaborative multi-year effort, illustrates marine ecological resources and human uses on the British Columbia coast and intends to provide planners, scientists and decision-makers with resources to facilitate informed marine planning and management.
wildlife viewing revenue reported. Kayak and dive businesses that directly depend on healthy marine biodiversity generated between $2-$3 million and $0.5-$0.6 million respectively in 2013.

<table>
<thead>
<tr>
<th>Activity (number of businesses in study area)</th>
<th>Number of survey respondents</th>
<th>Total revenue from respondents (range in million $)</th>
<th>Total revenues including estimates for non-responders (range in million $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dive businesses (4)</td>
<td>2</td>
<td>~0.3</td>
<td>0.5 - 0.6</td>
</tr>
<tr>
<td>Kayak businesses (12)</td>
<td>8</td>
<td>1.7 – 2.1</td>
<td>2.4 - 3.1</td>
</tr>
<tr>
<td>Wildlife viewing businesses (17)</td>
<td>14</td>
<td>8.4 – 11.3</td>
<td>9.4 – 12.5</td>
</tr>
<tr>
<td>Total (33)</td>
<td>24</td>
<td>10.4 – 13.7</td>
<td>12.4 – 16.2</td>
</tr>
</tbody>
</table>

Gross revenues for each business and activity took into account the proportion of time spent in the study area and the percent of gross revenue accrued from each activity, all of which was information obtained from the survey. Revenues were assigned to non-responders based on the revenues of similarly-sized sampled operations.

**The Direct Value of Self-Guided Marine Recreation**

Total economic value of expenditures by self-guided marine recreationalists remains much more uncertain as reliable data could not be located to estimate the total number of recreationalists or self-guided trips in the study area per year. The literature provides coarse estimates of these values and we applied B.C.-wide data on participation rates to determine the proportion of residents in our study area who were involved in self-guided kayaking and diving activities and thereby calculate approximate values for these activities.

Our survey, completed by 38 recreational divers and paddlers, did reveal daily expenditures (Table 3). Nine of 21 divers took self-guided trips (i.e., without using the services of a local dive business) either with a dive club, by dive boat or private boat. Self-guided divers were residents of the study area as well as visitors from other areas of B.C. Reported daily expenditures for self-guided dives ranged from $10 to $250 per person (Table 3).

Ten of 17 paddlers who responded to our survey reported that they undertook self-guided trips and spent between $10 and $170 a day per person, or up to $200 a day if using a water taxi for access (Table 3). It was hard to tell from our survey how many paddlers responding might be local residents. Nine were members of clubs based in Vancouver or Victoria, while the rest did not identify their location, and only two spent most of their paddling days in the northern Vancouver Island region.
**Table 3. Marine Recreation Survey Participation and Daily Expenditures**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Individual survey respondents</th>
<th>Respondents who participated in self-guided activities</th>
<th>Daily expenditure per person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diving</td>
<td>21</td>
<td>9</td>
<td>$10 - $250*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>Using water taxi, $100 - $200*</td>
</tr>
<tr>
<td>Kayaking</td>
<td>17</td>
<td>Self-guided</td>
<td>$10 - $170*</td>
</tr>
</tbody>
</table>

*Data from our survey

Based on a study of B.C. residents’ participation in outdoor recreation\(^{14}\) and minimal daily expenses, we estimated that scuba diving and kayaking activities could be valued by the residents of the study area at $1.5 million (Table 4).

**Table 4. Estimated Expenditures of Residents on Diving and Kayaking in Northern Vancouver Island**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Participation rate (%)(^*)</th>
<th>Participants(^*)</th>
<th>Daily expenses(^#)</th>
<th>Days/year(^\§)</th>
<th>Annual expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scuba diving</td>
<td>6</td>
<td>2,340</td>
<td>$20</td>
<td>7</td>
<td>$ 327,600</td>
</tr>
<tr>
<td>Kayaking</td>
<td>10</td>
<td>3,900</td>
<td>$45</td>
<td>7</td>
<td>$ 1,228,500</td>
</tr>
</tbody>
</table>

![15](15)

\(^*\) Data from Tourism BC 2009/10 Outdoor Recreation Study, BC Resident Participation.\(^{15}\)

\(^\#\) Diving and kayaking expenses from our survey (median value).

\(^\§\) Best guess. Tourism BC Outdoor recreation study found that 39% of the respondents participated in an outdoor activity once a week and 97% participated several times a year or more.\(^{15}\)

Using another approach, we estimated that the value of self-guided scuba diving in the region might be lower. A recent study of the recreational diving fatality rates, or rates of decompression illness, estimated the number of diver-days in B.C. to be between 120,000 and 150,000 annually, based on information from air fill stations throughout the province.\(^{16}\) Further, approximately 24,400 divers used charter services for their dives.\(^{17}\) If divers spent an average of 2.4 days per person on charters (based on our survey results), then 60,000 diver days were charted, leaving 60,000 to 90,000 diver days attributable to self-guided recreationalists. If 10%\(^b\) of these took place in the study region, that would equate to between 6,000 and 9,000 diver days and approximately $120,000 to $180,000 in expenditures, at $20/day. It is hard to know which estimation method is more reliable, but

\(b.\) We use 10% because that is the amount of the B.C. dive industry’s gross revenue generated in northern Vancouver Island in 2004.\(^{17}\)
we can be fairly certain that the value of self-guided diving in the area falls above $120,000 and may even be more than $327,000 as we know that many self-guided divers using the area are not local residents and other studies have estimated higher daily expenses for divers along the Pacific Coast of North America.\textsuperscript{18}

Recreational motorised boating and sailing are also popular self-guided activities in the region. B.C.’s outdoor recreation study also revealed that 32\% of Vancouver Island residents participated in whale watching or other marine wildlife viewing and 30\% participated in motorised boating.\textsuperscript{15} These impressive participation rates again reflect the importance of healthy marine biodiversity to residents of the area. If 30\% of the population spent even 1 or 2 days per year boating to view wildlife, that equates to an additional $1.8 to $3.5 million in expenditures (Table 5). Note that while ‘motorised boating’ in the outdoor recreation study did not necessarily exclude saltwater fishing, the category of ‘whale watching or other marine wildlife viewing’ did seem to.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Participation rate (%)(^*)</th>
<th>Participants(^\wedge)</th>
<th>Daily expenses(^#$)</th>
<th>Days/year(^&amp;)</th>
<th>Annual expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreational boating to view marine wildlife</td>
<td>30</td>
<td>11,700</td>
<td>$150</td>
<td>1</td>
<td>$1,755,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>$3,510,000</td>
</tr>
</tbody>
</table>

\(^*\) Data from Tourism BC 2009/10 Outdoor Recreation Study, BC Resident Participation and may be a conservative estimate.

\(^\wedge\) Based on estimate of 39,000 residents in the study region, 15 years of age and older (Source: MaPP, Draft NVI Base Case).

\(^\#$\) Boating expenses obtained from studies of the economic impact of small craft harbours.\textsuperscript{20, 21} Daily boating expenditures include fuel, food and accommodation but not the capital costs of boats.

\(^\&\) Conservative estimates. Tourism BC Outdoor recreation study found that 39\% of the respondents participated in an outdoor activity once a week and 97\% participated in some outdoor activity several times a year or more.\textsuperscript{15}

In total, we estimated that residents of the area could spend as much as $3-$5 million annually on self-guided marine recreation activities that are predicated on a healthy environment and extract nothing from it. We did not include sport fishing or food fishing activities in our estimates because we wanted to tally the value of the intact ecosystem and resources. Dollars spent by residents were obviously not new dollars flowing to the area from outside, but they provide a sense of the worth of the healthy and intact marine ecosystem to the area residents. Our estimate is conservative because we know there are additional self-guided visitors to the area from other parts of B.C. that also partake in these activities, benefit from the marine environment and spend their dollars in the area. This additional
economic input could not be calculated due to a lack of data on the number of self-guided visitors to the area which prevents us from developing a robust estimate for total expenditures of self-guided activities.

However, one way to ballpark the value of self-guided recreation is to extrapolate based on the ratio of residents to non-residents who completed our survey and reported self-guided trips. Visitors to the area outnumbered residents by at least two to one. The sample size was quite small (only 19 self-guided users) but if that ratio holds, the total value of self-guided recreation could range from $9-$15 million taking both residents and non-residents into account. Even this coarse estimate is likely low. A recent study of the marine economy in the Regional District of Mount Waddington (RDMW) estimated that for an area smaller than our study area, ocean recreation—including saltwater angling, and ferry and cruise ship tourism—expenditures in tourism package businesses were roughly $20 million and expenditures in the “other” recreation category, including self-guided participants, were estimated to be $25 million, a figure based on provisional data and the author’s professional judgement.

Our estimated total value of self-guided recreation added to the total for ecotourism businesses in our study area brings the value to $21-$31 million which begins to underscore the significance of intact and healthy marine environment for the region.

**Additional Economic Benefits**

In economic analyses, the total economic impact of a business sector is not limited to its direct revenue. Expenditures of ecotourists and visitors support additional local jobs and contribute to revenues for other sectors in the economy, such as suppliers to tourism businesses and the service industry which includes hotels, restaurants, retail and transportation. These added benefits are often called indirect impacts. Both the direct revenues and indirect impacts on the regional economy are multiplied, in turn, through ‘respending’ of wage incomes earned and these are called induced impacts.

Indirect and induced financial impacts (i.e., simply known as spin-off effects) are commonly estimated based on their effects on three indicators: gross domestic product (GDP), labour income (LI), and employment in person years (PY). We used the same method and multipliers as Gislason employed in his 2007 report Economic Contributions of the Oceans Sector in British Columbia, which was prepared for the joint federal - provincial Oceans Coordinating Committee. Our estimated ecotourism business total revenue of $12-$16 million provided benefits to the regional economy estimated at $12-$15 million in GDP, $8-$10 million in local wages and benefits, and 216-282 person-years of employment (Table 6).

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c. A study of B.C.'s kayak industry found that sea kayaking businesses provided products and services to almost 70,000 clients in 2005 and tourists outnumbered residents of the community by three to one (22), so our estimate may be conservative.
When we applied indirect and induced spin-off benefits to our self-guided recreation expenditure estimates, we found added benefits ranged from $1.5-$7.5 million in GDP, $1-$4.7 million in wages and benefits, and anywhere between 24 and 122 person years of employment (Table 7.) However, caution should be taken in interpreting these estimates because we need a more robust and precise estimate of participation on self-guided trips and expenditures to better pinpoint the spin-off benefits.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Revenue</td>
<td>$12.4–$16.2 million</td>
</tr>
<tr>
<td>Gross Domestic Product (multiplier = 0.95 for each $1 direct output)</td>
<td>$11.8-$15.4 million</td>
</tr>
<tr>
<td>Labour Income (multiplier = 0.61 for each $1 direct output)</td>
<td>$7.6-$9.9 million</td>
</tr>
<tr>
<td>Employment (multiplier = 17.4 person years for $1 million direct output)</td>
<td>216-282 person years</td>
</tr>
</tbody>
</table>
than others (Figures 2a and 2b). Diving and bear watching areas were quite specific and compact compared to paddling and wildlife viewing areas. When we combined the activities into one composite map, we used the economic value of each activity to scale the maps appropriately and then re-standardized and displayed on a relative scale from low to high value (Figure 3). Approximately 50% of the marine area in the study region was of some importance to the marine recreation and tourism sector but the value was clearly not evenly spread. Areas of higher value, not surprisingly, included Blackfish Sound, the Broughton Archipelago, areas close to each population center, Browning Passage, God’s Pocket, and stretches of Knight and Smith Inlets where bear watching was especially lucrative.
Figure 2a. Value of marine areas used for diving (top) and kayaking (bottom) activities.
Figure 2b. Value of marine areas used for marine wildlife viewing (top) and bear watching (bottom) activities.
Figure 3. Value of marine areas used for diving, kayaking, and wildlife viewing combined (based on revenue streams and frequency of use)

**Connecting valued areas with MPAs**

Once the relative value of locations where the marine recreation and tourism sector derives economic value was identified, we used mapping software to overlay two different scenarios of protection and tallied the relative values encompassed by each. The two protection scenarios analyzed were 1) existing MPAs including any marine portion of existing provincial or federal MPA that occurs in northern Vancouver Island and, 2) areas of high conservation value recommended for greater protection by the conservation sector. These latter areas were chosen collaboratively in 2014 by a group of conservation organizations working together to advise the Marine Planning Partnership (MaPP) on areas of high conservation value.

d. Areas identified had particularly high biodiversity, rare species, critical habitats, or are very productive ecosystems of importance for many species including humans. In our analyses to choose the best areas to protect, local ecological knowledge was used alongside the Marxan decision support tool, which examined 1,243 different ecological features, including important species such as seabirds and whales, in addition to habitats including kelp forests, coral reefs and even strong currents that feed plankton blooms.
The two protection scenarios differ significantly and each captured the total marine recreation and tourism values in the region to different extents (Table 8, Figures 4 and 5). A large majority of the value is garnered outside of currently protected areas. In fact, only 18% of the total value fell within existing MPAs, while the areas recommended for greater protection covered 77% of the value.

The scenario of proposed protection also overlaps with more highly valued areas for individual activities compared with existing MPAs (Table 8). A minimum of 75% of the areas of economic importance to individual diving, kayaking, and wildlife viewing activities were covered by areas proposed for greater protection. Existing MPAs covered a little more or less than 10% of the value for each activity except diving, which is captured to a greater extent (33%), but still less than half of the value of diving was under existing protection.

### Table 8. Percent of the Value Stemming From Marine Activities Covered by Two Different Protected Area Scenario

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percent of Value covered by:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing MPAs</td>
</tr>
<tr>
<td>Diving</td>
<td>33%</td>
</tr>
<tr>
<td>Kayaking</td>
<td>8%</td>
</tr>
<tr>
<td>Wildlife viewing</td>
<td>12%</td>
</tr>
<tr>
<td>Marine wildlife viewing</td>
<td>11%</td>
</tr>
<tr>
<td>Grizzly bear viewing</td>
<td>5%</td>
</tr>
<tr>
<td>All</td>
<td>18%</td>
</tr>
</tbody>
</table>
Figure 4. Valued areas for marine recreation and existing MPAs. Note: any activity represented within the Robson Bight ecological reserve, where ecotourism is generally prohibited, is due to the scale of the data collection and analysis (2 km x 2 km grid cells).

Figure 5. Valued areas for marine recreation and areas recommended for greater protection
**Perceptions**

When prompted, all survey respondents (n=72) stated that a healthy marine environment was important to their diving, kayaking or wildlife viewing experience. When asked what aspects of the environment were important, the marine biodiversity of northern Vancouver Island was identified more often than any other quality by recreational users and tourism businesses alike (Figure 6). Marine mammals and invertebrates were the next most popular responses. Support for MPAs was also quite high, with 85% of respondents being “very supportive.” When asked about willingness to pay fees for use of an MPA, the majority of respondents stated that more information was needed about fee schedules and fee management.

![Graph showing important aspects of the marine environment in the study area, as listed by survey respondents](image-url)
Discussion

Marine ecotourism businesses in the study region contributed between $12 and $16 million dollars in revenues to the regional economy in 2013. In addition, self-guided recreation in the region likely contributes equally to the economy, but was hard to quantify precisely. Without robust visitation estimates, total expenditures from the self-guided group remain uncertain. Some expected areas of activity were not identified by survey participants, such as the kayaking base camps in northern Johnstone Strait, suggesting that a continued effort to collect information for an increasingly diverse number of visitors would be valuable. Further, we have estimated the value of recreation and tourism activities based upon what users paid to enjoy them (i.e. market values) and this study does not include other, “non-market” components. The contribution of marine ecotourism to the economy would likely be much higher with their inclusion, as supported by our survey results which showed that a healthy marine environment and abundant biodiversity, both of which we generally take for granted, were perceived as crucial by tour providers and self-guided visitors alike.

While MPAs are primarily designated to protect marine ecosystems, they can also help us meet important social or economic goals. Mapping of these values demonstrated that existing coverage of MPAs was insufficient to safeguard the economic value of this sector. Just about half of the marine area in our study region held some value for at least one of the marine activities considered. Areas of highest relative value were in locations where the activities overlapped. Clearly, the high value areas occurred where a healthy and rich marine environment most benefits the sector. Protecting the values that businesses and users depend upon can allow for long-term sustainability of this sector of the regional economy, but currently that is not happening. Existing MPAs in northern Vancouver Island covered less than 20% of the total economic value of this sector. The areas recommended for greater protection, which were designed to maximize biodiversity representation as efficiently as possible, captured nearly 80% of the relative value of all the marine recreation and tourism activities we considered. Establishing a more comprehensive network of MPAs that includes the areas recommended for greater protection would sustain and enhance recreation and tourism benefits quantified in our study as well as other wider ecological, social, and cultural benefits that arise through conserving biodiversity and its associated ecosystem services.

By quantifying some of the economic value of and degree to which the local economy depends upon areas of high biodiversity deserving of greater protection, we provide much needed data for decision making. Planners and policy-makers can make decisions informed by socio-economic and biodiversity data and better weigh the needs of competing human activities against the need for more protected areas to supply the vital ecosystem services upon which economic interests and critical ecosystem functioning depend.
In 2013, tourism in British Columbia generated $14 billion in revenue\textsuperscript{23} and in 2010, nearly 90% of British Columbians reportedly participated in outdoor recreation activities.\textsuperscript{15} This demonstrates that these activities are important to the province’s economy and identity. Further, ocean recreation was the biggest sub-sector contributor to the $11.6 billion ocean economy of British Columbia in 2005 (Figure 7). Gislason’s report to governments of the day estimated that $2.4 billion was spent in 2005 on marine recreation and leisure activities including boating, sailing, whale watching, scuba diving and beach/shore activities.\textsuperscript{10} This class of activities excluded sport fishing (angling), ferry travel, and cruise ship travel. According to Gislason’s study, the total revenue from the non-extractive marine recreation activities was second only in magnitude to ocean transport and nearly double that of the seafood sector.\textsuperscript{10}

Figure 7. Total ocean sector revenues/expenditures in 2005\textsuperscript{10}

Our highest estimate of $16 million, expanded to the $31 million ballpark to include self-guided recreation, does not approach even 10% (a reasonable northern Vancouver Island portion of B.C.’s total) of Gislason’s estimate for this type of activity for the entire province. Clearly, our studies are counting different things. We can assume Gislason’s estimates are fairly comprehensive, while we did not include economic values of retail businesses that rent or sell equipment such as kayaks and dive gear, nor tourism businesses that used the area but were not locally-based (e.g., U.S.-owned). In addition, live-aboard dive businesses that depend upon northern Vancouver Island marine ecosystems were not included in our survey as they did not contribute to the local economy. What our study did do was quantify the value of a set
of activities that absolutely depended on the healthy biodiversity in specific locations and points to the lack of designated protection to safeguard those values. The monetary value of the ecosystem services and biodiversity of these areas warrants investment in protection.

Tourism BC estimated that total revenue from tourism in British Columbia increased by 44% from 2003 to 2013.\textsuperscript{23} It is likely that the tourism sector will continue to grow in the future and, while the report did not look at ecotourism or marine-related tourism in particular, but it is likely these subsectors will grow as well. Increases of this magnitude in marine ecotourism could significantly benefit coastal communities with economies under stress. B.C.’s marine environment is regarded as unique in the world and highly attractive to tourists. For three consecutive years, B.C. was rated as the top dive destination in North America in a readership poll conducted by “Rodales Scuba Diving magazine”, the U.S. diver magazine with the largest circulation. In 2003 B.C. shared first place with the Galapagos Islands.\textsuperscript{17} In 2007, Gislason reported that ocean recreation was one of the three most promising sectors for future growth.\textsuperscript{10}

Ecotourism and properly managed MPAs could be developed and promoted in parallel, in that they support and enhance each other. Partnerships between MPAs and ecotourism businesses elsewhere in the world (e.g., the Mediterranean Experience of EcoTourism Network\textsuperscript{24}) can be instructive models that help Canada and British Columbia develop policies to enhance the socio-economic benefits of ecotourism on Canada’s Pacific coast while protecting and conserving the environment, not compromising it.
Recommendations

1. Make the valuation of “ecosystem services” an inherent part of economic assessments when decisions are to be made concerning the use of marine space and resources.

2. Recognize, quantify, and take into account the value of businesses and self-guided recreational activities that rely on free-of-charge, healthy, biodiversity and take steps to protect the provision of these services.

3. Improve data collection on ecotourism and marine-related tourism sectors in British Columbia to better understand current demand, value, trends, and frequently versus infrequently used areas.

4. Conduct research on other marine destinations around the world where ecotourism and MPAs are connected to determine how a symbiotic relationship between well-managed MPAs and sustainable ecotourism is best developed and nurtured.

5. Use this economic valuation and maps of valued areas for marine recreational and tourism as part of a cost benefit analysis for MPA network design for the Northern Shelf Bioregion.

6. Expand this analysis to the scale of the Northern Shelf Bioregion to better inform MPA network design for the entire bioregion. Attach economic values to our healthy and intact marine ecosystems as a necessary component of the comprehensive analyses required to inform MPA network design. Both monetary and non-monetary values should be considered to ensure that intangible cultural, ecological, and social values are not ignored.
Conclusion

Ocean management worldwide increasingly considers the degree to which healthy and intact ecosystems provide economic opportunities and support coastal community livelihoods. Given that most types of MPAs do allow non-extractive economic opportunities such as self-guided recreation and ecotourism activities within their boundaries, well-planned and managed protected areas with appropriate monitoring and enforcement in place can support both the local economy and maintain a healthy environment.

This study explored the economic value and importance of the marine recreation and tourism sector in the northern Vancouver Island region, and the degree to which that value is dependent upon areas of high marine biodiversity. We also showed that current MPAs are insufficient to protect and sustain the substantial recreation and tourism values and other wider social and cultural benefits that result from healthy ecosystems. Decision-making for our marine spaces, including MPA network design, needs to consider both the ecological and economic benefits of protected areas and recognize that while we currently don’t pay for many of the things we value in the marine environment, we do need to account for their immense value to local businesses, the local economy and local citizens. These contributions deserve due consideration as natural capital when weighing the economic benefits of various management and protection scenarios.

Being able to articulate the values that we depend upon empowers residents and planners to engage in building more sustainable coastal communities. This study was designed to fill a gap in knowledge and while we couldn’t meet all our objectives, our work can serve as a springboard and provide the impetus for other spatial economic assessments along B.C.’s coast to better balance our decision-making and give greater weight to those things we often take for granted.
Bibliography


http://www.meetnetwork.org/home


Dive Business Survey

Dear Dive Business Operator,

Living Oceans invites you to take part in our study on the contribution of a healthy environment to marine recreation for northern Vancouver Island. For this study, we are focusing on the "North Island"; the north-east portion of Vancouver Island, extending from Campbell River north to the Scott Islands (see map).

Living Oceans sits on an advisory committee for the ocean management process underway on B.C.’s coast (MaPP - see www.mappocean.org for more information). The identification of those marine areas that hold the highest economic value for recreation will allow us to communicate the importance of the ecosystem's contribution to the local recreational economy through processes such as MaPP. Being valued increases their chances of protection, and can subsequently ensure the long term health of both the environment and recreational opportunities.

We recognize that your time is valuable, so this survey contains only 6 questions. Your feedback is very important to us, as it is those, like you, who live in and spend time visiting these areas that hold the most knowledge about the recreational values in the North Island.

The information you provide is strictly CONFIDENTIAL. Individual results will be unattributed, aggregated and only used for the purpose of this study.

If you have any questions or comments, please do not hesitate to contact Sharlene Shaikh, the Living Oceans Ecosystem Services Analyst.

Sincerely,

The Marine Planning Team,
Living Oceans
Please note that the information you provide is strictly CONFIDENTIAL. Individual results will be unattributed, aggregated and only used for the purpose of this study.

Business Information

Business Name: ___________________________

Your Postal Code (so we can determine the distance traveled to dive sites in the North Island): __________

1. Approximately what percentage of your tours are in the North Island region (see map above) compared to other areas? _______%

2. Please provide the following details about your business operations in 2013:
   a. Employment. (e.g. If you have 2 people for 4 months and 1 person for 6 months. Total number of people employed: 3 people; Total number of person-months: 14 months):
      i. Total number of people employed: __________
      ii. Total number of person-months of employment: __________
   b. Business Activities.
      i. Is diving your primary or secondary business activity? Primary Secondary
      ii. Please approximate the following information for the marine recreation and tourism services you provided in 2013. Trip prices should be in Canadian dollars and include all trip-related costs e.g. boat and equipment rentals, training etc.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Live-Aboard/ Multi-day trips in the North Island</th>
<th>Day trips in the North island</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total no. of trips</td>
<td>Average no. of people per trip</td>
</tr>
<tr>
<td>Diving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other activity e.g. diving, whale watching, grizzly bear viewing, angling (please state):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
c. Approximate percentage of your clientele in 2013 who were not from Canada? ___%

d. Please indicate your annual gross revenue in Canadian dollars (before taxes) in 2013:

<table>
<thead>
<tr>
<th>≤$20,000</th>
<th>≤$60,000</th>
<th>≤$100,000</th>
<th>≤$140,000</th>
<th>≤$180,000</th>
<th>≤$220,000</th>
<th>≤$260,000</th>
<th>≤$300,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤$40,000</td>
<td>≤$80,000</td>
<td>≤$120,000</td>
<td>≤$160,000</td>
<td>≤$200,000</td>
<td>≤$240,000</td>
<td>≤$280,000</td>
<td>&gt;300,000</td>
</tr>
</tbody>
</table>

(please specify): $________

3. Please estimate what percentage of your gross revenue (before taxes) in 2013 was:
   a. From diving trips (trip cost, charters, training, rentals, accommodation): _________ %
   b. From other marine recreational activities e.g.:
      i. Kayaking: _______ %
      ii. Angling:_______%
      iii. Wildlife viewing:________%
      iv. Other activity (please specify)_________ : ______ %

Location of Dive Sites

4. Please RIGHT-click on the map below\(^a\) to add markers indicating key areas where you dived in 2013. Dive locations within 1km of each other will be grouped, so precise locations are not necessary. Once you right-click on the map you will be prompted to enter the area name (e.g. Browning Wall) and the number of times you dived there. Repeat dives on the same day should each be logged as individual dives. For example, if you dived 2 times at 2 different sites at Browning Wall, add one marker near Browning Wall on the map and enter 4 as the dive frequency. Mac users CTRL-Click to place markers.

Some well-known dive locations are shown here to orient you (zoom in and click on a dive site for it’s name and a brief description).

---
\(^a\) Virtual map of the study area is not included in this report.
Map Instructions:

To add a dive area:

- Right-click on the map (Mac users CTRL-Click)
- Fill in the pop-up window
- Click ‘Save & Close’ or click ‘x’ to cancel

--> Saved dive area will turn GREEN

Tips:

- Zoom in to add your dive areas. Dive areas cannot be deleted.

If there is an error with your dive areas please let us know in the comment box at the end of the survey.

Your Views

5. **Importance of a healthy marine environment.** Is a healthy marine environment important for your diving experience?
   a. If “Yes”, what aspects (species, habitats, and geographic features) are particularly important to you?

6. **Marine protected areas are known to maintain or enhance marine habitats and species if harmful human activities are restricted.**
   a. On a scale of 1-5 (1=very unsupportive, 5=very supportive), to what extent do you support the establishment of marine protected areas in the North Island?

   ________

   b. Would you be willing to pay an annual fee to help fund the management and enforcement of marine protected areas in that you dive in? (please circle)

       YES    NO

   c. If “YES”, what is the maximum percentage of your revenue that you would be willing and able to pay per year through an industry association/ not-for-profit organization to support the management and enforcement of marine protected areas?

       Percentages can be specific to 2 decimal places e.g. X.X% or X.XX%

Please feel free to comment on any of the questions above.

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE! If you have any questions on this survey or would like to receive an online version of the full report, please contact Sharlene at sshaikh@livingoceans.org or by phone at 604-696-5044.
Kayak Business Survey

Dear Kayak Business Operator,

Living Oceans, the North Island Marine Mammal Stewardship Association and the Wilderness Tourism Association invite you to take part in our study on the contribution of a healthy environment to marine recreation for northern Vancouver Island. For this study, we are focusing on the “North Island”; the north-east portion of Vancouver Island, extending from Campbell River north to the Scott Islands (see map).

Living Oceans and the Wilderness Tourism Association sit on an advisory committee for the ocean management process underway on B.C.’s coast (MaPP - see www.mappocean.org for more information). The identification of those marine areas that hold the highest economic value for recreation will allow us to communicate the importance of the ecosystem’s contribution to the local recreational economy through processes such as MaPP. Being valued increases their chances of protection, and can subsequently ensure the long term health of both the environment and recreational opportunities.

We recognize that your time is valuable, so this survey contains only 5 questions. Your feedback is very important to us, as it is those, like you, who live in and spend time visiting these areas that hold the most knowledge about the recreational values in the North Island.

The information you provide is strictly CONFIDENTIAL. Individual results will be unattributed, aggregated and only used for the purpose of this study.

If you have any questions or comments, please do not hesitate to contact Sharlene Shaikh, the Living Oceans Ecosystem Services Analyst.

Sincerely,

The Marine Planning Team

Living Oceans Society
Please note that the information you provide is strictly CONFIDENTIAL. Individual results will be unattributed, aggregated and only used for the purpose of this study.

Business Information

Business Name: ________________________

Your Postal Code (so we can determine the distance traveled to kayak sites in the North Island):
________________

1. Approximately what percentage of your tours are in the North Island region (see map above) compared to other areas? _______%

2. Please provide the following details about your business operations in 2013:
   a. Employment. (e.g. If you have 2 people for 4 months and 1 person for 6 months. Total number of people employed: 3 people; Total number of person-months: 14 months):
      i. Total number of people employed: __________
      ii. Total number of person-months of employment: __________
   b. Business Activities.
      i. Is kayaking your primary or secondary business activity? Primary Secondary
      ii. Please approximate the following information for the marine recreation and tourism services you provided in 2013. Trip prices should be in Canadian dollars and include all trip-related costs e.g. boat and equipment rentals, training etc.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Multi-day trips in the North Island</th>
<th>Day trips in the North island</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total no. of trips</td>
<td>Averag e no. of people per trip</td>
</tr>
<tr>
<td>Kayaking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other activity e.g. diving (please state):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other activity (please state):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

37
c. Approximate percentage of your clientele in 2013 who were not from British Columbia? __ %
d. Please indicate your annual gross revenue in Canadian Dollars (before taxes) in 2013:

<table>
<thead>
<tr>
<th>≤$20,000</th>
<th>≤$60,000</th>
<th>≤$100,000</th>
<th>≤$140,000</th>
<th>≤$180,000</th>
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<td>≤$200,000</td>
<td>≤$240,000</td>
<td>≤$280,000</td>
<td>&gt;$300,000</td>
</tr>
</tbody>
</table>

(please specify): $______

3. Please estimate what percentage of your gross revenue (before taxes) in 2013 was:
   a. From kayaking (trips, rentals, training, accommodation etc.): __________ %
   b. From other marine recreational activities e.g.:
      i. Diving: _______ %
      ii. Angling: _______ %
      iii. Wildlife viewing: _______ %
      iv. Other activity (please specify)__________: ______ %

Your Views

4. Importance of a healthy marine environment. Is a healthy marine environment important for your kayaking experience?
   a. If “Yes”, what aspects (species, habitats, and geographic features) are particularly important to you?
      ______________________________________________________

5. Marine protected areas are known to maintain or enhance marine habitats and species if harmful human activities are restricted.
   a. On a scale of 1-5 (1=very unsupportive, 5=very supportive), to what extent do you support the establishment of marine protected areas in the North Island? __________
   b. Would you be willing to pay an annual fee to help fund the management and enforcement of marine protected areas in that you kayak in? (please circle)
      YES       NO
   c. If “YES”, what is the maximum percentage of your revenue that you would be willing and able to pay per year through an industry association/ not-for-profit organization to support the management and enforcement of marine protected areas?
      Percentages can be specific to 2 decimal places e.g. X.X% or X.XX%
Please feel free to comment on any of the questions above.

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE! If you have any questions on this survey or would like to receive an online version of the full report, please contact Sharlene at sshaikh@livingoceans.org or by phone at 604-696-5044.
Wildlife Viewing Business Survey

Dear Wildlife Viewing Tour Operator,

Living Oceans, the North Island Marine Mammal Stewardship Association and the Wilderness Tourism Association invite you to take part in our study on the contribution of a healthy environment to marine recreation for northern Vancouver Island. For this study, we are focusing on the "North Island"; the north-east portion of Vancouver Island, extending from Campbell River north to the Scott Islands (see map).

Living Oceans and the Wilderness Tourism Association sit on an advisory committee for the ocean management process underway on B.C.'s coast (MaPP - see www.mappocean.org for more information). The identification of those marine areas that hold the highest economic value for recreation will allow us to communicate the importance of the ecosystem’s contribution to the local recreational economy through processes such as MaPP. Being valued increases their chances of protection, and can subsequently ensure the long term health of both the environment and recreational opportunities.

We recognize that your time is valuable, so this survey contains only 9 questions. Your feedback is very important to us, as it is those, like you, who live in and spend time visiting these areas that hold the most knowledge about the recreational values in the North Island.

The information you provide is strictly CONFIDENTIAL. Individual results will be unattributed, aggregated and only used for the purpose of this study.

Please note that wildlife viewing is defined as an activity where water taxis, charters, and other motorized boats are used for the primary purpose of observing wildlife such as whales. Kayak businesses that also operate wildlife viewing tours from kayaks should complete the Kayak Survey. If you have any questions or comments, please do not hesitate to contact Sharlene Shaikh, the Living Oceans Ecosystem Services Analyst.

Sincerely,

The Marine Planning Team, Living Oceans
Please note that the information you provide is strictly CONFIDENTIAL. Individual results will be unattributed, aggregated and only used for the purpose of this study.

Business Information
Business Name: _________________________

Your Postal Code (to determine the distance traveled to wildlife viewing areas in the North Island):

1. What percentage of your tours are in the North Island (see Figure 1) compared to other areas? ___%

2. Please provide the following details about your business operations in 2013:
   a. Employment. (e.g. If you have 2 people for 4 months and 1 person for 6 months.
      Total number of people employed: 3 people; Total number of person-months: 14 months):
      i. Total number of people employed: __________
      ii. Total number of person-months of employment: __________
   b. Business Activities.
      i. Is wildlife viewing your primary or secondary business activity?     Primary
         Secondary
      ii. Please approximate the following information for the marine recreation and
tourism services you provided in 2013. Trip prices should be in Canadian dollars
and include all trip-related costs e.g. boat and equipment rentals, training etc.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Multi-day trips in the North Island</th>
<th>Day trips in the North island</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total no. of trips</td>
<td>Average no. of people per trip</td>
</tr>
<tr>
<td>Wildlife viewing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other activity e.g. diving (please state):</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   a. Approximate percentage of your clientele in 2013 who were not from British Columbia (i.e. other parts of Canada or abroad)? ___%
   b. Please indicate your annual gross revenue in Canadian dollars (before taxes) in 2013:
7. Please estimate what percentage of your gross revenue (before taxes) in 2013 was:
   a. From wildlife viewing (trips, charters, accommodation etc.): _________ %
   b. From other marine recreational activities e.g.:
      i. Kayaking: _______ %
      ii. Angling:_______%
      iii. Diving:________%
      iv. Other activity (please specify)________________: _____ %

Your Views

8. **Importance of a healthy marine environment.** Is a healthy marine environment important for your wildlife viewing experience?
   a. If “Yes”, what aspects (species, habitats, and geographic features) are particularly important to you?
      ___________________________

9. **Marine protected areas are known to maintain or enhance marine habitats and species if harmful human activities are restricted.**
   a. On a scale of 1-5 (1=very unsupportive, 5=very supportive), to what extent do you support the establishment of marine protected areas in the North Island? _________
   b. Would you be willing to pay an annual fee to help fund the management and enforcement of marine protected areas in that you go wildlife viewing in? (please circle)
      YES      NO
   c. If “YES”, what is the maximum percentage of your revenue that you would be willing and able to pay per year through an industry association/ not-for-profit organization to support the management and enforcement of marine protected areas? Percentages can be specific to 2 decimal places e.g. X.X% or X.XX%
      __________________________

Please feel free to comment on any of the questions above.

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE! If you have any questions on this survey or would like to receive an online version of the full report, please contact Sharlene at sshaikh@livingoceans.org or by phone at 604-696-5044.
Dear Diver,

Living Oceans invites you to take part in our study on the contribution of a healthy environment to marine recreation for northern Vancouver Island. For this study, we are focusing on the “North Island”; the north-east portion of Vancouver Island, extending from Campbell River north to the Scott Islands (see map).

Living Oceans sits on an advisory committee for the ocean management process underway on B.C.’s coast (MaPP - see www.mappocean.org for more information). The identification of those marine areas that hold the highest economic value for recreation will allow us to communicate the importance of the ecosystem’s contribution to the local recreational economy through processes such as MaPP. Being valued increases their chances of protection, and can subsequently ensure the long term health of both the environment and recreational opportunities.

We recognize that your time is valuable, so this survey contains only 9 questions. Your feedback is very important to us, as it is those, like you, who live in and spend time visiting these areas that hold the most knowledge about the recreational values in the North Island.

The information you provide is strictly CONFIDENTIAL. Individual results will be unattributed, aggregated and only used for the purpose of this study.

If you have any questions or comments, please do not hesitate to contact Sharlene Shaikh, the Living Oceans Ecosystem Services Analyst.

Sincerely,
The Marine Planning Team,
Living Oceans

Please note that the information you provide is strictly CONFIDENTIAL. Individual results will be unattributed, aggregated and only used for the purpose of this study.

Name of your diving club (if you are a member): __________________

General - Diving in North Vancouver Island

1. Approximately, how many days did you spend diving in 2013: _________________ days
2. How many days did you spend diving in the North Island (Figure 1) in 2013:

______________ days

3. Did you spend time at a North Island dive resort or live aboard in 2013 (please circle)?

YES    NO

Time spent:_________ days Location: ______________

Average number of divers in your group: _____ Estimated dive costs per person per day:

$_____ 

4. Apart from resort/ live aboard trips, how often this year did you/ your club:

a. Hire a dive boat (incl. charters, water taxis etc.)? _____________ (number of days)

Average number of divers in your group: _____ Estimated dive costs per person per day: $_____ 

b. Use your dive club boat or a privately-owned one? ____________ (number of days)

Average number of divers in your group: _____ Estimated dive costs per person per day: $_____ 

5. Please estimate any additional costs associated with your dive trips to the North Island this year (e.g. accommodation, fuel, rentals, transport to dive sites, food and drink, gas, parking etc.)

_______ CDN for _____ trip days 

Location of Dive Sites

6. Please enter the approximate distance you travel to go diving in the North Island in kilometres (e.g. Vancouver to Campbell River is 236km) or enter your postal code:

__________ 

7. Please RIGHT-click on the map below\textsuperscript{b} to add markers indicating key areas where you dived in 2013. Dive locations within 1km of each other will be grouped, so precise locations are not necessary. Once you right-click on the map you will be prompted to enter the area name (e.g. Browning Wall) and the number of times you dived there. Repeat dives on the same day should each be logged as individual dives. For example, if you dived 2 times at 2 

\textsuperscript{b} Virtual map of the study area is not included in this report.
different sites at Browning Wall, add one marker near Browning Wall on the map and enter 4 as the dive frequency. Mac users CTRL-Click to place markers. Some well-known dive locations are shown here to orient you (zoom in and click on a dive site for it's name and a brief description).

**Map Instructions:**

*To add a dive area:*

- Right-click on the map (Mac users CTRL-Click)
- Fill in the area name and number of times visited
- Click 'Save & Close' or click 'x' to cancel
- --> Saved dive area will turn GREEN

**Tips:**

Zoom in to add your dive areas. Dive areas cannot be deleted.

If there is an error with your dive areas please let us know in the comment box at the end of the survey.

**Your Views**

8. **Importance of a healthy marine environment.** Is a healthy marine environment important for your diving experience? If “Yes”, what aspects (species, geographic features) are particularly important to you? ______

9. **Marine protected areas are known to maintain or enhance marine habitats and species if harmful human activities are restricted.**
   a. On a scale of 1-5 (1=very unsupportive, 5=very supportive), to what extent do you support the establishment of marine protected areas in the North Island? ________
   b. Would you be willing to pay an annual fee to help fund the management and enforcement of marine protected areas in that you dive in? (please circle)   YES             NO
   If “YES”, What is the **maximum amount that you would be willing and able to pay per year** through a diving club/ not-for-profit organization to support the management and enforcement of marine protected areas (Please circle)

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Please feel free to comment on any of the questions above.
Recreational Paddling Survey

Dear Paddler,

Living Oceans invites you to take part in our study on the contribution of a healthy environment to marine recreation for northern Vancouver Island. For this study, we are focusing on the “North Island”; the north-east portion of Vancouver Island, extending from Campbell River north to the Scott Islands (see map).

Living Oceans sits on an advisory committee for the ocean management process underway on B.C.’s coast (MaPP - see www.mappocean.org for more information). The identification of those marine areas that hold the highest economic value for recreation will allow us to communicate the importance of the ecosystem’s contribution to the local recreational economy through processes such as MaPP. Being valued increases their chances of protection, and can subsequently ensure the long term health of both the environment and recreational opportunities.

We recognize that your time is valuable, so this survey contains only 9 questions. Your feedback is very important to us, as it is those, like you, who live in and spend time visiting these areas that hold the most knowledge about the recreational values in the North Island.

The information you provide is strictly CONFIDENTIAL. Individual results will be unattributed, aggregated and only used for the purpose of this study.

If you have any questions or comments, please do not hesitate to contact Sharlene Shaikh, the Living Oceans Ecosystem Services Analyst.

Sincerely,
The Marine Planning Team,
Living Oceans
Recreational Paddling Survey

1. Approximately, how many days did you spend paddling in 2013?

2. How many days did you spend paddling in the North Island (Figure 1) in 2013?

3. Did you spend time at a North Island lodge during a paddle trip in 2013? NO  YES
   a. Time spent (days):
   b. Location:
   c. Average number of paddlers in your group:
   d. Estimated paddle costs per person per day (CDN):

4. How many days this year did you:
   a. Hire a water taxi or charter to go paddling?
      i. Average number of paddlers in your group:
      ii. Estimated cost per person per day (CDN):
   b. Hire a kayak or canoe?
      i. Average number of paddlers in your group:
      ii. Estimated cost per person per day (CDN):

5. Please estimate any additional non-paddling costs from your trips to the North Island this year (e.g. accommodation, car or other rentals, food and drink, gas, parking etc.):

Location of Paddling Sites

6. Please enter the approximate distance you travel to go paddling in the North Island in kilometres (e.g. Vancouver to Campbell River is 236km) or enter your postal code:

7. Please RIGHT-click on the map below to add markers indicating key areas where you paddled in 2013, as well as camp and launch sites. Paddling areas within 1km of each other will be grouped, so precise locations are not necessary. Once you right-click on the map you will be prompted to enter the area name (e.g. Robson Bight) and the number of times you paddled there. Mac users CTRL-Click to place markers.

Some well-known paddling areas are shown here to orient you (zoom in and click on an area for it’s name and a brief description; layers can be turned on and off in the bottom right corner).

Map Instructions:

To add a paddling area:

Right-click on the map (Mac users CTRL-Click)

Fill in the area name and number of times visited
Click ‘Save & Close’ or click ‘x’ to cancel

--> Saved paddling area will turn GREEN

Tips:

Zoom in to add your paddling areas as they cannot be placed on top of existing paddle areas. Paddling areas cannot be deleted.

If there is an error with your paddling sites please let us know in the comment box at the end of the survey.

Your Views

8. Importance of a healthy marine environment. Is a healthy marine environment important for your paddling experience? If “Yes”, what aspects (species, geographic features) are particularly important to you?

________________________________________________________________________

________________________

9. Marine protected areas are known to maintain or enhance marine habitats and species if harmful human activities are restricted.

   a. On a scale of 1-5 (1=very unsupportive, 5=very supportive), to what extent do you support the establishment of marine protected areas in the North Island?

      _______

   b. Would you be willing to pay an annual fee to help fund the management and enforcement of marine protected areas in that you paddle in? (please circle)

      YES  NO

If “YES”, what is the maximum amount that you would be willing and able to pay per year through a diving club/ not-for-profit organization to support the management and enforcement of marine protected areas (Please circle):

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Please feel free to comment on any of the questions above. _________________________________

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE! If you have any questions on this survey or would like to receive an online version of the full report, please contact Sharlene at sshaihk@livingoceans.org or by phone at 604-696-5044.
Survey Method Details

Recipients
Several local businesses in North Vancouver Island offered more than one type of recreational activity to clients. To ensure that economic values were not double-counted, businesses were asked to state the percentage of their revenue that was generated from each activity (diving, kayaking, wildlife viewing, or other).

Because the goal was to spatially assign the value generated by these businesses to the marine areas they visit based on frequency of use, only businesses that take tours out on the water were included. Many local tour operators worked in other parts of British Columbia, so for these only the portions of their revenue that were derived in the North Vancouver Island study area were included.

Wildlife viewing businesses that operated from the water and focused on both marine species such as whales and terrestrial species such as bears were surveyed. These were all included because, from an ecological perspective, grizzly bears are directly dependent on the health of the marine and coastal environment (i.e., estuaries are a regular habitat and salmon are a common food source).

Respondents - Dive businesses
Two out of four local dive businesses responded. The total estimated value of dive business activity was determined by calculating the gross revenue of our sample group (one dive charter and one dive resort) and estimating the revenues of the remaining businesses. The revenues of these remaining businesses, also a dive charter and a dive resort, were estimated based on their relative sizes and clientele according to websites and personal communication with other local dive businesses.

Respondents - Kayak businesses
Ten responses were obtained for eight businesses that were primarily involved in kayaking, and two businesses that provided kayak tours as a secondary activity. Four kayak businesses did not respond to the survey. The total estimated economic value of business activity in northern Vancouver Island was determined by calculating the gross revenue of the sample and adding an estimate for the four businesses that did not respond, based on the median value from the responding group.

Respondents - Wildlife viewing businesses
Fifteen responses were obtained for 11 businesses primarily involved in wildlife viewing and four that provided wildlife viewing tours as a secondary activity. Two businesses did not respond to the survey so their values were estimated using the median revenue of the sample. All businesses were summed to give a total estimated value.

Respondents - Grizzly bear viewing businesses
Three out of the four businesses that offered grizzly bear tours were interviewed. One business did not respond to the survey so a value was estimated using the median revenue of the sample. The results were summed to give a total estimated value.

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^ The median value (i.e., the value that falls in the middle of the sample results) is a more accurate representation of a sample than the average, when sample size is less than 30.
Appendix B – Methods of Spatial Distribution of Economic Values

The study area was divided into 2 km by 2 km grid cells and values were assigned using these methods:

- Dive sites, identified by both businesses and self-guided users, were buffered by one kilometre and the number of visits to each site was distributed amongst grid cells based on the amount of grid cell overlap with the buffer \[\text{number of visits} \times (\text{overlap area}/\text{total buffer area})\]. The number of visits to each grid cell was then summed.

- Kayak and wildlife viewing businesses indicated area, sites and routes of importance on paper maps. Areas of high economic value were identified based on the number of times each 2x2 km cell was overlapped by routes, areas and sites (all buffered by 1 km) reported by the different businesses. A single business could report using any one cell a maximum of two times (i.e., a count of two was reserved for areas of high importance that fell in an area of general use).

- Online survey respondents, who identified as self-guided kayakers, provided the location of important kayaking sites (launch sites, camping sites, etc). The BCMCA kayak route database was used to add route information to the online responses; the BCMCA database includes data sourced from the Province’s Coastal Resource Information Management System and Tourism Opportunity Studies, as well as primary data collected by the Outdoor Recreational Council.

- When a kayaker identified a site as a day trip location, we buffered the location by 1 km to identify connected routes, then assumed a day trip length of 3 nm (or 5.6 km) from the site. This is an estimate of the distance travelled for a typical out and back day trip. Some respondents provided descriptions of routes, which were digitised and added to the database or matched to existing BCMCA routes. To identify areas of high economic value, the frequency count for each individual site was assigned to associated grid cells and its intersecting route, also buffered by 1 km.

- Known and important recreational boating routes, marinas, and anchorages were used to locate areas of high economic value to self-guided wilderness viewing. Recreational boating routes and anchorages from the BCMCA database included relative importance rankings. Routes ranked medium or higher were used. Anchorages with medium or higher relative importance (or unknown importance) were included. All the marinas that intersected included routes were used as these were likely to be starting or rest points for pleasure boat excursions. Any grid cells that intersected the important routes and marinas were given a value based on the number of routes, marinas or anchorages that occurred in that cell.
The Council of British Columbia Yacht Clubs was updating its list of important anchorage sites in British Columbia at the time of this study. Therefore, it was not possible to refine our results to sites that were visited in 2013, as was done for recreational diving and kayaking. As a result, some sites we identified as important may be historically but not recently important to recreational boaters.

Appendix C – Notes about Confidence in our Estimates

Economic values

- We have high confidence in our estimates of the value of marine ecotourism businesses because revenue information was obtained directly from 75% of the businesses was self-reported within a range of values, rather than as an absolute value.

- Business revenues reported in our survey were consistent with the findings of other studies. The average gross revenue of a dive business in British Columbia in 2003 was between $98,000 and $166,70017, while the average gross revenue for a sea kayaking business in British Columbia in 2005 was $125,000.22 Reported revenues in our study were 6%-13% higher, which could easily be explained by growth in the sector and increasing prices.

- In 2013, North Island Marine Mammal Stewardship Association estimated the combined annual revenue of its members was $17-25 million25, and this is higher than our findings. This inconsistency was due to the fact that we included only revenues that stayed local and stemmed from marine-based tours. We were able to account for the differences in total revenue when we neglected these exceptions.

- As noted in the body of our report, we were less confident in estimates of the value of self-guided marine recreation. We found no robust information on the number of visitors who undertake this kind of recreation. While the proportion of residents who participate in different activities came from a reliable source, the number of days they actually participate in a specific activity was not available. Therefore our estimates were educated guesses.

- For kayakers and divers, we used estimates of average daily expenditures based on our survey results and, compared to the number of people who undertake these self-guided activities, our sample size was small. This added to the uncertainty in our estimates.

- Expenditures by recreational boaters involved in wildlife viewing were drawn from previous studies in the region that studied recreational boating from small craft harbours only. The extent to which those expenditure values are skewed when compared to the larger recreational boating population was unknown.
• For self-guided use, larger sample sizes would certainly have added to the confidence in results. However, access to this population was a challenge, and research on alternate methods to measure or estimate visitation may provide simpler solutions than surveys.26

**Spatial distribution of values**

For diving, only boat dives were studied, and we expect that the spatial distribution of diving activities would be more widespread if shore dives were included.

The spatial distribution of valued areas for kayaking was likely skewed in favour of the northern areas of the study region. Kayaking values in the Discovery Islands region around Campbell River were likely under-represented in spatial data collected from both businesses and self-guided divers.

During the participatory mapping exercise, some kayakers noted that they used water taxis to get to the Broughton Archipelago or completed multi-day trips to get there. This explained the diffusion of value observed in the Figure 2 in the Archipelago.

Marine wildlife viewing had the most diffuse relative value across the study area, and this made sense since motorised boats provided most of the access for this activity. The concentration of grizzly bear viewing values in specific estuaries was accurate, although the specific estuaries viewed may change annually.