Measuring Human Wellbeing Indicators for Hood Canal

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Introduction

In 2012, the Hood Canal Coordinating Council (HCCC) collaborated with the Puget Sound Institute, UW Tacoma (PSI), to develop human wellbeing indicators related to the Hood Canal natural environment (Biedenweg and Hanein 2012). Using literature review, stakeholder interviews, and stakeholder workshops, PSI recommended 26 indicators representing seven domains of wellbeing: Economic, Physical, Psychological, Social, Cultural, and Governance. The HCCC selected six of these indicators for initial monitoring of human relationships to the local environment. The purpose of these indicators is to capture a broad image of the "State of the Hood Canal" that represents both ecological and social systems. Eventually, these indicators can be monitored over time to evaluate resource management projects and select the most appropriate strategies according to both human and ecological trends.

In the fall of 2014, we collected baseline data for four subjective indicators: accessing locally harvested products, experiencing positive emotions, working with community members to solve natural resource issues, and knowledge gained from different communication sources (Appendix I). This report describes the methods and results for this effort.

Methods

Data Collection

We contracted with Google Consumer Surveys (GCS) to administer the survey instrument. GCS offers the ability to target respondents at the zipcode prefix level. A zipcode prefix is a three-digit code that references a group of zipcodes. Figure 1 shows geographic region corresponding to the two zipcode prefixes targeted for this survey, 983- and 985-. As shown in Figure 1, zipcode prefixes are not fine-grained enough to sample a local region such as Hood Canal. Thus, the first question of the survey instrument served as a screener question. Respondents were asked whether they live full time, part time, or own property in Hood Canal; if a respondent selected any of these choices, they were then invited to continue the survey, whereas if they did not, they were not asked to complete any further questions. Thus, by using zipcode prefix targeting in conjunction with the screener question, we are able to sample from the target population: individuals who perceive themselves to be part of the Hood Canal community. 4,529 individuals responded to the screener question and 15.2% (688) reported that they lived in Hood Canal or owned property in the area. Of these, many did not complete the survey or Google could not provide sufficient demographic data, resulting in a final sample size of 503.

GCS implements surveys in two ways: (1) by embedding questions into Google's network of premium online news, reference, and entertainment sites, wherein people complete surveys in exchange for access to content; and (2) on mobile devices where people receive credit for books, music, and apps from the Google Play store in exchange for complete surveys. For responses embedded in Google websites, GCS infers key demographic data (gender, age, and geographic location) using the respondent's browsing history and IP address. Respondents who answer questions on their mobile device to receive credit from Google answer demographic questions as part of signing up to participate in the program. These mechanisms of providing demographic data are a key advantage of this approach, since it means that we do not have to ask demographic questions ourselves--and thus pay, either in terms of cost or response rate, the additional cost of adding several more questions to the survey. Of the 503 complete responses, 380 came from respondents using mobile devices, with the remainder from Google websites related to arts and entertainment (9 responses), news (82 responses), reference (20 response), and miscellaneous (12) (See Google's white paper on how this method robustly compares to other common survey methods).

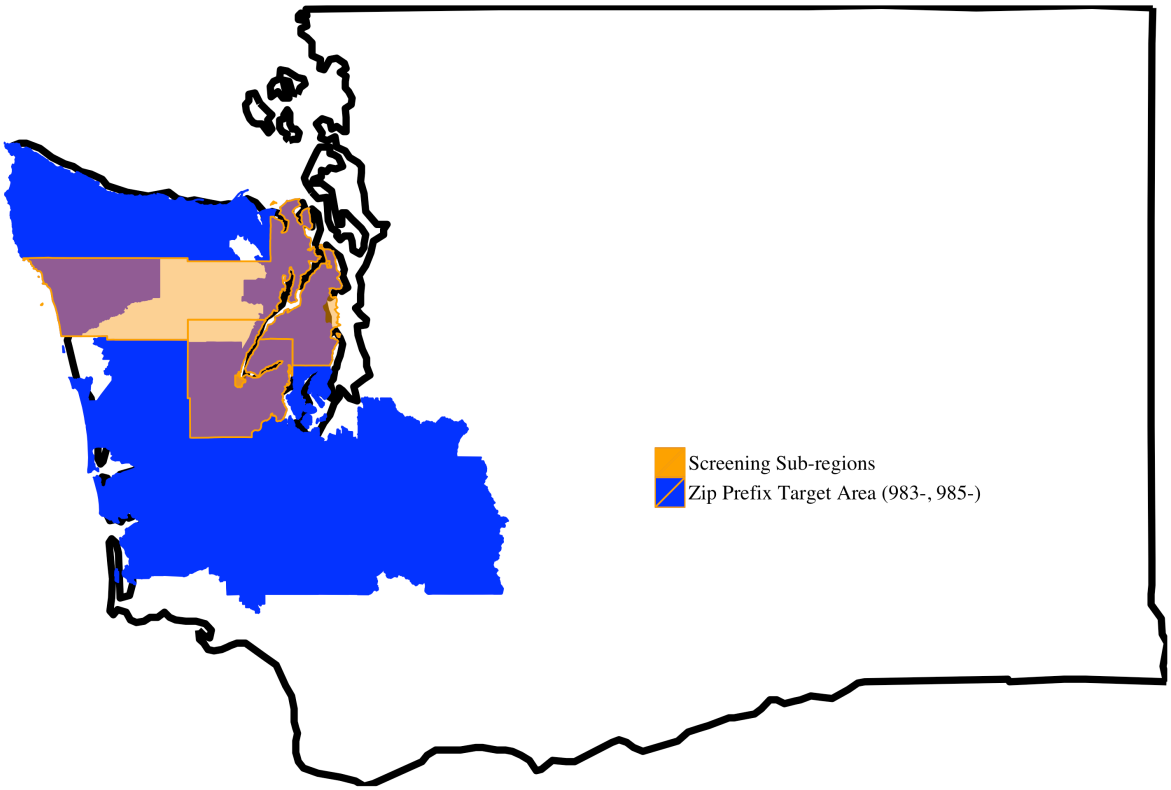

Figure 1: GCS Target and Screening Regions

Weighted Responses

As with any survey, one of the primary concerns for this analysis is to ensure that the responses in the survey are representative of the population that we wish to study. We accounted for any discrepancy between the sample group and the target Hood Canal population using survey weights; these weights are applied to survey responses to ensure that responses are accorded significance in keeping with the prevalence of that type of respondent in the target population. For instance, Hood Canal has a higher proportion of elderly residents than occurs in the GCS sample; thus, elderly residents that are in the GCS sample are accorded a stronger weight so that the informational contribution these responses make to the data is in keeping with the actual proportion of elderly residents in the Hood Canal population. Figure 2 compares several demographic characteristics in the GCS sample with the benchmark values for the Hood Canal region:

These benchmark values are generated using data from the 2010 US Census. The demographic weights are based on region-wide estimates based on aggregating the totals from Mason, Jefferson, and Kitsap Counties as well as the designated places of Port Gamble S'Klallam and Skokomish, Washington. To establish population proportions by demographic strata (age, gender and region), we relied on the 2012 5-year American Community Survey Data. We then used the ratio of the census population frequency of each strata to our survey frequency to develop weights. This results in a series of weights that can adjust for the relative frequency of age-gender-subregion groups in the survey responses. Because within-subregion traits were potentially of interest, we additionally provide age-gender weights for within each sub-region. This second set of weights is used for building inference within subregions but is not valid for making inference about Hood Canal wide characteristics. Using these weights, we were able to produce representative results for the Hood Canal region. Because GCS is not able to impute demographic data for all responses, the weighted response data include 440 responses. The data file attached to this report contains all 503 complete survey responses; response for which weights cannot be computed are given an NA value for both the region-wide and sub-region weights.

Figure 2 breaks the sample population down into strata referring to a specific gender and age group within one of the targeted sub-regions (Jefferson County, Kitsap County, Mason County, Port Gamble S'Klallam Tribe, and Skokomish Tribe). The height of each stratum-specific bar reflects the sample weight assigned to that strata. Strata with values to the left of the centerline are underrepresented in our response data; a higher line means that a given stratum is assigned a larger weight, greater than one, to account for this underrepresentation. Conversely, values to the right of the centerline reflect overrepresentation. Responses in these strata are assigned a survey weight less than one to ensure that these responses do not overly influence the results. Thus, the centerline corresponds to a weight of one, which neither increases nor decreases the weight given to a specific response. There is no bar at all for some strata; this reflects a stratum that does not occur in our sample. For instance, we received no responses from males or females over the age of 45 in the Port Gamble S'Kallam Tribe. Overall, Figure 2 clearly demonstrates that

older age groups are undersampled in our responses, and conversely that young age groups are oversampled. Thus, the use of survey weights is very important for producing results that are representative of the Hood Canal population.

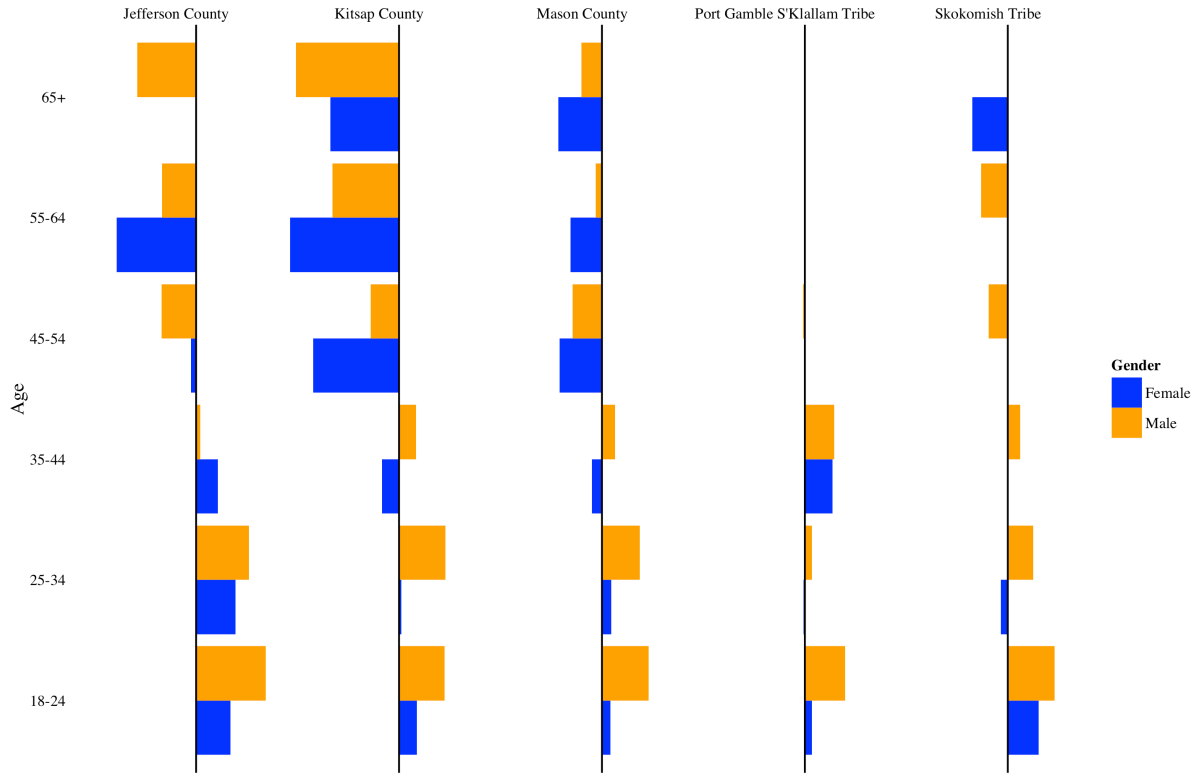

Figure 2: Survey weights by stratum

Results

In what follows, we provide summary results for each question in the survey. For questions that related so a specific human wellbeing indicator (Questions 3-7), we also relate the survey results to the broader indicator context. Table 1 presents a summary of all seven survey questions:

Table 1: Summary of Survey Questions

Indicator	Question
Screening Question	Do you live or own property in the Hood Canal region?
Additional Demographics	Where in the Hood Canal region do you live or own property?
Access to locally harvested products(a)	If you like to gather or hunt wild local food resources (e.g., gathering berries or crab fishing), how often are you able to harvest as much as you'd like?
Access to locally harvested products(b)	Which of the following factors most prevents you from harvesting more wild local food (e.g., digging for clams or gathering mushrooms)?

Positive emotions	In the past year, how often have you felt positive emotions (such as awe, inspiration, or appreciation) when spending time outdoors around Hood Canal?
Communication	In the past year, from which of the following sources have you learned the most about Hood Canal environmental or recreational topics?
Strong Communities	In the past year, how often have you worked with other residents to manage resources, prepare cultural events, solve community challenges, or share harvested goods?

Question 1: Hood Canal Residency

This survey targeted individuals who live in the Hood Canal region full or part time or own property in the area.

Table 2: Hood Canal Residency Summary

Do you live or own property in the Hood Canal region?	Responses (Unweighted)
I live in Hood Canal part-time	102
I live in Hood Canal year-round	278
I own property but do not live in Hood Canal	123
Total	503

As shown in Table 2, more than half of all respondents reported that they live in Hood Canal year-round. Figure 1 presents the age distribution of weighted responses for each residency category:

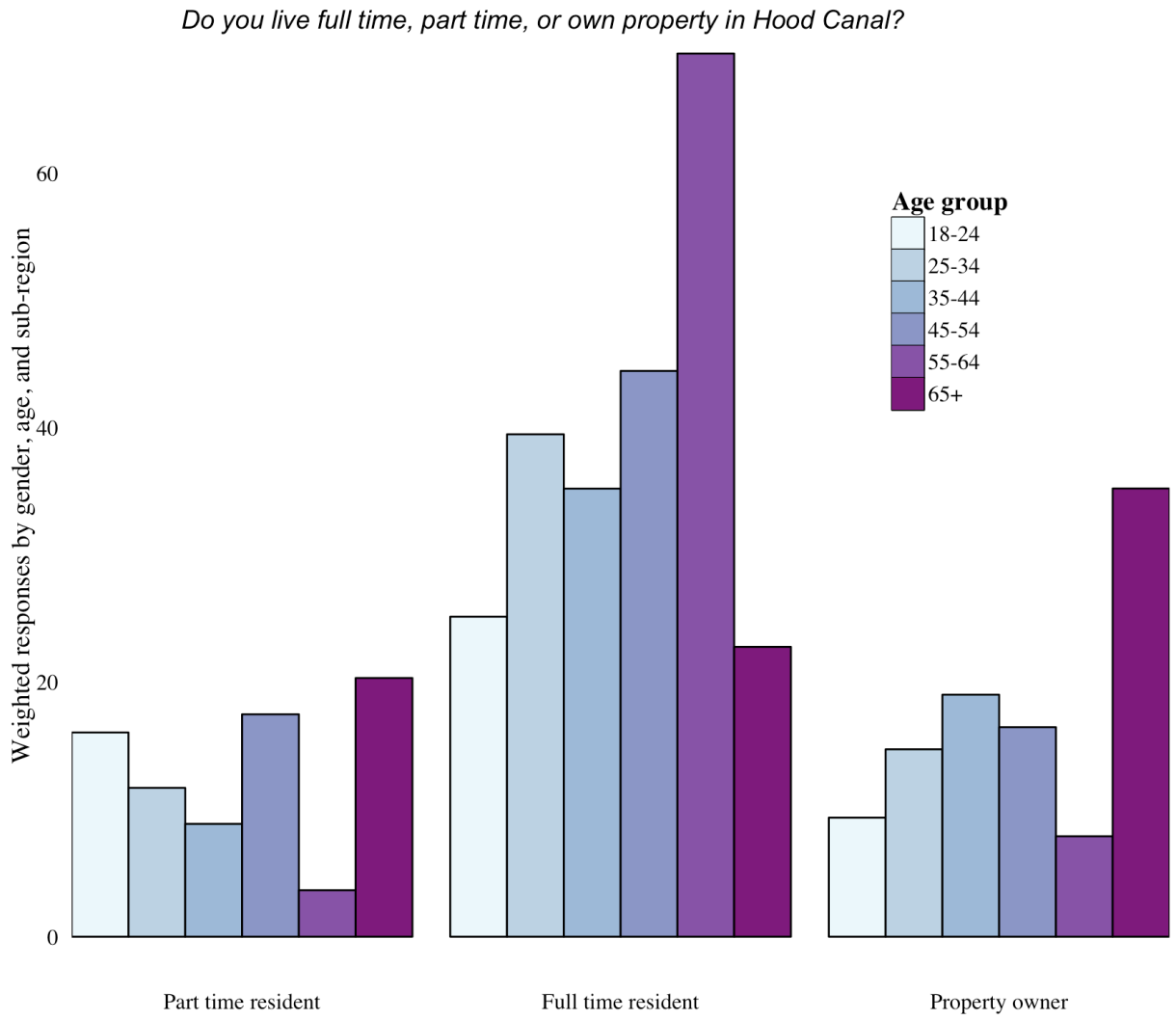

Figure 3: Residency status by age

Figure 3 demonstrates findings that are perhaps unsurprising, but nonetheless demonstrate a key point about the Hood Canal area. Primarily, we see that the distribution of part time residents is not skewed towards older residents, while full time residents are disproportionately 55 year of age or older.

Question 2: Hood Canal Sub-Region

In order to facilitate data analysis on a finer geographic scale, the survey asked respondents to report the specific sub-region of Hood Canal in which they live or own property. Respondents were given five options, presented in Table 3:

Table 3: Respondent Sub-Region

Where in the Hood Canal region do you live or own property?	Responses
Jefferson County	63
Kitsap County	201
Mason County	136
Port Gamble S'Klallam Tribe	13
Skokomish Tribe	27

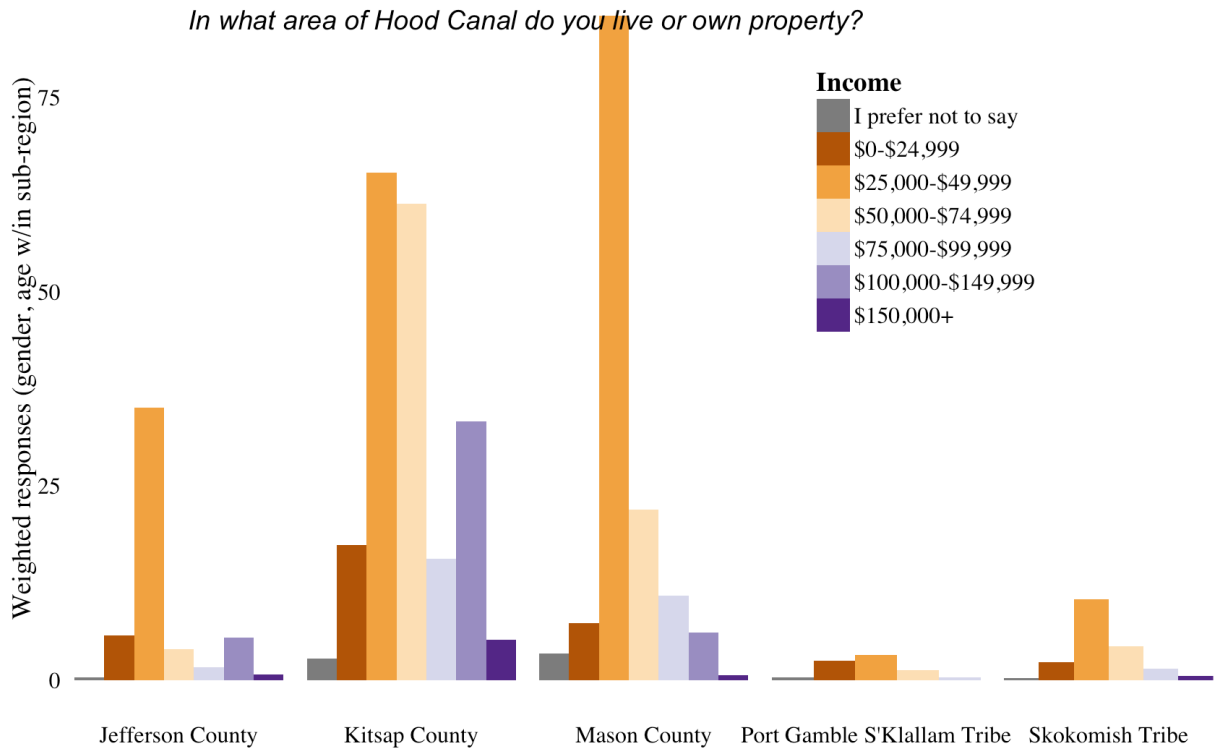

Figure 4: Respondent sub-region by income

Figure 4 shows the distribution of responses by income level (either imputed by GCS or reported by mobile respondents), with the number of respondents weighted by gender and age within each sub-region.

Question 3: Wild local food availability

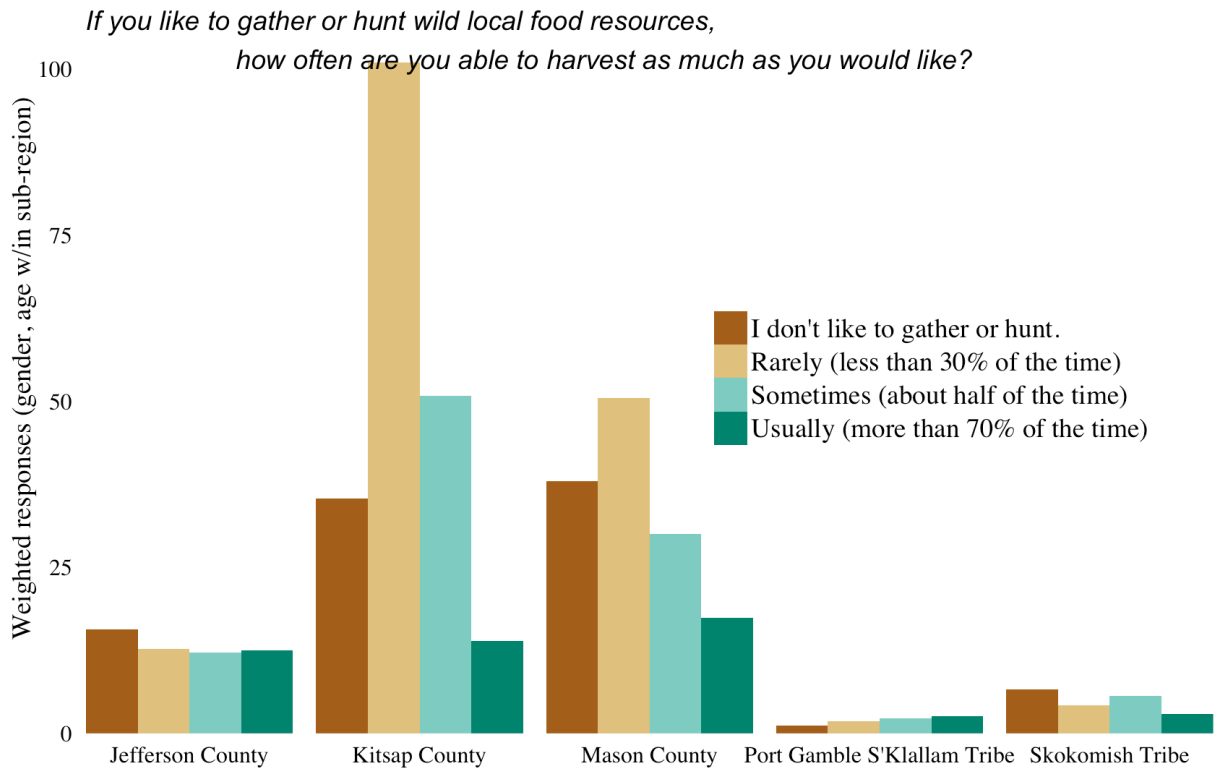

Figure 5: Reported harvesting success

Amongst Hood Canal residents who engage in hunting or gathering for wild local food, the majority reported that they rarely (less than 30% of the time) get as much as they would like (Figure 5). Also of interest is that 20.4% (weighted) of all respondents reported that they do not like to gather or hunt at all. This indicates that local food resources are not necessarily a key ecosystem good for all Hood Canal residents, and that perhaps aesthetic ecosystem services and other non-traditional environmental goods merit strong consideration both in future analyses and in management decisions.

Question 4: Factors that hinder procurement of local wild food

Question 4 complemented the results of Question 3 by asking residents to specify the particular factors that prevent them from harvesting as much local wild food as they would like. Interestingly, the plurality of respondents reported that the primary factor keeping them from harvesting more wild local food is that they do not want any more than they currently harvest. This category not only includes residents who reported for Question 3 that they do not like to harvest wild local food, but also an additional group of residents who are apparently successful at acquiring as much local food as they desire. In contrast,

Figure 6 shows that some barriers that we commonly think of, such as supply shortages, health-related closures, and even expenses, are less of issue.

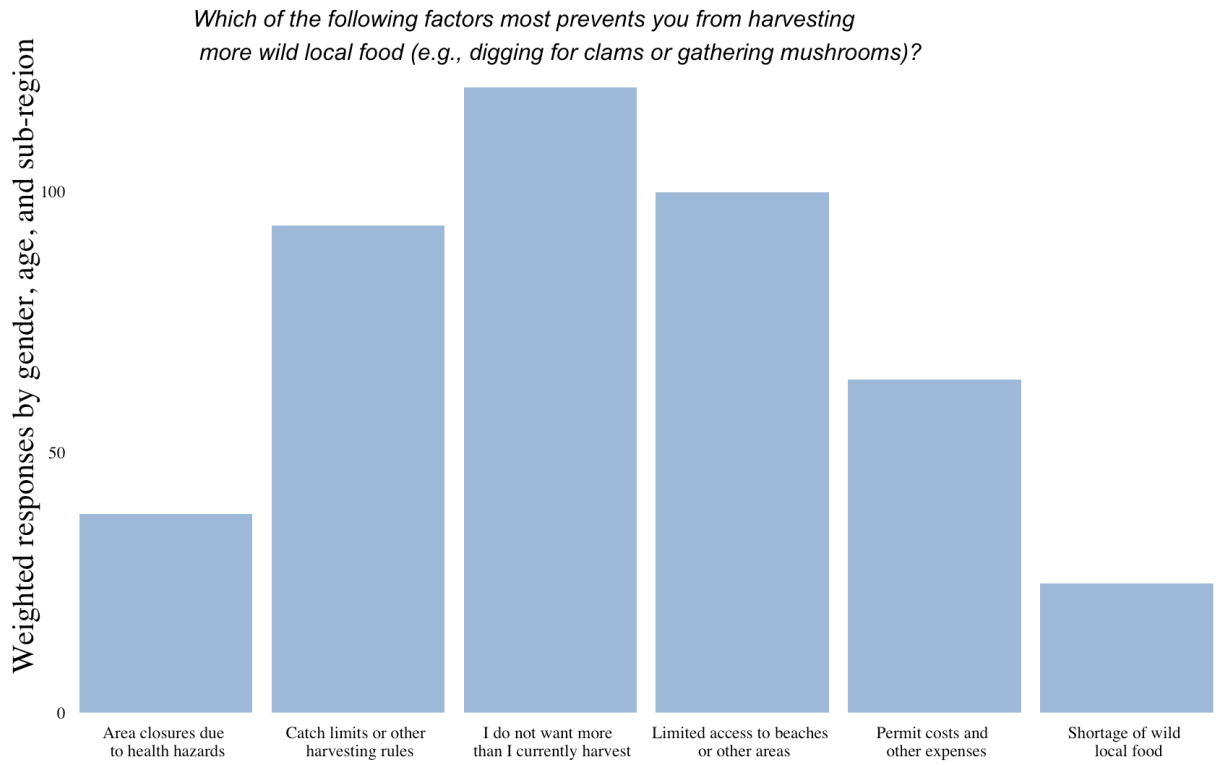

Figure 6: Factors that present wild local food harvesting

Breaking these data down by income level (Figure 7) revealed that the factors constraining additional wild food hunting or gathering vary for Hood Canal residents with different incomes. As might be expected, permit costs and other expenses (e.g., fishing gear, crab traps, or parking passes) were reported to be the most significant barrier for residents in the lowest ($0-$24,999 a year) income level. Access limitations were reported to be a primary barrier by middle income residents; however, the plurality of individuals in both the $25,000- $49,999 and $75,000-$99,999 income brackets reported that they do not want any more wild local food than they currently harvest. Catch limits appear to be the prominent concern for wealthier residents.

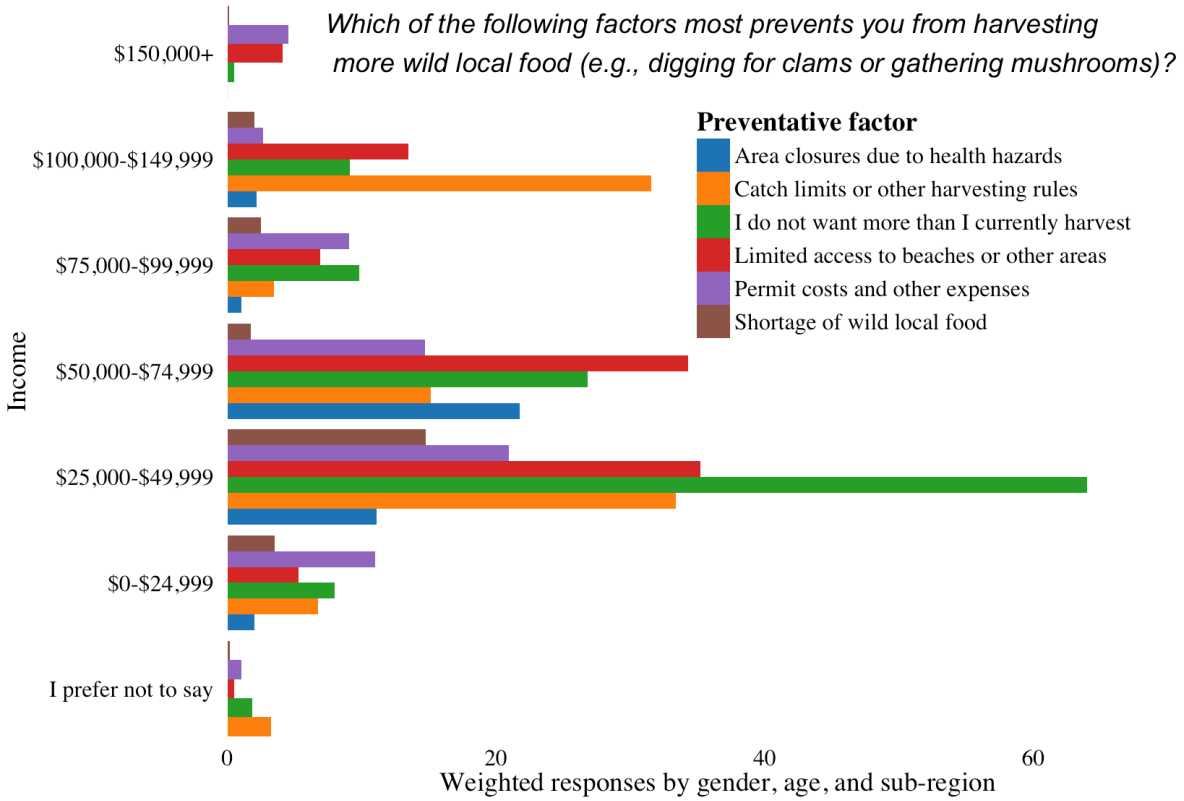

Figure 7: Harvest barriers by income level

Question 5: Positive emotions from time spent outdoors

As the findings above demonstrate, Hood Canal residents benefit from their natural surroundings in ways that go beyond instrumental goods and services such as wild local food. One aspect of this is the emotional benefit of time spent outside around Hood Canal (not just at the beach, also local forests, rivers, and other environs). Figure 8 shows that the overwhelming majority of Hood Canal residents regularly experience positive emotional benefits from spending time outside. While this question does not speak directly to the specific environs that residents had in mind when answering this question, the regularity with which residents experience positive emotions in this regard suggests that Hood Canal residents do not just experience positive emotions from going to specific outdoor destinations (e.g., Olympic National Park or beaches), but also derive positive emotional benefits from their everyday surroundings (e.g., yards, neighborhoods, local community). This has important policy and management implications going forward, as it speaks to the need for holistic, region-wide management and development actions that preserve these benefits rather than a reserve-oriented focus that emphasizes particular environmental destinations.

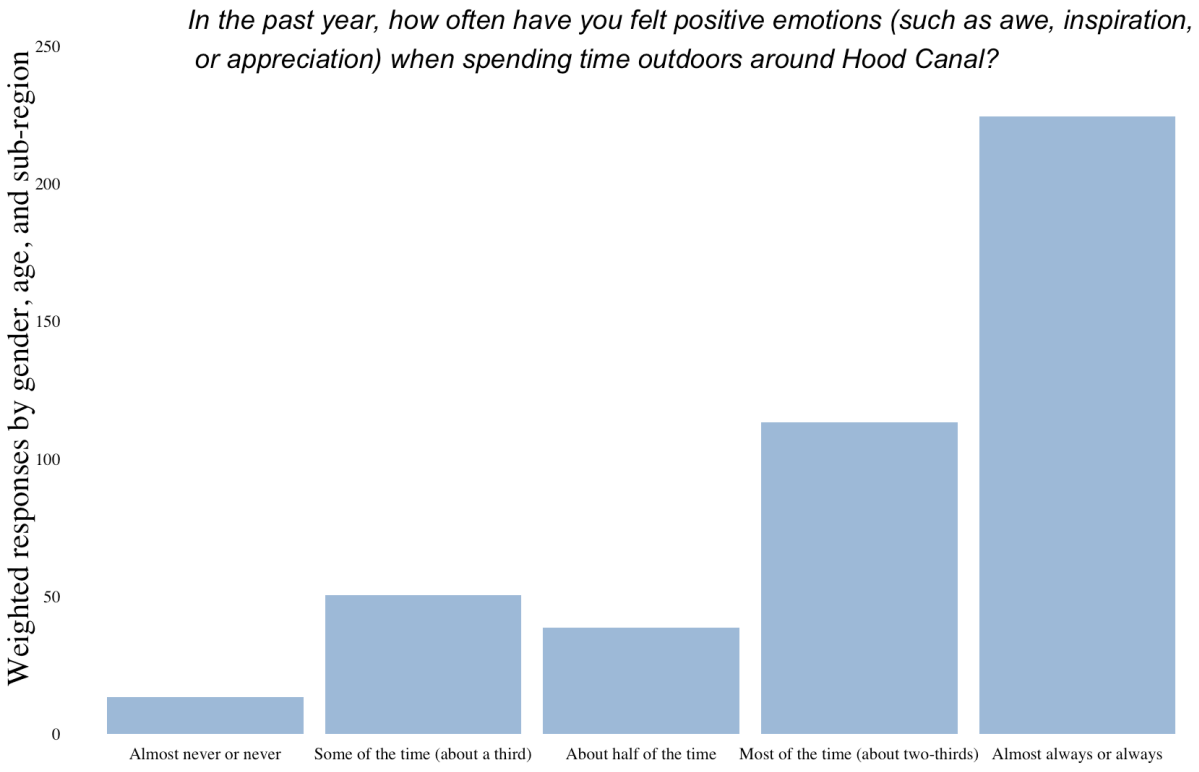

Figure 8: Frequency of positive emotions from time spent outside

Question 6: Information sources

A key component for understanding how Hood Canal residents relate to their natural surroundings and the role of institutions in communication about local natural resources is learning about the information sources from which residents learn about environmental and recreational topics. Across all respondents, Figure 9 shows that the most prominent information source is conversations with friends and neighbors. While we often think about information as a function of media sources (print, radio, internet, and television), these data provide an important reminder that residents learn a lot about their local area from other residents. Particularly in a relatively small, localized region such as Hood Canal, this means that the role of engagement and outreach in the community should not be overlooked. Conversations with community members can be a highly effective way to disseminate information.

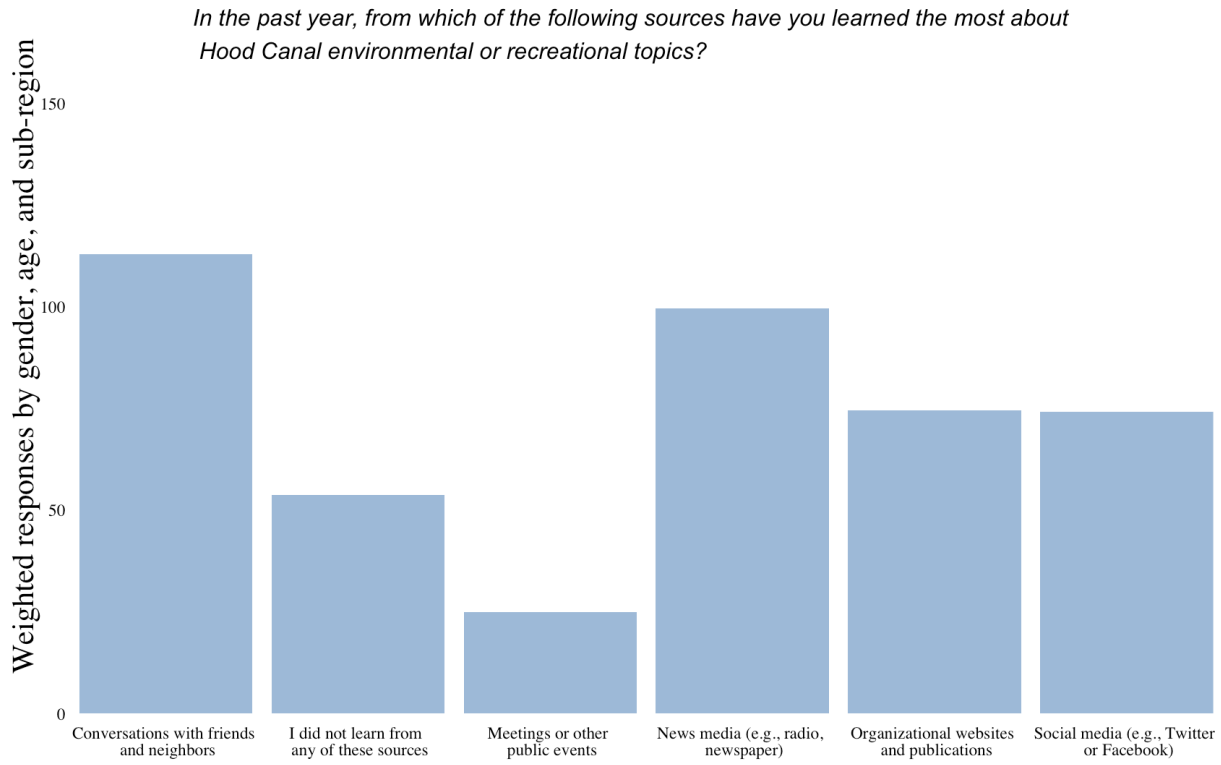

Figure 9: Information sources

When information sources were broken down by income, the results reveal that the prominence of information sources varies considerably by income group. One major discrepancy is that news media appears particularly prominent as an information source for those in higher income brackets (Figure 10). One reason for this is that Hood Canal residents in higher income brackets are also of older age; these residents are also more likely to report traditional news media sources as their most prominent information sources. Figure 9 also reveals that conversations with friends and neighbors and organizational websites grow in importance as income decreases. Lower income Hood Canal residents are much more likely to get information about outdoor recreation and environmental issues from these sources or to not receive information from any of the suggested sources.

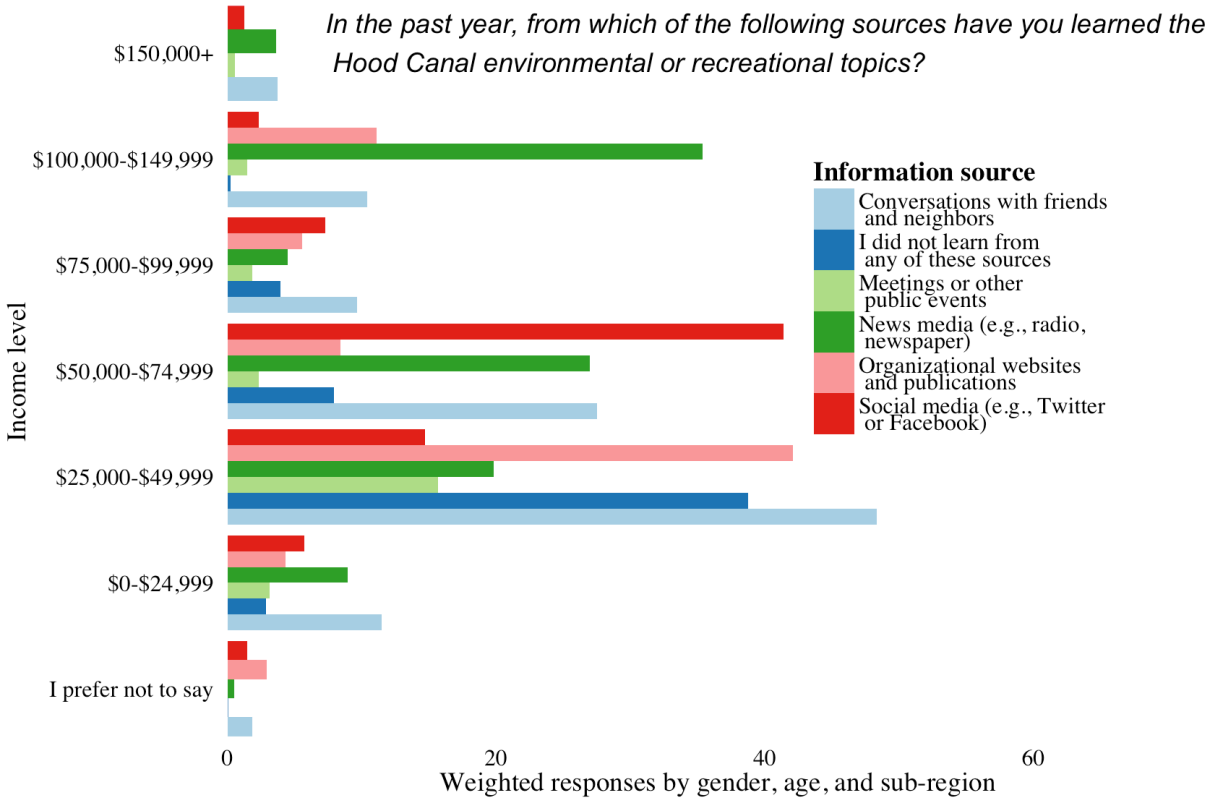

Figure 10: Information sources by income

Question 7: Working with others in the community

The final component analyzed by this survey is the extent to which Hood Canal residents engage with other community members to address natural resource issues. In Figure 11, we see that most Hood Canal residents are not heavily involved in community activities. This is not surprising, since only a small proportion of the population generally engages in community activity on a frequent basis. Further, if those who participate less than once a month (but more than zero times) are aggregated, we see that 58% (weighted) of all residents engage in community activities at least a few times (fewer than 12) each year. This indicates that such actions do play a role in the Hood Canal community. Perhaps more importantly from a management perspective, these results indicate that many Hood Canal residents are willing and able to participate in community actions, but are not currently heavily involved in doing so. This might represent untapped capacity that could be leveraged.

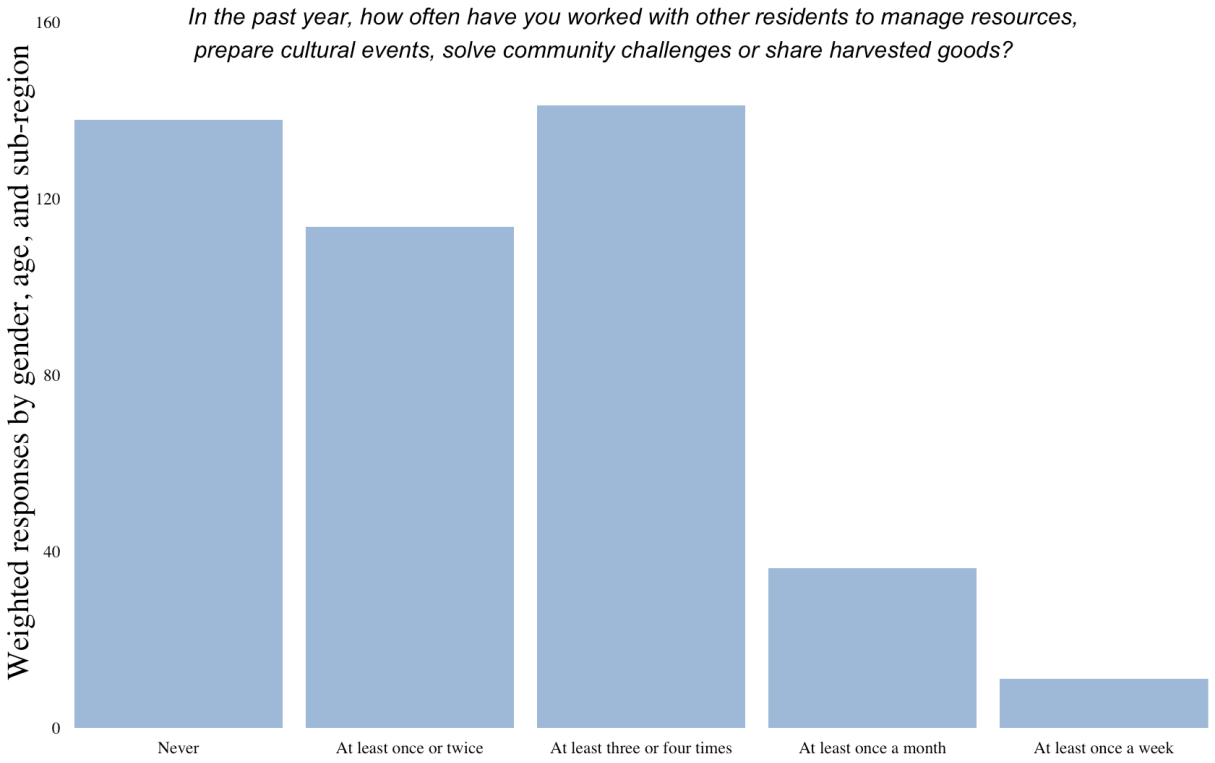

Figure 11: Community involvement

Future Directions

Based on comments received during the 2014 Annual Awards Ceremony, our experience exploring global measures of human wellbeing, and our experience using GCS for survey design, we recommend considering the following in future measurements of HWB for Hood Canal.

1) **Create a map for the screener question**
   For the screener question in GCS, you can use a map image of the Hood Canal watershed and ask people if they own or rent property in the designated area. This would solve the issue of personal interpretation of geographical residence.
2) **Separate local resources to assess cultural traditions**
   If you would like data more specific to resource types (i.e., shellfish, berries, etc.) than the current question offers because it lumps them all together, we recommend asking a question for each of the primary resources of interest.
3) **Add a general subjective wellbeing measure**
   There are a couple of robust subjective wellbeing metrics that are currently being used globally and well as within the U.S. to assess overall human wellbeing. This would provide a baseline against which to compare shifting baselines associated with wellbeing metrics that are directly tied to the natural environment. This metric could be added to the overall survey or it can be extrapolated from the CDC's Behavioral Risk Factor Surveillance System (BRFSS) survey which is regularly

conducted across the United States, the data for which is available at state and county public health agencies.

4) **Ask length of time of residence**
   To respond to some concerns about demographic differences in subjective responses, analyze the data based on length of time of residents to see if long-term residents respond differently.
5) **Use Knowledge Networks for survey distribution**
   GCS is an easy, inexpensive, and extremely fast way to collect subjective data. We recommend continuing to use it if it was effective for the HCCC. Creating your own survey as a standalone survey, however, would allow more questions to explore the nuances of the data better (i.e., ask more demographics such as length of residence and more precise location of residence, ask more questions, or use more complex question types that actually make the survey easier (such as decision-tree questions or having all the questions with the same response scale grouped into one table for quick responses)). With this latter option, Knowledge Networks in an excellent tool for survey distribution. They have preselected respondents who are guaranteed to represent the demographics of the region, including those who don't have Internet access. Because of the preselection, Knowledge Networks already has their demographic information as well, maintaining one of the benefits of Google Insights (not needing to waste respondent time answering demographic questions). The benefit to using Knowledge Networks is that you can use any survey platform and structure you'd like because they are simply the distributors of the survey. We are unsure, however, of the ability of Knowledge Networks to have a large enough sample for Hood Canal.
6) **Pursue ways to leverage survey questions with existing data**
   Surveys provide valuable data, but one of the inherent tensions for survey instruments generally is that increasing the length and detail of a survey increases response burden and does not necessarily produce better, more accurate data. More detailed and lengthy surveys also cost more to implement. One alternative then is to consider ways that existing data, such as fishing and hunting license data, satellite land cover data, or park visitation statistics, can provide more detailed metrics to supplement general survey questions. In particular, partnerships with state agencies might provide rich sources of relevant data.

Appendix I: Survey Questions

1. Do you live or own property in the Hood Canal region?
   - I live in Hood Canal year-round
   - I live in Hood Canal part-time
   - I own property but do not live in Hood Canal
   - I do not live or own property in Hood Canal

2. Where in the Hood Canal region do you live or own property?
   - Jefferson County
   - Mason County
   - Kitsap County
   - Port Gamble S'Klallam Tribe
   - Skokomish Tribe

3. If you like to gather or hunt wild local food resources (e.g., gathering berries or crab fishing), how often are you able to harvest as much as you'd like?
   - I don't like to gather or hunt.
   - Rarely (less than 30% of the time)
   - Sometimes (about half of the time)
   - Usually (more than 70% of the time)

4. Which of the following factors most prevents you from harvesting more wild local food (e.g., digging for clams or gathering mushrooms)?
   - Catch limits or other harvesting rules
   - Area closures due to health hazards
   - I do not want more than I currently harvest
   - Limited access to beaches or other areas
   - Permit costs and other expenses
   - Shortage of wild local food

5. In the past year, how often have you felt positive emotions (such as awe, inspiration, or appreciation) when spending time outdoors around Hood Canal?
   - Almost never or never
   - Some of the time (about a third)
   - About half of the time
   - Most of the time (about two-thirds)
   - Almost always or always

6. In the past year, from which of the following sources have you learned the most about Hood Canal environmental or recreational topics?
   - News media (e.g., radio, newspaper)
   - Meetings or other public events
   - Conversations with friends and neighbors
   - Social media (e.g., Twitter or Facebook)
   - I did not learn from any of these sources
   - Organizational websites and publications

7. In the past year, how often have you worked with other residents to manage resources, prepare cultural events, solve community challenges or share harvested goods?
   - Never
   - Rarely (at least once or twice)
   - Occasionally (at least three or four times)
   - Regularly (at least once a month)
   - Constantly (at least once a week)

Appendix II: Google Consumer Surveys Pricing

Custom Google Consumer Surveys (GCS) projects that use zip-prefix targeting have a different pricing structure than the standard per-complete list price. Below, we present the pricing for the 7 question, zip-prefix targeted survey including a screening question used to filter responses. For comparison, we also provide the pricing estimate for a 6 question survey as well:

For a 7 question survey - **$5.55 per complete response** or **$2,775.00**.

- 7 Questions including the Screening Question
- Incidence Rate Estimated at 11%
- 500 responses
- Zip Prefix Targeting

For a 6 question survey - **$4.90 per complete response** or **$2,450.00**.

- 6 Questions including the Screening Question
- Incidence Rate Estimated at 11%
- 500 responses
- Zip Prefix Targeting

Attachments:

1) HoodCanal.withWeights.2014.csv

503 rows, each corresponding to a completed survey.