Methodology Design
and
Community Nutrition Needs Modeling Report

Community Needs/Nutritional Study
for North and Central Coast First Nations Marine Use Planning
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Background

First Nations communities in the Central and North Coast[1] are engaged in integrated marine use planning (IMUP) as part of the Pacific North Coast Integrated Management Area[2] (PNCIMA) Initiative. As a collaborative initiative, marine use planning in PNCIMA looks to incorporate the many facets of marine resource management and utilization. Of particular interest to First Nations is the integrity and protection of marine resources required for sustenance, informal trade and feasting purposes. To support marine management planning decisions, this project seeks to scientifically quantify biomass of marine species required to meet community needs for these purposes. Karen Fediuk and Dr. Brian Thom have been contracted by Turning Point to design a multi-community dietary study that quantifies current and preferred diets to model long term household and community marine resource needs. This includes methods and development of data instruments, data collection training and support, analysis and report writing. Area Technical Team (ATT) members and community researchers from the North and Central Coast will deliver the field research/survey part of the study in each of the First Nation communities.

Methodology Design

To estimate the marine biomass needed to support community needs based on a preferred diet and future needs for sustenance, informal trade and feasting purposes, this project employs a three part data collection strategy.

1) household survey (up to 100 households/community);
2) community feasts cooks working group workshops;
3) key informant interviews (10-25 marine food processors/harvesters per community);

The information collected on household traditional foods, feasting, and informal trade will be analysed in the context of modelling for preferred diet and future marine foods needs.

Data Collection Part 1: Household Surveys

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[1] *Central Coast communities include:* Kitasoo/Xaixais, Heiltsuk, Wuikinuwx, and Nuxalk. *North Coast communities include*: Gitxaala, Kitselas, Kitsumkalum, Metlakatla, Gitga'at, and Haisla.

[2] The PNCIMA is one of five pilot Integrated Management Planning initiatives in Canada developed under the legislation of the Oceans Act. PNCIMA is geographically identified as extending from the Canada-Alaska border in the north to Brooks peninsula on the west coast of Vancouver Island and south to Quadra Island and Bute Inlet on the west coast of British Columbia.

There is general agreement among the Technical Working Group that currently people in the Turning Point communities have limited access to traditional resources and that present-day consumption does not reflect preferred use. To assist with understanding and quantifying a preferred diet of substantially re-invigorated traditional foods, up to 100 households in each community will be asked to describe their preferred or ideal traditional food consumption pattern. In communities where more than 100 households exist (see population table below), a random sample is suggested to provide all families an equal opportunity to participate. This number has been chosen based on a sample size calculation of 95% confidence level and a 10% confidence interval. As this is a household questionnaire, preferably the people most familiar with cooking and feeding the household – an adult female or male -- would sit down with the interviewer to answer the questions.

Current Community Population and Household Estimates

	On-IR	Off-IR	Total	#HH On-IR	## HH (estimated total)	Adults on-IR Based on 40% under 19 (potential interviewees)	Proposed Number of Household Survey On-IR
Heiltsuk	1150	1030	2180	300	623	690	100
Nuxalk	790	666	1456	265	416	474	100
Haisla	650	943	1593	170	455	390	100
Gitxaala	453	1249	1702	110	486	272	100
Kitasoo	314	192	503	100	144	188	100
Kitsumkalum	213	442	654	80	187	128	80
Kitselas	186	321	517	50	148	112	50
Gitga'at	161	490	651	60	186	97	60
Metlakatla	106	677	783	30	224	64	30
Wuikinuxw	80	177	280	30	80	48	30
Population			10319		2948	2462	750

A preferred diet method

In nutrition studies, the food frequency method is commonly used (Gibson, 2005) to measure the usual food-consumption patterns in a certain time period (month, season). Many food frequency questionnaires ask for portion size estimates in order to quantify the relative contribution of each food to nutrient intake. We employ a food frequency questionnaire to assist the participant in visualizing the current household diet (last month) in order to indicate what a preferred diet pattern would look like if marine resources were abundant and the traditional diet could be revitalized.

Published Literature

In the literature, only Eleanor Wein (1994) has published results from a household food frequency questionnaire which asked Yukon households to describe current frequency of use and preferred frequency of use. In the Yukon, where Aboriginal Peoples have little restrictions on use and access of traditional resources and less competition with commercial interests, direct frequency of consumption of traditional foods occurs 1-2.5 times/day (Wein 1994). When Wein asked Yukon participants to indicate how many times/day would like to have traditional foods, participants said between 2-4 times/day. She did not attempt to calculate any bio-mass from the data collected in these interviews.

Reports
In 2001, Fediuk designed a harvest study for Hul'qumi'num communities that asked households to estimate current amounts of traditional food used (total edible weight) and desired for household purposes. As there were over 191 completed interviews and 300 traditional foods that were reported on, we created a quantitative preferred diet model based on the top 10 species in each category (fish, beachfood, land mammals, plants). This data (Fediuk 2002) has been used to support treaty negotiators in understanding what community needs/desires are for marine, terrestrial, and avian food sources and has been used to assist in evaluating community need in the HTG state of the marine resources project.

Getting to a quantitative amount needed to support community needs
The food frequency questionnaire in this survey will generate information about:

1. the most commonly used protein rich and other traditional foods by age group and community
2. differences between current and desired use of traditional foods by age group and community
3. the proportion of households satisfied/dissatisfied with the current food consumption pattern

Both traditional and market foods are included in the survey question as many market foods are acting as substitutes for protein rich foods due to availability of traditional foods and food preferences. For instance, Charlotte Waddell's (1982) report on fish and seafood consumption of Native Families in the Naas Valley and Kitkatla, shows that eggs and peanut butter were the most commonly consumed protein food on a monthly basis by First Nations households included in her study. Collecting information on these factors will assist in informing the analysis and modeling of revitalized community traditional food needs.

The average and median current and desired frequency of use for species by community and age group will be calculated and presented in tables. In order to arrive at a quantitative understanding of what people would like to eat, as described further below in the Community Needs Modeling section, the median desired frequency of use for each species will be multiplied by a portion size/species (based on published amounts) to generate biomass models for each community. The upper limit of the total per capita quantitative traditional food needed (in grams) will be based on a 2000-2500 kcal daily intake/per capita with no more than 70% (max) coming from protein and fat.

Limitations of the preferred diet modelling: The preferred diet will essentially be driven by age, recent experience, food skills, modern preservation techniques (freezing) experience and flavour. In the past, the foods that were harvested and eaten were dependent on seasonality, property rights, preservation techniques, variation in abundance, cultural values, physical activity levels and a greater need for higher fat foods (eulachon grease, Chinook salmon).

Part 2: Community Feasts Working Group Sessions

Key informants are essential for obtaining reliable information for food needs for the various kinds of community feasting. Local researchers will help bring together people who cook for these events in each community for a 2-hour working group session. In larger communities or where there are more than one site/kitchen/set of cooks, additional groups could be considered. Good facilitation of these working groups will be essential to obtaining data that can be quantified. Working from a list of both survey-style and open-ended questions that would be circulated in advance, working group participants are be asked to estimate amounts needed per species/person at various typical feasts. This is achieved by documenting the number of events/month and range of people in attendance, the general plan for

how people are fed at these feasts (menus) and the amount of traditional food that is typically needed to support these menus. Also queried will be any significant variation in the types of food appropriate to different kinds of events so that reliable extrapolations can be made.

It is expected that Area Technical Team members and community researchers would both attend these working group sessions to adequately facilitate and document the feedback. A more detailed methods guide and interview worksheets has been produced to facilitate productive working group sessions.

Part 3: Informal Trade Interviews
Community researchers will be key in identifying key knowledgeable people to have focussed discussions about informal trading of marine foods. Open-ended interview questions would be provided to guide interviewers in discussing the following factors with heavy traditional food harvesters and processors about:
-amount needed for trade and trade factors
-amount they would like to have to support immediate household and extended family (would like to use this to get a projected need /person)
-issues related to processing
-barriers to using more traditional food (availability, people to harvest, time) and what factors are being included when estimating

It is anticipated that one or two interviews will be needed per community to get a full sense of the currency of marine resources in the informal trade network.

Community Nutrition Needs Preferred Diet Modelling

Using the data collected in the surveys and working groups, models will be produced for the preferred marine diet of each participating community. Models will be created separately for household use, community feasts and trade.

The models will be grounded in the Acceptable Macronutrient Distribution Ranges (AMDR) for fat, protein and carbohydrate published by the Institute of Medicine (2002), that are considered to support human nutrition needs. Eaton et al. (1996) theorized that our Paleolithic ancestors had a similar macronutrient breakdown to today's recommendations however the types and sources of macronutrients differed substantially: there was an assumed plant to animal ratio of 65:35.

Published macronutrient ratios				
Source	*Reference*	*% of Total Energy from Carbohydrates*	*% of Total Energy from Protein*	*% of Total Energy from Fat*
Traditional Paleolithic	Eaton et al. 1996 J. Nutrition 126:1732-1740	40-50	25-30	25-30
Acceptable Macronutrient Distribution Ranges	Institute of Medicine. 2002	45-65	10-35	20-35

Carbon isotope measurements indicate that Northwest Coast adults obtained 90% of their protein from

marine sources (Chisholm et al. 1983). Based on Chisholm's work and the AMDR, some gross calculations can be made with respect to a historic Northwest Coast daily diet. It is conceivable that a daily consumption of marine and land animal sources, at a minimum ranged between 1-1.5 kg/capita/day (365-545 kg/capita/year). This is based on the assumption that adults were previously more physically active and would require at a minimum, approximately 2500 calories and up to 70% of this energy would have been derived from protein and fat. The weight range reflects caloric differences between marine resources and different preparations (cooked or half-smoked salmon, clams, smoked salmon). The low contribution from carbohydrates represents a more apt characterization of a pre-contact fisher/hunter gatherer diet on the west coast. Available early nutrition studies among Greenland Inuit with minimal imported foods estimated daily carbohydrate intakes below 50 grams (7%) (Hoygaard 1941).

Modeling Household Traditional Food Use

Factors involved in the modelling of diet for household use include: AMDR, nutrient composition values, household food frequency patterns, number of households/community wishing to use the resource (decisions to include/exclude will be based on discussions with Area Technical Team) and agreed upon portion size estimates.

The median frequency of use (at the household level) will be transformed into a proportional breakdown of species on a gram weight basis. Median frequency of use (at the household level) will be multiplied by:

1) % of households wanting to use the species/item (>20%) with portion sizes/species based on common portion sizes (from government reports)
2) portion sizes/species based on based on common portion sizes (from government reports)

A re-invigorated heavy use model will be calculated based on the proportional breakdown of species, the AMDR upper limits for protein and fat and nutrient composition values. Total energy in the model will be set at 2000-2500 kcal with 175-218 grams (35%) coming from protein, 78-100 g (35%) coming from fat and 175-185 g coming from carbohydrate.

The model will be adjusted accordingly so that grams of fat and protein do not move higher than max limits and that vitamin D levels from the diet remain under the Upper Limit of 2000 IU.

See Appendix 1 (excel file) for an example of modelling based on Waddell's govt report.

COMMUNITY FEASTING

To calculate the traditional food needs to support feasting, we want to be able to get a sense of the number of feasts held, how many people typically attend, what the menu is for the food served at the feasts, and what the preferred serving sizes are for each adult (over 15) and child (5-14). Assuming that working group participants are satisfied that the 'typical' feasts they describe are indicative of actual (or preferred) feasting practices (in terms of frequency and size of events), and the range of menus that are served at these events, and that the participants give consistent and indicative measures of how much food is provided for each plate served at these events, it is hoped that this provides a reliable view of feasting preferences in the communities.

However, we anticipate that it may be difficult to get consistent answers to these questions, as there may be a great deal of variation in reporting. To provide a basis to evaluate these numbers, we are also asking participants to provide a view of feasting (and the commensurate data regarding size, menu and serving size) in their communities in recent times. We are also asking them to provide "kitchen-view" (as opposed to "plate-view" estimates of the food quantity needed to serve at 'typical' feasts.

Finally, information will be collected at the current use of market foods in community feasting, as well as estimates of what/how much traditional food replacement would be preferred for feasting if they were available.

From all these figures, calculation and comparisons can made be made of the gross edible weight of marine foods needed to satisfy these species. Using the conversion tables provided, these figures can be converted into other comparable units of bio-mass.

TRADING

The core of the analysis for the issue of informal trade will be in establishing a list of key species for trade (both into and out of a community), a table of preferred volumes for these species, and listing the range of exchange rates or species currencies that were offered by the knowledgeable people during the working groups.

These tables will be used in the overall bio-mass calculations when a species need for trade (either into or out of a community) is indicated as being significant in overall marine resource use. This analysis will be driven by the import demand side -- for foods that are desired but not locally abundant – by calculating the species normally used for exchange to accommodate community needs.

Other Considerations for Community Needs Modeling

Modeling Inputs: Gross edible and whole weights
These weights (edible and whole) will need to ultimately be transformed to whole weights to assist in understanding biomass requirements. Turning Point will be asked to review the current edible to whole weight conversion table and adjust based on firsthand knowledge or actual measurement.

Modeling Inputs: Population Growth and Future Marine Food Needs Projections
Drawing from the preferred diet modelling, an additional analysis will be conducted to model future needs, assuming an agreed-upon population increase and maintained interest in marine foods at 25 and 50 years.

Predicting population trends into the future is always difficult. Population projections are subject to a variety of uncertainties, and the degree of uncertainty increases over time. Most projections look 20 or 30 years into the future. Both the Capital Regional District (CRD) and the Nanaimo Regional District, for example, have carried out population projections or "forecasts" to 2026. The CRD population forecast includes a note to use "extreme care" in using the data presented. Population projections beyond 30 years are not common, due to the increasing amount of uncertainty involved. Nevertheless, such long-term projections are required to help guide decisions that will have long-term consequences for a community, such as in determining community needs for traditional foods from protected areas.

Population projections are based on a small number of variables, primarily relating to fertility (births), mortality (deaths), and migration (people moving into or out of the population). However, a large number of other factors affect these variables. For example, fertility and mortality are key indicators of health, which are closely linked to social and economic factors such as formal education and income. Populations with a high level of formal education and high incomes tend to have a higher life expectancy. Fertility is similarly tied to these factors; typically, the fertility rate (the number of children a woman has) is lower when women have more formal education and higher incomes.

For Aboriginal populations, migration is usually not a large factor and usually relates to change in status (e.g., population statistics record people who regained their 'Indian' status through Bill C-31 as "in-migrants" to the Aboriginal population). As indicated earlier, the introduction of Bill C-31 resulted in significant "in-migration" into the Canadian Aboriginal population (including the Hul'qumi'num), as people regained their 'Indian' status. While the rate of in-migration due to Bill C-31 has slowed, it is difficult to predict how rates of in-migration or out-migration may change in the future. For example, at some point in the future, changes to the Indian Act may (again) affect the definition of 'Indian' status.

Most studies predict that Canada's Aboriginal population will continue to grow into the foreseeable future. INAC has provided projected population growth rates for Canada's Registered Indian population; for 2005 and 2010, they estimated an annual growth rate of 1.9 percent and 1.7 percent respectively (INAC 2002a).[3] Norris et al. (1996)[4] provided population growth projections for Canada's Aboriginal population based on a number of scenarios. Based on a high growth rate scenario they predicted a 67 percent population increase between 1991 and 2016. The low growth rate scenario was 48 percent over this same period. Norris et al. (1996) suggest that the growth rate of the Aboriginal population in British Columbia will be lower than that for other provinces; they predict a 37 percent increase between 1991 and 2016. INAC (2002b) has projected that British Columbia's Aboriginal population will increase by 25 percent between 2000 and 2021.[5]

Studies carried out by demographers tend to predict that the rate of growth of the Aboriginal population will slow in the future, primarily due to a decrease in fertility rates (i.e., women will have fewer children or have children later in life). INAC (2002a) predicts that the annual population growth rate will slow to 1.9 percent in 2005 and 1.7 percent in 2010. Norris et al. (1996) predict a steady decline in the annual average rate of population growth, dropping to 1.3 percent in 2016. For British Columbia, INAC (2002b) predicts that the population growth rate will drop to 0.68 percent in 2021. These predictions are based on an argument that the current growth rates are unusually high and unlikely to be sustained, and that fertility rates will drop significantly. The assumption here is that the Aboriginal population will gradually come to resemble the larger Canadian population, in terms of the rate of fertility and mortality. This expectation relies, in part, on the assumption that the social determinants of health (e.g., formal education, income) will improve for Aboriginal peoples and come to more closely resemble those for the Canadian population as a whole.

Whether these assumptions are correct remains to be seen. Aboriginal peoples in Canada have long

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[3] INAC. 2002a. Basic Departmental Data, 2001. Ottawa: Indian and Northern Affairs Canada, First Nations and Northern Statistics Section. Available from: http://www.ainc-inac.gc.ca/pr/sts/index_e.html

[4] Norris, Mary Jane, Don Kerr, and Francois Nault. 1996. Projections of the Population with Aboriginal Identity, Canada, 1991-2016. Report Prepared for the Royal Commission on Aboriginal Peoples. Ottawa: Canada Mortgage and Housing Corporation.

[5] INAC. 2002b. "Population Projections by 5 Year Age Groups, Band-Affiliated, Medium Migration Scenario, British Columbia, 2000-2021, Registered Indians, Male and Female, by Residency" and "Average Annual Growth Rates by 5 Year Age Groups, Band Affiliated, Medium Migration Scenario, British Columbia, 2000-2021, Registered Indians, Male and Female, by Residency." Data table provided by INAC staff. Ottawa: Indian and Northern Affairs Canada.

been at the bottom of the socio-economic ladder, with indicators of health and wealth far below the Canadian average in most categories. There are signs of improvement in some indicators of health; for example, historically the life expectancy of Aboriginal peoples has been significantly lower than for the Canadian population as a whole but it is increasing and is approaching parity with the Canadian population. However, in 2000 the life expectancy of an average aboriginal person was still 6.3 years less than that of the average Canadian (INAC 2002a). If the socio-economic position of the First Nation population improves, will this result in a longer life expectancy? Will it result in a lower birth rate? While this has been the case for other populations, will this necessarily be the case for First Nations? Such questions underlie the assumptions used to do population projections for Aboriginal peoples.

Given that current growth rates are higher than the growth scenarios predicted by INAC, we will project a 2.1 annual rate of population growth for the next three decades for the community needs modelling.

Modeling Outputs: Aggregated or Community-Based data

In the final stage of analysis, the Area Technical Team will need to discuss with the contractors the question of the amounts for household, community and trade will be summed or kept individually by community. There are benefits to aggregating the data in terms of reliability and generalizability, but we acknowledge that there are also significant benefits in reporting (though from a smaller data set) the results individually to each community.

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