Development of the Intertidal Clam Monitoring Program for the South Coast of British Columbia

Amy Ganton, Alexander Dalton, Chelsea Ashbrook, and Dominique Bureau

Fisheries and Oceans Canada
Science Branch, Pacific Region
Stock Assessment and Research Division
Pacific Biological Station
3190 Hammond Bay Road
Nanaimo, British Columbia
V9T 6N7

2024

Canadian Manuscript Report of
Fisheries and Aquatic Sciences 3279

Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

Canadian Manuscript Report of Fisheries and Aquatic Sciences

Manuscript reports contain scientific and technical information that contributes to existing knowledge. but which deals with national or regional problems. Distribution is restricted to institutions or individuals located in particular regions of Canada. However, no restriction is placed on subject matter, and the series reflects the broad interests and policies of Fisheries and Oceans Canada, namely, fisheries and aquatic sciences.

Manuscript reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report is abstracted in the data base *Aquatic Sciences and Fisheries Abstracts*.

Manuscript reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page.

Numbers 1-900 in this series were issued as Manuscript Reports (Biological Series) of the Biological Board of Canada, and subsequent to 1937 when the name of the Board was changed by Act of Parliament, as Manuscript Reports (Biological Series) of the Fisheries Research Board of Canada. Numbers 1426 - 1550 were issued as Department of Fisheries and Environment, Fisheries and Marine Service Manuscript Reports. The current series name was changed with report number 1551.

Rapport manuscrit canadien des sciences halieutiques et aquatiques

Les rapports manuscrits contiennent des renseignements scientifiques et techniques qui constituent une contribution aux connaissances actuelles, mais qui traitent de problèmes nationaux ou régionaux. La distribution en est limitée aux organismes et aux personnes de régions particulières du Canada. II n'y a aucune restriction quant au sujet; de fait, la série reflète la vaste gamme des intérêts et des politiques de Pêches et Océans Canada, c'est-à-dire les sciences halieutiques et aquatiques.

Les rapports manuscrits peuvent être cités comme des publications à part entière. Le titre exact figure au-dessus du résumé de chaque rapport. Les rapports manuscrits sont résumés dans la base de données *Résumés des sciences aquatiques et halieutiques.*

Les rapports manuscrits sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page du titre.

Les numéros 1 à 900 de cette série ont été publiés à titre de Manuscrits (série biologique) de l'Office de biologie du Canada, et après le changement de la désignation de cet organisme par décret du Parlement, en 1937, ont été classés comme Manuscrits (série biologique) de l'Office des recherches sur les pêcheries du Canada. Les numéros 901 à 1425 ont été publiés à titre de Rapports manuscrits de l'Office des recherches sur les pêcheries du Canada. Les numéros 1426 à 1550 sont parus à titre de Rapports manuscrits du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom actuel de la série a été établi lors de la parution du numéro 1551.

Canadian Manuscript Report of
Fisheries and Aquatic Sciences 3279

2024

DEVELOPMENT OF THE INTERTIDAL CLAM MONITORING PROGRAM FOR THE SOUTH COAST OF BRITISH COLUMBIA

Amy Ganton, Alexander Dalton, Chelsea Ashbrook and Dominique Bureau

Fisheries and Oceans Canada
Science Branch, Pacific Region
Stock Assessment and Research Division
Pacific Biological Station
3190 Hammond Bay Road
Nanaimo, British Columbia
V9T 6N7

Cat. No. Fs 97-4/3279E-PDF ISBN 978-0-660-70194-3 ISSN 1488-5387
https://doi.org/10.60825/0ah6-5c27

Correct citation for this publication:

Ganton, A., Dalton, A., Ashbrook, C. and Bureau, D. 2024. Development of the intertidal clam monitoring program for the south coast of British Columbia. Can. Manuscr. Rep. Fish. Aquat. Sci. 3279: iv + 67 p. https://doi.org/10.60825/0ah6-5c27

ABSTRACT

Ganton, A., Dalton, A., Ashbrook, C. and Bureau, D. 2024. Development of the intertidal clam monitoring program for the south coast of British Columbia. Can. Manuscr. Rep. Fish. Aquat. Sci. 3279: iv + 67 p. https://doi.org/10.60825/0ah6-5c27

The *Fisheries Act*, amended under Bill C-68 (2019), includes Fish Stocks provisions that align some elements of Fisheries and Oceans Canada's (DFO) Precautionary Approach framework with legal requirements within the Act; including developing Limit Reference Points (LRPs). The Intertidal clam fisheries in the south coast of British Columbia target three species: Manila Clam (*Venerupis philippinarum*), Butter Clam (*Saxidomus gigantea*), and Littleneck Clam (*Leukoma staminea*); some of the species targeted in these fisheries may be considered for prescription in regulation. An Intertidal Clam Monitoring Program (ICMP) was proposed, to address a paucity of data and to collect standardized population dynamics data, that will support the development of LRPs for these species. This report captures the process and discussion of the first two steps in the development of the ICMP, which included engagement with First Nations, Industry and other stakeholders, to inform future project direction and identify beaches for clam monitoring.

RÉSUMÉ

Ganton, A., Dalton, A., Ashbrook, C. and Bureau, D. 2024. Development of the intertidal clam monitoring program for the south coast of British Columbia. Can. Manuscr. Rep. Fish. Aquat. Sci. 3279: iv + 67 p. https://doi.org/10.60825/0ah6-5c27

La *Loi sur les pêches*, modifiée par le projet de loi C-68 (2019), comprend des dispositions sur les stocks de poissons qui harmonisent certains éléments du Cadre de l'approche de précaution de Pêches et Océans Canada (MPO) avec les exigences juridiques prévues dans la Loi, notamment l'élaboration de points de référence limites (PRL). La pêche de la palourde intertidale sur la côte sud de la Colombie-Britannique cible trois espèces : la palourde japonaise (*Venerupis philippinarum*), la palourde jaune (*Saxidomus gigantea*) et la palourde du Pacifique (*Leukoma staminea*). Certaines des espèces ciblées par ces pêches pourraient être considérées en vue d'une éventuelle prescription dans la réglementation. Un programme de surveillance des palourdes intertidales a été proposé pour remédier à la rareté des données et pour recueillir des données normalisées sur la dynamique des populations qui appuieront l'élaboration de PRL pour ces espèces. Le présent rapport décrit le processus et la discussion relatifs aux deux premières étapes de l'élaboration du programme de surveillance des palourdes intertidales, qui comprenaient la mobilisation des Premières Nations, de l'industrie et d'autres intervenants, en vue d'éclairer l'orientation future du projet et de déterminer des plages pour la surveillance des palourdes.

INTRODUCTION

The intertidal clam fisheries, which include the: Food, Social and Ceremonial (FSC) and domestic purposes under Treaty, Commercial, Recreational, and Decontamination sectors, in the south coast of British Columbia (BC), i.e. beaches around Vancouver Island and the BC mainland south of Cape Caution (Figure 1), target three species: Manila Clam (*Venerupis philippinarum*), Butter Clam (*Saxidomus gigantea*), and Littleneck Clam (*Leukoma staminea*). Intertidal clams are hand-harvested by picking or digging from beaches at low tide. Indigenous harvest for FSC and domestic purposes, and Recreational clam harvest may occur year round in the south coast waters of BC, in areas that are open for fishing under the Canadian Shellfish Sanitation Program (CSSP). However, the level (both number of participants and days fished) of harvest, and the predominant species taken in these fisheries, are unknown in the South Coast of BC (DFO 2023).

The commercial fishery is managed mainly through size limits, and subject to biotoxin and water quality monitoring as detailed in the Integrated Fisheries Management Plan for Intertidal Clams (DFO 2023). As of 2023, there are 150 category Z2 commercial clam licences and 568 category Z2ACL Aboriginal commercial clam licences (DFO 2023). However, from 2018 to 2021 on average, 91% of the commercial and 26% of the Aboriginal commercial clam licences were activated annually (B. Myhal, Pers. Comm. 2022).

Manila Clam has represented the majority of landings in the commercial intertidal clam fishery since 1981 (DFO 2022). Between 2016 and 2021, BC's commercial intertidal clam fishery had an average annual landed value of $1.4M with Manila Clams accounting for 84% of the landings by weight and 92% of the landed value during that time frame (DFO 2023). The directed fishery for Manila Clam (which were introduced inadvertently in the Strait of Georgia in the 1930s) did not develop until the late 1970s. The target species historically in the commercial intertidal clam fishery was Butter Clam (DFO 2022). Strong markets and initially higher prices for the smaller steamer clams (Littleneck and Manila) combined with the high cost of processing Butter Clam shifted the focus of the commercial intertidal clam fishery. Landings in the commercial intertidal clam fishery peaked in 1988 at 3,909 tonnes with a landed value of ~$7.5M. The value and volume of wild clams harvested has been experiencing a decline since 2002, following a period of comparatively stable landings (~1,300 t) from 1991 to 2002 (DFO 2022; Figure 2 & Figure 3).

The management of Canada's fisheries resources is governed by the federal *Fisheries Act*. In June 2019, the *Fisheries Act* was amended through Bill C-68 and included Fish Stocks provisions (FSPs), whereby, Fisheries and Oceans Canada (DFO) is now required (Parliament of Canada 2019) to:

- Implement measures to maintain major fish stocks at or above levels necessary to promote sustainability (*Section 6.1 (1)*);
- Develop and implement rebuilding plans for stocks that have declined to or below their limit reference point (*Section 6.2*); and

- Prescribe the list of major stocks to which Section 6.1 and 6.2 apply (*Section 6.3*).

The FSPs, in particular the Limit Reference Point (LRP) and the requirements for rebuilding plans, align with elements of DFO's Precautionary Approach (PA) framework (DFO 2009). In fisheries management, the PA is about being cautious and avoiding postponing action when scientific information is uncertain or absent (DFO 2009). The PA framework entails defining the stock status of a resource by establishing two references points: 1) the LRP and 2) the Upper Stock Reference (USR), which creates three stock status zones (Healthy, Cautious and Critical; Figure 4). The LRP is a biologically-based point that represents the point below which there is a high probability that the stock's productivity will be so impaired that serious harm will occur, and it is the boundary between the Critical and Cautious Zones. The USR is defined as the point below which removals must be progressively reduced to avoid reaching the LRP, and is the boundary between the Cautious and Healthy Zones. In a PA compliant fishery, the harvest strategy must have established harvest decision rules (adjust the removal rate) and management actions associated with each zone. The PA framework also requires that a rebuilding plan be developed and put in place if a stock has declined to the Critical Zone (DFO 2009).

Some of the species targeted by the intertidal clam fisheries on the south coast of BC may be considered to be prescribed into the *Fishery (General) Regulations* (Schedule IX) under *Section 6.3* of the *Fisheries Act*. Although DFO has some intertidal clam data available for 270 locations on the BC coast, currently the data are insufficient to support developing LRPs for the south coast; 75% of the sites were only visited once and approximately two-thirds of the sites that have been visited multiple times are in the southern portion of Vancouver Island. Therefore, with the understanding that DFO may need to develop LRPs for each species, the Department proposed the Intertidal Clam Monitoring Program (ICMP), to collect intertidal clam population dynamics data to establish a time series of abundance focused on the three main species: Manila Clam, Butter Clam, and Littleneck Clam.

Developing a monitoring program for intertidal clams in an area as large as the south coast of BC is challenging, mainly due to the varied spatial distribution of intertidal clams (i.e., habitat preference/availability), variation in harvest pressures between beaches and species (i.e., targeted harvest), and the remote location of some beaches. It is not possible for DFO to implement a monitoring program on every beach, both from a logistical and financial perspective. Therefore, using the Clam Management Areas (CMAs; Figure 1) as a way to distribute the program, DFO proposed surveying two to four index beaches per CMA in the initial stage of the ICMP. Four beaches were suggested in CMA "F" (West Coast of Vancouver Island (WCVI)) because this CMA is much larger than the other CMAs and it was hypothesized that larval clam transfer may be limited between sounds on the WCVI. In addition, surveying multiple beaches would provide a buffer in the event one beach could no longer be used in the program (i.e., if it no longer met the pre-determined criteria for index beaches). Periodic reviews of the ICMP are recommended to determine if any changes or updates are required. Beach surveys for intertidal clams will follow the protocols outlined in Gillespie and Kronlund

(1999), similar to DFO clam surveys completed at Seal Island (Kingzett and Bourne 1998).

The objective of this manuscript report is to document the approach taken to develop the ICMP, so that it may inform future program reviews, or serve as an example of how other monitoring programs could be developed for a large area like the south coast of BC.

ICMP DEVELOPMENT APPROACH

INITIAL WORKPLAN

Development of the ICMP was led by DFO Science, Marine Invertebrates Section. It was important for DFO to engage with First Nations, commercial intertidal clam harvesters (Industry) and other stakeholders as early as possible about how DFO could approach the ICMP. In particular, the Federal Government of Canada committed to "Build renewed nation-to-nation, Inuit-Crown, and government-to government relationships with Indigenous peoples based on the recognition of rights, respect, co-operation and, partnership" (Prime Minister, Justin Trudeau, June 21st, 2017; DFO 2019). Additionally, DFO acknowledged that the program would need to be updated over time as more information became available and experience was gained through the implementation phase.

In July 2019, DFO began internal discussions about charting a path forward. The program was broken down into four steps:

- Step 1: engage with First Nations, Industry and other stakeholders about the monitoring program, what beaches could be included in the program, what data is available about intertidal clams from other groups, and who had interest in collaborating on the monitoring program.
- Step 2: schedule one in-person meeting per CMA based on interest from Step 1 to discuss survey plans for each proposed beach.
- Step 3: implement the monitoring program (establish survey design for index beaches).
- Step 4: continue implementing the monitoring program, and begin to analyze the data collected for the determination of LRPs.

Step 1 and the majority of Step 2 were completed between April 2019 to March 2020. The in-person meeting for CMA "E" (Step 2) scheduled for March 16, 2020 was cancelled due to the declaration of the global COVID-19 pandemic. The COVID-19 pandemic caused delays to the development of the ICMP between April 2020 and March 2021. Development of the ICMP resumed in April 2021 with implementation of Step 3 in CMAs for which in-person meetings had been completed. Step 2 was completed in March 2022 for CMA "E". The initiation of Step 4 can occur after data collection has begun. However, the analysis for the purpose of determining LRPs for

intertidal clams on the south coast of BC will require a minimum of three surveys completed at each of the index beaches first.

STEP 1 - ENGAGEMENT

In preparation for Step 1 (Engagement), DFO Science and Resource Management developed an initial list of potential candidate beaches to start discussions. The proposed list of indicator beaches considered beaches which had high commercial catches and fishing effort, had no aquaculture tenures present and were accessible by all sectors/harvesters (i.e., First Nations, commercial and recreational harvesters).

In addition, DFO Science requested feedback from the Island Marine Aquatic Technical (IMAT) working group on September 9, 2019, and the Island Marine Aquatic Working Group (IMAWG) on October 4, 2019, about how DFO could engage with First Nations for collaboration on the monitoring program. IMAWG is a registered not-for-profit society composed of 15 member First Nations encompassing Vancouver Island, the adjacent BC mainland and Central Coast; with the mission of strategically advancing indigenous fisheries as it relates to policy, stewardship, modern science, habitat protection, management and traditional ecological knowledge. IMAT is the technical team which supports IMAWG by providing advice to the Nations engaged in co-management with DFO based on historical and modern science. Given the number of First Nations that would be included in Step 1 and that this was the first time the Marine Invertebrates Section had attempted an engagement process of this scale, the feedback from IMAT and IMAWG was valuable in understanding information gaps in presentation materials and ways DFO could engage further with First Nations.

From October 21 to November 29, 2019 an engagement package (Appendix 7) was distributed to First Nations, Industry and other stakeholders by email, using contact information provided by DFO Science, Resource Management, and Aboriginal Fisheries Strategy sectors. Sixty-seven First Nations and First Nations Organizations were contacted by email, and mailed copies were also distributed where possible. The package included a presentation that contained additional details about reference points, timelines, and a breakdown of the steps that would be taken to implement the program, as well as a questionnaire about indicator beaches and participation in the ICMP.

DFO received 23 responses (from 21 First Nations, one non-profit society and one Industry representative) by email, phone, or letter mail. Throughout the engagement process, it was clear that intertidal clams continue to be of high importance to many First Nations, groups and individuals across the south coast of BC. Some concerns raised included population trends, harvest levels, impacts of other species on intertidal clam populations (e.g., native and non-native), and contamination. In addition, it was identified that a six-week engagement timeline was not long enough given existing workloads for some Nations, groups and individuals. DFO also gained an understanding of other surveys completed and the type of data that may be available for intertidal clams.

DFO received valuable feedback about numerous beaches that could be monitored, and established a preliminary list of indicator beaches to move forward with (Table 1). The following criteria were used when evaluating beaches:

- High levels of commercial fishing effort
- Access available to all harvesters (i.e., First Nations, Industry and recreational)
- No shellfish aquaculture tenures present
- No permanent contamination closures present
- Rationales provided to DFO during the engagement period
- Feedback from DFO's Resource Management, Canadian Shellfish Sanitation Program (CSSP) and Science sectors.

STEP 2 – IN-PERSON MEETINGS & SURVEY PLANNING

With a better understanding of the level of interest in the monitoring program, the Department arranged one meeting per CMA to discuss survey planning for each proposed indicator beach in that area. Rather than meet with interested groups individually, it was thought that there were benefits to discussing beaches as a group and exploring collaboration opportunities across a CMA. Meetings were scheduled for the following CMAs:

- February 12, 2020: CMA F, Port Alberni
- February 13, 2020: CMA D, Comox
- February 18, 2020: CMA C, Powell River
- February 20, 2020: CMA B, Campbell River
- February 21, 2020: CMA G, Port McNeill
- March 16, 2020: CMA E, Chemainus (cancelled due to the declaration of the global COVID-19 pandemic; completed March 7th, 2022 via an online meeting).

In addition, DFO met with the Klahoose First Nation on February 22, 2020 in Nanaimo regarding CMAs "B" and "C", and the T'Sou-ke First Nation (virtually) on March 15th, 2022 regarding CMA "E".

At each meeting, participants were presented with an overview of Bill C-68 and reference points, a program timeline, and the proposed list of indicator beaches. The DFO Butter Clam survey at Seal Island was presented as an example of how a clam survey is set up and conducted, the sampling requirements, and the equipment and personnel needed to conduct the survey. Participants also reviewed the Government of Canada's aim to make government data more accessible and open to the public. With respect to individual indicator beaches, participants were asked standard questions to understand how a survey could be designed at each indicator beach. These questions were:

- Where are clams found on the beach?
- Are there areas where clams are absent?
- Is clam density consistent across the beach?
- What tide height is needed to access the bed?
- Based on your experience, what are some factors to consider about the beach?

- What equipment considerations are there to conduct the survey?
- If the goal is to leave as many clams on the beach as possible, do you think there is enough interest to support the survey?
- How could DFO coordinate support?

Meeting summaries were drafted and distributed to each group for review. The meeting notes were also distributed along with copies of the presentation materials. The information provided during the survey planning meeting will be used in developing initial surveys at each beach that had not been previously surveyed. Implementation of surveys in CMAs where in-person meetings had been completed began in April 2021.

A total of 36 individuals representing 21 different First Nations, non-profit societies, industry, and DFO attended at least one of the six in-person/virtual meetings during which a total of 21 different potential indicator beaches were discussed as they relate to the questions proposed by DFO (listed above). A variety of other topics were also discussed including but not limited to: the indicator beach selection process, the scale at which these surveys would be conducted, the timing of surveys, how could limit reference points (LRPs) be set, the meaning of LRPs, the definition of a “major stock”, data accessibility, recreational harvest, funding, permanent closures, and the desire to leave clams on the beach. Meeting summaries were compiled after each discussion for CMA “B” (Appendix 1), CMA “C” (Appendix 2), CMA “D” (Appendix 3), CMA “E” (Appendix 4), CMA “F” (Appendix 5) and CMA “G” (Appendix 6). The ICMP received considerable interest from both First Nations and individual commercial harvesters to collaborate on the program. The information provided during the meetings would be reviewed and considered by DFO when determining Step 3 of the ICMP.

DISCUSSION

Step 1 and Step 2 were essential for DFO to understand the level of interest in the proposed program, questions or concerns that should be considered in the development of the ICMP and when developing LRPs, how surveys may be implemented at each beach, and the breadth of surveys that are completed by First Nations. Three additional key topics of discussion are also presented below.

PROPOSED INDICATOR BEACHES AND PROGRAM REVIEW

It was challenging to identify potential beaches that had the highest interactions with harvest activities, which is typically driven by the commercial sector, to act as indicators for the CMA. During Step 1 and Step 2, a number of beaches were identified as potential candidates for the ICMP (Table 1). Although they may not have been selected for the Step 3 implementation stage, they could be considered in future program reviews if circumstances regarding a beach’s ability to meet the selection criteria have changed. The selection criteria did not consider survey logistics as a key factor when considering potential beaches, and may be something to incorporate in the future. For example, Cluxewe beach in CMA “G” was proposed in Step 1 and raised again in Step

2 due to the high catch and effort from local harvesters. DFO revisited the initial review of the beach, considering the parameters described in the selection process. After further discussion, DFO verified that the level of commercial fishing effort is low, with opportunistic fishery openings when there is interest from a harvester, as well as a lack of commercial landing data for this area.

DFO will periodically review the list of indicator beaches and modify as necessary based on factors such as available resources, logistical feasibility, contamination closures, aquaculture tenures, etc. Currently, there is no definitive review schedule as part of the monitoring program's plan.

BIOLOGICAL SAMPLING

Following the guidance from Gillespie and Kronlund (1999) for intertidal clam surveys, and based on previous clam surveys completed (Kingzett and Bourne 1998), DFO may remove clams from surveyed beaches for later processing (sorting by species, weights, counts, individual measurements, and age determination) in the laboratory at the Pacific Biological Station in Nanaimo.

During Step 1, DFO received feedback that it would be important to leave clams on the beach after the survey was complete rather than taking clams back to the laboratory for processing. DFO brought this feedback to each CMA meeting in Step 2 and learned that, where logistics were challenging and the beach was remote, it was not a priority to leave clams on the beach. If logistics were relatively straight-forward, then leaving clams on the beach was preferable. In addition, some groups (e.g., A-Tlegay Fisheries Society and Musgamagw Dzawada'enuxw Fisheries Group) have experience collecting biological sample data on the beach in their surveys, and leaving the clams when finished; DFO was similarly interested in attempting this during intertidal clam surveys.

RETROSPECTION - AQUACULTURE TENURES

Following Step 2, DFO reviewed each of the potential survey locations for the presence of aquaculture tenures, as uncertainty was raised regarding a possible active tenure at Equis Beach (CMA F); one criterion of the monitoring program is that tenured beaches will not be included. A "Tenure" means an authorization issued under the authority of the Province of British Columbia's *Land Act* to allow for (exclusive) use and occupancy of the provincially owned Crown land or Crown land covered by water (Province of British Columbia 2017). The presence of a tenure was deemed to be an exclusionary factor for the ICMP as restocking or seeding of the beach could artificially increase biomass when the index beach is intended to represent the wild population; additionally a tenure could prohibit the survey from occurring and could interrupt or cause the cessation of a time series at the indicator beach.

Using the Province of British Columbia's iMapBC web application (https://maps.gov.bc.ca/ess/hm/imap4m/), with all the 'Crown Tenures – All – Tantalis' layers ('Tenure Applications – Tantalis – Outlined' and 'Tenures – Tantalis – Outlined')

turned on, six potential indicator beaches were flagged for follow-up investigation: Hyacinthe Bay (CMA B), Von Donop Inlet (CMA B), Blind Bay (CMA C), Seal Island (CMA D), Equis (CMA F), and Burdwood (CMA G).

Hyacinthe Bay (Crown Lands File Number [CLFN] 1412090, Figure 5), Von Donop Inlet (CLFN 1411114, Figure 6), Seal Island (CLFN 1411091, Figure 7), and Equis Beach (CLFN 1409478, Figure 8) were all confirmed to have Provincial Section 17 designations, designated use for aquaculture purposes, on a portion of their beaches. A Section 17 designation is given by the Province to an Area of Interest which excludes the land from being tenured for purposes other than aquaculture; a Section 17 designation does not mean that the area is currently under active tenure.

Subsequently, the current valid British Columbia shellfish aquaculture licence holders database was obtained from the Government of Canada's Open Government webpage (https://search.open.canada.ca/opendata/) and plotted in ArcGIS to look for active tenures at potential survey locations. Active tenures were identified at two of the potential survey locations: Equis Beach and Seal Island. As a result of the active tenure at Equis Beach, the beach will not be included in the Intertidal Clams Monitoring Program and another indicator beach will be selected in Barkley Sound (Clam Management Area "F"). In comparison, an active tenure, which overlaps the survey strata at Seal Island, was unexpected as an intertidal clam survey has occurred triennially at Seal Island since 1942 (Figure 7). The tenure was created in 2002 by the Province of British Columbia, licensed by the province from 2002 to 2009, and has been licensed by DFO since 2010 as it was a historic site. DFO assumed the responsibility of licensing aquaculture operations from the Province of BC in December 2010. Although, it does not meet one of the criteria of the ICMP, Seal Island will remain in the monitoring program given the long-term time-series of survey data at that site; beaches where surveys have previously been conducted present a unique opportunity, if the data/time series can be continued, as they provide a longer time-series of data. DFO will continue to request access to the tenured area at Seal Island and work in collaboration with the license holder for the continuation of the survey every three years. There were no active tenures identified at Hyacinthe Bay or Von Donop Inlet, therefore these sites will remain in the monitoring program as potential indicator beaches.

Although aquaculture tenures was a criterion consideration for the ICMP, there may be other area designations to consider that may impact surveys. For example, Blind Bay (CLFN 2412452) was identified to be located within an area of "Cultural Significance" of the Shíshálh Nation swiya (traditional territory) and the Burdwood Group (CLFN 1413583) was identified to be under a "Environment Protection/Conservation" or conservancy.

ACKNOWLEDGEMENTS

We would like to thank the reviewers, Leslie Barton and Brendan Aulthouse, as well as Ken Fong, Juanita Rogers and David Fogtmann for providing guidance on approaching the ICMP. Thank you to Rachel McGuinness for her support in Step 1 discussions and meetings, and Shaun McNeill for his support at the Step 2 meetings. We would also like to thank First Nations, Industry, other stakeholders, and our colleagues in DFO for their thoughtful feedback, knowledge, advice and interest in the development of the ICMP.

REFERENCES

Bower, S.M., Harbo, R. Adkins, B., and Bourne, N. 1986. Investigation of manila clam (*Tapes philippinarum*) mortalitites during the spring of 1985 in the Strait of Georgia, with a detailed study of the problem on Savary Island, British Columbia. Can. Tech. Rep. Fish. Aquat. Sci. 1444: 25 p. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/12969.pdf [accessed on 23 January 2023]

DFO. 2009. A fishery decision-making framework incorporating the precautionary approach. Available from https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/precaution-eng.htm [accessed 10 March 2020].

DFO. 2019. DFO – Coast Guard reconciliation strategy. Available from https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40947208.pdf [accessed 2 November 2023]

DFO. 2022. Pacific Region, Integrated Fisheries Management Plan, Intertidal Clams, January 1, 2022 to February 28, 2023. Available from https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41020315.pdf [accessed on 22 November 2022]

DFO. 2023. Pacific Region, Integrated Fisheries Management Plan, Intertidal Clams, March 1, 2023 to February 28, 2026. Available from https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41097385.pdf [accessed on 1 November 2023]

Gillespie, G.E. and A.R. Kronlund. 1999. A manual for intertidal clam surveys. Can. Tech. Rep. Fish. Aquat. Sci. 2270: 144 p. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/234406.pdf [accessed on 2 December 2022]

Kingzett, B.C. and N.F. Bourne. 1998. Assessment of intertidal clam population surveys at Seal Island, British Columbia, 1940-1992. Pp. 47-125. *In*: B.J. Waddell, G.E. Gillespie, and L.C. Walthers [eds.]. Invertebrate Working Papers reviewed by the Pacific Stock Assessment Review Committee (PSARC) in 1995. Part I. Bivalves. Can. Tech. Rep. Fish. Aquat. Sci. 2214.

Parliament of Canada. 2019. Statutes of Canada 2019 – Chapter 14: An Act to amend the Fisheries Act and other Acts in consequence. Available from https://www.parl.ca/DocumentViewer/en/42-1/bill/C-68/royal-assent [accessed 10 March 2020].

Prime Minister, Justin Trudeau. June 21, 2017. Statement by the Prime Minister of Canada on National Aboriginal Day. Available from https://www.pm.gc.ca/en/news/statements/2017/06/21/statement-prime-minister-canada-national-aboriginal-day [accessed 2 November 2023]

Province of British Columbia. 2017. Guide to the Pacific shellfish aquaculture application. October 18, 2017. Available from https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/pacific_shellfish_aquaculture_application_guide.pdf [accessed 2 November 2023]

Table 1. Indicator beaches following the Step 1 engagement period, which were considered in Step 2 discussions.

CMA	Indicator Beaches	Additional Beaches Proposed to DFO
B	Hyacinthe Bay, Von Donop Inlet	Manson's Lagoon, Mary's Point, Squirrel Cove, Turn Point
C	Blind Bay, Myrtle Beach, Savary Island	Carlson Beach, Maplewood Mudflats, Okeover Park
D	Deep Bay, False Bay, Seal Island	
E	Brickyard Beach, Erskine Point, Kulleet Bay	Bamberton, Clam Beach, East Sooke, Shell Beach
F	Amai Inlet, Atleo River, Equis Beach, Little Espinosa	Causeway Beach, Port Eliza, Rae Basin
G	Burdwood Group, Port Elizabeth	Airport Beach, Bones Bay, Cluxewe Beach, Deep Harbour, Fort Rupert Beach, Mound Island, Thomas Point

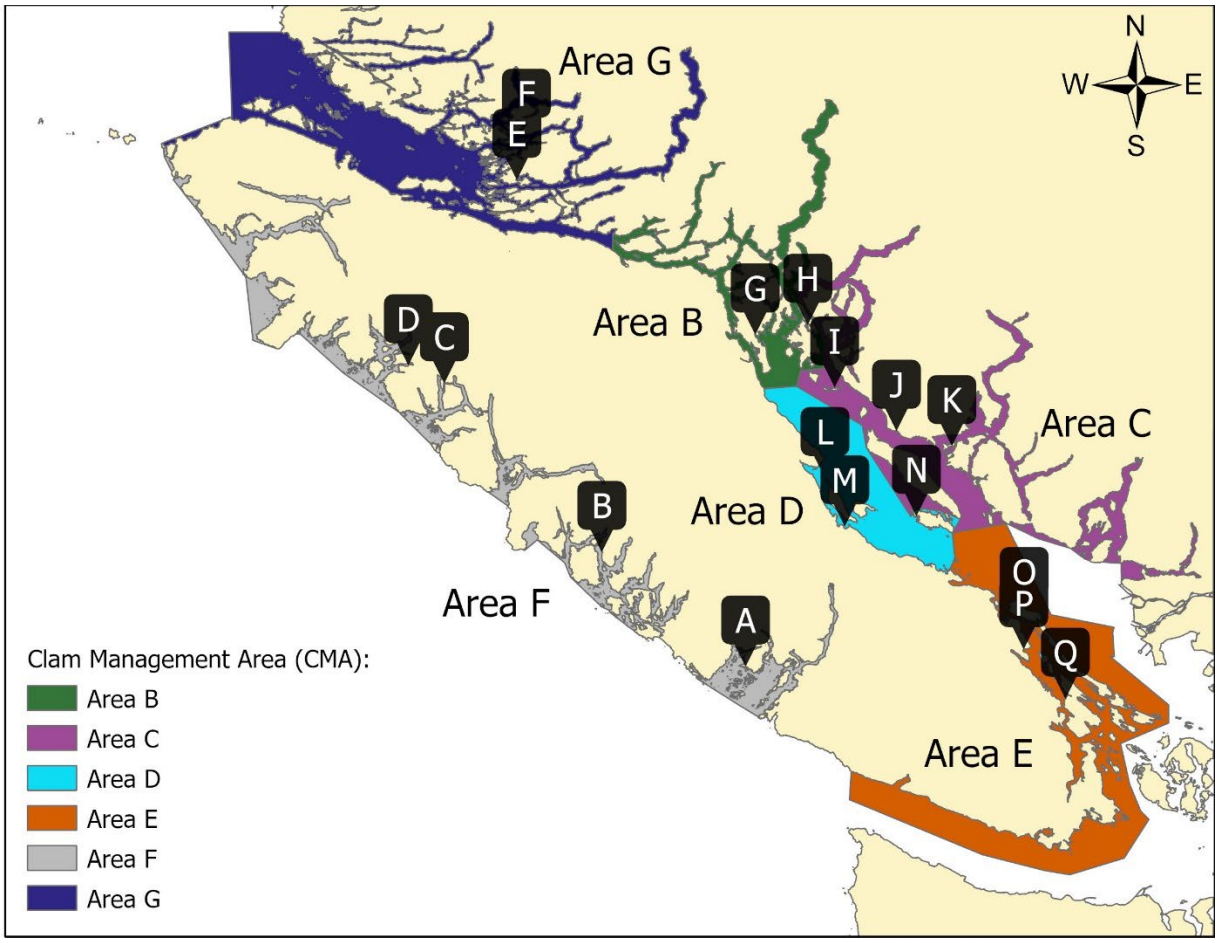


Figure 1. Clam Management Areas (CMAs) in the south coast of British Columbia. Indicator beaches following the Step 1 engagement period included: A) Equis Beach, B) Atleo River, C) Little Espinosa, D) Amai Inlet, E) Port Elizabeth, F) Burdwood Group, G) Hyacinthe Bay, H) Von Donop Inlet, I) Savary Island, J) Myrtle Beach, K) Blind Bay, L) Seal Island, M) Deep Bay, N) False Bay, O) Brickyard Beach, P) Kulleet Bay, and Q) Erskine Point.

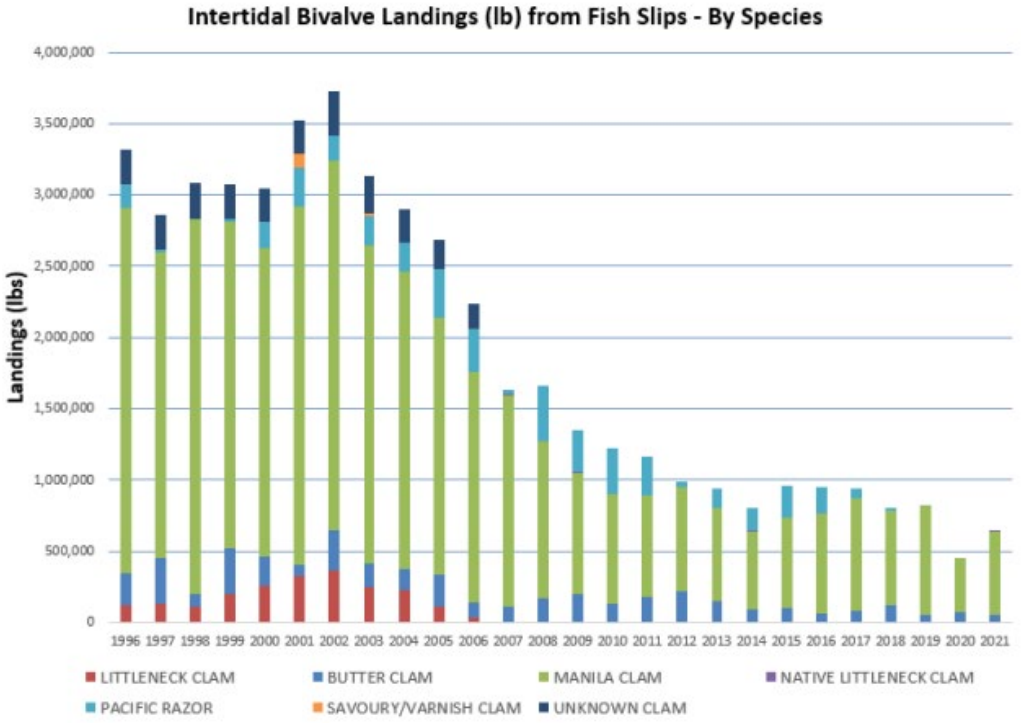


Figure 2. Annual British Columbia commercial intertidal clam fishery landings 1996 to current (from DFO 2022; data source: Sales slips).

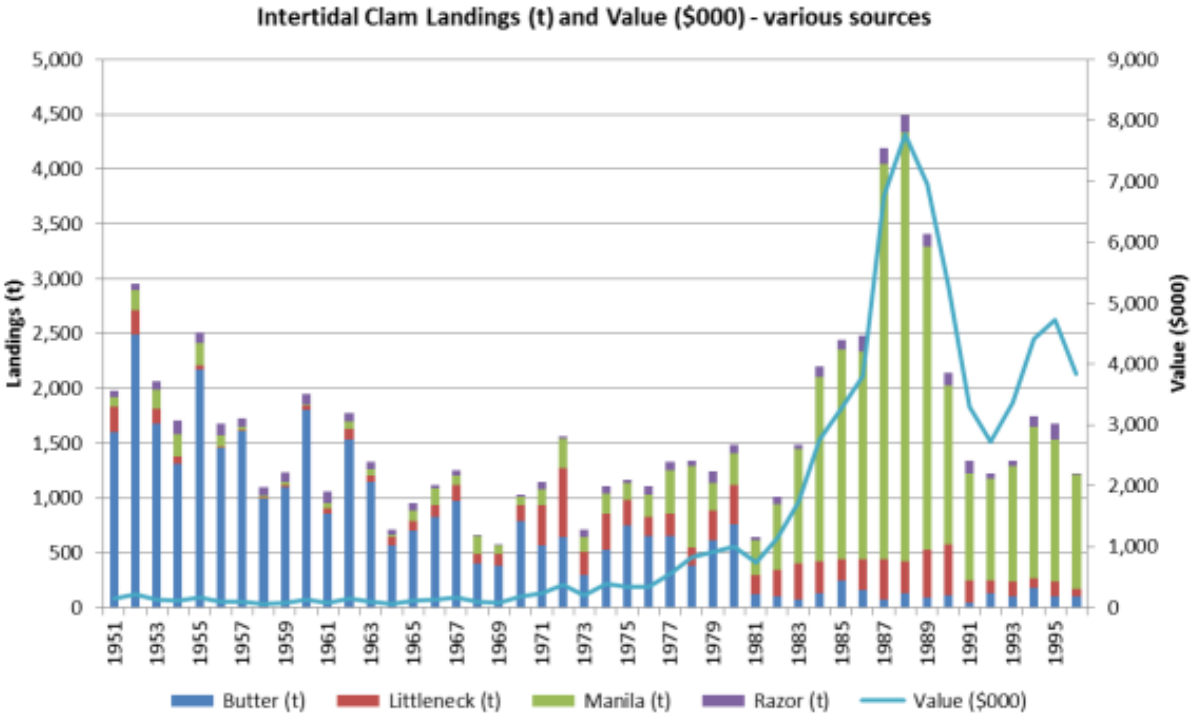


Figure 3. Annual British Columbia commercial intertidal clam fishery landings 1951-1996 (from DFO 2022; adapted from data in Gillespie and Bond 1997)

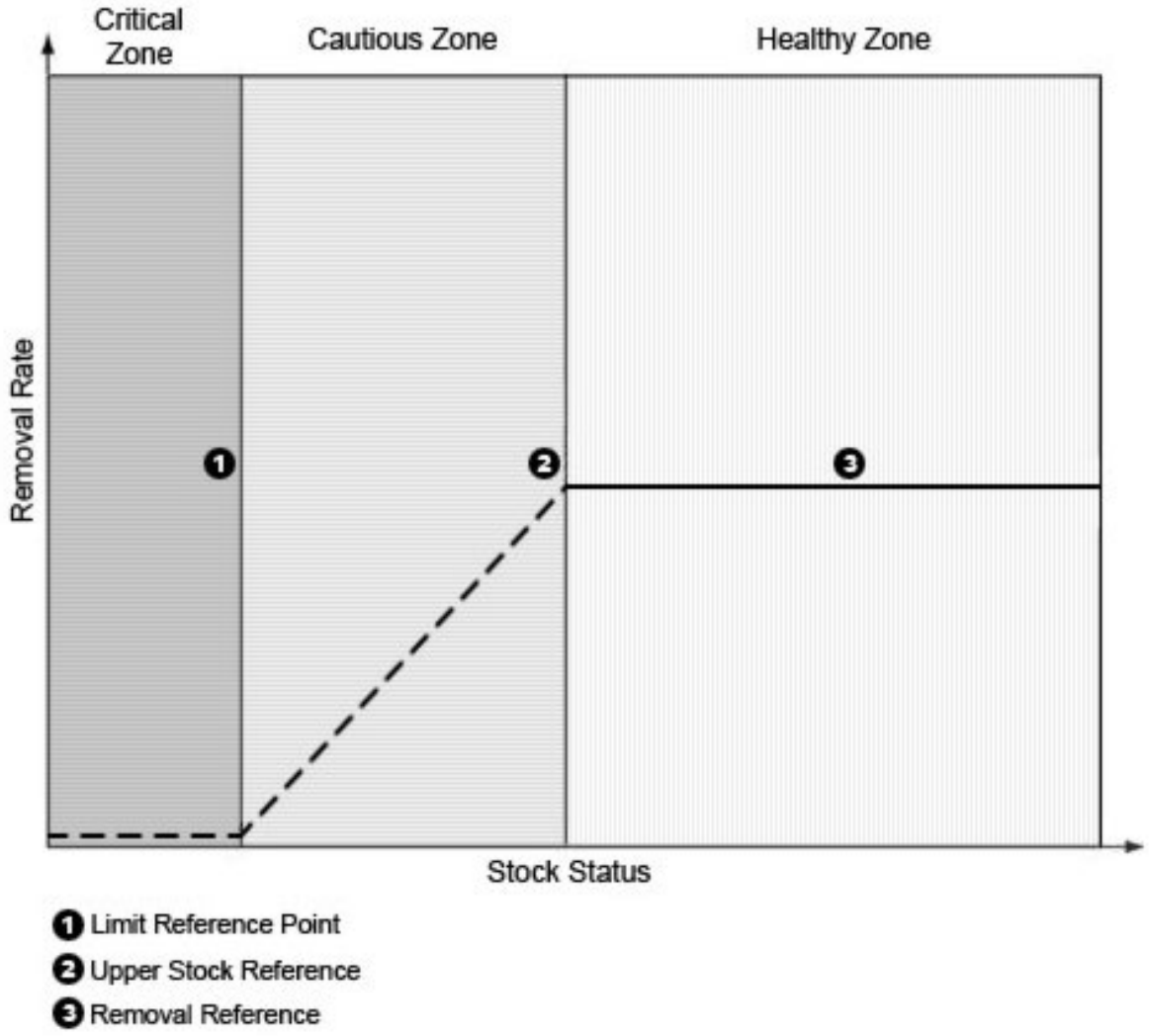


Figure 4. Reference points and stock status zones from the Precautionary Approach framework (from DFO 2009).

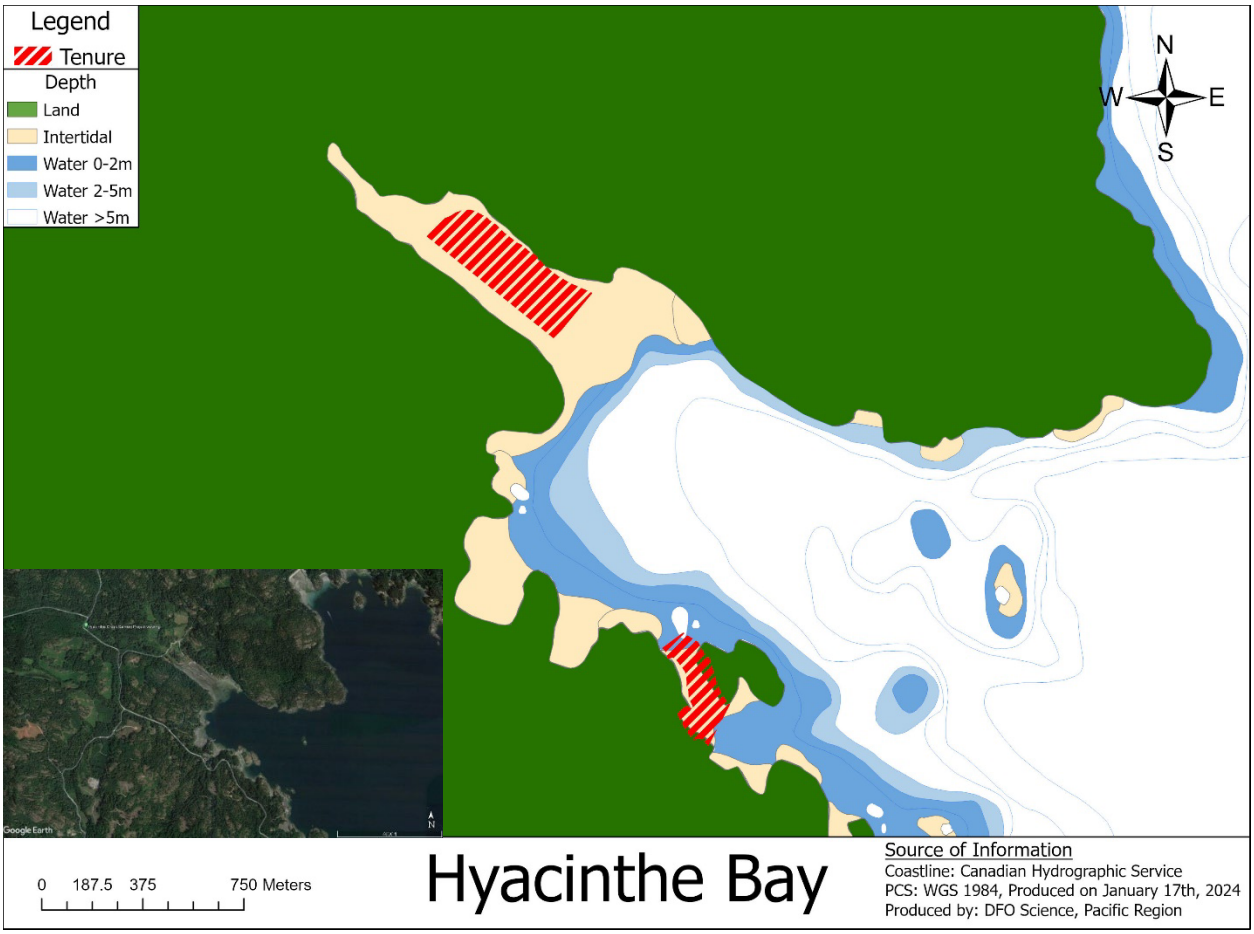


Figure 5. Tenure locations at Hyacinthe Bay Beach, Quadra Island, in Clam Management Area “B” with Aerial photo inlay from Google Earth.

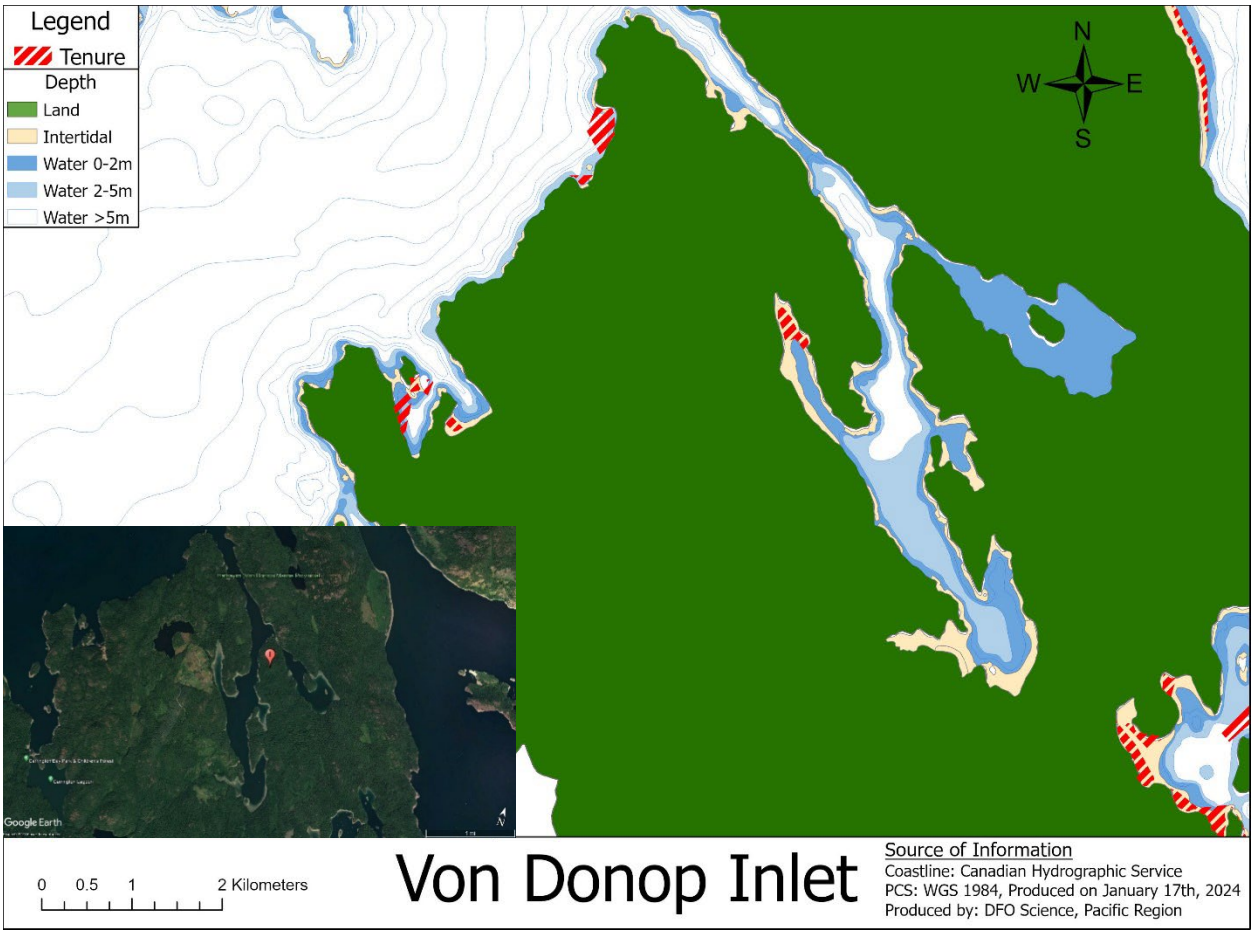


Figure 6. Tenure locations at Von Donop Inlet, Cortes Island, in Clam Management Area “B” with Aerial photo inlay from Google Earth.

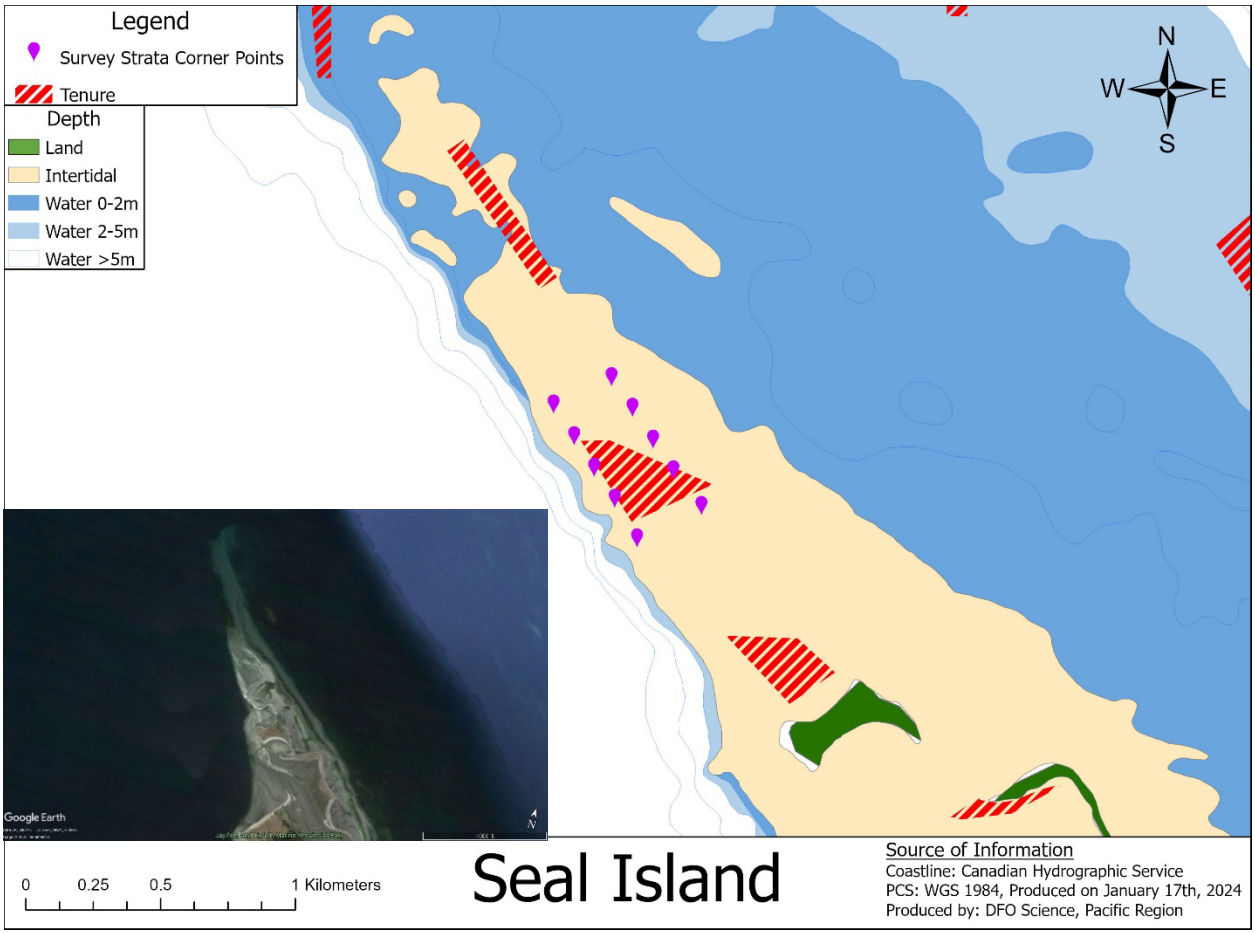


Figure 7. Tenure locations at Seal Island in Clam Management Area “D” with Aerial photo inlay from Google Earth.

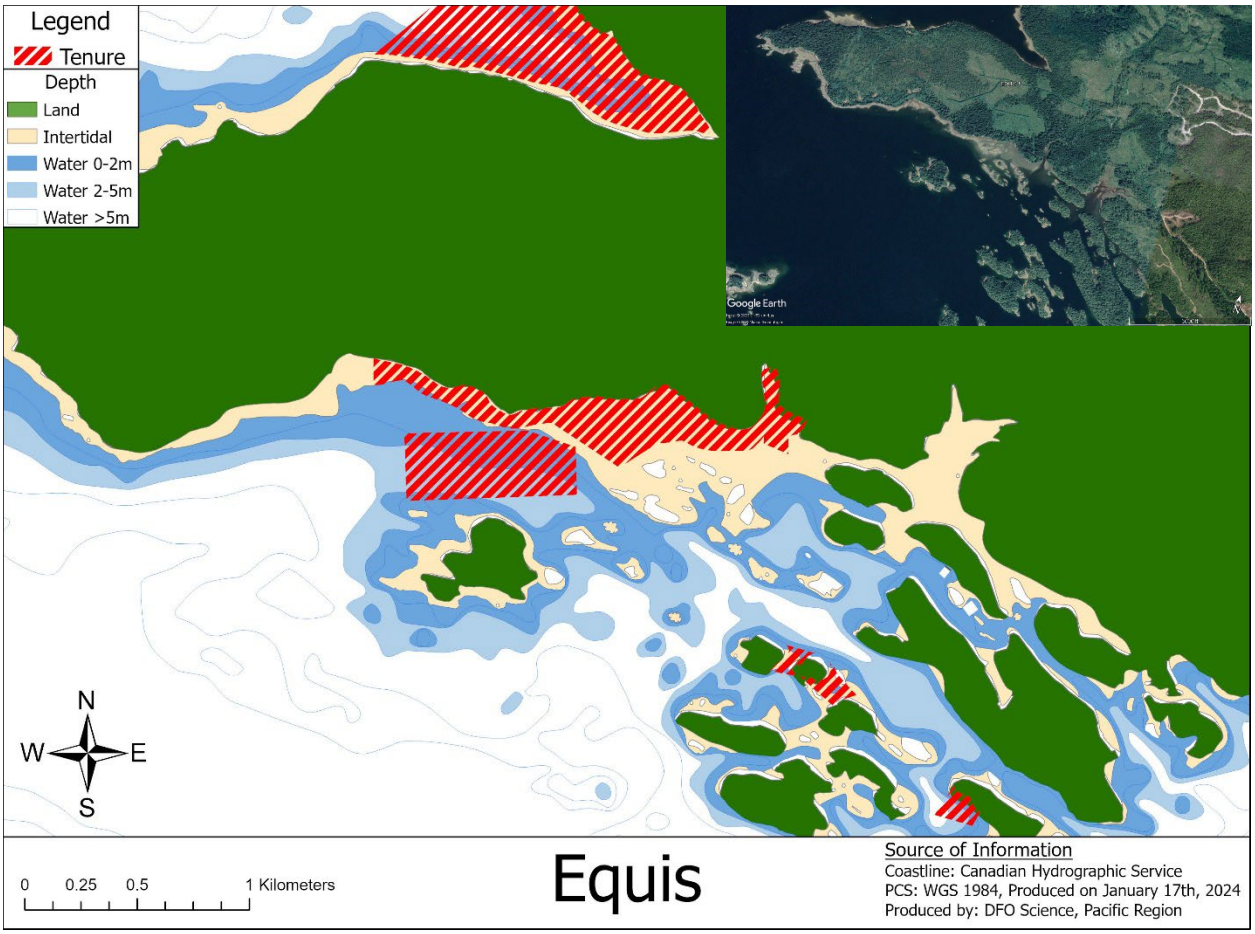


Figure 8. Tenure locations at Equis Beach, Barkley Sound, in Clam Management Area "F" with Aerial photo inlay from Google Earth.

1

APPENDICES

Appendix 1. Survey planning meeting summary for Clam Management Area B.

Intertidal Clam Monitoring Meeting Summary- CMA B

Date: February 20, 2020

Location: A-Tlegay Fisheries Society, 1441A Old Island Highway, Campbell River BC.

Time: 10:00am-1:30pm

Attendees: Christa Rusel (A-Tlegay First Nation); Karl Smith (Wei Wai Kum First Nation); Louis Poitras (commercial clam fisherman); Amy Ganton, Shaun MacNeill, Chelsea Ashbrook (DFO)

The Tla'amin Nation and Klahoose First Nation expressed interest in participating in the survey planning discussion, but notified DFO they were unable to attend the Clam Management Area (CMA) B meeting. After sending requests for follow-up discussions, DFO was able to meet with Tyrone Wilson (Tla'amin Nation) on February 18, 2020 in Powell River, B.C., and Tina Wesley (Klahoose First Nation) on February 22, 2020 in Nanaimo, B.C. Details of these conversations are captured in the notes below.

Purpose: To develop a survey plan for indicator beaches in CMA B for the Intertidal Clam Monitoring Program.

The following is a brief meeting summary that highlights the major items discussed for CMA B.

DFO made a presentation to highlight: Bill C-68 and reference points, stock assessments, program timeline, indicator beaches, survey planning, an example survey (Seal Island), questions to consider, data accessibility, and next steps.

General Discussion

The main discussion focused on how indicator beaches were selected and the scale in which these surveys would be conducted. For example, whether indicator beaches would be representative of the overall status of clam populations in each CMA, as clam size and harvest levels varies throughout. DFO explained that the monitoring program is in its early planning stages and limit reference points (LRPs) for intertidal clams have yet to be determined in the south coast waters of BC.

Survey Planning

Questions were raised about the size of survey areas and the locations of clams within them. DFO clarified that the size of the survey site was dependent on the beach, clam density and where clams were located. Beaches lacking previously established survey

designs may require a reconnaissance survey to determine how the survey may be set up. After discussion about the size of crew needed and how the Department could support each survey, the group stated it would support the monitoring program. Scheduling of the surveys would be important relative to other commitments and capacity by the group, and it was advised that early communication with the group would be essential.

Similar to CMA C (Appendix 2), timing of the monitoring program was flagged as a consideration for CMA B due to high levels of tourism from May to September. Surveys that occur in May could have different results than those in late September, and it was suggested that surveys could be conducted before and after the main tourism season.

Indicator Beaches

There was general discussion about Drew Harbour as a potential indicator beach given the high level of harvest that occurs, however, concerns were raised about the likelihood of closures in the area due to the high level of marine traffic, tourism, and the resulting risk of contamination. A tenure at Mary's Point was also identified as a survey location by Klahoose First Nation given harvest interests by Klahoose First Nation and Tla'amin Nation, however tenured beaches cannot be included in the monitoring program. Overharvest is of high concern to Klahoose First Nation and support from DFO's Conservation and Protection (C&P) was requested for CMA B. It was suggested that if overharvest issues were not addressed, it would be challenging to rebuild clam stocks.

Hyacinthe Bay

The A-Tlegay Fisheries Society has conducted clam surveys at this location (Figure 9) that were originally designed using the Gillespie and Kronlund (1999) "A manual for intertidal clam surveys" and in discussion with DFO Aquatic Biologist Tammy Norgard. Surveys are completed every two to three years, even if there are contamination closures. The first year of exploratory surveying started with three strata. The strata were set up in both high and low intertidal areas due to unfamiliarity with the beach and clam habitat locations. A-Tlegay Fisheries Society may share previous survey data with the Department pending a discussion with their Board, and a data sharing agreement with DFO could be explored at a future date. The beach can be accessed by road through private property if permission is given by landowners.

Von Donop Inlet

One of the main concerns of Von Donop Inlet focused on contamination closures from June to September during the tourist season. Beach access for this area is by boat, although there may be vehicle options through private property if permission is given by landowners. Of the many beaches available in Von Donop Inlet, the beach suggested for surveying was located in the western arm. At this location, it would be important to consider tide height and fog, as there is a narrow channel at the entrance of the inlet

where a fast-receding tide can increase the risk of beaching vessels. A tide height of 7 feet (2 m) was suggested to safely navigate through the channel, and wind would not be a concern because the inlet is protected. Louis Poitras shared that over the last ten years of harvesting in this area, the average clam size has remained consistent. In addition to the western arm, it was suggested the monitoring program include other beaches given the high harvest pressure reported in Von Donop Inlet.

Figure 9. Aerial photo (Google Earth) of Hyacinthe Bay in Clam Management Area “B” with A-Tlegay Fisheries Society clam survey sites.

Appendix 2. Survey planning meeting summary for Clam Management Area C.

Intertidal Clam Monitoring Meeting Summary- CMA C

Date: February 18, 2020

Location: Powell River Town Centre Hotel, Powell River BC.

Time: 10:00am-3:00pm

Attendees: Tyrone Wilson (Tla'amin Nation); Monte Bromley, Amy Ganton and Chelsea Ashbrook (DFO)

The shíshálh Nation, Klahoose First Nation, and Tsleil-Waututh Nation expressed interest in participating in the survey planning discussion, but notified DFO they were unable to attend the Clam Management Area (CMA) C meeting. After sending requests for follow-up discussions, DFO was able to meet with Tina Wesley (Klahoose First Nation) on February 22, 2020 in Nanaimo, B.C. Details of this conversation are captured in the notes below.

Purpose: To develop a survey plan for indicator beaches in CMA C for the Intertidal Clam Monitoring Program.

The following is a brief meeting summary that highlights the major items discussed for CMA C.

DFO made a presentation to highlight: Bill C-68 and reference points, stock assessments, program timeline, indicator beaches, survey planning, an example survey (Seal Island), questions to consider, data accessibility, and next steps.

General Discussion

Questions were raised about limit reference points (LRPs) and if they will determine the status of clam stocks in specific areas or for the entire clam stock. DFO responded that the monitoring program is in the early stages of development and the path forward for determining LRPs for intertidal clams is yet to be determined. In addition to the clam surveys conducted with DFO in Okeover Inlet and Myrtle Beach, the Tla'amin Nation also studied Varnish Clams in CMA C with LGL Limited that observed a high abundance of Varnish Clams and their main habitat locations. Commercial harvest reporting requirements were discussed, and it was identified that the Department generally receives landing information for an area rather than a specific beach.

Indicator Beaches

Okeover beach was identified as a potential indicator beach during the initial engagement period in 2019, however no commercial harvest occurs in this area and it was not considered for the proposed monitoring program. Tla'amin Nation stated Okeover beach has been overharvested and support is needed for monitoring. Tla'amin Nation requested funding and assistance from DFO's Compliance and Protection (C&P) to monitor harvest on Okeover beach, as well as for monitoring other beaches in CMA C by the Tla'amin Nation and C&P. Overharvest is of high concern to Klahoose First Nation and C&P support was also requested for CMA C. It was suggested that if overharvest issues were not addressed, it would be challenging to rebuild clam stocks.

In terms of implementing the monitoring program, the impacts of tourism were raised as a concern for survey timing. There was interest in supporting the monitoring program, and that May and June were preferable times for scheduling. However, given the high levels of tourism in the area, survey results in May would be different than those in September when tourism was winding down for the season. Careful consideration must be given to survey timing in CMA C, and it was suggested that surveys could be conducted before and after the main tourism season.

Savary Island

In the past DFO has conducted a monitoring program at Savary Island (Figure 10), dividing the northern shores of the Island into three 'beaches'. Beach 1 is on the eastern shore, Beach 2 is in the middle between First Point and Second Point, and Beach 3 is on the western shore. Beach 2 was identified as the core fishing area and focusing survey efforts in this location was supported. Given fishing effort also occurs on Beach 1 and Beach 3, it was suggested that surveying includes these areas to understand the full impact of harvest.

During logistics planning discussions, it was raised that the area is accessible by boat only, and inclement weather conditions have left harvesters and surveyors stranded in the past. As a result, some harvesters pack camping gear when harvesting this area. There was discussion about using seine or gillnet vessels as floating accommodations, however it was identified that the skippers of these vessels generally prefer to participate in the salmon fishery over other fisheries such as clam. Due to challenging logistics and weather, it may be difficult to leave clams on the beach during surveys.

Myrtle Beach

Due to the proximity to the road, Myrtle Beach (Figure 11) is easily accessible to all harvesters. Concerns were raised about the negative environmental impacts caused by tour groups that harvest this beach during the summer months. In addition, tourism is growing in this area and is expected to increase the pressure on clam populations. In addition to tour groups, there were concerns about illegal harvesting. Tla'amin Nation has been working with DFO Resource Manager Guy Parker to determine whether areas such as Myrtle Beach need temporary closures in the summer months to protect clam stocks from overharvest. In general, DFO C&P has observed increasing compliance in

terms of licences and abiding by harvest limits, however, even with increased compliance there is still concern for Myrtle Beach because of booming tourism. Leaving clams on the beach during a survey may be possible depending on the day and time of year. Intense wind events occur in the fall and surveys were not recommended during this time. Commercial harvest at this location generally occurs from February to April during the day.

Blind Bay

It was recommended that the Department communicate with shíshálh Nation for information about Blind Bay. In addition, it was identified that harvesters usually launch at Kent's Beach and, similar to Savary Island, it would be important to pack camping gear for the possibility of inclement weather.

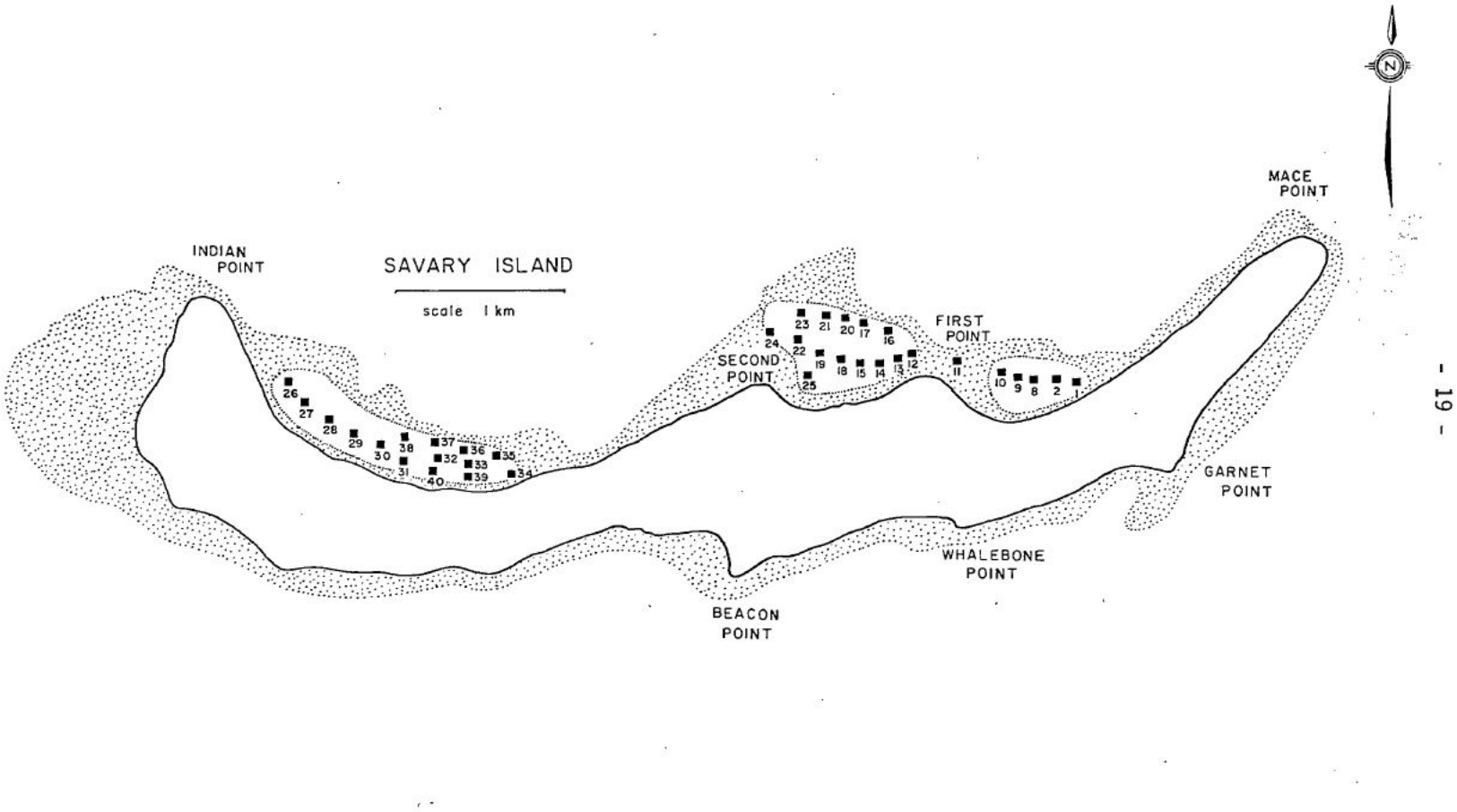


Figure 10. Map of Savary Island with sample plots (solid squares) of July 1985 survey and areas of clam beds indicated. Figure from Bower et al. 1986

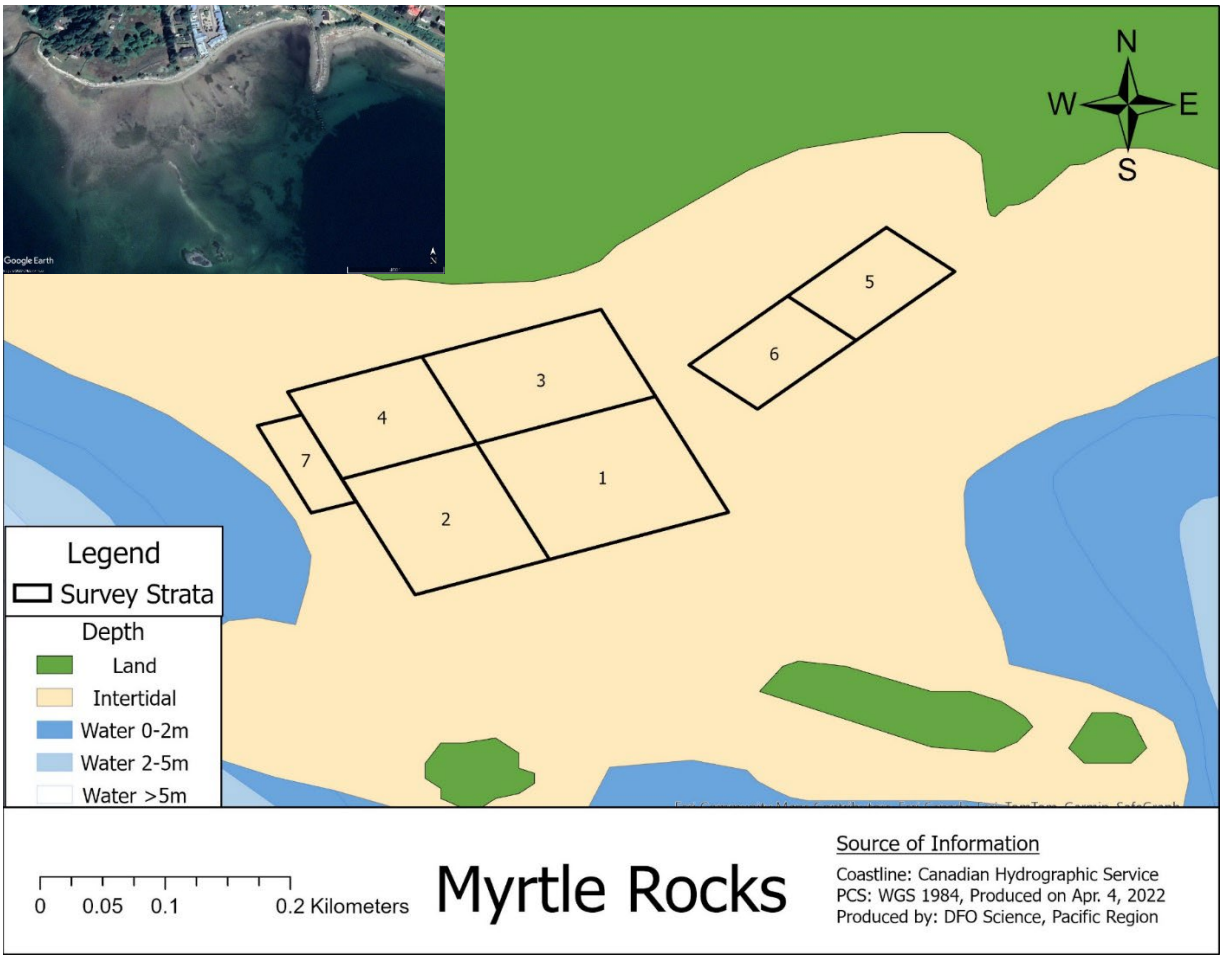


Figure 11. Survey strata locations at Myrtle Rocks in Clam Management Area “C” with Aerial photo inlay from Google Earth.

Appendix 3. Survey planning meeting summary for Clam Management Area D.

Intertidal Clam Monitoring Meeting Summary- CMA D

Date: February 13, 2020

Location: DFO Comox Office, 148 Augusta Street, Comox BC.

Time: 9:00am-11:30am

Attendees: Randy Frank, Cory Frank (K'ómoks First Nation); Dave Fogtmann, Amy Ganton, Leslie Barton, Chelsea Ashbrook (DFO)

The A-Tlegay Fisheries Society expressed interest in participating in the survey planning discussion, but notified DFO they were unable to attend the Clam Management Area (CMA) D meeting.

Purpose: To develop a survey plan for indicator beaches in CMA D for the Intertidal Clam Monitoring Program.

The following is a brief meeting summary that highlights the major items discussed for CMA D.

DFO made a presentation to highlight: Bill C-68 and reference points, stock assessments, program timeline, indicator beaches, survey planning, an example survey (Seal Island), questions to consider, data accessibility, and next steps.

General Discussion

The discussion began with questions on how DFO selected indicator beaches. DFO explained that criteria for selection were: beaches with high catch and effort rates, access available to all harvesters, and an absence of aquaculture tenures. The surveys are intended to determine the impacts of harvest rates on these indicator beaches. There were questions on how limit reference points (LRPs) are set, and DFO clarified that LRPs have not been established for intertidal clams in the south coast waters of BC as there is not enough data available.

Survey Planning

DFO raised that, if it is a priority, it may be possible to leave clams on the beach to minimize the impact of the surveys, however the final decision may be made on the day of the survey in light of weather conditions and the number of participants. The K'ómoks First Nation is interested in leaving clams on the beach if possible and suggested setting up a station at the beach to collect bio-sample data as quadrats are processed. K'ómoks First Nation felt it would be feasible if there were enough people to support the initiative, and mentioned that in their experience clams can quickly bury themselves

back into the substrate. There were also questions about survey frequency and timing, which have yet to be determined.

Indicator Beaches

False Bay

Ferry logistics were identified as a challenge for this indicator beach, but no additional information was available for the location.

Deep Bay

Deep Bay was described to be fairly rocky and Manila Clams are found where there is an outflow of freshwater. After discussion, Deep Bay would not be a suitable indicator beach given there is no commercial access to the area. It was recommended that the Department communicate with Qualicum First Nation if additional indicator beach locations were required. Although Mud Bay was originally suggested as a potential indicator beach by DFO, the number of tenures in the surrounding area would pose challenges for implementing the monitoring program.

Seal Island

A Butter Clam survey was established in 1940 on Seal Island (Figure 12) and surveys have been conducted in the same area since that time. The group discussed moving survey efforts to different areas on Seal Island to manage harvest at a local scale. In addition, there were questions on whether the survey would focus solely on Butter Clams or if Manila and Littleneck clams could be incorporated into survey efforts in the area, given Deep Bay would not be an appropriate indicator beach. Potential Manila Clam survey sites around Sandy Island (also known locally as Tree Island) were reviewed and identified. Some sites occur within a K'ómoks First Nation tenure, but the Nation would be willing to permit DFO to conduct a survey program in those areas. However, tenured beaches cannot be used for the purposes of the ICMP. In the past, K'ómoks First Nation has conducted Varnish Clam surveys in these areas and found Varnish Clams to be in high abundance, which were observed to be outcompeting other species of clams. Illegal harvest occurring at Seal Island was also discussed.

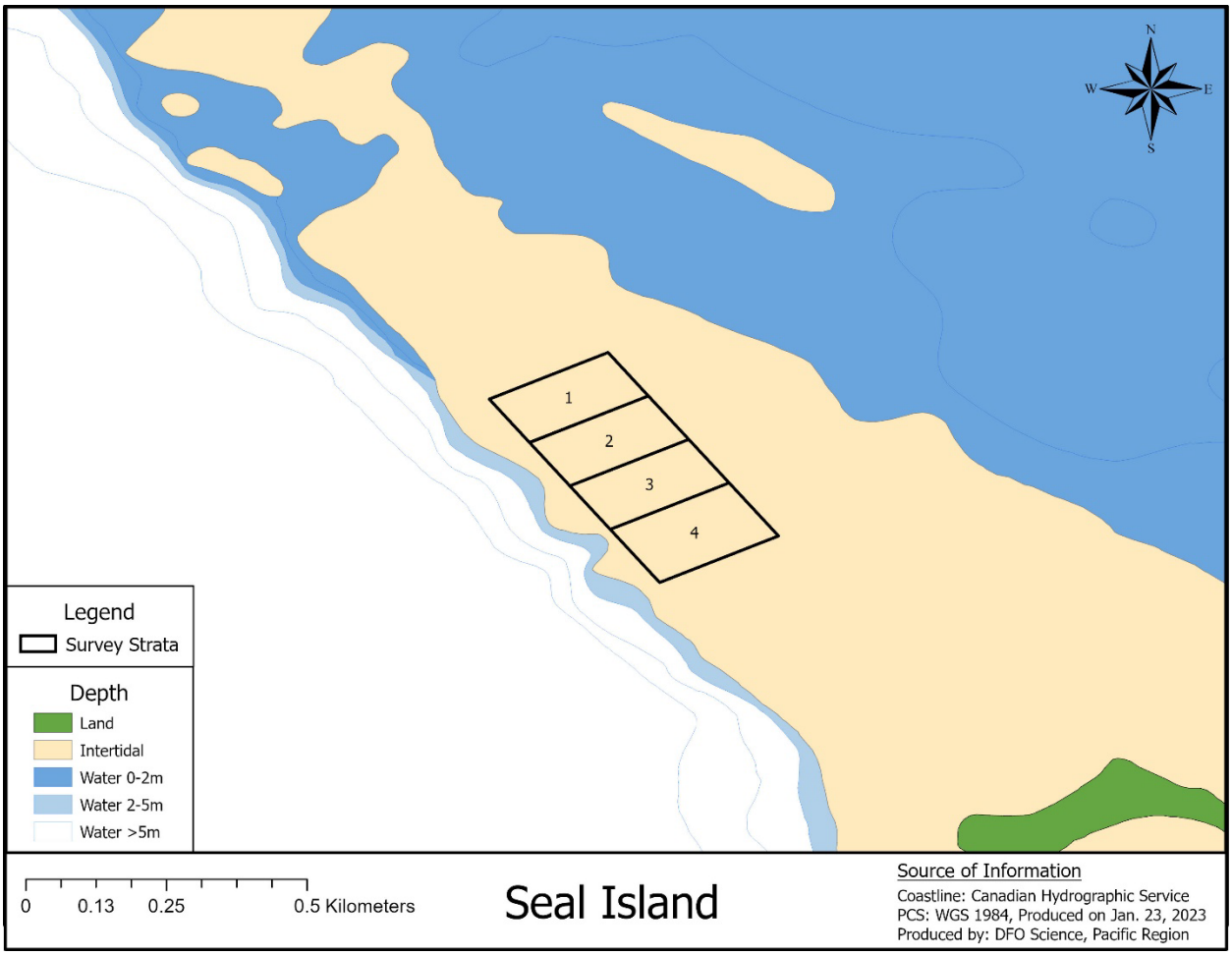


Figure 12. Current survey strata locations at Seal Island in Clam Management Area “D”.

Appendix 4. Survey planning meeting summary for Clam Management Area E.

Intertidal Clam Monitoring Meeting Summary, CMA "E" – online, MS Teams

Date: March 7th, 2022

Location: Virtual - MS Teams

Time: 09:00am-12:00pm

Attendees: Andrew Sheriff (Malahat First Nation); Tim Kulchyski, Bernette Laliberte (Cowichan Tribes); Damon Nowosad (Q'ul-lhanumutsun Aquatic Resources Society); Nicole Frederickson (Island Marine Aquatic Working Group); Andrew McNaughton (on behalf of Snuneymuxw First Nation and T'Sou'ke Nation); Chris Good (Snuneymuxw First Nation); Alex Dalton, Dominique Bureau, Chelsea Ashbrook (DFO)

The T'Sou'ke Nation expressed interest in participating in the survey planning discussion, but notified DFO they were unable to attend the Clam Management Area (CMA) "E" meeting. DFO was able to meet with David Planes on March 15th, 2022 via a separate phone call.

Purpose: To develop a survey plan for indicator beaches in CMA "E" for the Intertidal Clam Monitoring Program.

The following is a brief meeting summary that highlights the major items discussed for CMA "E".

DFO made a presentation to highlight: Bill C-68 and reference points, stock assessments, program timeline, indicator beaches, survey planning, an example survey (Seal Island and Atleo River), questions to consider, data accessibility, and next steps.

Data Accessibility:
One of the requirements associated with the C-68 funding that DFO receives for the Intertidal Clam Monitoring Program is that all data collected in connection with the funding would be made available publicly on the Open Data platform. Survey data is not subject to the same privacy restrictions that apply to commercial fishing data. A conservation concern was raised, and DFO acknowledged, that revealing specific clam survey quadrat locations could increase targeted harvesting and a meeting participant suggested this is something that must be considered when publishing the results.

Recreational Harvest:
It was suggested that DFO should consider broadening the criteria used for the selection of indicator beaches; to ensure that beaches with high recreational harvest are included (e.g., Bamberton Beach). DFO acknowledged that all sectors (First Nations, commercial and recreational) of the clam fishery (i.e. fisheries removals) are important and need to be understood for the purposes of stock assessment. The selection criteria for indicator beaches requires the beach be accessible to all user groups. One idea suggested to estimate recreational landings was to count how many people are out

clamming on a given day and extrapolate what the maximum legal removal could be (based on daily possession limits).

Funding:
DFO funding for the Intertidal Clam Monitoring Program is associated with Bill C-68. The initial funding was for 5 years (2 years to begin, with annual renewal for 3 years afterwards). There is hope that long-term funding will be made available. It was expressed that schedules are busy for all groups currently and that adding this program to work plans could either require something to be dropped or additional funds provided. It was recommended that the Aboriginal Fisheries Strategy (AFS) Liaisons for the area be contacted as one potential source of additional funds.

Survey Design:
In the example provided using the Atleo River Beach reconnaissance survey, the reconnaissance survey data were used to determine the location of the clam bed on the beach and survey strata were defined for future surveys using ArcGIS Pro; the goal was an unbiased survey design. DFO remains committed to a fully open and documented process therefore feedback will be sought from the Nations and internal DFO modelers prior to the finalization of the location of survey strata.

Permanent Closures:
If there was a permanent closure at an indicator beach, the indicator beach would no longer meet all of the criteria set out in the monitoring program design; therefore it is likely that beach would have to be removed or replaced in the monitoring program. Beaches under permanent closure do need someone to advocate for their re-opening once the source of contamination is removed. Re-opening is a collaborative effort with many players involved, the source of the contamination needs to rectified and re-occurrence needs to be unlikely. The site needs to test clean. Many of the beaches that are under permanent closures are closed because of contamination closures which are the jurisdiction of Environment and Climate Change Canada.

Indicator Beaches

Kulleet Bay

Further conversations with the Stz'uminus First Nation regarding the potential inclusion of Kulleet Bay as an indicator beach are necessary. DFO had reached out to the Stz'uminus Nation previously. DFO is committed to the ICMP being a collaborative program and, with the assistance of the Q'ul-lhanumutsun Aquatic Resources Society (QARS), will follow-up with Stz'uminus Nation for discussion. DFO presented three areas of interest for reconnaissance in Kulleet Bay and meeting participants suggested that there might be additional good spots for clams outside those areas.

Brickyard Beach

Brickyard Beach (Figure 13) was noted to get fished intensively by the recreational fishery and that tour buses have been observed at this beach in the past. Clam abundance on the beach has been noted to have bounced back rapidly following

intensive fishing. Andrew McNaughton expressed an interest and availability in providing further on site information and support for a clam survey at this beach.

Erskine Point (locally known as Rainbow Beach)

There was no recent knowledge from meeting participants regarding Erskine Point. The Cowichan Tribes have previously harvested clams at this beach and expressed interest in participating in a survey of the beach. It is likely that support could include diggers and vessels. The Malahat Nation also expressed interest in participating in a survey at this site, providing diggers and a vessel. IMAWG was also interested in providing support wherever possible.

Figure 13. Aerial photo of Brickyard Beach in Clam Management Area “E” with expected clam bed provided by Andrew McNaughton.

Appendix 5. Survey planning meeting summary for Clam Management Area F.

Intertidal Clam Monitoring Meeting Summary- CMA F

Date: February 12, 2020

Location: Uchucklesaht Tribe Government Building, 5251 Argyle St, Port Alberni, BC.

Time: 10:00am-3:00pm

Attendees: Dennis Hetu, David Johnsen (Toquaht Nation); Keith Cox, Dameon Cox (Ka:'yu:'k't'h'/Che:k'tles7et'h' First Nations); Andrew Jackson (Tla-o-qui-aht First Nation); Jim Lane, Sabrina Crowley (Nuu-chah-nulth Tribal Council Uu-a-thluk Fisheries); Anabel Jarry (Nuchatlaht Tribe); Lindsay Reed, Leslie Barton, Amy Ganton and Chelsea Ashbrook (DFO)

Although the Ehattesaht First Nation expressed interest in participating in the survey planning discussion, DFO did not receive feedback from representatives about attending the Clam Management Area (CMA) F meeting.

Purpose: To develop a survey plan for indicator beaches in CMA F for the Intertidal Clam Monitoring Program.

The following is a brief meeting summary that highlights the major items discussed for CMA F.

DFO made a presentation to highlight: Bill C-68 and reference points, stock assessments, program timeline, indicator beaches, survey planning, an example survey (Seal Island), questions to consider, data accessibility, and next steps.

Reference Points

The main discussion focused on how limit reference points (LRPs) would be established for intertidal clams and what would occur if the "critical" zone was reached. In addition, questions were raised about the process to determine LRPs if the indicator beaches were already in the "critical" and "cautious" zones. DFO discussed that LRPs have not been established for intertidal clams in the south coast waters of BC as there is not enough historical data available, however the 2019 amendments to the *Fisheries Act* under Bill C-68 include provisions for developing rebuilding plans in the event fish stocks decline into the "critical" zone.

Bill C-68

After an overview of Bill C-68, there was discussion about how "major stocks" were defined in Section 6.3. DFO explained that the list of "major stocks" would be drawn from those fisheries that have an Integrated Fisheries Management Plan (IFMP) and does not consider economic viability at this time. Finally, there were questions about

whether Bill C-68 includes working with First Nations. DFO explained that collaborating with First Nations continues to be important to the Department through the implementation of Bill C-68. Section 6 aligns the *Fisheries Act* with some elements of the Department's Precautionary Approach Framework and focuses on conservation through science and resource management perspectives.

Survey Planning

The group discussed the possibility of leaving clams on indicator beaches during surveys to ensure minimal impact to the clam populations. DFO clarified that if it is a priority for groups, it can be included in the survey planning with an understanding that the final decision may be made on the day of the survey, depending on weather conditions and the number of participants. After discussion about the increase in resources and logistics planning if this were to be accomplished successfully, the group thought that leaving clams on the beach was not a priority at this time. Survey scheduling and frequency for the next fiscal year were discussed, including support and involvement by First Nations. Planning survey schedules around the availability of First Nations groups who want to be involved in the monitoring program would be an important consideration, given First Nations may have existing monitoring programs scheduled for species such as herring or salmon. The group also suggested training opportunities prior to surveying a beach.

Indicator Beaches

There was a general discussion about indicator beaches, including concerns of illegal harvesting. Questions were also raised on whether one beach survey would determine the status of intertidal clams for an entire CMA. DFO responded that the Department is in the early stages of the monitoring program and has not determined a path forward on developing LRPs for intertidal clams. The Department will consider this question in the LRP process.

Equis Beach

The main discussion focused on the aquaculture tenure located on Equis Beach and if it was active. There was mention that the areas outside the tenure are not as intensely harvested as the area within the tenure however, there was concern about illegal harvesting and the effects it may have on the beach. Equis Beach is located in a well-protected area, therefore no concerns were raised about wind or weather conditions and boats could be beached during the survey. It was recommended that tide heights of 1-3 feet (0.3-0.9 m) were ideal as Manila Clams are concentrated at the 2-3 feet (0.6-0.9 m) mark.

Atleo River

The abundance of clams and concerns that stocks have declined over the years was discussed for Atleo River. It was unknown where the core productivity of clams is

located but there were often harvesters in the area adjacent to where the river fans into a delta. Additional conversations are needed with individuals familiar with this area, and contact information was provided to DFO.

Little Espinosa

With the proximity of Little Espinosa to a road, the ease of access for Little Espinosa raised concerns about overharvest. Harvesters generally target this area around the end of October and early November. A creek must be crossed to reach the survey area and the group advised that weather forecasts should be checked prior to travelling to the beach. Heavy rainfall events cause water levels and flow to increase in the creek, creating a safety hazard when crossing.

Amai Inlet

The main discussion focused on logistics and survey planning considerations. Amai Inlet is boat access only, and Fair Harbour is the nearest boat launch. There was a concern that water can freeze on the beach, which prevents accessibility and makes night surveys and surveys throughout colder seasons unfeasible. The group mapped the main clam grounds and suggested that a tide height of less than 1 m (less than 3 feet) is necessary to access the bed. The beach is “freckled” with clam habitat and chest waders were only required in the event that there was a creek crossing, otherwise no extra equipment is necessary.

Appendix 6. Survey planning meeting summary for Clam Management Area G.

Intertidal Clam Monitoring Meeting Summary- CMA G

Date: February 21, 2020

Location: Black Bear Resort Hotel, 1812 Campbell Way, Port McNeill BC.

Time: 10:00am-12:30pm

Attendees: Melissa Willie (Musgamagw Dzawada'enuxw Fisheries Group); Michelle Hunt (Kwakiutl First Nation); Mark Kenny, Kristen Walkus (Gwa'sala Nakwaxda'xw First Nations); Gana Dawson ('Namgis First Nation); Amy Ganton, Shaun MacNeill and Chelsea Ashbrook (DFO)

The A-Tlegay Fisheries Society and Island Marine Aquatic Working Group expressed interest in participating in the CMA G discussion, but were unable to attend the meeting.

Purpose: To develop a survey plan for indicator beaches in CMA G for the Intertidal Clam Monitoring Program.

The following is a brief meeting summary that highlights the major items discussed for CMA G.

DFO made a presentation to highlight: Bill C-68 and reference points, stock assessments, program timeline, indicator beaches, survey planning, an example survey (Seal Island), questions to consider, data accessibility, and next steps.

Reference Points:

Questions were raised about the Department's Precautionary Approach Framework and how limit reference points (LRPs) will be developed. DFO discussed that the monitoring program was in the early stages of development and LRPs had not been established to date. The group discussed what metrics would be used to measure LRPs (ie. pounds, tonnes, pieces, etc.). DFO clarified that there was not enough data available to decide how LRPs may be measured.

Survey Planning:

The group discussed the possibility of leaving clams on the beach during surveys, with the suggestion to have a smaller crew of people on the indicator beaches for a longer period of time (when compared to the Seal Island Butter Clam survey example). The crew could bring all equipment needed to collect bio-sample data and leave clams on the beach. This scenario could be possible if the low tides are within the same few days, but sampling could not be spread over tide events that may be separated by a few weeks. A suggestion was raised that alternative technologies could be investigated, such as the option to photograph clams to determine age at a later date rather than

remove them from the beach. The group reviewed the bio-sampling protocols and how many clams would be sampled in this process. Using the Seal Island Butter Clam survey example, up to 500 bio-samples were collected from Butter and Littleneck clams, and as many Manila Clams as possible given survey area did not include Manila Clam habitat. DFO cannot return samples to the beach after bringing them in the laboratory (due to public health concerns), so samples were disposed of after processing.

The group was interested in supporting the monitoring program with funding from DFO, and suggested the Department could provide contracts for the monitoring program.

Proposed Indicator Beaches

Burdwood and Port Elizabeth

The Musgamagw Dzawada'enuxw Fisheries Group conducts clam monitoring in these areas using the Gillespie and Kronlund (1999) "A manual for intertidal clam surveys", and bio-sampling is completed on site as they bring the required equipment to the beach. Musgamagw Dzawada'enuxw Fisheries Group suggested they may be able to share the survey data with DFO with a data sharing agreement, and would need a discussion within the Fisheries Group about working with the Department on this program. Musgamagw Dzawada'enuxw Fisheries Group would contact the Department following that discussion.

Potential Indicator Beach

Cluxewe was discussed as a potential indicator beach for CMA G. Given the close proximity to the road, Cluxewe was reported to have a high number of harvesters and was considered by the group to meet the indicator beach requirements of high catch and effort. At the end of the discussion it was unclear if the beach was open to commercial harvest, though it was mentioned that the area was targeted by many harvesters even if the beach was closed. The Department would consider the request after further review of the criteria for indicator beaches. The group mapped the main clam grounds and suggested a 1-3 feet (0.3-0.9 m) tide is necessary to access the bed. It was a goal of the group to leave clams on the beach if possible.

Appendix 7: Engagement package shared in support of the development of the Intertidal Clam Management Program (ICMP).

Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

Fisheries and Oceans Canada
3190 Hammond Bay Rd.
Nanaimo, BC V9T 6N7

October 21, 2019

RE: Engagement on the New Intertidal Clam Monitoring Program in the South Coast of British Columbia

The purpose of this package is to share information and request your feedback on a proposed monitoring program for intertidal clams in the south coast of British Columbia (BC). It is recognized that the proposed monitoring program may not overlap with your specific area of interest; however, the Department is interested in sharing this package with you for your information and in consideration of potential future projects.

In June 2019, the *Fisheries Act* was amended through Bill C-68 that legislated new requirements for major fish stocks, part of which include determining reference points to maintain these stocks at sustainable levels. In the south coast of BC, intertidal clams will be one of the major stocks requiring reference points.

Currently, there are no reference points in place to measure intertidal clam health in the SCA. As a result, Fisheries and Oceans Canada (DFO) will be implementing a new monitoring program to collect data that will allow DFO to build data sets for intertidal clams, with the long term objective of monitoring the health of clam stocks. DFO has a minimum of 2 years of funding until March 2021 with a possible extension of up to 5 years to implement this program.

DFO is engaging as early as possible in the development process and is requesting feedback from First Nations, Industry and other stakeholders about the proposed monitoring program. Attached to this letter are two documents that provide additional information:

1. Presentation: additional details about reference points, timelines and a breakdown of the steps that can be taken to implement the new monitoring program.
2. Questionnaire: asks a number of questions about the list of indicator beaches and participation in the program.

DFO is providing the consultation package by email, and mail where possible. If you require a paper copy of the package, please contact Amy Ganton. DFO will be providing information at previously scheduled in-person meetings where possible, but may also be able to join additional meetings by teleconference or webinar.

Responses are requested by **November 29, 2019**, and feedback can be provided through the questionnaire or by letter, email or phone. In light of the limited funding available for implementing the program, this is the only opportunity to provide feedback on the list of indicator beaches before the program progresses to the next step.

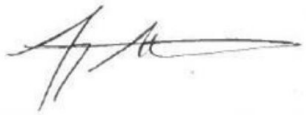
Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

In December 2019, feedback will be reviewed and summarized and a list of indicator beaches will be finalized. DFO will provide the summary and list of beaches by email to anyone requesting feedback. In early 2020, DFO will set up meetings with interested groups to plan survey logistics and implementation of the program.

If you have any questions about this process or would like to provide feedback please contact me by email, phone, or mail.

Yours sincerely,



Amy Ganton, Aquatic Biologist

Email: Amy.Ganton@dfo-mpo.gc.ca
Phone: 250-756-7055
Mail: Fisheries and Oceans Canada
3190 Hammond Bay Rd.
Nanaimo, BC V9T 6N7

Fisheries and Oceans Canada | Pêches et Océans Canada

Intertidal Clam Monitoring

Implementing Bill C-68 in the South Coast of British Columbia

October 21, 2019

Canada

Agenda

- Overview of Bill C-68
- Goals and Objectives
- Proposal
- Collaboration on the Monitoring Program
- Developing the Monitoring Program:
  - Step 1 – Indicator Beaches
  - Step 2 – Survey Planning
  - Step 3 – Implementing the Monitoring Program
  - Step 4 – Reference Points and Long-term Monitoring
- Next Steps

Questions requesting feedback are outlined in red.

Overview of Bill C-68

- In June 2019, the federal *Fisheries Act* was amended under Bill C-68.
  - The last time the *Fisheries Act* was amended was in 2012.
- Some of the 2019 amendments re-established elements of the *Fisheries Act* that were in place prior to 2012.
- Some of the 2019 amendments are new, such as the provisions around Fish Stocks.

- If you have any questions about the amendments to the *Fisheries Act*, please email:
  DFO.Pacific_FFHPP_IEU-UEA_PPPH_Pacifique.MPO@dfo-mpo.gc.ca

Overview of Bill C-68

- As part of the new Fish Stock provisions, DFO will now be required to:
  - Maintain major fish stocks at levels necessary to promote sustainability (Section 6.1);
  - Develop and implement rebuilding plans for stocks that have declined to their critical zone (Section 6.2); and
  - Prescribe the list of major stocks to which Section 6.1 and 6.2 apply (Section 6.3).

- DFO's aim is to prescribe all major stocks in 5 years (by March 31, 2024).
  - This includes intertidal clams in the south coast of British Columbia (BC).

Overview of Bill C-68

- *Limit Reference Point (6.1 – 2):* if the Minister is of the opinion that it is not feasible or appropriate, for cultural reasons or because of adverse socio-economic impacts, to implement the measures referred to in subsection (1), the Minister shall **set a limit reference point and implement measures to maintain the fish stock at or above that point**, taking into account the biology of the fish and the environmental conditions affecting the stock.

- *Plan to Rebuild (6.2 – 1):* If a prescribed major fish stock has declined to or below its **limit reference point**, the Minister shall develop a plan to **rebuild the stock** to or above that point in the affected area, taking into account the biology of the fish and the environmental conditions affecting the stock, and **implement it within the period provided for in the plan**. **Measurable objectives aimed at rebuilding the stock with timelines and probability for achieving the objectives.**

Reference Points

- With the goals of avoiding conservation concerns and to sustain stocks, reference points are a metric that provide insight on what is happening with a population.
- Reference points are biologically-based, and align with the Precautionary Approach (PA) Framework that DFO implements.

- Currently, there are no reference points in place to measure intertidal clam health in the south coast of BC.

Butter Clam ←

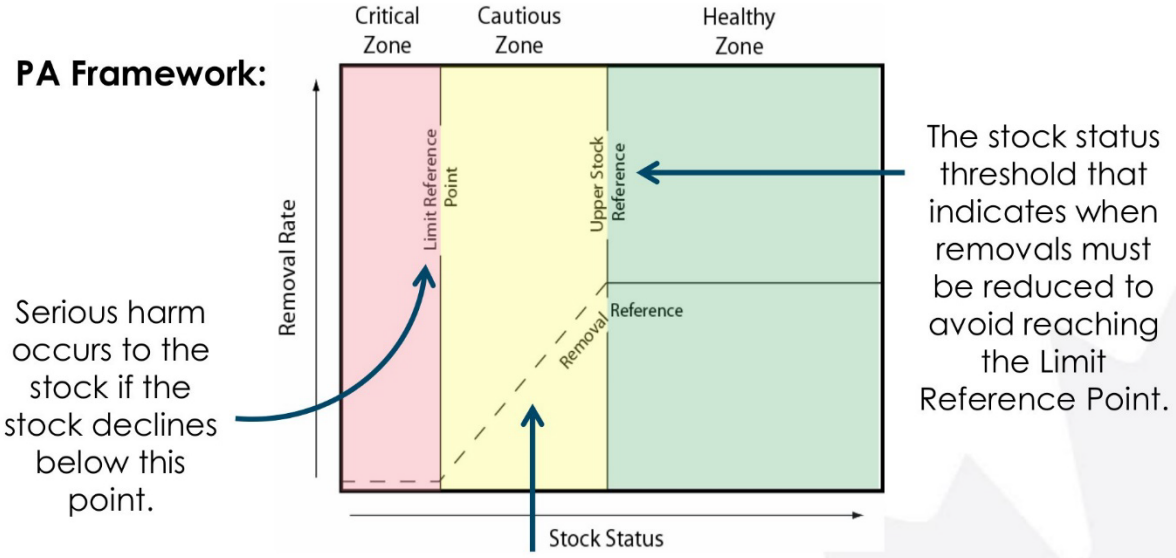
Manila Clam ←

Littleneck Clam →

6

Reference Points

PA Framework:



Serious harm occurs to the stock if the stock declines below this point.

The stock status threshold that indicates when removals must be reduced to avoid reaching the Limit Reference Point.

Harvest Control Rules are in place in the Cautious Zone to progressively reduce fishing pressure and return the stock to the Healthy Zone.

7

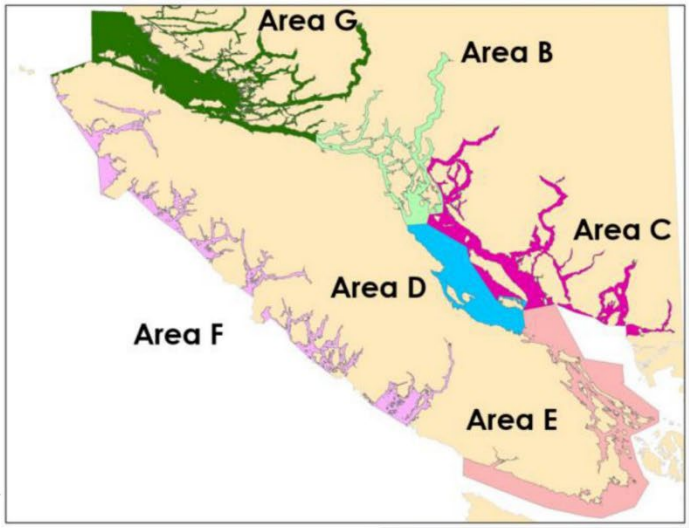
Reference Points

- In order to develop reference points, a monitoring program is required to collect population dynamics data and establish a time series of abundance.
  - Time series information is particularly important for intertidal clams in the south coast of BC because there is a paucity of data.

- A monitoring program would enable the Department to start building data sets for intertidal clams, with the long term objective of monitoring the health of clam stocks.

Proposal

- DFO Science proposes implementing a monitoring program across the six Clam Management Areas (CMAs) in the south coast of BC.
- In each CMA, 2-3 indicator beaches could be selected to provide an overview of intertidal clam stock status.



Proposal

- DFO has a minimum of 2 years of funding until March 2021, with a possible extension of up to 5 years to implement this monitoring program. To take advantage of the funding, DFO Science proposes the following timeline:

Dates	Activity
October 21 – November 29, 2019	**Step 1:** collect feedback from First Nations, Industry and other stakeholders on where a monitoring program could occur, available data, and collaboration on a monitoring program.
December 2019	Finalize where the monitoring program will occur.
January – March, 2020	**Step 2:** DFO will set up meetings with interested groups to develop a survey plan.
April 2020 – March 2021	**Step 3:** implement the monitoring program.
April 2021 – beyond	**Step 4:** analyse data collected in Step 3 to determine reference points in a scientific, peer-reviewed process; continuation of the monitoring program.

Collaboration on the Monitoring Program

- This is a new monitoring program for DFO that will require input and collaboration with First Nations, Industry and other stakeholders.

- DFO Science would like to engage with First Nations, Industry and other stakeholders as early as possible to understand what information is available, where a monitoring program could occur, and if there is interest to collaborate on a monitoring program.

- The following slides will provide additional information on the proposed monitoring program, broken down into four steps.

Step 1: Indicator Beaches

- Indicator beaches will provide information on the impact of harvest on the stock and provide an overarching snapshot of stock status.
- DFO recognizes that it will both be challenging to select a small number of beaches to represent a CMA, and that fishers move from one beach to another if stocks start to decline.
- DFO does not have the ability to fund surveys at every beach with the limited funding available.

- It is essential in Step 1 that DFO receive feedback on which beaches should be considered indicator beaches for the monitoring program. This is the only opportunity to provide feedback before the program progresses to the next step.

Step 1: Indicator Beaches

- DFO Science is looking for indicator beaches that are the most productive with a large turnover of clams, which is largely determined through catch and effort.
  - Trying to understand the impact of harvest on the stock, so need beaches that have a high level of fishing pressure.
  - Indicator beaches cannot have shellfish tenures.
- Butter and Manila clams currently have the highest fishing pressure by the commercial sector; littleneck clams are not as sought after.
- Based on commercial landings and advice from DFO Fisheries Management, a list of proposed indicator beaches was generated to start discussions.
- **Do you agree with the proposed list? If no, what other beaches should be considered and why?**

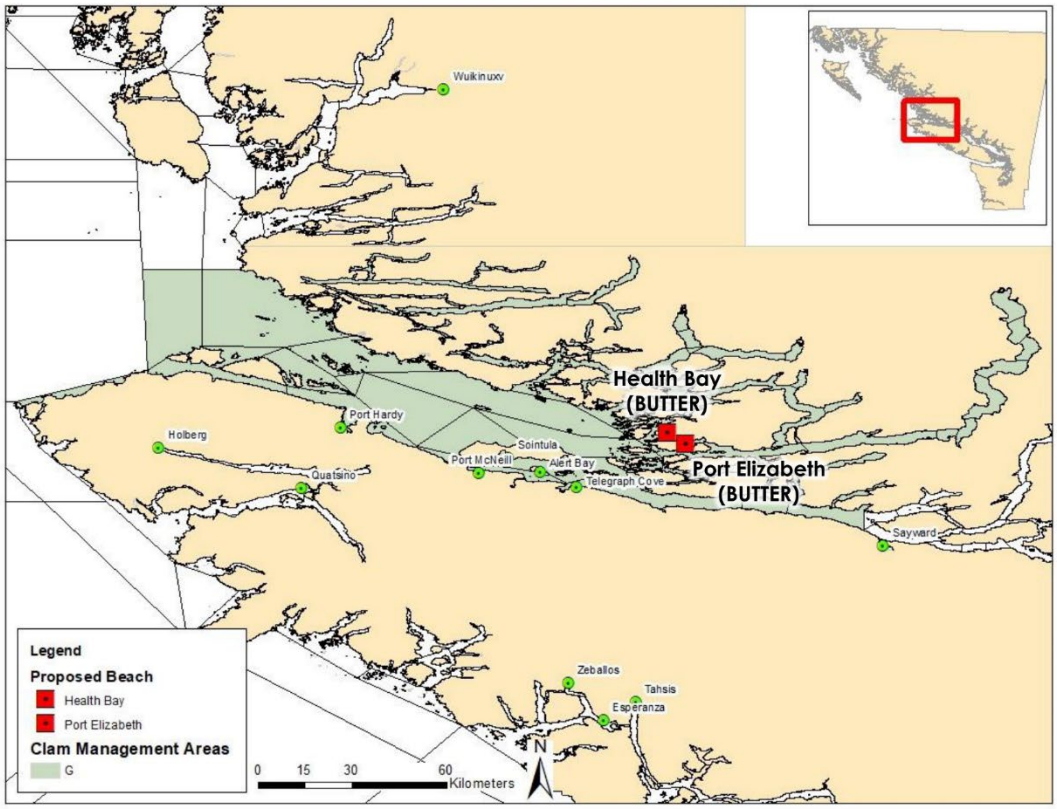

Butter Clam


Manila Clam

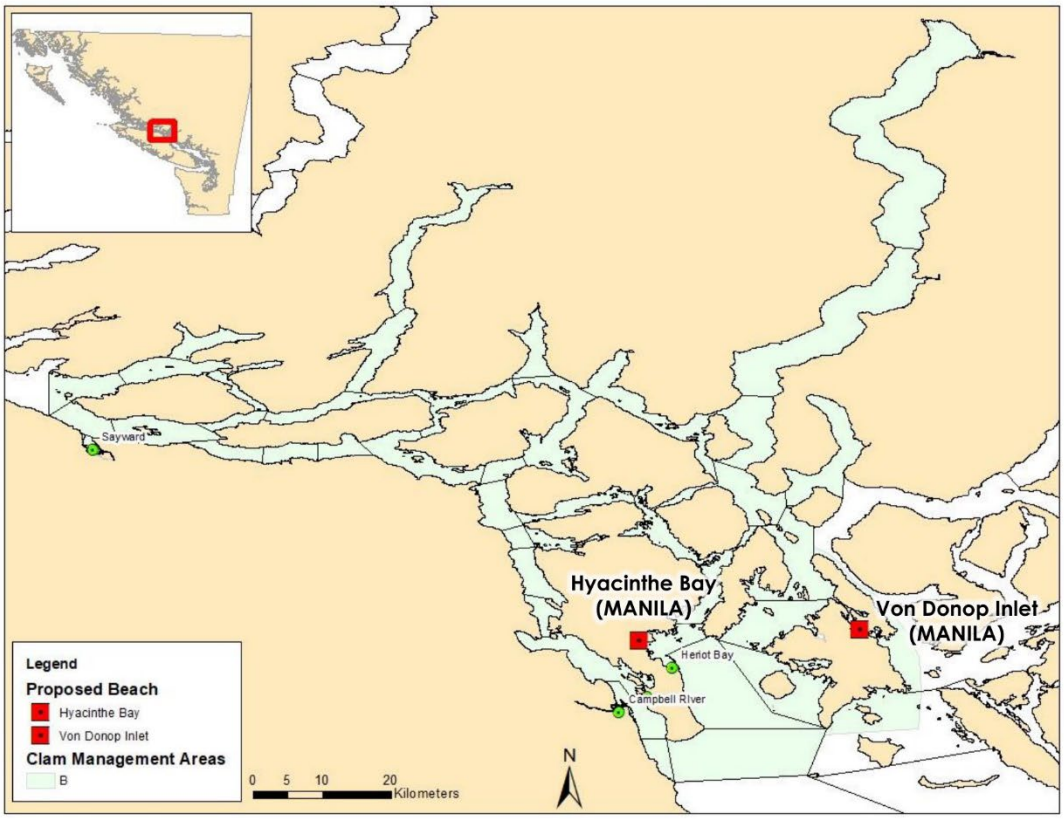

Littleneck Clam

13

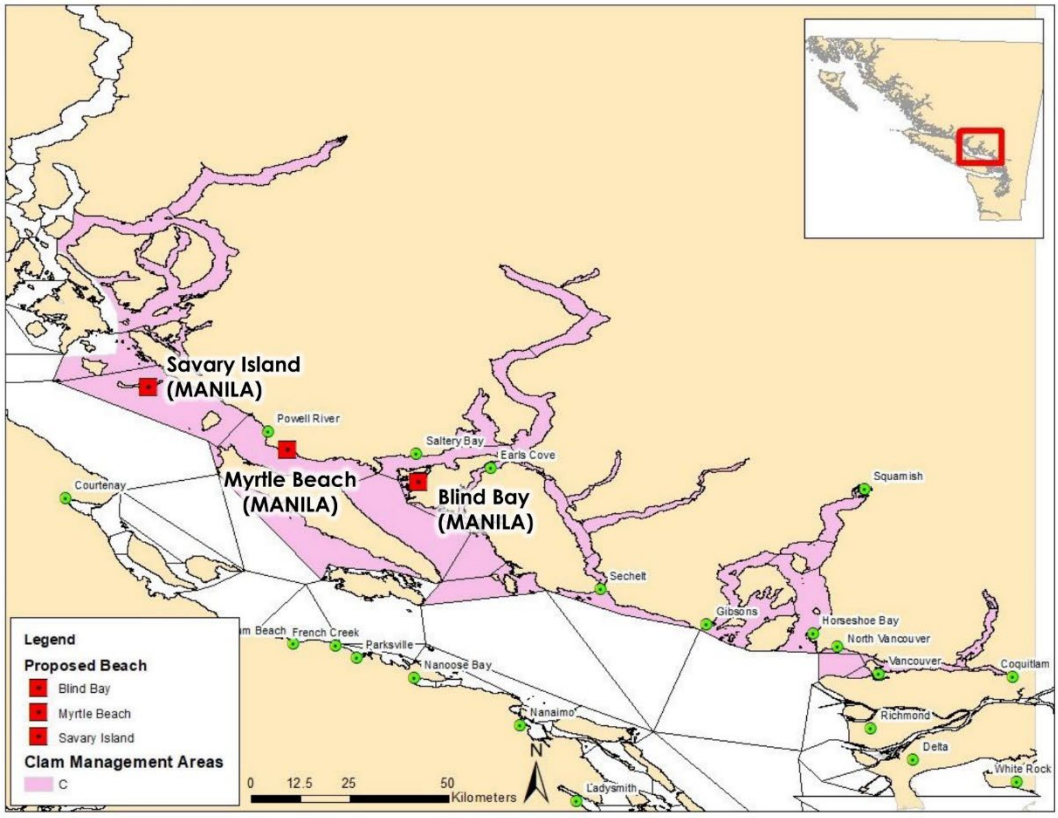
Area G


Wuikinuxv
Health Bay
(BUTTER)
Port Elizabeth
(BUTTER)
Port Hardy
Holberg
Quatsino
Sointula
Port McNeill
Alert Bay
Telegraph Cove
Sayward
Zeballos
Tahsis
Esperanza
Legend
Proposed Beach
Health Bay
Port Elizabeth
Clam Management Areas
G
0 15 30 60
Kilometers
N

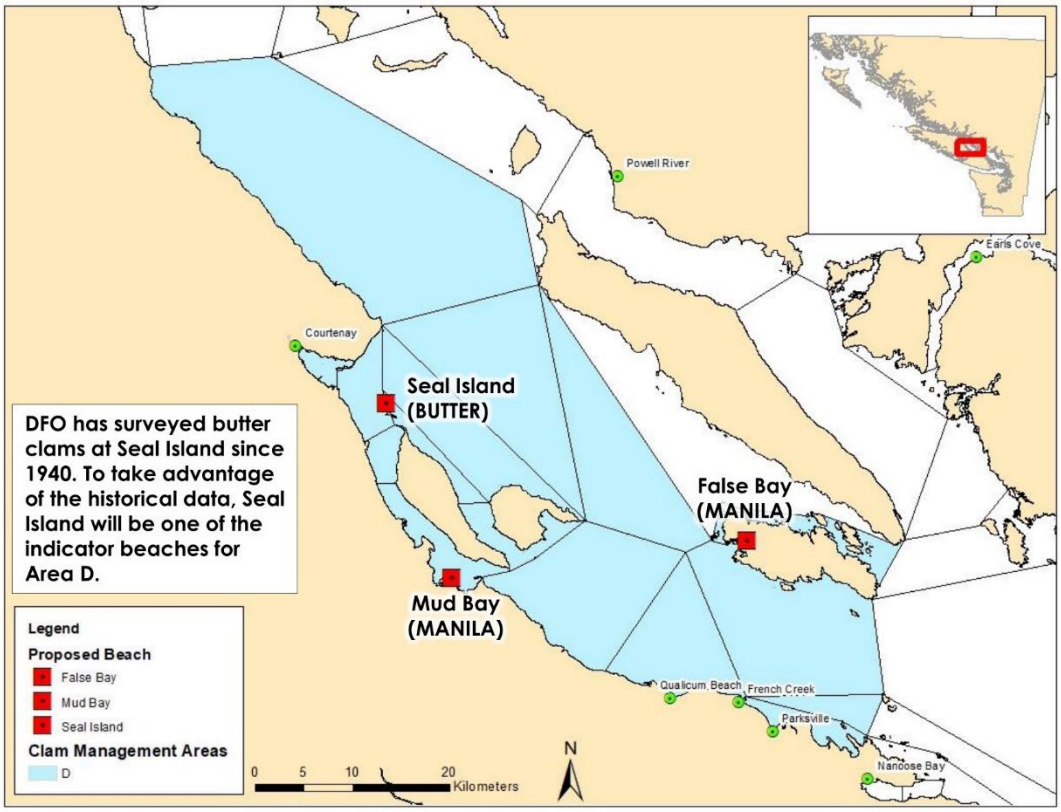
Area B


Sayward
Hyacinthe Bay
(MANILA)
Von Donop Inlet
(MANILA)
Heriot Bay
Campbell River
Legend
Proposed Beach
Hyacinthe Bay
Von Donop Inlet
Clam Management Areas
B
0 5 10 20
Kilometers
N

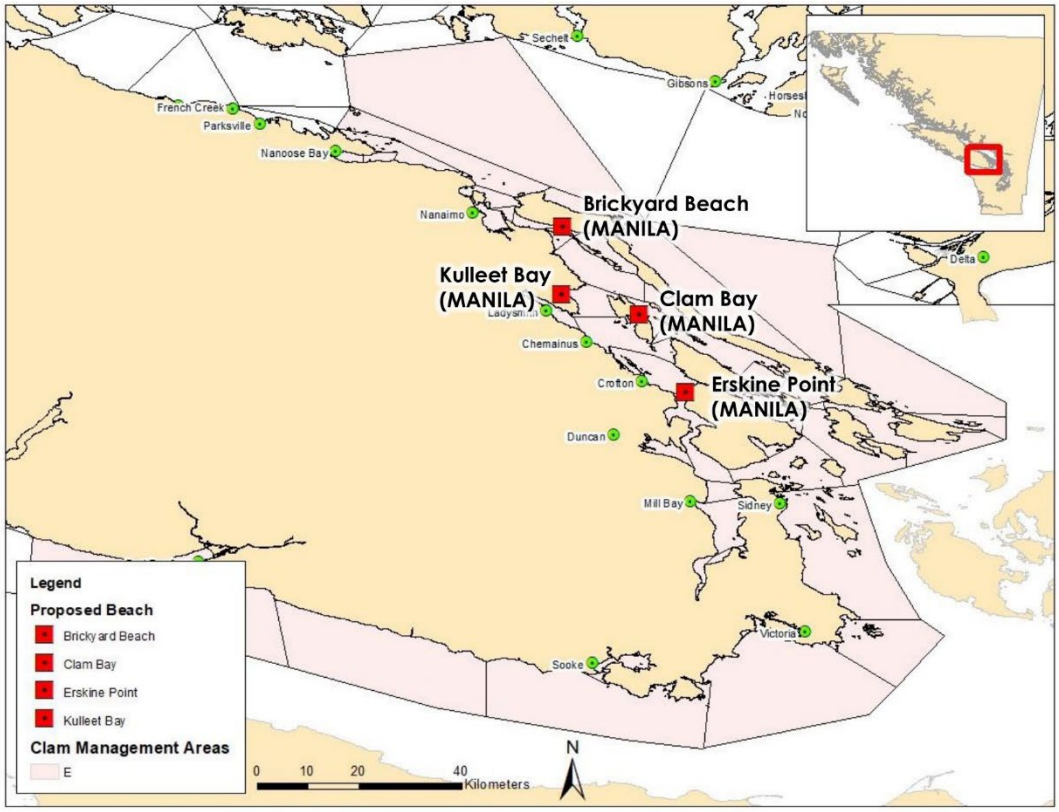
Area C


Savary Island
(MANILA)
Powell River
Myrtle Beach
(MANILA)
Saltery Bay
Earls Cove
Blind Bay
(MANILA)
Courtenay
Squamish
Sechelt
Gibsons
Horseshoe Bay
North Vancouver
Vancouver
Coquitlam
French Creek
Parksville
Nanoose Bay
Nanaimo
Richmond
Delta
White Rock
Ladysmith
Legend
Proposed Beach
Blind Bay
Myrtle Beach
Savary Island
Clam Management Areas
C
0 12.5 25 50
Kilometers
N

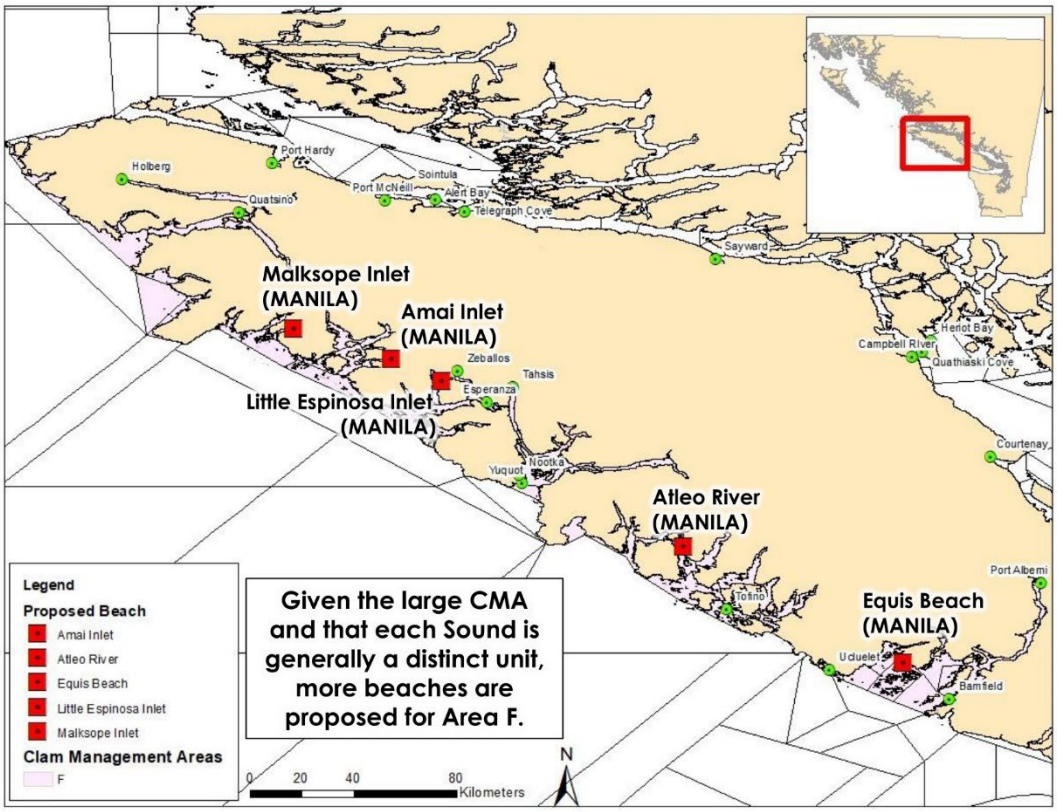
Area D


Powell River
Courtenay
Seal Island
(BUTTER)
False Bay
(MANILA)
Mud Bay
(MANILA)
Qualicum Beach
French Creek
Parksville
Nanoose Bay
Earls Cove
DFO has surveyed butter clams at Seal Island since 1940. To take advantage of the historical data, Seal Island will be one of the indicator beaches for Area D.
Legend
Proposed Beach
False Bay
Mud Bay
Seal Island
Clam Management Areas
D
0 5 10 20
Kilometers
N

Area E


Sechelt
Gibsons
French Creek
Parksville
Nanoose Bay
Nanaimo
Brickyard Beach
(MANILA)
Kulleet Bay
(MANILA)
Clam Bay
(MANILA)
Ladysmith
Chemainus
Crofton
Erskine Point
(MANILA)
Duncan
Mill Bay
Sidney
Victoria
Sooke
Delta
Legend
Proposed Beach
Bricky ard Beach
Clam Bay
Erskine Point
Kulleet Bay
Clam Management Areas
E
0 10 20 40
Kilometers
N

Area F


Port Hardy
Holberg
Quatsino
Port McNeill
Sointula
Alert Bay
Telegraph Cove
Sayward
Malksope Inlet
(MANILA)
Amai Inlet
(MANILA)
Zeballos
Tahsis
Esperanza
Little Espinosa Inlet
(MANILA)
Yuquot
Nootka
Heriot Bay
Campbell River
Quathiaski Cove
Courtenay
Atleo River
(MANILA)
Port Alberni
Tofino
Equis Beach
(MANILA)
Ucluelet
Bamfield
Legend
Proposed Beach
Amai Inlet
Atleo River
Equis Beach
Little Espinosa Inlet
Malksope Inlet
Clam Management Areas
F
Given the large CMA and that each Sound is generally a distinct unit, more beaches are proposed for Area F.
0 20 40 80
Kilometers
N

Finalizing Indicator Beaches

- After review of the feedback provided, DFO will finalize the list of indicator beaches and move to Step 2.
  - DFO will summarize the feedback provided about indicator beaches and the rationale for selecting the final list of beaches. Summaries will be provided by email to interested groups.
  - Indicator beaches can be reviewed in the future and changed if necessary.
    - For example, a beach becomes tenured and cannot be part of the monitoring program.

Step 2: Survey Planning

- For each CMA, DFO will set up an in-person meeting with interested groups to develop survey plans for indicator beaches.
  - Funding may be available to cover travel costs to the meeting (to be confirmed).
- Survey plans will finalize details such as identifying clam habitat and outlining the survey area, available historical data, tide heights to access the survey area, equipment, support needed to implement the program, etc.

- **Do you want to be involved in Step 2?**

21

Step 3: Implement the Monitoring Program

- Implementation will be based on the survey schedule for each CMA that was developed in Step 2.
  - Involves travelling to a beach, digging quadrats, etc.
- There may be funding available to support participation by interested groups in Step 3, which will be confirmed during Step 2.
- **Do you want to be involved in Step 3?**

Step 4: Reference Points and Long-term Monitoring

- Once information is collected from Step 3, data will be analysed and reference points will be developed.
- Continuation of the monitoring program beyond March 2021 will be needed to build datasets, monitor stock status, and evaluate reference points.
- DFO may be able to provide staff support to groups continuing the program, but it is unclear if DFO will be able to provide financial support in the long term.
- Approximate survey costs for a beach:

Beach Access	Initial Equipment Costs	Annual Costs (excluding hourly wages)
Vehicle	$10,000	$600
Boat	$10,000	$3,000

  - Equipment could be shared between groups to lower the initial costs.

Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

New Intertidal Clam Monitoring Program in the South Coast of British Columbia

The following questions are intended to assist you in providing comments about indicator beaches and participation in the monitoring program process. They are not limiting and any other comments you may have are welcome.
Feedback can be provided through this questionnaire, or by letter, email, or phone.

Questionnaire filled out by:

_____

(Print name / title)

First Nation / Commercial Fishery / Recreational Fishery / Group:

_____

Date questionnaire completed: _____

Please provide feedback by **November 29, 2019** to:

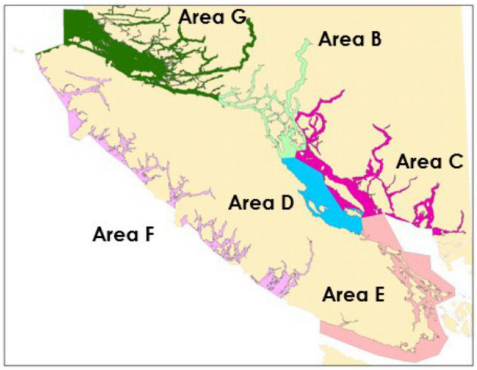
Amy Ganton	Email: Phone:	Amy.Ganton@dfo-mpo.gc.ca 250-756-7055	Mail:	Fisheries and Oceans Canada 3190 Hammond Bay Rd. Nanaimo, BC V9T 6N7

When answering this questionnaire, which Clam Management Areas (CMAs) are you providing feedback for? *Check all that apply.*

☐ Area B ☐ Area C

☐ Area D ☐ Area E

☐ Area F ☐ Area G



Intertidal clams are considered to be the following three species:


Butter Clam


Manila Clam


Littleneck Clam

1. A list of proposed indicator beaches is provided in the Intertidal Clam Monitoring presentation material for each CMA. DFO is looking for indicator beaches that are the most productive with a large turnover of clams, which is largely determined through catch and effort. Indicator beaches cannot have shellfish tenures.

   What are your thoughts about the proposed list of indicator beaches? For the CMAs you are providing feedback for:

☐ Agree with the proposed list of indicator beaches.

☐ Suggest the following list of indicator beaches: *(Please include a rationale for each beach)*

2. Based on the indicator beaches from Question 1, do you know if additional, non-DFO survey data from current or historical projects are available? For example, any non-DFO monitoring or data collection projects.

☐ No, I am not aware of any data.

☐ Yes, additional data are available: *(If possible, please include a description of the project)*

3. For each CMA, DFO will set up an in-person meeting with interested groups to develop survey plans for indicator beaches (Step 2). Would you like to be involved in the survey planning process?

☐ No, I am not interested in Step 2.

☐ Yes, I am interested in Step 2.

➔ What is your availability between January and March 2020 to have a meeting?

4. Once a survey schedule for each CMA is developed, the monitoring program will be implemented in April 2020 (Step 3). Would you like to be involved in the implementation phase?

☐ No, I am not interested in Step 3.

☐ Yes, I am interested in Step 3.

5. DFO will summarize the feedback received about indicator beaches and provide a rationale for selecting the final list of beaches. Are you interested in receiving an email with the summary and final list of indicator beaches?

☐ No, I am not interested in this information.

☐ Yes, I am interested in this information.

➔ Email address:_____

6. Do you have any additional comments, suggestions or feedback that DFO should consider?

Thank you for completing this questionnaire!

Please provide responses to DFO by **November 29, 2019**.