

**NATIONAL RECOVERY ACTION PLAN for  
NORTHERN ABALONE (*Haliotis kamtschatkana*)  
in CANADA**



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**INTRODUCTION**

This 'National Recovery Action Plan for Northern Abalone (*Haliotis kamtschatkana*) in Canada' forms the integral component to implementing the 'National Recovery Strategy for Northern Abalone (*Haliotis kamtschatkana*) in Canada'. Please refer to the Recovery Strategy for more complete information about northern abalone and its recovery in British Columbia, Canada, available on the Fisheries and Oceans Canada Abalone web site (<http://www.pac.dfo-mpo.gc.ca/ops/fm/shellfish/Abalone/default.htm>) or by contacting the Abalone Recovery Team Chairperson listed in Appendix 1.

The northern or pinto abalone (*Haliotis kamtschatkana*) is a patchily distributed marine mollusc that has been declining in numbers and distribution in surveyed areas of British Columbia (B.C.), Canada<sup>1</sup>, as documented by regular surveys since the late 1970s. In response to observations of population declines, the northern abalone fisheries in B.C. were closed to all harvest in 1990 and a rebuilding program was initiated in 1999. In April 1999, northern abalone were assigned *threatened* status by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). A recovery team formed in November 2001 prepared a 'National Recovery Strategy for Northern Abalone (*Haliotis kamtschatkana*) in Canada', which was finalized by the Minister of Fisheries & Oceans Canada in November 2002 and, at the time of drafting this document, will be posted to the public registry for comment.

Although other factors may play a role<sup>2</sup>, low recruitment levels and continued harvest despite the fisheries closures probably have had predominant and widespread impacts and are considered to be the most significant threats to northern abalone recovery. With input from First Nations, stakeholders and those interested in the recovery of northern abalone in B.C., the Abalone Recovery Team has co-ordinated the drafting of this National Action Plan (or "Action Plan") for implementing the National Recovery Strategy (or "Recovery Strategy"). Activities are added, adapted and revised as new information is gathered. 'Abalone recovery action groups' working with the Abalone Recovery Team may also identify local recovery activities (e.g., a 'community action plan').

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<sup>1</sup> In Canada, northern abalone occurs only in British Columbia.

<sup>2</sup> Threats identified in the National Recovery Strategy for Northern Abalone in Canada: illegal harvest, low recruitment, habitat concerns, and sea otter predation.

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## 1. BACKGROUND

In consideration of northern abalone's threatened status and that there has been no indication of recovery to date, the short-term goal of the Recovery Strategy is to *halt the decline* of the wild northern abalone population in B.C. in order to reduce the risk of the species becoming endangered. In consideration for the long-term viability of northern abalone in Canada, the goal will be to increase numbers and densities to *self-sustaining levels* in order to remove the species from threatened status.

The measurable short-term objectives set out in the Recovery Strategy for the next 5 years are: 1) to ensure that mean densities of adult (>100 mm) abalone do not decline below 0.1 per m<sup>2</sup> at surveyed index sites and that the percentage of surveyed index sites without adult abalone (at 0.1 per m<sup>2</sup>) does not increase to greater than 60%; and 2) to develop indices of abundance for other areas of the coast.

The approaches as recommended in the Recovery Strategy for reaching these objectives are to:

1. maintain the fisheries closures;
2. develop and implement a proactive protection plan;
3. develop a communications campaign to stop illegal harvest and raise public awareness;
4. undertake research and rebuilding experiments<sup>3</sup>; and
5. monitor the status of the population.

Ensuring effective recovery efforts will require consulting and working co-operatively with First Nations on proposals for projects that are in a First Nations' local area, including sharing of information on abalone population, project goals, rebuilding techniques, and impacts. It will also require working co-operatively with coastal communities to share information on local abalone populations and developing rebuilding techniques, incorporating information on abalone from other jurisdictions where appropriate, and considering a broad ecosystem approach in the research of northern abalone.

The *Species At Risk Act* Bill C-5 (SARA), new legislation that came into force June 2003, requires mandatory recovery planning under lead of the responsible ministry, which for northern abalone is the Minister of Fisheries & Oceans Canada (DFO). The first step in the recovery planning was the preparation of the Recovery Strategy. The second step of this process is the preparation of an Action Plan (this document) outlining steps recommended to implement the strategy. In addition to these documents, SARA also prohibits killing, harming, harassing, capturing and taking abalone, damaging or destroying residences, and any part of northern abalone's 'critical habitat' (as identified in a recovery strategy or action plan)<sup>4</sup>.

### *Integration with Sea Otter Recovery*

Sea otters (*Enhydra lutris*), also listed as threatened by COSEWIC (1996), are a predator of northern abalone and play a key role in structuring nearshore underwater

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<sup>3</sup> For the purpose of implementation and this action plan, research and rebuilding experiments have been split into two separate categories.

<sup>4</sup> SARA s.32, 33, 58, respectively.

communities. Extirpated from Canada<sup>5</sup> during the fur trade, sea otters were re-introduced to the west coast of Vancouver Island, B.C., in 1969 – 1972. The current (2003) range of sea otters is from Hesquiat Harbour (seasonally southeast to Flores Island) northwest to Cape Scott and eastward to Hope Island, with a second group found from the Goose Islands to Cape Mark, at the edge of Milbanke Sound on the central coast of B.C.

Preparing a single recovery strategy for northern abalone and sea otters is not feasible because the biology, history, geographic range, threats, knowledge gaps and research requirements are different, and specific to, each animal. Abalone currently have a broader geographic distribution than sea otters, a different life history (prey versus predator), and different threats to their survival. Hence, separate recovery strategies have been prepared. However, the recoveries are being integrated to the extent possible by incorporating the effects from sea otters as a key predator of nearshore communities in defining a sustainable abalone population for the long-term. As research is gathered and knowledge of species interactions improve, refinements to the abalone Recovery Strategy may be required as sea otters recover to occupy their former range.

Communication (awareness and reporting) and improved on-grounds protection are common to both the northern abalone and sea otter recovery strategies. In consideration of costs and efficiency, these efforts should be integrated wherever possible.

## 2. CRITICAL HABITAT

“Critical habitat” is defined under *SARA* as “*the habitat that is necessary for the survival or recovery of a listed wildlife species that is identified as the species’ critical habitat in the recovery strategy or in an action plan for the species*”<sup>6</sup>.

Generally occurring in patchy distributions, northern abalone are normally found on firm substrates, such as rocks, boulders, or bedrock, and in areas of moderate to high sea water exchange, such as in exposed or semi-exposed coastlines, from the low intertidal zone to about 100 m depth. Most of the adult population in B.C. occurs in near shore waters at <10 m depth (Breen and Sloan, 1988). Currently there is ample habitat available in B.C. for the northern abalone population. In general, the abalone population has declined, however, there has been no known significant reduction in available habitat. Therefore, habitat loss is not a major concern in the recovery of northern abalone at this time in comparison with the identified threats. Although good abalone habitat is not believed to be limiting, there may be certain habitat where juvenile survival is better, or where the reproducing adults contribute to a larger portion of the total recruitment. Identification of this key habitat is being included as part of the abalone research and rebuilding plans (Section 3.4 & 3.5).

Once defined, critical habitat for northern abalone can be protected under the *Fisheries Act* (1993) and/or *SARA* legislation. Prohibition on the harmful alteration, disruption or destruction of northern abalone habitat can be applied under Section 35(1) of the *Fisheries Act* (1993)<sup>7</sup>. Under *SARA*, the destruction of a threatened aquatic species’

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<sup>5</sup> In Canada, sea otters occurred only in British Columbia.

<sup>6</sup> *SARA* s.2(1).

<sup>7</sup> *SARA* requires that the action plan include “a statement of the measures that are proposed to be taken to protect the species’ critical habitat” [*SARA* s.49(1)(b)].

critical habitat is prohibited, as is damaging or destroying the residence of one or more individuals. A residence is defined as “a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating”.

Until critical habitat can be defined, difficulty may arise in practical application. The Recovery Strategy included a need to clarify the extent that works and developments on, in and under the water may pose a threat to northern abalone habitat and numbers and identified a need to develop criteria around authorizing works and developments in order to maintain habitat in which the northern abalone can be recovered and to prevent losses to important spawning aggregations. Once ‘critical habitat’ for northern abalone has been identified (e.g., abalone beds or important spawning aggregations), the SARA prohibition will apply, which will be another important consideration in authorizing works and developments (e.g., at what distance from an abalone bed may development of a finfish farm be considered?). Until then, it is recommended that the best science available be used, and where science is lacking that a precautionary approach be adopted in considering and authorizing location(s) for works and developments on, in, and under the water.

## **2.1 Schedule of Studies<sup>8</sup>**

The research studies described in Section 3.4 (#2, 4, 5, 10, and 11) and Section 3.6 (#1 and 3) will assist in identifying key habitats for the rebuilding program and in determining affects on northern abalone and its habitat from works and developments on, in and under the water. The information gathered from these studies is needed in order to identify critical habitat for northern abalone in B.C. Refer to Table 1 ‘Research’ (#2, 4, 5, 10, and 11) and ‘Population Rebuilding’ (#1 and 3) for a schedule of these studies over the next 5 years.

## **3. RECOVERY ACTIVITIES<sup>9</sup>**

For the next 5 years, the following Sections identify priority activities that are recommended towards the recovery of northern abalone.

### **3.1 Abalone Fisheries Closures**

Abalone fisheries closures were implemented in 1990 to allow for natural population recovery. However, there is evidence that the reduced abundance and fragmentation of the population (i.e. animals spread too far apart) is hindering recovery. Further harvest will further hinder recovery.

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<sup>8</sup> SARA requires “a schedule of studies to identify critical habitat, where available information is inadequate” [SARA s.41(1)(c.1)]. Once critical habitat is identified, “any portions of the species’ critical habitat that have not been protected” [SARA s.49(1)(c)] can be described.

<sup>9</sup> SARA requires that the action plan include “a statement of the measures that are to be taken to implement the recovery strategy, including those that address the threats to the species and those that help to achieve the population and distribution objectives” [SARA s.49(1)(d)].

1. Maintain closures (implemented in 1990) under the *Fisheries Act* and Regulations (1993) to recreational, commercial and First Nations' food, social and ceremonial abalone fisheries to limit mortalities and declines in abundance.

*Responsibility:* DFO.

*DFO Lead:* DFO Resource Management.

*Estimated Increased Costs next 5 years:* \$0K/yr. (\*costs are incurred for enforcing closures; see below). *Addresses:* the threats from harvest and low recruitment and the prohibitions on killing, harming, and harassing a species at risk.

### **3.2 Proactive Protection Plan**

A proactive protection plan is aimed to improve enforcement of the abalone fisheries closures and the ongoing threat from continued harvesting. Continued harvesting affects the population by removing individuals and directly lowering abundance and by furthering the fragmentation of the population by leaving fewer animals farther apart, thereby decreasing reproductive success and further hindering recovery.

1. Reactive enforcement by responding to reports of illegal harvest (i.e. all harvest of northern abalone in B.C.) to curtail the threat from illegal harvest and trafficking of northern abalone. Intended also to improve community confidence that reports will be acted upon, which will support development of Coast Watch programs.
2. Preventative enforcement through active patrols to enforce the fisheries closures and to curtail the threat from illegal harvest and trafficking of northern abalone. This will entail having Fishery Officers dedicate more time and effort to patrolling areas and activities of special concern to abalone conservation and protection. In addition, a Canine Unit (with detection dog) has been incorporated in the efforts to protect abalone. The Canine Unit will further enhance the ability to protect abalone by detecting the existence of abalone in areas of concern e.g. airports, ferry terminals and in the course of general patrol duties and inspections. Further, the Canine Unit will assist with education and public relations aspects as it relates to abalone and other species at risk.
3. Market analysis will be undertaken in attempt to determine the extent and breadth of the illegal trade of northern abalone in the market place. The analysis will attempt to identify the market threat(s) to northern abalone and it is anticipated that the final analysis will provide a greater degree of understanding of the trade of abalone (quantity, locations, consumer, and harvester). The understanding achieved will assist in directing energy and resources at the key aspects of the illegal trade and harvest of northern abalone. This will be a multi-year project building on the information and knowledge gained from the previous years efforts.
4. Proactive enforcement lead by DFO to curtail the threat from illegal harvest and trafficking of northern abalone by co-ordinating with other agencies, coastal communities, First Nations and the public, promoting a greater awareness of abalone concerns in local and coastal communities and increasing the public's overall involvement in the protection of abalone in the wild. Given the vast and inaccessible coastline of B.C., co-operation will be necessary to reduce the threat from ongoing illegal harvests.
5. Develop a Coast Watch program for community monitoring and reporting of illegal harvest. These programs are being established under the lead of First Nations and coastal communities.

6. Species identification (through genetic sampling) to discriminate northern abalone from other abalone species to support enforcement cases of potential illegal harvest within B.C.

*Responsibility:* DFO.

*DFO Lead:* DFO Conservation and Protection.

*Co-operators:* RCMP, Provincial Conservation Officer Service, Canadian Armed Forces, Canadian Coast Guard, Environment Canada, Parks Canada, Bamfield Huu-ay-aht Community Abalone Project, Gwa'sala-'Nakwaxda'xw Nation, Haida Gwaii Abalone Stewards, KITASOO Abalone Stewardship Project, Malcolm Island Shellfish Cooperative, First Nations, coastal communities, and the public.

*Estimated Increased Costs next 5 years:* \$254K in 2003/4, \$234K/yr thereafter.

*Addresses:* threat from illegal harvest and a 'knowledge gap' on the extent of illegal harvest.

### 3.3 Communications Campaign

The communications approach will be to build support for an 'anti-poaching' message by developing awareness and knowledge of abalone's threatened status. As awareness grows, it is predicted that behaviour modification will follow, especially if the campaign is successful at putting the emphasis on the specific human activities which are hindering recovery. Finally, the previous two approaches will generate public support for enforcement activities linked to abalone harvest by helping with monitoring and reporting.

1. Raise awareness on the plight of the abalone and the threats to its survival. May include but not limited to:
  - Dedicated abalone web site, including an internet discussion group and/or poaching reporting system.
  - Provide communications support to stewardship activities in order to further the First Nations and community involvement in the abalone work plan.
  - Produce an education kit for distribution and use within the school system.
  - Display to be used at public events and in public areas.
  - Media relations: TV and educational programs, public service announcements.
2. Stop or discourage illegal harvesting activities. May include but not limited to:
  - Promote the Coastal Watch Program and the observe-record-report phone number (e.g. sticker/card with enforcement information and phone number).
  - Media relations.
  - Advertising.
  - Involve First Nations in monitoring and reporting poaching activities.
  - Promote enforcement actions and results (arrests, convictions, fines, etc.) and foster public support of court imposed sentencing that is appropriate to the threatened status of northern abalone. This may be achieved by educating the general public through publications, other communication media, and the provision of impact statements to the court. In the future this awareness may include members of the public that are involved in the protection of northern abalone providing their support in court at sentencing hearings (i.e. speaking to sentence when the courts prepare to sentence an accused who has been found guilty of an abalone violation).
3. Reduce significantly the demand for northern (illegal) abalone. Targeting sales and consumption of northern abalone may include but is not limited to:

- Media and public relations to explain the distinction between illegal and legal types of commercial abalone. Inform public on legal types of abalone available how and where.
- Restaurant program: “We only use legal abalone” sticker for restaurant in menu-size and window size.

*Responsibility:* DFO.

*DFO Lead:* DFO Policy and Communications Branch.

*Co-operators:* Bamfield Huu-ay-aht Community Abalone Project, Gwa’sala-Nakwaxda’xw Nation, Haida Gwaii Abalone Stewards, Kitasoo Abalone Stewardship Project, Malcolm Island Shellfish Cooperative, First Nations, coastal communities, restaurants/marketplace and the public.

*Estimated Increased Cost next 5 years:* 2003/4 \$132K, 2004/5 \$107K, 2005/6 \$104K, 2006/7 \$92K, 2007/8 \$92K.

*Addresses:* threat from illegal harvest.

### 3.4 Research

Prior to attempting full scale rebuilding, feasibility studies need to be conducted to determine the appropriate rebuilding method(s) to address the problem of poor adult recruitment and to fill knowledge gaps<sup>10</sup> on northern abalone biology, habitat and ecology. Criteria for evaluating the feasibility of the rebuilding methods will include the ability to increase abalone abundance in the study areas, efficiency, practical application and cost effectiveness. Wherever possible, a broad ecosystem approach in the research of northern abalone will be incorporated in each of the projects. Studies and findings about abalone in other jurisdictions will be incorporated into B.C. activities as applicable. Some of the research studies outlined may overlap and / or complement each other.

1. (a) If a disease is detected among wild or cultured stocks, conduct examinations to identify the cause of disease(s).  
(b) If the disease is determined to be infectious, investigate the etiological agent to identify the pathogen and determine the biology of the pathogen to find methods of prevention or control.
2. Examine the natural growth, survival and distribution of early benthic stages (post-settled larvae and juveniles) of abalone in relation to local habitat, algal, predator and competitor species interactions (e.g., red sea urchins, sea stars and /or sea otters).
3. Investigate the feasibility and effectiveness of aggregating adults in and from different habitats for future population rebuilding efforts. Growth of adults tends to be stunted in highly exposed outer coastal areas (“surf” abalone) where food may be limited because of strong wave action and water currents. Abalone growth is more rapid in moderately exposed areas with giant kelp, *Macrocystis integrifolia*, or bull kelp, *Nereocystis luetkeana*, kelp forests than at highly exposed areas with *Pterygophora californica* kelp forests (Sloan and Breen 1988). By aggregating adults

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<sup>10</sup>Knowledge gaps as identified in the National Recovery Strategy for Northern Abalone in B.C.: Survey Requirements (Index Surveys; Survey Methodology; Fine Scale Surveys), Biological/Ecological Research Requirements (Larval Dispersal, Patch Size and Recruitment; Genetics; Species Interactions; Rebuilding Techniques; Diseases/Parasites), Threat Clarification (Extent of Illegal Harvest; Clarification of Habitat Concerns from developments on, in and under the water).



and monitoring juvenile recruitment, the stock-recruitment relationship of abalone populations may also be characterized.

4. Develop measurable objectives (e.g. adult densities) to meet the long-term goal of the Recovery Strategy by defining a “self-sustaining level” for the B.C. abalone population. This will include defining a “self-sustaining level” 1) in different benthic communities (e.g. how red sea urchin densities affect abalone abundances because red sea urchins often share the same habitat with abalone) 2) in different habitat types (e.g. boulder habitat with large crevices including a potentially significant number of unseen abalone versus bedrock habitat with few hiding places); 3) in the presence and absence of sea otters (*Enhydra lutris*), which are key predators known to significantly affect the demographics of abalone populations, and have been increasing in numbers and distribution in B.C. following extirpation (~1929) and re-introduction (1969-1972), but still under ‘threatened’ status (1996).
5. Examine abalone distribution in relation to local seawater current patterns and computer simulations developed to determine potential larval dispersal mechanisms.
6. Identify genetically discrete northern abalone populations in support of enforcement investigations of potential illegal harvest.
7. Kinship analyses to identify adults to their progeny in support of linking the source of adult concentrations with the proportion of their recruited progeny in an area in (i) wild adult aggregation studies, and (ii) hatchery-reared abalone release studies.
8. Maximizing larval settlement and early juvenile growth and survivorship in aquaculture will involve: 1) determining the effect of dissolved organic matter on larval nutrition, 2) finding appropriate cues to induce larval settlement and metamorphosis, 3) determining optimum natural and prepared diets for early juvenile growth, and 4) determining optimum temperature and stocking density for juvenile grow out.
9. Aquaculture broodstock development to maximise quantity and quality of gametes and larvae.
10. Investigate the effect of 1) size, 2) habitat type, 3) season, 4) presence/absence of predators, and 5) site exposure on wild-stock enhancement success, by assessing the survival and growth of released juvenile and larval abalone in small experimental plots of known habitat and species complex.
11. Investigate the extent to which works and developments on, in and under the water may impact on abalone habitat and recovery.

*Responsibility:* DFO.

*DFO Lead:* DFO Science Branch (Stock Assessment, Aquaculture, and Genetics) and DFO Habitat Branch (#11).

*Co-operators:* Bamfield Huu-ay-aht Community Abalone Project, Haida Gwaii Abalone Stewards, KITASOO Abalone Stewardship Project, Malcolm Island Shellfish Cooperative, Parks Canada, Proponents of works/developments (#11), and may include additional First Nations, coastal communities, and others.

*Estimated Increased Costs next 5 years:* 2003/4 \$621K/yr, 2004/5 \$563K/yr, 2005/6 \$470K/yr, 2006/7 \$455K/yr, 2007/8 \$405K/yr.

*Addresses:* threats from low recruitment and illegal harvest, and knowledge gaps.

### 3.5 Population Rebuilding

Although not limited to this involvement, First Nations and coastal communities have taken a lead in population rebuilding projects to ensure effective abalone recovery efforts. Without this involvement, contribution and interest, many of the population rebuilding efforts and the associated research activities listed above may otherwise be cost-prohibitive.

1. Aggregate reproductive adult abalone to increase density and improve reproductive success and transplant “surf” abalone to calmer, kelp abundant habitats, to improve growth rates (Emmett and Jamieson 1988).
2. Out-plant hatchery-raised juvenile abalone to the wild to enhance recruitment.
3. Conduct small scale enhancement of habitat to monitor and increase survival of early abalone benthic life-stages. Abalone, especially juveniles, are cryptic and hide in rock crevices, which makes monitoring of juvenile survivorship difficult. Currently, contained units (concrete blocks caged in small (e.g. crab) traps), are being used to increase rugosity (i.e., hiding crevices), to monitor juvenile and early life stages survival and species interactions, and to allow efficient sampling without disrupting the natural environment.

*Responsibility / Lead:* First Nations and coastal communities.

*DFO Lead:* DFO Science Branch (Stock Assessment and Aquaculture) and Resource Management.

*Estimated Increased Costs next 5 years:* 2003/4 \$207K/yr, \$187K/yr thereafter.

*Addresses:* threats from low recruitment and illegal harvest (community support to stop and report illegal harvesting).

### 3.6 Monitor Population Status<sup>11</sup>

Establishing a time series of abundance estimates is essential to determine the progress (decline or increase) of the northern abalone population in the five different biogeographic zones\* of coastal B.C. Monitoring the abalone population before and after various rebuilding actions will be critical in evaluating the recovery rate of northern abalone.

1. Continue index site surveys (started 1977 and continued every 4-5 years) in the North and Central Coast (next survey due 2005/2006) and Haida Gwaii (Queen Charlotte Islands) (next survey due 2007/2008). The index site surveys follow the methodology from Breen and Adkins (1979) and include the collection of habitat information.
2. Establish baseline abalone abundance data with surveys (including the collection of habitat information) in southern B.C.: West Coast of Vancouver Island (2003/2004); Georgia Basin (2004/2005); Queen Charlotte and Johnstone Straits (2006/2007).
3. New or modifications of existing survey methods (e.g., transects, larval or juvenile index collectors, GIS, remote operated vehicles (ROV)) will be tested for specific surveys or experimental studies to estimate the abundance of different life stages of abalone and suitable habitat areas and habitat mapping.

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<sup>11</sup> SARA requires that the action plan include “the methods to be used to monitor the recovery of the species and its long-term viability” [SARA s.49(1)(d.1)].



**\*BIOGEOGRAPHIC ZONES IN B.C.** - based on environmental, management and/or biological considerations for northern abalone, includes intertidal and sub-tidal waters surrounding the following land areas:

**Haida Gwaii (Queen Charlotte Islands):** Queen Charlotte Islands.

**Queen Charlotte and Johnstone Straits:** Quadra Island (Seymour Narrows) north to Cape Caution.

**North and Central Coast:** Cape Caution north to and including Prince Rupert.

**Georgia Basin:** San Juan Point to Seymour Narrows near Quadra Island.

**West Coast of Vancouver Island:** the west coast of Vancouver Island from San Juan Point north to the Scott Islands.

*Responsibility:* DFO.

*DFO Lead:* DFO Stock Assessment.

*Co-operators:* Bamfield Huu-ay-aht Community Abalone Project, Gwa'sala-'Nakwaxda'xw Nation, Haida Gwaii Abalone Stewards, Kitasoo Abalone Stewardship Project, Parks Canada, and may include other First Nations and coastal communities.

*Estimated Increased Costs next 5 years:* \$135K/yr for 2003/4, \$115K/yr for 2004/5, \$105K/yr thereafter.

*Addresses:* the requirement to monitor the population's status.

#### 4. IMPLEMENTATION

The specific activities detailed in Section 3 that are recommended to recover northern abalone in B.C. are summarized in Table 1. The broad categories highlighted in bold correspond to the 'approaches' listed in the Recovery Strategy. The period covers five fiscal years, April 2003 through March 2008. Activities are rated according to priority and assigned to agencies taking the lead and/or co-operating roles. Projected implementation dates<sup>12,13</sup> are given. Cost estimates are based on estimated increases in costs over pre-existing programs, and does not include core-funding provided by lead agencies (i.e. DFO, Parks Canada, Environment Canada) and in-kind contributions to funding programs (e.g., Interdepartmental Recovery Fund, Habitat Stewardship Program). In consideration for reducing costs, activities have been combined where appropriate.

Priority ratings have been adapted from the criteria being established by RENEW (A Working Draft - Recovery Operations Manual 20 November 2001) as:

*"Urgent"* – an activity addressing the main threats from illegal harvest and low recruitment, with a high predictability of success; or

*"Necessary"* – an activity addressing knowledge gaps and/or other threats, for which success may be measured over the long-term; or

*"Optional"* – an activity primarily outside those activities specific to abalone recovery, but which could impact on abalone recovery; or

<sup>12</sup> Implementation dates may refer to implementation of an improved program rather than a date at which similar activities were started.

<sup>13</sup> SARA requires that the action plan include "an indication as to when these measures are to take place" [SARA s.49(1)(d)].

“SARA” - a requirement under SARA (these activities have not been rated).

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**Key to Abbreviations used in Table 1:**

|            |   |
|------------|---|
| BHCAP      | Bamfield Huu-ay-aht Community Abalone Project (an equal partnership of the Huu-ay-aht First Nation, Bamfield Community School Association, and Bamfield Marine Sciences Centre)   |
| CAF        | Canadian Armed Forces (federal government)  |
| CC         | B.C. coastal communities  |
| CCG        | Canadian Coast Guard, Fisheries & Oceans Canada (federal government)  |
| CO Service | B.C. Conservation Officers Service (provincial government)  |
| DFO        | Fisheries and Oceans Canada (federal government)  |
| EC         | Environment Canada (federal government)   |
| FN         | First Nations   |
| G-N        | Gwa'sala-'Nakwaxda'xw Nation  |
| HASP       | Heiltsuk Abalone Stewardship Project  |
| HGABs      | Haida Fisheries Program, Council of the Haida Nation and partner groups, Laskeek Bay Conservation Society, Gwaii Haanas National Park Reserve/ Haida Heritage Site, World Wildlife Fund Canada, Haida Gwaii Marine Resources Group Association, Environment Canada and Fisheries & Oceans Canada. |
| KASP       | Kitasoo Abalone Stewardship Program (under lead of the Kitasoo Fisheries Program)   |
| MISC       | Malcolm Island Shellfish Co-operative   |
| Parks      | Parks Canada (federal government)   |
| Proponent  | Proponent for the works or developments on, in or under the water   |
| PROV       | Province of B.C. Ministry of Agriculture Food and Fisheries, BC Assets and Lands (provincial government)  |
| RCMP       | Royal Canadian Mounted Police   |
| Univ       | Simon Fraser University, University of Victoria, and University College of the Cariboo  |

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*The goals, objectives, and recovery actions identified in this plan are subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations, as well as to modifications resulting from changed objectives or new findings. The Action Plan is subject to appropriations, priorities, and budgetary constraints in which under section 7 of the Fisheries Act provides that the Minister of Fisheries and Oceans may "in his absolute discretion" accept all, some or none of the proposed action items identified in this Action Plan.*

**Table 1. Implementation of the National Recovery Strategy for Northern Abalone in B.C. (2003-2008).**

| Recovery Activities   | Priority | Responsibility                           |   | Date | Estimated Costs (\$000s) |       |       |       |       |
|---|----------|--|---|------|--------------------------|-------|-------|-------|-------|
|   |          | Lead                                     | Co-operators  |      | 03/04                    | 04/05 | 05/06 | 06/07 | 07/08 |
| <b>Abalone Fisheries Closures</b>   |          |  |   |      |                          |       |       |       |       |
| 1. Aboriginal, recreational and commercial abalone fisheries closed                     | U        | DFO                                      |   | 1990 | 0                        | 0     | 0     | 0     | 0     |
| <b>Proactive Protection Plan</b>  |          |  |   |      |                          |       |       |       |       |
| 1. Reactive enforcement (respond to specific reports of illegal harvest)                | U        | DFO                                      |   | 2003 | 60                       | 60    | 60    | 60    | 60    |
| 2. Preventative enforcement (patrols and Canine Unit)                                   | U        | DFO                                      |   | 1990 | 114                      | 114   | 114   | 114   | 114   |
| 3. Analysis of illegal marketplace  | U        | DFO                                      | CCG<br>CO Service<br>RCMP<br>CAF<br>TRAFFIC                           | 2002 | 20                       |       |       |       |       |
| 4. Proactive enforcement (co-ordinate with other agencies, coastal communities, public) | N        | DFO                                      | CCG<br>CO Service<br>RCMP<br>CC & FN<br>CAF<br>EC<br>Parks<br>TRAFFIC | 2003 | 20                       | 20    | 20    | 20    | 20    |
| 5. Coastal watch program(s)   | N        | BHCAP<br>HGAbS<br>KASP<br>G-N<br>CC & FN | DFO<br>EC   | 2000 | 35                       | 35    | 35    | 35    | 35    |
| 6. Species identification (genetic discreteness)  | U        | DFO                                      | RCMP  | 2000 | 5                        | 5     | 5     | 5     | 5     |
| <b>Communications Campaign</b>  |          |  |   |      |                          |       |       |       |       |
| 1. Awareness  | N        | DFO                                      | EC<br>BHCAP<br>HGAbS<br>KASP<br>G-N<br>HASP<br>CC & FN                | 2000 | 65                       | 51    | 42    | 30    | 30    |
| 2. Stop illegal harvest   | U        | DFO                                      | EC<br>BHCAP<br>HGAbS<br>KASP<br>G-N<br>HASP<br>CC & FN                | 2003 | 52                       | 48    | 52    | 52    | 52    |
| 3. Reduce commercial demand   | N        | DFO                                      | Restaurants   | 2003 | 15                       | 8     | 10    | 10    | 10    |

| Recovery Activities   | Priority    | Responsibility |  | Date                       | Estimated Costs (\$000s) |       |       |       |       |  |
|---|-------------|----------------|--|----------------------------|--------------------------|-------|-------|-------|-------|--|
|   |             | Lead           | Co-operators                                   |                            | 03/04                    | 04/05 | 05/06 | 06/07 | 07/08 |  |
| <b>Research</b>   |             |                |  |                            |                          |       |       |       |       |  |
| 1. Disease  | N           | DFO            | BHCAP<br>MISC                                  | 2003                       | 10                       | 35    | 35    | 35    | 10    |  |
| 2. Early benthic stages   | U           | DFO            | Parks  | 2002                       | 40                       | 50    | 50    | 50    | 50    |  |
| 3. Adult growth and reproduction success  | U           | DFO            | Parks  | 2002                       | 50                       | 50    | 50    | 50    | 50    |  |
| 4. Species interactions   | N           | Parks          | DFO  | 2002                       | 45                       | 40    | 40    | 40    | 40    |  |
| 5. Larval dispersal   | N           | Parks          | DFO  | 2002                       | 50                       | 30    | 30    | 20    | 0     |  |
| 6. Population identification (genetic discreteness)                                   | U           | DFO            |  | 2000                       | 30                       | 30    | 30    | 30    | 30    |  |
| 7. Kinship identification   | N           | DFO            | Parks<br>BHCAP<br>MISC                         | 2002                       | 30                       | 30    | 30    | 30    | 30    |  |
| 8. Aquaculture settlement and early juvenile growth                                   | N           | DFO            | BHCAP<br>MISC<br>Prov<br>Univ                  | 2003                       | 169                      | 117   | 60    | 60    | 60    |  |
| 9. Aquaculture broodstock development   | N           | DFO            | BHCAP<br>MISC<br>Prov<br>Univ                  | 2003                       | 77                       | 46    | 10    | 10    | 10    |  |
| 10. Optimal conditions for out-planting   | N           | DFO            | BHCAP<br>MISC                                  | 2003                       | 35                       | 55    | 60    | 60    | 60    |  |
| 11. Potential impact from works and developments on, in and under the water           | O           | DFO/<br>Prov   | Proponent                                      | As<br>need                 | 85                       | 80    | 75    | 70    | 65    |  |
| <b>Population Rebuilding</b>  |             |                |  |                            |                          |       |       |       |       |  |
| 1. Improve reproductive success (adult densities)                                     | U           | HGAbs<br>KASP  | DFO<br>EC<br>Parks                             | 2001                       | 60                       | 60    | 60    | 60    | 60    |  |
| 2. Out-planting hatchery-raised larvae and/or juveniles                               | N           | BHCAP<br>MISC  | DFO<br>EC                                      | 2003                       | 122                      | 102   | 102   | 102   | 102   |  |
| 3. Enhancement to protect early life-stages   | N           | HGAbs<br>KASP  | DFO<br>EC                                      | 2001                       | 25                       | 25    | 25    | 25    | 25    |  |
| <b>Population Status</b>  |             |                |  |                            |                          |       |       |       |       |  |
| 1. Index site surveys<br>• north and central coasts<br>• Haida Gwaii (QCI)            | SARA        | DFO            | HGAbs  | 2005/6<br>2007/8           |                          |       | 85    |       | 85    |  |
| 2. Baseline abundance surveys in southern BC<br>• WCVI<br>• Georgia Basin<br>• QCS/JS | U<br>(SARA) | DFO            | Parks<br>BHCAP                                 | 2003/4<br>2004/5<br>2006/7 | 85                       | 85    |       | 85    |       |  |
| 3. Survey methodology and habitat mapping   | N           | DFO            | Parks<br>BHCAP<br>HGAbs<br>KASP<br>G-N<br>HASP | 2002                       | 50                       | 30    | 20    | 20    | 20    |  |

## 5. SOCIO-ECONOMIC EVALUATION

### 5.1 Description

SARA requires the responsible federal minister to undertake “an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation”<sup>14</sup>. This section identifies the anticipated socio-economic impacts associated with the proposed action items listed in this five-year Action Plan.

The evaluation process included a preliminary assessment of the anticipated socio-economic impacts of each action item identified in the plan, consultation with stakeholders on the anticipated impacts and consideration of the feedback received. The results of the evaluation have been grouped into three broad areas: i. Abalone Fisheries Closures; ii. Enforcement, Coast Watch and Communication; iii. Research, Population Rebuilding, and Status Survey.

### 5.2 Evaluation

#### i. Abalone Fisheries Closures

Maintaining the abalone fisheries closures that began in 1990 in response to conservation concerns should not result in any new or additional costs or benefits to either government or stakeholders.

#### ii. Enforcement, Coast Watch, and Communications

Full implementation of the action plan could increase federal government expenditures by an estimated \$1.7 million over five years. Of this amount, \$1.0 million is estimated for increased enforcement through faster response to illegal harvesting and an augmented patrol presence; providing support to community-based coast watch programs to monitor illegal harvest; and for developing abalone-specific communications campaigns to raise public awareness, helping stop illegal harvests and decreasing the marketplace demand.

Approximately \$0.4 million of the increased government expenditures is estimated for First Nations / community groups (funding is subject to proposal submission and acceptance; for 2003/4: Bamfield Huu-ay-aht Community Abalone Project, Haida Fisheries Program, KITASOO Fisheries Program and the G’wa’sala – ‘Nakwaxda’xw Nation) involvement through the federal government’s Habitat Stewardship Program (HSP), administered by Environment Canada. These groups may benefit by using \$0.26 of the \$0.4 million to create short-term employment opportunities through patrol, coast watch and education and awareness programs. These short-term employment opportunities should provide long-term benefits through building increased community capacity.

The First Nations / community groups are estimated to also bear some costs to deliver these programs. It is estimated that approximately \$0.4 million in in-kind contributions would be expended in their delivery of the coast watch patrol and

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<sup>14</sup> SARA s.49 (1)(e).

education and awareness programs. As specific activities are undertaken, broader public involvement is anticipated over the five-year period.

### iii. Research, Population Rebuilding, and Status Survey

Full implementation of the action plan could increase federal and provincial government expenditures by an estimated \$4.0 million over five years. Of this amount, \$2.9 million is estimated to undertake research and rebuilding experiments; increase abalone enhancement; and, provide site surveys to monitor population status.

Approximately \$0.8 million of the increased government expenditures is estimated for First Nation / community groups (approved for 2003/4: Bamfield Huu-ay-aht Community Abalone Project, Haida Fisheries Program, KITASOO Fisheries Program and the G'wa'sala – Nakwaxda'xw Nation) involvement through HSP funding. These groups may benefit by using \$0.2 million to create short-term employment opportunities through population rebuilding experiments. These short-term employment opportunities should provide long-term benefits through building increased community capacity.

The First Nations / community groups are estimated to also bear some of the costs to deliver these programs. It is estimated that approximately \$0.5 million in in-kind contribution could be expended in their delivery of the population rebuilding experiments. As specific activities are undertaken, broader public involvement is anticipated over the five-year period.

Approximately \$0.3 million of the increased government expenditures over the next five years will come from the Province of B.C., through a commitment to the Bamfield Huu-ay-aht Community Abalone Project's hatchery program to raise juvenile abalone, \$0.2 million in 2003/4 and \$0.1 million in 2004/5. This program may have the potential to produce additional benefits in terms of economic opportunity and employment if the hatcheries are able to build the capacity necessary to engage in abalone aquaculture on a commercial scale.

The Red Sea Urchin fishery in Juan Perez Sound on the south-east coast of the Queen Charlotte Islands / Haida Gwaii was closed to support rebuilding efforts in that area. Fishing opportunity (quota) was shifted to other areas in 2002/3 and no anticipated costs or benefits on the red sea urchin fishery are anticipated. Impacts are however likely if harvesting opportunities cannot continue to be provided for in other areas.

### 5.3 Summary

Full implementation of the Action Plan could increase federal government expenditures by an estimated \$5.7 million over five years. Of this amount, approximately \$1.0 million is estimated for the HSP program (approved for 2003/4: Bamfield Huu-ay-aht Community Abalone Project, Haida Fisheries Program, KITASOO Fisheries Program and the G'wa'sala – Nakwaxda'xw Nation). These funds would be used to implement specific recovery activities and in the process create short-term, and perhaps long-term, employment opportunities. An additional \$0.3 million has been committed to the Bamfield Huu-ay-aht Community Abalone Project by the provincial government to support efforts to build abalone aquaculture capacity. The cost to stakeholders is estimated as approximately \$0.9 million over five years, incurred predominately through in-kind contributions to HSP. As the Action Plan is implemented, further avenues to

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work with stakeholders will be explored, which could further result in short-term employment opportunities and long-term capacity building.

The socio-economic impacts reported here are subject to re-evaluation five years after implementation of the Action Plan, as required by SARA “*the competent minister must monitor the implementation of the action plan and the progress towards meeting its objectives and assess and report on its implementation and its ecological and socio-economics impacts five years after the plan comes into effect*”<sup>15</sup>.

## **APPENDIX I RECORD OF COOPERATION & CONSULTATION<sup>16</sup>**

Northern abalone are an aquatic species under federal jurisdiction, managed by Fisheries and Oceans Canada: 200 - 401 Burrard Street, Vancouver, B.C. V6C 3S4.

Fisheries and Oceans Canada engaged an Abalone Recovery Team to work cooperatively in the development of this action plan. Recovery action groups also work cooperatively with Fisheries and Oceans Canada and the recovery team in the development and implementation of recovery programs. The recovery team membership and a list of recovery action groups are provided in Appendix II and III.

Public workshops were held January 20, 2003 in Queen Charlotte City, B.C. and January 25, 2003 in Port Alberni, B.C. to receive input on the draft of this Action Plan, and to continue to encourage, support and promote recovery activities. Participants at the workshops included B.C. Ministry of Assets and Lands Shellfish Aquaculture Development, Ditidaht Nation, Gwa wa enuk Tribe, Kwakiutl Territorial Fisheries Commission Alert Bay, Nuu-chah-nulth Tribal Council, Penelakut Council, the West Coast Vancouver Island Aquatic Management Board and interested people from the shellfish aquaculture and marine biology sectors.

A workshop was also held November 12, 2002 with the B.C. commercial dive fisheries and abalone recovery action groups to receive input on the draft of this Action Plan, continue to encourage, support and promote recovery activities, and to integrate research and coast watch programs with dive fisheries’ programs. Participants included Haida Fisheries Commission, KITASOO Abalone Stewardship Program, Malcolm Island Shellfish Cooperative, Pacific Sea Cucumber Harvesters Association, Pacific Urchin Harvesters Association, Underwater Harvesters Association, and West Coast Green Urchin Harvesters Association.

A workshop on Abalone Rebuilding Techniques was held January 14-16, 2003 to examine past, present and future research on aquacultural, biological and ecological studies relevant to northern abalone rebuilding efforts. The workshop brought together international researchers with those active in abalone rehabilitation in B.C. to discuss scientific projects, share information and technology transfer and improve communication on restoration methods for northern abalone in B.C. Participants included: B.C. Ministry of Agriculture, Food and Fisheries, Bamfield Huu-ay-aht Community Abalone Project, California Fish & Game Marine Region, Cawthron Institute New Zealand, Fisheries and Oceans Canada, Haida Fisheries Program, KITASOO Fisheries Program, Malaspina University-College, Malcolm Island Shellfish Cooperative,

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<sup>15</sup> SARA s.55.

<sup>16</sup> SARA s.48.

Parks Canada, Proteus Seafarms, University of Cape Town South Africa, University of Melbourne, University of Washington, and Washington Department of Fish and Wildlife.

Input from these workshops assisted in particular with drafting of the cost estimates, socio-economic evaluation, and list of recovery activities and in refining the research and rebuilding programs. The input provided has been incorporated into this document to be adopted into the recovery program wherever possible.

The Nisga'a Fisheries Program has been contacted and will be reviewing their current program commitments and available resources. In the meantime, they will continue to be kept abreast of abalone recovery initiatives.

## **APPENDIX II ABALONE RECOVERY TEAM**

Alan Campbell, Fisheries and Oceans Canada, Science Branch  
 Laurie Convey (Chairperson, Abalone Recovery Team), Fisheries and Oceans Canada, Resource Management South Coast Area, 3225 Stephenson Point Rd., Nanaimo B.C. V9T 1K3. Phone 250-756-7163. ConveyL@pac.dfo-mpo.gc.ca;  
 Christiane Cote, Fisheries and Oceans Canada  
 Paul Coulson Fisheries and Oceans Canada  
 Ted Down, Government of British Columbia, Ministry of Water, Air and Land Protection  
 Carole Eros, Fisheries and Oceans Canada  
 Kelly Francis, Fisheries and Oceans Canada  
 Rick Harbo, Fisheries & Oceans Canada  
 Bill Heath, Government of British Columbia, Ministry of Agriculture, Food and Fisheries  
 Heather Holmes, Parks Canada Agency, Pacific Rim National Park Reserve  
 Bryan Jubinville, Fisheries and Oceans Canada  
 Joanne Lessard, Fisheries and Oceans Canada  
 Guy Parker, Fisheries and Oceans Canada

## **APPENDIX III ABALONE RECOVERY ACTION GROUPS**

The following groups work with the recovery team on implementation.

*Habitat Stewardship Projects (as of 2003-2004), implementing community involvement and population rebuilding (e.g. improving reproductive success), communications, and coast watch:*

Bamfield Huu-ay-aht Community Abalone Project, an equal partnership between the Bamfield Community School Association, the Huu-ay-aht First Nation and the Bamfield Marine Sciences Centre.

Central Coast Abalone Stewardship and Awareness Initiative under lead of the Gwa'sala-'Nakwaxda'xw Nation Fisheries Department with in-kind support also from Mill and Timber Products Ltd.

Haida Gwaii Northern Abalone Stewards, under lead of the Haida Fisheries Program, partner groups include Council of the Haida Nation, Laskeek Bay Conservation Society, World Wildlife Fund Canada, Haida Gwaii Marine Resources Group Association, Gwaii Haanas National Park Reserve / Haida Heritage Site, Fisheries and Oceans Canada, Environment Canada.

Kitasoo Abalone Stewardship Project under lead of the Kitasoo Fisheries Program.

Heiltsuk Abalone Stewardship Project under lead of the Heiltsuk Fisheries Program with in-kind support also from the Raincoast Conservation Society, Ecotrust Canada and JMS Consulting.

*Projects implementing community involvement in population rebuilding by developing aquaculture technology and outplanting hatchery-raised juveniles to the wild:*

Bamfield Huu-ay-aht Community Abalone Project (partners listed above).

Malcolm Island Shellfish Co-operative.