RECOVERY ACTION PLAN for the SEA OTTER (*Enhydra lutris*) in Canada

2004 - 2009

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1. INTRODUCTION

This document, the 'Recovery Action Plan for the Sea Otter (*Enhydra lutris*) in Canada' forms the integral component for implementing the 'Recovery Strategy for the Sea Otter (*Enhydra lutris*) in Canada'. **Please refer to the recovery strategy for more complete information about sea otter biology, history and their recovery** (www.pac.dfo-mpo.gc.ca/sara/sotters_e.htm).

Sea otters once ranged from Northern Japan to central Baja California, Mexico, but were hunted almost to extinction during the Maritime fur trade that began in the mid 1700s. As few as 2000 animals, little more than 1% of the pre-fur trade population, are thought to have remained in 13 remnant populations by 1911. In Canada, sea otters occurred only in coastal British Columbia (BC) and the last verified sea otter was shot near Kyuquot, BC, in 1929. Between 1969 and 1972, 89 sea otters from Amchitka and Prince William Sound, Alaska, were translocated to Checleset Bay on the west coast of Vancouver Island, BC. Animals from these translocation efforts established themselves, but there were still less than 100 animals in 1978, when the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the Canadian sea otter population as *Endangered*. By 1995, the population had increased in size (to about 1500 animals) and in geographic extent but was still considered relatively small and restricted in distribution and therefore vulnerable to environmental catastrophes such as oil spills. The species was re-assessed by COSEWIC in 1996, and although it was no longer considered to be in imminent danger of extirpation, it was still considered to be at risk and thus was down-listed to *Threatened*. The most recent estimate made in 1998 indicated the population consists of a minimum of 2000 animals along the west coast of Vancouver Island and 500 animals on the central BC coast. However, oil spills remain a significant threat to the population because of its size and distribution and sea otters' vulnerability to oil.

The *Species At Risk Act* (*SARA*)(www.sararegistry.ca), which was enacted in June 2003, requires the development of a recovery strategy and action plan by the responsible minister, which for sea otters is the Minister of Fisheries & Oceans Canada (DFO). Consistent with the requirements of *SARA*, Fisheries & Oceans Canada formed a recovery team in June 2002 to develop a National Recovery Strategy for the Sea Otter in Canada. Following development of the recovery strategy, the second step in the recovery planning process is the preparation of an action plan (this document), outlining the steps recommended to implement the recovery strategy. In addition to recovery planning, *SARA* also prohibits killing, harming, harassing, capturing and taking sea otters[1], damaging or destroying sea otter residences[2] and any part of sea otters' 'critical habitat'[3] (as identified in a recovery strategy or action plan, see Section 3.5).

[1] *SARA* s.32.

[2] *SARA* s.33.

[3] *SARA* s.58.

COSEWIC Species Information

Status Reports and the Assessment Summary for sea otters are available from the Committee on the Status for Endangered Wildlife in Canada (COSEWIC) Secretariat (www.cosewic.gc.ca).

Common Name: Sea Otter

Scientific Name: *Enhydra lutris*

Assessment Summary: 1996 – Threatened, confirmed May 2000

Status: Threatened

Reason for Designation: Formerly endangered. The population is increasing and now occupies two sites off the British Columbia coast and is not in imminent danger of extirpation. However, the species remains at risk due to potential environmental contamination and fisheries conflicts.

Canadian Occurrence: Pacific Coastal Waters

Status History: Designated Endangered in April 1978. Status re-examined and confirmed Endangered in April 1986. Status re-examined and down-listed to Threatened in April 1996. Status re-examined[4] and confirmed Threatened in May 2000. Last assessment based on an existing status report.

2. RECOVERY GOAL AND OBJECTIVES

The goal for recovery[5] of sea otters in BC is as follows:

> *Ensure that the sea otter population in British Columbia is sufficiently large and adequately distributed so that threats, including events catastrophic to the species, such as oil spills, would be unlikely to cause extirpation or diminish the population such that recovery to pre-event numbers would be very slow.*

To achieve this goal the recovery team has adopted a non-interventionist approach to recovery that recognizes the sea otter's ability to recover without the need for translocation or other similar efforts to enhance population growth and distribution. At the same time, the approach considers threats that could limit or reverse population growth if not addressed. The first short-term recovery objective (for the next 5 years) focuses on identifying and reducing the threats to sea otters and their habitat that could impede recovery. Without knowing the size and distribution of the sea otter population needed to consider the population 'recovered' (i.e., able to withstand and recover from a large-scale environmental catastrophe), the recovery team could not at this time set quantitative recovery objectives. Instead, the team identified the need to determine a minimum population size and distribution by 2006, and then monitor the population to determine when these targets have been reached.

The approaches recommended in the recovery strategy for reaching these objectives are grouped into the following broad categories:

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[4] New COSEWIC assessment criteria were applied to the existing status report.

[5] A single-species approach to recovery was adopted to allow focused consideration of the activities needed to recover sea otters. It does not preclude integration with other recovery strategies and consideration of environmental or ecosystem effects.

1. protection;
2. population assessment;
3. threat clarification research;
4. communications;
5. identification of critical habitat.

3. RECOVERY ACTIVITIES[6]

The recovery strategy listed a number of activities that could be considered to aid the recovery of sea otters in BC. The activities have since been given further consideration, revision, and are provided in detail in this action plan. The following sections identify the priority activities needed to aid the recovery of sea otters in BC over the next 5 years.

3.1 Protection

One of the greatest threats to the BC sea otter population is that the entire population could be affected by a single oil spill or other catastrophic event. Small chronic spills may be an on-going source of mortality. The two principal areas inhabited by otters in BC are adjacent to major shipping lanes where regular spills occur (documented by Canadian Coast Guard, who fly regular pollution surveillance flights). Certain areas of interest for offshore oil and gas fields may pose a risk if a moratorium on oil and gas exploration is lifted.

1). Develop an oil spill response plan specifically for sea otters, including strategies, protocols, procedures and training.

- Evaluate and determine the appropriate procedures needed to protect sea otters in the event of an oil spill. Link into existing oil spill response procedures (Appendix I) and address gaps.
- Assess the feasibility of moving sea otters in the event of an oil spill. An analysis of the Exxon Valdez's oil spill suggests that rehabilitating oiled sea otters is not very successful at a population level and the cost to rehabilitate individual animals is high. A pre-emptive capture of sea otters to protect them from spreading oil may be more effective and should be considered. An assessment should address the following questions:

  What is the feasibility, risks and benefits of moving sea otters in the event of a spill given that season, weather and sea conditions might not be optimal for captures when a spill occurs?

  What are the options and risks for:

  a) herding sea otters away from the path of the oil into an area that will be protected from oil;

[6] *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*)].

b) capturing and holding (e.g., penning) sea otters then releasing them back to the original area of capture; and/or
c) capturing and re-locating sea otters in the event that the clean-up process or environmental damage would prevent release back to the original area of capture?

What is the expected survival rate of released healthy sea otters and released rehabilitated sea otters?

How can public support and local community involvement in oil spill response (including pre-emptive captures (e.g., netting), holding, releasing, spill containment and carcass collection) best be solicited?

What are the financial costs of each option?

- Determine where to focus oil spill prevention and response; use the results of the oil spill simulation model (Section 3.3.1) to assist in identifying critical areas.
- Ensure that there is a defined and agreed upon procedure for communication and involvement of identified marine mammal experts in an oil spill response plan, so that the most up-to-date information on sea otter distribution is available as a priority-setting tool for sea otter rescue in the event of an oil spill.
- With this information, develop an oil spill response plan specific for sea otters to be followed in the event of an oil spill. The plan should include the appropriate procedures and protocols, clear roles and direction for local response teams, and an analysis of liability/insurance issues.
- Identify within the oil spill response plan the necessary rescue equipment to be stored at strategic locations for moving, capturing and/or holding sea otters. Append an inventory of the equipment that is already stored at strategic locations.
- Include within the oil spill response plan an estimated budget to carry out each of its recommendations.
- Ensure that sea otter response plans and teams are integrated with those for other warm-blooded marine vertebrates.
- Develop a protocol (or review and adopt existing protocols, i.e., for Pacific US states) for the collection, sampling and disposal of oiled sea otter carcasses.

2). Identify and train agencies and individuals that would participate in an oil spill response team specifically for sea otters and be prepared to implement the response plan in the event of an oil spill.

- Identify and train a sea otter oil spill response team that would coordinate oil spill response activities for sea otters. The team may include agencies (i.e., governments), First Nations, businesses (e.g., airlines, vessels), fishing associations and fishermen, non-governmental organizations (NGOs), and individuals. Identify key individuals to be trained as trainers or supervisors.

- Build on the sea otter oil spill response network initiated by the Vancouver Aquarium Marine Science Centre's program funded through the federal government's Habitat Stewardship Program in 2003/4.
- Develop a training module specific to sea otter oil spill response techniques that can be incorporated into oil spill response training (e.g., Burrard Clean Operations organizes a two-day course "*Basics of Oil Spill Response*" to train people for oil spill assessment and clean-up).
- Select and train key residents from local communities (e.g., vessel owners, agency employees, NGO representatives) in oil spill response techniques. Spill response at the field/operational level requires training, including to locate, assess health status, capture, handle and release sea otters, and in personal safety.
- Ensure that equipment and facilities are in place to carry out the sea otter oil spill response plan in the event of a spill.

3). Evaluate opportunities for new, or improvements to existing, regulations, programs and procedures that will reduce the probability of spills of oil and other environmental toxins occurring and coming in contact with sea otters.

Reducing the probability of spills of oil (chronic as well as catastrophic) or other environmental toxins and improving the ability to combat a spill will reduce the threat of spills to sea otters.

- Once results of the oil spill simulation model (Section 3.3.1) are available, marine traffic patterns should be reviewed with a focus on sea otters, and options to reduce the risks of vessel-related spills should be encouraged. For example, in Washington State, the Olympic National Marine Sanctuary has identified an "Area To Be Avoided" (ATBA) by vessels transporting petroleum or other hazardous materials, and the Pacific States/BC Oil Spill Task Force has signed a resolution on vessel routing measures.
- Additional measures for spill prevention and improved response should be investigated.
- Evaluate the need for regulations relating to possible new oil and gas exploration activities within the present and projected sea otter range.
- Evaluate the possibility of increasing fines for illegal bilge water dumping and for requiring a separator and separate holding tank for bilge water.
- Promote the use of proper dumping facilities for bilge water and promote proper facilities being installed in areas of the BC coast where they are needed.

4). Once habitat or areas important to sea otters have been identified, consider methods of ensuring that disturbance to the sea otters in these areas is minimized.

- Once habitat or areas important to sea otters that are vulnerable to human activities have been identified through threat clarification research (Section 3.3.5

and 3.3.6), consider spatial and temporal closures to ensure that disturbance to the sea otters in these areas are minimized.

- Involve local communities in the identification, consideration for closures and stewardship of habitat or areas important to sea otters.
- Once 'critical habitat' for sea otters is identified (Section 3.5), marine protected areas could be established to protect it. This will require an identification of the types of activities that are likely to result in the critical habitat's destruction, the measures that are proposed to be taken to protect the critical habitat, and the portions of the critical habitat that are not already protected[7]. Existing protected areas are reviewed by Jamieson and Lessard (2000) e.g., Checleset Bay Ecological Reserve which was established for sea otters.

5). Reduce the likelihood of conflict between sea otters and aquaculture operations.

As the sea otter population increases in size and expands in distribution, there may be conflicts with existing aquaculture operations. There may be further conflict as aquaculture operations expand into areas already occupied by sea otters. Considerations will likely differ between finfish and shellfish operations. Shellfish operations may be directly affected by sea otters foraging on shellfish, whereas the siting of finfish pens may conflict with sea otters for habitat use.

- Ensure that information regarding current distribution and abundance of sea otters in areas of proposed aquaculture sites continues to be provided to the BC Ministry of Agriculture, Food and Fisheries (which is responsible for aquaculture licensing) and aquaculture proponents through the aquaculture sitings referral process.
- Develop guidelines for appropriate distances from aquaculture sites to sea otters and their critical habitat, once defined, particularly for areas where potential conflicts with sea otters are anticipated to be high.
- Develop responsible operating procedures, such as appropriate barriers (e.g., predator netting), to reduce the likelihood of conflict between sea otters and aquaculture operations.

6). Develop sea otter watching guidelines to protect sea otters from disturbance.

- General national marine mammal viewing guidelines are being developed. There have been reports of sea otters being injured or killed from vessel strikes. As part of this national effort, specific guidelines for viewing sea otters should be developed for aircraft, recreational boaters and commercial eco-tour operators that view sea otters from the air, water or shore.

[7] *SARA* s.49(1)(*a*)(*b*) and (*c*).

7). Protect sea otters as other threats are identified.

As threats to the sea otter population are identified (see activities under Section 3.3 Threat Clarification Research) additional measures may be needed to protect sea otters. For example, as the sea otter population expands and conflicts with people intensify the incidence of illegally killed sea otters may increase. Shootings of sea otters have been reported in some areas.

- Ensure that illegal killing of sea otters does not become a threat to the population (e.g., carry-out enforcement).

3.2 Population Assessment

Establishing a time series of the relative abundance of sea otters is essential to develop measurable population recovery targets that specify a minimum population size and distribution and to monitor the progress of population recovery and long-term viability. It is also crucial as an approach for assessing the effect of threats at a population level. For example, as a result of the *Exxon Valdez* oil spill it is now known that an estimate of the impact of an oil spill on a sea otter population requires unbiased, accurate and precise baseline survey data as well as current knowledge of their distribution (see Watson 1995).

1). Develop a survey protocol suitable for the BC coast.

- Set out the procedures for executing a survey (e.g., aerial and/or boats); identify factors that introduce variation and recommend how to improve the repeatability of counts.
- Assess the repeatability or precision of counts made using the method, and compare the results of boat counts and aerial (e.g., helicopter) counts.
- Determine the survey effort needed to achieve various assessment requirements (e.g., population trends, distribution, relative abundance).
- Carry out studies to assess daily behaviour patterns of sea otters (e.g., dispersed and foraging versus rafted and resting) to evaluate the effect of behaviour and time of day on variation in counts.

2). Carry out population assessment of the BC sea otter population to monitor population size, growth rate and distribution.

- Continue sea otter surveys as outlined by the survey protocol above (Section 3.2.1). Surveys should assess changes in the geographic distribution, trends in abundance and population growth rate. The frequency of these surveys will be laid out in the protocol but will not occur at greater than 5 year intervals.
- Make recent survey information available for inclusion in the next COSEWIC status report for sea otters, i.e., by 2006.

- Develop an incidental reporting system and protocol for reliable observers to report extra-limital and winter sightings of sea otter rafts. These could be used to aid population surveys, especially at the range limits.

3). Estimate a theoretical equilibrium population size as an input to estimating a minimum population size.

- Develop a habitat model. Use physical (depth, coastline complexity, depth contour complexity) parameters to characterize areas where sea otter density appears to be at equilibrium in BC. Then apply the habitat model coast wide to identify suitable sea otter habitat. Estimate the sea otter density in the equilibrium area and then apply this density to the habitat area identified by the model to estimate the theoretical coast wide sea otter equilibrium population size.

4). Specify a minimum population size and distribution.

Sea otters are listed as Threatened because of their small population size and limited distribution, which make the population vulnerable to environmental catastrophes such as oil spills. The 1988 *Nestucca* spill, for example, impacted much of the area of BC that is currently occupied by the sea otter population. Therefore the Sea Otter Recovery Team recognizes the need for a population size and distribution that will allow the population to recover from or withstand a large-scale environmental catastrophe. In other words, even if the probability of a major spill occurring has not been reduced, once the BC sea otter population has reached a specified population size and distribution, the population level effect of a major spill would be lessened because an adequate portion of the population would be expected to survive such events.

These targets need to be developed using a scientific approach that incorporates knowledge of the current population size, growth rate and distribution, life history parameters of sea otters, oil spill modeling results, habitat availability, and relating these to COSEWIC criteria for a species at-risk.

- Synthesize population assessment and equilibrium modelling results and the oil spill risk model to help identify recovery targets for inclusion in the next status report (2006).

3.3 Threat Clarification Research

Research is needed to identify or clarify the significance of threats that may limit sea otter population growth and range expansion. These include threats not only to sea otters but also to their habitat.

1). Assess how chronic and catastrophic oil spills will affect sea otters and their habitat by modeling oil spill source trajectories and sea otter habitat.

- Develop an oil spill simulation model by assembling existing physical (oceanographic, climatic) and industrial (shipping routes, oil spills) data and

categorizing the likelihood of oil spills (catastrophic and chronic) occurring in different zones along the BC coast. Estimate areas potentially affected and the severity of effect under different oil spill scenarios.

- Apply the model to sea otter distribution data (rafting and foraging areas from surveys) to identify areas where sea otters are most susceptible to oil from spills.
- Assess the effects of these spills to sea otter population persistence and recovery under different oil spill scenarios.
- Use the model results to focus enforcement efforts related to chronic oil spills (including bilge water dumping), as well as highlighting key areas for prevention by recommending modifications to high-risk vessel traffic patterns.

2). Assess the impact of proposed oil and gas exploration on sea otter recovery.

- Assess the potential impact of oil and gas exploration and drilling, by applying oil spill risk models, such as the model detailed in Section 3.3.1 above, to estimate the likelihood of oil spills and sea otter contact with hydrocarbons from oil and gas exploration and drilling.
- Assess the potential effects of noise associated with seismic activity from oil and gas exploration and drilling.
- Involve sea otter experts in discussions about lifting the BC moratorium on oil and gas exploration.

Should offshore oil and gas exploration resume (lifting the moratorium is currently (2004) under discussion) assessing these potential impacts and providing results to appropriate agencies will become more urgent.

3). Assess the genetic diversity of the BC sea otter population and its vulnerability to random environmental events.

Populations that have been reduced to a small size have lost genetic diversity. Even as the population recovers in size, genetic diversity remains lower than in the pre-reduction population. Genetic diversity is important as it allows a population to withstand random catastrophic events. Low genetic diversity is often associated with factors such as poor reproductive success and higher juvenile mortality, which may contribute to poor recovery of a population. Sea otters in BC have experienced two severe population reductions. Historically, the entire North Pacific sea otter population was reduced to about 2000 animals by 1911, little more than 1% of the pre-fur trade population size. The sea otters on the west coast of Vancouver Island are descendents of 89 sea otters introduced from Alaska between 1969 and 1972. A genetic study to determine whether the sea otters in the central coast of BC are descended from a few animals that survived the fur trade or are also descended from the 89 re-introduced animals is presently (2004) underway.

- Capture sea otters from the group on the central coast of BC and the group on the west coast of Vancouver Island and non-lethally take genetic (DNA) samples.

- Assess the genetic diversity of BC sea otters by comparing to the genetic diversity of other remnant and translocated populations and with archaeological samples of pre-fur trade populations.
- Determine if the central BC coast sea otters are genetically different from those re-introduced to the west coast of Vancouver Island.

4). Develop a sea otter health-monitoring program.

- Review, and if necessary modify, sampling and necropsy protocols developed in California and other jurisdictions to establish a set of standard morphometric measures to be made and a standard set of samples to be collected from live-captured animals and from carcasses.
- Assess samples for exposure to a suite of diseases reported in wild sea otters elsewhere. Identify and assess the significance of diseases to which sea otters are exposed and compare results with those from other geographical areas (e.g., Alaska, California).
- Complete blood chemistry analyses of samples to determine baseline ranges for various blood parameters.
- Assess levels of environmental contaminants including persistent organic pollutants and hydrocarbons in sea otters and identify associated health effects. An assessment of contaminants in prey could also be undertaken. Together these data will provide important baseline information to assess impacts from environmental catastrophes (e.g., major oil spills) and to assess chronic effects from small spills (e.g., from vessels, bilge pumping, and from shore spills and seepage).

5). Assess the occurrence and significance of sea otter entanglement or entrapment in fishing gear.

There may be potential for entanglement in BC in gill net fisheries for salmon (e.g., Roller Bay) and herring. In California, gill nets and trammel nets (nets with mesh >9cm) have been prohibited in shallow coastal waters (<30m) throughout most of the southern sea otter range (US Fish and Wildlife Service 1996) and in Washington State, only treaty gill net fisheries are allowed in the current sea otter range. Non-treaty gill net fisheries are specifically excluded (one sea otter was caught in 1989 (Kajimura 1990)).

The potential of entrapment may be greatest in BC in the commercial Dungeness crab fishery, where there are18,000-20,000 traps on the west coast of Vancouver Island set in shallow waters (generally less than 20m). There is very little monitoring of Dungeness crab sport fisheries. In other trap fisheries, for prawn, tanner crab and sablefish, the traps are set in deeper waters and should not pose a threat to sea otters.

- Collect data from fishery monitoring, observer programs and information from fisheries managers about sea otter entanglements/entrapments in fishing gear to identify seasonal or spatial patterns. Determine the type(s) of gear, area(s), seasonality and frequency of interactions.

- If entanglement/entrapment is a problem, identify gear type(s) responsible, season and frequency of entanglement and develop strategies to reduce the incidence of sea otter entanglements / entrapments.
- As sea otters move into areas, new conflicts may arise. The information from fishery monitoring programs and fisheries managers should be used to identify gaps for the development of new monitoring programs where entanglements or entrapments may also occur.

6). Assess the significance and occurrence of sea otter interactions with aquaculture netting, culture lines, etc.

- Use existing or new monitoring programs to determine types and incidence of interactions between sea otters and aquaculture activities. Interactions or the potential for interactions may be different with finfish aquaculture than with shellfish aquaculture and these should be assessed separately. Interactions may include entanglement in net gear, entanglement in anti-predator cover netting, etc.

7). Assess other sources of mortality in sea otters.

In addition to activities 4), 5) and 6) listed above, other sources of mortality and their significance to sea otters in BC should be assessed. Other sources of mortality may arise from: a) anthropogenic impacts, including illegal kills (based upon anecdotal reports, illegal killing does occur), vessel strikes, and chronic small spills of environmental contaminants and b) natural causes, including predation, starvation, and marine biotoxins.

- Collect and necropsy carcasses to determine the cause of death, using necropsy protocols developed in Section 3.3.4.
- Assess the local impact of eagle predation by monitoring prey remains near nest trees during the peak of sea otter pup rearing.
- Assess the spatial and temporal distribution of Paralytic Shellfish Poisoning and domoic acid events in the sea otter range.
- Identify anthropogenic sources of mortality and determine occurrence (what or how) and frequency.
- Develop a protocol for local communities and the public to assist with reporting, collecting and transporting of incidentally found sea otter carcasses. Reporting will need to be timely as carcasses are scavenged quickly and the protocol will need to consider handling and permitting procedures.
- Encourage reporting of illegal killing of sea otters (Observe-Record-Report 1-800-465-4336).
- Tagging and monitoring studies may also be useful to estimate mortality rates of different age-sex classes.

3.4 Communications

To build support for sea otter recovery, effective communication is required. In particular, the conflict between commercial, aboriginal and recreational shellfish harvesters and sea otters has the potential to threaten sea otter recovery efforts. Building public support through proactively addressing conflict issues is essential. Scientific and traditional knowledge about sea otter biology, habitat, census techniques, COSEWIC listing criteria, abundance and distribution, current status, threats, recovery goals and activities should be made available. Topics and emphasis may be tailored towards the specific needs, concerns and interests of particular groups and local communities.

1). Reduce conflict between shellfish harvesters and sea otter recovery.

- Complete a historical and socio-economic review of BC shellfish fisheries and sea otters.
- Assess the effects of sea otters on shellfish stocks and identify fisheries and areas most likely to be affected by sea otters.
- Work with shellfish harvesters to develop innovative solutions to mitigate the economic effects of sea otters (e.g., geoduck enhancement in the Strait of Georgia).
- Encourage shellfish harvesters' participation in sea otter research, reporting extra-limital or winter sightings of sea otters, surveys, recovering drift or beached carcasses for pathological examination, and local oil spill response.

2). Within the current range of sea otters, communicate with coastal Tribal Councils, First Nations and local communities and involve them in sea otter recovery.

- Encourage the development of informed views and decisions about sea otter conservation, habitat protection and recovery activities.
- Increase the level of understanding of scientific and aboriginal traditional knowledge by facilitating a two-way transfer of knowledge, and discussing concerns and issues.
- Engage First Nations in discussions and consultations based on the historical and socio-economic review recommended above (Section 3.4.1) in order to cooperatively seek resolution of conflicts with First Nations shellfish harvesting.
- Engage recreational shellfish harvesters in local communities to cooperatively seek resolution of conflicts with sea otters.
- Encourage the development of stewardship programs to participate in local recovery and research activities, e.g., monitoring local population trends, identifying rafting areas, reporting extra-limital or winter sightings, identification and mapping of important winter habitat, recovering drift or beached carcasses for pathological examination, and participation in preparing for local oil spill responses.

- Develop education outreach materials (e.g., to build further on the Nuu-chah-nulth Tribal Council's 2002/2003 Habitat Stewardship Program project) emphasizing the long-term ecological benefits associated with sea otter recovery and the beneficial role sea otters play in near-shore marine ecology. Present a historical perspective on sea otters, invertebrate abundance and species composition to give perspective to current and anticipated changes in sea otter and invertebrate densities.

3). Outside the current range of sea otters, communicate with coastal Tribal Councils, First Nations, and local communities.

- Develop education outreach materials directed at First Nations and coastal communities outside the current range of sea otters to build support for the recovery of sea otters. Emphasize the history of sea otters co-evolving and co-existing with nearshore marine invertebrates.
- Encourage the development of programs (e.g., stewardship programs) to encourage support for sea otter recovery including reporting extra-limital sightings.
- Engage First Nations and coastal communities in discussions of ways to mitigate future conflicts with shellfish fisheries that can be anticipated with sea otter range expansion.

4). Communicate with marine plant harvesters, aquaculture groups and programs, and kelp-related fishing organizations within the sea otter range.

- Promote awareness of potential entanglements in fishing and aquaculture gear (e.g., clam protective netting) and encourage reporting of entanglements.
- Provide sea otter viewing guidelines to each organization and members.
- Identify important and critical habitat, once described, to the BC Ministry of Agriculture, Food and Fisheries, marine plant harvesters, aquaculture groups and kelp-related fishing organizations (e.g., Area 25 roe-herring gill net and spawn-on-kelp) to avoid disturbing sea otters in these areas and for consideration during aquaculture siting proposals.
- Solicit participation in preparing for local oil spill responses.

5). Communicate with regional and local governments identifying habitat for protection in land use planning.

- Communicate locations of important sea otter habitat (e.g., *via* the Coastal Resource Management Information System) to regional and local governments involved in land-use planning and land development referrals to aid in protection and minimization of disturbance to these habitats and the sea otters.
- Ensure that land-use planners are aware of sea otter recovery efforts.

6). **Assist eco-tourism operators, tourism support services, recreational fishing guides and lodges, commercial fishermen and the general public to minimize disturbance to sea otters.**

- Develop and distribute a multi-language pamphlet or waterproof card containing sea otter facts (e.g., how to identify differences between river otters and sea otters) and marine mammal and sea otter viewing guidelines to avoid disturbing sea otters and areas important to sea otters.

7). **Encourage general support for sea otter recovery through public education programs.**

- Encourage broad understanding of recovery goals and actions, research activities and potential threats to sea otter recovery in BC. Establish a sea otter recovery website containing information about sea otters and recovery that can be linked to local gateway websites and provide information for local education groups, environmental non-government organizations (ENGOs), research institutes, and others.
- Produce education kits for distribution within primary and secondary schools.
- Produce communications materials suitable for distribution and display through museums (e.g., Royal British Columbia Museum, Campbell River Museum, etc.), historical societies, tourist information offices, parks (e.g., BC Parks, Pacific Rim National Park Reserve), marine science centres (e.g., Vancouver Aquarium Marine Science Centre, Bamfield Marine Sciences Center, Marine Ecology Station), ENGOs (e.g., Clayoquot Biosphere Trust, Clayoquot Alliance for Research Education and Training, Raincoast Education Society, Laskeek Bay Conservation Society, Northwest Habitat Foundation / Haida Gwaii Marine Resources Group, World Wildlife Fund Canada, West Coast Anti-whaling Society), local management boards (e.g., West Coast Vancouver Island Aquatic Management Board), eco-tourism operators (e.g., Sea Kayak Guides Alliance of BC, Tofino Sea Kayaking, Broken Island Adventures), and high traffic areas (e.g., B.C Ferries, transit buses).
- Work with other recovery teams (e.g., northern abalone, marbled murrelet) where possible to ensure appropriate integration of recovery programs and avoid duplication of effort.
- Promote Coastal Watch programs and encourage reporting through Observe-Record-Report (1-800-465-4336) of illegal kills, disturbance to sea otters and threats to sea otter habitat.

3.5 Critical habitat identification

"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"[8]. Under *SARA*, defining critical habitat for sea otters to the extent possible is a legal requirement[9]. Although the general types of habitat in which sea otters are found (refer to the recovery strategy for more information) is known, specific habitat features that are critical or important to the survival of sea otters in BC, or how these vary by season, age, or gender of animals, are unknown. Foraging behaviour, diet, social organization, reproduction and maternal care are influenced by and influence habitat use and requirements.

The following studies will provide information needed to identify critical habitat for sea otters in BC (refer to Table 1 for a schedule of studies[10]):

1). Identify important rafting and foraging areas and seasonal variations.

Winter is thought to be the season of highest natural mortality for sea otters and is also the time when oil spills are most likely to occur and most difficult to respond to because of sea conditions. The spatial and temporal distribution of the sea otter population in winter may indicate the areas most critical to its survival and recovery.

- Determine the winter distribution of sea otters by observation and by compiling incidental reports of sea otter raft locations in winter. Summer rafting areas can be identified from population survey work but winter rafting areas are likely quite different.
- Develop a reporting protocol for fishermen, First Nations, local communities and the general public to report sightings of rafts of sea otters, especially in winter.
- Use physical attributes of observed winter distribution to characterise habitat use in winter. Then use this model to predict probable winter habitat in other areas, including areas not yet occupied by sea otters.

2). Research movements and home range patterns of sea otters.

- Assess movements and home range patterns of sea otters using telemetry (i.e., implanting radio transmitters into sea otters followed by intensive aerial and/or boat-based tracking). Such studies have been carried out and are underway in Alaska, California, and Washington. Local community involvement in radio tracking tagged individuals may be possible and could be pursued.

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[8] *SARA* s.2(1).

[9] *SARA* requires that the action plan include "an identification of the species' critical habitat, to the extent possible, based on the best available information and consistent with the recovery strategy" [*SARA*.s.49(1)(*a*)]. *SARA* prohibits the destruction of critical habitat [*SARA* s.58(1)]. Until critical habitat is defined, "examples of the activities likely to result in its destruction" [*SARA* s.49(1)(*a*)], "measures that are proposed to be taken to protect critical habitat" [*SARA* s.49(1)(*b*)] and "an identification of any portions of the species' critical habitat that have not been protected" [*SARA* s.49(1)(*c*)] cannot be identified.

[10] *SARA* requires "a schedule of studies to identify critical habitat, where available information is inadequate" [*SARA* s.41(1)(*c.1*)].

4. IMPLEMENTATION SCHEDULE

The specific activities (detailed in Section 3) that are recommended to recover sea otters in BC are summarized below in Table 1. The period covers five fiscal years, April 2004 through March 2009. Activities are rated according to priority and assigned to agencies taking the lead and/or co-operating roles (the list of organizations is not exhaustive; additional groups and potential co-operators may be identified over the course of implementation). Projected implementation dates[11] are given. Cost estimates are based on estimated increases in costs over pre-existing programs, and do not include core-funding provided by lead agencies (i.e., Fisheries & Oceans Canada, Parks Canada Agency, Environment Canada) and in-kind contributions to funding programs (e.g., Interdepartmental Recovery Fund, Habitat Stewardship Program). A '?' indicates that the cost could not be estimated because the activity is dependent on the findings of another activity(s). In consideration of the need to reduce costs, activities have been combined where appropriate.

[11] *SARA* requires that the action plan include "an indication as to when these measures are to take place" [*SARA* s.49(1)(*d*)].

Key to Abbreviations used in Table 1:

Priority ratings have been adapted from the criteria being established by RENEW (*A Working Draft - Recovery Operations Manual February 2004*) as:

"Essential"(E) – an activity required immediately to address or assess the main threats to sea otters or to monitor whether recovery objectives are being met;

"Necessary"(N) – an activity that may become essential within the next 5 years;

"Important"(I) – an activity whose implementation is currently considered less time-dependent, although this may change with improved knowledge or as sea otters move into areas with higher human population densities.

BCO	Burrard Clean Operations		
BC Parks	Parks & Protected Areas Branch, MWLAP	NTC	Nuu-chah-nulth Tribal Council
BCSA	BC Seafood Alliance	OWSBC	Oiled Wildlife Society of BC
BIA	Broken Island Adventures	PCA	Parks Canada Agency
BMSC	Bamfield Marine Sciences Centre	PUHA	Pacific Urchin Harvesters Association
CFIA	Canadian Food Inspection Agency	RBCM	Royal BC Museum
CARET	Clayoquot Biosphere Trust, Clayoquot Alliance for Research Education and Training	RDs	Regional Districts
CC	Coastal communities	REET	Regional Environmental Emergency Team
DFO	Fisheries and Oceans Canada	RES	Raincoast Education Society
EC	Environment Canada	SA	Subtidal Adventures
Eco	Eco-tourist groups and associations	SKGABC	Sea Kayak Guides Alliance of BC
FN	First Nations (including Tribal Councils)	TBD	To be determined
HCC	Heiltsuk Co-management Committee (Heiltsuk Tribal Council)	TC	Transport Canada
HGMRG	Haida Gwaii Marine Resources Group	TSK	Tofino Sea Kayaking
IRF	Interdepartmental Recovery Fund	UBC	University of British Columbia
LBCS	Laskeek Bay Conservation Society	UHA	Underwater Harvesters Association
LF	Life Force Society	UVIC	University of Victoria
MAFF	BC Ministry of Agriculture, Food and Fisheries	VAMSC	Vancouver Aquarium Marine Science Centre
MSRM	BC Ministry of Sustainable Resource Management (Coast and Marine Planning)	WCAS	West Coast Anti-whaling Society
MalU	Malaspina University College	WCVIAMB	West Coast Vancouver Island Aquatic Management Board
MWLAP	BC Ministry of Water, Land, and Air Protection	WWF	World Wildlife Fund Canada, Pacific Region

Table 1. Implementation of the Recovery Strategy for the Sea Otter in BC (2004-2009)[12].

Recovery Activities	Priority	Lead	Co-operators	Start Date	Estimated Cost ($000s / annum)				
					2004/5	2005/6	2006/7	2007/8	2008/9
Protection					**90**	**45**	**30**	**30**	**20**
1) Develop oil spill response plan for sea otters	**E**	**MWLAP**	**EC, BCO, OWSBC, VAMSC**	**2004** (underway)	**30**				
2) Oil spill response plan implementation	**E**	**DFO, EC, MWLAP, VAMSC, CC, FN**	**BCO, OWSBC UHA, PUHA, LF, BIA, WCVIAMB, BMSC, SA**	**2004**	**20**	**40**	**30**	**30**	**20**
3) Opportunities for new oil spill regulations	**E**	**EC, MWLAP**	**DFO**	**As possible**					
4) Minimize disturbance in important areas or habitats	**I**	**BC Parks, DFO, PCA**	**Eco, CC, FN**	**With id. of imp. habitat**	**?**	**?**	**?**	**?**	**?**
5) Aquaculture sitings	**N**	**MAFF, DFO**	**WLAP**	**2004**	**10**	**5**			
6) Sea otter watching guidelines	**I**	**DFO**	**Eco**	**2004** (underway)	**30**				

[12] ***Table 1 provides a comprehensive summary of actions that could be done should funds be available. Implementation of specific activities is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations, as well as to modifications resulting from changed recovery objectives or new research or other findings.***

Recovery Activities	Priority	Lead	Co-operators	Start Date	Estimated Cost ($000s / annum)				
					2004/5	2005/6	2006/7	2007/8	2008/9
7) Protect from other threats	**I**	**DFO**		**As id'd.**	**?**	**?**	**?**	**?**	**?**
Population Assessment					**67**	**80**	**60**	**60**	**100**
1) Survey protocol	**E**	**DFO**	**MalU, IRF**	**2001** (underway)	**7**				
2) Surveys	**E**	**DFO**	**MalU, EC, IRF, NTC, PCA, WCVIAMB, BC Parks, UHA, PUHA, BIA, SA**	**2001** (underway)	**60**	**60**	**60**	**60**	**60**
3) Equilibrium population model	**E**	**DFO**	**MalU**	**2002** (underway)					**40**
4) Size and distribution targets	**E**	**DFO**	**MalU**	**2004**		**20**			
Threat Clarification Research					**173**	**216**	**108**	**60**	**2**
1) Oil spill risk model	**E**	**PCA**	**DFO, EC, TC**	**2003** (underway)	**50**	**40**			
2) Impact from oil and gas exploration	**N**	**DFO**	**PCA, EC, MWLAP, FN, CC**	**2005**		**40**			
3) Genetics	**E**	**DFO**	**UBC, VAMSC, MAFF, CFIA**	**2003** (underway)	**52**	**33**	**33**		
4) Health Monitoring	**E**	**DFO**	**UBC, VAMSC, MAFF, CFIA, IRF, WLAP**	**2003** (underway)	**71**	**40**	**40**	**40**	**2**

Recovery Activities	Priority	Lead	Co-operators	Start Date	Estimated Cost ($000s / annum)				
					2004/5	2005/6	2006/7	2007/8	2008/9
5) Assess entanglements and entrapments in fishing gear	**N**	**DFO**		**2004**		**20**	**20**		
6) Assess interactions with aquaculture gear	**I**	**DFO**	**MalU, MAFF**	**2004**		**20**			
7) Other sources of mortality	**I**	**DFO**	**NTC, UHA, PUHA, CC, FN**	**2005**		**23**[13]	**15**[13]	**20**[13]	
Communications					**72**	**74**	**52**	**47**	**47**
1) Reduce conflict with shellfish harvesters	**E**	**DFO**	**UHA, PUHA, BCSFA**	**2004**	**5**	**5**	**5**	**5**	**5**
2) Communication & involvement of Coastal Tribal Councils, First Nations & communities within sea otter range	**E**	**DFO**	**NTC, WCVIAMB, BMSC, HCC, FN, CC**	**2004**	**40**	**30**	**25**	**25**	**25**
3) Communication with Coastal Tribal Councils, First Nations & communities outside current sea otter range	**N**	**DFO, PCA**	**FN, CC**	**2004**	**10**	**20**	**10**	**5**	**5**
4) Communication with marine plant harvesters, aquaculture, kelp-related fishing organizations (habitat)	**I**	**DFO, MAFF**	**MalU**	**2004**	**2**	**2**	**2**	**2**	**2**
5) Land-use planning with regional & local governments	**E**	**DFO**	**MSRM, RDs**	**2004**	**2**	**2**	**2**	**2**	**2**
6) Education of eco-tourism, public (sea otter watching guidelines)	**N**	**DFO, PCA**	**VAMSC, WCVIAMB, BMSC, SKGABC, TSK, BC Parks**	**2004**	**3**	**5**	**3**	**3**	**3**

[13]Telemetry studies have been included under 'Critical Habitat Identification – movements and home range patterns'.

Recovery Activities	Priority	Lead	Co-operators	Start Date	Estimated Cost ($000s / annum)				
					2004/5	2005/6	2006/7	2007/8	2008/9
7) General public education	**I**	**BMSC, CARET, DFO, HGMRG, LBCS, MES, RBCM, RES, PCA, SKGABC, VAMSC, WCVIAMB, WWF[14]**	**BC Parks**	**2004**	**10**	**10**	**5**	**5**	**5**
Critical Habitat Identification					**49**	**157**	**121**	**77**	**0**
1) Identify rafting & foraging areas & seasonal variations	**E**	**DFO**	**BMSC, NTC, WCVIAMB, UHA, PUHA, CC, FN**	**2004**	**49**	**49**	**44**		
2) Movements and home range patterns	**E**	**TBD**	**BCParks, BMSC, NTC, WCVIAMB, CC, FN**	**2004**		**108**	**77**	**77**	
Total estimated costs					**451**	**572**	**371**	**279**	**174**

[14] Some groups may lead programs while others may cooperate as part of a larger program.

5. MONITORING RECOVERY[15]

The methods to be used to monitor the recovery of sea otters in BC and their long-term viability are described under 'Population Assessment' (Section 3.2).

Setting recovery targets, i.e., the "minimum population size", "adequate distribution", and population trend is planned for inclusion in the next sea otter status report. Under *SARA*, COSEWIC is required to review a status report for sea otters by 2006[16].

Once recovery targets are established, survey information (Section 3.2) will be used to determine when (or whether) recovery objectives are being met and whether the species situation is improving.

6. SOCIO-ECONOMIC EVALUATION

6.1 Description

SARA requires the responsible federal minister (Fisheries & Oceans Canada) to undertake "*an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation*"[17]. Input provided during consultations highlighted that it is not the recovery activities *per se* but rather the effects of a recovered sea otter population that is of socio-economic interest to most people. A brief overview of these perspectives is provided below (Section 6.2). The Sea Otter Recovery Team recognizes the concerns, particularly those of First Nations and commercial shellfish harvesters, regarding sea otter recovery. As a result, this action plan includes: 1) a specific evaluation of the impacts, costs and benefits of each recovery activity over the five year period of the action plan as presented in Section 6.3 and 2) a more detailed socio-economic review of BC shellfish fisheries and sea otters as a recommended action for 2004 in Section 3.4.1. The review requires a more extensive analysis than can be included within this action plan and should be compiled in a technical report separate from this document.

6.2 Overview

For many people the socio-economic effects of sea otter recovery represents a return to the pristine natural order of the marine ecosystem and includes the important ecological role of sea otters as a keystone species that enhances the diversity of nearshore communities. For others, the recovery of the sea otter is viewed as a threat to socially and economically valuable invertebrate resources, such as sea urchins, Dungeness crab,

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[15] *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)].

[16] Under *SARA*, COSEWIC is required to assess the status of a threatened species every 10 years. The last assessment was made in 1996.

[17] *SARA* s.49(1)(*e*).

intertidal clams, geoducks and abalone. For many people, the effects of sea otter recovery lie far in the future, while others on the west coast of Vancouver Island and the central coast of BC have already started to experience these effects in areas where sea otters have re-established. Comments summarized in this section have been partially based on science, traditional knowledge, and recent experience.

During community workshops held in Queen Charlotte City and Port Alberni (January 2003) on the Draft Sea Otter Recovery Strategy, participants identified significant ecological ramifications related to the recovery of sea otters. While there was general support for sea otter recovery, it was widely recognized that recovery will open up new challenges. The difficulty of finding a solution that will balance conservation and species recovery with shellfish as a food source and fishery resource was acknowledged. Many participants from all backgrounds emphasized the need to resolve conflicts and work together towards solutions. Having a clear, shared understanding of what the socio-economic effects of recovery are for different interests is a foundation for working together.

The socio-economic effects of sea otter recovery identified during the workshops can be summarized as either positive or negative. The general categories of negative socio-economic effects identified were to First Nations' harvesting opportunities and to the commercial shellfish industry. First Nations spokespersons emphasized a number of problems connected with the loss of seafood resources, including: loss of convenient access to sea resources, loss of important food with respect to dietary needs, loss of a food source traditionally appreciated by all age groups, loss of shellfish for social and ceremonial use (e.g., medicines, feasts), and loss of income from commercial harvesting (e.g., from manila and littleneck clams). Commercial shellfish industry representatives emphasized concerns over lost revenue in a number of fisheries, including: sea urchin, intertidal clam, Dungeness crab, and geoduck and horse clams.

The positive socio-economic effects identified by participants were related to eco-tourism, the restoration of a natural ecological balance, and the potential for enhanced kelp growth and finfish populations. Eco-tourism opportunities were seen as positive for those involved in that industry, for communities that may gain future employment from expanded eco-tourism, and for the tourists and the general public who appreciate wildlife viewing opportunities. The important ecological role of sea otters and their ability to increase diversity and productivity of nearshore ecosystems was emphasized by researchers, environmental groups, parks staff and members of the public. The expanded kelp forest that could follow sea otter recovery was recognized as having potential to support spawn on kelp and herring fisheries and rockfishes, although participants identified a shortage of information on this topic.

6.3 Evaluation of recovery activities

The evaluation process included an initial assessment of the anticipated social and economic effects of each recovery activity identified in this action plan over the five-year period of the plan, followed by a re-assessment that considered the feedback received during consultation. The evaluation grouped the recovery approaches as follows: 1)

Protection; 2) Population Assessment, Threat Clarification Research, and Communication; and 3) Identification of Critical Habitat.

Estimated expenditures are taken from Table 1, which provides a comprehensive summary of actions that could be done should funds be available. The implementation of specific activities is however subject to the appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

1). Protection

If all proposed activities were to be funded, expenditures on sea otter protection may increase by an estimated $40 to $43 thousand[18,19] per year over the next five years. Of this amount, an approximate $26 to $28 thousand per year may be directed to community oil spill response training. First Nations, coastal communities, and others may benefit by working and training with oil spill response teams, which will result in increased community capacity-building and increased general capacity to respond to oil spill emergencies on Canada's west coast.

Oil spill response activities are not expected to negatively affect First Nations, coastal communities, fishermen or other stakeholders. However, there may be negative impacts, e.g., to fisheries and/or marine mammal viewing, in the event that specific area and/or seasonal closures are implemented to minimize disturbance to habitat or areas important to sea otters, or to protect 'critical habitat' (Section 3.1.4). Until important habitat areas and 'critical habitat' have been identified, it is not known whether there will be any effect. Consideration for appropriate measures (e.g., seasonal closures) would first involve Fisheries & Oceans Canada working with potentially affected First Nations, fishermen, aquaculture operators and regulators, and eco-tourism operators towards minimizing impacts. As required by *SARA*, any impact would be monitored as part of the report on the socio-economic impacts of the action plan to be completed five years after the plan comes into effect.

2). Population Assessment, Threat Clarification Research and Communication

If all proposed activities were to be funded, expenditures towards sea otter assessment, research, and communications activities may increase by an estimated $228 to $246 thousand per year over the next five years. Of this amount, First Nations, coastal communities, fishermen and others may benefit from an estimated $152 to $155 thousand per year by being employed to work with researchers and assist in the following priority activities: population abundance surveys, health monitoring, assessing other sources of mortality, and communications to raise public awareness. These potential short-term employment opportunities could provide long-term benefits through community capacity-building.

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[18] Estimated expenditures are presented as net present value which is "calculated by applying a discount rate to the cost estimates for each year" (Treasury Board Secretariat, "Benefit-Cost Analysis Guide For Regulatory Programs," by Consulting and Audit Canada: 1995 pg. 22).

[19] All calculations in Section 6.2 are based on a 5% and 0% interest at time equal to 0.

The activities in these three approaches are not anticipated to negatively affect First Nations, fishermen, and other stakeholders as the activities are primarily for research, information gathering, and communication.

3). Identification of Critical Habitat

If all proposed activities were to be funded, federal government expenditures for the identification of critical habitat for sea otters may increase an estimated $75 to $81 thousand per year over the next five years. Of this amount, First Nations, coastal communities, fishermen and others may benefit from an estimated $27 to $28 thousand per year by being employed to work with researchers and assist in the identification of important rafting and foraging areas.

It is not anticipated that these research activities will negatively affect First Nations, coastal communities, fishermen or other stakeholders as the activities are primarily research for habitat identification. The potential effects of protecting critical habitat is discussed above under Section 6.3.1.

6.4 Summary

If all proposed activities were to be funded, implementation of the action plan may increase expenditures on sea otters[20] above existing programs by an estimated $343 to $369 thousand per year over the next five years. Primarily this action plan identifies research and oil spill response activities that have few negative socio-economic ramifications. However, Section 6.3.1 identifies a potential for negative impacts in the future in the event that closures (e.g., to fishing or marine mammal viewing) result from the identification of important or critical habitat. In the event that the action plan must be amended[21] to incorporate new findings prior to the 5 year re-evaluation timeline (e.g., a definition of critical habitat), the socio-economic impacts will be re-considered at that time.

As the action plan is implemented, avenues will be explored to work with First Nations, coastal communities, eco-tourism operators, shellfish harvesters, fishermen and others. For example, Habitat Stewardship Program[22] funding may provide opportunities for First Nations and community-based sea otter recovery projects and for leveraging additional funding to these local projects. These short-term employment and funding opportunities should provide long-term benefits by building increased community capacity.

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[20] In general, funding for species at risk may be provided through federal and provincial funding initiatives within lead agencies (e.g., Fisheries & Oceans Canada, Parks Canada Agency, Environment Canada, BC Ministry of Water, Land and Air Protection), federal funding sources (e.g., Interdepartmental Recovery Fund), federally-funded stewardship initiatives (e.g., Habitat Stewardship Program) and other sources (e.g., World Wildlife Fund's Endangered Species Recovery Fund).

[21] *SARA* s.52.

[22] The Habitat Stewardship Program (HSP) for Species at Risk is a partnership-based conservation initiative sponsored by the Government of Canada. The Program is administered by Environment Canada (EC) and managed cooperatively with Fisheries and Oceans Canada (DFO) and the Parks Canada Agency (PCA). (www.cws-scf.ec.gc.ca/hsp-pih/default_e.cfm)

The socio-economic effects of the recovery activities 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-economic impacts five years after the plan comes into effect*"[23]. The socio-economic effects of a recovered sea otter population may be better defined and reported on as part of the re-evaluation, based on the socio-economic review (Section 3.4.1), the habitat model (Section 3.2.3), and determination of the size and distribution of the 'recovered' sea otter population (in 2006; Section 3.2.4).

7. PERMITTED ACTIVITIES[24]

Existing aboriginal and treaty rights are recognized and affirmed in Section 35(1) of the *Constitution Act, 1982*. Fisheries & Oceans Canada does not have the mandate or expertise to determine the existence, nature or scope of aboriginal or treaty rights but seeks to manage in a manner that does not unjustifiably infringe any existing aboriginal or treaty rights.

In accordance with subsection 83(4) of *SARA*, Fisheries & Oceans Canada may permit the taking of a limited number of sea otters by aboriginal people for food, social, and ceremonial purposes (*e.g.,* for use in ceremonial regalia). Any such taking of sea otters will be subject to scientific assessment and advice from the recovery team that demonstrates to the satisfaction of Fisheries & Oceans Canada that the taking will not jeopardize the survival or recovery of the species, and must be authorized pursuant to licence issued under the *Fisheries Act* or regulations.

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[23] *SARA* s.55.

[24] *SARA* s.83(4).

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9. GLOSSARY OF TERMS

Acute effect – An adverse effect resulting from a single or short-term exposure to a substance.

Benthic – A term that refers to the ocean bottom or seabed. Benthic animals are those who live on or in the seafloor.

Carrying capacity – This is the maximum population size that can be supported by an area or environment. This is a theoretical concept. In reality, carrying capacity changes as conditions change. This is also known as "K". Also see "equilibrium density".

Chronic effect - An adverse effect resulting from long-term exposure to a substance.

COSEWIC – Committee on the Status of Endangered Wildlife in Canada, an independent national body responsible for scientific assessment of the status of wild species.

Critical habitat – defined in the Species At Risk Act as the habitat necessary for the survival or recovery of a species and identified as critical habitat in a recovery strategy or an action plan. Under *SARA*, the destruction of critical habitat is prohibited.

Deleterious recessive alleles – Alleles are alternate forms of genes (brown, blond, red and black hair represent different alleles of the same gene). The effect of a single recessive allele is masked by a dominant allele, however when an individual inherits two recessive alleles for the same trait it is potentially harmful. This often occurs due to inbreeding in small populations. Also see genetic diversity.

Demography – A term that refers to the characteristics of a population. Usually processes which affect the size of the population, birth rates, death rates, immigration, and emigration.

Dinoflagellate – A microscopic organism that drifts in the water. Some species cause 'red tide' (Paralytic Shellfish Poisoning or PSP).

Equilibrium density – The density of a population at carrying capacity. This is the state at which the population size remains almost steady with birth and immigration rate equal to the death and emigration rate.

Extant population – A population in existence.

Extinct – A species that no longer exists.

Extirpated – A species that no longer exists in the wild in part of its range but exists elsewhere. COSEWIC defines an extirpated species as one that no longer exists in the wild in Canada but occurs elsewhere.

Endangered – COSEWIC uses this term to define a species facing imminent extirpation or extinction.

Fecundity – The number of offspring produced by an individual during some period of time.

Genetic diversity – This is a measure of the number of alternate forms (alleles) of genes in a population. Populations that have become small generally have low genetic diversity. Genetic variability is what ultimately allows individuals to cope with changing environments. See also 'deleterious recessive alleles'.

Hypothermia – A condition in which the body core temperature drops to a dangerously low level.

Immune suppression – The ability of the immune system to fight off infection or disease is reduced. Contaminants such as PCBs, lead and mercury may cause immune suppression in many animals.

Invertebrates – Animals without backbones; edible marine invertebrates are commonly referred to as 'shellfish'.

Metabolic rate – The rate at which an animal uses energy to maintain body temperature and activity. Sea otters, which must consume 25-33% per day of their body weight in food to maintain their elevated body temperature and activity level, have high metabolic rates.

Polygynous – Referring to a reproductive strategy where males mate with more than one female.

Precautionary approach – An approach to management that says we must err on the side of caution when making decisions about systems we do not fully understand.

Raft – An aggregation of resting sea otters.

Recruitment – Increases to a population caused by the addition of new animals to the adult population, either through birth or immigration.

Residence – Defined in the Species at Risk Act 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".

Shellfish – Common term for edible marine invertebrates (e.g., clams, crabs, shrimps, sea urchins, sea cucumbers).

Soft-bottomed communities – The organisms that live in and on gravel, mud and sand bottoms. Marine invertebrates such as clams, worms and sea pens are members of soft-bottomed communities.

Special Concern – COSEWIC applies this status to species that are of conservation concern because of characteristics that make it particularly sensitive to human activities or natural events.

Threatened – COSEWIC defines a threatened species as one that is likely to become endangered if limiting factors are not reversed.

APPENDIX I OIL SPILL RESPONSE

In the event of a major marine oil spill in British Columbia, an established oil spill response protocol is initiated. The lead federal agency is the Canadian Coast Guard (CCG) under the *Canada Shipping Act*, while the *Emergency Program Act* establishes the BC Ministry of Water, Land and Air Protection (MWLAP) as the lead provincial agency. These agencies work in partnership with other branches of government and with industry in order to ensure proper clean-up and protection of natural resources. The individual or company responsible for an oil spill (the 'Responsible Party', or RP) is also the party legally responsible for leading spill response. If the RP is unable or unwilling to manage the spill, or is unknown, provincial and federal governments will manage oil spill response efforts instead, through their own Incident Management Teams (IMTs). Where the RP takes control of the response efforts, government agencies will assume a monitoring role to ensure that environmental protection priorities are being met. Government agencies establish the environmental protection priorities – such as what species get the highest protection priorities, restrictions on shoreline cleanup, when a shore is considered clean, etc. Government may also provide resources to the RP to augment the response – generally based on cost recovery. These resources may be in the form of trained specialists, technology, equipment, and/or facilities. It is into this system that a sea otter oil spill response plan must fit.

Most vessel owners in Canada – including all oil tankers of 150 GWT and above, and all other vessels 400 GWT or greater, as required by the *Canada Shipping Act* – subscribe to a certified Response Organisation. The only Response Organisation on Canada's west coast is Burrard Clean Operations (BCO); in the event of an oil spill by one of its subscribers, BCO sets up an IMT either on its own or jointly with the Responsible Party. The RP always has the Incident Command function.

BCO uses the Incident Command System (ICS), an organisational structure that is employed across North America as a framework from which to manage major emergency incidents. Wildlife rescue and rehabilitation efforts take place under the Operations Section of ICS, specifically through the Wildlife Branch of that structure.

Within the incident management organization for industry and government in British Columbia, there is an integrated relationship that fosters timely development of Incident Action Plans to guide field operations, and an oversight/advice mechanism to ensure that government and other stakeholders are in agreement with – or have articulated – the environmental protection priorities provided to Incident Command. The two entities involved in this process are the ICS Environmental Unit, and the Regional Environmental

Emergency Response Team (REET), an arms-length organization co-chaired by Environment Canada and MWLAP.[25]

The Environmental Unit resides under the ICS Planning Section and is usually staffed by Technical Specialists from government in such subject areas as oil spill trajectory analysis, shoreline assessment, and species at risk. Other personnel may be community stakeholders such as First Nations, fishermen, or tourist operators that can provide first hand local knowledge of the affected area. The Environmental Unit may deploy field observers to determine the actual oil trajectory and what natural resources are at risk (e.g. bird colonies, seal haulouts, sea otter populations, sensitive shorelines). All these activities operate under the Environmental Unit function under ICS protocols and are generally paid for by the Responsible Party.

Working in conjunction with the Environmental Unit is the REET. Whereas the former has a direct influence on establishing the Incident Action Plan to guide operations on such activities as offshore booming, nearshore protection, shoreline cleanup, and wildlife rescue, the REET's primary role is to validate the priorities and advise their respective Command representatives – i.e., the Provincial Incident Command or Federal Monitoring Officer.

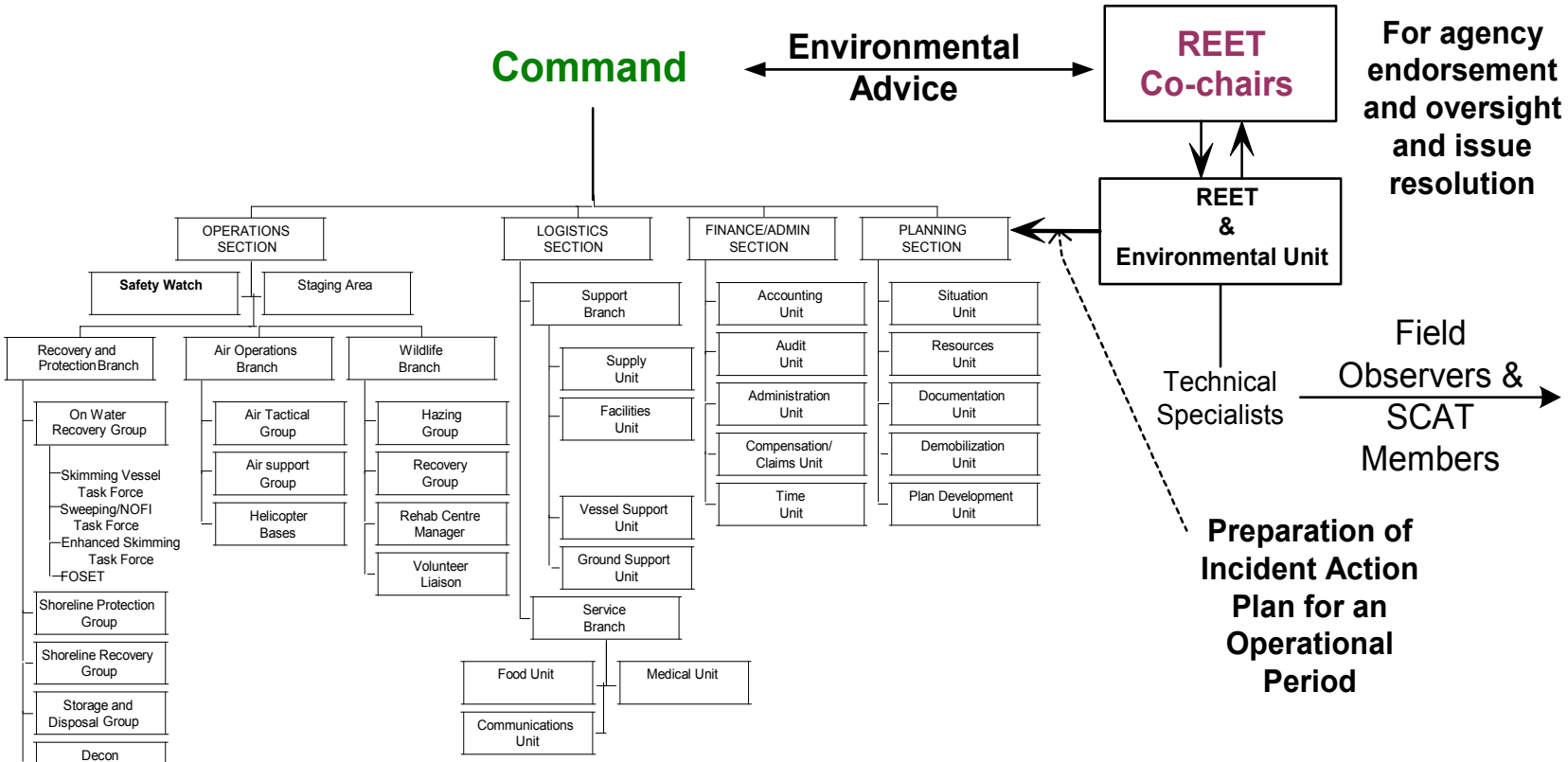
The REET – in both a governance and technical role – establishes the performance standards and quality insurance regarding personnel selection; and analyzing, gathering, and interpreting any information pertaining to the establishment of environmental priorities. REET is responsible to ensure that stakeholders with a legitimate interest in the spill impacts and response measures are included in the process. The REET members – *via* its co-chairs - provides environmental advice to Command, and identifies issues that may need to be resolved. On the other hand, the Environmental Unit is tasked with the technical delivery and compilation of environmental and stakeholder information in accordance with the REET standards.

REET and Environmental Unit personnel may be the same. Any government personnel with the Environmental Unit are providing the technical inputs without prejudice and without losing or abdicating agency authority, responsibility, or accountability.

Provincial roles

The Province of BC's lead agency on oil spill response, the Ministry of Water, Land and Air Protection, will invoke the *BC Marine Oil Response Plan* in response to a major oil spill. This plan is built around the internationally-recognised ICS structure. Provincial response to a major oil spill will likely be shared with other levels of government (e.g.,

[25] An Environmental Unit is a common element in the Incident Command System organization for oil spills. An Environment Unit has been adopted by Burrard Clean Operations' Response Management System, the BC Marine and Inland Oil Spill Response Plans, by US State and Federal agencies, and most shipping and oil companies. The Environmental Unit does not reside in the CCG Response system – the Regional Environmental Emergency Response Team assumes this role.



The Environmental Unit and Regional Environmental Emergency Response Team Organizational Relationship

federal, local, First Nations) and with industry, under both Unified Command[26] and team integration principles – all to be done in accordance with established ICS protocol.

Initial callout of the provincial Incident Management Team is done through the Environmental Emergency Management Program headquarters in Victoria, where member names and contact information of team members are maintained. A Provincial Incident Commander will be present in all major spills, and other provincial IMT members will be involved depending on the spill complexity and demands. Technical specialists – in biology, geomorphology, GIS, species at risk, etc. – within the Ministry may also be required to participate as part of the provincial response effort.

Minor spills – those which do not cross jurisdictional boundaries and/or require and IMT – are managed by regional Environmental Emergency Response Officers.

The Province of BC recognises that marine mammals are primarily a federal responsibility, but participates in marine mammal response through responding to associated oiled habitat concerns and protection of affected parks and protected areas. The Ministry of Sustainable Resource Management's Coast Information System and Marine Oil Spill Information System (OSRIS) facilitates priority-setting around important areas of wildlife habitat and other coastal resources. Environmental advice by the province will be vetted through the Regional Environmental Emergencies Team (REET).

Federal roles

Personnel from Parks Canada Agency and the Habitat Enhancement Branch (HEB) of Fisheries and Oceans Canada (DFO) also participate in REET. REET is activated during *moderate to major spills*, and its regional and local experts provide advice on species, habitats, and shorelines at risk and environmental protection priorities directly to the CCG's Federal Monitoring Officer (FMO). Although not formally part of an Incident Command System structure, REET works in conjunction with the Environmental Unit of an ICS Planning Section – and is often comprised of the same people. The Canadian Coast Guard's *Marine Spill Contingency Plan* also uses ICS and is consistent with the *BC Marine Oil Spill Response Plan*, except that the CCG by national policy does not endorse the use of Unified Command and works in a parallel response structure with the other agencies operating under Unified Command.

DFO Radio Room and Environment Canada have an Emergency Spill Response Notification List that provides office and after hours contact numbers for HEB water quality staff in DFO. New notification procedures are being developed to include DFO Conservation & Protection staff, Area Directors, Science Directors and Resource Managers. A Regional Working Agreement establishes a joint response procedure for Environment Canada and DFO to conduct assessments and evaluate methods for restoring habitats impacted by spills or other deleterious substances.

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[26] Unified Command is where jurisdictions share in command decisions, but without abrogating legal or mandated responsibilities of their government or company.

Provision of marine resources data in response to *minor spills* is undertaken by area-based DFO Habitat Enhancement Branch personnel.

International roles

BC is a signatory to the Pacific States/British Columbia Oil Spill Task Force, through a Memorandum of Cooperation (MoC) with Washington, Oregon, California, Alaska and Hawaii. Initiatives carried out under this MoC include such activities as production of protocols for oiled wildlife rescue and rehabilitation; development and signing of a joint resolution on vessel traffic routing; mutual aid agreements; and promotion of multi-party spill exercise programs.

Joint contingency plans (CANUSDIX – Dixon Entrance area, and CANUSPAC – Juan de Fuca area) exist for Pacific boundary waters, and include wildlife response components. Under these plans, Canadian wildlife representatives work through REET while US resource agency representatives are situated in the Environmental Unit of the ICS Planning Section. The provincial government will work in conjunction with both the Environmental Unit and REET, and will provide a Provincial Incident Commander to represent the Province in Unified Command. Participants in CANUSDIX and CANUSPAC working groups represent US and Canadian federal agencies, state and provincial agencies, NGOs and industry. In international scenarios, recommendations regarding sea otter responses will be made by the US Fish and Wildlife Service and DFO.

APPENDIX II RECORD OF COOPERATION AND CONSULTATION[27]

Sea otters are an aquatic species under federal jurisdiction, managed by Fisheries and Oceans Canada: 200 - 401 Burrard Street, Vancouver, BC. V6C 3S4.

Fisheries and Oceans Canada engaged a Sea Otter Recovery Team to work cooperatively in the development of this action plan. The Recovery Team membership is provided in Appendix III. Representatives to the Nuu-chah-nulth Tribal Council who sit on the Sea Otter Recovery Team also ensure there is information exchange on sea otter recovery, planning and activities with the West Coast Vancouver Island Wildlife Advisory Committee, established as a Nuu-chah-nulth Treaty Related Measure.

Consultation workshops, organized by Fisheries and Oceans Canada and the Recovery Team were held to solicit information, input and feedback on the draft action plan. The workshops, held February 7 - 21, 2004 in Bella Bella, Kyuquot, Massett, Nanaimo, Port McNeill, Prince Rupert, Skidegate, Tofino, Vancouver and Victoria, BC, were open to all those interested in sea otter recovery. The primary purposes were to receive input on an earlier draft of this action plan, and to continue to encourage, support and promote recovery activities. All coastal First Nations and over 400 individuals from environmental groups, the eco-tourism sector, commercial and recreational fishing sectors, marine mammal organizations and the general public were specifically invited to participate. Sixteen public announcements were made. A presentation was also made to the BC Aboriginal Fisheries Commission March 24, 2004.

[27] *SARA* s.48.

Representatives from the following organizations attended and provided input at the workshops: Archipelago Management Board (AMB), Archipelago Marine Research Ltd., Bamfield Marine Sciences Centre, BC Aboriginal Fisheries Commission, BC Parks, Broken Island Adventures, Clayoquot Biosphere Trust, Council of the Haida Nation, Crab Fisherman, D&D, Prince Rupert Daily News, Dogfish Association, Friends of the Wild Side, Geoduck Fishermen, Haida Fisheries Program, Ha-Shilth-Sa Newspaper, Ha-Kiusta Haida Gwaii, KNT, Kyuquot B&B, Ka:'yu;'k't'h'/Che:ktles7et'h' First Nations, Ka:'yu;'k't'h'/Che:ktles7et'h' Fisheries, Laskeek Bay Conservation Society, Mowachaht/Muchalaht Fisheries Program, Naden Haida Gwaii, Northwest Habitat Foundation, Nuu-chah-nulth Tribal Council, Pacific Northwest Expeditions, Parks Canada Haida Gwaii, Parks Canada Pacific Rim, Council of Haida Nations, Prince Rupert Environmental Society, Prince Rupert resident, Raincoast Conservation Society, Red sea urchin fisherman, Remote Passages Marine Excursions, Retired Fishermen, Sea Kayak Guides Alliance of BC, Seafood Harvesters, Self-employed Boat Charter, Shellfish Farmer Consultant, Straitwatch/Cetacean Siting Network, Students, Subtidal Adventures, The Observer, Tla-o-qui-aht First Nations, Tofino resident, Tofino Sea Kayaking, Tseshaht First Nations, Ucluelet, Underwater Harvesters Association.

Input from the workshops was compiled from the notes taken at each of the 10 meetings and the participant's evaluation forms by Julia Gardner, Dovetail Consulting Inc. The report compiles the input into the five categories of recovery activities in the draft action plan, the costs and benefits related to sea otter recovery and to the recovery activities, and into themes that cut across the five types of recovery activities. The report and the individual meeting notes are available at the Fisheries & Oceans Canada website (www-comm.pac.dfo-mpo.gc.ca/pages/consultations/sea-otters/default_e.htm).

The action plan was also made available in advance of the workshops. Comments were welcomed through written submissions and via the Fisheries & Oceans Canada website. Written comments were submitted by: BC Seafood Alliance, Defenders of Wildlife (based in Washington, DC) and an e-mail campaign, Life Force Society, Prince Rupert Chamber of Commerce, and Underwater Harvesters Association.

The workshops stimulated local media interest as well. Articles following the workshops were published/aired in: Ha-Shilth-Sa February 12, Ha-Shilth-Sa February 26, The Daily News Prince Rupert February 19, CBC Radio On the Island February 23, City Pulse TV Vancouver February 21, The Observer March 24, 2004.

Input from the workshops and the written submissions has been incorporated into this document wherever possible.

APPENDIX III SEA OTTER RECOVERY TEAM

Louise Blight	Species at Risk Biologist, Terrestrial Ecosystem Science Section, Biodiversity Branch, BC Ministry of Water, Land and Air Protection
Fred Carpenter	Co-management Director, Heiltsuk Fisheries Program
Laurie Convey (Chairperson)	Resource Management Biologist, Fisheries and Oceans Canada, South Coast Area, 3225 Stephenson Point Rd., Nanaimo, BC, V9T 1K3 phone 250-756-7163, e-mail: conveyl@pac.dfo-mpo.gc.ca

Roger Dunlop	Regional Fisheries Biologist Nootka-Kyuquot, Nuu-chah-nulth Tribal Council
Carole Eros	Species at Risk Recovery Planner, Fisheries and Oceans Canada, Resource Management Branch Pacific Region
John Ford	Marine Mammal Scientist, Fisheries and Oceans Canada, Science Branch, Conservation Biology Section, Pacific Biological Station
Rick Harbo	Senior Resource Management Biologist, Fisheries and Oceans Canada, South Coast Area
Leonard John	Fisheries Program Manager, Ka:yu:k't'h/Che:ktles7et'h First Nations
Marilyn Joyce	Marine Mammal Resource Coordinator, Fisheries and Oceans Canada, Resource Management Branch Pacific Region
Tim Joys	BC Seafood Alliance
Linda Nichol	Marine Mammal Biologist, Fisheries and Oceans Canada, Science Branch, Conservation Biology Section, Pacific Biological Station
Midori Nicolson	Coastal Planner - Oceans, Fisheries & Oceans Canada, Central Coast Area
Paul Preston	Resource Manager, Fisheries & Oceans Canada, South Coast Area
Cliff Robinson (alternate)	Marine Ecologist, Parks Canada Agency, Ecosystem Services, Western Canada Service Centre
Juanita Rogers	Resource Management Biologist, Fisheries & Oceans Canada, North Coast Area
Pippa Shepherd	Species at Risk Co-ordinator, Parks Canada Agency, Ecosystem Services, Western Canada Service Centre
Scott Wallace	Sierra Club of BC
Jane Watson	Marine Ecologist, Malaspina University College
Clint Wright	Vancouver Aquarium Marine Science Centre

APPENDIX IV SEA OTTER RECOVERY ACTION GROUPS

- West Coast Aquatic Management Association (Habitat Stewardship Program 2004/5).
- Vancouver Aquarium Marine Science Centre (Habitat Stewardship Program 2003/4).
- Nuu-chah-nulth Tribal Council (Habitat Stewardship Program 2002/3).

Additional groups who are involved in sea otter recovery activities or have indicated an interest in being involved are listed in Table 1 ('Co-operators').