Communities Play an Important Role in the Recovery of Marine Species at Risk: Pinto Abalone and Sea Otter on the West Coast of Vancouver Island

E. ANNE STEWART

Bamfield Marine Sciences Centre, Bamfield, BC, V0R 1B0, Canada, email anne.lstewart@Community.RoyalRoads.ca

Abstract: The British Columbia coast is in the center of a kelp forest ecosystem that extends along the Pacific coast of North America. Many marine species at risk depend either directly or indirectly on this system. This paper examines community recovery efforts for two marine species at risk, the pinto abalone (*Haliotis kamstchatkana*) and the sea otter (*Enhydra lutris*), on the west coast of Vancouver Island, British Columbia. The Nuu-chah-nulth First Nations and other coastal communities play critical roles in the recovery of these two species, and those efforts are examined here in light of improving collaboration and cooperation with the federal lead agencies responsible for marine species at risk recovery, namely Fisheries and Oceans Canada and Environment Canada.

Key Words: pinto abalone¹, northern abalone, *Haliotis kamstchatkana*, sea otter, *Enhydra lutris*, Nuu-chah-nulth First Nations, traditional ecological knowledge, community conservation, marine species recovery, species at risk, British Columbia

West Coast Kelp Forests

Extreme northern distributions of ecosystems such as Garry oak meadows and the grasslands of the South Okanagan are well known in the Canadian species at risk scene. Less well known are the kelp forests of the outer west coast of Canada, which are at the center of their north-south distribution and support, either directly or indirectly, a large number of listed species at risk including the pinto abalone (*Haliotis kamstchatkana*), sea otter (*Enhydra lutris*), marbled murrelet (*Brachyramphus marmoratus*), killer whale (*Orcinus orca*), humpback whale (*Megaptera novaeangliae*), and various salmonids, to mention a few.

The Nuu-chah-nulth First Nations’ traditional territories extend out to sea and along the outer coast of Vancouver Island, British Columbia (B.C.) from the Makah territories of northwestern Washington State in the south to the Kyuquot/Checleset territories in the north. There are fourteen amalgamated nations on the Canadian portion of this region. Cultural and linguistic diversity is great, and in the small area of Barkley Sound, 15 nautical miles in width across the mouth of the sound, six separate nations exist today, one of which is the Huu-ay-aht First Nation. The richness of the kelp forest ecosystem, combined with the coastal upwelling system (Thomson

¹COSEWIC (November 2004) lists *Haliotis kamstchatkana* as the northern abalone; NatureServe Explorer (version 4.0, July 2004) lists it as the pinto abalone.
of the offshore banks, supported an estimated 10,000 people at the time of European contact. The Nuu-chah-nulth First Nations never signed treaties with the government of Canada or the province of British Columbia; therefore, they have not relinquished title to their traditional territories. They have, however, been systematically excluded, through hegemony and legislation, from meaningful coastal management input.

This paper presents two case studies of marine species at risk recovery in the nearshore kelp forest ecosystem within the traditional territories of the Nuu-chah-nulth First Nations on the west coast of Vancouver Island. The pinto abalone and the sea otter coevolved in the kelp forests of the northeastern Pacific. Both species have been recognized and utilized as cultural resources by the Nuu-chah-nulth people for millennia (McMillan 2003), and by others more recently; therefore, the broader social ecological system is considered here. The recovery efforts discussed in this paper are centered in Barkley Sound where the Bamfield Huu-ay-aht First Nation community has realized the power of community learning and engagement in working together to recover these marine species at risk.

**Pinto Abalone Case Study**

Most of the recovery efforts that have taken place in the Barkley Sound area to date have been directed towards the pinto abalone. Abalone are considered to be a delicacy and are called *apsi’yin* in most Nuu-chah-nulth dialects. The beautiful shell with its rainbow-colored nacre is used for jewellery, art inlay work, and ceremonial regalia, and was used traditionally in the production of fishing lures. Archaeological studies of faunal remains in Barkley Sound have found *apsi’yin* in Nuu-chah-nulth middens dating back 5000 years (McMillan 2003), indicating a long relationship between *apsi’yin* and the Nuu-chah-nulth.

More recently, abalone have been exploited by a commercial dive fishery managed by Fisheries and Oceans Canada (DFO). This fishery was characterized by a ‘killer spike’ of very high landings like many of the so-called ‘gold rush fisheries’. Abalone harvesting has been closed coastwide since 1990 in an attempt to halt the rapid decline in the population. When populations not only failed to recover during nine years of ‘protection’, but declined further, the species was designated as Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Jamieson 1999). The high value of abalone in the black market contributes to illegal fishing. Globally, abalone poaching has connections to organized crime (Brian Jubinville, pers. comm.). The Bamfield Huu-ay-aht Community Abalone Project is fighting abalone poaching on the west coast.

The Bamfield Huu-ay-aht Community Abalone Project was initially formed to address abalone recovery strategies identified by lead government agencies while at the same time building community capacity\(^2\) and life-long learning. The project is a nonprofit society with three

---

\(^2\)Community capacity refers to the capacity for both species conservation and economic development, which is a strong motivator. Capacity is built through training, volunteerism, education, and on-the-job experience.
partners: the Huu-ay-aht First Nation, the Bamfield Community School Association, and the Bamfield Marine Sciences Centre. These partners bring diverse interests and expertise to the table. There is strong incentive for the Huu-ay-aht to get abalone off the species at risk list as a means of restoring the kelp forest ecosystem in their territories, developing economic opportunities, and saving seafood species for future generations. The Bamfield Community School Association is interested in learning, building community capacity, and maintaining community health. The Bamfield Marine Sciences Centre, operated by the five major western universities, is concerned with research, education, and community stewardship.

**Project Objectives and Activities**

The objectives of the Bamfield Huu-ay-aht Community Abalone Project are to

- conserve, protect, and recover abalone stocks;
- promote community stewardship through outreach and educational activities; and
- raise public awareness and support for the project.

The project identifies and addresses the following activities in its Abalone Recovery Strategy and Action Plan:

- Monitor populations and characterize critical habitat
- Raise public awareness
- Develop aquaculture technology and capability
- Conduct out-planting experiments
- Stop illegal harvesting

**Population Monitoring**

Abalone population monitoring and habitat stewardship have involved volunteer community divers, and students and staff from the Bamfield Marine Sciences Centre. Collaboration with Parks Canada and DFO divers has been limited but productive. A Remotely Operated Vehicle (ROV) is also used for monitoring. Parameters such as abalone length, density, frequency of occurrence, sex, fecundity, and community associations, including those with other invertebrates, algae, and fish, are recorded.

Nocturnal dives have been important in identifying critical habitat for juvenile abalone, which is a necessity for out-planting studies (Mortimor et al. 2003). Multivariate analyses using Primer© software have been useful in characterizing habitat. Students and volunteers have been crucial to the success of this underfunded component of the project.
Raising Public Awareness

The public education program at the Bamfield Marine Sciences Centre is raising awareness about abalone, sea otters, and the nearshore kelp forest ecosystem. The program works with a multitude of community partners from school districts across B.C. and Alberta, to colleges, universities, and the Nuu-chah-nulth First Nations. Over 10,000 students have participated in the abalone awareness programs. Outreach events for the general public have been popular from Victoria to Tofino as have the in-classroom presentations and activities. Experiential action learning has also been an important building block in this program. Work experience opportunities including mentoring, job shadowing, and youth forums for Grade 11 and 12 students from B.C. and Alberta offer hands-on credit learning options and the prospect of taking individual action plans back to the students’ communities. Huu-ay-aht science camps support similar experiences for Huu-ay-aht youth and validate and promote respect for traditional ecological knowledge.

Multimedia communications also play an important role in raising public awareness. Existing vehicles such as ‘Ocean News’ learning packages for middle school students and teachers are used, and the ‘OceanLink’ outreach web site (www.oceanlink.island.net), which targets youth, had over 12 million hits last year. The film, ‘Abalone Odyssey’, which is about the Bamfield Huu-ay-aht abalone project, is now being commercially distributed to school districts across North America. This wonderful film by Simon Schneider, Shiny Shell Productions, is accompanied by a teacher’s guide that was developed by the project. ‘Abalone Advocates’, a suite of learning activities with a teacher’s guide, is another example of curriculum development, in this case, one that is designed specifically for urban, middle school classes.

Building Community Capacity: Developing Aquaculture Technology and Capability

Building community capacity locally is an important aspect of the abalone recovery project. The aquaculture component of the project has been key to engaging local interest. It provides opportunities for training Huu-ay-aht and other local abalone aquaculture technicians, and provides experience in informal teaching, ecosystem learning, group dynamics, and facilitation. The project has also allowed for cooperative education students and graduate students to participate in abalone recovery research.

The outstanding, original research and technology aspects of abalone aquaculture are largely due to the hard work and leadership of manager Guy White and his colleague, Dr. Dawn Renfrew. DFO permitted this work by allowing access to brood stock under very stringent terms. Population assessments are conducted to ascertain that sufficient densities exist to allow for the collection of brood stock. This is witnessed by an independent observer designated by DFO. Collected brood stock is then sexed, weighed, measured, and tagged with permanent tags. DNA samples are taken for analysis and individual identification by Dr. Ruth Withler of the Pacific Biological Station in Nanaimo.
Results have shown that abalone culture is not only feasible, but that seed stock can be provided for out-planting experiments (see below). Without aquaculture, there would be no out-planting experiments.

It should be noted that the local community continues to have a strong interest in this project for economic diversification purposes. Many community members feel that the out-planting effort will, in the long run, only provide food for returning sea otters and that the future of abalone as an economic consideration lies wholly in the aquaculture enterprise.

**Out-planting Experiments**

Abalone out-planting experiments are conducted with both juveniles and competent eyed larvae. A number of preparatory dives are performed both day and night to assess population density, and close attention is paid to juveniles. Immediately before out-planting, other invertebrates are temporarily removed from the vicinity of the out-plant site. This allows the young abalone time to get up on their foot, adjust to their new environment, and either take hold or move if confronted by a predator. Juveniles are anaesthetized prior to translocation, and larvae are treated to induce metamorphosis just before release. Juveniles and competent eyed larvae are released in built ‘abitats’\(^3\), natural crevices, and hiding spots. Out-planting sites are carefully guarded by members of the Barkley Sound Abalone Coast Watchers. Follow-up dives to monitor success have shown encouraging preliminary results.

These experiments are a partnership in science and would not be possible without the generous support of the project society, volunteers, and students. Even high school students have contributed by conducting original research on juvenile abalone behavior.

**Stopping Illegal Harvesting**

Illegal harvesting has been identified as one of the major threats preventing the recovery of abalone. In response to this, an Abalone Coast Watch program with over 70 members has been established to stop abalone poaching in southern Barkley Sound. Based on the Block Watch and Neighbourhood Watch programs, this is a passive crime prevention program with a strong communications campaign to let would-be poachers know they are being watched and reported. Reports can be made to either DFO or the local First Nations fisheries office. Huu-ay-aht First Nations fisheries guardians, and shellfish and aquaculture crews are proving invaluable for on-the-ground participation in Abalone Coast Watch. Through a series of community workshops mediated by the project, the Abalone Coast Watch program has now expanded into a network extending to other First Nations in Barkley Sound, to the Ucluelet and Toquaht First Nations, and to the Clay-o-qui-aht First Nations in Clayoquot Sound. The villages of Tofino and Ucluelet have also joined the network. During a group formation workshop in Opitsit near Tofino, it was

---

\(^3\) Abitats’ are small reefs made by divers specifically for out-planting young abalone.

suggested that the group be called ‘Gil Watch’ in reference to a convicted Tofino abalone poacher.

A large percentage of the DFO convictions for abalone poaching on this coast have originated from tips from the public; hence, the communications strategy developed around this is important. Collaboration with fisheries officers has led to significant improvements in reporting procedures.

Abalone Coast Watch is also an important means to empower community stewardship by involvement in a marine conservation project. Community incentive is high for the recovery of abalone, and residents are looking forward to the removal of this species from the ‘at risk’ list. It is the active engagement of the coastal communities who live on the edge of the abalone’s critical habitat that is crucial to the successful recovery of this species.

**Summary**

In order to maintain local commitment and to avoid cynical disinterest and even active obstruction of abalone recovery efforts, it is important that trust be upheld. Open communication about the possibilities of recovery has been lacking. Realistic recovery goals must be defined and developed on a more local basis. Currently, decisions about the status and trend of abalone recovery are based on two sites on B.C.’s north coast which are very much removed from west coast Vancouver Island populations and activities. Realistic recovery goals must take into consideration the long-term coevolution of abalone and sea otters and their resulting concurrent low densities.

**Sea Otter Case Study**

A rapid decline in the sea otter population occurred in the late 18th and early 19th centuries. Over-exploitation resulted in probable extirpation from B.C. in the last century and in the subsequent reintroduction of Alaskan stock a little over 30 years ago (MacAskie 1971; MacAskie 1987; Watson et al. 1996). The sea otter was designated as Endangered in 1978, its status was reexamined and reconfirmed in 1986, and then it was downlisted to Threatened in 1996 (DFO 2004).

The near elimination of the sea otter, considered by many as a ‘keystone predator’ species, most likely had a positive impact on the abundance, age, and size of marine invertebrate prey species, including abalone, in the kelp forest ecosystem (Breen 1982; Watson and Smith 1996; Watson 2000). Sea otters are capable of limiting both the populations and the sizes of many benthic invertebrate species on which they feed, some of which, like abalone, are important shellfish resources for humans (Estes et al. 1978; Estes and VanBlaricom 1985; Tegner and Dayton 2000; Watson 2000).
Biologists are well aware of two alternate stable states in the kelp forest ecosystem: one includes sea otters and extensive, deep, productive kelp beds with few large invertebrates; the other does not include sea otters, is dominated by sea urchin ‘barrens’, has large invertebrates like abalone, and has only a narrow band of kelp above the surge zone. Nuu-chah-nulth traditional ecological knowledge adds another ‘keystone’ species to this ecosystem—humans. Ethnographic evidence of the historic use of sea otters by Nuu-chah-nulth First Nations has been well documented (Drucker 1951; Vaughn and Holm 1982; Arima 1983). Sea otter remains have been found in middens throughout Nuu-chah-nulth territory, including at Hesquiat Harbour (Calvert 1980), Alberni Inlet (McMillan 1981), Ts’ishaa village on Benson Island (Crockford 2000; McMillan 2003), and the Makah village of Ozette in Washington State (Huelsbeck 1983).

In 2002/2003, as part of the Nuu-chah-nulth Tribal Council’s Sea Otter Habitat Stewardship Program, the Bamfield Marine Sciences Centre conducted ecological and archaeological literature searches and reviews related to sea otters. Community workshops were held in various Nuu-chah-nulth communities to raise awareness about the role of sea otters in nearshore ecosystems. This was a two-way learning experience for the biologists and the Nuu-chah-nulth. Hereditary chiefs, beachkeepers, fishers, and hunters have an intimate knowledge of their traditional territories, something that cannot be attained by biologists who might visit, at the most, for a month or so in the summer. Nuu-chah-nulth fisheries guardians conduct detailed sea otter censuses and kelp bed and critical winter habitat mapping. Input for the draft Sea Otter Recovery Strategy was passed on to the recovery team, and some of it has been incorporated into the latest version of the document. There is still great concern, however, about the hegemonic language in the recovery documents, although improvements over earlier versions have been made.

**Summary**

The 1996 listing of the sea otter as Threatened was based on 1995 data (Watson et al. 1996). Although more recent population estimates are available for the Kyuquot and Checleset Bay areas (Linda Nichol, pers. comm.), coastwide population numbers remain unknown; consequently, recovery goals for population numbers and distribution have not been determined. Engaging communities who are being deprived of access to seafood by a ‘recovering’ species is a difficult task when there is no goal post for recovery. Sensitivity to the way others put their worldview together is critically important for mutual understanding and cooperation when working to recover species at risk.

The Nuu-chah-nulth hold hereditary rights to the sea otter and responsibility for its management. When working in Nuu-chah-nulth communities, it is important to examine assumptions that may be in direct conflict with traditional Nuu-chah-nulth cultural and societal values and attitudes. The sea otter, like the pinto abalone, is listed as Threatened under the *Species at Risk Act*, and the recovery of both species is contingent on engaging and empowering local communities on the west coast of Vancouver Island, the majority of which are Nuu-chah-
nulth. Inclusion, validation and respect for Nuu-chah-nulth perspectives will go far towards protecting both sea otters and abalone in the long term.

From a sociological viewpoint, the traditional rights and responsibilities of the Nuu-chah-nulth hereditary chiefs must be taken into consideration. Nuu-chah-nulth people are an important shaper of the kelp forest ecosystem, and their traditional knowledge embraces the concept of a ‘balanced’ system which includes the Nuu-chah-nulth, sea otters, kelp forests, fish, and invertebrates, as well as the other marine species at risk that are largely missing. Effective recovery initiatives that engage local communities will have to become more inclusive, which means allowing for perspectives other than the conservation biology paradigm based on traditional, objective, western science. Validating the perspectives of First Nations and coastal communities while addressing the requirements of the Species at Risk Act recognizes the ‘human faces in species at risk recovery’, and will ultimately help advance a more holistic and balanced approach to marine species recovery.

Acknowledgments

Thanks to all the volunteers, community members and students, Bamfield Huu-ay-aht Community Abalone Project, Bamfield Marine Sciences Centre, Liz Woodford, Kate Henderson, Kat Peace, Sarah Tyne and all of the Public Education crew, James Mortimor—Bamfield Marine Sciences Centre dive officer, Roger Dunlop and Josie Osborne, Nuu-chah-nulth Tribal Council Fisheries, Huu-ay-aht, Ucluelet, Toquaht, Tla-o-qui-aht Fisheries Guardians and crews, Karen Haugen and Sandra Mulligan, Parks Canada, Aboriginal Liaison Office, Pacific Rim National Park Reserve and last, but certainly not least, Steve and Karen Charleson, Hesquiaht First Nation. The Bamfield Huu-ay-aht Community Abalone Project gratefully acknowledges funding from the Canada Habitat Stewardship Program and World Wildlife Fund’s Endangered Species Recovery Fund.

References


**Personal Communications**

Brian Jubinville, DFO Special Investigations, Nanaimo, British Columbia.

Linda Nichol, Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo, British Columbia.