

Contemplating One-Sided Clams: The Northern Abalone Quincunx

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Introduction

IN THIS PAPER I DISCUSS A PROPOSED NATIONAL MARINE CONSERVATION AREA in British Columbia, Canada, using northern abalone (*Haliotis kamtschathkana*) as a lens through which regional communities can view issues of culture, commerce and conservation. Indigenous Haida people, whose traditional territory includes Haida Gwaii (Queen Charlotte Islands), sometimes refer to northern abalone as “one-sided clams.” British Columbia marine waters have one species of abalone, a herbivorous snail reaching 140 mm in shell length that uses its massive (and edible) foot to creep over lower intertidal and shallow subtidal rocky substrates under a canopy of kelp forest while grazing on algae.

With over 2,500 species recorded so far, invertebrates represent more than 90% of the marine animal species diversity around Haida Gwaii (Sloan and Bartier 2004). Yet marine invertebrates are usually overlooked as focal species, in favor of high-profile vertebrate “charismatic megafauna,” when envisioning conservation (Lunney and Ponder 1999).

Gwaii Haanas National Park Reserve and Haida Heritage Site is a national park managed by Parks Canada Agency with the Haida in a First Nation–Canada cooperative management agreement in place since 1993. Given the success of this arrangement with the lands, there are expectations that adding on the proposed Gwaii Haanas National Marine Conservation Area (NMCA) Reserve could involve another cooperative management agreement with the Haida. This implies full consideration of traditional Haida knowledge about marine resource uses along with coastal

community experiential and Western science knowledge.

I explain how the northern abalone of Haida Gwaii function as a focal species whose cultural history, protection, and recovery could help focus public attention on regional marine area conservation. To do this, I use a quincunx—a rather exotic word for an arrangement of five items in which four are at the corners of a square or rectangle and one is at the center. This arrangement, shown in Figure 1, is useful when contemplating a central role for northern abalone surrounded by four types of issues relevant to engaging Canadians in Gwaii Haanas’ marine conservation future.

Fisheries

Northern abalone was commercially fished in British Columbia from the early 20th century until the fishery’s closure in 1990. This was the first total closure—covering all sectors (Aboriginal, commercial,

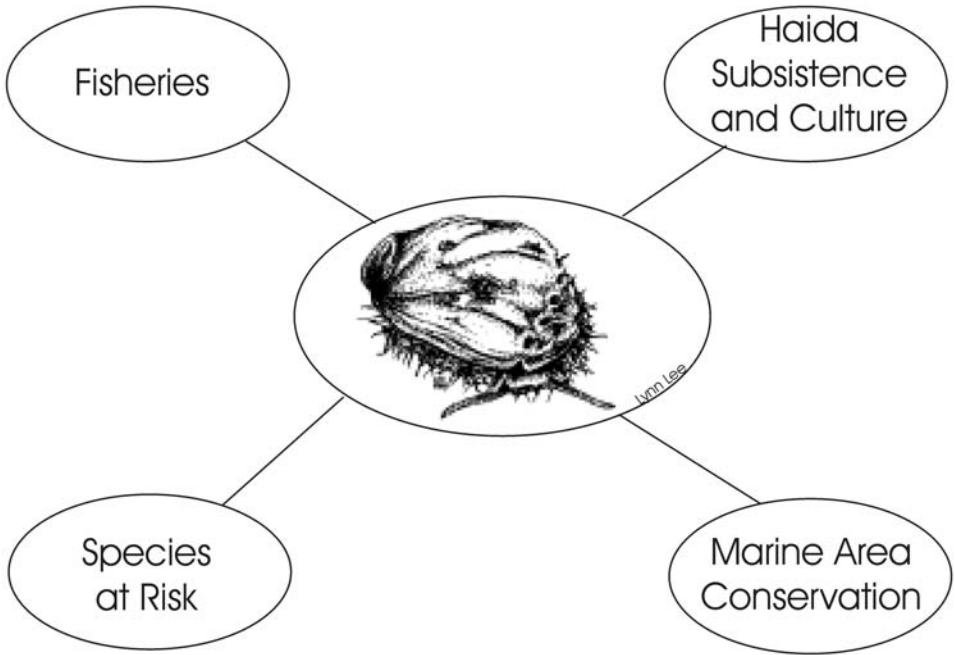


Figure 1. The Haida Gwaii northern abalone quincunx. *Abalone image courtesy of L. Lee, World Wildlife Fund-Canada.*

recreational) and the entire geographic range—in Canadian history (Sloan 2004). It was the advent of SCUBA diving in the 1950s that initiated the decline. Landings peaked, and a quota was introduced, in the late 1970s, but stocks showed no recovery through many subsequent surveys, and the total closure remains in force. Further, high black-market value and the difficult enforcement logistics, particularly along the rugged and sparsely populated north coast, render abalone vulnerable to poaching (Campbell 2000). Aggressive fishing causing serial stock depletion has characterized abalone fisheries for various species throughout Pacific North America (Hobday et al. 2001; Sloan 2004).

In the last eight years of the fishery, the coast north of Vancouver Island to Alaska

averaged 76% of annual coast-wide northern abalone landings. Within the north coast, Haida Gwaii accounted for 63% of mean annual landings over the same period and the proposed Gwaii Haanas NMCA area accounted for 61% of total annual Haida Gwaii landings (Sloan et al. 2001). That the Gwaii Haanas area has so much prime abalone habitat is not surprising, as rocky coast with kelp forests characterize much of the shoreline.

Knowledge of abalone distribution and density around Haida Gwaii comes from fishery-independent diving surveys by Fisheries and Oceans Canada (DFO) from 1976 to 2002 during which index sites were established. One area within Gwaii Haanas' proposed marine area, for example, was surveyed seven times by 2002. Gwaii

Haanas represents, therefore, a well-documented (by both fisheries-dependent and -independent sources) northern abalone area, and recent surveys show this area continues to support populations. As well, since 1998 further diving surveys, using a protocol similar to that of DFO, have been executed each year by the Haida Fisheries Program (HFP) which has directly involved the Haida in abalone stock assessment.

To put abalone fisheries in an Alaska-to-Mexico context, commercial diving fisheries for six abalone species have all been accompanied by serial stock collapses and cries for management reform that include the use of refugia. The most dramatic case is of the deep-water white abalone (*Haliotis sorenseni*) off southern California, which is now approaching extinction (Hobday et al. 2001). This is after a brief nine-year period (1969 to 1977) that accounted for 95% of the historical landings.

A second complexity to rock reef/kelp forest-associated fisheries is the on-going commercial diving fishery for red sea urchin (*Strongylocentrotus franciscanus*). Red sea urchins coexist with northern abalone as fellow algae-grazers associated with kelp forests and are fished commercially and for Haida subsistence (Sloan et al. 2001).

Haida subsistence and culture

The collapse of abalone stocks and subsequent closure to all, including the Haida for subsistence gathering, represents an appreciable cultural loss (Sloan 2004). Further, no Haida were among the 26 licensed to participate in the commercial fishery that led to the stock collapse. The Haida remain legally excluded (based on overriding stock conservation concerns) from access to an otherwise constitutionally established subsistence fishing right.

Competition for abalone between the Haida and sea otters (*Enhydra lutris*) was distinctly possible. The sea otter population of Haida Gwaii was likely intact, although hunted and perhaps locally depleted nearby larger village sites, prior to the vigorous sea otter fur trade between Haida and English and Americans from the 1790s to 1830s. By the early 20th century, sea otters were effectively extirpated from the Haida Gwaii region (Heise et al. 2003). Sea otters are keystone, kelp-forest-associated, specialist predators of invertebrates that reduce abalone to sparse crevice-dwelling populations in areas where they co-occur (Watson 2000). It is possible, therefore, that abalone were relatively more available to the Haida near village sites when sea otters were hunted in the pre-contact era. Further, after the 1840s, abalone may have become more available throughout Haida Gwaii because of reduced sea otter populations due to the fur trade, as abalone populations rebound in the absence of sea otters (Watson 2000).

There is, as well, an appreciable role for abalone shell in Haida trade and material culture (Sloan 2003). Many North American indigenous peoples prized the nacreous (mother-of-pearl) insides of abalone shells (Dubin 1999). Abalone shell from at least four species in the California area was a trade commodity throughout northwestern North America. Abalone was part of an overall marine shell trade, also including tusk shell (*Dentalium* spp.) and olive snail (*Olivella* spp.), going back 7,000 years.

The first recorded European contact with the Haida occurred in July 1774 when the Spanish (Juan Pérez aboard the *San-tiago*) encountered Haidas off northwestern Haida Gwaii. Translations of ship's logs

revealed that trading occurred during which the Spanish exchanged goods including “Monterey” (abalone) shell, brought north from the Spanish-occupied area of what is now California, for sea otter and other pelts (Sloan 2003). The earliest Haida article inlaid with abalone shell (a labret, or lip-plug) was collected by George Dixon aboard the *Queen Charlotte* in 1787 off the northwest coast of Haida Gwaii (King 1981). Amazingly, in the same year, other British on a trading mission along the southeast coast of the archipelago also noted high-status women’s labrets, “some inlaid with pearl” (Galois 2004:128). However, many authors, starting with Swanton (1908:303) have reported that the shell of northern abalone was less preferred for decorative work compared with California-area abalone shell. In summary, the occurrence of California-area abalone trade shell in Haida art, language, and family crest usage demonstrates the influence of the abalone shell trade, particularly in the post-contact era (Sloan 2003).

Species at risk

An intriguing species-at-risk precedent in Canadian marine conservation is the potentially mutually exclusive recovery of two “listed” species: northern abalone and their predator, the sea otter (Sloan 2004). Northern abalone was Canada’s first marine invertebrate to be federally listed by the Committee on the Status of Endangered Wildlife in Canada as “threatened” in 1999. Sea otters have been internationally protected since 1911 and federally listed as “endangered” in Canada since 1978 (down-listed to “threatened” in 1996). In the U.S., white abalone was the first marine invertebrate to be proposed for the endan-

gered species list (Hobday et al. 2001)—becoming federally listed in June 2001.

Canada’s Species at Risk (SAR) Act (passed 2002, fully in force 2004) compels protection and recovery of all federally listed species, including protection of their critical habitats in federally controlled areas such as NMCAs. Further, listed status requires the production of a national recovery strategy that goes through public consultation towards a formal action plan, also subject to public consultation, that guides recovery efforts. The SAR Act prohibitions protect individuals, their “residences” (e.g., nesting trees) and critical habitats. The strategy and planning processes are now completed for both northern abalone and sea otter.

Sea otters do occur around Haida Gwaii and there have been eight confirmed sightings, all likely free-ranging males, between 1972 and 2002. They could have originated from any of the expanding populations surrounding the Haida Gwaii region, such as southeast Alaska, or from the mainland coast, or from northern Vancouver Island (Heise et al. 2003).

Northern abalone has become a regional marine conservation focal point. The federally funded, community-driven Haida Gwaii Abalone Stewardship Program, now entering its fourth year, is an important first for Haida Gwaii (Jones et al. 2004). Abalone is the first marine species to unite local and national marine environmental nongovernmental organizations, the HFP, and federal agencies. One of the two stewardship areas is within Gwaii Haanas’ proposed NMCA; it was selected according to fishery-independent survey data and local experiential knowledge.

Marine area conservation

Northern abalone is exemplary in its spatially persistent clumping associated with kelp forest ecosystems, whose sea-surface canopies render them easy to map. Therefore, abalone is a useful surrogate for exploring area-based conservation ideas such as zoning, including sizing and placement of no-take zones (Sloan 2004). The prospect of zoning for no-take through to (sustainable) commercial extraction is articulated in the Canada National Marine Conservation Areas Act (passed in 2002).

Abalone populations generally rely upon having sufficiently dense clumps for successful fertilization of broadcaster gametes linked by relatively restricted dispersal of their short-lived, non-feeding larvae. Therefore, understanding the dynamics of clump size, between-clump proximity, and connectivity via larval transport is key to sustaining their populations. Further, abalone species respond well to area protection and readily increase in density, average body size, and reproductive output within refugia (Sloan 2004).

Conclusion

Issues of culture, conservation, and commerce unite when contemplating northern abalone. Concerning culture, the loss of northern abalone as a traditional food for the Haida is ethically and politically important. As well, abalone has a long human-associated history linking material culture, trade, and ceremonial use, including post-contact Haida–European relations. Another cultural aspect is the role of northern abalone as a focal species in increasing public awareness of marine conservation and changing attitudes towards acceptance of new ideas about protecting species and habitats (ecosystems) through protecting

marine areas. Finally, given that understanding coastal community values is central to success in marine conservation, northern abalone provides a vehicle by which regional communities can address complex marine conservation challenges, such as zoning within protected areas and species-at-risk recovery.

Concerning conservation, there is federal agency will to cooperate in regional programs to restore abalone populations. Provided that there is consensus and clarity on the population objectives for northern abalone, this species' characteristics, such as its tendency to clump, render it well suited as a case study for discussing marine area protection. The goals of the local abalone stewardship program to restore populations to the point of enabling a Haida (and then an overall recreational) fishery (Jones et al. 2004), and that of the national recovery strategy to ultimately have the species delisted, are not intractable, but represent differing geographic scales of recovery.

Concerning commercial fishing, it is most unlikely that a sustainable commercial fishery will re-emerge. However, fishing for red sea urchin, in kelp forest habitats, will continue in Haida Gwaii, including in the proposed Gwaii Haanas marine area. This supports the widely stated recommendation in the literature for a multi-species, ecosystem-based management perspective. The interacting effects of the red sea urchin fishery on future northern abalone and sea otter recovery within kelp forest ecosystems warrants careful consideration.

Abalone conservation poses some interesting questions (Sloan 2004). First, why recover northern abalone if recovered sea otter populations would likely crop abalone populations to low levels, threatening even subsistence fishing? Confronting

such hard choices will help develop the public's understanding of the innate complexity of marine area conservation. Second, what benchmark state of local kelp forest ecosystems, including optimal populations of northern abalone, red sea urchin, and sea otter, should be the (integrated) recovery goal within Gwaii Haanas? Perhaps the goal should be the restoration of pre-European contact (pre-1790) conditions, which likely would mean low abalone populations with sea otters present. Whatever state is desired, we have little local kelp forest ecosystem baseline data from which to compare current with past states. Third, would protecting abalone in some areas lead to enhanced larval settlement in adjacent areas that could eventually support some level of non-commercial fishing (Aboriginal and recreational)? The possibility of net export of recruits ("spillover") from protected areas to adjacent areas is an important consideration when discussing protecting marine areas with the fishery sector (Roberts et al. 2005). Finally, there is the important issue of propagule dispersal (Shanks et al. 2003). That is, what is the spatial scale of larval ori-

gin and destination dynamics of northern abalone populations? For Gwaii Haanas' future, this relates to zoning issues such as no-take zone *sizes* (to protect sufficient densities to maintain adequate recruitment), *shapes* (to preserve an adequate amount of kelp forest habitat), *locations* (for appropriate distance between sub-populations) and *connectedness* (to link sub-populations via larval transport in currents and according to different planktonic larval durations).

With public consultations on establishing Gwaii Haanas NMCA imminent, there is an opportunity for abalone to focus ideas and values. Thinking about northern abalone links people to the sea culturally and fosters learning about the inherent complexity of contemporary marine conservation. If we are serious about the Panel on Ecological Integrity's core ideas of Canadian national parks (and, by extension, forthcoming NMCAs) as "centres for ecological understanding" and "sentinels for the ecological condition of their region" (PCA 2000a, 2000b), then we should seize opportunities that species such as northern abalone present to us.

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