



Abalone – Urchin – Sea Otter Meeting

An ecosystem-level look at managing species in the Inland Waters

On October 8, 2004: approximate 25 people gathered at the Quil Ceda Village Conference Center to discuss species interactions between Pinto (or Northern) abalone, urchins, and sea otters. The venue was provided courtesy of the Tulalip Tribe and the meeting was sponsored and hosted by the SeaDoc Society, a marine ecosystem health program of UC Davis's Wildlife Health Center. The goal of the meeting was to update people with current information about the status and recovery of these species in Washington state as well as to share recent research as it relates to the harvest, management, and recovery of these species. What follows is a brief summary of the meeting intended to help document this meeting and share the proceedings with people who were unable to attend.

Joe Gaydos of the SeaDoc Society welcomed everybody and thanked the Tulalip Tribe for offering such an outstanding venue for the meeting. He made it clear that the intent of the meeting was to share scientific information between state and tribal biologist who manage these species. Mike McHugh with the Tulalip Tribe also welcomed the group.

Don Rothaus (WDFW) gave the first presentation on the **status of abalone in Washington state**. He noted that Washington state never had a commercial abalone harvest and that abalone monitoring has gone through changes in protocol between 1982 and the present. There is good evidence indicating that the explosive urchin harvest in 1988 provided a platform for large-scale poaching of abalone. In 1994 (August 1st), Washington state closed the recreational abalone harvest due to continued declining trend in abalone survey data (1979-1994). Don provided extensive discussion about WDFW's index stations and their continued use for monitoring abalone and provided interesting information on abalone length-frequency distribution at these sites and theorized that this may be indicative of Allee Effect based recruitment failure. He also presented evidence that there might be some aggregation of abalone to try and compensate for low distribution. It was apparent from Don's talk that this species might be in need of additional ESA protection if current trends continue. For Pinto abalone status in Canada, please see Jamieson 1999. Please see the SeaDoc website (www.seadocsociety.org - sponsored science events) for PDF files of most of the manuscripts listed referred to in these proceedings.

Laura Rogers-Bennett (UC Davis Bodega Bay Labs) then presented her work on **red urchin – red abalone interactions** that was recently published in Conservation Biology (Rogers-Bennett and Pearse, 2001). She stressed that this was an example of biogenic structures and positive species interactions. In field work conducted, half of the juvenile abalone inside of MPAs were found under the urchins' spine canopy. Laboratory experiments showed that juvenile abalone survived crab predation better when red sea urchins were available as shelter. Similarly,

it has been noted that red urchin juvenile also will hide under the adult red urchin spine canopy for protection (Breene et al., 1985). Little is known about the relationship between red sea urchin and Pinto Abalone in Washington.

Thomas Ebert (Oregon State Univ.) spoke about his recent work on **red urchin longevity** (Ebert and Southon, 2003; Ebert et al., 1999). He discussed the use of tetracycline as well as the use of atmospheric C14 to develop size and age curves. Additionally he discussed evidence suggesting that red sea urchins do not age (and do not become reproductively senescent). It was discussed that Washington state has both a lower size limit and an upper size limit for urchin harvest (unlike California, where fishing regulations have lower limits only).

Jane Waston (Malaspina University) presented on **abalone –sea otter interactions** as studied off of northwest coast of Vancouver Island. She pointed out that extirpation of sea otters is what actually permitted development of commercial abalone (and urchin and probably other species) fisheries. That said, abalone and sea otters have co-existed for thousands of years, just not at abalone sizes nor densities that we saw without otters. In areas with otters, abalone are rare, small, and are found within crevices. This grouping in crevices actually might enhance reproduction by these broadcast spawners. She also discussed her work looking at *Astrea*, which are a model for abalone. Like abalone, *Astrea* (technically *Megastraea*) or red turban snails are equally abundant in areas with and without sea otters but the biomass is significantly greater in areas without sea otters because the individual snails are larger. She then discussed possible life history strategies that might be selected for in the presence of otters that permit this.

Glen VanBlaricom (University of Washington) then gave a talk on **direct and indirect impacts of sea otters foraging in the Strait of Juan de Fuca**. They surveyed sites in the Strait of Juan de Fuca before (1997) and after (2001) sea otters had foraged (VanBlaricom and Chambers, 2003). This work was done to test hypotheses regarding direct effects of sea otters on prey populations and shellfish fisheries and indirect effects on kelp forest communities. Although urchin harvest complicated their ability to definitively conclude otter impacts on urchins, their work showed that direct effects of otters on invertebrate populations was consistent with studies done in other locations. Regarding indirect effects on kelp forests, they did not see that kelp forest changes were related to otter foraging. This could be due to other factors regulating kelp forest communities (storms and substratum instability) or inadequate foraging time of otters in the area.

Kristin Laidre (NOAA) presented work done on the **movement, forage patterns and diet of sea otters in Washington**. Activity budgets suggested otters were not resource limited; telemetry work indicated that otters dispersed widely and made long distance movements (linear home range averaged 37 km of coastline), and sea otter diet has likely lead to modifications in kelp habitat within their range. Dispersion potentials for otters include moving south into sandy habitat south of Destruction Island, moving into mixed habitat in the Strait of Juan de Fuca, or moving north onto the west coast of Vancouver Island.

Steve Jeffries (WDFW) concluded the series of speakers with a talk on the **estimated carrying capacity in Washington state** (Laidre et al., 2002). Work based on habitat type available and linear densities estimated the carrying capacity for the Washington sea otter population at 2,734 otters (95% CI=2,082-3,452). Using the MMPAs definition for the lower bound of an Optimum Sustainable Population (OSP) set at 60 percent of "K", a minimum of

1,640 otters would be required for consideration of downlisting. Down-listing from endangered to threatened will occur with a population of at least 1,640 (60% of "K") for at least five years and the population is distributed so that a single catastrophic event is unlikely to cause extirpation. Down-listing from threatened to sensitive will occur with a population of at least 2,187 (80% of "K") for at least 5 consecutive years and the population is distributed so that a single catastrophic event is unlikely to cause extirpation. Based on results of the 2004 assessment survey conducted by WDFW, the Washington sea otter population currently numbers over 700 animals and ranges from Cape Elizabeth to Pillar Point. Scattered individual otters have been reported near Cape Arago and Yaquina Head in Oregon as well as in the San Juan Islands, Strait of Juan de Fuca and southern Puget Sound. Continued population growth and range expansion into their historic range can be expected for the Washington sea otter population resulting in conflicts with a variety of valuable shellfish resources.

After lunch provided by the SeaDoc Society, the entire group had a round-table discussion about abalone, urchin, and sea otters in Washington state. Talks given in the morning made it clear that the abalone population was not in good shape, that there is potential for there to be biogenic structure / positive species interactions between red urchins and Northern abalone, and that the expanding sea otter population in Washington state as well as the one on the west side of Vancouver Island had the potential of ranging into the Strait of Juan de Fuca. The Haida people lived with sea otters, abalone, and urchins for thousands of years and afternoon discussion focused on how to manage species recovery and fisheries interactions in Washington. Specifically, what realistically can we do to control otter-resource conflicts in a way that preserves fishery sustainability and abalone recovery? There was general consensus that protection of the species was more important than maintaining a fishery or harvest, but if management could permit recovery of abalone and sea otters while protecting a sustainable urchin harvest, that would be ideal. The idea of urchin aquaculture was brought up as a potential tool for fisheries enhancement, but it was almost unanimously dismissed as a bad idea due to the recently presented data on urchin longevity, the cost of rearing urchin in captivity, concerns about disease introduction, and the fact that it would take energy away from proper management of the wild resource. Some of the current roadblocks to managing species recovery and conflicting fisheries management that were discussed include:

- No legal framework within the state to deal with species recovery and fisheries conflicts. This meeting was probably a great first step in this direction
- There are many invertebrate species in Washington, abalone and red urchin probably included, where we know the biological parameters needed to manage the species effectively. The state is moving from a "passive" management scheme to taking a more active role in the management of "minor" species. This will require more research on simple life history traits (such as size of first reproduction for wild Northern abalone) as well as more coordination between the state and the tribes.
- There needs to be continued effort for biologists, researchers, and managers to work together on conservation, especially where species interactions are concerned.

This October 8th abalone-urchin-otter meeting was an important first step for biologist to open in-house discussions on where to go and how to manage multiple species interactions. Efforts need to continue within the Department of Fish and Wildlife and with the Tribes to develop a protocol for dealing with species recovery and fisheries interactions and to bring together people managing and studying species that have defined or potential interactions.

References

Note: PDFs of most can be found on the SeaDoc Society website (www.seadocsociety.org under sponsored science events – abalone-urchin-otter meeting):

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