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Cruise Report 07-PA-1
Invertebrate Resource Assessment
Abalone and Sea Urchins
Prepared by
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Vessel: P/B MARLIN

Dates: Sept. 9 – Sept. 14, 2007

Location: Point Arena Cove and Stornetta Ranch, Mendocino County, northern California

Purpose: 1. Assess the density and size frequency distribution of red abalone, *Haliotis rufescens*, and red sea urchin, *Strongylocentrotus franciscanus*, populations at Point Arena Cove and Stornetta Ranch.
2. Collect 50 red abalone for genetics tissue sampling at Point Arena Cove.
3. Collect boulders and plankton tows for red abalone recruitment.
4. Collaboration with Reef Check divers: fish, invertebrate, and algal transects taken at Stornetta Ranch.

Procedures: Divers conducted emergent transects 30 x 2 m sampling in randomly selected GPS way –points in and around Point Arena Cove and at a second location, Stornetta Ranch. Point Arena Cove is a popular fishing location with a pier that has a boat launch. The area surveyed at Stornetta Ranch is north of Point Arena Cove approximately 3 miles and just south of the landmark Point Arena Lighthouse. It is a shallow reef area found in between the shoreline and Sea Lion Rocks. Recreational abalone fishing is permitted (no SCUBA) and commercial red sea urchin fishing is permitted in these areas along with recreational nearshore fin-fish fishing. The public access to the Stornetta Ranch site was recently opened to the public in summer 2004.

Emergent transects were surveyed by two divers (a dive team) each sampling 1 meter on either side of a 30 m tape for a total of 60 m². Transect locations were selected by using random way points and divers were instructed to complete transects at four depth strata (0-15 feet, 15 to 25 feet, 30-45 feet and 45 to 60). At Stornetta Ranch, transects were close together

since the area was small and depths were between 5-25ft. Transect clusters were strung parallel to each other between 5-10m apart.

Data collected on the emergent transects include location, and depth of transect, date, abundance of abalone and urchins, size of abalone and urchins, abundance of predators, substrate and algal cover. Emergent sampling focuses on emergent exposed or slightly cryptic large animals. Invasive sampling involved moving substrate to search for cryptic juvenile organisms was not conducted.

On the first day of the cruise, abalone were collected after the transect dive and a small sample of epipodia was taken for genetics sampling. These abalones were then returned on subsequent dives.

Following completion of the transects, dive teams were instructed to return with 1 or 2 coralline covered rocks, less than then head size. Divers put the rocks in plastic bags to maintain the newly settled organisms on them. A total of 70 boulders were collected at both Point Arena Cove and Stornetta Ranch. These boulders were then sampled by placing them in buckets of 5% Etoh in seawater, brushed off in the solution and the resulting supernatant poured off in to a sampling jar. Boulders were measured for length, width, and height and coralline cover. Plankton tows were conducted at both sites with a 100µm plankton net for larval abalone at shallow 5m depths and deep 15m depths. The volume of water sampled was recorded using a flow meter at the mouth of the net. Three replicate plankton samples were collected at each depth and samples were placed in 5% Etoh seawater solution.

Reef Check divers took fish, invertebrate, and algal counts along 3 inshore and 3 offshore transects at Stornetta Ranch. Each transect consisted of a 30 x 2m swath (60 m²) which was surveyed for a selected group of indicator species of invertebrates, and algae while fish survey transects were expanded to 30 x 2 x 2 m swath.

Results: During the 4 days of the cruise we sampled a total of 36 emergent transects at Point Arena Cove and 33 emergent transects at Stornetta Ranch completing our goal of 56 for both sites. A total of 50 red abalone epipodia were sampled for genetics where each sample was stored in Netstar buffer at room temperature.

A total of 1383 red abalone, 0 flat abalone, 0 pinto abalone, 1386 red sea urchins, and 69 purple sea urchins were observed and sampled along the 36 transects at Point Arena Cove. The search area was 2160 m² along 36 transects (60m² each). The mean density of red abalone was 0.6398/ m² from the emergent transects. Red sea urchins had a mean density of 0.6416/ m².

Of the 36 transects completed at Point Arena Cove, 17 were at depths <29 feet while the remaining 19 were at depths from 29 to 55 feet. Abalone were more abundant in the shallow depths (<29 feet) at 0.8520/m² than at the

deeper depths $0.4500/\text{m}^2$. Red sea urchins however, were more dense at the deeper transects (>29 feet) $1.110/\text{m}^2$ compared with $0.1186/\text{m}^2$ the shallow transects.

A total of 891 red abalone, 0 flat abalone, 0 pinto abalone, 14 red sea urchins, and 10 purple sea urchins were observed and sampled along the 33 transects at Stornetta Ranch. The search area was 1980 m^2 along the 33 transects used (60m^2 each). A 34th transect was completed at a depth of 44ft around a kelp forest found outside of the shallow reef area, but these data was not included in the population density calculation for this site. The mean density of red abalone was $0.4500/\text{m}^2$ from the emergent transects. Red sea urchins had a mean density of $0.0070/\text{m}^2$.

Of the 33 transects completed at Stornetta Ranch, 21 were at depths of ≤ 15 feet while the remaining 12 were at depths from 16 to 24 feet. Abalone were more abundant in the deeper depths (>15 feet) at $0.7194/\text{m}^2$ than at the shallow depths, $0.2960/\text{m}^2$. Red sea urchins were also more abundant at the deeper transects (>15 feet) $0.0153/\text{m}^2$ compared with $0.0024/\text{m}^2$ in shallow transects.

Reef Check completed their goal of 3 inshore and 3 offshore transects. allocated in two zones, offshore of Sea Lion Rocks with the upcoast boundary of the zone being located at $38^\circ 56' 13.84 \text{ N}$; $123^\circ 43' 56.94'' \text{ W}$, and inshore of Sea Lion Rocks with the upcoast boundary of the zone being located at $38^\circ 56' 15.07'' \text{ N}$; $123^\circ 43' 50.02'' \text{ W}$. The offshore core transects depth range was 11 - 13 m (36 – 41 ft) and the onshore core transect depth range was 4 -5 m (12 – 15 ft).

A total of 173 red abalone were measured (110–220mm). No other abalone species were encountered. The mean length for red abalone was $178\text{mm} \pm 2\text{SE}$. The offshore zone is rarely accessible to shore anglers due to exposure to high surf and wind. There was a significant difference, $t(171) = -3.732$, $p < .001$, in the mean length of red abalone in the offshore zone ($185\text{mm} \pm 2\text{SE}$, $n=77$) and the inshore zone ($173\text{mm} \pm 2\text{SE}$, $n=96$). Total mean density for red abalone was $0.481/\text{m}^2 \pm 0.081 \text{ SE}$. The density in the inshore zone, $0.533/\text{m}^2 \pm 0.075 \text{ SE}$, was slightly higher than the offshore density, $0.428/\text{m}^2 \pm 0.157 \text{ SE}$, but the difference was not significant. This is very similar to densities found by CDFG divers at Stornetta Ranch of $0.4500/\text{m}^2$.

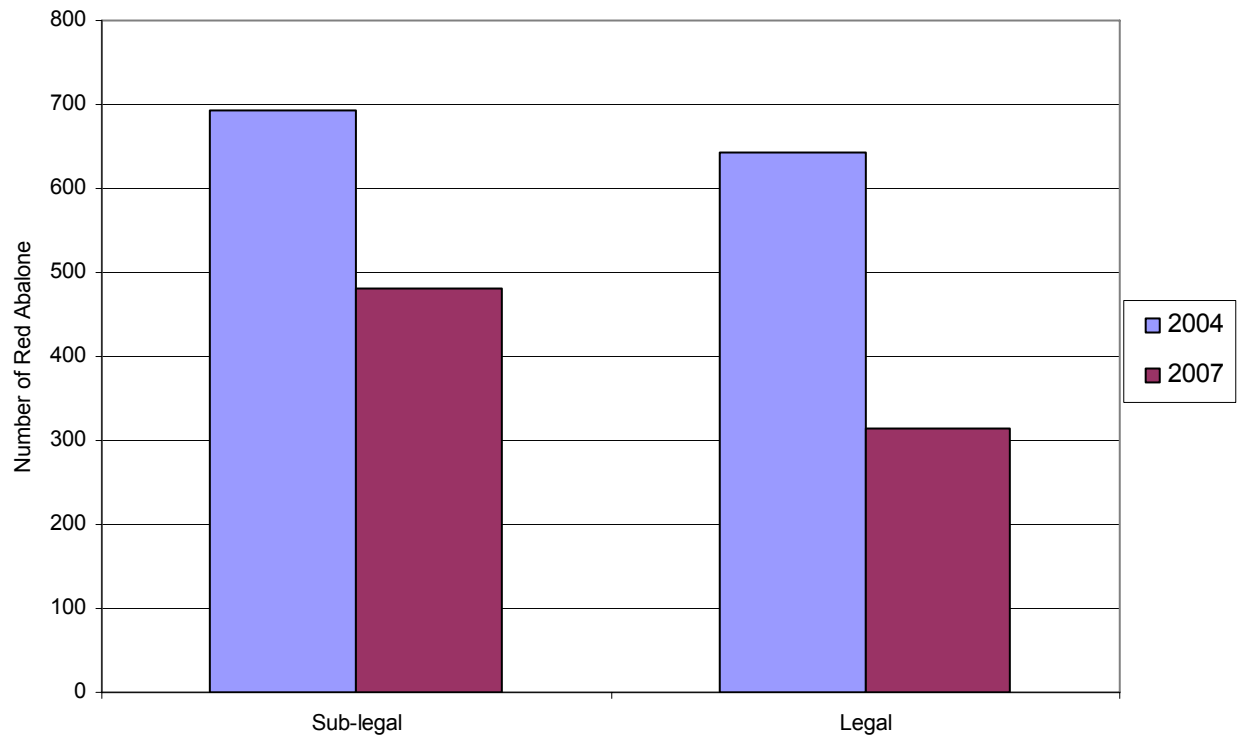
A total of 173 fish were counted (110-212mm) with a mean total length of $178\text{mm} \pm 2\text{SE}$. The fish total length at the inshore transects ($173\text{mm} \pm 2\text{SE}$, $n=96$) was significantly smaller ($p < 0.001$) than the offshore transects ($185\text{mm} \pm 2\text{SE}$, $n=77$).

Conclusions: Stornetta Ranch population densities have declined since access to this site was opened August 1, 2004. Humboldt State University divers under contract by Fish and Game surveyed the site prior to opening in May 2004. In May, 2004 abalone densities were $1.19/\text{m}^2$ in the 1320m^2 area of the 22 complete

transects sampled. If we examine the total abalone density observed on 35 partially completed transects covering an area of 2,005 m² the density is comparable at 1.18/ m². Densities observed in Sept. 2007 were >2.5 times less than those found in May 2004. Included in this cruise report are charts that compare the size frequencies of abalone between the emergent transect surveys in Spring 2004 and the most recent survey in Sept. 2007. All size classes of abalone decreased in numbers suggesting poaching of sub-legal abalone may also be taking place at Stornetta Ranch. The Abalone Recovery and Management Plan stipulates that red abalone densities at fished sites should be at or greater than 0.66 abalone m².

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Stornetta Spring 2004 & Summer 2007



Stornetta Ranch Size Frequency Distribution in Spring 2004 & Summer 2007

