Population dynamics of pinto abalone aggregations in Sitka Sound, Alaska

*Bell L.[1], White T.D.[2], Donnellan M.D.[3], Hebert K.P.[3], Raimondi P.T.[2]

*lbell@sitkascience.org

1 – Sitka Sound Science Center, Sitka, Alaska; 2 – University of California, Santa Cruz, California; 3 – Alaska Department of Fish and Game, Juneau, Alaska

What is the size class structure of abalone aggregations, and is it temporally consistent?

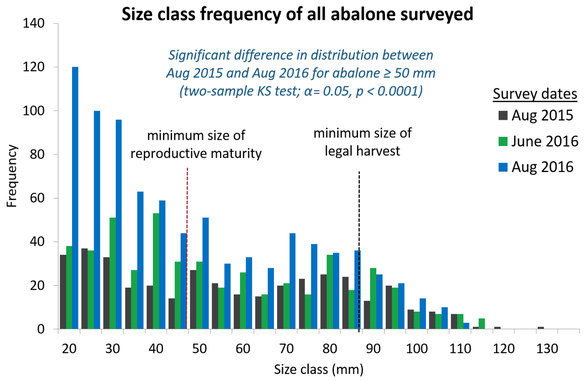
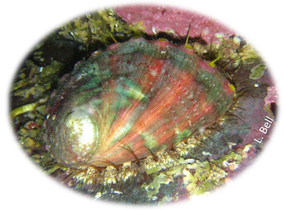


Figure 2. Frequency of abalone >20 mm across all sites by size class.

Size class distribution over three sampling periods indicates that > 85 % of pinto abalone surveyed across all sites were smaller than the minimum size of legal personal use or subsistence harvest. An apparent increase in the frequency of smaller-sized abalone over time may be influenced by increasing observer survey experience, suggesting a larger size (≥ 50 mm) threshold for consistent detectability. Size class distribution was significantly different between Aug 2015 and Aug 2016 for abalone ≥ 50 mm), though not significant for abalone larger than the legal limit (89 mm), perhaps reflecting size-associated differences in immigration or predation pressure.



Background & Methods

Commercial harvest of pinto abalone throughout Southeast Alaska steadily declined prior to fishery closure in 1996. A historical lack of population assessments was cited in the 2014 decision by the National Marine Fisheries Service as a reason to not list pinto abalone under the Endangered Species Act. To this day, the true status and trajectory of pinto abalone stocks in Southeast Alaska remain unknown.

To initiate a long-term monitoring program of pinto abalone aggregations in Sitka Sound:

- Established 8 permanent index sites containing two 30 x 2 m transects (Fig. 1)
- Each transect surveyed by the same two divers for all abalone > 20 mm w/ notation of size, location, and behavior
- Habitat classified by substrate and algal cover
- Surveys repeated throughout summer (Jun - Aug) 2015 & 2016

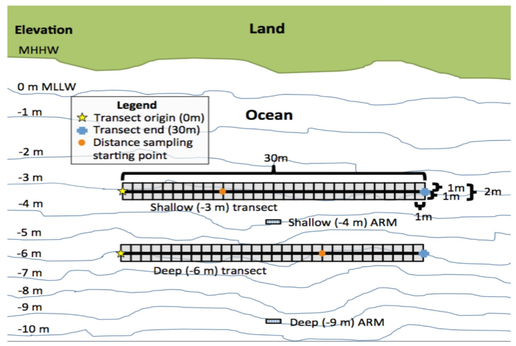


Figure 1. Schematic of standard site set-up

Is there a difference in abalone density with depth?

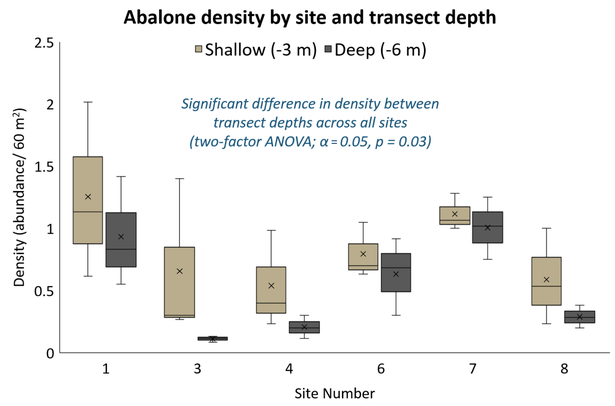


Figure 4. Box and whisker plots representing absolute densities of all abalone > 20 mm observed over three survey periods per site transect (Aug 2015, Jun 2016, Aug 2016).

Over multiple survey periods, the shallower (-3 m) transect at each site consistently had greater absolute abalone density than the deeper (-6 m) transect. While both transects were established well within what is considered the optimal depth range of pinto abalone, habitat-related factors within Sitka Sound may favor shallower depths for abalone at these sites. Further correlations of abalone size and density with surveyed habitat characteristics may better elucidate these trends.

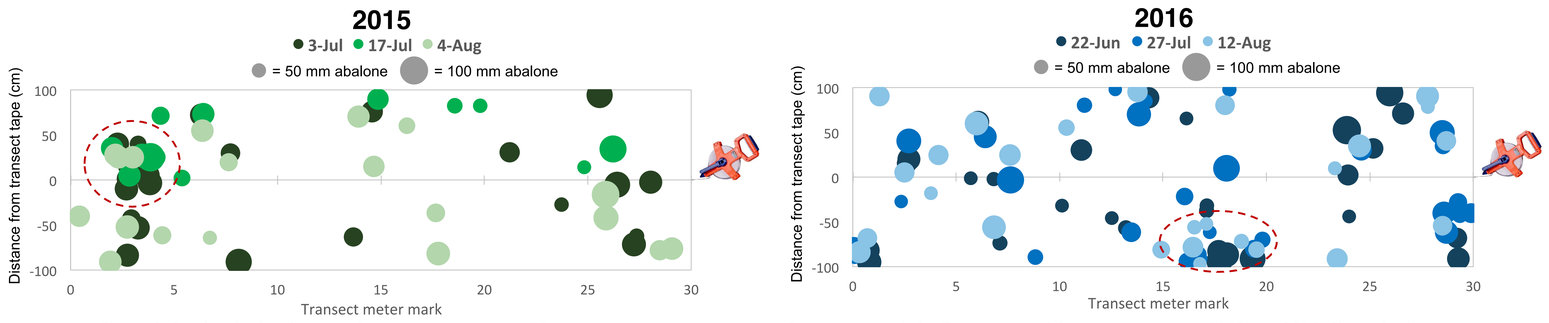


Figure 3. Spatial distribution and size of adult abalone (> 50 mm) surveyed at the shallow (-3 m) transect of site 7 over three visits each summer of 2015 and 2016. Circle size is scaled to represent relative size of each abalone. Different colors represent different survey dates.

How does the spatial distribution of abalone at a site change over time?

Preliminary results indicate frequent movement of abalone between bi-monthly surveys. Similar-sized abalone seen repeatedly near the same location over time suggest possible site fidelity, but this cannot be confirmed without tagging efforts. Small-scale 'clusters' of abalone appear to persist across surveys within each summer (e.g., abalone indicated in red circles). Yet, neither of these clusters extended from year to year. Abalone are thought to aggregate into higher density groups during broadcast spawning, which may take place throughout the year. Future surveys of these sites outside the summer season may elucidate the longevity and timing of such clusters throughout the year.

Next Steps

- Ongoing analysis including habitat data (see fig. 5)
- Expand future surveys to winter and spring months
- Tagging of individual abalone for spatial tracking and growth rate estimation

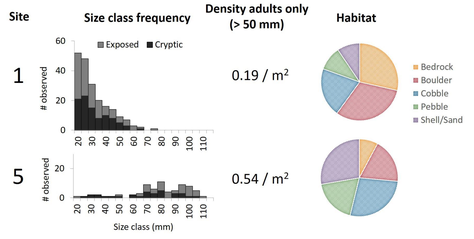


Figure 5. Demonstration of additional data to be analyzed. Site-specific habitat will be considered alongside population demographics and abalone behavior.

Acknowledgments

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