Distribution and Recruitment of the Black-lipped Pearl Oyster, *Pinctada margaritifera*, at Midway Atoll, Northwestern Hawaiian Islands: a Pilot Study

Kristin M. McCully, Donald C. Potts

Department of Ecology and Evolutionary Biology, University of California Santa Cruz

Contact: mccully@biology.ucsc.edu

Presented at the 11th International Coral Reef Symposium, Fort Lauderdale, Florida, July 7 – 13, 2008

**Results:**
- We found 16 pearl oysters on 120 settlement tiles and 45 pearl oysters on 12 spat collectors (and equipment).
- Recruitment was highest in the central lagoon (north of Sand Island) and in Welles Harbor.
- Recruitment was higher on shallow (1 m deep) spat collectors than on deep spat collectors (2 m deep). Recruitment occurs at least in the late summer and fall (August to November).
- Large size of recruits found on settlement tiles collected in July indicate that recruitment may be minimal in spring and early summer.
- All observed recruits were smaller than 3 cm, as expected for juveniles less than a year old.
- Our preliminary searches found no adults.

**Conclusions:**
Substantial recruitment suggests that a reproducing population of pearl oysters exists in Midway Atoll, mostly likely near the area of highest recruitment (patch reefs in central lagoon). If such a population is not found, then larvae may be recruiting from other locations, such as Pearl and Hermes Atoll.

Ongoing studies on a larger scale evaluate:
- spatial, vertical, and temporal distribution of recruitment (using spat collectors)
- growth rates of recruits, juveniles, and adults
- spatial distribution and abundance of adults.

Future studies should evaluate the genetic connectivity of pearl oysters throughout the Hawaiian Archipelago.

These studies will evaluate the feasibility of and help establish the protocol for a possible pearl oyster restoration program at Midway Atoll, leading the way for similar programs at other NWHI.

**Background:**
The black-lipped pearl oyster, *Pinctada margaritifera*, occurs throughout the Hawaiian Archipelago, including Midway Atoll near the northern end of the chain. This species experienced intense commercial exploitation at neighboring Pearl and Hermes Atoll in 1927-1929 and has not recovered to pre-exploitation levels (Keenan, Brainard and Basch 2006). Although *P. margaritifera* exists at Midway Atoll, there are no reports of a commercial industry there. Because this species is used in pearl farms in the South Pacific, its biology and genetics are well-known.

Our goals are to extend knowledge of the biology of *P. margaritifera*, enhance understanding of its use as an indicator of biological change, and provide a pilot restoration study at Midway that will assist the U.S. Fish and Wildlife Service’s goal of restoring *P. margaritifera* at Pearl and Hermes Atoll.

Although we only present here the results of a pilot study based on unexpected observations of pearl oyster recruitment, we are continuing studies of adult distribution, growth rate, and temporal and spatial patterns of recruitment.

**Methods:**
We collected *Pinctada* recruits in 2007 on:
- 120 terra cotta tiles deployed for coral recruitment studies at six locations for one year.
- 12 black plastic mesh spat collectors designed for *Pinctada* recruitment deployed at four locations for three months (Figure 1).

Spat collector design (Figure 3) is based on spat collectors used for pearl farms and research documenting that *Pinctada* spat prefer to settle on dark substrate at 1-3 m depth (Haws and Ellis 2000, Gervis and Sims 1992).

**Acknowledgments:**

**References**