Tongass Island Geoduck Mortality and Survival Study

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Introduction

The Alaska Department of Fish and Game (ADF&G) proposed to conduct research on the mortality and growth rate of geoduck clams in the intertidal zone located on the east side of Tongass Island in Nakat Bay, within Section 11, Township 82 South, Range 98 East, Copper River Meridian and encompassing an area of less than one acre. The study was conducted under a Fish Resource Permit issued to Jackie Timothy, former Mariculture Coordinator for ADF&G. Four inch diameter PVC pipe was cut to approximately twelve-inch long sections (tubes) and covered on the top end with ¼ inch mesh predator net held on by a heavy duty rubber band. Three groups of 27 tubes were placed at each of the zero, minus one, and minus two feet tide levels. The tubes were driven into the ground by hand leaving about one to three inches of tube and the predator net exposed. Three 6mm geoduck seed, acquired from the Qutekcak Shellfish Hatchery in Seward, Alaska, were placed into each tube. Three to six tubes from each group were to be removed each year during a five-year monitoring period to check growth and mortality rates. Results from this study would be applied to the growing mariculture industry in the state of Alaska.

Objectives

The objectives were to assess the winter mortality and growth rate of very small geoduck clam seed in a southernmost intertidal location in Alaska.

Planting geoduck spat at the -1.0 ft. tide line (September 26, 2003)

Methods

Garold (Flip) Pryor (ADF&G) and contractor's Tom Curruth, Dale Stanley, and their deck hand traveled aboard the F/V *Sable* to the selected beach site in Nakat Bay on September 25, 2003. The beach is in protected waters on the east side of Tongass Island between the Tongass Reef reflector and Dark Point. The beach runs northeast to southwest. Before going to shore, twelve-inch long tubes were cut from a piece of four-inch diameter PVC pipe. A piece of ¼ inch mesh predator net was stretched over one end and held in place with a heavy-duty rubber band (commonly used with commercial crab pots). Low tide on September 26, 2003 was –1.9 ft. at 7:13 a.m. according to the 2003 tide predictions posted on the NOAA web page for the area of Cape Fox. From this, we decided that 6:05 a.m. was the time of the mean low tide and 6:35 a.m. was the time the tide was at the –1 ft. level. At the selected times, two pieces of rebar were pushed into the ground at the water level to rough in the location of each group. The PVC tubes were then pushed into the ground between the pieces of rebar. The rebar was color coded to differentiate the levels of water (0 tide was orange, -1 tide was green, and the –2 tide was yellow). Once tubes were in place the rebar was adjusted to more accurately mark the group. The (0) and (-1) plots were seeded as the tide went out. The (-1) plots were seeded first to give the clams time to set before the tide came back in. The (-2) plot did not have enough time to set before the tide turned around so that plot was seeded by divers. The plots were numbered from left to right while facing the beach from the boat. Plots 1-3 were at the zero tide line, 4-6 were at the minus one tide line, and 7-9 were at the minus two tide line. GPS coordinates were taken from the northeast rebar marker of each plot. Extra pipes were pushed in wherever possible between plots in case there were extra clams.

Project site from the -2.0 ft. tide line (September 26, 2003)

Plot numbers and coordinates

#1	N 54 46.435 W 130 44.008	#2	N 54 46.439 W 130 44.028	#3	N 54 46.440 W 130 44.032
#4	N 54 46.439 W 130 44.020	#5	N 54 46.442 W 130 44.027	#6	N 54 46.443 W 130 44.033
#7	N 54 46.443 W 130 44.019	#8	N 54 46.443 W 130 44.025	#9	N 54 46.444 W 130 44.029

Two readings of water temperature and salinity were taken on Friday (9/26). The first was done from shore at 8 am on the incoming tide. The temperature was 11.5 C and the salinity was 2.2 0/00 (4-6 0/00 low reading not figured in as noted on back of machine). The next was done from the boat on an outgoing tide at 5:20 pm. The temperature was 12.5 C and the salinity was 5.5 0/00 (without correction). I don't trust those salinities to be accurate but that was what the meter was reading.

General Notes

- There was quite a bit of tidal surge on the beach.
- There were very few logs on the beach but several were moving through the area at high tide.
- There was seaweed and kelp washing up on the beach that could pose a fouling problem.
- Other species were observed on the beach, including needle fish, butter clams, and horse clams.
- The site was inspected at about 6:30 pm (next low tide was 7:30 pm).
- Six pipes were washed out of plot number one with the tide change. They were replaced and reseeded. No other pipes were lost at the other sites. It was determined that the rocky soil kept the pipes from being properly seated.
- All other seed went into extra pipes after reseeding the displaced pipes.
- The (0) and (-1) plots were inspected and several clams were seen. It was feared that they might have been washed out with the incoming tide. The (-2) plots were not checked because the tide did not go out far enough.

Results

A trip was made to the geoduck site on the east side of Tongass Island on April 26, 2005. Flip Pryor and David Petree of ADF&G flew out by floatplane and met up with Tom Curruth, Dale Stanley, and their deck hand aboard the F/V *Sable*. On arrival, it was found that none of the tubes were immediately visible. Tom had dove near the site a few months earlier and found that several of the PVC pipes had been washed well below our lowest planting depth. A few of the rebar markers were the only sign of our plots. Plot eight had both rebar intact making it the only completely identifiable site. Plot nine had one of the rebar. One rebar was found in plot six, knocked over but still in place. We used shovels and rakes to dig for clams. No tubes or geoducks were found in any of the –2 foot plots (7-9). There were lots of butter clams and a few littleneck clams found. We found plot six by accident. One tube was spotted lying on its side with about a ½ inch of the tube exposed. On further inspection, a bit of predator webbing was spotted a few feet away. We dug up the area and found six tubes still in an upright position; most still had their predator nets in place.


Predator netting visible at surface of substrate at -1.0 ft. tide line (April 26, 2005)

They had all been buried completely in the gravel. We dug down beside them and extracted the tubes by holding their contents in place with the shovel and removing them intact. We dumped the contents on the beach after confirming there were no siphon holes passing all the way through the tube (i.e. the bottom of the cores were solid). The contents were dumped out and sifted through by hand. No geoducks or geoduck shells were found. Butter clams were found in a few tubes. One truncated soft shell clam with a shell length of approximately 33 cm was found living in one of the tubes. More tubes were found buried in plot #5. No geoducks were found in any of the tubes.

Discussion

Several mistakes were made in the design of this experiment. The beach chosen for the experiment was not stable. While the beach was protected from direct wave action, there was enough hydraulic energy to move the substrate. Several of the tubes were found still in place but buried completely. Tubes stuffed solid with rock and sand meant that surging water was able to move the rock and sand back and forth until it was able to work its way through the predator net and fill the tube. Assuming the geoduck seed set in the tubes, the rising substrate level would eventually have crushed or smothered the seed. The remoteness of the site also proved to be a problem. The site was chosen because it is a southern most point in Alaska. However, the site is several hours away from Ketchikan by boat or 40 minutes by float plane, making it difficult and expensive to monitor regularly. The time between inspections should have been reduced. The tubes should have been planted and preferably gone through at least one tide cycle to insure they were securely seated. Planted geoducks should have been inspected for survival within a week, to accurately estimate the planting mortality. Checks should have been done monthly until we

determined that the tubes were safe from moving rock, logs washing up on beach, fouling problems, etc. Given the time span before inspection we can only conclude that the project did not work and speculate that mortality was caused by the moving substrate. The question of winter mortality and growth of very small geoduck clam seed in an intertidal area in a southernmost location in Alaska can not be answered by this experiment.