

## Flat Abalone Surveys, 2001

### Background

In 2000, a commercial diver petitioned the Developmental Fisheries Board to add flat abalone to the list of developmental species. Since 1962, no commercial harvest of any abalone species has been allowed due to the low abundance of red abalone, the main species of interest. The petitioner felt there was a sufficient abundance of flat abalone (a smaller sized species) to explore the possibility of a limited commercial dive fishery. ODFW staff was hesitant to allow a commercial harvest of flat abalone because of the lack of information on the species, the difficulty of distinguishing flat abalone from small red abalone, and the lack of staff resources to collect needed information or monitor the fishery.

The Developmental Fishery Board recommended and the Commission approved adding flat abalone to the species list and allowing one permit on a limited research oriented basis. Harvest is allowed from May through October with a 3,000 pound annual quota and a 4 1/2 inch minimum size. In addition, the permit holder must collect density and size data from each harvest area and collect samples of flat abalone for maturity analysis.

The purpose of this report is to summarize the data collected during the first year of harvest/research and make recommendations for future sampling needs and regulation changes.

### Fishery

The permit holder harvested flat abalone from May 3 to October 10. The quota of 3,000 was made in 24 landings averaging 126 pounds per trip. Almost half the landings, 49.5%, came from Rogue Reef and 44.2% came from Nellies Cove (Table 1). Rogue Reef also had the highest catch per unit of effort, 48.7 pounds per hour, and Nellies Cove had 41.8 pounds per hour (Table 1). Goat Island produced 6.3% of the landings and had the lowest CPUE, 31.8 pounds per hour.

### Density Surveys

Four areas were surveyed for density of flat abalone. In each area, three, 100 meter transects were established and the number of flat abalone were counted within one-square-meter plots, every 10 meters along each transect. The depth range of the transects was also recorded. The locations of the transects were identified on a chart and two of the areas (Rogue Reef and Mack Arch) were outlined by the permit holder. The outline of the other two areas (Nellies Cove and Goat Island) were estimated based on the location of the transects. The size of each area was estimated using MapGraphics software.

The transects at Goat Island (Brookings) had the lowest average density of flat abalone (1.8 abalone/m<sup>2</sup>) and Nellies Cove (Port Orford) had the highest average density (5.6/m<sup>2</sup>) (Table 2). More than half the samples at Goat Island (54%) had a density of one or zero flat abalone/ m<sup>2</sup> and no samples had a density greater than 5 abalone/ m<sup>2</sup>. However, at Nellies Cove, more than half the samples (54%) had densities of six or more abalone/ m<sup>2</sup>.

### **Size Samples**

In each transect surveyed for density, the first 50 flat abalone counted were also measured (longest length in mm). Goat Island and Mack Arch (Brookings) had the highest average size, 132 mm and 129 mm, respectively. Nellies Cove and Rogue Reef (Gold Beach) had a higher percentage of smaller abalone (smaller than the minimum size for harvest) and smaller mean lengths (Table 3 and Figure 1).

### **Dock Samples**

Length, weight, and sex data were collected from three landings of flat abalone. The sex was determined by the color of the gonad on visual inspection. The male's gonad is a cream color and the female's is a greenish-cream color. The overall average length and weight was 142 mm and 0.9 lb (Table 4 and Figure 2). The length/weight relation is shown in Figure 3. The overall sex ratio was 46% males and 54% females.

### **Maturity samples**

In September, 12 flat abalone were collected and given to Oregon State University researchers to analyze for maturity. All were larger than 100 mm (4 in). Upon visual inspection, all abalone were mature (Anja Robinson, OSU, personal communication).

### **Recommendations**

The data collected was very informative. However, we recommend continuing with a similar harvest and sampling program for at least one more year.

Transects at Rogue Reef were all conducted along one edge of the area. Additional transects are needed through out the area. The outline of the area needs to be identified by the divers for Nellies Cove and goat Island.

Some verifying of survey data (i.e. surveys by ODFW divers) would be very helpful to alleviate concerns of bias by commercial harvesters conducting surveys. The amount of data collected at the dock was minimal. Additional size and weight data of the commercial catch need to be collected.

The minimum size seems to be adequate to insure flat abalone have spawned at least once before harvested. Additional samples of very small individuals would be helpful to determine size at maturity. However, since fecundity of abalone increases with size, it would be beneficial to collect data on fecundity at size to determine the appropriate minimum size.

Table 1. Percent of landings of flat abalone and CPUE from areas fished, 2001.

area	percent of landings	CPUE (lb/hr)
Nellies Cove	44.2	41.8
Rogue Reef	49.5	48.7
Goat Island	6.3	31.8
all areas		43.8

Table 2. Densities ( $m^2$ ) of flat abalone from four areas sampled in 2001.

area	depth range (fm)	number of transects	number of sample sites	range of densities ( $m^2$ ) for samples	average density ( $m^2$ ) for area	approximate size of area (hectares)
Nellies Cove	20-40	3	30	0-12	5.6	60.1
Rogue Reef	25-45	3	30	0-8	2.7	172.9
Mack Arch	25-55	3	30	0-9	3.2	169.5
Goat Island	20-40	3	30	0-6	1.8	13.9
all areas		12	120	0-12	3.3	416.4

Table 3. Mean length (mm) and range of flat abalone sampled in four areas in 2001.

area	mean length (mm)	range (mm)	% less than 115 mm
Nellies Cove	112	30-154	38
Rogue Reef	119	29-161	38
Mack Arch	129	57-164	18
Goat Island	132	49-163	18

Table 4. Weight (gm) and sex ratio from flat abalone dock samples, 2001.

date	number measured	length (mm)			number weighed	weight (lb)			sex ratio (%) (m/f)
		minimum	maximum	average		minimum	maximum	average	
July 9	30	123	156	142	10	0.7	1.6	0.9	53/47
Sept. 5	10	117	162	132	15	0.5	1.3	0.7	50/50
Sept. 12	25	125	157	147	25	1.6	1.4	1.0	36/64
total	65	117	162	142	50	0.5	1.6	0.9	46/54

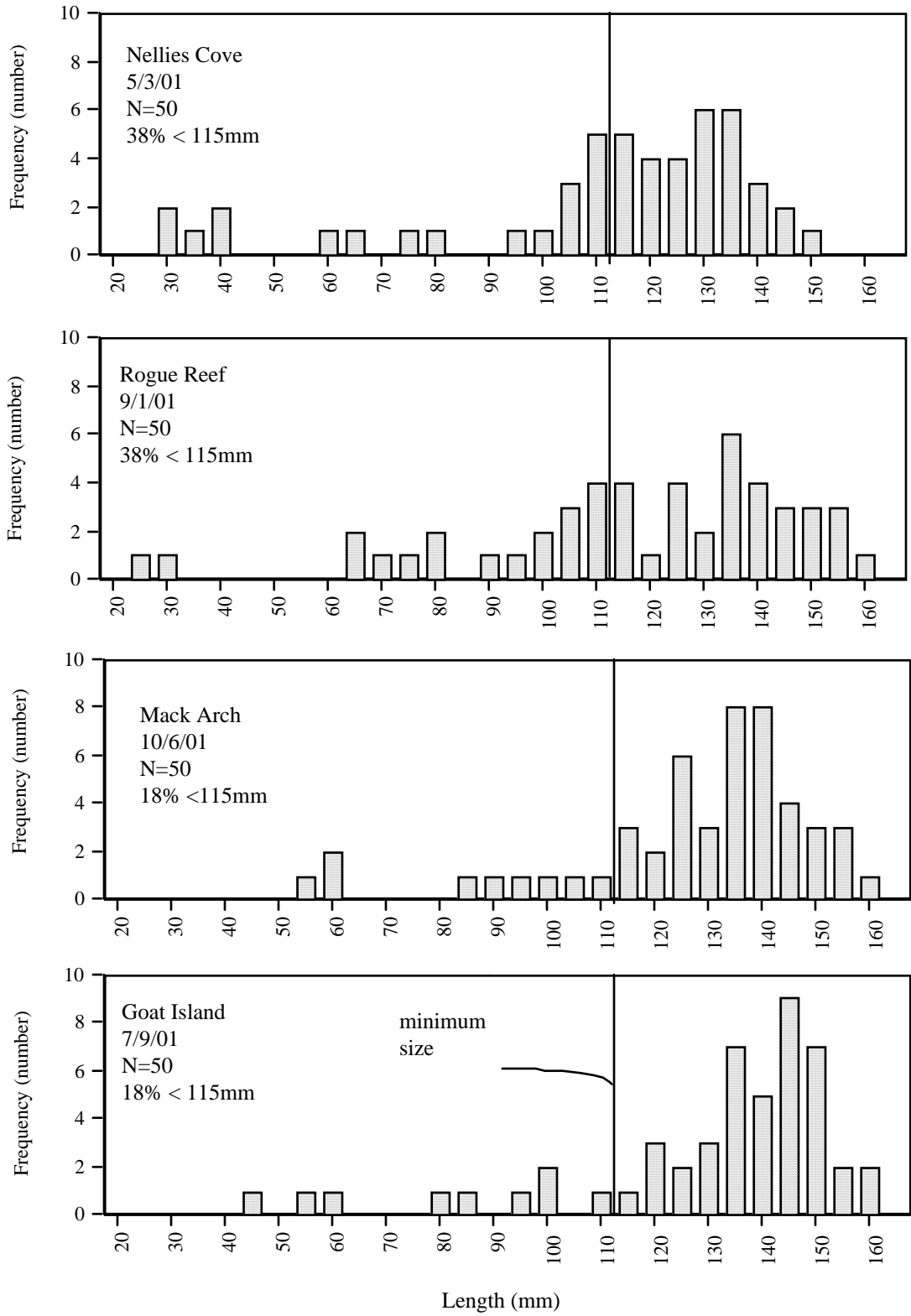


Figure 1. Length frequency (numbers) of flat abalone sampled from four areas, 2001.

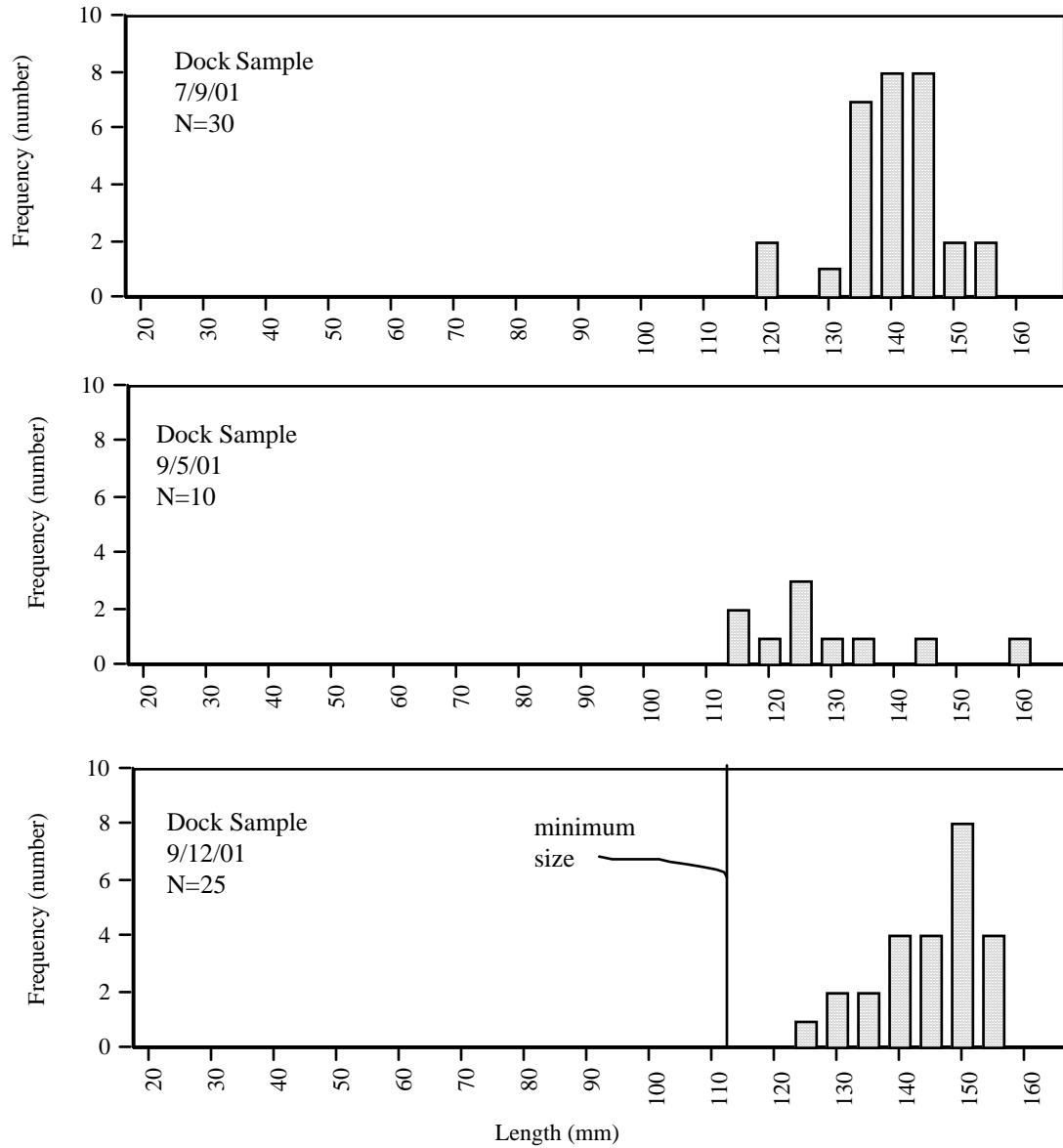


Figure 2. Length frequency (numbers) of flat abalone sampled from commercial landings, 2001.

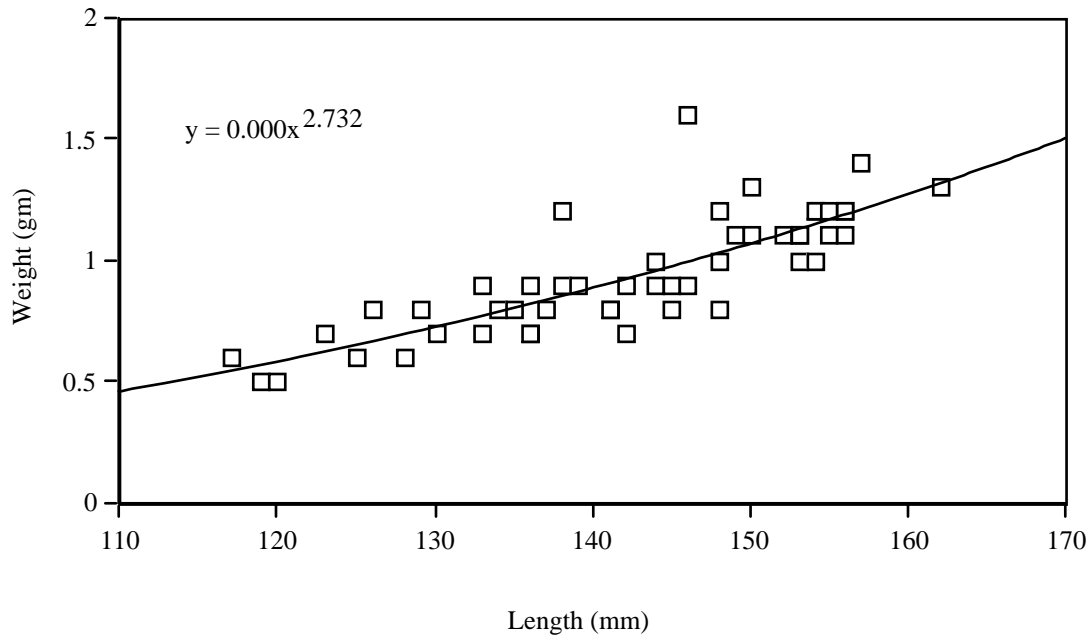


Figure 3. Weight (gm) at length (mm) for flat abalone sampled from commercial landings, 2001. N=65.