Stock Assessment of Abalone in Sta. Ana, Cagayan

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Abstract

Abalone species were collected from the collecting stations namely: Bimmapor, Dalupang and A.4 apurao from August 2001 to July 2002.

The identified two species were Haliotis asinina and Haliotis ovina.

Of the 192 samples, 71% were *Haliotis asinina* and 29% were *Haliotis ovina*. Fifty eight (58) samples or 43% were gathered at Bimmapor 35% or 48 samples were gathered at Dalupang and 22% or 30 samples were collected at Mapurao for *Haliotis asinina*.

For *Haliotis ovina*, 21 samples or 37% were collected at Bimmapor; 36% or 20 samples were at Dalupang while 15 samples or 27% were collected at Mapurao.

The parameters that were mea=ed ranged from 30 ppt to 33 ppt for salinity and 28° C to 31° C for temperature.

Introduction

Abalone is one of the most exploited species of gastropods. This is due to its high commercial value not only in the domestic scene but as well as in the International Market. Its palatable flesh is a delicacy in many countries while the shell is a raw material for the manufacture of buttons and fashion jewelry.

Abalone is readily available and often served with an oyster sauce. The meat is very expensive and highly regarded.

Abalone flesh is used directly by the fisherfolks for food. In many countries, the large muscular foot and palatable flesh is a high price delicacy and a source of about 20% protein. The flesh is usually processed dried, canned in brine, smoke in oil, seasoned and roasted, or eaten fresh.

Abalone thrives in the rocky coralline marine benthic domain in Northern Cagayan. According to those who have been a of abalone gathered. This is due to unregulated harvesting and absence of a management program for the resource.

Objectives

The study aimed to assess the abalone in Sta. Ana, Cagayan.

It specifically aimed to:

- 1. determine the quantity of abalone gathered in Sta. Ana;
- 2. be able to identify the species of abalone present in three study areas;
- 3. monitor the ecological parameters and
- 4. determine the relationship of water parameters with the mean weight of abalone gathered.

Review of Literature

Abalone are gastropod molluscs belonging tobthe Family Haliotidae. The genus *Haliotis* means "sea ear". There are about 100 species of abalone distributed worldwide.

Abalone are slow-growing one-shelled gastropods which live in rocky and shallow waters near stands of algae. There are three (3) species of abalone that naturally occur in the Philippine marine waters; the donkey's ear abalone or *Haliotis asinina*; the locally known "lapas" or *Haliotis varia* and the oval abalone or *Haliotis ovina*. Haliotes asinina. grov~to a maximum size of 10-1 lcm. It has a broad, flattened asymmetrical shell and large fleshy body. Its head is greenish, its marginal frill green with blotches of dark green and brown. Its foot is creamy with brown markings. This species has potential for culture due to its large size and shape. *Haliotis varia* and *Haliotis ovina* are relatively smaller with maximum shell length of 6-8 cm. *Haliotis varia* have shells with uneven spiral ridges, strong growth lines, radial folds and raised holes. Its head and mantle are greenish while feet and muscles are whitish (SEAFDEC1 1997 and 2000).

Abalone species that occur in temperate regions are bigger than the species found in the tropics. Tropical species are associated with coral and stone substrates while temperate species are found on rocks and boulder substrates. Abalones are herbivores, veliger larvae and early juveniles feed on epiphytic microalgae such as diatoms than gradually shift to macro-algae or seaweed until the adult stage.

The characteristics of abalone, which differentiates from other gastropods, is the presence of dislike shell, and shape and perforated near the edge of a single row of small holes that become progressively filed during the growth. The last five to nine holes remain open to serve as an outlet for the snail survival (SEAFDEC, 2000).

Captive abalone attains sexual maturity within 6-8 months of culture at shell size range of 35-40 mm. Sex can be distinguished by visual inspection of the gonad: females have dark green gonad while males have milky-white gonad. In gravid animals, the gonad bulk can be seen protruding between the shell and the foot muscle. Gonad maturation is enhanced by proper nutrition, high water temperature, and longer photoperiod.

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The abalone spontaneously spawns several days before or during the new moon and full moon. Natural spawning seems regular, at least every two weeks following a lunar cycle. *Haliotis asinina*, is known to spawn year round with a monthly peak in October. (Capinpin, 1995).

Research Methodology

I. Identification of Study Areas

Survey and floating of questionnaires were the first step that were undertaken. Three (3) sampling sites were chosen namely: Bimmapor, Dalupang and Mapurao, Sta. Ana, Cagayan.

Geographical Location of the Study

Sta Ana, Cagayan lies in the extreme northeastern tip of Luzon. It lies within 18 30' to 18 55'N Latitude and 122' E Longtitude.

II. Gathering of Data

A. Collection of Abalone Samples

Collection of samples was done monthly from August 2001 to July 2002. A transect line was laid to the shore (100 mm rope). Collection was done during daytime at low tide by searching species under rocks and at the crevices of corals where they rest and hide.

A driving knife was used to detached specimens from their substratum. The samples were placed on the labeled plastic bags. Diving mask was also used especially when collecting species at greater depths.

B. Identification of Abalone samples

Collected samples were sorted according to species. The total body weight was determined with the used of weighing balance and total body depth and length were determined with the use of vernier calliper. The morphological characteristics of each were noted and described. Using these data, dichotomous key was used to find each classification to the genus or species. Each sample was described based on morphological characteristics. The description was compared to the description of each species on references.

C. Monitoring of Ecological Parameters:

Ecological parameters in the study areas were observed during the study period.

The salinity was measured by means of refractometer. This was done by placing a drop of water on the slide and then read the measurement on the eyepiece so as to get the value.

The temperature of the water measured by immersing the maximum-minimum thermometer beneath the surface of the water.

Results and Discussions

Survey was conducted first in the Municipality of Sta. Ana with rocky coralline shore. It was found out that abalone species was thriving in the different collecting stations based on their morphological features. Description was compared to the description of species in references.

Samples were collected at three (3) study sites namely: Bimmapor (Station 1), Dalupang (Stations 2) and Mapurao (Station 3). The station is characterized by rocky coralline, rocky-sandy, and muddy type of substrates.

During the whole duration of the study, 192 samples of abalone were gathered, 136 of which were *Haliotis asinina* comprising 70.83% and 56 were *Haliotis ovina* making up 29.16%.

Of the 136 samples of *Haliotis asinina*, fifty eight (58) samples or 42.64% were collected at Bimmapor; 35.94% or 48 samples were collected at Dalupang, while 30 samples or 22.05% were collected at Mapurao.

Of the 56 samples of *Haliotis ovina*, 21 samples or 37.5% were collected at Bimmapor; 35.71% or 20 samples were collected at Dalupang while 15 samples or 26.78% were collected at Mapurao.

Table 1.	Average	Monthly	Mean	Weight.	Length	and Wi	dth of	Haliotis	asinine.
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Months	Weight	Length	Width
August	44.5	8.6	4.6
September	39.5	6.9	3.7
October	37.2	6.7	3.5
November	35.7	6.5	3.2
December	38.3	6.9	3.3
January	34.2	6.0	2.9
February	26.3	6.4	3.0
March	28.6	6.1	2.8
April	27.0	6.1	2.5
May	25.8	6.2	2.3
June	24.5	6.4	2.2
July	32.7	6.5	3.1

Table I shows that *Haliotis asinina* collected has the largest and heaviest weight for the month of August with 44.5 grams; length of 8.6cm. and a width of 4.6 cm. While the smallest and lightest samples were collected in the month of June with a weight of 24.5 grams, length of 5.9 cm. and a width of 2.2 cm.

Growth of abalone is very heterogeneous. Abalone seldom grows at the same rate.

Months	Weight	Length	Width
August	20.9	5.0	3.6
September	15.8	4.4	3.0
October	9.9	4.0	2.6
November	5.5	2.9	2.2
December	7.4	2.8	1.9
January	5.1	3.3	2.2
February	8.7	3.5	2.5
March	7.6	4.0	2.6
April	9.5	3.8	2.1
May	5.2	2.9	2.0
June	5.0	2.3	1.8
July	10.6	3.7	2.8

Table 2. Average monthly samples of Haliotis ovina

As shown in table 2, during the whole duration of the study it was found that that *Haliotis ovina* has the biggest and heaviest in the month of August with a weight of 20.9 grams, length of 5.0 cm. and a width of 3.6 cm. while the lowest and smallest is in the month of June with a weight of 5.0 grams, length of 2.3cm. and a width of 1.8 cm. This implies that the *Haliotis ovina* is on the period of spawning in the month of February-May, become spent in June and July but rematured after that (Capinpin, 1995).

Months	Station I	Station 2	Station 3	Total
August	3	1	1	5
September	2	1	1	4
October	3	2	1	6
November	2	1	1	4
December	1	1	1	3
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	0	0	0	0
July	0	0	0	0

Table 3. Gravid samples of *Haliotis asinina* at 3 stations

As shown Table 3, there were 22 gravid samples gathered during the study. There are 6 samples that are gravid for the month of October, 5 gravid samples were gathered for the month of August, 3 gravid samples for the month of December and 4 gravid samples for the month of September and November.

Months	Station I	Station 2	Station 3	Total
August	1	1	1	3
September	1	1	1	3
October	2	2	1	4
November	1	1	1	3
December	1	1	1	3
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	0	0	0	0
July	0	0	0	0

Table 4. Gravid samples of Haliotis ovina at 3 stations

Table 4 shows that there are 16 gravid samples gathered. For the month of October there were 4 gravid samples of *Haliotis ovina* that were gathered and 3 gravid samples that gathered for the month of August, September, November and December respectively.

Months	Station I	Station 2	Station 3	Total	Mean
August	33.5	33.5	32.5	99.5	33.16
September	32.5	32	32.5	97	32.33
October	31	32	31	94	31.33
November	31	31	31	93	31.33
December	30	30	30	90	30.0
January	31	31.5	31	93.5	30.0
February	32	32	30	96	32.2
March	33.5	33.5	33	100	33.33
April	34	34	33.5	101.5	33.83
May	34	33.5	34	101.5	33.83
June	34	33	33	100	33.33
July	33.5	32	32	97.5	32.5

Table 5. Salinity reading in ppt.

Table 5 shows that the highest average mean salinity was 33.83 ppt which occurred in April while the lowest is 30.0 ppt which occurred in December.

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Months	Station I	Station 2	Station 3	Total	Mean		
August	31.5	30.5	30	92	30.6		
September	30.5	30	30	90.5	30.1		
October	29.5	29.5	29.5	88.5	29.5		
November	29	29	28.5	86.5	28.8		
December	28.5	29	29.5	86	28.6		
January	29	29.5	29.5	88	29.3		
February	30	30.5	30.5	91	30.3		
March	31.5	31.5	30	93	31.0		
April	31.5	32	31.5	94.5	31.5		
May	31.5	31	31.5	95	31.6		
June	30.5	30	31	92.5	30.5		
July	30.5	30.5	30.5	92	30.6		

Table 6. Temperature reading C

As shown in Table 6, the highest average mean temperature of 31.6° C occurred in May while the lowest was observed in the month of December, which was 28.6° C.

Classification and Description of Abalone

Kingdom: Animalia Phylum: Mollusca Class: Gastropoda Order: Archaeogastropoda Family: Haliotis Genus: Haliotis

Key to Species

Color mottled tan and dark green exterior of the shell	H. asinina
Color brown with spirally cream shell	H. ovina

Summary, Conclusion and Recommendations

Based on the result of the study, two species of abalone - *Haliotis asinina* and *Haliotis ovina* were recorded in San Vicente. Collected from three study stations namely: Bimmapor, Dalupang and Mapurao.

Of the 192 samples that were collected 71% consisting 136 samples were *Haliotis asinina* and *Haliotis ovina* with 56 samples accounting for 29%. Of the 136 of *Haliotis asinina* fifty eight (58) samples or 43% of were collected at Bimmapor; 35% or 48 samples were collected at Dalupang while 22% or 30 samples were collected at Mapurao.

Of the 56 samples of Haliotis ovina, 21 samples or 37% were collected at Bimmapor; 36% or 20 samples were collected at Dalupang while 15 samples or 27% were collected at Mapurao.

Most of the samples were collected at Bimmapor.

The ecological parameters were measured with a mean range of 30 ppt to 33 ppt in salinity and temperature range from 280C to 3 It.

Based on the number of samples gathered which was 192 pieces, 136 *Haliotis asinina* and 56 *Haliotis ovina*. The abalone resource of San Vicente has been depleted and that the resource should be given a chance to be replenished through natural process.

It is therefore strongly recommended that gathering of abalone should be prohibited; further study should be undertaken and that culture of abalone in the area should be conducted for sustainability of the resource.

Literature Cited

SEAFDEC, 2000. Abalone Seed Production and Culture SEAFDEC, 1997. Abalone Seed Production and Culture SEAFDEC, 1995. The abalone in the Philippines