

SUMMARY OF CATCH AND VALUE
IN THE RED SEA URCHIN TEST FISHERY
IN DISTRICT 101, SOUTHEAST ALASKA.



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FOREWARD

This is a compilation of data and text from the final report on the red sea urchin test fishery in District 101 of Southeast Alaska. The final report was authored by Ocean Fresh Alaska in May, 1996 under contract with the Alaska Department of Fish and Game. The final report was the last in a series of monthly reports provided by the contractor, the first of which was published in June, 1995. The department is providing this compilation in advance of the potential opening of a commercial fishery in districts 101 to 104 in southern Southeast Alaska. Selected chapters from the final report are reprinted after page 10 in original form without editing. The department assumes no responsibility for the accuracy of the data or narratives in the reprinted sections. The original contractor reports for each month may be viewed at the Ketchikan office of the Commercial Fisheries Management and Development Division.

INTRODUCTION

It is the policy of the Alaska Department of Fish and Game, Southeast Region, to provide for the development of new fisheries only when new funding sources are made available. To this end, a red sea urchin test fishery was conducted near Ketchikan, Alaska from August 1994 to May 1995. The purpose of the surveys was to estimate the biomass and market quality of red urchins along the shorelines and on offshore reefs of District 101. The surveys were funded by a test fishing contract awarded to Ocean Fresh Seafood Products. Under this contract, Ocean Fresh paid the department \$139,567 in exchange for the opportunity to harvest up to 2.75 million pounds of red urchins (later 3 million pounds following a contract adjustment, see below). The contract required monthly reporting and a final report. This document summarizes the fishery and economic data from the final report. Included are reprints from selected chapters of the final report authored by Ocean Fresh.

The survey had a department-only phase and a phase that was conducted jointly with the contractor, in which Ocean Fresh supplied boats and divers for the assessment surveys as stipulated by the contract. Results of the surveys were reported by Woodby et al. (1996).

QUOTAS

The original quota of 2.75 million pounds was apportioned to each of seven areas in relation to the survey estimates of biomass of urchins in each area (Table 1). The quota was increased by 0.25 million pounds to compensate the contractor for additional survey effort in the second survey phase, as stipulated in the contract. The additional quota was assigned to area 101-21A in January 1996.

SUMMARY OF CATCH AND VALUE TRENDS

The test fishery spanned 13 months from March 1995 to April 1996. Over one-third of the urchin harvest came from subdistrict 101-21A on the south and west shore of Duke Island (Fig. 1) where 1,014,283 pounds were harvested (Table 1). The reefs southwest of Duke Island, Bee Rocks and Hassler Reef (subdistrict 101-21B) provided a harvest of 705,920 pounds, which was nearly one-quarter of the total. Harvests ranged from 274,468 to 388,547 pounds in Subdistricts 101-11, 101-23, 101-25, and 101-29. Only 5,878 pounds were harvested from subdistrict 101-43, where relatively minor populations of red urchins are found.

Peak harvests of over 300,000 pounds per month were taken in May, June, and July (Figure 1). These three months and December were the peak months for total earnings (Figure 2). The highest average price per pound was \$0.81, paid in December and the lowest price was \$0.29 paid in August (Figure 3). Roe recovery increased steadily from a low of 6.2% in June to a peak of 11.3% in November (Figure 4). Recovery decreased in December and hovered between 8% and 9% until finally decreasing to 7.7 % in April 1996.

Comparing the 7 statistical areas, monthly roe recovery varied between 5.5 and 12.2% (Table 2). Subdistricts 101-21B and 101-23 produced the highest average percent roe recovery at 8.8 %. The lowest average percent roe recovery was 7.2 % in subdistricts 101-21A; however, that area also produced some of the highest recoveries in October and November, and the most pounds of all Subdistricts combined (Table 1).

Further detail on trends in catch and value are described in selected chapters from the Final Report from Ocean Fresh Alaska, reprinted without editing following page 10.

LITERATURE CITED

- Woodby, D, R. Larson, and T. Minicucci. 1996. Red sea urchin assessment surveys in District 101, August 1994 to May 1995. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report Number 1J96-20, Douglas.

Table 1. Pounds of urchins by month and subdistrict

	101-11	101-21A	101-21B	101-23	101-25	101-29	101-41	Total
Mar-95	29,251			5,443	13,203			47,897
Apr-95	105,174							105,174
May-95	94,954	207,522				3,605		306,081
Jun-95		312,118	37,762	1,261				351,141
Jul-95	54,304	169,426			147,266			370,996
Aug-95	7,589	50,567	206,131		1,922	7,093		273,302
Sep-95		4,820	109,775	11,660	16,500	328		143,083
Oct-95		9,032	86,942	45,154	10,291	16,912		168,331
Nov-95		2,174	124,405		2,875	9,073		138,527
Dec-95		5,886	110,222	33,230	26,753	7,772		183,863
Jan-96	19,097	121,415	30,683	23,997	39,657	11,137		245,986
Feb-96	8,073	131,323		14,254	25,834	2,768		182,252
Mar-96	70,105			122,852	509	13,505		206,971
Apr-96				16,617	2,096	237,412	5,878	262,003
Total	388,547	1,014,283	705,920	274,468	286,906	309,605	5,878	2,985,607

Table 2. Percent roe recovered by subdistrict and month

	101-11	101-21A	101-21B	101-23	101-25	101-29	101-41	Average
Mar-95	8.1			8.0	6.1			7.6
Apr-95	8.8							8.8
May-95	8.1	7.0				5.5		7.3
Jun-95		6.2	6.6	7.3				6.3
Jul-95	6.1	6.5			7.0			6.6
Aug-95	7.1	7.3	7.5		5.9	7.0		7.4
Sep-95		8.7	8.6	9.1	8.1	7.5		8.6
Oct-95		10.5	9.7	9.6	7.8	6.8		9.3
Nov-95		12.2	11.6		8.6	8.5		11.3
Dec-95		9.7	8.6	8.4	8.5	8.1		8.6
Jan-96	9.8	9.1	8.7	8.7	8.5	8.4		8.9
Feb-96	8.9	8.8		8.4	8.1	5.2		8.7
Mar-96	9.5			8.8	5.5	7.6		9.0
Apr-96				7.1	8.7	7.8	7.6	7.7
Average	8.4	7.2	8.8	8.8	7.5	7.5	7.6	

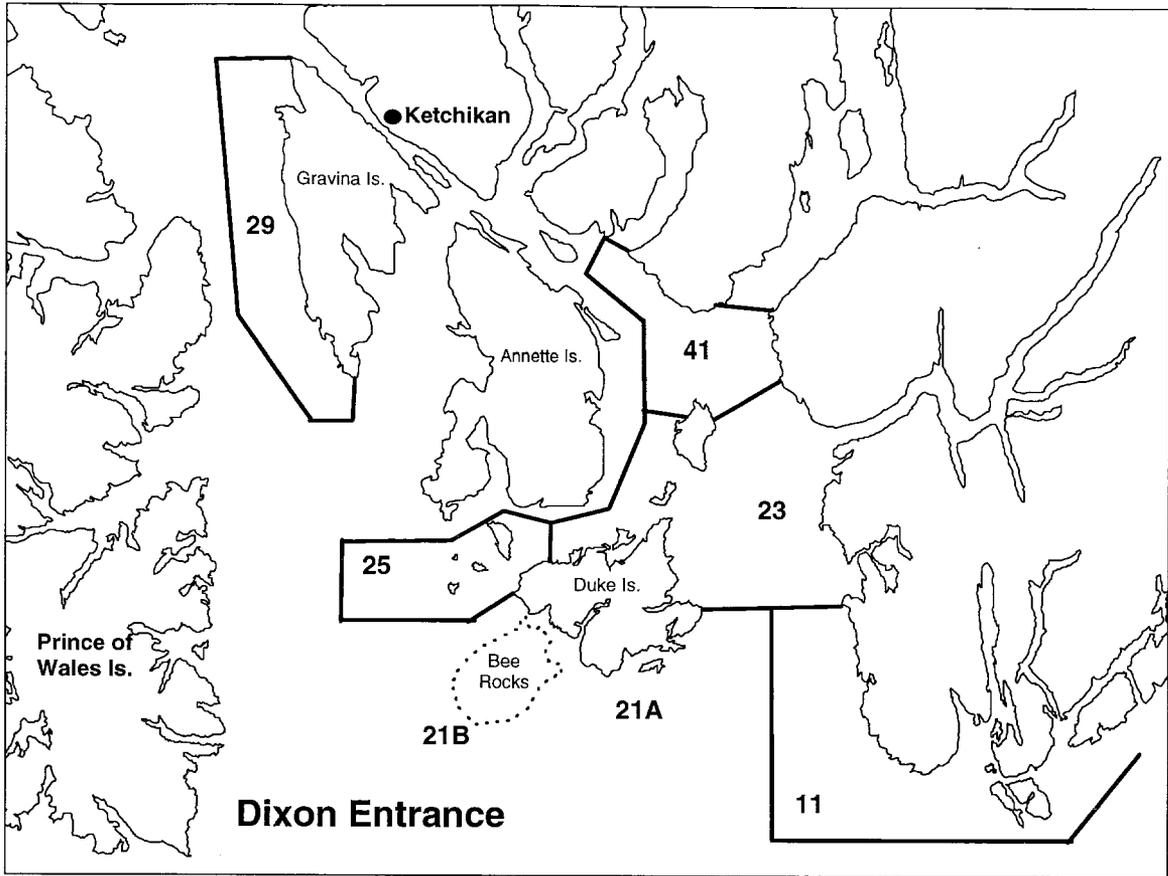


Figure 1. Seven subdistricts of district 101.

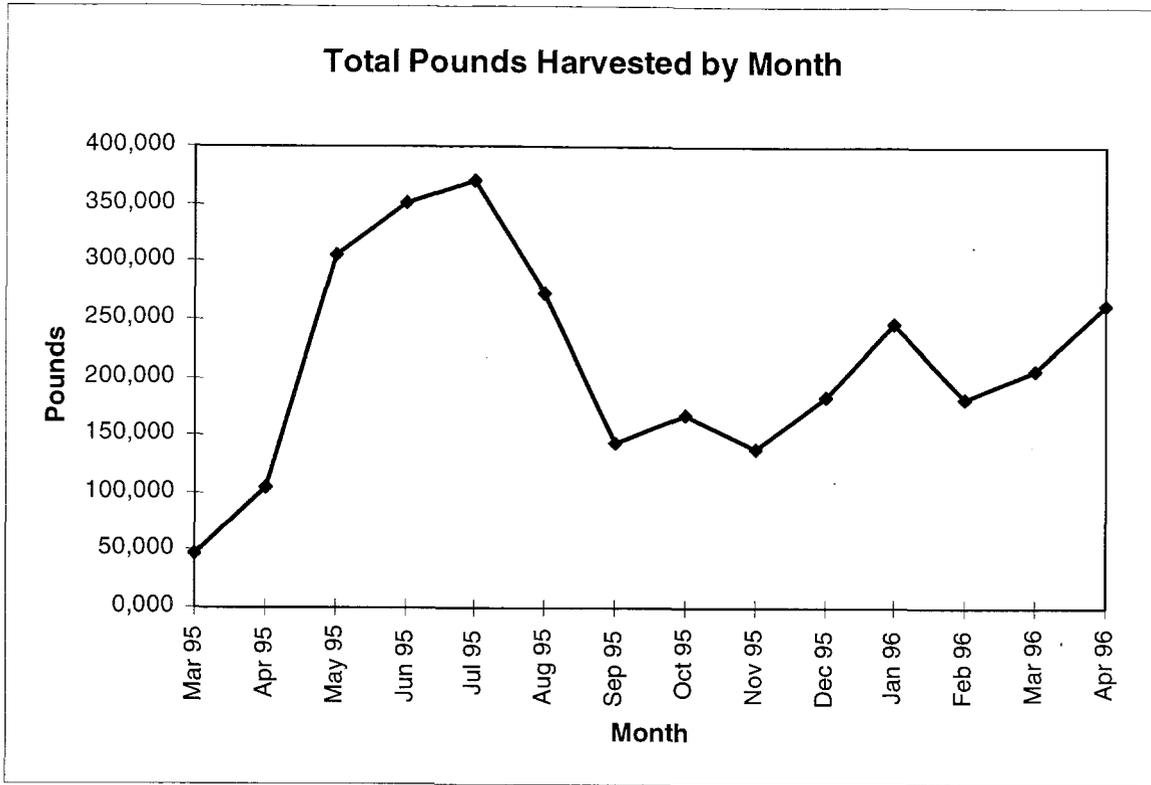


Figure 2. Total pounds of red sea urchins harvested by month, March 1995-April 1996.

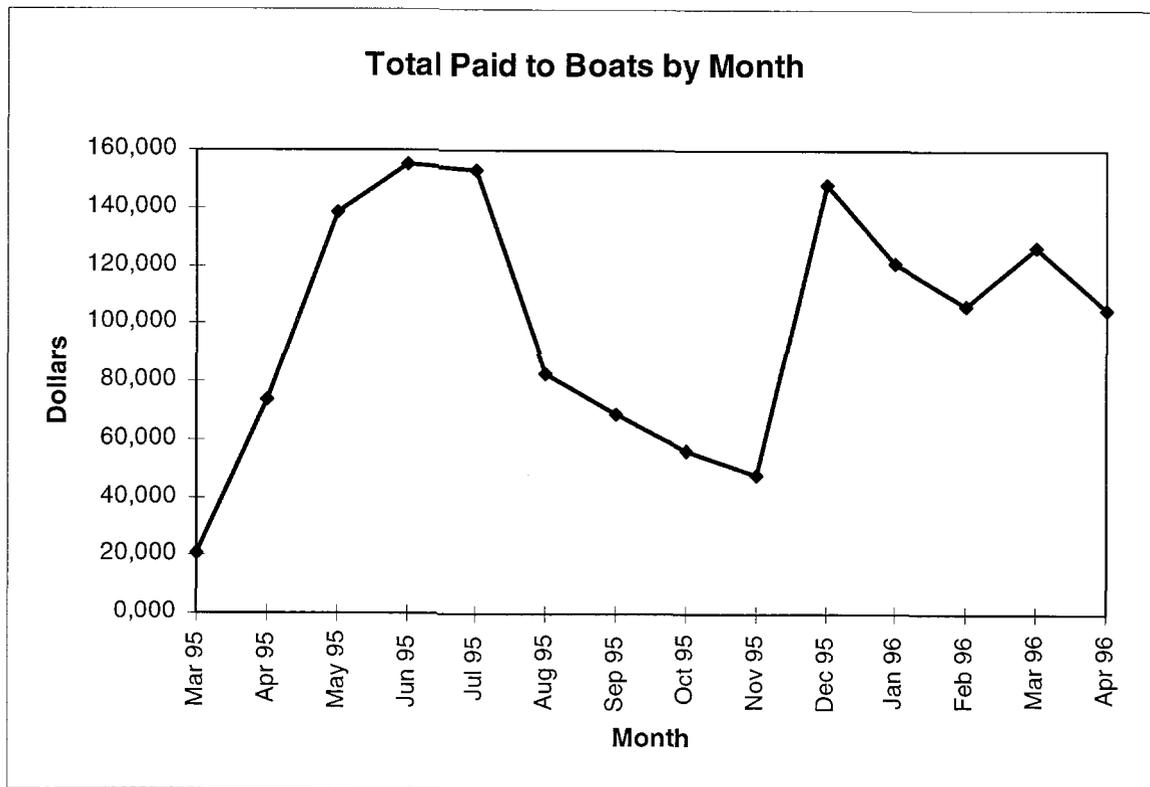


Figure 3 . Amount paid to boats for red sea urchins by month, March 1995-April 1996.

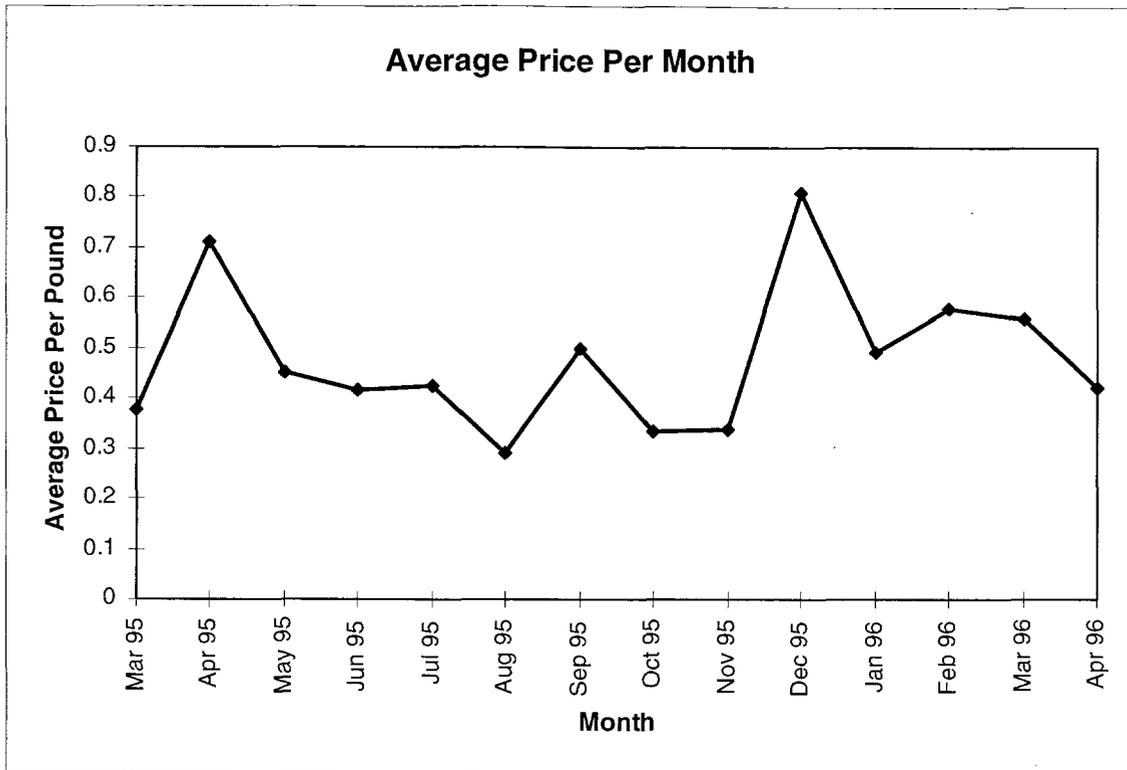


Figure 4. Average price per month for red sea urchins by month, March 1995-April 1996.

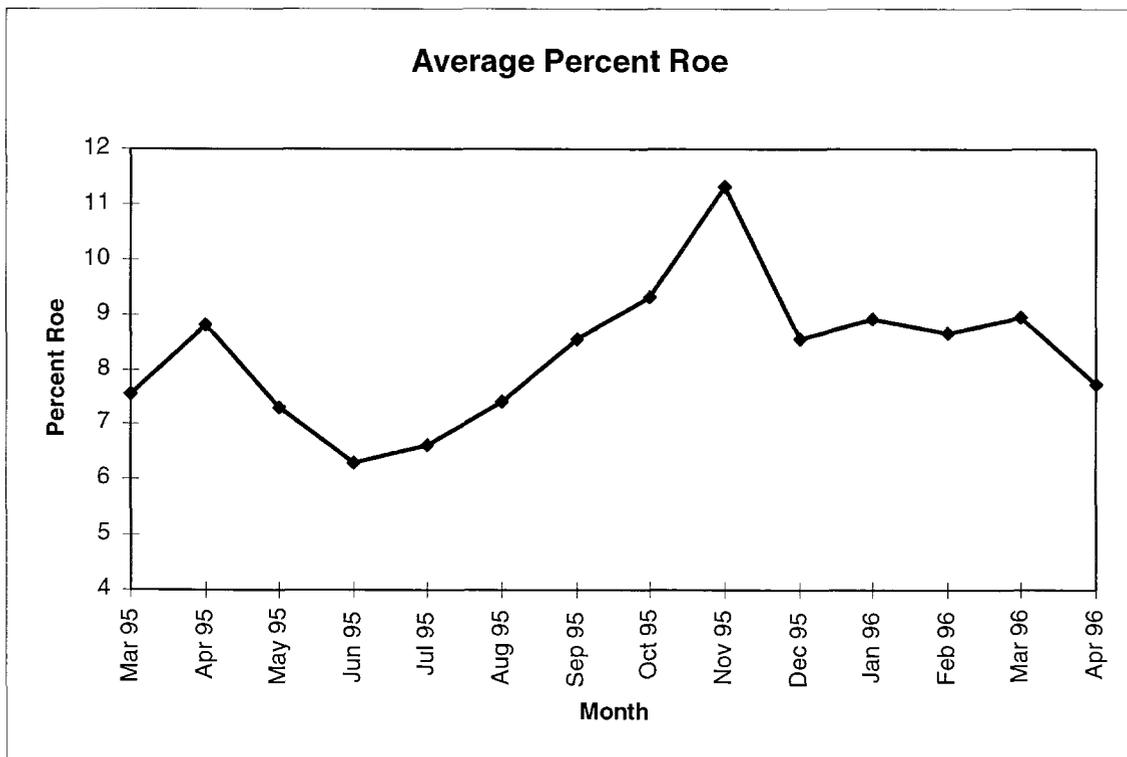


Figure 5. Average percent roe from red sea urchins by month, March 1995-April 1996.

SELECTED CHAPTERS FROM THE SEA URCHIN TEST FISHERY FINAL REPORT

by

OCEAN FRESH ALASKA

MAY 1996

Chapter 3 Harvesting

3.1 RED SEA URCHIN PROJECT: HARVESTING SUMMARY

The test fishery spanned over one year of harvest. In the following pages we have extracted highlights from the previous reports representing each month of harvest. One of the most notable facts was the market. We had anticipated July (or the summer months) as being the least favorable market condition. As it turned out, the summer was actually a decent market, but in the fall the market was poor. Because of harvests in other parts of the world this is likely to be a trend rather than an anomaly unique to last year.

Overall, the project went according to plan. The yen to dollar rate deteriorated beyond our expectations but the recoveries were slightly higher which compensated for the unfavorable exchange rate. In the following pages the monthly changes in market condition, quality, and production rates will be reviewed.

In March, April, and May of 1995, most of Ocean Fresh's production was taken from area 101-11. May harvest production was split among area 101-11, Foggy Point to Nakat, and area 101-21, Duke Island. At that time the quality in area 101-11 appeared superior to that in area 101-21. In May, the kelp, the urchin sole food source was just beginning to appear in area 101-21. In June, after they began feeding on the kelp, the quality of the urchin from 101-21 did improve but did not reach the quality for area 101-11. Market conditions deteriorated in June which forced the prices to fall approximately twenty percent (20%). A drop in price was not unusual for this time of year. Traditionally, June and July are the lowest in market conditions. Ninety percent (90%) of the sea urchin harvest in June came out of West Duke Island sub-district 101-21. The remaining ten percent (10%) came from Bee Rocks.

The harvest area in July was spread over four different areas of these, North Duke (101-25) produced the largest. However, the quality was not great. The product from North Duke was skinny and recoveries were low. In July, it was noted that the quality at Bee Rocks was improving. Seventy two thousand (72,000) pounds were harvested from West Duke Island (101-21) and fifty three thousand pounds (53,000) were harvested from the Nakat area during the month. Production was increased in July due to increased diver effort and exceptional weather conditions. However, this may have been a poor financial decision because market prices were low.

In August, many of the participants became discouraged due to low prices and difficulty finding good quality. In fact, the majority of the divers involved in August quit at the end of that month. The average price for August was around thirty cents (\$.30) per pound. August turned out to be our worst month. Production for August was taken primarily from the Bee Rock harvest area. A total of two hundred seventy thousand (270,000) pounds were harvested. Over two hundred thousand (200,000) pounds or seventy three percent (73%) came out of the Bee Rocks harvest area. Just over fifty thousand pounds (50,000) or eighteen percent (18%) came out of West Duke. The remainder came from three different areas. Ocean Fresh focused so specifically on the Bee Rock area in August for two reasons. First, the favorable weather conditions and second, the erroneous belief that the quality at Bee Rocks would reduce rapidly in the fall. In August, we also inaccurately predicted the accessibility of the Bee Rock reef during the winter.

Harvesting operations in September were reduced primarily because of market conditions. Once again the Bee Rocks area 101-21B was the area most heavily harvested. Of the one hundred forty-three thousand (143,000) pounds taken one hundred nine thousand seven hundred seventy five (109,775) pounds were harvested from Bee Rocks. This represents over seventy-six percent (76%) of the total harvest for September. This area yielded consistently good product for several months, contrary to our original assessment during the survey.

Area 101-25, Percy Island, had sixteen thousand five hundred (16,500) pounds taken. This was about eleven percent (11%) of the total. Most of this was accomplished by one boat. This area has not had the quality of urchins we had anticipated. It was very difficult to find good product in this area and the divers were frustrated in their attempts. Area 101-23, East Duke Island, had eleven thousand six hundred sixty (11,660) pounds harvested or about eight percent (8%) of the monthly total. This area had good quality product and is very protected in regard to weather. However, we chose, in September to reserve some of the quota for the winter months as this area is so protected. The quota for Duke Island, area 101-21 was almost filled, four thousand eight hundred twenty (4,820) pounds were taken.

The remainder of the pounds, four hundred eighty (480), were taken from Gravina Island. The urchin in this area are mostly skinny. This was probably due to the coast line. The bottom drops off so fast there is not as much food available to the urchins. The urchins feed and grow fat on drift

kelp. The drift kelp in this area falls off the cliffs and the urchins in accessible areas do not feed as well as urchins on the flats.

Landings for October were up twelve percent (12%) from September totals. However, market conditions did not improve. Production in October occurred in five different areas. The Bee Rock area produced the most pounds. Eighty-six thousand nine hundred forty-two (86,942) pounds of product were taken from this area fifty-two (52%) percent of the months total production. Over the previous four months over five hundred thousand (500,000) pounds were taken from this area. One interesting fact that has been noted by many of the divers is that since the exploitation in this area has been higher than in other areas the sea urchins have become very active. Urchins in this area are moving around and filling in the areas previously picked by the harvesters. West Foggy Bay area 101-23 produced forty-five thousand one hundred fifty-four (45,154) pounds of urchin or twenty-seven (27%) percent. The urchins in this subdistrict were harvested primarily from the Northeast section of Duke Island. This area provides protection from most rough weather conditions and has yielded good quality urchins. The third area is 101-29, West Gravina Island. This area provided ten (10%) percent of the production with sixteen thousand nine hundred twelve (16,912) harvested. The sea urchins on Gravina are not as fat as they are in other areas. Most of the production came from the north end around Guard Island. This area has a strong current and seems to have better product than most of the island. The remaining five (5%) percent came from area 101-21, West Duke Island. This area has good yield and the largest mass of urchin. The nine thousand thirty-two (9,032) pounds that were harvested this month were a sample for future harvest. As should be expected, all stock assessments were not completely accurate. In October, it was noted that there is a much larger biomass in this area than predicted.

Landings in November were down approximately eight percent (8%) from October totals. In addition the Japanese market was down and many sea urchin fishery participants became discouraged. The combined effort for the month of November was also less than previous months. The total hours spent in the water was seven hundred eight two (782) hours. This time produced one hundred thirty eight thousand five hundred twenty seven (138,527) pounds of live sea urchin. The ex vessel value for this weight was forty seven thousand six hundred fifty six (\$47,656.00) dollars, down twenty percent from last month. The average amount paid per day was six hundred fifty two dollars (\$652.00), which translates into approximately sixty one dollars (\$61.00) per hour in the water including survey time. This does not

include the time spent traveling to and from the grounds. There is no accurate way to calculate this time since all of the boats travel at different speeds and work different areas.

In November most of the effort was once again concentrated on the Bee Rocks area 101-21B. This area produced one hundred twenty four thousand four hundred four pounds (124,404) of product, equaling ninety percent of the month's total production. The quota for this area is just under eight hundred thousand pounds (800,000). By the end of November, just under six hundred forty five thousand pounds (645,000) have been taken. Most of this poundage has been harvested from the outside reef which is less than ten square miles of reef. The remaining catch for this area is approximately one hundred fifty-five thousand pounds (155,000). The other areas seem inconsequential in respect to Bee Rocks. Gravina Island, area 101-29, had landings of nine thousand seventy three (9,073) pounds most of which came from the Valenar Point area. The area around Percy Islands, 101-25, had landings of two thousand eight hundred seventy five (2,875) pounds or approximately two percent (2%) of the effort. Two thousand one hundred seventy four (2,174) pounds were taken from Duke Island, area 101-21. These three areas combined produced fourteen thousand one hundred twenty two (14,122) pounds equivalent to ten percent (10%) of the production.

Our efforts were concentrated on the Bee Rocks in November in an effort to maximize the condition of the sea urchin that habitat the reef. During our biomass surveys we were unable to find any good sea urchin in this area. During the summer a small percentage of the product started to become favorable. This condition continued to spread over the reef in the summer and into the fall. The recovery on the reef is once again starting to drop. Since it is unlikely the product will have time to go through another cycle before the test fisheries is concluded, we concentrated our efforts in the vicinity of the reef.

In December, although weather conditions were poor, landing were up thirty two percent (32%) from November. This is mainly due to improved market conditions which inspired more effort. The combined effort represented one hundred eighty three thousand sixty three (183,063) pounds. The average price per pound was eighty cents (\$.80). The boats averaged three hundred seventy-five (375) pounds per hour equal to three hundred dollars (\$300.00) per hour. The low production was due to the number of boats who participated in the sea cucumber fisheries. The sea cucumber

fisheries only lasts two days per week, but due to the logistics many of the vessels were unable to maintain their sea urchin production while harvesting sea cucumbers. In addition to the competition provided by the sea cucumber fisheries we also took a week off during the Christmas holiday.

The market conditions in December were up with the one hundred eighty-three thousand one hundred sixty-three (183,163) pounds equaling one hundred forty-eight thousand seventy-one (\$148,071.00) dollars. This is an increase over last month of three hundred percent (300%) or one hundred thousand dollars (\$100,000). The major market factor in the price is supply versus demand. The demand for the product was very high while the supply was low. The supply was low because the weather on much of the west coast was unfavorable. We were fortunate enough to be able to supply good Alaskan product during this time.

The December catch was taken from five of the six available harvest areas. The only area not worked was the Kah Shakes area where the quota is only twelve thousand pounds. Most of the poundage taken this month came from the Bee Rocks area. Bee Rocks produced one hundred ten thousand two hundred twenty two pounds (110,222). This is approximately sixty five percent (65%) of the month's production. East Duke to West Foggy Bay, area 101-23 produced thirty three thousand two hundred thirty pounds (33,230). Most of the production came from the Foggy Bay area. Area 101-25 produced fifteen percent (15%) of the production or twenty six thousand seven hundred fifty three pounds (26,753). Most of this harvest was taken from Percy Island. Seven thousand seven hundred seventy two pounds (7,772) were taken from Gravina Island. This area has not produced very good quality, even our most experienced boats have trouble finding good urchin, thus the low production for this area. Five thousand eight hundred eighty six pounds (5,886) were taken from South Duke Island. This was done mainly to check the quality in the area.

The quality on the south end of Duke Island during the spring was not very good. However, we did several tests on the area since springtime. The quality has improved greatly during the test fishery period. Because of the bottom terrain the original survey we did not cover much of the biomass. We would estimate that we have only taken half of the amount from this area compared to other areas. For this reason, we decided to take the additional two hundred fifty thousand pounds awarded to us under the contract (IHP-95-005) from the South Duke Island area. The sea urchin in this area is not the best quality but biologically, we felt this was the best area for additional harvest because of the abundance of product. The extensive reef system that

lies beneath the surface extends several miles from the shoreline in many areas providing excellent habitat for sea urchins. The urchins in this area are so densely packed that many of them do not have enough to eat. We believe it was most beneficial to remove some of this product so that the premium product has a chance to get fatter. Since the reproductive capability is directly related to the size of the gonad which increases with the food supply. This should be beneficial in all respects to future harvest in this area.

In January, the catch was taken from five of the six available harvest areas. The only area not worked was the Kah Shakes. The Bee Rocks (area 101-21B) quota was officially fulfilled in January with a total of thirty thousand six hundred eighty-three (30,683) pounds harvested during the current reporting month. Three hundred ninety-two (392) pounds remain in the Bee Rocks area. We closed the area at that time and no further harvest was allowed.

Most of the poundage taken in January came from area 101-21, West Duke Island. West Duke produced one hundred twenty-one thousand four hundred fifteen (121,415) pounds. This is approximately forty nine percent (49%) of the month's production. North Duke Island (area 101-25) produced thirty-nine thousand six hundred fifty-seven (39,657) pounds which represents sixteen percent (16%) of the total catch. Area 101-23 produced nineteen thousand ninety-seven (19,097) pounds. Most of this catch was taken from one general area at Foggy Point. In January, Gravina (101-29) produced eleven thousand one hundred thirty-seven (11,137) pounds. The quality in this area has improved dramatically. However, harvesting the urchins was difficult. The urchins in this area are normally of low quality. Therefore, the harvesters had difficulty finding the high quality urchins to deliver. The divers that attempted this area in January were highly experienced. They had been with the project since the beginning and had a strong grasp on the methods needed for successful harvesting. Less experienced divers may not have achieved the excellent recoveries displayed in January from district 101-29.

The quality on the South end of Duke Island had improved greatly during the winter months. We elected to take the additional two hundred fifty thousand (250,000) pounds of quota from this area. In January we had taken approximately half of the additional quota, one hundred twenty thousand pounds (120,000), from South Duke. Fortunately the quality in this area this month was excellent. The harvesters achieved high recoveries up to over twelve percent (12.13%). The average recovery in January was about nine percent (9.14%). This increase in recovery may be due in part to several

factors. Among these factors are increased diver experience, favorable weather conditions in January, and possibly the feeding patterns of the urchins themselves.

At the inception of the test fishery the urchins in area 101-21 were so densely packed that many did not have enough to eat. This lack of food caused a decrease in the size of the gonad. The size of the gonad directly relates to the urchin's ability to reproduce. Thus, the reproduction level of the urchins was probably poor. In addition, the uni (product) was of very low quality. In the months of May, June, and July area 101-21 was heavily harvested. We took five hundred ninety-six thousand four hundred ninety-six (596,496) pounds of the quota from the area at that time. However, then the recovery averaged only around six percent (6.13%) which is low. The normal average recovery is at least seven percent (7%). It is possible that the previous harvest of the urchins in this area represented enough of a decrease in habitation to enable surviving urchins to feed more and therefore improve in quality.

In February, the production was taken from five subdistricts. The majority came from area 101-21, West Duke Island. Seventy-two percent (72%) was taken from this area equaling one hundred thirty-one thousand three hundred twenty-three (131,323) pounds of sea urchins. This is the remainder of the additional two hundred fifty thousand pounds given under the contract.

The reason the additional pounds were taken from this area and not spread out equally among the areas is that South Duke Island has such a large biomass. The method used to determine biomass does not include much of the reef system in this area. It was concluded after working all of the areas that biologically, taking additional urchins from area 101-21 would result in the least amount of impact on the total available biomass. During the month of February, we took all of the quota allowed from subdistrict 101-21 and no further harvest was allowed in this area.

North Duke Island area 101-25 had twenty-five thousand eight hundred thirty-four (25,834) pounds taken from it leaving a remaining quota of less than four thousand (4,000) pounds. East Duke Island West Foggy Bay area had fourteen thousand two hundred fifty-four (14,000) pounds or fifty-one (51%) percent. From Foggy Point to the Nakat, area 101-11, we harvested six thousand eight hundred ninety-three (6,893) pounds. During February only two thousand six hundred twelve (2,612) pounds were taken from Gravina (101-23). Since the quality at Gravina has been poor, the

harvest continued in the Foggy Bay-Nakat area before the fleet moved up to Gravina to complete that quota.

During March we harvested product in four subdistricts. In area 101-11 Foggy Point to Nakat, seventy thousand one hundred and five (70,105) pounds were harvested. This completes the harvest in area 101-11 leaving only five hundred fifty two (552) pounds of the original three hundred eighty nine thousand ninety nine (389,099) pounds. This area produced some of the best quality during the test fishery. In addition, even though it was the farthest from the processing plant, it has been one of the favorite places for the harvesters to work.

In area 101-23, the East Duke to West Foggy Bay area one hundred twenty two thousand eight hundred fifty two (122,852) pounds were taken. This leaves twenty one thousand seven hundred and twenty one (21,721) pounds left on the original quota for this subdistrict. This area was more difficult to find good urchin than in area 101-11. The most productive area within subdistrict 101-23 was the stratum of coastline from Foggy Bay to Kah Shakes. The only other area of significance was the West Gravina island area 101-29.

In the area of 101-29 many of the harvest vessel have had trouble finding good quality. The vessels from Washington seem to have the most difficulty in this area and will probably discontinue their operations because they are unable to find good quality product and thus have diminished earning capacity. So far thirteen thousand five hundred five (13,505) pounds have been landed from this area. Even though some of the harvesters here stopped working, many of the more experienced sea urchin harvested are having no problem finding good product.

Area 101-25 had one landing of five hundred nine (509) pounds. This area has three thousand three hundred thirty two (3,332) pounds left to be harvested.

April was a unique month since the majority of the remaining quota was located at Gravina Island, subdistrict 101-29, which had not produced high yields in previous months. Many of the harvest vessels stopped working due to their assumption that it was impossible to find good quality product in this area. The first casualties of the month were the two boats from Washington. As we mentioned in previous reports, the dive harvest method employed by the Washington boats is bottom walking. This method proved unproductive along the Gravina Shore. Both of the Washington boats, the Tsunami and the Princess Feliesha stopped working, stating that it was impossible to find good quality. Contrary to this belief, two hundred thirty

seven thousand four hundred twelve (237,412) pounds were taken from Gravina in April with an average price of forty (\$.40) cents paid per pound.

The only boats that were able to successfully harvest urchin in the Gravina area have years of experience. Production would not have been possible with less experienced harvesters. Over one half of the product was landed by two vessels. The other twelve vessels combined landed the remaining forty seven percent (47%). Although during the test fishery many complained about not being able to participate, April is a good example of how competitive most permit holders will be. It is important to the fishery to harvest all areas that have large amounts of urchins even if harvesting is difficult. It is our belief that all the urchins will improve in quality after the various areas have been harvested a few times. In other words, by harvesting all areas the entire biomass will become more marketable in the future.

Chapter 4 HARVEST REVENUE

Harvesting began in March but the few pounds received were used to get the plant up and running. Only forty seven thousand eight hundred ninety seven (47,897) pounds were landed. The quality was mixed. Actual production began in April. One hundred five thousand one hundred seventy four (105,174) pounds were landed. The total paid to harvesters was seventy three thousand four hundred twelve (73,412) dollars. This was accomplished with four boats and seven divers. The area worked was 101-11. This area was chosen because it was the most distant from the plant and kept us from being overwhelmed in the early stages of our processing operation. This proved to be a good choice, production began slowly and the quality in this area turned out to be some of the best received during the entire fishery. With the good quality in the beginning we were able to start out establishing some good market connections.

Seven boats and fourteen divers harvested urchins for Ocean Fresh during the month of May. Total landings exceeded three hundred six thousand (306,000) pounds out of the seven boats accomplishing this task, two were from California, two were from Washington, two were from Alaska and one was from Oregon. The majority of the harvesting production was done by the Southern boats. This was due to diver experience in the red sea urchin fishery. As product quality is often driven by the divers knowledgeable picking, inexperienced divers often do not earn enough from their harvest to make their time profitable.

In June, Ocean Fresh had ten boats working with eighteen divers. This combined effort produced \$154,193.54 in income to the participants. The average price per pound dropped in June to an average of \$.43 per pound. This was mainly due to market conditions. The top boat produced \$40,504.25 dollars in revenue while the lowest boat only earned \$168.20 dollars. This is a gigantic spread. The discrepancy is essentially due to diver experience.

During the month of July over one hundred fifty-three thousand dollars (\$153,000) was paid to the divers harvesting sea urchins. This amount equals approximately forty cents (\$.40) per pound of live urchin. This is a two cent drop from June. Even with a poor market this represented over seven thousand dollars (\$7,000) gross income per diver.

In July, the exchange rate moved from eighty-five (85) yen per dollar to ninety-nine (99) yen per dollar. This is a 15% difference in the return

price in dollars. In the summer months, experts predicted the yen would level off at one hundred yen per dollar. This did not occur, the yen actually increased to a high of 109 by December. Thus, our summer predictions and harvest planning were inaccurate. Factors such as urchin recovery percentages and the exchange rate made predictions very difficult. August turned out to be our poorest revenue month. In August, the total amount paid to harvesters was just over \$81,000, a reduction of almost 50% from July. This reduction was a reflection of a combination of poor market and reduced pounds. The poor market condition resulted in low prices (an average of \$.30 per pound) and the reduced harvest was a result of the harvesters inability to find quality urchin at this time of year. In August, the yen to dollar ratio raised as high as 105 yen per one dollar. In previous months the exchange rate was as low as eighty five yen per dollar. In August, production was greatly reduced due to poor market conditions.

In September Ocean Fresh paid almost sixty-nine thousand (69,000) dollars to divers for approximately one hundred forty-three thousand (143,000) pounds of product. This is just over forty-eight (48) cents per pound of sea urchin. Eight boats participated generating eight thousand six hundred (8,600) dollars per vessel for the month. The average income per day worked was four hundred eighty (480) dollars per diver.

In September, the harvest was not characterized by one or two dominant boats. In additions, the participating vessels were fewer because of poor harvest return in August. Also, weather in the month of September was deteriorating rapidly which also contributed to low vessel participation.

In October the harvesting vessels received a total of fifty thousand six hundred seventeen (56,617) dollars for one hundred sixty-eight thousand three hundred three hundred thirty-one (168,331) pounds of product. This is equal to thirty-three (33) cents per pound of round product. This represents a fourteen (14) cent drop in price, nearly a thirty-two (32) percent drop from last month.

Ten boats participated in the fishery last month. If viewed as a combined effort the average paid was five thousand six hundred sixty-one (5661) per vessel. Since eighteen divers were involved, this would equal three thousand one hundred forty-five (3,145) dollars per diver. However, as in most fisheries, a few of the boats produce most of the product so the average price and pounds only applies to a small number of participants.

The market condition in October did not improve from previous months. When the economy is bad in Japan, export prices fall yielding lower prices for harvesters. The amount paid to the vessel is determined by two

major factors. The quality of the product and the price paid by the market. If either of these are in poor condition the price will reflect it.

The total paid to vessels in November was forty seven thousand five hundred two (47,502) dollars. This is a drop of twenty percent from October. The total poundage produced in November was one hundred thirty eight thousand five hundred twenty seven (138,527) pounds. This represents a drop of eighteen percent. The average price per pound of sea urchin paid to the vessels was thirty four cents per pounds. The decline in effort in November was mostly due to the opening of the sea cucumber fishery. Many of the urchin vessels diverted their efforts towards this fishery. Eleven boats participated in the test fishery in November. However, five of them worked less than four days during the month. The combined effort of the fleet equaled a total of seventy three dive days. The average amount paid to the vessel each working day was six hundred fifty two dollars. Since there were twenty divers involved in the harvest, the average amount received per diver equaled three hundred sixty dollars per day.

The market in the fall of 1995 was very soft. The November market was depressed. As we encountered the low market conditions, we have discussed the fluctuation with the auction companies in Japan in great length so that could better understand the weak condition that persisted throughout the fall. We have found that the market is driven by two major factors.

The first and foremost factor is supply and demand. Many other areas around the world produce sea urchin that is sold in Japan. As these other areas structure their fishery regulations, they have tried to tailor the regulations to the market in order to capitalize on the best possible market conditions, thus enhancing the value of their resource. The results of this combined effort is an over supply of product in what was previously a more favorable time to sell. Over the past few years, the market trend has shifted from the fall and winter months being the best to the winter and spring time being more favorable. This is one of several reasons that it is important to have a year round fisheries in order to be sure to hit to best possible market.

The second reason we found for the weak market was the economy in Japan itself. The economic situation in Japan is very poor. As the dollar weakens against the yen, the short term market improves. However, this situation also slows exports to the US.—This is but one factor in their sluggish economy. The biggest factor is the fall of real estate prices that the banks have secured their loans with. Even as these factors appear to be an entirely different subject, discussing them briefly is valid for our purposes because the state of the economy itself affects the amount consumers are willing to

pay for goods. In November, Ocean Fresh found it necessary to examine all of the factors affecting the drop in the market value of Alaskan uni.

In December, the harvest vessels were paid one hundred forty eight thousand two hundred sixty two dollars (\$148,262.00) for the product. This is an increase of three hundred eighty percent (380%) over last month. The total poundage was one hundred eighty three thousand eight hundred sixty three pounds (183,863), up by twenty five percent (25%) from last month. The average price per pound of live urchins was eighty cents (\$.80), fifty four percent (54%) higher than last month. This dramatic increase in price, coupled with the increased production, produced the additional one hundred thousand dollars paid to the vessels.

Nine boats worked this month with a combined total of eighty nine (89) days. During this month four hundred ninety hours (490) were spent under water. This in an average of almost six hours per vessel each day. Most of the vessels have two divers aboard. The average pounds per hour spent in the water was three hundred seventy five (375) yielding an average of three hundred dollars (\$300.00) per hour. This, of course, does not include the time spent traveling to and from the grounds. Since the work areas all vary in distance and the boats travel at substantially different speeds, the actual work day is difficult to average. Sixteen divers participated in the harvest averaging thirty hours dive time during the month. At three hundred dollars per hour the pay for the thirty hours was equal to over nine thousand dollars (\$9000.00) for the month.

The market condition in December experienced an up-swing during the last part of the month. Factors that contributed to the market condition were the time of year and the bad weather in many other areas which created an under supply. This market condition generated favorable sales for the Alaskan product.

In January, the harvest vessels were paid one hundred twenty thousand nine hundred seventy dollars and twenty two cents (\$120,970.22). This is a decrease of about eighteen thousand (\$18,000.00) dollars from last month. Although production increased in January, the divers earned substantially less. The harvesters delivered a total of two hundred forty five thousand nine hundred eighty six (245,986) pounds which is sixty two thousand one hundred twenty three (62,123) pounds more than in December. The average price was \$.49 as compared to last month's high of \$.80. This represents a 39% decrease in price from December.

Nine boats worked in January but two boats earned \$65,391.82 which is over half of the revenue earned. Our highest producer was paid

\$37,079.08 which represent 31% of the total paid to boats. The nine harvest boats had a combined total of 694 hours under water in the 115 total days they worked. This is an average of 6 vessel hours per day. 17 divers participated in the harvest averaging 40.8 hours of dive time during the month.

For the past several months the area primarily harvested was Bee Rocks (101-21B) due to its superior quality urchins. This area also generally produced the best prices. On January 5 the Bee Rocks area quota was fulfilled and therefore area 101-21B was closed. This may have contributed to the drop in average price. The Bee Rocks average price per pound in January was \$.63 whereas the average prices in the other areas ranged from \$.29 - \$.54.

The product quality in areas other than Bee Rocks was generally poor. The product harvested in South Duke (101-21) had high recoveries (large gonad) but displayed low market quality. This poor quality has been an important harvest consideration since the beginning of the test fishery.

The market in January was stable. This is reflected by the forty-nine cent (\$.49) average price. The gross sales in Japan were equal to two dollars and seventy six cents (\$2.76) per pound which is also good for this product. However, even though we had hoped for more favorable conditions, the exchange rate held firm around 106 yen per dollar.

During the month of February, the total paid to the boats was one hundred six thousand one hundred ninety (\$106,190) dollars. This is down thirteen percent (13%) from last month. The vessels landed one hundred eighty two thousand two hundred fifty two (182,252) pounds of urchin. This is also down from last month by twenty six percent (26%). The average price paid was fifty eight (\$.58) cents.

Twelve boats worked during the month, however two boats earned just over fifty seven percent (57%) of the money. The highest paid vessel was the Mach-1, earning just over forty thousand dollars (\$40,000) for the month. The average paid to vessels was eight thousand eight hundred forty nine dollars (\$8,849). The Alaskan boats earned a total of twenty three thousand dollars (\$23,000) averaging three thousand two hundred eighty six dollars (\$3,286) per boat. The two Oregon boats averaged thirty thousand eight hundred thirteen dollars (\$30,813), ten times as much as Alaskan boats.

The average price was sixteen percent (16%) higher than last month. This is due, in part, to the area of harvest. Areas 101-11 and 101-23 have produced good quality throughout the project. Another factor is the market itself, which was stable throughout most of the month of February. The yen

to dollar exchange rate remained fairly consistent. Overall, the prices paid have been higher than we anticipated. This is mostly because of the quality being better than we originally planned.

The amount paid to the harvesters in March was one hundred twenty-six thousand two hundred seventy-seven (\$126,277) dollars. The landings for the month were two hundred six thousand nine hundred seventy-one (206,971) pounds. The average price per pound was sixty-one (\$.61) cents. Ten boats out of the twelve vessels participating in the test fishery landed product. The average price paid to each harvest vessel was just over twelve thousand six hundred (\$12,600) dollars.

The boats worked a combined total of sixty-six (66) days, averaging nineteen hundred (\$1900) dollars per day. This average does not take into account two day trips. The average paid per boat increased from last month by thirty (30%) percent. This is because fewer boats worked and the ones who did worked more days than they did the previous month.

The combined total paid to boats was up by sixteen (16%) percent over last month. The primary reason that revenue paid to individual vessels was twice the percentage of the combined total is because the product that was landed in March was better than average. This quality difference is also reflected in the average price per pound which was up three (\$.03) cents.

In March the yen to dollar exchange rate was around one hundred eight (108) yen per dollar. This is not a favorable rate and is much higher than we had originally planned when projecting our sales for the test fishery. Fortunately, we have been able to find better quality product than was expected. This has not only helped the price paid to the harvesters but has been essential to us in terms of offsetting costs. Most of the success in regards to the grade of sea urchin we have received is due to the diligence and experience brought into the test fishery from the divers. The first step in any sea food business is the quality of the product. In the case of sea urchin, the ability to determine which product is marketable at which time is very important. The success or failure of the entire program can rest on diver experience especially if the dollar to yen exchange rate worsens.

All harvest activities were finalized in April. Fourteen boats participated during the month, this yielded one hundred five thousand sixty nine (\$105,069.00) dollars to be split amongst the divers. This is an average of forty (\$.40) cents per pound, down thirty five (35%) percent from last month. The primary reason for the drop in price was the quality of the product out of the Gravina Island area, 101-29. Once again, the production was dominated by two boats which landed forty percent (40%) of the

product. Most of the effort was during the second half of the month. The average price per vessel was seven thousand five hundred four (\$7,504.00) dollars. Since twenty divers were involved in the harvest, the per diver total would be five thousand two hundred fifty three (\$5,253.00) dollars. However, four of the diver earned over one hundred thousand during this month. This illustrates the vast difference in individual effort.

The exchange rate for the month was one hundred six yen (106) per dollar on the average, this is two yen better than last month. The market overall was pretty good.

Considering all aspects of the test, we feel the project was a success. The average price per pound was almost fifty percent higher than our original estimates. Ocean Fresh was able to recoup its cost and come out of the project with a profit. The determining factor in the project is the capability of the dive fleet. With the new regulations anticipated, it will be interesting to see if the quality of the product will remain as high as it has during the test fishery. Since the resource belongs to the people in the State of Alaska, hopefully there interest will not be forgotten in an effort to appease a few people representing their *own* interest.

4.2 Harvester's Analysis

In the early months of the test fishery it was fairly difficult for many of the Alaskan vessels to commit to the test fishery because of the uncertainty of the future of sea urchin harvesting. Many harvesters were forced to participate in other fisheries because they did not know if future participation regarding urchin harvest was possible. If the sea urchin fishery becomes a reality that can be relied upon over the years we are sure a stable harvesting fleet will evolve composed of professional divers well trained in harvesting techniques. At the inception of the test fishery, we predicted that local Alaskan divers would, "gain the experience necessary to make their urchin harvest profitable,". This prediction proved to be accurate. Many divers were able to make a greater commitment to the urchin project throughout the past twelve months. In fact, local diver interest became so great as to be potentially detrimental to Ocean Fresh's future in Alaska. We found that local harvesters, whether involved in the test fishery or not, passionately want an open access sea urchin fishery. However, over the course of the test we also found that Alaskan divers who had not been exposed to the harvest methods of professional sea urchin divers lacked the necessary skill and experience to harvest marketable sea urchin.

Diver experience and training is essential. Quality urchin harvest depends on diver skill. Throughout the project, we had several complaints about the California divers. When Ocean Fresh entered into the test fishery project, our plans were to allow experienced divers from several areas to participate. These experienced divers would be used to help train divers from the local area. This is exactly what happened. If you note figure 1 on page 58, the ratio of local to out of state divers changed dramatically. In April, the final month of the test fishery, we had ten Alaskan boats participating and only five out-of-state boats. Only one of these out-of-state boats, the Autumn Wind is from California. The Autumn Wind has been a consistent producer for the project and as a highly experienced diver, the boat owner was always willing to help train others in proper harvesting techniques. For the most part, as the Alaskan divers became more proficient in harvesting techniques, the "trainers" became extraneous to the project. However, for the purpose of the test fishery, it seemed prudent to keep divers involved from several states so that a comparison between diver techniques could be examined. For instance, by comparing the Washington divers to those from California or Oregon one may easily ascertain that the bottom walking style of harvest is inferior to the swimming method employed by California and Oregon divers.

One must also take into consideration that the sea urchin fisheries have existed in California for about fifteen years. Thus, it is only obvious that much can be learned from experienced California divers. By using the pertinent information gathered from the Alaska test, local divers may adopt the best harvesting system.

*figure 1 (Boats harvesting each month during test fishery, broken down by state of origin)

MONTH	BOATS	DIVERS	ALASKA	WASHINGTON	OREGON	CALIFORNIA
MAY	7	14	2	2	1	2
JUNE	10	18	4	2	1	3
JULY	11	21	3	2	1	5
AUGUST	10	19	2	2	1	5
SEPTEMBER	8	15	4	1	1	2
OCTOBER	10	18	6	2	1	1
NOVEMBER	11	20	6	2	2	1
DECEMBER	9	15	5	1	2	1
JANUARY	9	15	4	2	2	1
FEBRUARY	12	21	7	2	2	1
MARCH	10	15	5	2	2	1
APRIL	14	19	10	2	1	1

Throughout the test, we found that there was a time period that we called the “learning curve” for all divers harvesting urchin. Ocean Fresh spent considerable time and energy in an attempt to employ and educate new divers, especially those from Southeast Alaska. We had both experienced and inexperienced divers working on the project. Many of the experienced divers have harvested literally millions of pounds of product over the years in other states. These professionals insured a successful fishery. We at Ocean Fresh recognize the value of experience in the urchin fishery. We actively encouraged inexperienced divers from initial contact with our company through actual harvesting to learn from experienced divers in order to achieve the greatest gain for themselves. We have found that divers who were not quality-oriented weakened the entire project.

Inexperienced divers always cost the company money. The urchins they brought to the plant often did not contain enough uni to cover the cost of processing. Even though most sea urchins contain some uni often the recovery is not high enough to cover labor, packing and shipping cost. When this happens the company has to make up the difference. The divers that are willing to spend the time to watch their loads being processed can see the results of their harvest efforts first hand. Through choosing to spend time educating themselves in this manner, they lose harvest time. Divers willing to

take the time to educate or re-educate themselves were not discouraged by the time required. However, many who expected to simply bring in poundage became discouraged very quickly. Many of the inexperienced divers were unwilling to incur brief personal losses in order to achieve greater future gain. The divers who were willing to make sacrifices always made a larger profit for themselves and for the company.

Quality is the greatest factor in the Alaska Sea Urchin project. The quality of the raw product is very important. It takes a great deal of expertise on the part of the divers to harvest high quality live urchins. There are many factors the experienced diver takes into consideration while harvesting. For example; experienced divers note the importance of size. There is an optimum size range and often even older, large urchins are poor quality. Also, there are "trenches" where kelp settles after it is broken off. These areas produce good product. The experienced diver knows to look for these "trenches" in order to harvest optimum quality product.

We found that professional divers were committed to their work on the test. They spent time on their own surveying new areas and cracking urchin on the bottom. They moved their boats along the reef until they found quality product to bring in for processing. Sometimes they spent all day covering miles of ocean bottom and came back with no sea urchins. This took great personal effort and understanding.

The sea urchin fishery is much different from most other fisheries. In other fisheries divers are paid a set price per pound landed. Therefore, most divers are pound oriented. They are more interested in the pounds landed than the quality of the product. With sea urchin, if a diver is paid a set price per pound it encourages divers to bring more pounds per hour and sacrifice quality. If this type of harvest was allowed it would have brought the overall price down and in some instances could completely collapse a fishery. Urchin divers must be able to make accurate and informed judgment calls about how to best maximize profit in an ever-changing uni market. To do this during the test they kept in constant communication with the plant management. At Ocean Fresh, the managers are experts at evaluating product quality and thus offered valuable input. Divers also had to keep current with trends in product, weather conditions, and the sea urchin area quotas. For example; many local boats did not work in inclement weather conditions. The winter months were very cold and stormy, cold enough to freeze that divers' air supply and stormy enough to make reaching (but not diving at) the harvest areas difficult. The professional divers had few

problems with either of these weather conditions. Divers who did not exhibit all the criteria mentioned above were not as successful.

Many of the divers have had to completely change their technique. For instance, as mentioned before, divers that walk on the ocean bottom have a much harder time than those that swim. Swimmers are much more adapted to urchin harvest. They can work the very top of the reefs without having to climb up on a ledge. The divers who walk extended the "Learning Curve" period past any reasonable length of time. Unfortunately, a large percentage of the divers in Southeast Alaska walk on the bottom. We hope that with the information gained from the test local harvesters will reevaluate their harvest methods in order to be more productive.

From reading the above, one may note that a considerable commitment is required from a sea urchin harvest diver. Many who attempted the fishery dropped out because they did not want to make the commitment necessary. Also, many resented the training needed to make a profit for their efforts. Still, we feel that those who made the commitment were rewarded by success in the red sea urchin test and also through acquiring skills needed to participate successfully in the emerging open access sea urchin fishery.

Chapter 6 FINANCIAL REPORT

During the course of the test fishery, Ocean Fresh has traced the sea urchin from the point of harvest to the actual sale in Japan on an individual load basis. This tracking system has provided the department with information on all aspects of the fishery. By making the test fishery a complete study analyzing all factors biological and economic a true evaluation of the sea urchin fishery potential may be ascertained. An essential element of our current report system is the financial portion. In this section, we address company earnings or losses and the factors influencing the revenue at Ocean Fresh.

March 29, 1995 marked the effective beginning of the Southeast Alaska red sea urchin test fishery in District 101. Efforts prior to March 29th were best characterized as "shakedown efforts" to enable the plant in Metlakatla to begin processing operations in a deliberative fashion and to smooth out logistical problems before any major harvest took place. The roughly sixteen thousand (16,000) pounds harvested prior to the 29th served the operation very well in this regard.

Sales in March and April neared four hundred thousand (\$400,000.00) dollars. The market condition was favorable and the exchange rate was very good. The harvesters were paid nine two thousand (\$92,000.00) dollars, approximately twenty three (23%) percent of the gross sale in Japan. Although early production was successful, our financial sheets at that time reflected a loss of eighty nine thousand one hundred one (\$89,101.00) dollars. This is equal to a twenty two percent (22%) loss. The main reason for the loss was the standard starting costs associated with any new operation. For this reason, it is imperative to have enough pounds available for harvest in order to offset the starting costs.

Sales in May were poor due to falling prices. Because of this, we expected further reduction in the Japan sales as we entered into the summer months. This was a normal market condition and something that we anticipate every year. In May we began realizing more costs that were not reflected in March/April. These costs included the California plant overhead that is allocated to the percentage of Alaska product processed at that facility. In April, 50% of the product processed at the Ocean Fresh California plant originated in Alaska. Since the volume of Alaska product became so great in April and May, product from outside sources, such as Chile, were no longer processed at the California plant. Therefore, a relevant percentage of the

California plant overhead began to be allocated to the Alaskan project as the California plant served as the sole secondary processing facility.

In June we showed an increase in revenue. This was because of our increased volume. The market conditions in June actually decreased but the increase in production eclipsed the market drop. With the increased sales we were able to show a profit. Our financial status moved from a five percent (5%) loss to a six percent (6%) profit. Market acceptance in Japan has been much better than we had anticipated and we began working to develop our markets in order to maximize the profits. This, along with the quality produced by experienced harvesters made the market increase possible.

Sales in July dropped approximately eighteen percent (18%) to slightly over seven hundred thousand (\$700,000.00) dollars. This was due to market conditions in Japan. Our production increased twenty thousand (20,000) pounds, or six percent (6%). The total cost of urchins in July was over one hundred fifty three thousand dollars (\$153,000) equaling twenty two percent (22%) of the total sales. Our total cost of sales was over five hundred thousand dollars (\$500,000) and our operating expenses neared two hundred forty thousand dollars (\$240,000), causing a forty two thousand dollar (\$42,000) loss or minus five percent (-5%). This brought our total year to date profit just over seventy thousand dollars (\$70,000) or two and a half percent (2 1/2%). At that time our total year to date sales had exceeded 2.5 million dollars, therefore so our net profit at that time was slightly over two and a half percent (2.5%).

Most of the loss was caused by harvesters producing loads that cost more to process than the total value of the product they produced. As in any other fisheries it isn't practical to pay negative prices. Thus, Ocean Fresh was forced to absorb these losses.

There were many things affecting the profits of urchin sales. Some of these included the condition of the product. Other were the conditions of the market itself. Another factor could be the exchange rate. Even though we experienced a loss during July we felt that it was important to have the product on the market throughout the year. By having a continual supply of product a better customer basis may be built and we are therefore able to sell for an overall higher price. During the month of July, Ocean Fresh was able to pick up some new markets by having product on the markets while other processors did not.

Sales in August dropped again. The gross sales in August were slightly over five hundred eighty eight thousand dollars (\$588,000.00). This is eight percent lower than July. This was mostly due to our drop in

production. In August, production was cut around one hundred thousand pounds, about twenty five percent (25%). The total cost of sales was over three hundred seventy six thousand dollars (\$376,000.00) with operating cost running over two hundred ninety three thousand dollars (\$293,000.00) leaving us with a loss of over twenty two thousand dollars (\$22,00.00) for the month. In August our year to date sales were million two hundred thirty five thousand dollars (\$3,235,000.00) and our net profit is thirty seven thousand six hundred (\$37,600.00). This made our year to date profit one percent (1%). According to the terms of the RFP our profits cannot exceed twelve percent (12%) of the cost. One of the major factors in the drop of revenue is the exchange rate. In August the yen to dollar ratio rose as high as one hundred five (105) yen per one dollar. In previous months the exchange rate was as low as eighty five (85) yen per dollar. This single factor changes the total sale by over twenty percent (20%).

Sales in September again showed a sharp decline. The gross sales for the Alaskan project were just over three hundred twenty thousand (\$320,000.00) dollars. This represents a forty-five (45%) percent reduction from August. This was the largest drop we experienced in the project. This reduction is representative of the drop in production that fell from two hundred seventy-three thousand (273,000) pounds in August to one hundred forty-three thousand (143,000) in September, a forty-eight (48%) percent decline.

Our loss for September was four thousand three hundred fifty-eight (\$4,358.00) dollars. This was only twenty (20%) percent of the loss we incurred in August. These numbers indicate a slight improvement in the market for September. As our production dropped, so did our costs. The purchase price for sea urchin averaged forty-eight (\$.48) cents a pound for a total cost of sixty-nine thousand (\$69,000.00) for September, a fifteen (15%) percent decline from the previous month. The boats were actually paid seven (7%) percent more of the total sales or about thirty-three (33%) percent more than August. There are two primary reasons for this increase, the vessels brought in a higher quality product so Ocean Fresh did not have to subsidize as many negative loads and secondly the divers were slightly overpaid. Our total expenses were just over one hundred twenty-six thousand (\$160,000.00) dollars, forty-seven (47%) percent less than August. Many of the costs for the project are constant such as rents and salaries. If our production dropped too drastically our fixed costs would become too great. In September we were able to decrease our overhead to correspond with our decrease in production. In September, the exchange rate appeared to have stabilized at

around one hundred two (102) yen per dollar. However, the exchange rate increased again in later months.

Total revenue for October was three hundred eighty thousand four hundred thirty-two (\$380,432.00) dollars. This is up slightly from September. In October the year to date total was just under four million (\$4,000,000.00) dollars. Urchin costs this month were sixteen (16%) percent at just over fifty-six thousand (\$56,000.00) dollars.

In October we posted our first profit for the past few months. At thirty-seven thousand six hundred fifty-four (\$36,654.00) dollars this brings our combined total to seventy-four thousand eighty-one (\$74,081.00) dollars. This was just under two (2%) percent for the project year to date. The average price paid to the vessels in October was thirty-three (\$.33) cents per pound. This is a thirty two (32%) percent drop from last month.

So far harvest efforts have exceeded one million seven hundred thousand (1,700,000) pounds with an average price of forty-four (\$.44) cents per pound paid to the boats. This is better than the thirty cents per pound we had originally expected. Production was up over ten (10%) percent from last month. In October we intended to gradually increase production over the next few months in anticipation of better market conditions. However, market conditions did not actually improve until late December.

Revenue for November was down by thirty percent at two hundred sixty two thousand seven hundred five (\$262,705.00). The drop in overall sales was ten percent (10%) greater for the fall in vessel prices, therefore we posted a substantial loss for the month. Our actual loss for the month was sixty nine thousand nine hundred seventy six (\$69,976.00) dollars. This is twenty seven percent (27%) for November. Ten percent (10%) of this loss was caused by overpayment to the vessels. The other ten percent (10%) was a combination of fixed costs such as rent and other overhead versus generated income from sales.

Contributing to the increase in fixed costs in November was a decrease in the available local labor force during the winter months. This has necessitated more employee housing as well as the additional costs associated with bringing in labor from outside the area. Another factor in our loss was our increased inventory of processing materials. Since we had anticipated better market conditions in November, we increased our processing capacity as well as our supply inventories. However, following the purchase of these additional materials, the anticipated market improvement was never realized. Other external factors which contributed to our loss, such as previously unrecognized market variables, were also at play.

One market phenomena that was not anticipated in regards to marketing is that when there is an abundance of good product on the market, Alaskan product suffers a dramatic drop in price. We, of course, had anticipated normal price fluctuations with supply and demand, but this situation is different. The product price does not merely fall with increased supply but becomes displaced in relation to its position in the market. California had a very good fall season as far as production and quality. This displaced the Alaskan product causing the price to fall greatly.

One good thing about the Alaskan product is the favorable taste. We decided in November that if our product could be present at market on a continual basis, over time it will not be so easily displaced. As with any business, the buyers of the sea urchins are looking for a good consistent supply at a reasonable price.

Revenue in December was up by fifty eight percent (58%), just under four hundred fifty one thousand dollars (\$451,000.00). This combined with the previous months brought our project total to four million six hundred fifty five thousand eight hundred sixty seven (\$4,655,867.00) in sales. At this time we had harvested just over two million of the three million pounds allocated to the test fishery. Approximately thirty three percent (33%) of the fishery remained to be taken. However, even with the fifty eight percent (58%) increase in sales, we posted a loss of over one hundred seven thousand dollars (\$107,000.00) for the month. This places our year to date profit and loss at a negative two percent (-2%) for the project.

Most of our losses are due to the cost of secondary processing in California. In our response to the original Request for Proposal (RFP), Ocean Fresh did anticipate a loss because of the necessity of secondary processing. It was not economical to set up a complete processing plant for the test fishery. Since we process product from many different places in our California plant, we allocate the cost of the plant to the percentage of product processed there. In December, sixty three percent (63%) of the total production in California came from Alaska. Thus, the Alaskan project was burdened with sixty three percent of the California plant cost. We feel confident that if a continual fishery were in place, a full spectrum processing plant could be set up in Alaska and many of these extra costs would be eliminated.

The amount paid to the harvest vessels for December was one hundred forty eight thousand two hundred sixty two dollars (\$148,262.00). This was an increase of over one hundred thousand dollars from November. The question automatically comes to mind, if Ocean Fresh lost over one hundred

thousand dollars why did we increase the vessel pay? As we have previously stated, we feel that in a continuing fishery, our urchin cost would be reduced. The method by which Ocean Fresh pays the vessels is formulated from the sale in Japan. This way, each individual harvester is responsible for what they pick. It is important that we do not let external influences affect the formulas used to pay the producers. The California plant overhead is averaged into this formula at a standard rate. We do not allow fluctuations to affect these regular formulas. We attempted to pay as though the project was a continued fishery so that all parties involved may get an accurate picture of an actual sea urchin fishery.

One aspect of sea urchin marketing that has not been in our favor through out the project is the exchange rate between the US and Japan. In December we were exchanging at one hundred eight (108) yen per dollar. This was the worst exchange for export in the past two years. Referring once again to the original RFP, we listed different scenarios including exchange rates. Our assumption at that time was a rate of one hundred (100) yen per dollar. When you compare the low of eighty seven yen per dollar to the December exchange rate of one hundred eight based on the anticipated sales for the project, the difference is one million four hundred thousand dollars (\$1,400,000.00). This single factor can completely change the viability of a project. If the exchange rate had remained at eighty seven yen per dollar, there would be twenty percent more money available at this time. This does not directly translate to twenty percent profit because the fees charged for customs and import duties are based on the total dollar amount. However, the twenty percent increase would have had a positive effect on our profit margins.

Revenue in January was up almost two hundred thirty thousand (\$230,000.00) dollars. This is an increase of fifty (50%) percent over December. The primary reason for this was the increase in production compared to last month. In December the production averaged eighty (\$.80) cents per landed pound compared to January with a forty-nine (\$.49) cent average price. The amount paid to the vessels was over one hundred twenty-one thousand (\$120,000.00) dollars. This represents a drop of around twenty-seven thousand (\$27,000.00) dollars equal to approximately eighteen (18%) percent. Because of the amount of pounds processed the fixed costs such as overhead, become a lesser percentage of the overall sale.

As with any processing operation the volume is very important. If we cannot maintain a constant supply of product the overhead becomes the predominant factor when figuring your profit or loss. Ocean Fresh did make

a profit of ninety thousand four hundred dollars (\$90,400.00) dollars in January. This brought our year to date financial statements to almost the break even point.

The most important factor in maintaining financial stability is the way in which a vessel is paid. It is also important to begin with a good quality product. If a means by which the harvesters are ultimately responsible for the quality that they pick cannot be devised the project is destined to failure. By tying the price paid per pound to the price the product sells for the harvesters are encouraged to maximize the total return. This method generates the most money possible for the resource.

The revenue in February was down forty three (43%) percent reaching four hundred seventy three thousand three hundred thirty five dollars (\$473,335.00). The total amount paid to the harvesters was one hundred six thousand one hundred ninety dollars (\$106,190.00), or twenty two percent (22%) of the gross revenue. This is an increase of two percent (2%) from the year to date total. The average price paid per pound of landed product was fifty eight cents (\$.58). This is ten cents higher than last month, an increase of eighteen percent (18%).

Sales for the month could be considered good in general but, due to the lack of pounds delivered we were unable to make a profit. The need for volume to offset overhead is illustrated by the losses in February. However, part of the problem was the lack of production in California. If production had been higher in California we could have offset more of the secondary processing. After fixed costs have been established and the percentage for materials and labor are calculated, the only way the cost may be adjusted is by paying the boats less or by increasing production to reduce fixed costs. During the test fishery we had anticipated earning approximately two hundred to two hundred and fifty thousand pounds (200,000 - 250,000) of product per month. If production is low, the plant overhead cuts into potential profits. When paying the harvest vessels we do not change our overhead cost calculation to reflect the actual pounds harvested because we paid the boats before we know what the total pounds harvested will be. The ability to accurately predict our production would have made cost analysis much easier.

During the course of the test fishery we became much more efficient in our processing and the harvesters have become more skilled in their production. This becomes evident through observing the average prices paid to the harvesters. Although in February of 1995 the dollar to yen exchange

rate was twenty percent more favorable then it was in February of 1995, the prices paid are approximately the same.

Financially March was a positive month. We show a profit of forty two thousand ten (\$42,010.00) dollars. This brings our year to date profit to thirty thousand eight hundred (\$38,800.00) dollars, one half of a percent (.5%). Our total revenue for the month was five hundred forty thousand fifty nine (\$549,059.00) dollars. This is an increase of thirteen percent (13%) from last month. The year do date revenue total at this time was six million three hundred forty nine thousand four hundred seventy one (\$6,349,471.00) dollars. Urchin cost for March was one hundred twenty five thousand nine hundred sixty (\$125,960.00) dollars. This is twenty three (23%) percent of the gross sales representing an increase of sixteen percent (16%) from last month. The total paid to the harvesters year to date is one million two hundred ninety two thousand seven hundred twenty two (\$1,292,722.00) dollars. This is over one hundred seventeen thousand (\$117,000.00) dollars for the month with ten boats working. This is over eleven thousand (\$11,000.00) dollars per month per vessel. This is not a lot of money per vessel and many people that have attempted the fishery did not do as well as average.

There are two main reasons our profits are up for this month. First, sales were better than last month, and secondly we received more product. The market remained about the same as the previous month which would be considered fair. The good part about the market is that it was stable. In a stable market, the harvesters are able to hone in on exactly what is selling best. This month that factor was in evidence when observing the average price of sixty one cents per pound. As we have progressed with the test fishery we have been able to sharpen the skills of the divers and processing crew alike. In addition, the market has become accustomed to our product. This combination had lead to our relative success this month.

April is the final month of the project and fortunately we showed a profit of seventy thousand five hundred nineteen (\$70,519.00.00) dollars, bringing our year to date total to just over one hundred on thousand (\$101,000.00) dollars. This is equal to almost one and one half (1.5%) percent for the project. The gross revenue in April was five hundred sixty four thousand (\$564,000.00) dollars. This is very close to being the same as March. We had hoped to reach a gross sale amount of seven million (\$7,000,000.00) dollars, and we are excited to report that we came within eighty seven (\$87.00) dollars of reaching our goal. Sea urchin cost for the month were just over one hundred five thousand (\$105,000.00) This is down

approximately twelve (12%) percent from last month. The main reason for the drop was the decrease in quality in the final area of harvest, area 101-29, Gravina. Even with this decrease our average price paid to the harvesters year to date is forty eight (\$.48) cents per pound of live urchin, which is almost forty (40%) percent higher than we had projected. The average price paid per pound in April was forty (\$.40) cents.

At this point we at Ocean Fresh feel that the test fishery was a complete success. The amount of information gathered can help make future management decisions, the community benefited economically, and the harvest divers themselves earned 1.4 million dollars. This was accomplished without decreasing the original biomass. This test fishery was a win win scenario. Once again, the state received all of the information they needed--covering every aspect of the fishery at not cost to the department. The divers and the local community benefited by over three million dollars and Ocean Fresh made a profit. All of this is accomplished and there are still as many sea urchins as we started with. *What could be better?*

Chapter 7 STATE AND LOCAL BENEFITS

The benefits associated with Ocean Fresh's presence in Alaska are far-reaching. Revenue at Ocean Fresh Alaska originates outside the county, and is not merely passed from one part of the state to another. This increases the real value of each dollar injected into the state and local economy. Within three months, Ocean Fresh had injected over one million dollars into the local economy. Now, at the end of our project, the total benefit of Ocean Fresh's presence in Alaska is approximately \$3,300,000.00. This represents a substantial increase into the local economic base. Through an investigation into basic economic theory, Ocean Fresh has been able to extrapolate general theory onto our monetary outlays. This extrapolation then illustrates the real benefit Ocean Fresh generates locally and statewide. The present report will address our firm's investment into Alaska and the economic impact of Ocean Fresh's various monetary injections. First, we will address the actual Alaska cost allocation graph located on page 156. Then we will discuss the economic theory behind Ocean Fresh's benefit to the community and state.

Ocean Fresh Alaska's *largest single cost* is the urchin cost or, the amount paid to the boats and divers for the product (uni). As you may note from the graph (page 156), sea urchin cost represents 42% of the cost allocation. The amounts paid to boats and divers by Ocean Fresh benefits the state in two ways. The first way is through boat owners and divers purchasing goods and services within the community and state. Most divers spend an average of 75% of the money they receive from Ocean Fresh in-state. This will be discussed in further detail later in this report.

The second way Ocean Fresh benefits the state is through the method by which we pay the divers. Ocean Fresh has reached a level of co-operative equilibrium with its subcontractors (divers). Divers are paid frequently and generally in substantial amounts (see harvest revenue sheets, pages 80-86). When pay is received frequently, the newly injected money works harder and circulates faster, thereby increasing the monetary velocity. When monetary velocity increases in a given economy, the result is similar to a substantial increase in the actual quantity of dollars available in the money stock.

The second largest expense at Ocean Fresh is labor. We have paid over \$1,106,907.00 in Alaska payroll. Of the 75 workers who were employed with the Alaska project, 60 were Alaska residents. Thus,

approximately 85% of the \$1,106,907.00 has remained in the community benefiting local business and boosting the local economy. Ocean Fresh's payroll is distributed weekly. This contributes an average of \$10,000.00 per week to the monetary stock. This weekly payment increases the monetary velocity making more money available for economic transactions.

The Annette Island Packing Company has received slightly over \$170,024.00 for unloading fees and rent. This represents approximately 5% of the cost allocation and is paid directly to Annette Island Packing. Annette Island Packing Company is a local company actually owned and operated by the Metlakatla Indian Community. Annette Island Packing Co. revenue serves the Metlakatla local government and people on several levels.

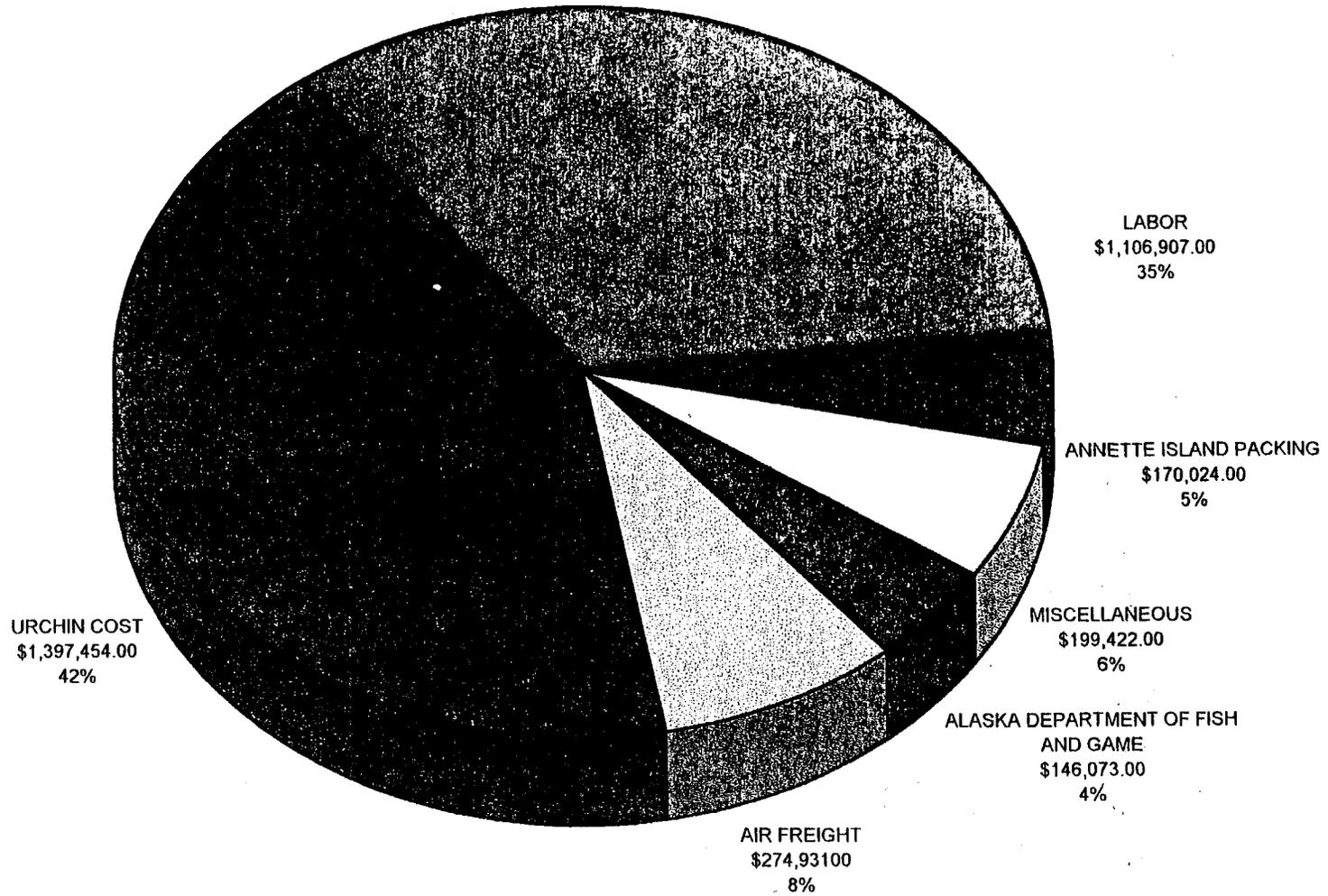
The next cost allocation, air freight, makes up 8% or just over \$274,931.00. The air freight portion includes both Alaska Airlines and Taquan Air. Taquan Air is a local firm originating in Metlakatla, which only operates within the state. According to Taquan Air employees, Ocean Fresh is presently Taquan Air's largest account. Ocean Fresh has made every effort to build lasting business relationships with Alaskan firms. As often as possible, Ocean Fresh uses Alaskan companies to supply needed products and services.

6% of the items in the cost allocation are grouped in a miscellaneous category. The cost allocation for miscellaneous is \$199,422.00. It is compiled from various operating expenses including fuel, propane, moorage, plant repair, utilities, travel, postage, etc. Most of the businesses paid amounts in this sector are Alaskan firms. Also, many of the services supplied are by skilled local contractors.

Next, the Alaska Department of Fish and Game represents 6% of the cost allocation at just under \$146,173.00. This allocation denotes the amount spent on the contract divided by the pounds of urchin harvested. The dividend of this equation totals approximately 7.4 cents per pound.

In order to explain the real benefits that Ocean Fresh contributes to the state, it is necessary to explain the basic economic theory that we are using to generate our numbers. First, we have applied the economic multiplier effect to Ocean Fresh monetary injections. The multiplier is the number the total injection dollar amount is multiplied by to show how much several rounds of

STATE AND LOCAL BENEFITS



hand-to-hand transactions make each dollar worth. In our illustration a dollar injected into the economy would be worth four dollars at the end of the multiplier effect.

The multiplier is derived by using the following formula. MPC, the marginal propensity to consume, shows how much planned consumption expenditure will be induced by a change in income.

$$\frac{1}{1-MPC} = \frac{1}{1-.75} = \frac{1}{.25} = 4$$

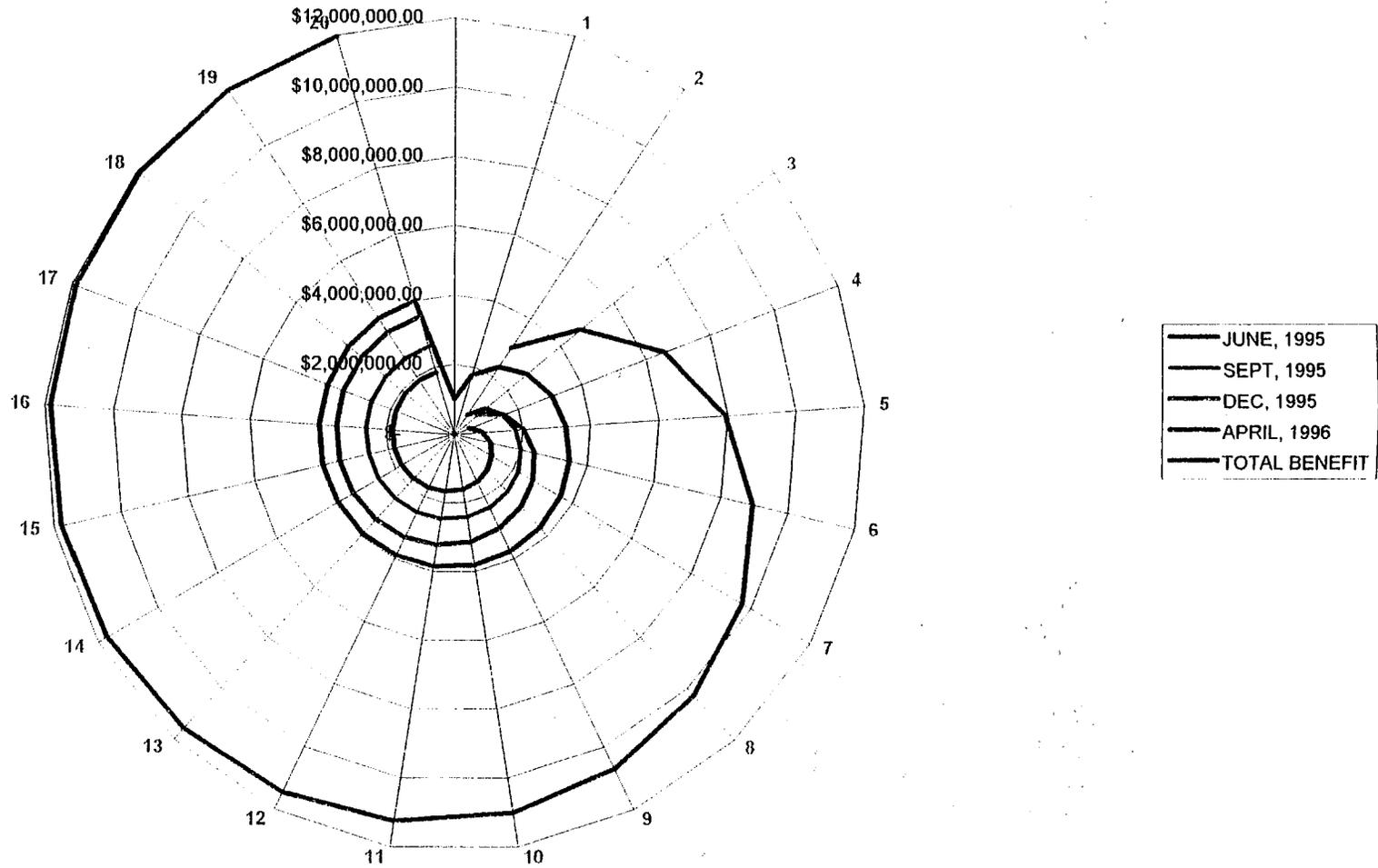
As noted previously, four is the multiplier used in our economic illustration. The multiplier is based on the theory that the public's marginal propensity to consume is about .75. This means that 75 cents of each income dollar is spent on goods and services. The other 25 cents is used for taxes and savings. We believe that people use 75 cents in planned (or regular) consumption. (This number may increase as disposable personal income increases.) Thus, 75 cents of every dollar moves around the circular flow at intervals of approximately three months. An injection of unplanned income into the economy will therefore have a multiplier of 4 which means that within a specific time frame the total dollar benefit will be multiplied times four. For example; Ocean Fresh Alaska had injected just over 1 million dollars into the economy by June. At the end of the second cycle (6 months) the benefit of the 1 million dollar injection reached \$1,750,000 because it had traveled around the circular flow twice with an MPC of .75. At the close of the year, the benefit from the injection of 1 million dollars in June will have increased to just over 3 million dollars. This does not include subsequent injections into the economy. When the standard multiplier is applied to these injections each round of benefits increases substantially.

The number grid on page 158 numerically illustrates the multiplier effect. The first column of numbers (1-20) indicates the multiplier cycle number. Twenty cycles represents 5 years. Still, although 20 cycles are shown, only the first 4 are truly significant. The second column shows Ocean Fresh's initial injection (June 1995) of 1 million dollars into the local economy. This million is then multiplied by .75 (the MPC) which is then continually multiplied times the product of each previous cycle. The third column is the sum of total benefit following each cycle around the circular flow. The next two sets of columns are repeats of the previous two columns

NUMERICAL ILLUSTRATION OF MULTIPLIER

	JUNE, 1995		SEPT, 1995		DEC, 1995		APRIL, 1996		TOTAL BENEFIT
	\$ 1,000,000.00	\$ 1,000,000.00							
1	\$ 750,000.00	\$ 1,750,000.00							
2	\$ 562,500.00	\$ 2,312,500.00	\$ 656,247.00	\$ 656,247.00					\$ 2,968,747.00
3	\$ 421,875.00	\$ 2,734,375.00	\$ 492,185.25	\$ 1,148,432.25	\$ 879,151.00	\$ 879,151.00			\$ 4,761,958.25
4	\$ 316,406.25	\$ 3,050,781.25	\$ 369,138.94	\$ 1,517,571.19	\$ 659,363.25	\$ 1,538,514.25	\$ 465,985.00	\$ 465,985.00	\$ 6,572,851.69
5	\$ 237,304.69	\$ 3,288,085.94	\$ 276,854.20	\$ 1,794,425.39	\$ 494,522.44	\$ 2,033,036.69	\$ 349,488.75	\$ 815,473.75	\$ 7,931,021.77
6	\$ 177,978.52	\$ 3,466,064.45	\$ 207,640.65	\$ 2,002,066.04	\$ 370,891.83	\$ 2,403,928.52	\$ 262,116.56	\$ 1,077,590.31	\$ 8,949,649.32
7	\$ 133,483.89	\$ 3,599,548.34	\$ 155,730.49	\$ 2,157,796.53	\$ 278,168.87	\$ 2,682,097.39	\$ 196,587.42	\$ 1,274,177.73	\$ 9,713,819.99
8	\$ 100,112.92	\$ 3,699,661.25	\$ 116,797.87	\$ 2,274,594.40	\$ 208,626.65	\$ 2,890,724.04	\$ 147,440.57	\$ 1,421,618.30	\$ 10,286,597.99
9	\$ 75,084.69	\$ 3,774,745.94	\$ 87,598.40	\$ 2,362,192.80	\$ 156,469.99	\$ 3,047,194.03	\$ 110,580.42	\$ 1,532,198.73	\$ 10,716,331.50
10	\$ 56,313.51	\$ 3,831,059.46	\$ 65,698.80	\$ 2,427,891.60	\$ 117,352.49	\$ 3,164,546.52	\$ 82,935.32	\$ 1,615,134.04	\$ 11,038,631.62
11	\$ 42,235.14	\$ 3,873,294.59	\$ 49,274.10	\$ 2,477,165.70	\$ 88,014.37	\$ 3,252,560.89	\$ 62,201.49	\$ 1,677,335.53	\$ 11,280,356.72
12	\$ 31,676.35	\$ 3,904,970.94	\$ 36,955.58	\$ 2,514,121.27	\$ 66,010.78	\$ 3,318,571.67	\$ 46,651.12	\$ 1,723,986.65	\$ 11,461,650.54
13	\$ 23,757.26	\$ 3,928,728.21	\$ 27,716.68	\$ 2,541,837.96	\$ 49,508.08	\$ 3,368,079.75	\$ 34,988.34	\$ 1,758,974.99	\$ 11,597,620.90
14	\$ 17,817.95	\$ 3,946,546.16	\$ 20,787.51	\$ 2,562,625.47	\$ 37,131.06	\$ 3,405,210.81	\$ 26,241.25	\$ 1,785,216.24	\$ 11,699,598.68
15	\$ 13,363.46	\$ 3,959,909.62	\$ 15,590.63	\$ 2,578,216.10	\$ 27,848.30	\$ 3,433,059.11	\$ 19,680.94	\$ 1,804,897.18	\$ 11,776,082.01
16	\$ 10,022.60	\$ 3,969,932.21	\$ 11,692.97	\$ 2,589,909.08	\$ 20,886.22	\$ 3,453,945.33	\$ 14,760.70	\$ 1,819,657.89	\$ 11,833,444.51
17	\$ 7,516.95	\$ 3,977,449.16	\$ 8,769.73	\$ 2,598,678.81	\$ 15,664.67	\$ 3,469,610.00	\$ 11,070.53	\$ 1,830,728.41	\$ 11,876,466.38
18	\$ 5,637.71	\$ 3,983,086.87	\$ 6,577.30	\$ 2,605,256.10	\$ 11,748.50	\$ 3,481,358.50	\$ 8,302.90	\$ 1,839,031.31	\$ 11,908,732.78
19	\$ 4,228.28	\$ 3,987,315.15	\$ 4,932.97	\$ 2,610,189.08	\$ 8,811.38	\$ 3,490,169.87	\$ 6,227.17	\$ 1,845,258.48	\$ 11,932,932.59
20	\$ 3,171.21	\$ 3,990,486.36	\$ 3,699.73	\$ 2,613,888.81	\$ 6,608.53	\$ 3,496,778.41	\$ 4,670.38	\$ 1,849,928.86	\$ 11,951,082.44
	\$ 2,378.41	\$ 3,992,864.77	\$ 2,774.80	\$ 2,616,663.61	\$ 4,956.40	\$ 3,501,734.80	\$ 3,502.78	\$ 1,853,431.65	\$ 11,964,694.83
	\$ 1,783.81	\$ 3,994,648.58	\$ 2,081.10	\$ 2,618,744.71	\$ 3,717.30	\$ 3,505,452.10	\$ 2,627.09	\$ 1,856,058.73	\$ 11,974,904.12
	\$ 1,337.86	\$ 3,995,986.43	\$ 1,560.82	\$ 2,620,305.53	\$ 2,787.97	\$ 3,508,240.08	\$ 1,970.32	\$ 1,858,029.05	\$ 11,982,561.09
	\$ 1,003.39	\$ 3,996,989.83	\$ 1,170.62	\$ 2,621,476.15	\$ 2,090.98	\$ 3,510,331.06	\$ 1,477.74	\$ 1,859,506.79	\$ 11,988,303.82
	\$ 752.54	\$ 3,997,742.37	\$ 877.96	\$ 2,622,354.11	\$ 1,568.24	\$ 3,511,899.29	\$ 1,108.30	\$ 1,860,615.09	\$ 11,992,610.86
	\$ 564.41	\$ 3,998,306.78	\$ 658.47	\$ 2,623,012.58	\$ 1,176.18	\$ 3,513,075.47	\$ 831.23	\$ 1,861,446.32	\$ 11,995,841.15
	\$ 423.31	\$ 3,998,730.08	\$ 493.85	\$ 2,623,506.44	\$ 882.13	\$ 3,513,957.60	\$ 623.42	\$ 1,862,069.74	\$ 11,998,263.86
	\$ 317.48	\$ 3,999,047.56	\$ 370.39	\$ 2,623,876.83	\$ 661.60	\$ 3,514,619.20	\$ 467.57	\$ 1,862,537.30	\$ 12,000,080.90
	\$ 238.11	\$ 3,999,285.67	\$ 277.79	\$ 2,624,154.62	\$ 496.20	\$ 3,515,115.40	\$ 350.67	\$ 1,862,887.98	\$ 12,001,443.67
	\$ 178.58	\$ 3,999,464.25	\$ 208.34	\$ 2,624,362.97	\$ 372.15	\$ 3,515,487.55	\$ 263.01	\$ 1,863,150.98	\$ 12,002,465.75
	\$ 133.94	\$ 3,999,598.19	\$ 156.26	\$ 2,624,519.22	\$ 279.11	\$ 3,515,766.66	\$ 197.25	\$ 1,863,348.24	\$ 12,003,232.32
	\$ 100.45	\$ 3,999,698.64	\$ 117.19	\$ 2,624,636.42	\$ 209.33	\$ 3,515,976.00	\$ 147.94	\$ 1,863,496.18	\$ 12,003,807.24
	\$ 75.34	\$ 3,999,773.98	\$ 87.90	\$ 2,624,724.31	\$ 157.00	\$ 3,516,133.00	\$ 110.96	\$ 1,863,607.13	\$ 12,004,238.43
	\$ 56.50	\$ 3,999,830.49	\$ 65.92	\$ 2,624,790.24	\$ 117.75	\$ 3,516,250.75	\$ 83.22	\$ 1,863,690.35	\$ 12,004,561.82
	\$ 42.38	\$ 3,999,872.86	\$ 49.44	\$ 2,624,839.68	\$ 88.31	\$ 3,516,339.06	\$ 62.41	\$ 1,863,752.76	\$ 12,004,804.37
	\$ 31.78	\$ 3,999,904.65	\$ 37.08	\$ 2,624,876.76	\$ 66.23	\$ 3,516,405.30	\$ 46.81	\$ 1,863,799.57	\$ 12,004,986.27
	\$ 23.84	\$ 3,999,928.49	\$ 27.81	\$ 2,624,904.57	\$ 49.68	\$ 3,516,454.97	\$ 35.11	\$ 1,863,834.68	\$ 12,005,122.71
	\$ 17.88	\$ 3,999,946.36	\$ 20.86	\$ 2,624,925.43	\$ 37.26	\$ 3,516,492.23	\$ 26.33	\$ 1,863,861.01	\$ 12,005,225.03
	\$ 13.41	\$ 3,999,959.77	\$ 15.64	\$ 2,624,941.07	\$ 27.94	\$ 3,516,520.17	\$ 19.75	\$ 1,863,880.76	\$ 12,005,301.77
	\$ 10.06	\$ 3,999,969.83	\$ 11.73	\$ 2,624,952.80	\$ 20.96	\$ 3,516,541.13	\$ 14.81	\$ 1,863,895.57	\$ 12,005,359.33
	\$ 7.54	\$ 3,999,977.37	\$ 8.80	\$ 2,624,961.60	\$ 15.72	\$ 3,516,556.85	\$ 11.11	\$ 1,863,906.68	\$ 12,005,402.50
	\$ 5.66	\$ 3,999,983.03	\$ 6.60	\$ 2,624,968.20	\$ 11.79	\$ 3,516,568.63	\$ 8.33	\$ 1,863,915.01	\$ 12,005,434.87
	\$ 4.24	\$ 3,999,987.27	\$ 4.95	\$ 2,624,973.15	\$ 8.84	\$ 3,516,577.48	\$ 6.25	\$ 1,863,921.26	\$ 12,005,459.15
	\$ 3.18	\$ 3,999,990.45	\$ 3.71	\$ 2,624,976.86	\$ 6.63	\$ 3,516,584.11	\$ 4.69	\$ 1,863,925.94	\$ 12,005,477.37

TOTAL DOLLAR BENEFITS



using the injection of \$656,247 in September and the injection of \$879,151 in December. The fourth set of columns represents the final monetary injection of \$465,985 in April of 1996. Each of these dollar amounts utilize their own sets of multiplier cycles. The final column is the total of the three columns which illustrate monetary benefit. This grid shows the multiplier effect through 40 full cycles. In reality, the effect is never fully realized. However, the most significant part comes fairly early in the process. Note the graphical illustration of these numbers on page 159.

The revenue at Ocean Fresh Alaska is gained from the sale of export goods. This means that Ocean Fresh revenue is a new injection into the economy which increases the monetary stock of a given economic base. It may even be considered an injection of unplanned income. This then launches the multiplier process as it applied to each Ocean Fresh injection. Because Ocean Fresh revenue comes from external sources, moneys paid from this revenue cause changes in planned (or regular) expenditures. The circular flow is affected each time Ocean Fresh injects new money. Due to Ocean Fresh's injections, the benefits we provide to the local economy exist in excess of the money already circulating in the economy.

We at Ocean Fresh have estimated that approximately 75% of what we pay the divers remains in the State of Alaska in the form of disposable income (currency) and deposits. Currency and deposits are what comprise the money stock in a given economy. Therefore, about 75% of \$1,397,792.00 (\$1,048,344.00) has remained in the state and local economy. Money paid to Alaskan boats probably remains in the state as a higher percentage than 75% but only about 40% of our current boats may be considered Alaska boats. These are boats captained by individuals residing in Alaska on a permanent basis. As more divers and boat owners in Alaska become aware of this fishery the 40% will increase. Still, due to the nature of the fishery, boat owners and divers from out-of-state must make a long term commitment to reside in the state as product (urchins) must be landed daily. Product cannot be held on boats for long periods due to loss in quality therefore all purchasing and processing activity must take place very near where the actual harvest area is located.

Divers that reside in Alaska must consume local goods and services to meet all of their personal and business needs. Examples of divers local expenditures include fuel, groceries, hardware supplies, rents, repair and

maintenance, etc. Divers also open both checking and saving accounts locally which contributes to the money stock. Due to how the urchin fishery must be managed, state and local benefits are maximized. When compared with other fisheries this is very significant.

Many of the species harvested in the various dive fisheries are of high sales price and low volume for example; abalone. This product has a high ex vessel price and high retail price but is not labor intensive. Many of the participants in the fisheries are from out-of-state. The money generated from the sale of the abalone does not circulate within the community. A second example of a fishery with minimum economic impact is geoduck clams. The largest majority of the exploration is taken from out-of-state boats that only frequent the state during short harvest cycles. One important factor in gauging economic value is the amount of value added to the product. In the case of geoduck clams, the value added is minimal at best. Most of the revenue generated from sales is returned to the vessel and taken out of state. This phenomena extends itself to many other fisheries including vessels with ITQ rights. The boat with ITQ rights can leave Washington state with crew and supplies, harvest their quota, and return to Washington with virtually no economic enhancement to the state that the product was taken from.

Sea urchin processing is different from many other fisheries in that the impact to the state per dollar value is very high. Since vessels are harbor dependent and the production takes a great deal of labor, the economic impact must be taken into consideration.

If there was an ongoing fishery the economic impact to the state would be much greater. With an ongoing fishery the secondary processing would also be accomplished in Alaska. A secondary processing facility was not practical during the test fishery due to the length of time it takes to train employees up to the level of expertise required to maximize the over all sale of the uni. The cost to set up secondary processing cannot be absorbed unless the future production is high enough and regular enough to support the crew of professionals that specialize in this trade. The work accomplished by the secondary processing crew is much more vital to the outcome of the product than the primary processing that Ocean Fresh did in Alaska. Therefore, local and state benefits will be substantially increased if there is to be an on going fishery.

Chapter 8 Conclusion

ALASKA SEA URCHIN FUTURE POTENTIAL

The sea urchin industry began on the North West coast in the early seventies. Production increased steadily. By 1980 poundage reached over twenty million (20,000,000) pounds. During this time period California produced over ninety-five (95) percent of all sea urchin harvested in the Northwest. Between 1980 and 1990 California produced over three hundred million (300,000,000) pounds of sea urchin, eighty (80) percent of the total production. The peak harvest year was 1992 with over seventy million (70,000,000) pounds harvested. Canada at that time contributed over thirty million (30,000,000) pounds to the inclusive total. This was almost twice as much as they had produced previously. California reached peak production in 1988 and 1989 producing over fifty million (50,000,000) pounds. In 1987 California felt the need to start limiting production of sea urchin to prevent overharvesting.

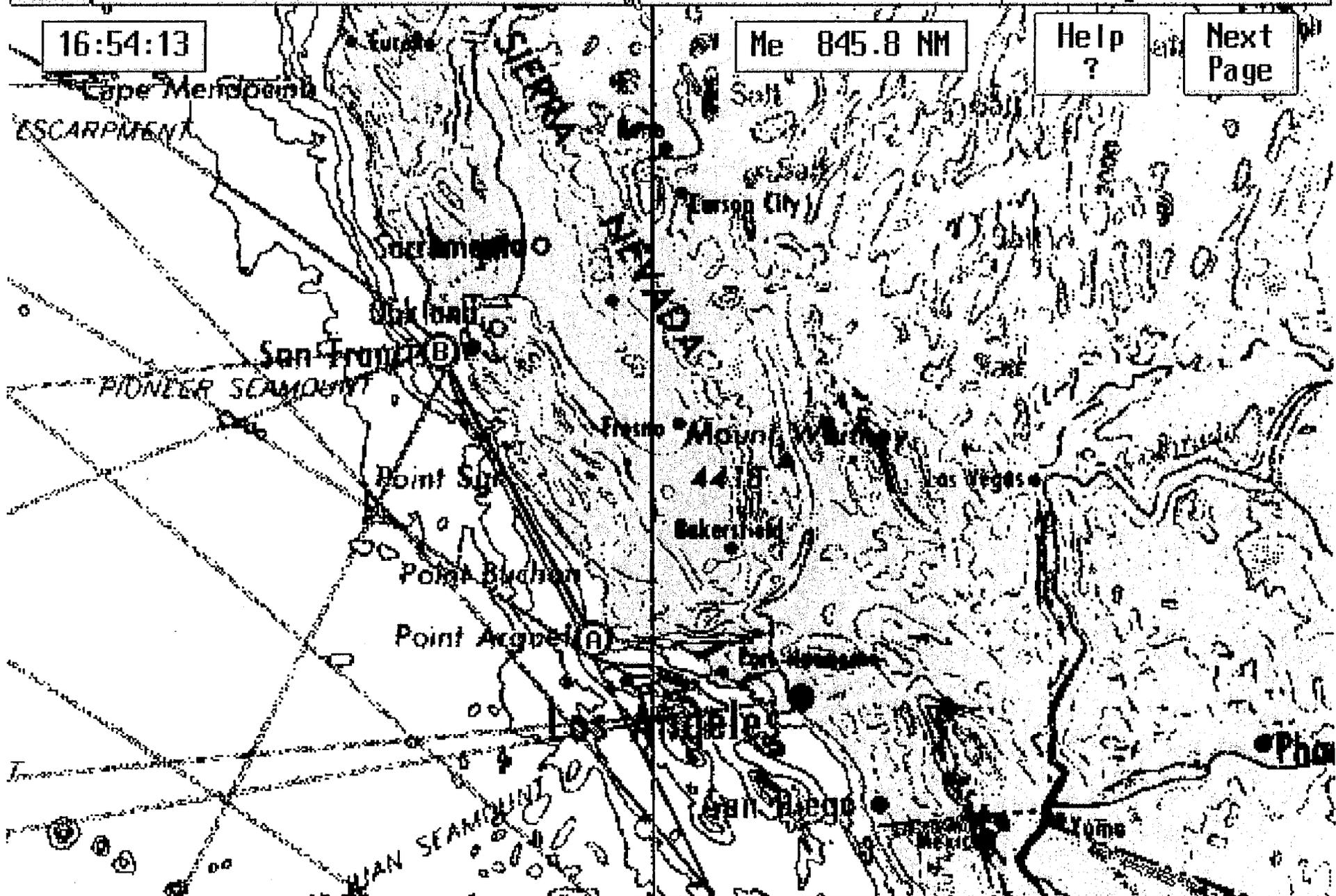
YEAR	ALASKA	BRITISH COLOMBIA	WASHINGTON	OREGON	CALIFORNIA	TOTAL
1971			1.80		0.20	2.00
1972			2.50		76.50	79.00
1973		802.50	14.70		3594.70	4411.90
1974			57.40		7107.80	7165.20
1975			31.00		7567.20	7598.20
1976			1544.40		11106.40	12650.80
1977		154.50	1045.60		16536.30	17736.40
1978		165.30	471.40		14424.30	15061.00
1979		706.50	697.00		20544.20	21942.70
1980		733.70	132.90		22167.10	23033.70
1981		254.20	304.20		26333.70	26892.10
1982		354.20	40.60		18403.90	18975.70
1983		2173.30	497.20		15809.40	18479.90
1984	107.40	3890.10	604.50		14746.50	19348.50
1985	126.00	4001.20	878.80		19994.90	25000.90
1986	282.40	4556.70	3501.20	55.80	34130.70	42526.80
1987	757.10	4935.00	4908.30	202.80	45636.80	56440.00
1988	244.90	5644.50	9357.90	1947.30	51988.00	69182.60
1989	187.00	7201.20	5739.70	7842.60	54187.30	72157.80
1990	100.30	8008.50	6839.20	9320.90	45269.70	69538.60
1991	225.10	16105.20	5686.40	4736.90	41926.70	68680.30
1992	454.10	30917.80	6298.20	2954.20	32681.40	70305.70
1993	386.90	15378.90	1867.60	2217.30	27012.40	46863.10
1994	23.40	13540.80	2037.90	1986.70	23985.00	41573.80

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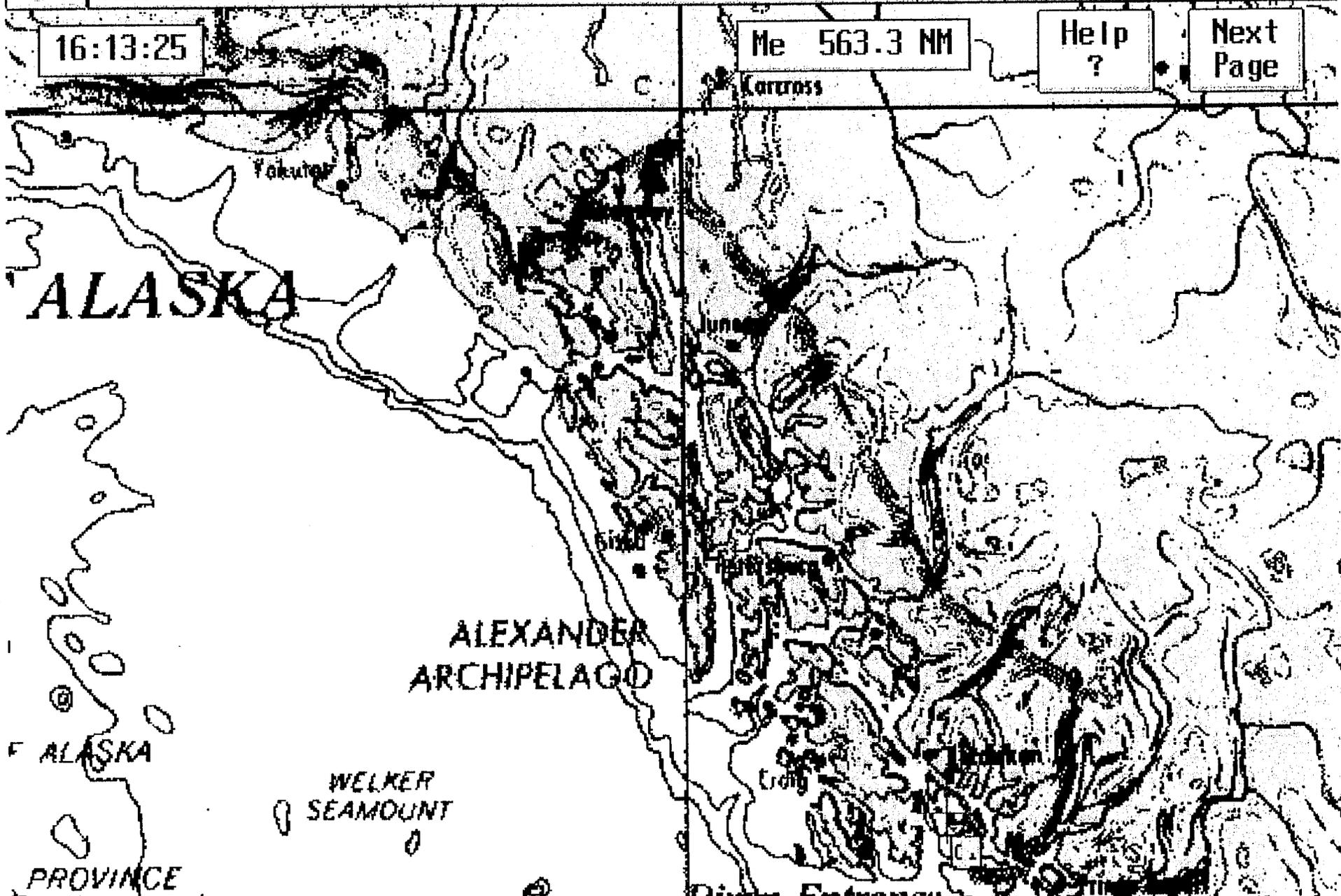
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A

34 34.279 N
120 47.146 W



Rng
Brg

207.5 NM
332 Mag



B

37 37.045 N
122 48.851 W

Man Overboard

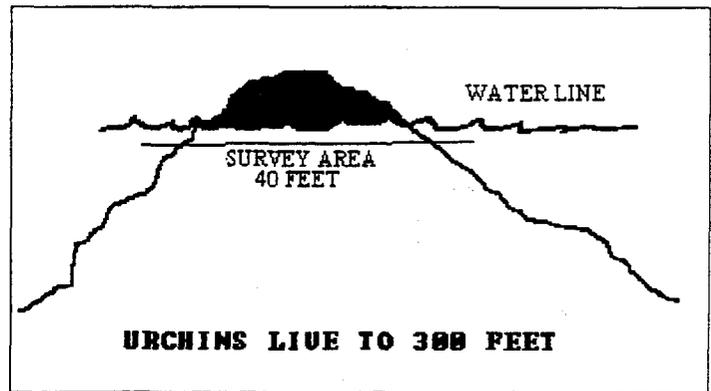
Between 1987 and 1993 regulations were adopted in California limiting permits, closing peak production times and implementing size restrictions. During the early nineties most states recognized the need for some regulations to stabilize their resource. Most of the fisheries on the West Coast have established some constant level of production over the past twenty years with the exception of Alaska. By viewing the production numbers provided in the table on the previous page it is easy to see that an area with good sea urchin habitat can provide long term harvest. For instance; California could sustain production levels of twenty million (20,000,000) pounds without endangering the resource, primarily due to the available habitat.

We have provided two charts of the same scale (page 163 and 164) so that the amount of available sea urchin habitat can be easily compared. The sea urchin harvest in California takes place in two primary areas, Northern and Southern California. Most of the production comes from Southern California. This area extends from the Mexican border to Point Conception indicated by the letter "A" on the chart. The Northern area extends from Half Moon Bay, indicated by the letter "B" on the chart, to Cape Mendocino. You will notice by comparing the charts that the California coastline is not nearly as rugged and lacks the islands and inlets found along the Alaskan coast. As expected, the California coast consists of a great deal of sand. This is in contrast to the coast line in Southeast which is primarily rocks and reefs. These rocks and reefs provide an ideal habitat for sea urchin. Therefore, since sea urchin abundance is directly related to habitat, it would appear that Southeast Alaska has the potential to be the dominant producer of sea urchin in the United States. This concept is supported by the assessment of the biomass in just district 101.

However, when examining the available biomass in our test area, district 101, we find that the method by which the biomass was assessed may not have included all the harvestable biomass. The estimate in district 101 is forty five million eight hundred thirty-three thousand three hundred thirty three sea urchins. This number has been calculated by the transect method with a confidence level of around seventy-five percent (75%). This means the actual estimate would be fifty-seven million two hundred ninety-one thousand six hundred sixty-six urchins (57,291,666). The forty-five million eight hundred thirty three thousand thirty-three (45,833,333) being the lower number when the confidence level (how confident or accurate the estimate is) is applied.

The transects are calculated from zero tide to a depth of forty feet. Sea urchins do not live above zero feet of tide. The actual amount of sea urchins included in the sampling (or transect) is only about thirty-five feet in depth. Sea urchins live down to a depth of ninety meters (over three hundred feet). The biomass estimate only includes eleven percent of the known habitat. From our own experience and by discussing the subject with many others in the industry, it can be conservatively said, the transects include less than half of the population. The density's are greater near the surface or zero feet of tide and become sparser as the depth increases.

The coastline is measured at the surface. This does not take into account that the deeper you go the greater the area. For example, this is much like measuring the top of a mountain and not including the base or valley areas. The surface is much greater than the coastline itself.



Even with the density per meter being less in deeper water, one must take into account the increased area as well. The amount of urchins is twice (at least) as much as the biomass estimate ($57,291,332 \times 2 = 114,583,332$). One way to prove this logic is to look at areas that have been transected and estimated with a low confidence level. Then add more transects, thus increasing confidence or accuracy. The number is always greater with more accurate surveys.

There are many theories regarding sea urchin exploitation. Most biologists calculate an exploitation rate by mortality rates. The natural mortality rate for sea urchins is approximately seven and a half percent per year. Some studies should that it is possible greater in Alaska. Most biologists agree that one half of an unharvested or virgin stock can be taken and the biomass will fully recover in a year. If the mortality rate of sea urchins is seven and a half percent annually, the average age of the population is thirteen to fourteen years.

The maximum sustainable yield of sea urchins is not the same as the saturation or virgin stock. Sea urchins are grazers feeding on kelp and bottom growth. They can be considered underwater cows. Cattle, if confined to a certain area, will reproduce until there is no longer a food supply. At this point the herd will stagnate and not grow any larger. This is the saturation point. With cows this would be called over population and

overgrazing thus decreasing the efficiency of the herd. It is more economical for a farmer or rancher to have less animals and let them grow more rapidly. The same situation holds true for sea urchins, which are grazing the ocean floor. They have reached the point of saturation.

Many biologists feel that forty to fifty percent of the stock should be removed. This is also consistent with many other animals as well. Studies have shown that sea urchins reach maturity within four to five years of growth. Studies have also shown that reproductive capability is directly related to the size of the gonads (the recovery) in relation to animal weight. Sea urchins with an adequate food supply have much larger gonads than those without. A smaller well-fed stock has a greater reproductive capability than the original biomass. Since urchins mature in four or five years and die in thirteen to fourteen years, their most productive years are from five to ten years of age. In planning the removal of forty-five percent of the stock it should be taken over a ten year period, so that no particular year class is affected. With one half of the mortality rate as the acceptable exploitation, the exploitation rate would be 3.75 percent of the biomass. This would maintain the maximum or saturation level since the amount should be taken over ten years or four and a half percent annually.

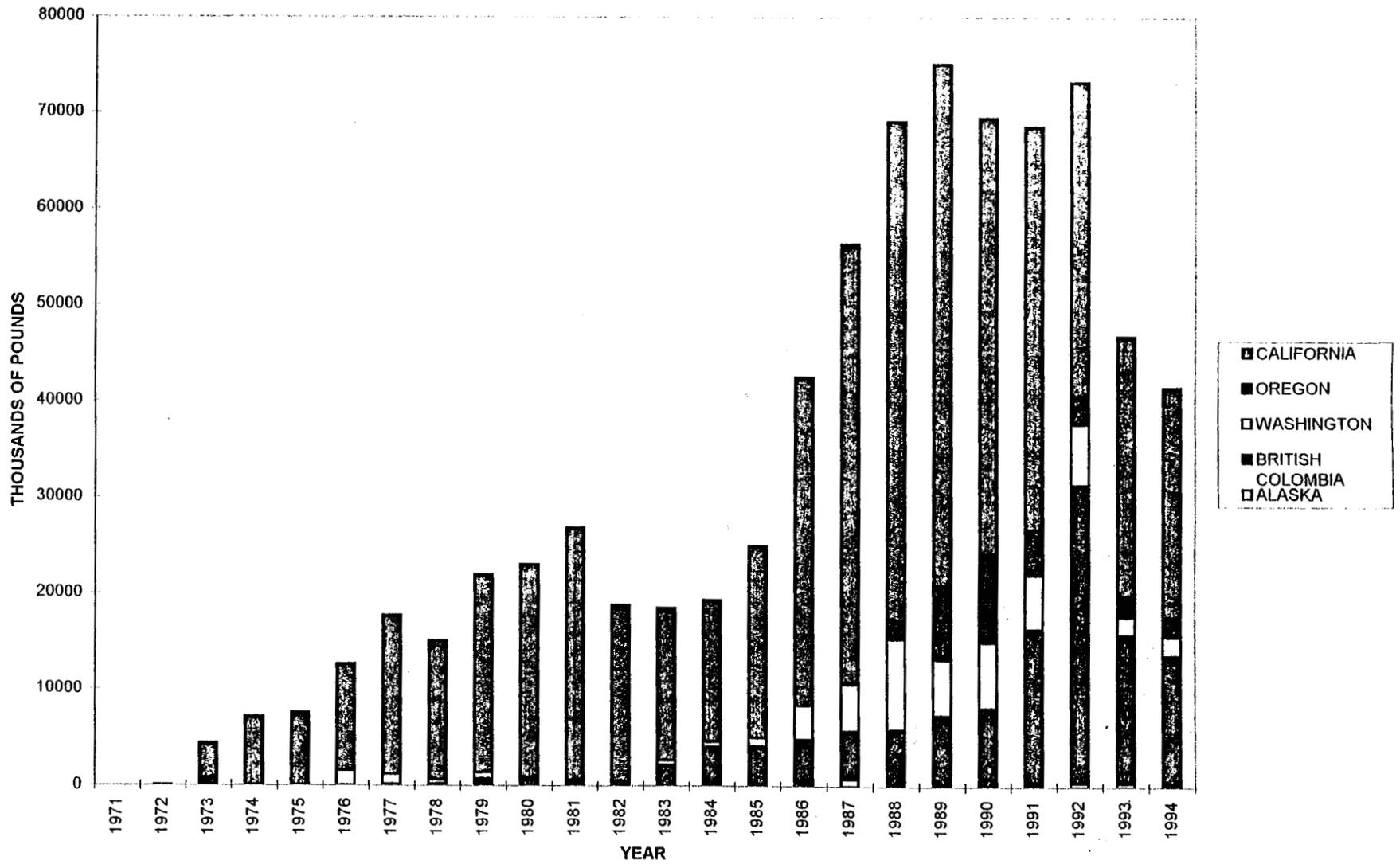
With the three and a half percent accounting for the growth of new urchins and the four and a half percent removing excess stocks, the targeted stock could be reached in ten years without damage being done to any year class. The total combined exploitation rate would be eight and a quarter percent of the original mass. The exploitation rate is based on the biomass. By conducting periodic surveys or transects, adjustments may be made for any error in calculations.

Using district 101 as an example, with the actual biomass being one hundred fourteen million five hundred eighty three thousand three hundred thirty two pounds (114,583,332), the exploitation rate would be eight and a quarter percent. This would make the quota nine million four hundred fifty three thousand one hundred twenty four (9,453,124) pounds annually. These estimates are based on the actual scientific theories regarding mass, growth rate, mortality rate, and exploitation rates.

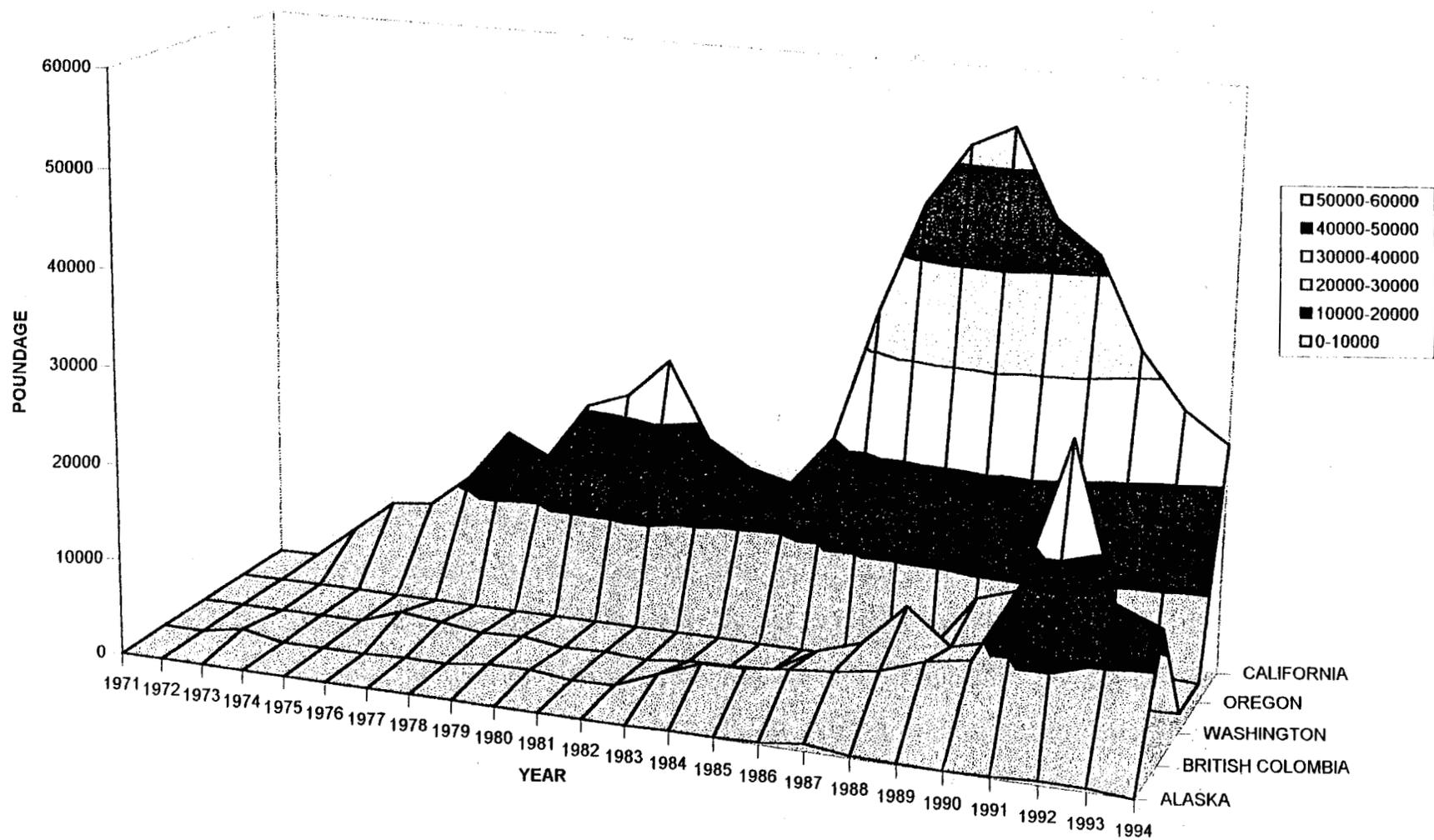
Biologists and other ordinary people are fearful of what happened in Northern California happening in Alaska. All parties agree that over harvesting did take place and stricter management was needed. However, various concerns do not appear well founded when the facts are examined.

One major difference between the California and Alaskan Departments of Fish and Game is the management technique employed.

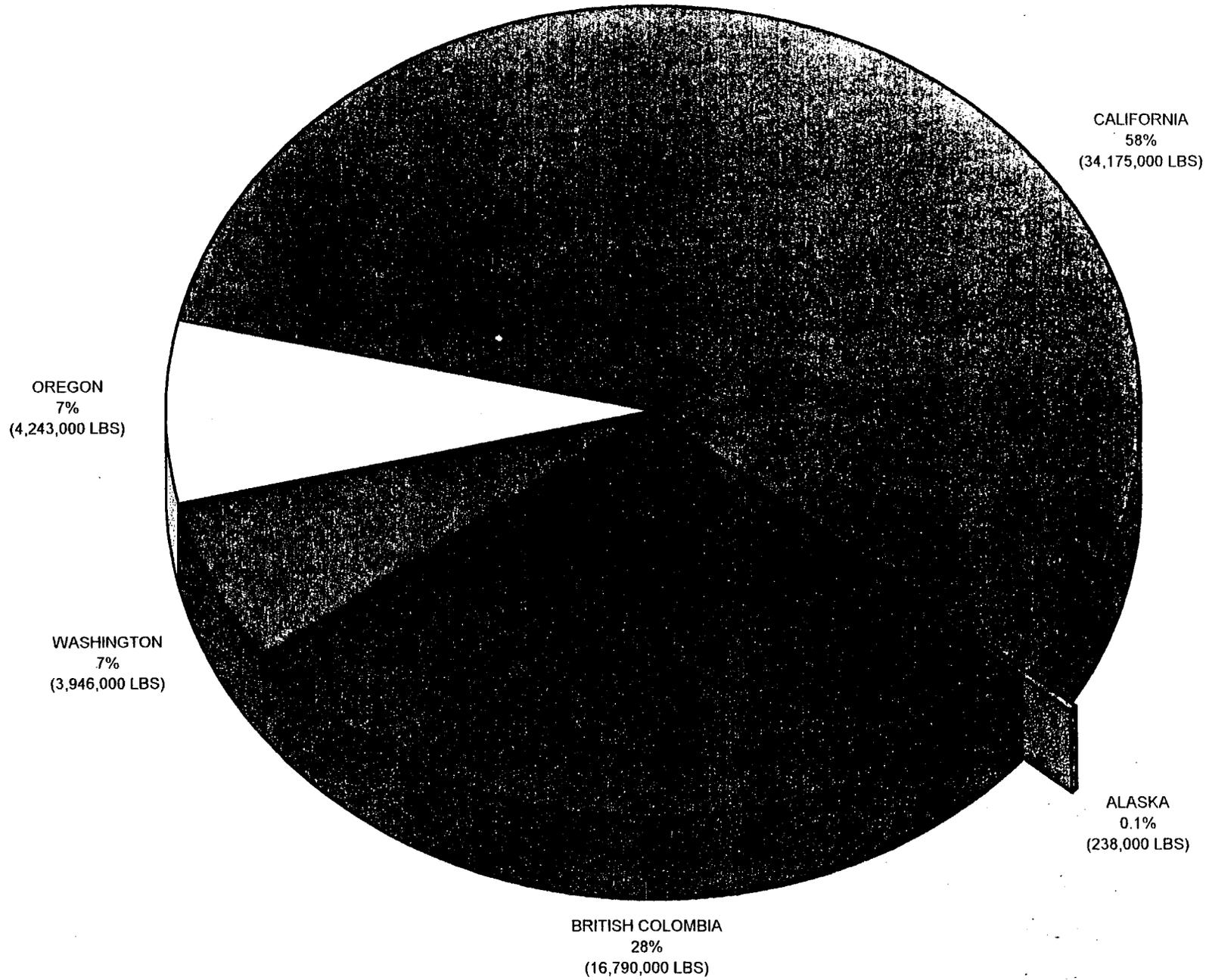
1971 TO 1994 URCHIN FISHERY TOTALS



WEST COAST URCHIN FISHERY TOTALS



WEST COAST SEA URCHIN FISHERY IN 1994



California, unlike Alaska, is completely reactionary. Alaska plans the fishery before opening it. The virgin stock in California was never assessed. All biomass information is theorized from landings information. Another major difference is the amount of available habitat. District 101 has more available habitat than all of Northern California. The harvesting in California exceeded twenty million pounds. The efforts were intense and conservation was no consideration in the beginning. In the past twenty years over seven hundred fifty-five million (755,000,000) pounds of sea urchin have been landed. California, with much less available habitat than Alaska, has landed over five hundred fifty million (550,000,000) pounds of urchins. We believe that the biomass in Alaska is substantial. With the utilization of the Alaska Department of Fish and Game's excellent management techniques, Alaska could be a leader in the west coast sea urchin industry.

The bar graph on page 168 shows the sea urchin production over the years. The light blue color represents Alaska. Since production has fallen throughout the West Coast in the last two years it would indicate that existing markets would be capable of handling Alaskan sea urchin production.

The pie graph on page 170 shows the amount that each of the West Coast states contributed to the total sea urchin harvest. The purple section represents Alaska. With the amount of available habitat in Southeast this portion could potentially dominate the chart.

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