

Shrimp Survey and Resulting Management Actions Area 12, June 1998

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SHRIMP SURVEY AND RESULTING MANAGEMENT ACTIONS

AREA 12, JUNE 1998

by

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ABSTRACT

Boutillier, J.A., J.A. Bond, H. Nguyen, and R.M. Harbo. 1998. Shrimp survey and resulting management actions Area 12, June 1998. Can. Manuscr. Rep. Fish. Aquat. Sci. 2463: 40 p.

This report forms part of a series that details the assessment and management actions undertaken in the shrimp trawl fisheries off the Pacific coast of Canada in 1998.

An area-swept shrimp trawl survey was undertaken in Pacific Fisheries Management Subareas 12-26, 12-39, 12-40, and 12-42 in June 1998. The survey was conducted using five volunteer commercial shrimp vessels. Area 12 is a large area with numerous small isolated fisheries that land a variety of shrimp species complexes. The majority of the landings consist of the northern pink shrimp, *Pandalus borealis eous*, the sidestripe shrimp, *Pandalopsis dispar*, and the humpback shrimp, *Pandalus hypsinotus*.

Vertical trap sets were used to evaluate the availability of shrimp to the trawl survey. Biomass indices of shrimp by species were determined in select trawlable areas of Area 12. Although the collection of shrimp data and the bycatch of halibut and eulachon were priorities over detailed information on bycatch of other species, catch information on all species was collected where time permitted. Landings of prawns, halibut or eulachon were very minor.

A fixed exploitation rate of 33% was applied to the biomass estimates by species. Catch ceilings, quotas, and other management actions as results of the survey are discussed.

These survey data are part of a long-term database of survey indices to be combined with logbook data, biological sampling and other fishery data. Until a long-term database is available, the initial biomass indices will be used as an absolute estimate for the purpose of setting quotas. The assessment and management process will require a collaborative effort on the part of DFO and stakeholders.

RÉSUMÉ

Boutillier, J.A., J.A. Bond, H. Nguyen, and R.M. Harbo. 1998. Shrimp survey and resulting management actions Area 12, June 1998. Can. Manuscr. Rep. Fish. Aquat. Sci. 2463: 40 p.

Ce rapport entre dans une série de travaux décrivant les évaluations et les mesures de gestion prises dans les pêches de la crevette sur la côte pacifique du Canada en 1998.

Une campagne de chalutage scientifique par la méthode des aires balayées a été entreprise en juin 1998 dans les sous-zones de gestion des pêches du Pacifique 12-26, 12-39, 12-40 et 12-42. Les relevés ont été effectués par cinq crevettiers commerciaux volontaires. La zone 12 est une vaste région couvrant de nombreuses petites pêcheries isolées qui débarquent des crevettes constituant divers complexes d'espèces. La majorité des débarquements consistaient en crevette nordique, *Pandalus borealis eous*, en crevette à flancs rayés, *Pandalopsis dispar*, et en crevette à front rayé, *Pandalus hypsinotus*.

Des pêches verticales avec des pièges ont servi à évaluer la capturabilité des crevettes dans les campagnes de chalutage. Les indices de la biomasse de crevette, par espèce, ont été déterminés dans certains secteurs chalutables de la zone 12. Les priorités de la campagne étaient la collecte de données sur les crevettes et les prises accessoires de flétan et d'eulakane plutôt que l'étude détaillée des prises accessoires, mais des données sur les captures ont en général été recueillies pour toutes les espèces. Les débarquements de crevette tachetée, de flétan et d'eulakane étaient minimes.

Un taux fixe d'exploitation de 33 % a été appliqué aux estimations de la biomasse, pour chaque espèce. Nous analysons les plafonds de capture, les quotas et les autres mesures de gestion prises à la suite des relevés.

Les données obtenues grâce aux relevés entrent dans une base de données à long terme qui rassemble des indices scientifiques en vue de les combiner aux informations des journaux de pêche, aux résultats des échantillonnages biologiques et à d'autres données sur les pêches. En attendant que la base soit suffisamment enrichie, les indices initiaux de la biomasse serviront d'estimations absolues pour l'établissement des quotas. Le processus d'évaluation et de gestion nécessitera un effort de collaboration de la part du MPO et des intervenants.

ASSESSMENT AND MANAGEMENT FRAMEWORK

This report forms part of a series of documents that outline the assessment data and management processes that were used in 1998 in the shrimp trawl fishery for specific areas along the British Columbia coastline. The shrimp trawl fishery takes place in a variety of areas ranging from large offshore grounds to small isolated inshore waters. These fisheries also vary with respect to the target species. There are seven species of shrimp that are harvested commercially in British Columbia and fisheries vary in complexity from single to multiple species fisheries. Many of these shrimp trawl fisheries are new or developing and there is little or no information available from which to assess the stocks.

A suite of management principles was developed for these fisheries as a result of discussions and concerns outlined in PSARC assessments of inshore (Boutillier et al. 1996) and offshore (Boutillier et al. 1997) shrimp fisheries. The management systems adopted in 1998 varied depending on the nature and complexity of the fishery.

For the offshore fisheries in the southern and central regions off the West Coast of Vancouver Island (WCVI), time and area closures were implemented. The recruitment process for these offshore fisheries appears to be strongly influenced by environmental factors which affect the strength and direction of surface currents. There also appears to be a strong south to north recruitment interdependence between grounds (Boutillier et al 1997).

For inshore fisheries and the remaining offshore areas, a fixed arbitrary, historically based or forecasted¹ catch ceiling was assigned to each shrimp management area. These catch ceilings can be adjusted inseason, if information from fishery independent biomass indices and catches indicate that the area can sustain fishing pressure either less than or greater than the initial levels. The biological reference point for sustainable fishing pressure that is used at this time is the biomass of the area multiplied by an exploitation rate of 33%.

The use of biological reference points discussed above is based on precautionary principles discussed in Boutillier et al. (1996) and is designed to meet conservation and sustainable utilization goals in data limited situations. Over the long term, the management and assessment systems for these fisheries will undergo a number of changes that reflect a better understanding of these initial, hopefully conservative, thresholds. These changes will result from a management and assessment system which will be designed to collect information on a number of key issues including: the biotic and abiotic factors that affect the population, quantifying biological compensatory mechanisms, calculating compensatory mortality thresholds, evaluating factors affecting availability, developing survey designs which quantify shrimp abundances in untrawlable areas, and accounting for variations in availability to trawl surveys due to vertical migrations.

One of the key tools used in collection of the data that will address these issues is the use of fishery independent area swept trawl surveys. Area swept trawl surveys are used to calculate biomass indices for these fisheries which provide trends in abundance. These trends when

¹ Forecasting only took place in Pacific Fisheries Management Area 12 where there were fishery independent trawl surveys conducted the previous year (both in April and November 1997).

modelled with the catch history from the area will provide estimates of absolute abundance. However, until a reliable long-term data base of survey indices and catches are available, the survey biomass indices will be used as an absolute estimate for the purpose of setting the biological reference point catch ceilings.

The management and assessment process is an iterative process which demands a constant building and learning. It will take years of careful assessment and testing of critical basic biological parameters such as: growth, mortality, recruitment, appropriate levels of exploitation by area and species etc., to address the issues as stated above. This will take a collaborative effort on the part of department and stakeholders to achieve meaningful results while adhering to precautionary principles.

INTRODUCTION

This report summarizes the data collection process, analysis, interpretation and resulting management actions of a fishery independent shrimp survey that was conducted June 3-5, 1998 in Pacific Fishery Management Area (PFMA) 12 on the Pacific coast of Canada.

Area 12 is a large area that has a number of small isolated fisheries that target on a variety of species complexes. At least seven commercial shrimp are harvested by trawl in the area: *Pandalus borealis eous* (northern or spiny pink); *P. jordani* (smooth pink); *P. goniurus* (flexed pink), *P. danae* (coonstripe); *P. hypsinotus* (humpback); *P. platyceros* (prawn); and *Pandalopsis dispar* (sidestripe). Although there have been trawl fisheries for shrimp for a number of years in this area, it was not until recently that there has been a consistent strong effort in the area as can be seen in the area landing figures in Figure 1.

In 1997, following initial surveys and consultation with fishers, Area 12 was divided into two shrimp management areas, 12-IN (Subareas 12-22, 12-23, and 12-26 to 12-48) and 12-OUT (Subareas 12-1 to 12-21, 12-24, and 12-25) (Figure 2).

OBJECTIVE

A survey was undertaken in 12-IN, to update quotas for the 1998/99 season. Initial quotas were set for 12-IN based on forecasted biomass estimates of northern pink shrimp from the 1997 survey and catch information. The forecasted biomass estimate was based on the index of abundance, growth and mortality of the 0+, 1+ and 2+ animals only (since the 3+ animals would have died after egg hatch in the spring of 1998). This quota was anticipated to be conservative since the 1997 estimates of 0+ and 1+ animals, due to their availability, are felt to be low and therefore their forecasted abundance should subsequently be biased low. There is no way of knowing, at this time, the correction factors for availability for 0+ and 1+ animals.

The preliminary quotas for 12-IN were taken by the fishery in May, 1998 and 12-IN subsequently closed on May 25. A survey for the area, using the research vessel Caligus, was planned for late August, 1998, however, the industry requested an earlier survey of selected areas. Subsequently this multi-vessel survey using industry vessels was conducted to provide inseason fishery biomass indices of shrimp by species in select trawlable areas of Area 12, and develop inseason quotas for the various areas by species. To do this there were two survey techniques used:

1. An area swept trawl survey to determine the fishable biomass index of shrimp by species in the various trawlable areas.
2. Vertical trap sets placed in trawlable area to estimate the proportion of the of shrimp stock by species off bottom and not accessible to the trawl.

This is the third survey of this region since April 1997; the previous surveys (April and November 1997) are reported in Boutillier et al. (in press). In the 1997 surveys, long-lined trap sets placed inside and outside the trawl survey area were also used as part of the overall survey. The data from this latter survey technique were used to delimit extent and density of the various shrimp stocks outside the trawlable area. However, logistic problems in implementing this survey in the time frame industry desired required that the long-lined trap component of the survey not be carried out. The mask used to delimit the area of shrimp abundance did however include known distribution ranges of the various species of shrimp from the 1997 surveys.

METHODS

The survey in June 1998 provided inseason fishery biomass indices, and age and size distribution of shrimp for Pacific Fisheries Management Subareas 12-26, 12-39, 12-40 and 12-42 (Figure 2). The survey was conducted using five volunteer commercial fishing vessels: four to conduct the trawl survey: F.V. Diligent (Captain Hannu Harju); F.V. Foxy Lady II (Captain Murray Tanner); F.V. Frigga (Captain Ross Michelson); and F.V. Mae Ann (Captain David Renwall) and one to carry out the vertical trapping: F.V. Maile III (Captain Calvin Siider). The trawl survey vessels ranged in length from 11.3 to 12.2 m, and had beam lengths from 13.1 to 14.0 m.

Each vessel carried a biological technician, who was funded by DFO science using industry stock assessment funds. The trawl vessels that volunteered provided trawl gear in good working order as well as accommodation for the technician. The gear for the trap vessel was provided by DFO science. The cost of fuel and meals was provided through industry stock assessment funds.

MAPPING

Locations of shrimp trawl activity were identified initially in preparation for the 1997 surveys of this area (Boutillier et al in press). Locations were incorporated into CompuGrid, the proprietary raster-based geographic information system (GIS) utilized by DFO, Shellfish StAD, and displayed in relation to land mass, Pacific Fishery Management Areas and depth contours. Masks were initially drawn around the areas of most concentrated effort (clusters of location points), using the 50m and 200m contour lines as rough guides, and these were subsequently modified slightly as a result of the survey results. The masks were captured digitally and incorporated into the GIS. Within each mask, a sampling grid was established which broke the masked area into blocks of 0.25 square nautical miles (each block was a square with sides measuring 0.5 nautical miles).

FIELD DATA

All data was collected in a standard format which included details on the: sequential tow number², time and date, duration, Pacific Fisheries Management Area (PMFA), latitude and longitude of the start and finish of the tow, direction of the tow, distance travelled, depth, remarks on usability, and detailed catch information on total catch weight and weight by species (for commercial shrimp species #/kg information was also collected). Biological samples of 100 (if available) shrimp by species were collected from each tow for later processing by size and sex. Biological samples were taken of any eulachon and halibut caught in the survey as bycatch.

EFFORT STANDARDIZATION

The trawl survey vessels used were the same as in the 1997 surveys and the effort standardization exercise is described in detail for between vessel differences and between trawl differences by Boutillier et al (in press). No effort standardization was conducted for the vertical trap vessel. The vessels participating in the survey had nets fitted with fish separator panels to reduce the by-catch of fish in their commercial operations. It was felt that this equipment might reduce the catch of shrimp and therefore the separator gear was removed from the trawls for the survey. However, from a logistic perspective, the major drawback with the removal of the separator grid is that processing the catch takes more time and reduces the number of tows that a vessel can complete in a day.

AREA SWEEP TRAWL SURVEY

Trawl tows were spaced systematically on a 0.5 nautical mile by 0.5 nautical mile grid over the masked survey area by major fishing area (see Table 1).

Tows were to be 30 minutes in duration, however, they were shortened if they encountered snags or bad bottom. The start and stop latitude and longitude co-ordinates were used to calculate the distance towed. The density of animals by species per square meter was then calculated using the following equation:

$$\text{Density (kg/m}^2\text{)} = \text{Catch(kg)} / (\text{Distance towed} * \text{Net opening})$$

This density per square meter was then used in the calculations of the biomass indices.

VERTICAL TRAPPING

In an effort to estimate the proportion of shrimp available to the bottom trawls, strings of fine mesh (7-10 mm) Pardiac traps (23.25 cm diameter by 10.25 cm high) were to be set vertically

² Each vessel started its tows with a different series e.g. the Mae Ann's were limited to 100-199 while the Diligent's tows were limited to 400-499.

in the water column from the bottom to 40 m off bottom. Sets were to be set in the morning and afternoon for 4 hour soaks. Traps were to be spaced along the groundline at distances 0, 5, 10, 20, 30, and 40 m off bottom. The traps were then sampled to determine the number of shrimp caught at various heights off bottom. These catch rates by depth were then to be used to estimate the proportion of the shrimp that were available to trawl at the time that the survey was conducted.

AGE CLASS ESTIMATES

To estimate year class abundance and their size range, samples of approximately 100 (if available) shrimp from each species were collected from each tow. Each sample was then processed to determine the number of shrimp per kilogram, and the size and sex of each individual animal. The histogram and length frequency distributions for all samples were analyzed to proportion out the size and number at age using Schnute and Fournier's (1980) length frequency modal analysis (a minimal desirable total sample size is 1000 animals). Using the resulting mean sizes for each year class plus and minus a proportionally calculated standard deviation, the minimum and maximum size of animals assigned to a age class were calculated. These minimum and maximum sizes for each age class allow us to estimate the proportion of the catch from each sample from each age class, and subsequently to calculate the density of shrimp by number for each age in the area sampled.

CALCULATION OF BIOMASS INDICES

To estimate indices of biomass and year class abundance, the total survey area for each Subarea was mapped and divided into grid cells representing areas of 25,600 square meters (i.e. squares with sides of length 160 meters). The centre point of each tow was assigned to the appropriate grid cell with weight and age class density information (calculated using the above methods).

A sector geospatial interpolation was then used to calculate values for empty grid cells within the total sampling area. The sector interpolation examined an area within a circle with a radius of ten grid cells (1600 meters), with the target cell (cell for which the value is being calculated) in the centre of the circle. The circle is divided into six sectors, and the value for the target cell is estimated using a distance-weighted average of the nearest sample in each of the sectors. Thus, samples closer to the target cell have a greater influence on the interpolated value.

Once blank grid cells were filled in with interpolated values, indices of biomass and year class abundance were calculated by adding the values in each grid cell within the entire survey area. The calculations of the indices were done within the CompuGrid GIS software package.

RESULTS

EFFORT STANDARDIZATION

As in the 1997 surveys, no effort standardization corrections were made for between vessel differences. The only standardization that was conducted was corrections for different sized nets and beams. The effective net opening was calculated to be 0.6 meters shorter than the beam length, which varied by vessel. All nets used were high-rise beam trawls which were estimated to open vertically approximately 4 to 5 meters.

TRAWL SURVEY

A total of 46 successful tows (of 50 total tows) were completed in all areas combined. This varied from 10 to 16 per vessel with an average of 3.8 per day. The tows sampled from 0.39 to 1.59 % of the total area surveyed (see Table 2).

A summary of the total catch is shown in Appendix 1 and detailed catch records are shown in Appendix 2.

Vertical Trap Sets

A total of 18 successful sets (of 21 total sets) were made in all areas combined (see Table 3). Unfortunately there was some confusion and traps were not set on the bottom so that most of the trap sets were not usable for proper analysis. As a result the correction had to be made using the results from the April and November surveys for those areas where shrimp were known to come off the bottom during the day (Boutillier et al in press). The one exception to this was in Subarea 12-39 where shrimp were found off the bottom in the area of highest concentration. In this area the first trap off the bottom was used for the calculated proportion available to the trawl. As pointed out in Boutillier et al (in press), this trap does not produce as effectively as a bottom trap and the calculated proportion available to the trawl is probably biased low, which in turn would overestimate the biomass of shrimp.

The proportion of shrimp available to trawl varied depending on the species and the area. Species such as humpbacks, coonstripes, prawns and sidestripe shrimp were all 100% available to the trawl i.e. within 5 m of the bottom in all areas in both surveys. The pelagic species: Northern pink, smooth pink, and flexed pink shrimp however, did vary considerably with respect to their availability to the trawl. The correction factor used to account for availability to the trawl survey varied from a low of 26.7% available to a high of 100% available for Northern pink shrimp depending on the Subarea.

AGE CLASS ESTIMATES

The size of the animals by age class and species for the this survey varied between Pacific Fisheries Management Subarea (see Table 4).

SURVEY BIOMASS INDICES

The survey indices and total catch to date are combined to estimate the total biomass at the beginning of the fishery. By assuming that biomass prior to the fishery is equal to the survey biomass index plus the catch we are assuming that over the period of time from the fishery start and the survey estimate, growth and natural mortality balance.

Critical to the estimate of biomass and the remaining quota is the estimate of total catch. There appears to be a major discrepancy between the reported catch composition and the survey and commercial sampling catch composition by species.

Eulachon were caught in 14 separate tows and made up only 0.08% of the total catch. No halibut was caught during the survey.

Problem areas - Sidestripe shrimp

The sidestripe catch from AMR validated landings to June 10, 1998, shows that sidestripes from the Area 12-IN fishery make up only 1.77% of the total sidestripe and pink catch combined. This percentage is much lower than the results of the May bycatch samples or the June survey results. The estimated catch of sidestripes over the entire 12-IN area should make up somewhere between 11.83% (8.0 t) and 12.60% (8.5 t) of the total catch of shrimp (i.e. sidestripe and pinks combined (Tables 6 and 7)).

Market sampling at the plants and bycatch sampling on the grounds show that the small sidestripes, Age 1+ and/or Age 2+ , are mixed in with the pink shrimp catch. Note the maximum length for our estimated 2+ sidestripes is approximately 24.5 mm carapace length (CL) which is near the maximum size of the pink shrimp i.e. approximately 24 mm CL. The AMR validated catch of sidestripes represents only the larger shrimp sorted from the catch and processed as a higher value product. If we look at the proportion of weight represented by 1+ and 2+ sidestripes in the estimated biomass for area 12-26, the 1+ sidestripe alone make up 13.8% of the biomass and the 1+ and 2+ animals combined make up 28.9% of the biomass (as calculated from the percentages of all samples combined; N.B. we still need to estimate the proportions from the calculated estimates of year class strength). If this estimate is expanded to the catch from the May 98 fishery, the 12-IN total catch of sidestripes would be 1.7 tonnes.

Using the *Subarea 12-26 bycatch sample from May 1998*, in the same manner as detailed above for the survey data, the proportion of 1+ sidestripes in the total bycatch of sidestripes by weight was 71.8%. When expanded over the catch from the May 1998 fishery for the total 12-IN area, this sampling would estimate the catch of sidestripes to be 4.3 t.

If we received the logbook information on a more timely basis or delayed the fishery until logs are in and processed we could get a better estimate of the catch of sidsstripes by proportioning the catch by Subarea. If, for example, all the catch to date of pink shrimp was taken from 12-39 and 12-42, then the catch of sidsstripes may be close to the reported catch. There may be consideration to create new smaller shrimp management areas in 12-IN.

DISCUSSION

This was the second year that fishery independent trawl surveys like this have been conducted in Area 12. There continue to be some difficulties as well as a number of very positive results. It became obvious very quickly that the limited deck space of the vessels was a problem with respect to handling and sorting the catch. This impacted both on the number of tows that could be completed in a day and on the ability of the observers to get accurate samples and weights of shrimp in addition to other species. As a result of this, the survey was restricted in scope in terms of the areas to be covered (e.g. a number of areas were dropped in Subarea 12-26). It is probably more effective to use the fish separators in the nets to reduce the handling time and get more coverage than to worry about the small loss of shrimp that may or may not occur with the use of the separator grids.

It is unfortunate that the vertical trapping did not in most cases provide the type of data that was useful for determining the availability, however there was useful information in the occurrence of shrimp off the bottom in greater numbers than previously noted in Subarea 12-39. This occurred in the area of maximum concentration of shrimp in the area. Other sets in the area where shrimp abundance was lower did not show shrimp off the bottom.

With the limited time available for the survey the fishers opted to go to a maximum number of areas and survey the tows with maximum catch rather than maximize the tows in a single area and determine with more certainty the boundaries of shrimp concentrations.

In back-calculating the biomass available at the beginning of the fishery it is clear how **important it is to have corroborating commercial samples to determine the makeup of the commercial catch.** This is especially evident in the difficulties in determining the sidsstripe biomass and subsequent quotas. It is also important to consider that sidsstripes are more available to the fishery at a younger age. It will be important to understand if the harvest rates for northern pinks and sidsstripes should be the same since the former is subject to the full impact of the fishery for 2 years while the latter is subject to the full impact of the fishery for 3 seasons.

FISHERY MANAGEMENT ACTIONS - 12IN MAY - JUNE, 1998.

Based on the number of egg-bearing shrimp found in the April, 1997 survey in this area the fishery opening in 1998 for Area 12 was delayed to May 15 from the normal opening date of April 15.

An initial fishery took place in Area 12-IN from May 15 to 25, 1998. Catch ceilings of 102,000 lb. pinks+coonstripes (46.3 t), 11,365 lb. humpbacks (5.2 t) and 7,500 lb. sidestripes (3.4 t) were set as conservative levels from a preliminary forecasting of shrimp populations surveyed in April and November, 1997. This was a short fishery with high effort for pink shrimp. A bycatch of sidestripes and coonstripes was evident in the catch sampled on the grounds. Landings (hailed) are shown in Table 5.

Following the survey June 3 to 5, 1998, the preliminary results were forwarded to managers. *Annual quotas (Table 5) were calculated based on a fixed exploitation rate of 0.33 of the total biomass (calculated as the sum of the survey biomass and the fishery landings of May 1998).* There was a reduction of the 12-IN shrimp biomass in the June, 1998 survey to 430 - 460 t, compared to the April 1997 estimate of 530 t. The annual TAC for pinks+coonstripes for 12-IN in 1997 was 172 t compared to the 1998 level of 145 t.

- A Notice to Industry was issued on June 19 for a second fishery in 12-IN. The quotas were announced on June 22 for a fishery for combined pinks and coonstripes to be opened on June 26, 1998 for a TAC of 170,000 lb. (77 t). This is a limit in the lower range of the quota options (74.9 t to 83.3 t) from two estimates of biomass from the survey in Area 12 (Table 5).
- It is anticipated that the bycatch of sidestripes in the June pink fishery will reach the suggested harvest level (9.8 t) of sidestripes (Table 5).
- Consideration for further shrimp management areas in Area 12 for directed fisheries in Subareas 12-26 and 12-40 for sidestripes should be considered in the development of next season's fishing plan. Provisions for more timely submission of harvest logs would assist in the evaluation of the surveys, fisheries and management options.
- A recommendation for trip limits in Area 12-IN cannot be implemented this season without a change to the Shrimp Trawl Licence Conditions.

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Table 1. The Pacific Fishery Management Areas and Subareas surveyed and the respective sampling areas.

Subarea	Location	Area surveyed (km ²)
12-26	Knight and Clio	75.37
12-39	Retreat Pass	15.49
12-40	Simoon and Penphrase	11.80
12-42	Drury Inlet	12.54

Table 2. The subareas that were surveyed in the June survey, the total number of tows made, and area sampled as a percentage of the total survey area.

Subarea	Number of tows	% Area Swept
12-26	20	0.39%
12-39	17	1.59%
12-40	4	0.53%
12-42	5	0.54%

Table 3. The number of vertical trap sets, by Subarea, in the June 1998 survey.

Subarea	Number of Sets
12-26	12
12-39	6
12-40	0
12-42	0

Table 4. The size and weight of shrimp by cohort, by species, by Subarea for the June 1998 survey.

Subarea	Species	Age1 length	Age2 length	Age3 length	Age 1 Wt	Age 2 Wt	Age 3 Wt
12-26	Northern Pink	12.9	18.5	21.4	1.78	4.57	6.69
12-26	Humpback	16.6	23.8	27.6	3.63	9.91	14.97
12-26	Sidestripe	16.2	22.6	27.0	2.74	7.45	12.72
12-39	Northern Pink	13.0	18.2	21.4	1.82	4.38	6.69
12-39	Humpback	17.4	23.6	26.8	4.14	9.68	14.97
12-39	Sidestripe	16.8	23.7	27.6	3.05	8.60	13.59
12-40	Sidestripe	17.1	23.1	28.3	3.22	7.96	14.66
12-42	Northern Pink	12.8	17.3	20.1	1.75	3.84	5.68
12-42	Humpback	16.9	21.9	24.9	3.82	7.86	11.23

Table 5. Survey estimates, AMR validated and missing landings to June 10, 1998, quota estimates and remaining quotas. *The two estimates of pinks+coonstripes are from calculations using the results of vertical trapping in November (left column) and April 1997 (right column).

Subarea	Pinks+Coonstripes	Pinks+Coonstripes	Sidestripes	Humpbacks
12-26	104.9*	129.3*	21.7	4.8
12-39	203.3	203.3	2.4	11.3
12-40	1.1*	2.1*	7.3	0
12-42	55.3*	55.3*	0.7	12.9
12-IN total survey	364.6	390	32.1	29
Landings (June 10/98)	63.6	63.6	1.2	2.7
Missing (June 10/98)	4.1	4.1		
Biomass estimate	432.3	457.7	33.3	31.7
Annual Quota for 1998/99	142.7	151.0	11.0	10.5
Remaining Quota for 1998/99	74.9	83.3	9.8	7.8

Table 6. Estimated proportions of sidestripe weight to sidestripes and mixed pink weight combined. This is compared by Subarea and by total inside area as compared to the total catch.

Species	Data Type	12-26	12-39	12-40	12-42	Grand Total	Correction
% sidestripes	Bycatch	16.62%	0.03%	86.92%	0.14%	12.60%	7.12
% sidestripes	Survey	35.42%	1.56%	86.28%	1.06%	11.83%	6.68
% sidestripes	Catch					1.77%	

Table 7. Estimates of catches of sidestripes and remaining quota (tonnes).

Estimation Technique	% Catch	Estimated Total Catch Sidestripe	Remaining Quota
Sidestripe Weight/(total sides & pink weight) from Bycatch	12.60%	8.5	2.5
Sidestripe Weight/(total sides & pink weight) from Survey	11.83%	8.0	3.0
Estimated weight of 1+ sidestripes mixed into pink catch from Bycatch sample 12-26	48.3%	2.3	8.7
Estimated weight of 1+ and 2+ sidestripes mixed into pink catch from Bycatch sample 12-26	71.8%	4.3	6.7
Estimated weight of 1+ sidestripes mixed into pink catch from Survey results 12-26	13.8%	1.4	9.6
Estimated weight of 1+ and 2+ sidestripes mixed into pink catch from Survey results 12-26	28.9%	1.7	9.3

Landings (t), Area 12

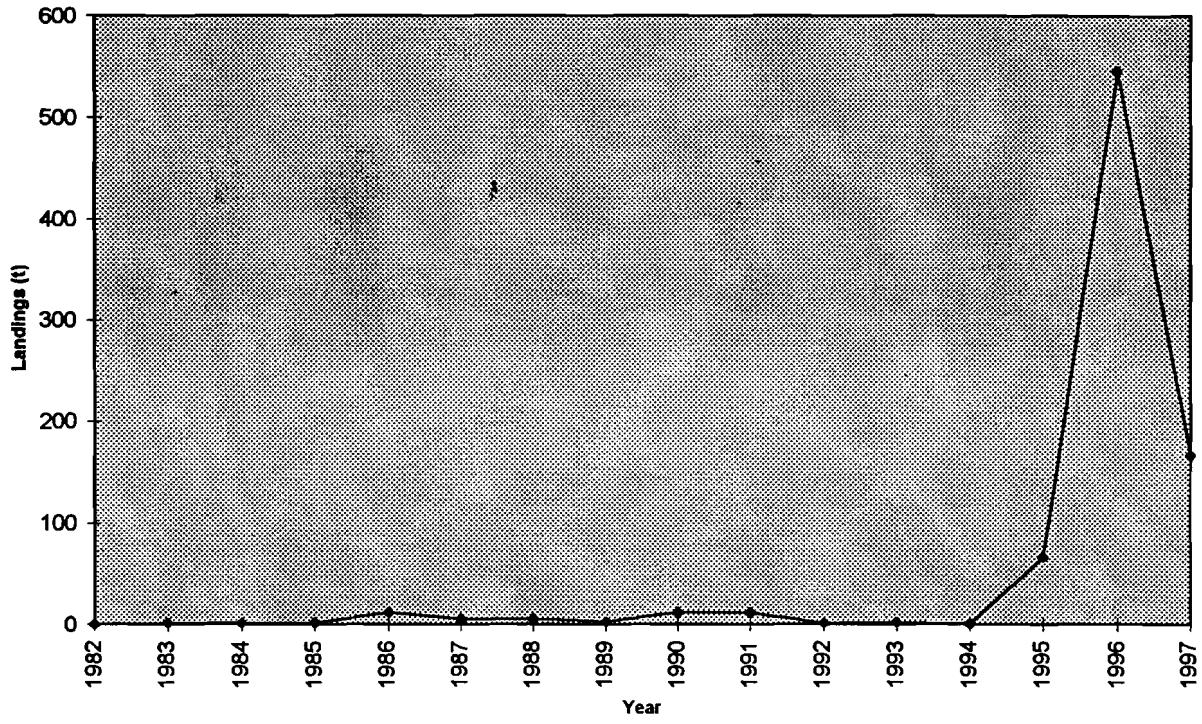
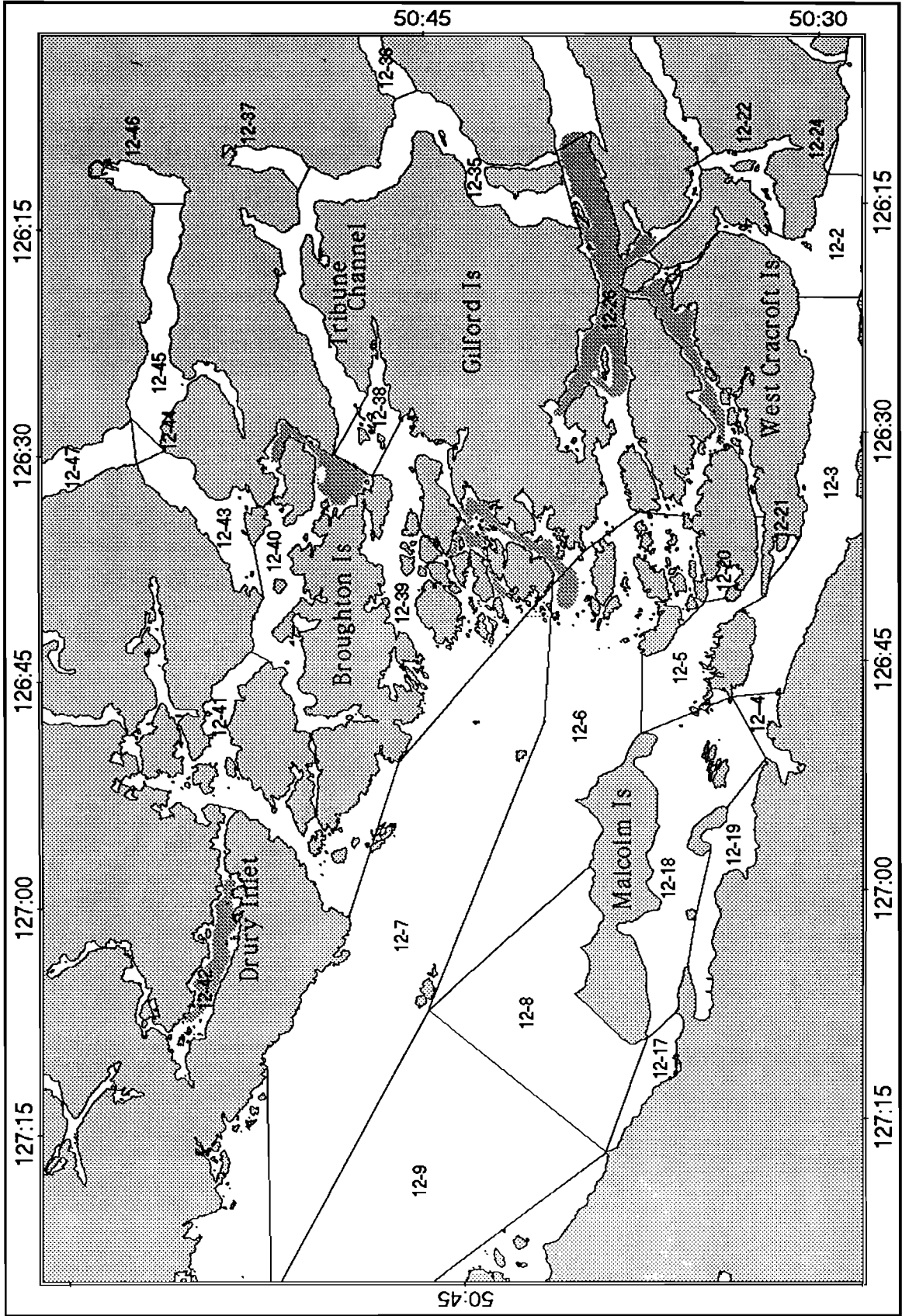


Figure 1. Catch history in PFMA 12.

Figure 2. Survey areas in PFMA 12, June 1998.



Appendix 1

Shrimp Biomass Survey, Area 12, June, 1998

There were 50 Tows.		Total Weight for all tows, 6,253 Kg.	Weight in Kg	Percent of Total	Number of Tows
Shrimp Species					
Northern Pink	<i>Pandalus borealis</i>	3,029.51	48.4505	50	
Smooth Pink	<i>Pandalus jordani</i>	4.70	0.0752	4	
Prawn	<i>Pandalus platyceros</i>	46.00	0.7357	35	
Coonstripe	<i>Pandalus danae</i>	21.90	0.3502	10	
Humpback	<i>Pandalus hypsinotus</i>	524.80	8.3930	42	
Sidestripe	<i>Pandalopsis dispar</i>	293.20	4.6891	37	
Bluespot	<i>Pandalus stenolepsis</i>	0.10	0.0016	1	
Pinks (Flexed)	<i>Pandalus goniurus</i>	281.90	4.5084	23	
Crangons	<i>Crangon</i> spp	50.51	0.8078	44	
Eualus	<i>Eualus</i> spp	12.20	0.1951	21	
Glass Shrimp	<i>Pasiphaea pacifica</i>	2.01	0.0321	12	
Other Invertebrates					
Heart Urchin	Atelostomata (Superorder)	0.20	0.0032	2	
Anemone	Actiniaria (Order)	1.60	0.0256	2	
Bivalves	Bivalvia (Class)	0.10	0.0016	1	
Jellyfish	Scyphozoa (Class)	0.30	0.0048	3	
Squat Squid	<i>Rossia pacifica</i>	2.80	0.0448	19	
Scallop	Pectinidae (Family)	0.10	0.0016	1	
Squid	Teuthoidea (Order)	0.10	0.0016	1	
Starfish	Asteroidea (Class)	11.50	0.1839	5	
Basket Stars	Euryalae (Order)	0.10	0.0016	1	
Dungeness Crab	<i>Cancer magister</i>	2.80	0.0448	6	
Squat Lobster	<i>Munida quadrispina</i>	1.00	0.0160	3	
Flatfish					
Dab (Pacific)	<i>Citharichthys sordidus</i>	0.50	0.0080	1	
Dover Sole	<i>Microstomus pacificus</i>	3.40	0.0544	10	
English Sole	<i>Pleuronectes vetulus</i>	137.25	2.1950	22	
Flathead Sole	<i>Hippoglossoides elassodon</i>	108.30	1.7320	22	
Rex Sole	<i>Errex zachirus</i>	14.10	0.2255	21	
Turbot	<i>Atheresthes stomias</i>	31.70	0.5070	9	
Rock Sole	<i>Pleuronectes bilineatus</i>	1.60	0.0256	3	
Slender Sole	<i>Eopsetta exilis</i>	16.71	0.2672	18	
Starry Flounder	<i>Platichthys stellatus</i>	31.60	0.5054	8	
Sand Sole	<i>Psettichthys melanostictus</i>	17.00	0.2719	6	
Rockfish					
Yellowtail	<i>Sebastes flavidus</i>	3.10	0.0496	4	
Redstripe	<i>Sebastes proriger</i>	1.40	0.0224	5	
Sharpchin	<i>Sebastes zacentrus</i>	0.10	0.0016	1	
Scorpionfishes	Scorpaenidae (Family)	0.20	0.0032	1	
Roundfish					
Eulachon	<i>Thaleichthys pacificus</i>	5.10	0.0816	14	
Pacific Herring	<i>Clupea pallasii</i>	1.50	0.0240	12	

Shrimp Biomass Survey, Area 12, June, 1998

There were 50 Tows.

Total Weight for all tows, 6,253 Kg.

		Weight in Kg	Percent of Total	Number of Tows
Pacific Cod	<i>Gadus macrocephalus</i>	4.70	0.0752	6
Walleye Pollock	<i>Theragra chalcogramma</i>	11.70	0.1871	18
Pacific Tomcod	<i>Microgadus proximus</i>	1.80	0.0288	4
Sablefish	<i>Anoplopoma fimbria</i>	6.90	0.1104	7
Eelpouts	Zoarcidae (Family)	83.91	1.3420	27
Pacific Hake	<i>Merluccius productus</i>	48.90	0.7820	20
Midshipman	<i>Porichthys notatus</i>	0.20	0.0032	2
Poachers	Agonidae (Family)	1.80	0.0288	12
Sculpins	Cottidae (Family)	24.70	0.3950	18
Shiner Perch	<i>Cymatogaster aggregata</i>	0.70	0.0112	7
Pricklebacks	Stichaeidae (Family)	1.00	0.0160	5
Greenlings	Hexagrammidae (Family)	0.40	0.0064	1
Selachii				
Spiny Dogfish	<i>Squalus acanthias</i>	168.10	2.6884	27
Skates	Rajidae (Family)	70.60	1.1291	20
Spotted Ratfish	<i>Hydrolagus coliei</i>	539.70	8.6313	24

Appendix 2

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 4 1998 Time 15:23 Duration (min) 30 Area 12 - 6 Haul No. 108
 Depth M 73 88 Direction
 Water Temp: Surface Bottom Distance 0.8 Naut. Mi.
 Type of Gear PH Total Catch 164 Remark Usable Vessel 25808
 Net Effective Opening (feet) 41.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	21.10	192	Squat Squid	English Sole 0.00
Prawn	1.60	80		Flathead Sole 0.00
Humpback	3.30	116		Turbot 0.00
Sidestripe	11.10	162		
Crangons	1.10			
Rockfish			Roundfish	Selachii
			Pacific Herring	Spiny Dogfish 23.50
			Pacific Cod	Skates 0.00
			Pacific Tomcod	Spotted Ratfish 68.70
			Eelpouts	
			Pacific Hake	
			Sculpins	

Date Jun 4 1998 Time 15:13 Duration (min) 30 Area 12 - 6 Haul No. 214
 Depth M 60 73 Direction 278
 Water Temp: Surface Bottom Distance 0.4 Naut. Mi.
 Type of Gear PH Total Catch 28 Remark Usable Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	3.80	164	Squat Squid	English Sole 0.00
Prawn	0.10		Squid	Flathead Sole 0.00
Coonstripe	0.10			Petrable Sole 0.00
Humpback	1.40	78		Rex Sole 0.00
Sidestripe	2.50	138		Slender Sole 0.00
Crangons	0.10			
Eualus	0.10			
Rockfish			Roundfish	Selachii
			Pacific Herring	Spiny Dogfish 8.70
			Pacific Cod	Spotted Ratfish 17.30
			Sablefish	
			Eelpouts	
			Pacific Hake	
			Poachers	
			Shiner Perch	

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 3 1998 **Time** 7:40 **Duration (min)** 30 **Area** 12 - 26 **Haul No.** 101
Depth M 113 154 **Direction** 108
Water Temp: Surface **Bottom** **Distance** 0.8 Naut. Mi.
Type of Gear PH **Total Catch** 60 **Remark** Usable **Vessel** 25808
Net Effective Opening (feet) 41.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	2.10	347	Squat Squid	0.10	
Prawn	0.30	10			
Humpback	0.10				
Sidestripe	6.20	218			
Crangons	1.70				
Glass Shrimp	0.30				

Rockfish		Weight	Roundfish	Selachii	
Yellowtail	1.00	Sablefish	0.70	Spiny Dogfish	3.70
Scorpionfishes	0.20	Eelpouts	3.10	Skates	0.20
		Pacific Hake	5.10	Spotted Ratfish	6.20
		Sculpins	0.10		

Date Jun 3 1998 **Time** 9:30 **Duration (min)** 22 **Area** 12 - 26 **Haul No.** 102
Depth M 128 154 **Direction** **Distance** 0.7 Naut. Mi.
Water Temp: Surface **Bottom** **Vessel** 25808
Type of Gear PH **Total Catch** 6 **Remark** Mechanical Problem
Net Effective Opening (feet) 41.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	0.10		Jellyfish	0.10	Dover Sole	0.20
Sidestripe	2.70	147			Flathead Sole	0.40
Crangons	0.20				Rex Sole	0.20
					Slender Sole	0.50

Rockfish		Weight	Roundfish	Selachii	
		Eelpouts	1.00	Spotted Ratfish	0.70
		Pacific Hake	0.40		

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 3 1998 Time 11:47 Duration (min) 30 Area 12 - 26 Haul No. 103
 Depth M 150 168 Direction 88
 Water Temp: Surface Bottom Distance 0.5 Naut. Mi.
 Type of Gear PH Total Catch 72 Remark Usable Vessel 25808
 Net Effective Opening (feet) 41.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	0.10			Dover Sole 1.50
Humpback	0.10			English Sole 0.60
Sidestripe	1.40	159		Rex Sole 0.50
Crangons	0.10			Slender Sole 0.20
Glass Shrimp	0.30			

Rockfish	Roundfish	Selachii
	Eelpouts 0.40	Skates 3.90
	Pacific Hake 0.40	Spotted Ratfish 62.60

Date Jun 3 1998 Time 14:46 Duration (min) 30 Area 12 - 26 Haul No. 104
 Depth M 64 77 Direction 52
 Water Temp: Surface Bottom Distance 0.8 Naut. Mi.
 Type of Gear PH Total Catch 38 Remark Usable Vessel 25808
 Net Effective Opening (feet) 41.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	8.80	172	Squat Squid 0.50	
Prawn	1.50	29		
Humpback	2.50	90		
Sidestripe	1.00	83		

Rockfish	Roundfish	Selachii
	Eulachon 0.20	Spiny Dogfish 3.10
	Pacific Tomcod 0.90	Spotted Ratfish 6.50
	Sablefish 0.50	
	Eelpouts 3.90	
	Pacific Hake 1.50	
	Poachers 0.50	
	Shiner Perch 0.10	

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 3 1998 **Time** 7:16 **Duration (min)** 29 **Area** 12 - 26 **Haul No.** 201
Depth M 59 73 **Direction**
Water Temp: Surface Bottom **Distance** 0.6 Naut. Mi.
Type of Gear PH **Total Catch** 50 **Remark** Usable **Vessel** 22995
Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	21.80	200		
Prawn	3.70	64		
Humpback	3.00	117		
Sidestripe	6.50	103		
Crangons	0.40			

Rockfish **Roundfish** **Selachii**

Date Jun 3 1998 **Time** 8:11 **Duration (min)** 22 **Area** 12 - 26 **Haul No.** 202
Depth M 51 77 **Direction** 270
Water Temp: Surface Bottom **Distance** 0.5 Naut. Mi.
Type of Gear PH **Total Catch** 119 **Remark** Usable **Vessel** 22995
Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	100.9	219	Squat Squid	0.10
Prawn	2.50	40	Squat Lobster	0.10
Humpback	1.30	132		
Sidestripe	5.10	227		
Crangons	0.60			

Rockfish **Roundfish** **Selachii**

Date Jun 3 1998 **Time** 9:24 **Duration (min)** 35 **Area** 12 - 26 **Haul No.** 203
Depth M 177 188 **Direction** 28
Water Temp: Surface Bottom **Distance** 0.7 Naut. Mi.
Type of Gear PH **Total Catch** 10 **Remark** Usable **Vessel** 22995
Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	2.90	179		
Prawn	0.20			
Humpback	0.10			
Sidestripe	2.80	155		
Pinks (Flexed)	0.10			
Glass Shrimp	0.40			

Rockfish **Roundfish** **Selachii**

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 3 1998 Time 12 : 12 Duration (min) 30 Area 12 - 26 Haul No. 205
 Depth M 110 115 Direction 225
 Water Temp: Surface Bottom Distance 0.7 Naut. Mi.
 Type of Gear PH Total Catch 72 Remark Usable Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	43.90	219	Jellyfish	0.10
Prawn	1.20		Squat Squid	0.10
Humpback	1.20		Squat Lobster	0.10
Sidestripe	11.60	311		
Crangons	0.10			

Rockfish

Roundfish

Selachii

Date Jun 3 1998 Time 13 : 06 Duration (min) 30 Area 12 - 26 Haul No. 206
 Depth M 88 113 Direction 210
 Water Temp: Surface Bottom Distance 0.7 Naut. Mi.
 Type of Gear PH Total Catch 35 Remark Usable Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	20.90	250		
Prawn	0.20			
Humpback	0.10			
Sidestripe	7.90	276		
Crangons	0.10			

Rockfish

Roundfish

Selachii

Date Jun 3 1998 Time 14 : 20 Duration (min) 30 Area 12 - 26 Haul No. 207
 Depth M 84 99 Direction 220
 Water Temp: Surface Bottom Distance 0.7 Naut. Mi.
 Type of Gear PH Total Catch 26 Remark Usable Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	0.50	224		
Prawn	0.10			
Humpback	0.40	82		
Sidestripe	3.90	142		
Pinks (Flexed)	0.10			
Crangons	0.10			

Rockfish

Roundfish

Selachii

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 3 1998 **Time** 15:13 **Duration (min)** 26 **Area** 12 - 26 **Haul No.** 208
Depth M 44 97 **Direction** 213
Water Temp: Surface **Bottom** **Distance** 0.6 Naut. Mi.
Type of Gear PH **Total Catch** 19 **Remark** Usable **Vessel** 22995
Net Effective Opening (feet) 42.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	0.60	200			
Prawn	0.10				
Humpback	0.20	80			
Sidestripe	3.40	102			
Pinks (Flexed)	0.10				
Crangons	0.10				

Rockfish	Roundfish	Selachii
		Skates 2.90

Date Jun 3 1998 **Time** 7:55 **Duration (min)** 30 **Area** 12 - 26 **Haul No.** 301
Depth M 113 123 **Direction** 90
Water Temp: Surface **Bottom** **Distance** 0.7 Naut. Mi.
Type of Gear PH **Total Catch** 63 **Remark** Usable **Vessel** 23460
Net Effective Opening (feet) 44.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	3.90	210	Squat Squid 0.10	English Sole 6.20	
Prawn	0.30			Flathead Sole 11.00	
Sidestripe	5.20	107		Rex Sole 2.00	
Crangons	1.00			Turbot 1.80	
				Slender Sole 3.00	
				Starry Flounder 1.40	

Rockfish	Roundfish	Selachii
	Sablefish 0.50	Spiny Dogfish 4.20
	Eelpouts 1.60	Skates 0.80
	Pacific Hake 3.80	Spotted Ratfish 16.50

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 3 1998 **Time** 11 :35 **Duration (min)** 20 **Area** 12 - 26 **Haul No.** 302
Depth M 121 124 **Direction** 90
Water Temp: Surface **Bottom** **Distance** 0.4 Naut. Mi.
Type of Gear PH **Total Catch** 56 **Remark** Usable **Vessel** 23460
Net Effective Opening (feet) 44.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	6.70	222	Heart Urchin	0.10	English Sole	1.00
Prawn	0.80				Flathead Sole	6.30
Sidestripe	22.00	140			Rex Sole	2.00
Crangons	1.20				Slender Sole	3.00
Eualus	0.30					
Glass Shrimp	0.30					
Rockfish			Roundfish		Selachii	
Sharpchin	0.10		Eelpouts	1.80	Spiny Dogfish	4.40
			Pacific Hake	3.10	Spotted Ratfish	2.50
			Sculpins	0.10		

Date Jun 3 1998 **Time** 15 :00 **Duration (min)** 32 **Area** 12 - 26 **Haul No.** 303
Depth M 93 102 **Direction** 50
Water Temp: Surface **Bottom** **Distance** 0.8 Naut. Mi.
Type of Gear PH **Total Catch** 193 **Remark** Usable **Vessel** 23460
Net Effective Opening (feet) 44.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	27.20	186	Squat Squid	0.10	Flathead Sole	2.00
Prawn	1.80		Dungeness Crab	0.40	Rex Sole	0.90
Coonstripe	0.10				Slender Sole	0.80
Humpback	1.30					
Sidestripe	29.10	200				
Pinks (Flexed)	0.10					
Crangons	0.10					
Rockfish			Roundfish		Selachii	
			Eulachon	0.50	Spiny Dogfish	6.80
			Pacific Herring	0.10	Skates	0.30
			Eelpouts	3.20	Spotted Ratfish	114.30
			Pacific Hake	4.70		

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 3 1998 Time 7:45 Duration (min) 15 Area 12 - 26 Haul No. 401
 Depth M 59 97 Direction
 Water Temp: Surface Bottom Distance 0.40 Naut. Mi.
 Type of Gear PH Total Catch Remark Usable Vessel 28752
 Net Effective Opening (feet) 42.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink		0.10			Dover Sole 0.30
Prawn		2.60			English Sole 9.80
Humpback		37.60	105		Flathead Sole 6.30
Sidestripe		0.10			Rex Sole 0.30
					Slender Sole 0.60
Rockfish				Roundfish	Selachii
				Pacific Cod 1.30	Spiny Dogfish 1.40
				Walleye Pollock 3.70	Spotted Ratfish 21.10
				Eelpouts 0.30	
				Poachers 0.30	
				Sculpins 1.00	

Date Jun 3 1998 Time 9:10 Duration (min) 30 Area 12 - 26 Haul No. 402
 Depth M 124 130 Direction
 Water Temp: Surface Bottom Distance 0.59 Naut. Mi.
 Type of Gear PH Total Catch Remark Usable Vessel 28752
 Net Effective Opening (feet) 42.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink		2.50	208	Anemone 0.10	English Sole 2.20
Prawn		0.20		Bivalves 0.10	Flathead Sole 11.90
Humpback		1.90	98		Rex Sole 2.00
Sidestripe		35.50	96		Slender Sole 4.30
Crangons		0.60			
Eualus		0.10			
Glass Shrimp		0.10			
Rockfish				Roundfish	Selachii
Redstripe		0.10		Pacific Cod 0.50	Spiny Dogfish 2.30
				Eelpouts 2.70	
				Pacific Hake 3.40	
				Sculpins 0.10	

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date	Jun 3 1998	Time	10 : 40	Duration (min)	15	Area	12 - 26	Haul No.	403
Depth	M 172 183						Direction		
Water Temp:	Surface		Bottom				Distance	0.3 Naut. Mi.	
Type of Gear	PH	Total Catch	17	Remark	Usable	Vessel	28752		
Net Effective Opening (feet)	42.0								
Shrimp	Weight	Num/Kg		Invertebrates		Flatfish			
Northern Pink	0.10					Dover Sole	0.50		
Humpback	0.10					Rex Sole	0.50		
Sidestripe	1.10	167				Slender Sole	0.10		
Crangons	0.10								
Eualus	0.10								
Glass Shrimp	0.10								
Rockfish				Roundfish		Selachii			
				Eelpouts	0.60	Spiny Dogfish	0.10		
				Pacific Hake	0.40	Skates	1.10		
				Sculpins	0.10	Spotted Ratfish	12.30		

Date	Jun 3 1998	Time	13 : 10	Duration (min)	30	Area	12 - 26	Haul No.	404
Depth	M 124 104						Direction		
Water Temp:	Surface		Bottom				Distance	0.69 Naut. Mi.	
Type of Gear	PH	Total Catch	35	Remark	Usable	Vessel	28752		
Net Effective Opening (feet)	42.0								
Shrimp	Weight	Num/Kg		Invertebrates		Flatfish			
Northern Pink	20.70	208		Squat Squid	0.10	Dover Sole	0.20		
Prawn	0.60			Basket Stars	0.10	English Sole	1.10		
Humpback	0.10					Flathead Sole	0.80		
Sidestripe	4.40	329				Rex Sole	0.70		
Crangons	0.10					Slender Sole	0.30		
Glass Shrimp	0.10								
Rockfish				Roundfish		Selachii			
				Eulachon	0.10	Spotted Ratfish	2.40		
				Walleye Pollock	0.70				
				Eelpouts	0.50				
				Pacific Hake	3.00				

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date	Jun 3 1998	Time	14 : 15	Duration (min)	30	Area	12 - 26	Haul No.	405
Depth	M 102 104						Direction		
Water Temp:	Surface	Bottom					Distance	0.8 Naut. Mi.	
Type of Gear	PH	Total Catch	128	Remark	Usable		Vessel	28752	
Net Effective Opening (feet)	42.0								
Shrimp		Weight	Num/Kg	Invertebrates			Flatfish		
Northern Pink	86.80	278	Squat Squid	0.10		English Sole	0.60		
Prawn	1.60					Flathead Sole	5.70		
Sidestripe	11.50	257				Rex Sole	0.20		
						Slender Sole	0.60		
Rockfish			Roundfish			Selachii			
Redstripe	0.10		Eulachon	0.50		Spiny Dogfish	5.30		
			Pacific Herring	0.20		Spotted Ratfish	2.80		
			Walleye Pollock	0.20					
			Eelpouts	1.70					
			Pacific Hake	10.00					
			Midshipman	0.10					
			Poachers	0.10					
			Sculpins	0.10					

Date	Jun 3 1998	Time	15 : 32	Duration (min)	30	Area	12 - 26	Haul No.	406
Depth	M 99 102						Direction		
Water Temp:	Surface	Bottom					Distance	0.88 Naut. Mi.	
Type of Gear	PH	Total Catch	97	Remark	Usable		Vessel	28752	
Net Effective Opening (feet)	42.0								
Shrimp		Weight	Num/Kg	Invertebrates			Flatfish		
Northern Pink	22.60	300	Squat Squid	0.10		Flathead Sole	8.30		
Prawn	0.10					Slender Sole	0.80		
Humpback	0.10					Sand Sole	0.10		
Sidestripe	45.10	273							
Crangons	0.10								
Eualus	0.10								
Rockfish			Roundfish			Selachii			
			Eulachon	0.20		Spiny Dogfish	1.90		
			Pacific Herring	0.10		Skates	0.80		
			Eelpouts	0.30		Spotted Ratfish	7.70		
			Pacific Hake	9.00					

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 3 1998 **Time** 10 :50 **Duration (min)** 9 **Area** 12 - 35 **Haul No.** 204
Depth M 148 152 **Direction** 160
Water Temp: Surface **Bottom** **Distance** 0.08 Naut. Mi.
Type of Gear PH **Total Catch** 2 **Remark** Usable **Vessel** 22995
Net Effective Opening (feet) 42.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	0.01			Jellyfish	0.10	English Sole 0.25
Sidestripe	1.10	127				Rex Sole 0.10
Crangons	0.01					Slender Sole 0.01
Glass Shrimp	0.01					
Rockfish				Roundfish	Selachii	
				Eelpouts	0.01	

Date Jun 4 1998 **Time** 8 :13 **Duration (min)** 30 **Area** 12 - 39 **Haul No.** 105
Depth M 33 64 **Direction** 24
Water Temp: Surface **Bottom** **Distance** 0.7 Naut. Mi.
Type of Gear PH **Total Catch** 226 **Remark** Usable **Vessel** 25808
Net Effective Opening (feet) 41.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	106.8	340		Squat Squid	0.00	Turbot 0.00
Prawn	0.40			Starfish	4.10	
Coonstripe	0.10			Dungeness Crab	0.30	
Humpback	24.30	170				
Pinks (Flexed)	4.90					
Crangons	9.70					
Eualus	0.10					
Rockfish				Roundfish	Selachii	
				Pacific Herring	0.00	Spiny Dogfish 5.60
				Pacific Tomcod	0.00	Skates 0.00
				Sablefish	0.00	Spotted Ratfish 0.00
				Eelpouts	0.00	
				Poachers	0.00	
				Sculpins	0.00	
				Shiner Perch	0.00	

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 4 1998 **Time** 10:15 **Duration (min)** 18 **Area** 12 - 39 **Haul No.** 106
Depth M 66 80 **Direction**
Water Temp: Surface Bottom **Distance** 0.5 Naut. Mi.
Type of Gear PH **Total Catch** 247 **Remark** Usable **Vessel** 25808
Net Effective Opening (feet) 41.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	114.2	425	Urchins	Turbot 0.00
Prawn	3.70	80	Squat Squid	0.00
Coonstripe	5.00		Scallop	0.00
Humpback	34.80	166		
Sidestripe	5.00			
Pinks (Flexed)	34.80	348		
Crangons	5.00			
Spirontocaris	0.00			

Rockfish**Roundfish****Selachii**

Pacific Cod	0.00
Walleye Pollock	0.00
Pacific Tomcod	0.00
Eelpouts	0.00
Pacific Hake	0.00
Poachers	0.00
Sculpins	0.00
Shiner Perch	0.00

Date Jun 4 1998 **Time** 12:21 **Duration (min)** 31 **Area** 12 - 39 **Haul No.** 107
Depth M 49 59 **Direction** 20
Water Temp: Surface Bottom **Distance** 0.7 Naut. Mi.
Type of Gear PH **Total Catch** 221 **Remark** Usable **Vessel** 25808
Net Effective Opening (feet) 41.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	135.2	292	Starfish	2.60
Prawn	0.20			
Humpback	30.50	139		
Pinks (Flexed)	4.40			
Crangons	4.40			

Rockfish **Roundfish** **Selachii**
Skates 3.20

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 5 1998 **Time** 14 : 22 **Duration (min)** 25 **Area** 12 - 39 **Haul No.** 111
Depth M 59 69 **Direction** 66
Water Temp: Surface **Bottom** **Distance** 0.8 Naut. Mi.
Type of Gear PH **Total Catch** 123 **Remark** Usable **Vessel** 25808
Net Effective Opening (feet) 41.0

Shrimp			Invertebrates		Flatfish	
	Weight	Num/Kg				
Northern Pink	27.60	315	Stony Corals	0.00	Flathead Sole	0.00
Prawn	4.60	120	Squat Squid	0.10	Slender Sole	1.10
Humpback	17.20	170				
Sidestripe	0.10					
Pinks (Flexed)	4.60					
Crangons	1.10					
Eualus	0.10					

Rockfish	Roundfish		Selachii	
	Pacific Herring	0.00	Spiny Dogfish	1.00
	Pacific Cod	0.00	Spotted Ratfish	9.70
	Walleye Pollock	0.00		
	Pacific Tomcod	0.00		
	Eelpouts	16.10		
	Pacific Hake	0.00		
	Sculpins	1.60		

Date Jun 4 1998 **Time** 8 : 24 **Duration (min)** 27 **Area** 12 - 39 **Haul No.** 209
Depth M 42 46 **Direction** 8
Water Temp: Surface **Bottom** **Distance** 0.9 Naut. Mi.
Type of Gear PH **Total Catch** 334 **Remark** Usable **Vessel** 22995
Net Effective Opening (feet) 42.0

Shrimp			Invertebrates		Flatfish	
	Weight	Num/Kg				
Northern Pink	269.5	324	Squat Squid	0.00	English Sole	0.00
Humpback	10.30	95			Flathead Sole	0.00
Pinks (Flexed)	0.70				Slender Sole	0.00
Crangons	0.10				Starry Flounder	0.00
Eualus	0.10				Sand Sole	0.00

Rockfish	Roundfish		Selachii	
	Eelpouts	0.00	Spiny Dogfish	0.00
	Midshipman	0.00	Spotted Ratfish	0.00
	Shiner Perch	0.00		

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 4 1998 Time 10 :00 Duration (min) 30 Area 12 - 39 Haul No. 210
 Depth M 40 46 Direction 17
 Water Temp: Surface Bottom Distance 0.6 Naut. Mi.
 Type of Gear PH Total Catch 200 Remark Mechanical Problem Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	176.0	354		English Sole 0.00
Humpback	20.00	100		Flathead Sole 0.00
Pinks (Flexed)	0.50			Slender Sole 0.00
				Sand Sole 0.00
Rockfish			Roundfish	Selachii
			Pacific Herring 0.00	Spiny Dogfish 0.00
			Eelpouts 0.00	Skates 0.00
			Poachers 0.00	

Date Jun 4 1998 Time 11 :20 Duration (min) 15 Area 12 - 39 Haul No. 211
 Depth M 42 46 Direction 357
 Water Temp: Surface Bottom Distance 0.3 Naut. Mi.
 Type of Gear PH Total Catch 50 Remark Usable Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	1.60	336	Anemone 1.50	English Sole 0.00
Coonstripe	0.10		Squat Squid 0.00	Flathead Sole 0.00
Humpback	26.70	125		Petrals Sole 0.00
Pinks (Flexed)	0.10			Rex Sole 0.10
Crangons	0.20			Rock Sole 0.00
				Slender Sole 0.00
				Sand Sole 2.30
Rockfish			Roundfish	Selachii
			Pacific Herring 0.10	Spiny Dogfish 9.10
			Pacific Cod 0.00	
			Walleye Pollock 0.10	
			Sablefish 0.00	
			Eelpouts 0.00	
			Pacific Hake 0.00	
			Midshipman 0.10	
			Poachers 0.10	
			Shiner Perch 0.10	
			Pricklebacks 0.00	

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 4 1998 Time 12 :56 Duration (min) 30 Area 12 - 39 Haul No. 212
 Depth M 46 80 Direction 216
 Water Temp: Surface Bottom Distance 0.8 Naut. Mi.
 Type of Gear PH Total Catch 102 Remark Usable Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp		Weight	Num/Kg	Invertebrates	Area	Flatfish	
Northern Pink	39.00	260	Squid	0.00	English Sole	0.00	
Humpback	17.00	114			Flathead Sole	0.00	
Sidestripe	0.10				Petrale Sole	0.00	
Pinks (Flexed)	0.70				Slender Sole	0.00	
Crangons	0.10				Sand Sole	0.00	
Eualus	0.10						
Rockfish				Roundfish		Selachii	
			Pacific Cod	0.00	Spiny Dogfish	0.00	
			Walleye Pollock	0.10	Skates	23.20	
			Eelpouts	0.00	Spotted Ratfish	0.00	
			Poachers	0.00			
			Shiner Perch	0.10			
			Pricklebacks	0.00			

Date Jun 4 1998 Time 14 :07 Duration (min) 28 Area 12 - 39 Haul No. 213
 Depth M 51 77 Direction 198
 Water Temp: Surface Bottom Distance 0.6 Naut. Mi.
 Type of Gear PH Total Catch 87 Remark Usable Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp		Weight	Num/Kg	Invertebrates	Area	Flatfish	
Northern Pink	18.20	304	Squat Squid	0.10	English Sole	0.00	
Prawn	0.10				Flathead Sole	0.00	
Coonstripe	0.10				Slender Sole	0.00	
Humpback	2.30	108					
Sidestripe	0.30						
Crangons	0.10						
Rockfish				Roundfish		Selachii	
			Pacific Herring	0.00	Skates	9.80	
			Pacific Cod	0.00	Spotted Ratfish	30.30	
			Eelpouts	0.00			
			Pacific Hake	0.00			
			Poachers	0.10			

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 4 1998 **Time** 8 : 25 **Duration (min)** 30 **Area** 12 - 39 **Haul No.** 304
Depth M 42 49 **Direction** 360
Water Temp: Surface **Bottom** **Distance** 0.7 Naut. Mi.
Type of Gear PH **Total Catch** **Remark** Usable **Vessel** 23460
Net Effective Opening (feet) 44.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	19.00	394	Squat Squid	0.40	English Sole	2.00
Humpback	48.10	190			Flathead Sole	1.90
Pinks (Flexed)	0.10				Starry Flounder	1.20
Crangons	0.10				Sand Sole	9.70
Rockfish			Roundfish		Selachii	
			Pacific Herring	0.20	Spiny Dogfish	12.00
			Walleye Pollock	0.20	Skates	0.30
			Eelpouts	10.80		
			Poachers	0.10		
			Sculpins	1.50		
			Shiner Perch	0.10		
			Pricklebacks	0.60		

Date Jun 4 1998 **Time** 10 : 50 **Duration (min)** 15 **Area** 12 - 39 **Haul No.** 305
Depth M 36 41 **Direction** 180
Water Temp: Surface **Bottom** **Distance** 0.4 Naut. Mi.
Type of Gear PH **Total Catch** **Remark** Usable **Vessel** 23460
Net Effective Opening (feet) 44.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	109.0	250	Squat Squid	0.20	Dover Sole	0.10
Prawn	1.00				English Sole	3.50
Humpback	11.60	86			Flathead Sole	3.10
Sidestripe	0.10				Rex Sole	0.20
Pinks (Flexed)	0.10				Rock Sole	0.70
Crangons	0.10				Slender Sole	0.10
Eualus	0.10				Sand Sole	0.10
Glass Shrimp	0.10					
Rockfish			Roundfish		Selachii	
			Pacific Herring	0.10	Spiny Dogfish	6.40
			Walleye Pollock	0.30	Skates	11.50
			Pacific Tomcod	0.30	Spotted Ratfish	10.90
			Eelpouts	7.60		
			Pacific Hake	0.30		

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 4 1998 **Time** 14 :30 **Duration (min)** 15 **Area** 12 - 39 **Haul No.** 306
Depth M 37 64 **Direction** 260
Water Temp: Surface Bottom **Distance** 0.3 Naut. Mi.
Type of Gear PH **Total Catch** **Remark** Usable **Vessel** 23460
Net Effective Opening (feet) 44.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	2.80	256	Scallop	0.10
Humpback	8.80	117		English Sole
Sidestripe	0.10			Flathead Sole
Pinks (Flexed)	0.10			Rex Sole
Crangons	0.10			Sand Sole
Eualus	0.10			

Rockfish**Roundfish****Selachii**

Eulachon	2.30
Pacific Herring	0.10
Walleye Pollock	0.20
Sablefish	0.40
Poachers	0.10
Sculpins	0.20
Shiner Perch	0.10
Pricklebacks	0.10

Date Jun 4 1998 **Time** 17 :50 **Duration (min)** 15 **Area** 12 - 39 **Haul No.** 307
Depth M 51 59 **Direction** 60
Water Temp: Surface Bottom **Distance** 0.4 Naut. Mi.
Type of Gear PH **Total Catch** **Remark** Usable **Vessel** 23460
Net Effective Opening (feet) 44.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	0.30		Squat Squid	0.10
Prawn	0.10		Dungeness Crab	0.50
Humpback	1.70	101		Dover Sole
Sidestripe	0.30			English Sole
Crangons	0.10			Flathead Sole
				Rex Sole
				Slender Sole
				Starry Flounder

Rockfish**Roundfish****Selachii**

Walleye Pollock	0.20	Spiny Dogfish	2.30
Pacific Tomcod	0.50	Skates	7.70
Eelpouts	4.20	Spotted Ratfish	16.50
Pacific Hake	0.30		
Sculpins	0.20		
Pricklebacks	0.10		

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 5 1998 **Time** 14 : 35 **Duration (min)** 15 **Area** 12 - 39 **Haul No.** 310
Depth M 68 75 **Direction** 90
Water Temp: Surface Bottom **Distance** 0.4 Naut. Mi.
Type of Gear PH **Total Catch** **Remark** Usable **Vessel** 23460
Net Effective Opening (feet) 44.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	264.7	292			English Sole	2.30
Prawn	0.40				Flathead Sole	0.40
Coonstripe	0.10				Turbot	0.40
Humpback	6.20				Rock Sole	0.80
Sidestripe	3.10				Slender Sole	0.10
Pinks (Flexed)	0.10					
Crangons	0.10					

Rockfish**Roundfish****Selachii**

Pacific Herring	0.10	Spiny Dogfish	5.40
Pacific Cod	0.50	Skates	1.60
Walleye Pollock	0.80	Spotted Ratfish	50.40
Pacific Tomcod	0.10		
Pacific Hake	1.00		
Sculpins	0.70		
Pricklebacks	0.10		

Date Jun 4 1998 **Time** 8 : 19 **Duration (min)** 30 **Area** 12 - 39 **Haul No.** 407
Depth M 44 57 **Direction**
Water Temp: Surface Bottom **Distance** 0.82 Naut. Mi.
Type of Gear PH **Total Catch** **Remark** Usable **Vessel** 28752
Net Effective Opening (feet) 42.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	145.4	300	Squat Squid	0.10	English Sole	16.00
Coonstripe	0.10				Flathead Sole	14.80
Humpback	10.40	100			Rock Sole	0.10
Crangons	0.10				Starry Flounder	20.60
Eualus	0.10				Sand Sole	1.00

Rockfish**Roundfish****Selachii**

Redstripe	0.10	Eulachon	0.10	Spiny Dogfish	10.70
		Pacific Herring	0.10	Skates	1.20
		Eelpouts	9.90	Spotted Ratfish	60.20
		Pacific Hake	0.40		
		Poachers	0.10		
		Sculpins	1.40		

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 4 1998 Time 10 :08 Duration (min) 22 Area 12 - 39 Haul No. 408
 Depth M 46 46 Direction
 Water Temp: Surface Bottom Distance 0.85 Naut. Mi.
 Type of Gear PH Total Catch 178 Remark Usable Vessel 28752
 Net Effective Opening (feet) 42.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	107.2	250	Squat Squid	0.10	English Sole 7.70
Coonstripe	0.10				Flathead Sole 4.60
Humpback	38.70	143			Turbot 2.40
Crangons	0.10				Starry Flounder 1.40
Eualus	0.10				

Rockfish	Roundfish	Selachii
	Pacific Herring	Spiny Dogfish 9.50
	Eelpouts	
	Pacific Hake	
	Poachers	
	Sculpins	
	Shiner Perch	
	Greenlings	

Date Jun 4 1998 Time 11 :15 Duration (min) 26 Area 12 - 39 Haul No. 409
 Depth M 64 64 Direction
 Water Temp: Surface Bottom Distance 0.64 Naut. Mi.
 Type of Gear PH Total Catch 1045 Remark Mechanical Problem Vessel 28752
 Net Effective Opening (feet) 42.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	753.0	333	Squat Squid	0.10	English Sole 11.60
Prawn	1.20				Rex Sole 1.50
Humpback	66.10				Starry Flounder 3.90
Sidestripe	0.10				
Pinks (Flexed)	158.6				
Crangons	0.10				

Rockfish	Roundfish	Selachii
Redstripe 0.80	Eulachon 0.10	
	Walleye Pollock 0.80	
	Eelpouts 0.80	
	Poachers 0.10	
	Sculpins 13.10	

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 5 1998 **Time** 9:22 **Duration (min)** 30 **Area** 12 - 40 **Haul No.** 109
Depth M 113 137 **Direction** 112
Water Temp: Surface Bottom **Distance** 0.6 Naut. Mi.
Type of Gear PH **Total Catch** 85 **Remark** Usable **Vessel** 25808
Net Effective Opening (feet) 41.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	1.40	290		English Sole	0.00
Smooth Pink	2.90			Flathead Sole	0.00
Prawn	0.30			Rex Sole	0.00
Sidestripe	20.70	106		Turbot	0.00
Crangons	1.70				
Eualus	0.10				
Glass Shrimp	0.10				
Rockfish			Roundfish	Selachii	
Yellowtail	0.60		Eulachon	Spiny Dogfish	4.50
			Pacific Cod	Spotted Ratfish	10.90
			Sablefish		
			Eelpouts		
			Pacific Hake		

Date Jun 5 1998 **Time** 11:31 **Duration (min)** 27 **Area** 12 - 40 **Haul No.** 110
Depth M 113 146 **Direction** 78
Water Temp: Surface Bottom **Distance** 0.7 Naut. Mi.
Type of Gear PH **Total Catch** 81 **Remark** Usable **Vessel** 25808
Net Effective Opening (feet) 41.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	1.30	320	Heart Urchin	Dab (Pacific)	0.50
Smooth Pink	1.30	350	Squat Squid	Dover Sole	0.30
Prawn	0.10			English Sole	28.40
Sidestripe	14.50	100		Flathead Sole	12.40
Crangons	0.60			Rex Sole	1.50
Eualus	0.10			Turbot	2.00
Rockfish			Roundfish	Selachii	
Redstripe	0.30		Eulachon	Spiny Dogfish	5.90
			Pacific Cod	Skates	1.00
			Walleye Pollock	Spotted Ratfish	2.80
			Sablefish		
			Eelpouts		
			Pacific Hake		
			Sculpins		
			Pricklebacks		

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 5 1998 **Time** 9:30 **Duration (min)** 30 **Area** 12 - 40 **Haul No.** 308
Depth M 106 113 **Direction** 90
Water Temp: Surface **Bottom** **Distance** 0.7 Naut. Mi.
Type of Gear PH **Total Catch** **Remark** Usable **Vessel** 23460
Net Effective Opening (feet) 44.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	1.00	240	Squat Squid	0.20	English Sole	1.80
Smooth Pink	0.20				Flathead Sole	4.40
Prawn	0.10				Rex Sole	0.40
Humpback	0.20				Turbot	0.30
Sidestripe	9.90	80			Slender Sole	0.30
Bluespot	0.10					
Crangons	0.20					
Eualus	0.10					
Glass Shrimp	0.10					
Rockfish			Roundfish		Selachii	
Yellowtail	0.80		Eulachon	0.20	Spiny Dogfish	1.80
			Walleye Pollock	1.70	Spotted Ratfish	3.40
			Sablefish	0.40		
			Eelpouts	1.20		
			Poachers	0.10		

Date Jun 5 1998 **Time** 11:50 **Duration (min)** 25 **Area** 12 - 40 **Haul No.** 309
Depth M 97 152 **Direction** 10
Water Temp: Surface **Bottom** **Distance** 0.6 Naut. Mi.
Type of Gear PH **Total Catch** **Remark** Usable **Vessel** 23460
Net Effective Opening (feet) 44.0

Shrimp		Weight	Num/Kg	Invertebrates	Flatfish	
Northern Pink	1.00	351			English Sole	10.50
Smooth Pink	0.30				Flathead Sole	3.70
Prawn	0.10				Rex Sole	0.60
Sidestripe	14.00	138			Turbot	0.50
Crangons	0.10				Slender Sole	0.80
Glass Shrimp	0.10					
Rockfish			Roundfish		Selachii	
Yellowtail	0.70		Eulachon	0.10	Spiny Dogfish	9.00
			Walleye Pollock	0.10	Skates	0.70
			Eelpouts	0.80	Spotted Ratfish	3.00
			Pacific Hake	0.30		

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 5 1998 Time 7:03 Duration (min) 32 Area 12 - 42 Haul No. 215
 Depth M 38 44 Direction 102
 Water Temp: Surface Bottom Distance 0.9 Naut. Mi.
 Type of Gear PH Total Catch 186 Remark Usable Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	46.50	726		English Sole 0.00
Humpback	22.40	148		Slender Sole 0.00
Pinks (Flexed)	54.80	306		Starry Flounder 0.00
Crangons	1.70			Sand Sole 0.00
Eualus	3.30			
Rockfish			Roundfish	Selachii
			Eulachon 0.00	Spiny Dogfish 17.70
			Pacific Herring 0.00	
			Walleye Pollock 0.00	
			Midshipman 0.00	
			Shiner Perch 0.10	

Date Jun 5 1998 Time 8:20 Duration (min) 30 Area 12 - 42 Haul No. 216
 Depth M 57 69 Direction 89
 Water Temp: Surface Bottom Distance 0.7 Naut. Mi.
 Type of Gear PH Total Catch 152 Remark Usable Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	105.8	270	Starfish 0.00	English Sole 0.00
Humpback	13.70	120		Slender Sole 0.00
Pinks (Flexed)	0.50			Starry Flounder 0.00
Crangons	4.10			Sand Sole 0.00
Eualus	0.50			
Rockfish			Roundfish	Selachii
			Pacific Herring 0.10	
			Walleye Pollock 0.10	
			Eelpouts 0.00	
			Pacific Hake 0.00	
			Midshipman 0.00	
			Poachers 0.10	

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 5 1998 Time 10:35 Duration (min) 16 Area 12 - 42 Haul No. 217
 Depth M 60 80 Direction 60
 Water Temp: Surface Bottom Distance 0.4 Naut. Mi.
 Type of Gear PH Total Catch 108 Remark Usable Vessel 22995
 Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	42.40	232	Squat Lobster 0.80	Dover Sole 0.10
Prawn	8.50	37		English Sole 0.00
Coonstripe	16.10	102		Petrale Sole 0.00
Humpback	16.90	136		Rex Sole 0.00
Pinks (Flexed)	3.80	242		Sand Sole 0.00
Rockfish			Roundfish	Selachii
			Pacific Cod 0.00	
			Walleye Pollock 0.00	
			Sablefish 0.00	
			Eelpouts 0.00	
			Pricklebacks 0.00	

Date Jun 5 1998 Time 7:11 Duration (min) 15 Area 12 - 42 Haul No. 410
 Depth M 51 51 Direction
 Water Temp: Surface Bottom Distance 0.40 Naut. Mi.
 Type of Gear PH Total Catch 61 Remark Usable Vessel 28752
 Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	24.10	625	Starfish 1.70	English Sole 5.20
Humpback	4.60	250	Dungeness Crab 0.40	Flathead Sole 2.90
Pinks (Flexed)	4.00			Rex Sole 0.10
Crangons	4.60			Turbot 9.00
Eualus	0.10			Starry Flounder 0.80
Rockfish			Roundfish	Selachii
			Pacific Cod 0.60	Skates 0.20
			Walleye Pollock 0.10	
			Eelpouts 1.40	
			Sculpins 1.40	

All weights are in Kilograms

Shrimp Biomass Survey, Area 12, June, 1998

Date Jun 5 1998 **Time** 8:09 **Duration (min)** 15 **Area** 12 - 42 **Haul No.** 411
Depth M 51 59 **Direction**
Water Temp: Surface Bottom **Distance** 0.40 Naut. Mi.
Type of Gear PH **Total Catch** 112 **Remark** Mechanical Problem **Vessel** 28752
Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	56.30	364	Starfish 1.50	English Sole 7.30
Prawn	0.10		Dungeness Crab 0.60	Flathead Sole 1.50
Humpback	19.20	142		Turbot 9.40
Pinks (Flexed)	6.90			Starry Flounder 2.20
Crangons	5.50			
Eualus	0.10			

Rockfish**Roundfish****Selachii**

Eulachon	0.10	Skates	0.10
Walleye Pollock	0.10		
Eelpouts	0.50		
Sculpins	1.30		

Date Jun 5 1998 **Time** 9:50 **Duration (min)** 10 **Area** 12 - 42 **Haul No.** 412
Depth M 71 101 **Direction**
Water Temp: Surface Bottom **Distance** 0.43 Naut. Mi.
Type of Gear PH **Total Catch** 127 **Remark** Usable **Vessel** 28752
Net Effective Opening (feet) 42.0

Shrimp	Weight	Num/Kg	Invertebrates	Flatfish
Northern Pink	62.10	267	Starfish 1.60	Dover Sole 0.10
Prawn	5.60		Dungeness Crab 0.60	English Sole 11.40
Humpback	18.30	130		Flathead Sole 1.10
Sidestripe	3.70			Rex Sole 0.10
Pinks (Flexed)	1.80	280		Turbot 5.90
Crangons	2.70			
Eualus	6.40			

Rockfish**Roundfish****Selachii**

Eulachon	0.10	Spiny Dogfish	1.80
Pacific Herring	0.20	Skates	0.10
Walleye Pollock	1.50		
Eelpouts	1.30		
Pacific Hake	0.20		
Sculpins	0.60		

All weights are in Kilograms