# FISHERIES INVENTORY AND UTILIZATION OF SAN DIEGO BAY, SAN DIEGO, CALIFORNIA FOR SURVEYS CONDUCTED IN APRIL AND JULY 2012

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## Executive Summary

The Vantuna Research Group at Occidental College surveyed the estuarine fishes of San Diego Bay in April and July 2012 for the Port of San Diego. The survey followed the protocols established from July 1994 to April 1999 (Allen 1999, Allen et al. 2002, Pondella et al. 2006, Pondella and Williams 2009a). The goals of the current study were to update the previous study and address the following objectives:

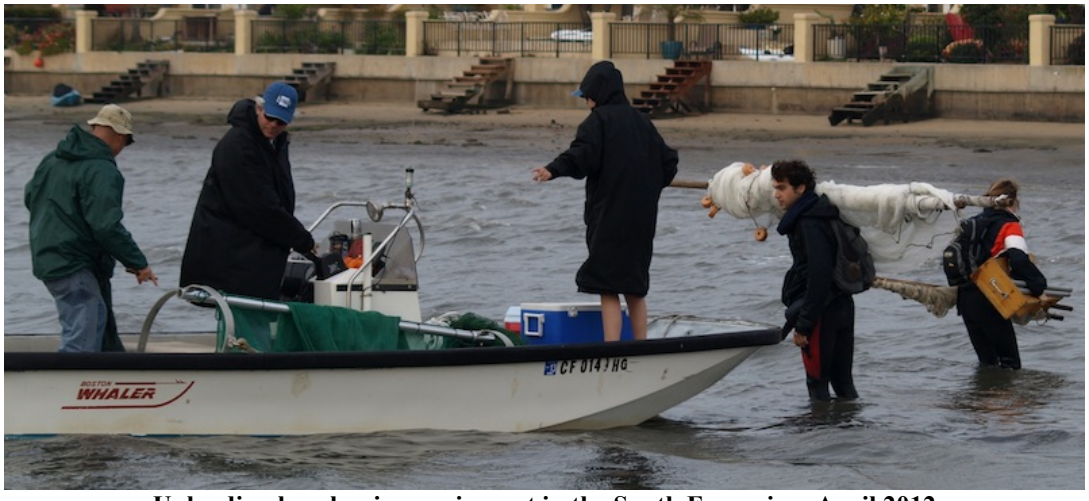
- Identify, determine and quantify the utilization of the fishery populations in San Diego Bay

- Identify habitats that support juvenile fish species and describe nursery utilization

- Determine geographic and/or habitat areas of San Diego Bay that support significant populations of fish species utilized as forage by endangered avian species

In order to accomplish the objectives for these two sampling periods, we have documented the following parameters:

- ✓ Fish species composition and abundance
  - Species diversity
  - Abundance by bay Ecoregion
- ✓ Ecological importance of species
- ✓ Nursery area function
- ✓ Fish assemblage structure
- ✓ Water quality parameters
- ✓ Fish density and biomass estimates
  - Numerical and biomass density
  - Density and standing stock of avian forage species
  - Density and standing stock of fishery species
  - Panamic species unique to San Diego Bay




**Unloading beach seine equipment in the South Ecoregion, April 2012**

## Composition and Abundance

During this study, 17,263 (52 species) fishes weighing 348 kg were collected during April and July 2012. The most numerous species comprising 37.8% of the catch was topsmelt (*Atherinops affinis*), followed by arrow goby (*Clevelandia ios*; 14.1%), shiner perch (*Cymatogaster aggregata*; 12.6%), giant kelpfish (*Heterostichus rostratus*; 11.2%), and slough anchovy (*Anchoa delicatissima*; 9.1%). In terms of biomass, round stingrays (*Urobatis halleri*) dominated the catch comprising 38.6% of the biomass. The spotted sand bass (*Paralabrax maculatofasciatus*: 17.9%) followed by bat ray (*Myliobatis californica*; 9.0%), California butterfly ray (*Gymnura marmorata*; 4.5%), and shiner perch (3.6%) rounded out the top five fishes for total biomass.

## Nursery Area Function

San Diego Bay continues to be a nursery area for the great majority of the fishes found there. Approximately 81% of all fishes sampled in San Diego Bay were juveniles.

**Juvenile black croaker (*Cheilotrema saturnum*)**

## Ecological Importance of Species

The principle fishes surveyed during these sampling periods as determined by the Ecological Index were the following estuarine species: round stingray, topsmelt, spotted sand bass, shiner perch, and arrow goby. Round stingray ranked first with an E.I. of 4,234, topsmelt ranked second (E.I. 4,110), and spotted sand bass ranked third (E.I. 1,981). All three species were found ubiquitously throughout the bay; round stingray and spotted sand bass were dominant in terms of biomass and topsmelt in terms of numerical abundance. These species were followed by shiner perch (E.I. 1,617) and arrow goby (E.I. 1,420).

## Best Estimates of Density and Standing Stock

The best total estimate for the total stock size was 16,153,537 fishes. With an estimated surface area of 4858 ha this gives an overall fish density 0.33 individuals/$m^2$. The highest estimate was of giant kelpfish (3.7 million), followed by topsmelt (2.8 million), arrow goby (2.4 million), shiner perch (2.0 million), and slough anchovy (1.4 million). Schooling and forage fishes unsurprisingly dominated the stock estimate for the bay. The total best estimate of biomass standing stock was 459,754 kg. This gives an overall estimate of 9.46 g/$m^2$. Interestingly, the stock size estimate in 2012 was far lower than in any other survey, though the biomass standing stock was the highest of any other survey.

## Avian Forage Species

Forage species are primarily surface dwelling schooling fish that are accessible to diving avian predators, especially terns. Generally, forage fishes are small silvery-sided fishes that are found in large schools. These schooling fishes are not habitat specific and move throughout the bay's ecosystem. Ten species of important forage fishes were captured during this study. The most abundant forage fishes were topsmelt, arrow goby, giant kelpfish, slough anchovy and shiner perch. These species were primarily found at small (juvenile) size classes (<50 mm SL) appropriate for nesting birds to feed their young in the area. The typical timing for the recruitment of fishes to San Diego Bay begins in the spring and continues through the summer and this is what was observed in 2012. The biomass standing stock estimate for forage fish was nearly 32 MT.

**Flock of marbled godwits (*Limosa fedoa*) in the South-Central Ecoregion, July 2012**

## Fisheries Species

During this study, 12 species were captured which have importance in either the recreational or commercial fisheries in California. Including all Ecoregions, standing stock estimates of fisheries species totaled 139 MT. Estimates were greatest at the South-Central Ecoregion (58 MT), followed by the South (44 MT), North-Central (21 MT) and North Ecoregions (15 MT).

## Trends and Comparisons

Overall, 2012 Shannon-Wiener Diversity estimates in each ecoregion were very strong – almost identical to the 2008 values – and among the highest values for any sampling period. Species richness for 2012 was among the highest in the range of values for the North-Central, South-Central and South Ecoregions for any survey period, but among the lowest for the North Ecoregion.

## San Diego Bay as a Unique Fish Habitat

San Diego Bay is known for being the northern edge of the range for a number of southern fishes that are not normally distributed in the Southern California Bight. As an example, at least nineteen northern range extensions have been reported for the bay. During the study, six species (bonefish, diamond stingray, California butterfly ray, Pacific seahorse, banded guitarfish, and California needlefish) with primarily southern distributions were taken. These fishes were mostly found in the South Ecoregion.

**Bonefish (*Albula vulpes*) captured in the South Ecoregion, April 2012**

As the largest estuary in Southern California, San Diego Bay provides critical habitat for bay and estuary fishes. The high productivity rate coupled with the abundance of juvenile fishes in the bay highlights the importance of the bay as a nursery habitat. The bay contains extensive shallow water eelgrass habitat that supports a unique assemblage of juvenile and adult fishes. San Diego Bay serves as critical habitat for many fishes that, in turn support surrounding nearshore ecosystems. Juvenile fishes emigrate from the bay to offshore habitats, and important or endangered avian species utilize forage fishes in the bay. Southern California indigenous bay and estuary fishes represented 14% of the total catch in this survey.

## *Field Surveys*

To adequately assess the status of all components of the ichthyofauna of the San Diego Bay, four Ecoregions of San Diego Bay including North, North-Central, South-Central, and South were sampled and inventoried (Figure 1, Table 1).

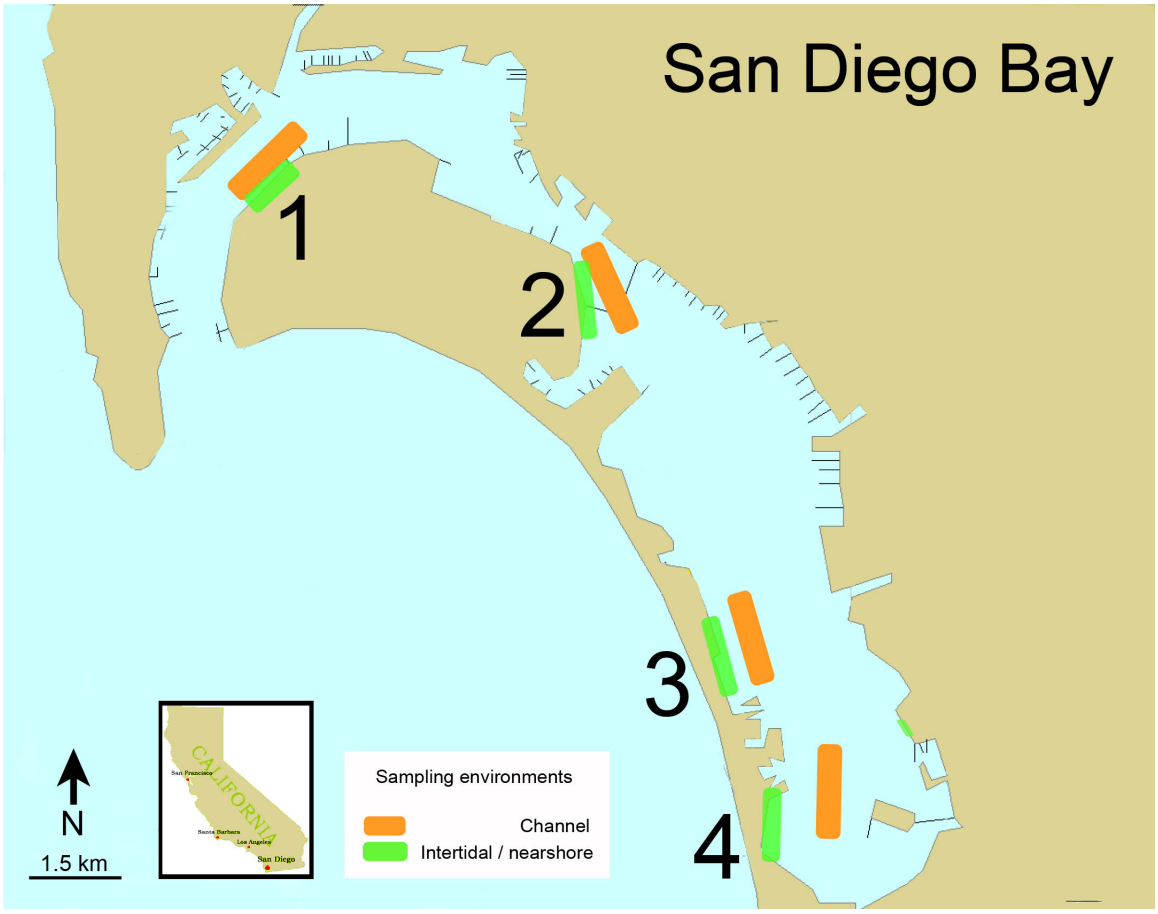



**Figure 1.** Sampling locations of the North **(1)**, North-Central **(2)**, South-Central **(3)** and South **(4)** Ecoregions in San Diego Bay.

**Table 1.** Lambert Coordinates (LAT, LONG) for San Diego Bay Fisheries Inventory and Utilization study, 2012.

| Ecoregion | Site | Latitude | Longitude |
|---|---|---|---|
| North | Vegetated | 32° 41' 50" | 117° 13' 40" |
| | Non-Vegetated | 32° 42' 45" | 117° 12' 30" |
| North-Central | Vegetated | 32° 41' 25" | 117° 09' 50" |
| | Non-Vegetated | 32° 41' 12" | 117° 09' 45" |
| South-Central | Vegetated | 32° 39' 05" | 117° 08' 30" |
| | Non-Vegetated | 32° 38' 48" | 117° 08' 25" |
| South-Central | Vegetated | 32° 37' 00" | 117° 07' 45" |
| | Non-Vegetated | 32° 36' 50" | 117° 06' 45" |

## *Sampling Procedures*

Sampling occurred during the spring and summer quarters of 2012 (April 13, 15, 16, 22 and July 24-27, 2012). One Ecoregion was sampled per day with the exception of April 22, where non-vegetated intertidal sampling and a single non-vegetated purse seine were performed after inclement weather postponed part of the April 13 sampling. Collections were made off the 5-m *R/V Blennius* and the 6-m *R/V Larvae*. At each Ecoregion, the following five subhabitats were sampled: deep channel, nearshore non-vegetated, nearshore vegetated, intertidal non-vegetated, and intertidal vegetated.

Fish were sampled at each ecoregion using the following gear:

1) A 15.2 X 1.8 m large seine equipped with a 1.8 X 1.8 X 1.8 m bag (1.2 cm mesh wings and 0.6 cm mesh in bag) was used to sample fishes in the intertidal subhabitat of each ecoregion at a depth of 0-2 meters. The sampling area was randomly selected within ecoregions. The net was set parallel to the shoreline and pulled in shore by 15 m rope lines, covering an area of about 220 $m^2$ per haul. Three replicates per subhabitat were conducted for a total of six per ecoregion.

**Removing fishes from the large seine in the North-Central Ecoregion, July 2012**

2) A 4.6 m X 1.2 small seine with 3 mm mesh was utilized to collect fish in the shallow intertidal habitat of 0-0.5m depths. The small seine was pulled 10 m along shore and pivoted towards the shore, covering an area of approximately 62 $m^2$. Three replicates per subhabitat were conducted for a total of six per ecoregion.

**Sampling with the small seine in the North-Central Ecoregion, April 2012**

3) A 1 $m^2$ square enclosure constructed of 2.5 cm metal pipe and canvas was used to survey small, burrow-inhabiting fish in shallow intertidal areas of the bay. The enclosure was randomly set within each subhabitat in a depth of 0.25-0.75 m. One liter of 9:1 isoproponal-2-quinoline solution was added to the enclosed water and then searched for 10 minutes using a 1 mm mesh dipnet.

**Preparing to use the square enclosure in the South-Central Ecoregion, July 2012**

4) A 1.6 m beam trawl (4 mm mesh wings and 2 mm knotless mesh in the codend) was used to sample nearshore fish species. Standardized 10 minute tows were conducted behind the 5-m research vessel, covering an area of approximately 290 $m^2$ per replicate. Three replicates per subhabitat were conducted for a total of six per ecoregion.

5) A 66 X 6 m purse seine (1.2 cm mesh wings and 0.6 cm mesh bag) was used to sample fish species in the nearshore and channel subhabitats. The purse seine was randomly set within each subhabitat and sampled a total area of approximately 296 $m^2$ per replicate. Three replicates per subhabitat were conducted for a total of nine in each ecoregion.

**Deploying the purse seine in the North-Central Ecoregion, July 2012**

6) An 8 m semi-balloon otter trawl (2 cm mesh wings and 0.8 cm mesh codend) towed behind the 5-m research vessel was used to survey fishes from the deepest portions of the channel subhabitat. The otter trawl was towed for 10 minutes and sampled a total area of approximately 2,417 $m^2$ per each replicate. Three replicates were conducted per ecoregion.

**Sponge captured by otter trawl in the North-Central Ecoregion, April 2012**

All fishes or subsamples of large catches were returned to the laboratory where all individuals were identified to species, measured to the nearest 0.01 mm (Standard Length or Disk Width) with a Mitutoyo Digital Caliper and weighed with a Sartorius Analytical Balance. Large fishes were measured aboard ship to the nearest millimeter and gram using Pesola hanging scales and returned. Lambert coordinates of each sampling effort were recorded for all sampling events. For otter and beam trawls the start and finish of each tow was recorded. The sampling events are plotted in Figures 2-5.

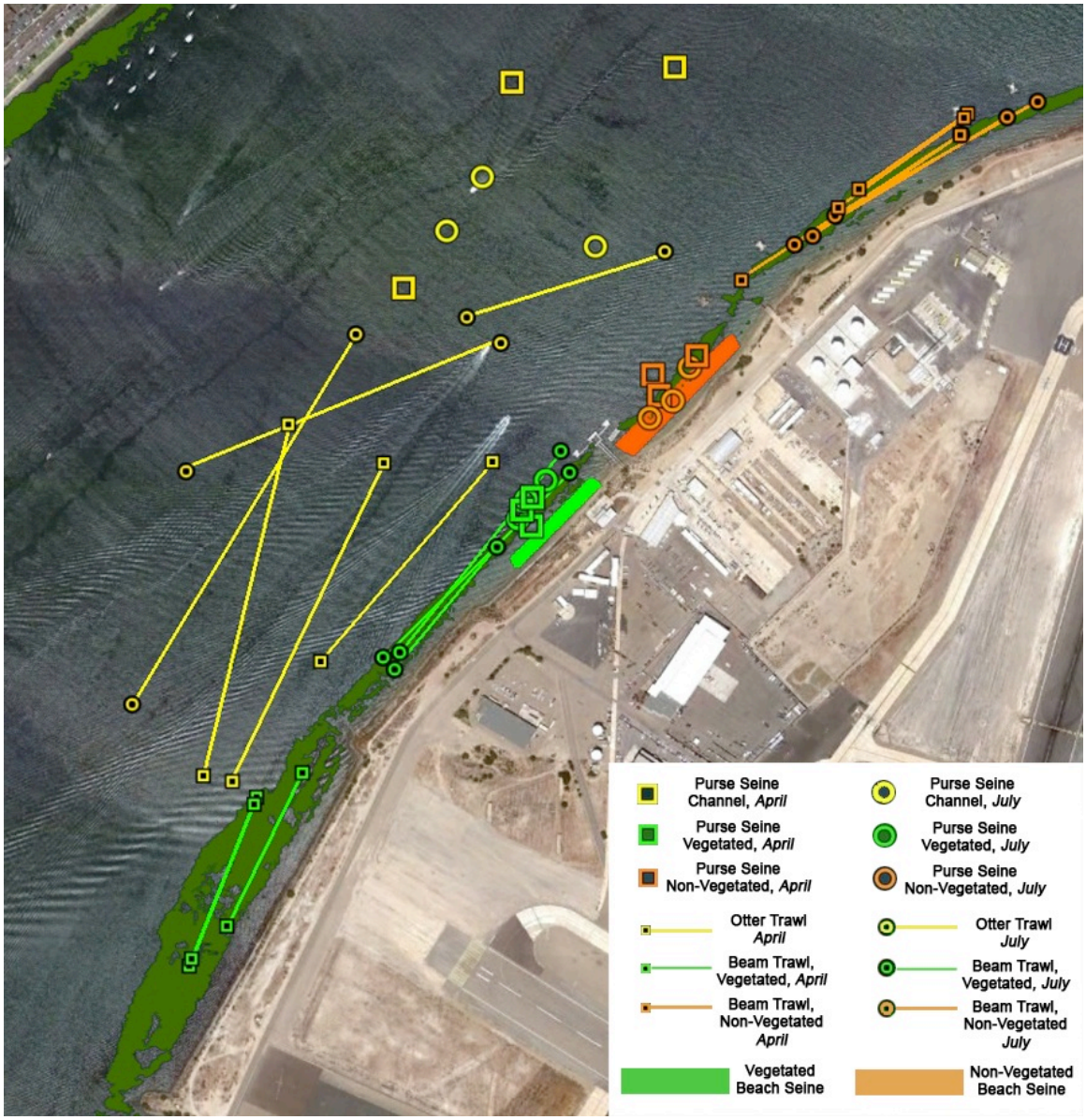



**Figure 2.** Sampling events for the North Ecoregion, 2012.

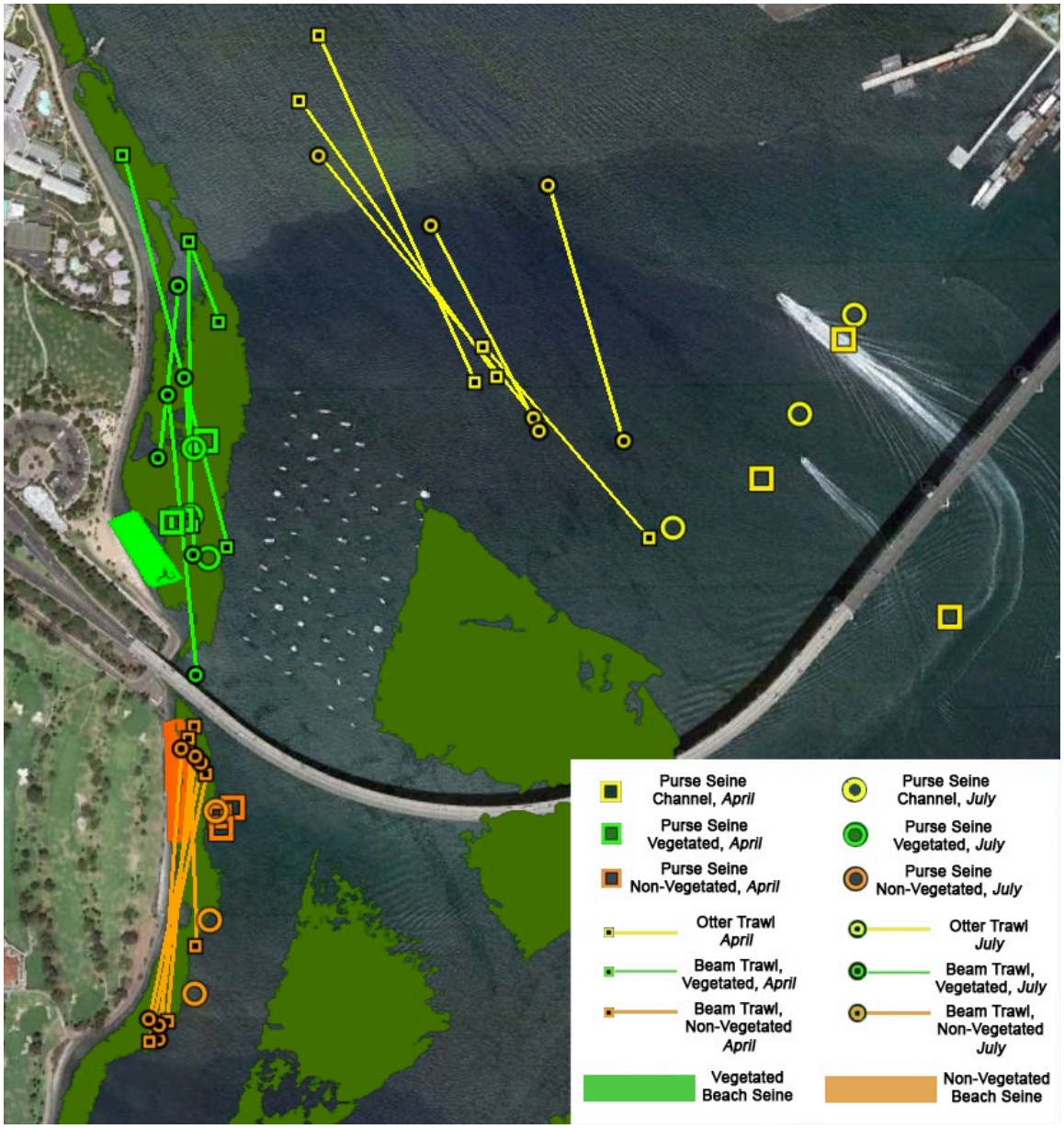



**Figure 3.** Sampling events for the North-Central Ecoregion, 2012.

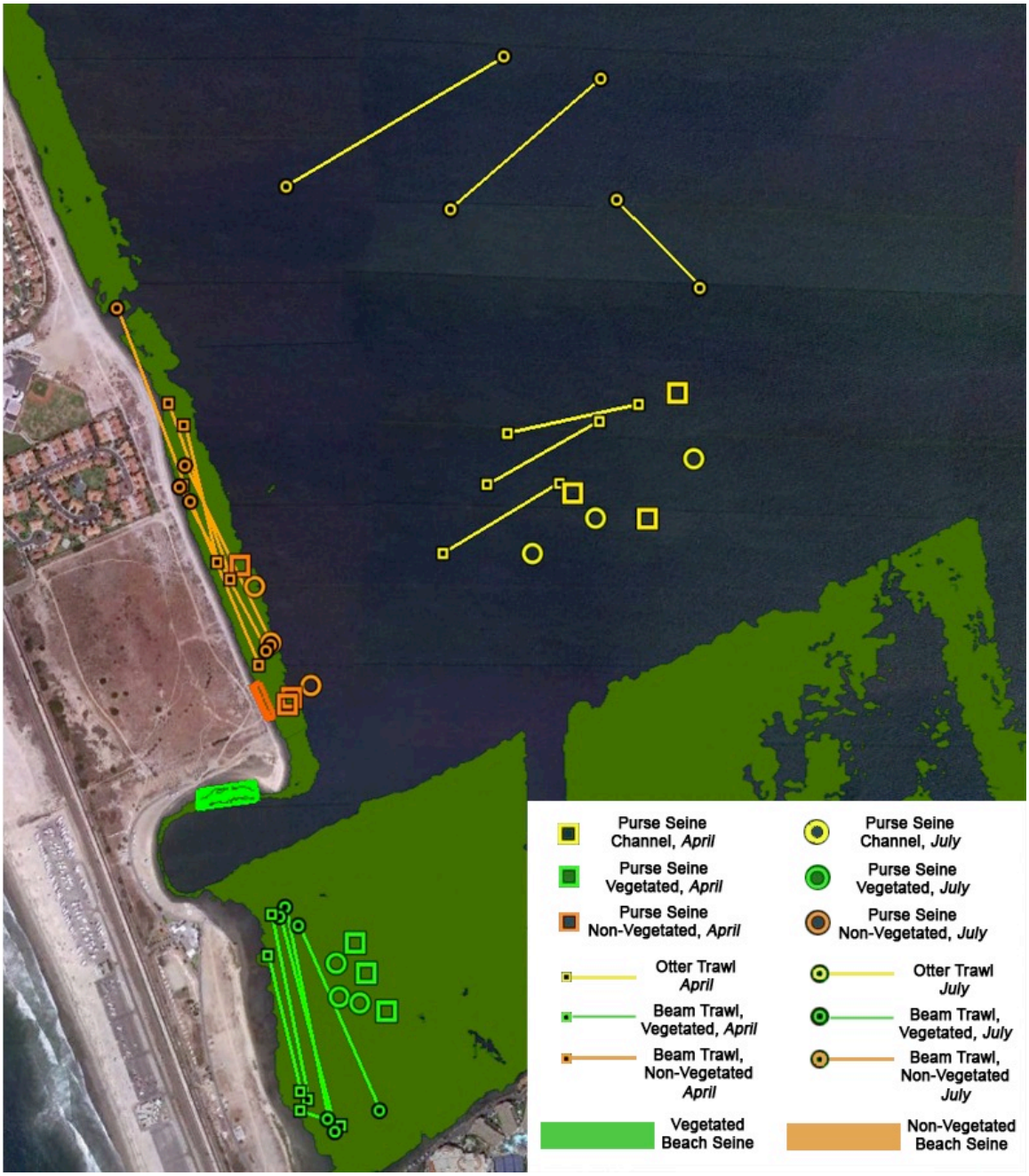



**Figure 4.** Sampling events for the South-Central Ecoregion, 2012.

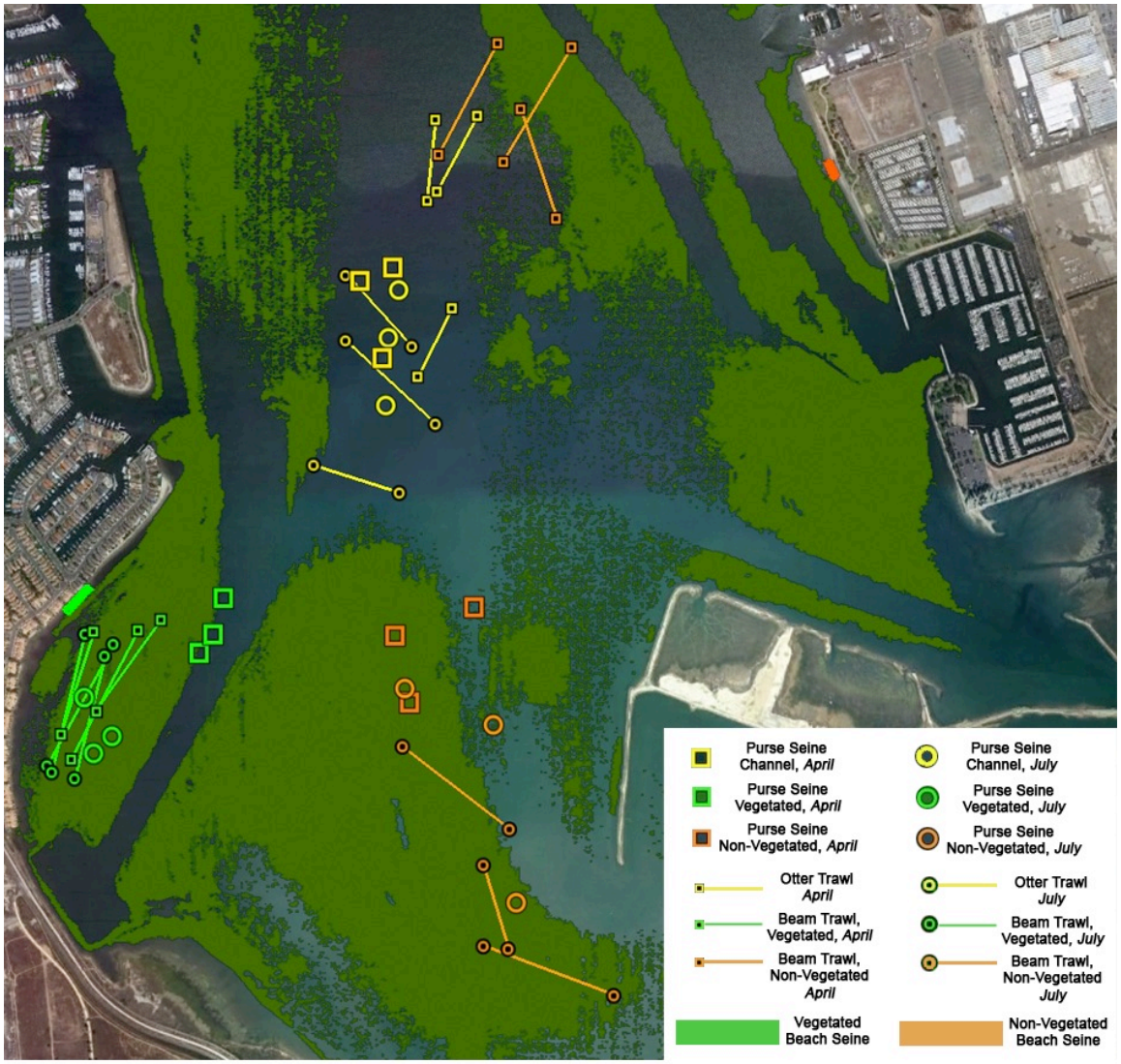



**Figure 5.** Sampling events for the South Ecoregion, 2012.

## *Water Quality Parameters*

Water temperature (°C), salinity (ppt), dissolved oxygen (mg $O_2$/1), and pH was measured at each ecoregion. Temperature increased from north to south in the bay during April and July sampling periods. Salinity increased slightly from north to south during the July sampling period, but declined sharply in the South Ecoregion during the April sampling period, likely due to heavy rains and estuarine input during the preceding weeks. Dissolved oxygen and pH were relatively stable and dissolved oxygen decreased slightly from north to south (Figure 6).

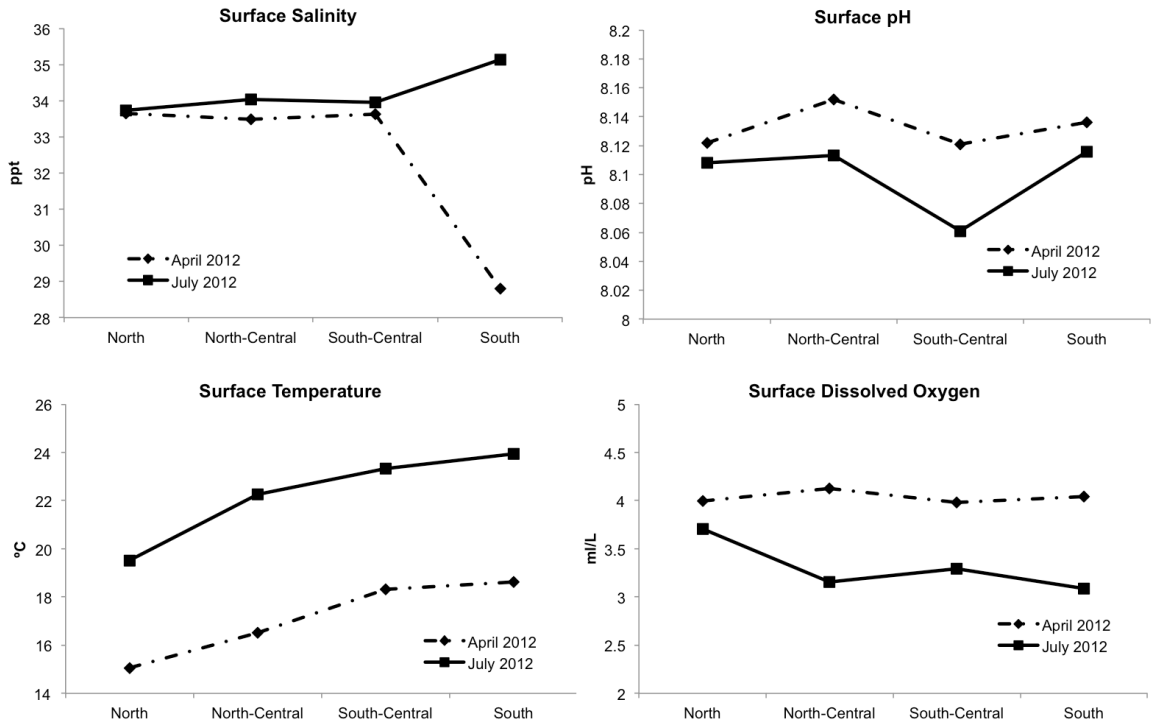



**Figure 6.** Summary of mean physical-chemical measurements by ecoregion over the sampling months, 2012.

## *Numerical Catch and Biomass*

During this study, 17,263 (52 species) fishes weighing 348 kg were collected during April and July 2012 (Tables 2 and 3). The most numerous species comprising 37.8% of the catch was topsmelt (*Atherinops affinis*), followed by arrow goby (*Clevelandia ios*; 14.1%), shiner perch (*Cymatogaster aggregata*; 12.6%), giant kelpfish (*Heterostichus rostratus*; 11.2%), and slough anchovy (*Anchoa delicatissima*; 9.1%). In terms of biomass, round stingrays (*Urobatis halleri*) dominated the catch comprising 38.6% of the biomass. The spotted sand bass (*Paralabrax maculatofasciatus*: 17.9%) followed by bat ray (*Myliobatis californica*; 9.0%), California butterfly ray (*Gymnura marmorata*; 4.5%), and shiner perch (3.6%) rounded out the top five fishes for total biomass.

Total catch varied moderately by Ecoregion (Figure 7) and was greatest at the North-Central Ecoregion (5,645; Table 5), followed by the North Ecoregion (4,244; Table 4), South Ecoregion (3,952; Table 7), and South-Central Ecoregion (3,422; Table 6). The North Ecoregion was dominated by topsmelt (2,467) and giant kelpfish (657). In the North-Central Ecoregion topsmelt (2,933) and giant kelpfish (1,099) also dominated the catch. Shiner perch (1,077), arrow goby (638), topsmelt (570) and slough anchovy (546) dominated the South-Central Ecoregion catch. Arrow goby (1,501), slough anchovy (750), shiner perch (573), and topsmelt (559) also comprised most of the catch in the South Ecoregion.

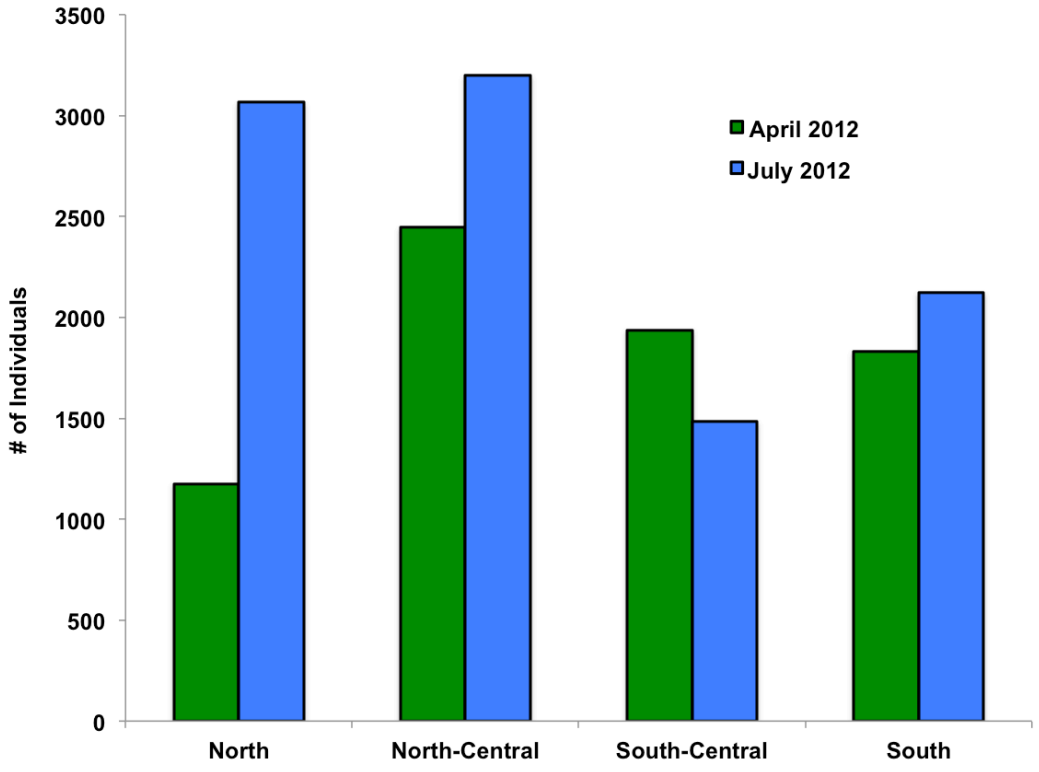



**Figure 7.** Catch of San Diego Bay fishes by ecoregion, April and July 2012.

**Several slough anchovies (*Anchoa delicatissima*) caught in the South Ecoregion, July 2012**

Overall, the catch of the five numerically dominant fishes had mixed patterns over the four ecoregions (Figure 8). Catch of topsmelt was higher in the North and North-Central Ecoregions and decreased towards the south. Arrow gobies increased in abundance from north to south, as did slough anchovy, with few arrow gobies and no slough anchovy being caught in the North Ecoregion. Shiner perch were caught in the greatest number in the South-Central Ecoregion, and giant kelpfish were caught in the greatest number in the North-Central Ecoregion.

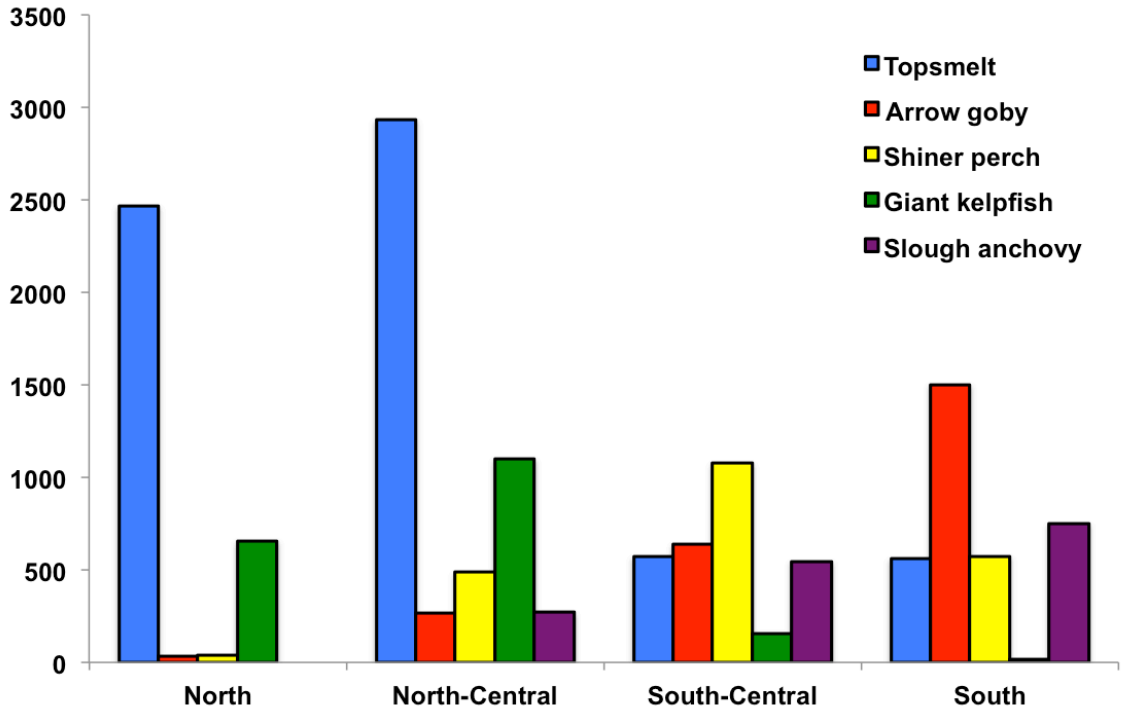



**Figure 8.** Total catch of the five numerically dominant species by ecoregion.

**Round stingray (*Urobatis halleri*) captured by beam trawl, North-Central Ecoregion, April 2012**

Round stingray had the highest catch in terms of biomass at three ecoregions (North, 67.7 kg; North-Central, 27.9 kg; and South, 26.7 kg). Round stingray was third in biomass (11.9 kg) in the South-Central Ecoregion. In the North Ecoregion, spotted sand bass (11.5 kg), topsmelt (7.9 kg), and California halibut (*Paralichthys californicus*; 6.9 kg) had the second through fourth highest biomass values, respectively. For the North-Central Ecoregion, after round stingray, spotted sand bass (23.7 kg) and shiner perch (*Cymatogaster aggregata*; 6.5 kg) were dominant in terms of biomass, with a single individual of diamond stingray (*Dasyatis dipterura*) accounting for 5 kg of biomass. In the South-Central Ecoregion, bat ray (*Myliobatis californica*, 28.1 kg) and spotted sand bass (13.4 kg) had the two highest biomass values, respectively. Finally in the South Ecoregion, California butterfly ray (*Gymnura marmorata*, 13.8 kg) and spotted sand bass (13.7 kg) were the second and third highest biomass values, respectively.

**Table 2.** Total abundance of fishes collected in San Diego Bay during April and July 2012 by ecoregion.

| | | Ecoregions | | | | | |
|---|---|---|---|---|---|---|---|
| Scientific Name | Common Name | North | North-Central | South-Central | South | Total | % |
| *Acanthogobius flavimanus* | yellowfin goby | | | | 3 | 3 | 0.02 |
| *Albula vulpes* | bonefish | | | 2 | 9 | 11 | 0.06 |
| *Anchoa compressa* | deepbody anchovy | | 1 | 2 | 14 | 17 | 0.10 |
| *Anchoa delicatissima* | slough anchovy | | 270 | 546 | 750 | 1,566 | 9.07 |
| *Anisotremus davidsonii* | sargo | | 1 | | | 1 | 0.01 |
| *Atherinops affinis* | topsmelt | 2,467 | 2,933 | 570 | 559 | 6,529 | 37.82 |
| *Cheilotrema saturnum* | black croaker | 1 | 9 | 3 | | 13 | 0.08 |
| *Citharichtys stigmaeus* | speckled sanddab | 46 | 2 | | 1 | 49 | 0.28 |
| *Clevelandia ios* | arrow goby | 32 | 267 | 638 | 1,501 | 2,438 | 14.12 |
| *Cosmocampus arctus* | snubnose pipefish | | 1 | | | 1 | 0.01 |
| *Cymatogaster aggregata* | shiner perch | 37 | 487 | 1,077 | 573 | 2,174 | 12.59 |
| *Dasyatis dipterura* | diamond stingray | | 1 | | | 1 | 0.01 |
| *Embiotoca jacksoni* | black perch | 71 | 9 | | | 80 | 0.46 |
| *Fundulus parvipinnis* | California killifish | | | 3 | 5 | 8 | 0.05 |
| *Gibbonsia elegans* | spotted kelpfish | 17 | 10 | 3 | 1 | 31 | 0.18 |
| *Gibbonsia metzi* | striped kelpfish | 3 | | | | 3 | 0.02 |
| *Gymnura marmorata* | California butterfly ray | | 1 | 1 | 3 | 5 | 0.03 |
| *Halichoeres semicinctus* | rock wrasse | 1 | | | | 1 | 0.01 |
| *Heterodontus francisci* | horn shark | 4 | 1 | | | 5 | 0.03 |
| *Heterostichus rostratus* | giant kelpfish | 657 | 1,099 | 158 | 18 | 1,932 | 11.19 |
| *Hippocampus ingens* | Pacific seahorse | | | | 1 | 1 | 0.01 |
| *Hypsoblennius gentilis* | bay blenny | 2 | 1 | | | 3 | 0.02 |
| *Hypsopsetta guttulata* | diamond turbot | 8 | 13 | 1 | 13 | 35 | 0.20 |
| *Hypsurus caryi* | rainbow perch | | 3 | | | 3 | 0.02 |
| *Ilypnus gilberti* | cheekspot goby | | 6 | 4 | 6 | 16 | 0.09 |
| *Leptocottus armatus* | staghorn sculpin | 11 | 23 | 15 | 25 | 74 | 0.43 |
| *Micrometrus minimus* | dwarf surfperch | 377 | 29 | 2 | 18 | 426 | 2.47 |
| *Mustelus californicus* | gray smoothhound | | | | 3 | 3 | 0.02 |
| *Myliobatis californica* | bat ray | | 2 | 7 | 4 | 13 | 0.08 |
| *Paralabrax clathratus* | kelp bass | 43 | 4 | 1 | | 48 | 0.28 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 34 | 136 | 73 | 89 | 332 | 1.92 |
| *Paralabrax nebulifer* | barred sand bass | 1 | 11 | 14 | 15 | 41 | 0.24 |
| *Paralichthys californicus* | California halibut | 35 | 12 | 20 | 12 | 79 | 0.46 |
| *Phanerodon furcatus* | white seaperch | | 4 | | | 4 | 0.02 |
| *Pleuronichthys decurrens* | curlfin turbot | 1 | | | | 1 | 0.01 |
| *Pleuronichthys ritteri* | spotted turbot | 15 | 10 | | | 25 | 0.14 |
| *Porichthys myriaster* | specklefin midshipman | 14 | 10 | 6 | 4 | 34 | 0.20 |
| *Quietula y-cauda* | shadow goby | | | 1 | 8 | 9 | 0.05 |
| *Rhacochilus vacca* | pile perch | 6 | | | | 6 | 0.03 |
| *Roncador stearnsii* | spotfin croaker | | 1 | 3 | 2 | 6 | 0.03 |
| *Sardinops sagax* | Pacific sardine | 1 | | 1 | | 2 | 0.01 |
| *Scomber japonicus* | Pacific mackerel | | | 1 | | 1 | 0.01 |
| *Scorpaena guttata* | California scorpionfish | 8 | | | | 8 | 0.05 |
| *Seriphus politus* | queenfish | | 1 | 1 | | 2 | 0.01 |
| *Strongylura exilis* | California needlefish | | | 1 | | 1 | 0.01 |
| *Symphurus atricauda* | California tonguefish | 21 | 2 | | | 23 | 0.13 |
| *Syngnathus leptorhynchus* | bay pipefish | 121 | 98 | 159 | 110 | 488 | 2.83 |
| *Synodus lucioceps* | California lizardfish | 11 | 4 | 1 | | 16 | 0.09 |
| *Tridentiger trigonocephalus* | chameleon goby | | 6 | 10 | 2 | 18 | 0.10 |
| *Umbrina roncador* | yellowfin croaker | | 5 | 2 | 12 | 19 | 0.11 |
| *Urobatis halleri* | round stingray | 196 | 172 | 96 | 191 | 655 | 3.79 |
| *Zapteryx exasperata* | banded guitarfish | 3 | | | | 3 | 0.02 |
| **# of species = 52** | | **4,244** | **5,645** | **3,422** | **3,952** | **17,263** | |

**Table 3.** Total biomass (g) of fishes collected in San Diego Bay during April and July 2012 by ecoregion.

| | | Ecoregions | | | | | |
|---|---|---|---|---|---|---|---|
| Scientific Name | Common Name | North | North-Central | South-Central | South | Total | % |
| *Acanthogobius flavimanus* | yellowfin goby | | | | 44 | 44 | 0.01 |
| *Albula vulpes* | bonefish | | | 1,130 | 2,930 | 4,060 | 1.17 |
| *Anchoa compressa* | deepbody anchovy | | 18 | 27 | 140 | 185 | 0.05 |
| *Anchoa delicatissima* | slough anchovy | | 730 | 1,315 | 317 | 2,363 | 0.68 |
| *Anisotremus davidsonii* | sargo | | 880 | | | 880 | 0.25 |
| *Atherinops affinis* | topsmelt | 7,927 | 2,116 | 813 | 590 | 11,446 | 3.29 |
| *Cheilotrema saturnum* | black croaker | 550 | 409 | 13 | | 972 | 0.28 |
| *Citharichtys stigmaeus* | speckled sanddab | 395 | 15 | | 3 | 413 | 0.12 |
| *Clevelandia ios* | arrow goby | 1 | 27 | 43 | 190 | 261 | 0.08 |
| *Cosmocampus arctus* | snubnose pipefish | | 1 | | | 1 | 0.00 |
| *Cymatogaster aggregata* | shiner perch | 402 | 6,499 | 4,119 | 1,446 | 12,466 | 3.58 |
| *Dasyatis dipterura* | diamond stingray | | 5,000 | | | 5,000 | 1.44 |
| *Embiotoca jacksoni* | black perch | 3,134 | 405 | | | 3,539 | 1.02 |
| *Fundulus parvipinnis* | California killifish | | | 2 | 18 | 19 | 0.01 |
| *Gibbonsia elegans* | spotted kelpfish | 165 | 37 | 2 | 0 | 204 | 0.06 |
| *Gibbonsia metzi* | striped kelpfish | 3 | | | | 3 | 0.00 |
| *Gymnura marmorata* | California butterfly ray | | 200 | 1,500 | 13,790 | 15,490 | 4.45 |
| *Halichoeres semicinctus* | rock wrasse | 2 | | | | 2 | 0.00 |
| *Heterodontus francisci* | horn shark | 2,450 | 800 | | | 3,250 | 0.93 |
| *Heterostichus rostratus* | giant kelpfish | 3,922 | 2,028 | 516 | 173 | 6,638 | 1.91 |
| *Hippocampus ingens* | Pacific seahorse | | | | 35 | 35 | 0.01 |
| *Hypsoblennius gentilis* | bay blenny | 19 | 30 | | | 49 | 0.01 |
| *Hypsopsetta guttulata* | diamond turbot | 1,322 | 2,805 | 1 | 44 | 4,172 | 1.20 |
| *Hypsurus caryi* | rainbow perch | | 20 | | | 20 | 0.01 |
| *Ilypnus gilberti* | cheekspot goby | | 2 | 1 | 2 | 5 | 0.00 |
| *Leptocottus armatus* | staghorn sculpin | 122 | 201 | 100 | 155 | 578 | 0.17 |
| *Micrometrus minimus* | dwarf surfperch | 3,090 | 387 | 10 | 86 | 3,573 | 1.03 |
| *Mustelus californicus* | gray smoothhound | | | | 3,200 | 3,200 | 0.92 |
| *Myliobatis californica* | bat ray | | 1,140 | 28,100 | 2,045 | 31,285 | 8.99 |
| *Paralabrax clathratus* | kelp bass | 795 | 80 | 1 | | 876 | 0.25 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 11,512 | 23,711 | 13,410 | 13,659 | 62,292 | 17.89 |
| *Paralabrax nebulifer* | barred sand bass | 14 | 191 | 530 | 1,454 | 2,189 | 0.63 |
| *Paralichthys californicus* | California halibut | 6,943 | 2,541 | 1,688 | 1,268 | 12,440 | 3.57 |
| *Phanerodon furcatus* | white seaperch | | 29 | | | 29 | 0.01 |
| *Pleuronichthys decurrens* | curlfin turbot | 20 | | | | 20 | 0.01 |
| *Pleuronichthys ritteri* | spotted turbot | 1,595 | 729 | | | 2,324 | 0.67 |
| *Porichthys myriaster* | specklefin midshipman | 686 | 956 | 116 | 253 | 2,010 | 0.58 |
| *Quietula y-cauda* | shadow goby | | | 1 | 2 | 3 | 0.00 |
| *Rhacochilus vacca* | pile perch | 400 | | | | 400 | 0.11 |
| *Roncador stearnsii* | spotfin croaker | | 600 | 4,200 | 2,400 | 7,200 | 2.07 |
| *Sardinops sagax* | Pacific sardine | 4 | | 100 | | 104 | 0.03 |
| *Scomber japonicus* | Pacific mackerel | | | 160 | | 160 | 0.05 |
| *Scorpaena guttata* | California scorpionfish | 3,745 | | | | 3,745 | 1.08 |
| *Seriphus politus* | queenfish | | 15 | 5 | | 20 | 0.01 |
| *Strongylura exilis* | California needlefish | | | 0 | | 0 | 0.00 |
| *Symphurus atricauda* | California tonguefish | 244 | 4 | | | 248 | 0.07 |
| *Syngnathus leptorhynchus* | bay pipefish | 218 | 115 | 197 | 50 | 581 | 0.17 |
| *Synodus lucioceps* | California lizardfish | 867 | 335 | 80 | | 1,282 | 0.37 |
| *Tridentiger trigonocephalus* | chameleon goby | | 2 | 5 | 2 | 9 | 0.00 |
| *Umbrina roncador* | yellowfin croaker | | 2,065 | 600 | 3,800 | 6,465 | 1.86 |
| *Urobatis halleri* | round stingray | 67,691 | 27,879 | 11,946 | 26,699 | 134,215 | 38.55 |
| *Zapteryx exasperata* | banded guitarfish | 1,425 | | | | 1,425 | 0.41 |
| **# of species = 52** | | **119,662** | **83,001** | **70,729** | **74,794** | **348,187** | |

**Table 4.** Total number of individuals and biomass (g) of fish species captured in the North Ecoregion, April and July 2012.

| Scientific Name | Common Name | Total # | % | Total Mass (g) | % |
|---|---|---|---|---|---|
| *Atherinops affinis* | topsmelt | 2,467 | 58.13 | 7,927 | 6.62 |
| *Cheilotrema saturnum* | black croaker | 1 | 0.02 | 550 | 0.46 |
| *Citharichtys stigmaeus* | speckled sanddab | 46 | 1.08 | 395 | 0.33 |
| *Clevelandia ios* | arrow goby | 32 | 0.75 | 1 | 0.00 |
| *Cymatogaster aggregata* | shiner perch | 37 | 0.87 | 402 | 0.34 |
| *Embiotoca jacksoni* | black perch | 71 | 1.67 | 3,134 | 2.62 |
| *Gibbonsia elegans* | spotted kelpfish | 17 | 0.40 | 165 | 0.14 |
| *Gibbonsia metzi* | striped kelpfish | 3 | 0.07 | 3 | 0.00 |
| *Halichoeres semicinctus* | rock wrasse | 1 | 0.02 | 2 | 0.00 |
| *Heterodontus francisci* | horn shark | 4 | 0.09 | 2,450 | 2.05 |
| *Heterostichus rostratus* | giant kelpfish | 657 | 15.48 | 3,922 | 3.28 |
| *Hypsoblennius gentilis* | bay blenny | 2 | 0.05 | 19 | 0.02 |
| *Hypsopsetta guttulata* | diamond turbot | 8 | 0.19 | 1,322 | 1.10 |
| *Leptocottus armatus* | staghorn sculpin | 11 | 0.26 | 122 | 0.10 |
| *Micrometrus minimus* | dwarf surfperch | 377 | 8.88 | 3,090 | 2.58 |
| *Paralabrax clathratus* | kelp bass | 43 | 1.01 | 795 | 0.66 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 34 | 0.80 | 11,512 | 9.62 |
| *Paralabrax nebulifer* | barred sand bass | 1 | 0.02 | 14 | 0.01 |
| *Paralichthys californicus* | California halibut | 35 | 0.82 | 6,943 | 5.80 |
| *Pleuronichthys decurrens* | curlfin turbot | 1 | 0.02 | 20 | 0.02 |
| *Pleuronichthys ritteri* | spotted turbot | 15 | 0.35 | 1,595 | 1.33 |
| *Porichthys myriaster* | specklefin midshipman | 14 | 0.33 | 686 | 0.57 |
| *Rhacochilus vacca* | pile perch | 6 | 0.14 | 400 | 0.33 |
| *Sardinops sagax* | Pacific sardine | 1 | 0.02 | 4 | 0.00 |
| *Scorpaena guttata* | California scorpionfish | 8 | 0.19 | 3,745 | 3.13 |
| *Symphurus atricauda* | California tonguefish | 21 | 0.49 | 244 | 0.20 |
| *Syngnathus leptorhynchus* | bay pipefish | 121 | 2.85 | 218 | 0.18 |
| *Synodus lucioceps* | California lizardfish | 11 | 0.26 | 867 | 0.72 |
| *Urobatis halleri* | round stingray | 196 | 4.62 | 67,691 | 56.57 |
| *Zapteryx exasperata* | banded guitarfish | 3 | 0.07 | 1,425 | 1.19 |
| **# of species = 30** | | **4,244** | | **119,662** | |

**Topsmelt (*Atherinops affinis*) caught by large seine in the North Ecoregion, July 2012**

**Table 5.** Total number of individuals and biomass (g) of fish species captured in the North-Central Ecoregion, April and July 2012.

| Scientific Name | Common Name | Total # | % | Total Mass (g) | % |
|---|---|---|---|---|---|
| *Anchoa compressa* | deepbody anchovy | 1 | 0.02 | 18 | 0.02 |
| *Anchoa delicatissima* | slough anchovy | 270 | 4.78 | 730 | 0.88 |
| *Anisotremus davidsonii* | sargo | 1 | 0.02 | 880 | 1.06 |
| *Atherinops affinis* | topsmelt | 2,933 | 51.96 | 2,116 | 2.55 |
| *Cheilotrema saturnum* | black croaker | 9 | 0.16 | 409 | 0.49 |
| *Citharichtys stigmaeus* | speckled sanddab | 2 | 0.04 | 15 | 0.02 |
| *Clevelandia ios* | arrow goby | 267 | 4.73 | 27 | 0.03 |
| *Cosmocampus arctus* | snubnose pipefish | 1 | 0.02 | 1 | 0.00 |
| *Cymatogaster aggregata* | shiner perch | 487 | 8.63 | 6,499 | 7.83 |
| *Dasyatis dipterura* | diamond stingray | 1 | 0.02 | 5,000 | 6.02 |
| *Embiotoca jacksoni* | black perch | 9 | 0.16 | 405 | 0.49 |
| *Gibbonsia elegans* | spotted kelpfish | 10 | 0.18 | 37 | 0.04 |
| *Gymnura marmorata* | California butterfly ray | 1 | 0.02 | 200 | 0.24 |
| *Heterodontus francisci* | horn shark | 1 | 0.02 | 800 | 0.96 |
| *Heterostichus rostratus* | giant kelpfish | 1,099 | 19.47 | 2,028 | 2.44 |
| *Hypsoblennius gentilis* | bay blenny | 1 | 0.02 | 30 | 0.04 |
| *Hypsopsetta guttulata* | diamond turbot | 13 | 0.23 | 2,805 | 3.38 |
| *Hypsurus caryi* | rainbow perch | 3 | 0.05 | 20 | 0.02 |
| *Ilypnus gilberti* | cheekspot goby | 6 | 0.11 | 2 | 0.00 |
| *Leptocottus armatus* | staghorn sculpin | 23 | 0.41 | 201 | 0.24 |
| *Micrometrus minimus* | dwarf surfperch | 29 | 0.51 | 387 | 0.47 |
| *Myliobatis californica* | bat ray | 2 | 0.04 | 1,140 | 1.37 |
| *Paralabrax clathratus* | kelp bass | 4 | 0.07 | 80 | 0.10 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 136 | 2.41 | 23,711 | 28.57 |
| *Paralabrax nebulifer* | barred sand bass | 11 | 0.19 | 191 | 0.23 |
| *Paralichthys californicus* | California halibut | 12 | 0.21 | 2,541 | 3.06 |
| *Phanerodon furcatus* | white seaperch | 4 | 0.07 | 29 | 0.03 |
| *Pleuronichthys ritteri* | spotted turbot | 10 | 0.18 | 729 | 0.88 |
| *Porichthys myriaster* | specklefin midshipman | 10 | 0.18 | 956 | 1.15 |
| *Roncador stearnsii* | spotfin croaker | 1 | 0.02 | 600 | 0.72 |
| *Seriphus politus* | queenfish | 1 | 0.02 | 15 | 0.02 |
| *Symphurus atricauda* | California tonguefish | 2 | 0.04 | 4 | 0.00 |
| *Syngnathus leptorhynchus* | bay pipefish | 98 | 1.74 | 115 | 0.14 |
| *Synodus lucioceps* | California lizardfish | 4 | 0.07 | 335 | 0.40 |
| *Tridentiger trigonocephalus* | chameleon goby | 6 | 0.11 | 2 | 0.00 |
| *Umbrina roncador* | yellowfin croaker | 5 | 0.09 | 2,065 | 2.49 |
| *Urobatis halleri* | round stingray | 172 | 3.05 | 27,879 | 33.59 |
| **# of species = 37** | | **5,645** | | **83,001** | |

**Table 6.** Total number of individuals and biomass (g) of fish species captured in the South-Central Ecoregion, April and July 2012.

| Scientific Name | Common Name | Total # | % | Total Mass (g) | % |
|---|---|---|---|---|---|
| *Albula vulpes* | bonefish | 2 | 0.06 | 1,130 | 1.60 |
| *Anchoa compressa* | deepbody anchovy | 2 | 0.06 | 27 | 0.04 |
| *Anchoa delicatissima* | slough anchovy | 546 | 15.96 | 1,315 | 1.86 |
| *Atherinops affinis* | topsmelt | 570 | 16.66 | 813 | 1.15 |
| *Cheilotrema saturnum* | black croaker | 3 | 0.09 | 13 | 0.02 |
| *Clevelandia ios* | arrow goby | 638 | 18.64 | 43 | 0.06 |
| *Cymatogaster aggregata* | shiner perch | 1,077 | 31.47 | 4,119 | 5.82 |
| *Fundulus parvipinnis* | California killifish | 3 | 0.09 | 2 | 0.00 |
| *Gibbonsia elegans* | spotted kelpfish | 3 | 0.09 | 2 | 0.00 |
| *Gymnura marmorata* | California butterfly ray | 1 | 0.03 | 1,500 | 2.12 |
| *Heterostichus rostratus* | giant kelpfish | 158 | 4.62 | 516 | 0.73 |
| *Hypsopsetta guttulata* | diamond turbot | 1 | 0.03 | 1 | 0.00 |
| *Ilypnus gilberti* | cheekspot goby | 4 | 0.12 | 1 | 0.00 |
| *Leptocottus armatus* | staghorn sculpin | 15 | 0.44 | 100 | 0.14 |
| *Micrometrus minimus* | dwarf surfperch | 2 | 0.06 | 10 | 0.01 |
| *Myliobatis californica* | bat ray | 7 | 0.20 | 28,100 | 39.73 |
| *Paralabrax clathratus* | kelp bass | 1 | 0.03 | 1 | 0.00 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 73 | 2.13 | 13,410 | 18.96 |
| *Paralabrax nebulifer* | barred sand bass | 14 | 0.41 | 530 | 0.75 |
| *Paralichthys californicus* | California halibut | 20 | 0.58 | 1,688 | 2.39 |
| *Porichthys myriaster* | specklefin midshipman | 6 | 0.18 | 116 | 0.16 |
| *Quietula y-cauda* | shadow goby | 1 | 0.03 | 1 | 0.00 |
| *Roncador stearnsii* | spotfin croaker | 3 | 0.09 | 4,200 | 5.94 |
| *Sardinops sagax* | Pacific sardine | 1 | 0.03 | 100 | 0.14 |
| *Scomber japonicus* | Pacific mackerel | 1 | 0.03 | 160 | 0.23 |
| *Seriphus politus* | queenfish | 1 | 0.03 | 5 | 0.01 |
| *Strongylura exilis* | California needlefish | 1 | 0.03 | 0 | 0.00 |
| *Syngnathus leptorhynchus* | bay pipefish | 159 | 4.65 | 197 | 0.28 |
| *Synodus lucioceps* | California lizardfish | 1 | 0.03 | 80 | 0.11 |
| *Tridentiger trigonocephalus* | chameleon goby | 10 | 0.29 | 5 | 0.01 |
| *Umbrina roncador* | yellowfin croaker | 2 | 0.06 | 600 | 0.85 |
| *Urobatis halleri* | round stingray | 96 | 2.81 | 11,946 | 16.89 |
| **# of species = 32** | | **3,422** | | **70,729** | |

**Table 7.** Total number of individuals and biomass (g) of fish species captured in the South Ecoregion, April and July 2012.

| Scientific Name | Common Name | Total # | % | Total Mass (g) | % |
|---|---|---|---|---|---|
| *Acanthogobius flavimanus* | yellowfin goby | 3 | 0.08 | 44 | 0.06 |
| *Albula vulpes* | bonefish | 9 | 0.23 | 2,930 | 3.92 |
| *Anchoa compressa* | deepbody anchovy | 14 | 0.35 | 140 | 0.19 |
| *Anchoa delicatissima* | slough anchovy | 750 | 18.98 | 317 | 0.42 |
| *Atherinops affinis* | topsmelt | 559 | 14.14 | 590 | 0.79 |
| *Citharichtys stigmaeus* | speckled sanddab | 1 | 0.03 | 3 | 0.00 |
| *Clevelandia ios* | arrow goby | 1,501 | 37.98 | 190 | 0.25 |
| *Cymatogaster aggregata* | shiner perch | 573 | 14.50 | 1,446 | 1.93 |
| *Fundulus parvipinnis* | California killifish | 5 | 0.13 | 18 | 0.02 |
| *Gibbonsia elegans* | spotted kelpfish | 1 | 0.03 | 0 | 0.00 |
| *Gymnura marmorata* | California butterfly ray | 3 | 0.08 | 13,790 | 18.44 |
| *Heterostichus rostratus* | giant kelpfish | 18 | 0.46 | 173 | 0.23 |
| *Hippocampus ingens* | Pacific seahorse | 1 | 0.03 | 35 | 0.05 |
| *Hypsopsetta guttulata* | diamond turbot | 13 | 0.33 | 44 | 0.06 |
| *Ilypnus gilberti* | cheekspot goby | 6 | 0.15 | 2 | 0.00 |
| *Leptocottus armatus* | staghorn sculpin | 25 | 0.63 | 155 | 0.21 |
| *Micrometrus minimus* | dwarf surfperch | 18 | 0.46 | 86 | 0.11 |
| *Mustelus californicus* | gray smoothhound | 3 | 0.08 | 3,200 | 4.28 |
| *Myliobatis californica* | bat ray | 4 | 0.10 | 2,045 | 2.73 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 89 | 2.25 | 13,659 | 18.26 |
| *Paralabrax nebulifer* | barred sand bass | 15 | 0.38 | 1,454 | 1.94 |
| *Paralichthys californicus* | California halibut | 12 | 0.30 | 1,268 | 1.70 |
| *Porichthys myriaster* | specklefin midshipman | 4 | 0.10 | 253 | 0.34 |
| *Quietula y-cauda* | shadow goby | 8 | 0.20 | 2 | 0.00 |
| *Roncador stearnsii* | spotfin croaker | 2 | 0.05 | 2,400 | 3.21 |
| *Syngnathus leptorhynchus* | bay pipefish | 110 | 2.78 | 50 | 0.07 |
| *Tridentiger trigonocephalus* | chameleon goby | 2 | 0.05 | 2 | 0.00 |
| *Umbrina roncador* | yellowfin croaker | 12 | 0.30 | 3,800 | 5.08 |
| *Urobatis halleri* | round stingray | 191 | 4.83 | 26,699 | 35.70 |
| **# of species = 30** | | **3,952** | | **74,794** | |

**Arrow goby (*Clevelandia ios*) caught by otter trawl from the South Ecoregion, July 2012**

## *Shannon-Wiener Diversity and Species Richness*

The Shannon-Wiener Diversity index was used to estimate diversity in San Diego Bay and provide a basis for comparison among Ecoregions within the bay. The Shannon-Wiener Diversity index, (H'): $H' = -\Sigma\, p_i (\ln p_i)$ where $p_i$ = proportion of species *i*, was calculated for total catches by ecoregion and by sampling month. Despite the variation in species composition and catch, both Shannon-Wiener Diversity (H') and species richness were fairly uniform among the four ecoregions (Figure 9). Both species richness and diversity declined from April to July 2012 (Figure 10).

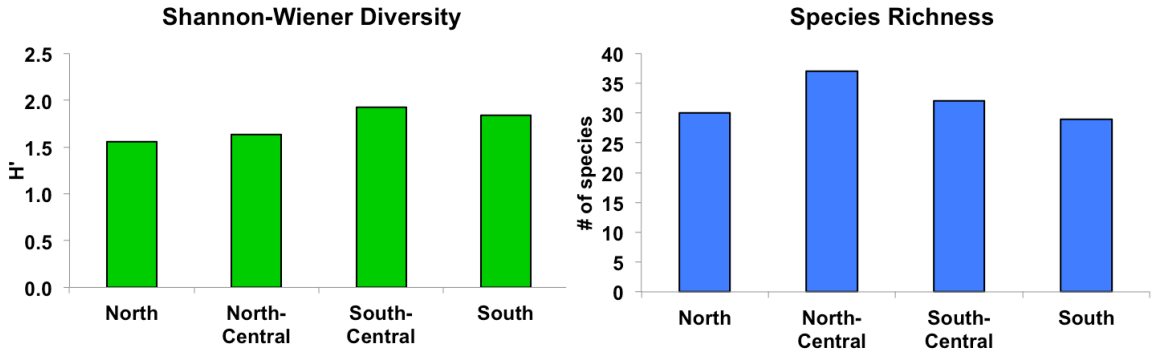



**Figure 9.** Shannon-Wiener Diversity (H') and number of species (richness) in each San Diego Bay ecoregion, 2012.

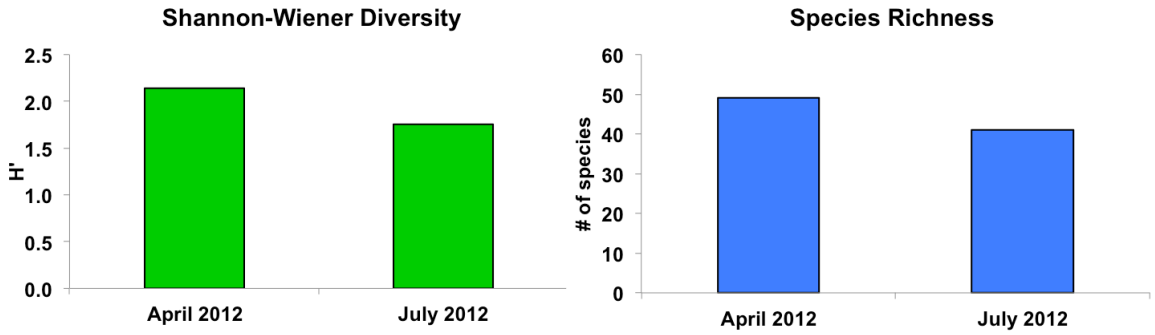



**Figure 10.** Shannon-Wiener Diversity (H') and number of species (richness) of fishes in San Diego Bay by sampling month, 2012.

## *Catch by Sampling Ecoregion and Period*

**North Ecoregion** – A total of 4,241 fishes belonging to 30 species, weighing 119.7 kg were collected in the North Ecoregion over two sampling periods in 2012 (Table 4). Topsmelt was the most abundant species (58.2%), followed by giant kelpfish (15.5%), dwarf surfperch (*Micrometrus minimus*; 8.9%), round stingray (4.6%) and bay pipefish (*Syngnathus leptorhynchus*; 2.9%). Round stingray led in total biomass (56.6%), followed by spotted sand bass (9.6%), topsmelt (6.6%), California halibut (5.8%) and giant kelpfish (3.3%).

**North-Central Ecoregion -** A total of 5,645 fishes belonging to 37 species, weighing 83.0 kg were collected in the North-Central Ecoregion over two sampling periods in 2012 (Table 5). Topsmelt was the most abundant species (52.0%), followed by giant kelpfish (19.5%), shiner perch (8.6%), slough anchovy (4.8%) and arrow goby (4.7%). Round stingray led in total biomass (33.6%), followed by spotted sand bass (28.6%), shiner perch (7.8%), diamond stingray (6.0%) and diamond turbot (*Hypsopsetta guttulata*; 3.4%).

**South-Central Ecoregion -** A total of 3,422 fishes belonging to 32 species, weighing 70.7 kg were collected in the South-Central Ecoregion over the two sampling periods in 2012 (Table 6). Shiner perch was the most abundant species (31.5%), followed by arrow goby (18.6%), topsmelt (16.7%), slough anchovy (16.0%) and bay pipefish (4.7%). Bat ray led in total biomass (39.7%), followed by spotted sand bass (19.0%), round stingray (16.9%), spotfin croaker (*Roncador stearnsii*; 5.9%) and shiner perch (5.8%).

**South Ecoregion -** A total of 3,952 fishes belonging to 30 species, weighing 74.8 kg were collected in the South Ecoregion in April and July 2012 (Table 7). Arrow goby was the most abundant species (38.0%), followed by slough anchovy (19.0%), shiner perch (14.5%), shiner perch (14.1%) and round stingray (4.8%). Round stingray led in total biomass (35.7%), followed by California butterfly ray (18.4%), spotted sand bass (18.3%), yellowfin croaker (*Umbrina roncador*; 5.1%) and gray smoothhound (*Mustelus californicus*; 4.3%).

In April 2012, 7,391 individuals comprising 49 species of fishes were captured (Figure 11, Table 8). In July, the catch increased to 9,869 fish, but species richness decreased to 41 species. Total biomass was greater in April (193 kg) than July (155 kg) (Figure 12, Table 9). Biomass increased substantially in July in the North Ecoregion, driven mainly by high catches of round stingray. Biomass was nearly identical in the North-Central Ecoregion between sampling periods, but decreased substantially in the South-Central and South Ecoregions from April to July (Figure 12).

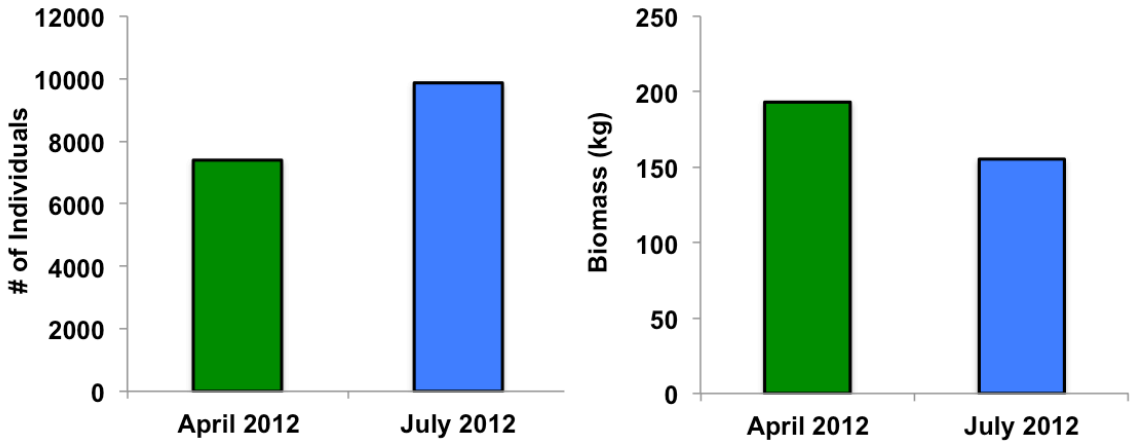



**Figure 11.** Total catch of fishes and biomass (kg) in San Diego Bay by sampling period, 2012.

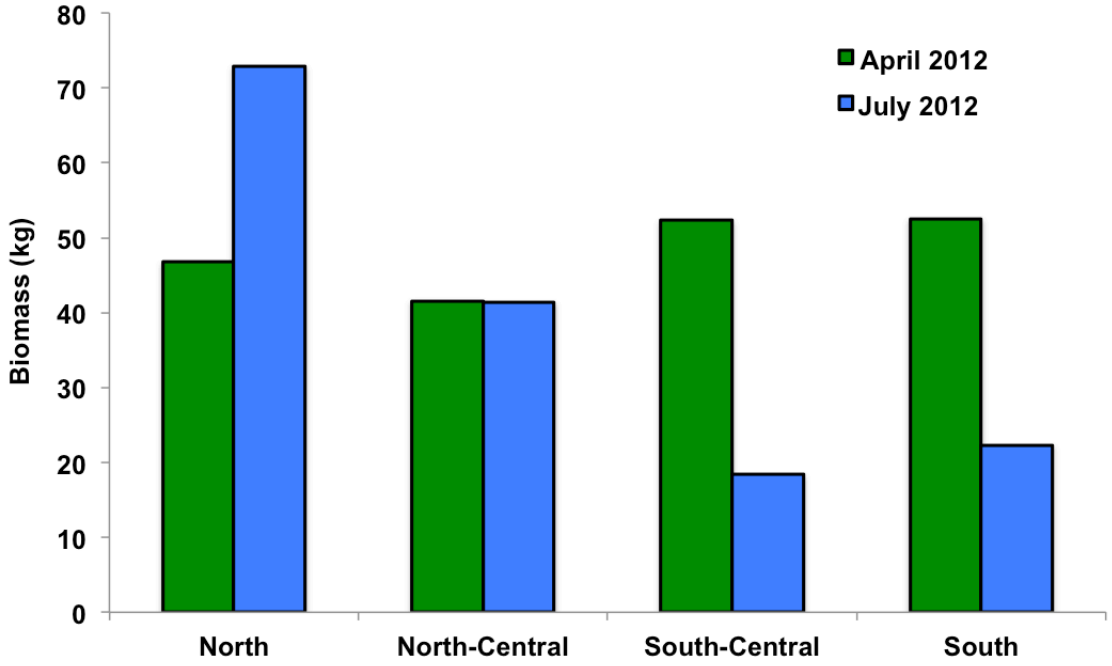



**Figure 12.** Biomass (kg) of San Diego Bay fishes by ecoregion, April and July 2012.

**Table 8.** Total abundance of fish species taken in San Diego Bay by sampling period, 2012.

| Scientific Name | Common Name | April 2012 | July 2012 | Total | % |
|---|---|---|---|---|---|
| *Acanthogobius flavimanus* | yellowfin goby | 1 | 2 | 3 | 0.02 |
| *Albula vulpes* | bonefish | 8 | 3 | 11 | 0.06 |
| *Anchoa compressa* | deepbody anchovy | 14 | 3 | 17 | 0.10 |
| *Anchoa delicatissima* | slough anchovy | 304 | 1,262 | 1,566 | 9.07 |
| *Anisotremus davidsonii* | sargo | 1 | | 1 | 0.01 |
| *Atherinops affinis* | topsmelt | 1,923 | 4,606 | 6,529 | 37.82 |
| *Cheilotrema saturnum* | black croaker | 2 | 11 | 13 | 0.08 |
| *Citharichtys stigmaeus* | speckled sanddab | 48 | 1 | 49 | 0.28 |
| *Clevelandia ios* | arrow goby | 850 | 1,588 | 2,438 | 14.12 |
| *Cosmocampus arctus* | snubnose pipefish | 1 | | 1 | 0.01 |
| *Cymatogaster aggregata* | shiner perch | 1,977 | 198 | 2,175 | 12.60 |
| *Dasyatis dipterura* | diamond stingray | | 1 | 1 | 0.01 |
| *Embiotoca jacksoni* | black perch | 68 | 12 | 80 | 0.46 |
| *Fundulus parvipinnis* | California killifish | 6 | 2 | 8 | 0.05 |
| *Gibbonsia elegans* | spotted kelpfish | 15 | 16 | 31 | 0.18 |
| *Gibbonsia metzi* | striped kelpfish | 3 | | 3 | 0.02 |
| *Gymnura marmorata* | California butterfly ray | 3 | 2 | 5 | 0.03 |
| *Halichoeres semicinctus* | rock wrasse | 1 | | 1 | 0.01 |
| *Heterodontus francisci* | horn shark | 2 | 3 | 5 | 0.03 |
| *Heterostichus rostratus* | giant kelpfish | 956 | 976 | 1,932 | 11.19 |
| *Hippocampus ingens* | Pacific seahorse | 1 | | 1 | 0.01 |
| *Hypsoblennius gentilis* | bay blenny | 1 | 2 | 3 | 0.02 |
| *Hypsopsetta guttulata* | diamond turbot | 26 | 9 | 35 | 0.20 |
| *Hypsurus caryi* | rainbow perch | 3 | | 3 | 0.02 |
| *Ilypnus gilberti* | cheekspot goby | 12 | 4 | 16 | 0.09 |
| *Leptocottus armatus* | staghorn sculpin | 65 | 9 | 74 | 0.43 |
| *Micrometrus minimus* | dwarf surfperch | 159 | 267 | 426 | 2.47 |
| *Mustelus californicus* | gray smoothhound | 3 | | 3 | 0.02 |
| *Myliobatis californica* | bat ray | 8 | 5 | 13 | 0.08 |
| *Paralabrax clathratus* | kelp bass | 36 | 12 | 48 | 0.28 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 155 | 176 | 331 | 1.92 |
| *Paralabrax nebulifer* | barred sand bass | 24 | 17 | 41 | 0.24 |
| *Paralichthys californicus* | California halibut | 42 | 37 | 79 | 0.46 |
| *Phanerodon furcatus* | white seaperch | 3 | 1 | 4 | 0.02 |
| *Pleuronichthys decurrens* | curlfin turbot | 1 | | 1 | 0.01 |
| *Pleuronichthys ritteri* | spotted turbot | 14 | 11 | 25 | 0.14 |
| *Porichthys myriaster* | specklefin midshipman | 14 | 20 | 34 | 0.20 |
| *Quietula y-cauda* | shadow goby | 1 | 8 | 9 | 0.05 |
| *Rhacochilus vacca* | pile perch | 6 | | 6 | 0.03 |
| *Roncador stearnsii* | spotfin croaker | 5 | 1 | 6 | 0.03 |
| *Sardinops sagax* | Pacific sardine | 1 | 1 | 2 | 0.01 |
| *Scomber japonicus* | Pacific mackerel | 1 | | 1 | 0.01 |
| *Scorpaena guttata* | California scorpionfish | 7 | 1 | 8 | 0.05 |
| *Seriphus politus* | queenfish | 2 | | 2 | 0.01 |
| *Strongylura exilis* | California needlefish | | 1 | 1 | 0.01 |
| *Symphurus atricauda* | California tonguefish | 7 | 16 | 23 | 0.13 |
| *Syngnathus leptorhynchus* | bay pipefish | 286 | 202 | 488 | 2.83 |
| *Synodus lucioceps* | California lizardfish | 13 | 3 | 16 | 0.09 |
| *Tridentiger trigonocephalus* | chameleon goby | | 18 | 18 | 0.10 |
| *Umbrina roncador* | yellowfin croaker | 13 | 6 | 19 | 0.11 |
| *Urobatis halleri* | round stingray | 300 | 355 | 655 | 3.79 |
| *Zapteryx exasperata* | banded guitarfish | 2 | 1 | 3 | 0.02 |
| **# of species = 52** | | **7,394** | **9,869** | **17,263** | |

**Table 9.** Total biomass (g) of fish species taken in San Diego Bay by sampling period, 2012.

| Scientific Name | Common Name | April 2012 | July 2012 | Total | % |
|---|---|---|---|---|---|
| *Acanthogobius flavimanus* | yellowfin goby | 34 | 10 | 44 | 0.01 |
| *Albula vulpes* | bonefish | 3,060 | 1,000 | 4,060 | 1.17 |
| *Anchoa compressa* | deepbody anchovy | 133 | 52 | 185 | 0.05 |
| *Anchoa delicatissima* | slough anchovy | 738 | 1,625 | 2,363 | 0.68 |
| *Anisotremus davidsonii* | sargo | 880 | | 880 | 0.25 |
| *Atherinops affinis* | topsmelt | 7,681 | 3,766 | 11,446 | 3.29 |
| *Cheilotrema saturnum* | black croaker | 605 | 367 | 972 | 0.28 |
| *Citharichtys stigmaeus* | speckled sanddab | 383 | 30 | 413 | 0.12 |
| *Clevelandia ios* | arrow goby | 109 | 152 | 261 | 0.08 |
| *Cosmocampus arctus* | snubnose pipefish | 1 | | 1 | 0.00 |
| *Cymatogaster aggregata* | shiner perch | 11,076 | 1,390 | 12,466 | 3.58 |
| *Dasyatis dipterura* | diamond stingray | | 5,000 | 5,000 | 1.44 |
| *Embiotoca jacksoni* | black perch | 3,120 | 419 | 3,539 | 1.02 |
| *Fundulus parvipinnis* | California killifish | 18 | 2 | 19 | 0.01 |
| *Gibbonsia elegans* | spotted kelpfish | 103 | 101 | 204 | 0.06 |
| *Gibbonsia metzi* | striped kelpfish | 3 | | 3 | 0.00 |
| *Gymnura marmorata* | California butterfly ray | 13,790 | 1,700 | 15,490 | 4.45 |
| *Halichoeres semicinctus* | rock wrasse | 2 | | 2 | 0.00 |
| *Heterodontus francisci* | horn shark | 1,320 | 1,930 | 3,250 | 0.93 |
| *Heterostichus rostratus* | giant kelpfish | 3,463 | 3,175 | 6,638 | 1.91 |
| *Hippocampus ingens* | Pacific seahorse | 35 | | 35 | 0.01 |
| *Hypsoblennius gentilis* | bay blenny | 2 | 47 | 49 | 0.01 |
| *Hypsopsetta guttulata* | diamond turbot | 2,437 | 1,735 | 4,172 | 1.20 |
| *Hypsurus caryi* | rainbow perch | 20 | | 20 | 0.01 |
| *Ilypnus gilberti* | cheekspot goby | 4 | 1 | 5 | 0.00 |
| *Leptocottus armatus* | staghorn sculpin | 483 | 95 | 578 | 0.17 |
| *Micrometrus minimus* | dwarf surfperch | 2,393 | 1,180 | 3,573 | 1.03 |
| *Mustelus californicus* | gray smoothhound | 3,200 | | 3,200 | 0.92 |
| *Myliobatis californica* | bat ray | 28,810 | 2,475 | 31,285 | 8.99 |
| *Paralabrax clathratus* | kelp bass | 741 | 135 | 876 | 0.25 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 33,398 | 28,894 | 62,292 | 17.89 |
| *Paralabrax nebulifer* | barred sand bass | 1,445 | 744 | 2,189 | 0.63 |
| *Paralichthys californicus* | California halibut | 6,819 | 5,621 | 12,440 | 3.57 |
| *Phanerodon furcatus* | white seaperch | 13 | 16 | 29 | 0.01 |
| *Pleuronichthys decurrens* | curlfin turbot | 20 | | 20 | 0.01 |
| *Pleuronichthys ritteri* | spotted turbot | 1,059 | 1,265 | 2,324 | 0.67 |
| *Porichthys myriaster* | specklefin midshipman | 1,360 | 650 | 2,010 | 0.58 |
| *Quietula y-cauda* | shadow goby | 1 | 2 | 3 | 0.00 |
| *Rhacochilus vacca* | pile perch | 400 | | 400 | 0.11 |
| *Roncador stearnsii* | spotfin croaker | 6,600 | 600 | 7,200 | 2.07 |
| *Sardinops sagax* | Pacific sardine | 100 | 4 | 104 | 0.03 |
| *Scomber japonicus* | Pacific mackerel | 160 | | 160 | 0.05 |
| *Scorpaena guttata* | California scorpionfish | 3,595 | 150 | 3,745 | 1.08 |
| *Seriphus politus* | queenfish | 20 | | 20 | 0.01 |
| *Strongylura exilis* | California needlefish | | 0 | 0 | 0.00 |
| *Symphurus atricauda* | California tonguefish | 95 | 153 | 248 | 0.07 |
| *Syngnathus leptorhynchus* | bay pipefish | 370 | 211 | 581 | 0.17 |
| *Synodus lucioceps* | California lizardfish | 1,142 | 140 | 1,282 | 0.37 |
| *Tridentiger trigonocephalus* | chameleon goby | | 9 | 9 | 0.00 |
| *Umbrina roncador* | yellowfin croaker | 4,275 | 2,190 | 6,465 | 1.86 |
| *Urobatis halleri* | round stingray | 46,368 | 87,847 | 134,215 | 38.55 |
| *Zapteryx exasperata* | banded guitarfish | 1,225 | 200 | 1,425 | 0.41 |
| **# of species = 52** | | **193,107** | **155,079** | **348,187** | |

## *Catch in Bay Depth Strata and Subhabitats*

Of the three bay depth strata (intertidal, nearshore and channel) the greatest catch of fishes was in the intertidal (8,836 individuals from 26 species; Table 10). 7,849 fishes from 46 species were captured in the nearshore stations, and just 575 fishes from 24 species were captured in the channel (Table 10). A total of 10,331 fishes were taken in vegetated areas (Table 11) comprised of 47 of the 52 species captured during the April and July surveys. 6,354 fishes from 42 species were caught in the intertidal non-vegetated areas.

**Topsmelt (*Atherinops affinis*); the most abundant fish in intertidal, vegetated, and non-vegetated sampling**

**Shiner perch (*Cymatogaster aggregata*); the most abundant fish in nearshore sampling**

**Round stingray (*Urobatis halleri*); the most abundant fish in channel sampling**

**Table 10.** Total abundance of fish species taken from San Diego Bay by depth strata, April and July 2012.

| | | Depth Strata | | | |
|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Intertidal** | **Nearshore** | **Channel** | **Total** |
| *Acanthogobius flavimanus* | yellowfin goby | 3 | | | 3 |
| *Albula vulpes* | bonefish | | 11 | | 11 |
| *Anchoa compressa* | deepbody anchovy | 9 | 8 | | 17 |
| *Anchoa delicatissima* | slough anchovy | 303 | 1,158 | 105 | 1,566 |
| *Anisotremus davidsonii* | sargo | | 1 | | 1 |
| *Atherinops affinis* | topsmelt | 6,182 | 323 | 24 | 6,529 |
| *Cheilotrema saturnum* | black croaker | | 9 | 4 | 13 |
| *Citharichtys stigmaeus* | speckled sanddab | 2 | 5 | 42 | 49 |
| *Clevelandia ios* | arrow goby | 1,770 | 665 | 3 | 2,438 |
| *Cosmocampus arctus* | snubnose pipefish | 1 | | | 1 |
| *Cymatogaster aggregata* | shiner perch | 213 | 1,960 | 2 | 2,175 |
| *Dasyatis dipterura* | diamond stingray | | 1 | | 1 |
| *Embiotoca jacksoni* | black perch | 3 | 77 | | 80 |
| *Fundulus parvipinnis* | California killifish | 8 | | | 8 |
| *Gibbonsia elegans* | spotted kelpfish | 2 | 29 | | 31 |
| *Gibbonsia metzi* | striped kelpfish | | 3 | | 3 |
| *Gymnura marmorata* | California butterfly ray | 1 | 3 | 1 | 5 |
| *Halichoeres semicinctus* | rock wrasse | | 1 | | 1 |
| *Heterodontus francisci* | horn shark | | 5 | | 5 |
| *Heterostichus rostratus* | giant kelpfish | 85 | 1,847 | | 1,932 |
| *Hippocampus ingens* | Pacific seahorse | | 1 | | 1 |
| *Hypsoblennius gentilis* | bay blenny | | 3 | | 3 |
| *Hypsopsetta guttulata* | diamond turbot | 15 | 7 | 13 | 35 |
| *Hypsurus caryi* | rainbow perch | 3 | | | 3 |
| *Ilypnus gilberti* | cheekspot goby | 11 | 5 | | 16 |
| *Leptocottus armatus* | staghorn sculpin | 70 | 3 | 1 | 74 |
| *Micrometrus minimus* | dwarf surfperch | 20 | 406 | | 426 |
| *Mustelus californicus* | gray smoothhound | | 3 | | 3 |
| *Myliobatis californica* | bat ray | 4 | 3 | 6 | 13 |
| *Paralabrax clathratus* | kelp bass | | 46 | 2 | 48 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 15 | 256 | 60 | 331 |
| *Paralabrax nebulifer* | barred sand bass | 3 | 27 | 11 | 41 |
| *Paralichthys californicus* | California halibut | 9 | 18 | 52 | 79 |
| *Phanerodon furcatus* | white seaperch | | 4 | | 4 |
| *Pleuronichthys decurrens* | curlfin turbot | | 1 | | 1 |
| *Pleuronichthys ritteri* | spotted turbot | | 2 | 23 | 25 |
| *Porichthys myriaster* | specklefin midshipman | | 7 | 27 | 34 |
| *Quietula y-cauda* | shadow goby | 9 | | | 9 |
| *Rhacochilus vacca* | pile perch | | 6 | | 6 |
| *Roncador stearnsii* | spotfin croaker | | 6 | | 6 |
| *Sardinops sagax* | Pacific sardine | | 1 | 1 | 2 |
| *Scomber japonicus* | Pacific mackerel | | 1 | | 1 |
| *Scorpaena guttata* | California scorpionfish | | 4 | 4 | 5 |
| *Seriphus politus* | queenfish | | 2 | | 2 |
| *Strongylura exilis* | California needlefish | 1 | | | 1 |
| *Symphurus atricauda* | California tonguefish | | 5 | 18 | 23 |
| *Syngnathus leptorhynchus* | bay pipefish | 42 | 445 | 1 | 488 |
| *Synodus lucioceps* | California lizardfish | | 8 | 8 | 16 |
| *Tridentiger trigonocephalus* | chameleon goby | | 15 | 3 | 18 |
| *Umbrina roncador* | yellowfin croaker | | 19 | | 19 |
| *Urobatis halleri* | round stingray | 52 | 437 | 166 | 655 |
| *Zapteryx exasperata* | banded guitarfish | | 2 | 1 | 3 |
| | **Total** | **8,836** | **7,849** | **577** | **17,263** |
| | ***Species Richness*** | ***26*** | ***46*** | ***24*** | ***52*** |

**Table 11.** Total catch of fish species taken from San Diego Bay by subhabitat, April and July 2012.

| | | Subhabitat | | | |
|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Vegetated** | **Non-Vegetated** | **Channel** | **Total** |
| *Acanthogobius flavimanus* | yellowfin goby | 3 | | | 3 |
| *Albula vulpes* | bonefish | 5 | 6 | | 11 |
| *Anchoa compressa* | deepbody anchovy | 13 | 4 | | 17 |
| *Anchoa delicatissima* | slough anchovy | 508 | 953 | 105 | 1,566 |
| *Anisotremus davidsonii* | sargo | 1 | | | 1 |
| *Atherinops affinis* | topsmelt | 3,986 | 2,519 | 24 | 6,529 |
| *Cheilotrema saturnum* | black croaker | 4 | 5 | 4 | 13 |
| *Citharichtys stigmaeus* | speckled sanddab | 3 | 4 | 42 | 49 |
| *Clevelandia ios* | arrow goby | 1,828 | 607 | 3 | 2,438 |
| *Cosmocampus arctus* | snubnose pipefish | 1 | | | 1 |
| *Cymatogaster aggregata* | shiner perch | 1,735 | 438 | 2 | 2,175 |
| *Dasyatis dipterura* | diamond stingray | 1 | | | 1 |
| *Embiotoca jacksoni* | black perch | 41 | 39 | | 80 |
| *Fundulus parvipinnis* | California killifish | 6 | 2 | | 8 |
| *Gibbonsia elegans* | spotted kelpfish | 25 | 6 | | 31 |
| *Gibbonsia metzi* | striped kelpfish | 2 | 1 | | 3 |
| *Gymnura marmorata* | California butterfly ray | 3 | 1 | 1 | 5 |
| *Halichoeres semicinctus* | rock wrasse | | 1 | | 1 |
| *Heterodontus francisci* | horn shark | 3 | 2 | | 5 |
| *Heterostichus rostratus* | giant kelpfish | 791 | 1,141 | | 1,932 |
| *Hippocampus ingens* | Pacific seahorse | | 1 | | 1 |
| *Hypsoblennius gentilis* | bay blenny | 2 | 1 | | 3 |
| *Hypsopsetta guttulata* | diamond turbot | 19 | 3 | 13 | 35 |
| *Hypsurus caryi* | rainbow perch | 3 | | | 3 |
| *Ilypnus gilberti* | cheekspot goby | 11 | 5 | | 16 |
| *Leptocottus armatus* | staghorn sculpin | 51 | 22 | 1 | 74 |
| *Micrometrus minimus* | dwarf surfperch | 331 | 95 | | 426 |
| *Mustelus californicus* | gray smoothhound | | 3 | | 3 |
| *Myliobatis californica* | bat ray | 4 | 3 | 6 | 13 |
| *Paralabrax clathratus* | kelp bass | 20 | 26 | 2 | 48 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 191 | 80 | 60 | 331 |
| *Paralabrax nebulifer* | barred sand bass | 14 | 16 | 11 | 41 |
| *Paralichthys californicus* | California halibut | 18 | 9 | 52 | 79 |
| *Phanerodon furcatus* | white seaperch | 4 | | | 4 |
| *Pleuronichthys decurrens* | curlfin turbot | 1 | | | 1 |
| *Pleuronichthys ritteri* | spotted turbot | 1 | 1 | 23 | 25 |
| *Porichthys myriaster* | specklefin midshipman | 2 | 5 | 27 | 34 |
| *Quietula y-cauda* | shadow goby | 8 | 1 | | 9 |
| *Rhacochilus vacca* | pile perch | 6 | | | 6 |
| *Roncador stearnsii* | spotfin croaker | 5 | 1 | | 6 |
| *Sardinops sagax* | Pacific sardine | | 1 | 1 | 2 |
| *Scomber japonicus* | Pacific mackerel | | 1 | | 1 |
| *Scorpaena guttata* | California scorpionfish | 4 | | 4 | 5 |
| *Seriphus politus* | queenfish | 1 | 1 | | 2 |
| *Strongylura exilis* | California needlefish | 1 | | | 1 |
| *Symphurus atricauda* | California tonguefish | 1 | 4 | 18 | 23 |
| *Syngnathus leptorhynchus* | bay pipefish | 285 | 202 | 1 | 488 |
| *Synodus lucioceps* | California lizardfish | 5 | 3 | 8 | 16 |
| *Tridentiger trigonocephalus* | chameleon goby | 9 | 6 | 3 | 18 |
| *Umbrina roncador* | yellowfin croaker | 11 | 8 | | 19 |
| *Urobatis halleri* | round stingray | 363 | 126 | 166 | 655 |
| *Zapteryx exasperata* | banded guitarfish | 1 | 1 | 1 | 3 |
| | **Total** | **10,331** | **6,354** | **578** | **17,263** |
| | ***Species Richness*** | ***47*** | ***42*** | ***24*** | ***52*** |

## *Nursery Area Function*

San Diego Bay continues to be a nursery area for the great majority of the fishes found there. Approximately 81% of all fishes sampled in San Diego Bay were juveniles (Table 12). In terms of percent juveniles captured, four of the top ten species (topsmelt, California halibut, kelp bass and barred sand bass) are all critical commercial or recreational species. The high catch of juvenile fishes in the bay highlights the continued importance of San Diego Bay as a nursery area for bay, estuarine, and nearshore species

**Table 12.** Percent of juveniles taken of the top 30 species of fish from San Diego Bay, 2012.

| Scientific Name | Common Name | % Juveniles |
|---|---|---|
| *Urobatis halleri* | round stingray | 100 |
| *Paralichthys californicus* | California halibut | 100 |
| *Leptocottus armatus* | staghorn sculpin | 100 |
| *Citharichtys stigmaeus* | speckled sanddab | 100 |
| *Myliobatis californica* | bat ray | 100 |
| *Heterostichus rostratus* | giant kelpfish | 98.7 |
| *Paralabrax clathratus* | kelp bass | 97.9 |
| *Atherinops affinis* | topsmelt | 96.8 |
| *Synodus lucioceps* | California lizardfish | 93.8 |
| *Paralabrax nebulifer* | barred sand bass | 92.7 |
| *Gibbonsia elegans* | spotted kelpfish | 90.3 |
| *Quietula y-cauda* | shadow goby | 88.9 |
| *Symphurus atricauda* | California tonguefish | 82.6 |
| *Embiotoca jacksoni* | black perch | 78.8 |
| *Cymatogaster aggregata* | shiner perch | 75.7 |
| *Cheilotrema saturnum* | black croaker | 69.2 |
| *Clevelandia ios* | arrow goby | 62.1 |
| *Porichthys myriaster* | specklefin midshipman | 58.8 |
| *Syngnathus leptorhynchus* | bay pipefish | 57.2 |
| *Tridentiger trigonocephalus* | chameleon goby | 55.6 |
| *Fundulus parvipinnis* | California killifish | 50.0 |
| *Anchoa delicatissima* | slough anchovy | 48.3 |
| *Micrometrus minimus* | dwarf surfperch | 48.1 |
| *Hypsopsetta guttulata* | diamond turbot | 45.7 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 33.1 |
| *Ilypnus gilberti* | cheekspot goby | 25.0 |
| *Pleuronichthys ritteri* | spotted turbot | 20.0 |
| *Umbrina roncador* | yellowfin croaker | 5.3 |
| *Anchoa compressa* | deepbody anchovy | 0.0 |
| *Albula vulpes* | bonefish | 0.0 |
| | **Total** | **80.7** |

## *Ecological Importance of Species*

An index of ecological importance was also calculated to estimate the relative importance of each species within the bay assemblage. An Ecological Index (E.I.) was determined using the total catch for each species during this study and incorporated three significant ecological variables: % Number, % Weight, and % Frequency of Occurrence, by Ecoregion and month (E.I. = (%N + % Wt) * % F.O; Table 13). This index is indicative of the importance of each species to the energy flow within the San Diego Bay ecosystem. Round stingray ranked first with an E.I. of 4,234, topsmelt ranked second (E.I. 4,110), and spotted sand bass ranked third (E.I. 1,981). All three species were found ubiquitously throughout the bay; round stingray and spotted sand bass were dominant in terms of biomass and topsmelt in terms of numerical abundance. These species were followed by shiner perch (E.I. 1,617) and arrow goby (E.I. 1,419; Figure 13).

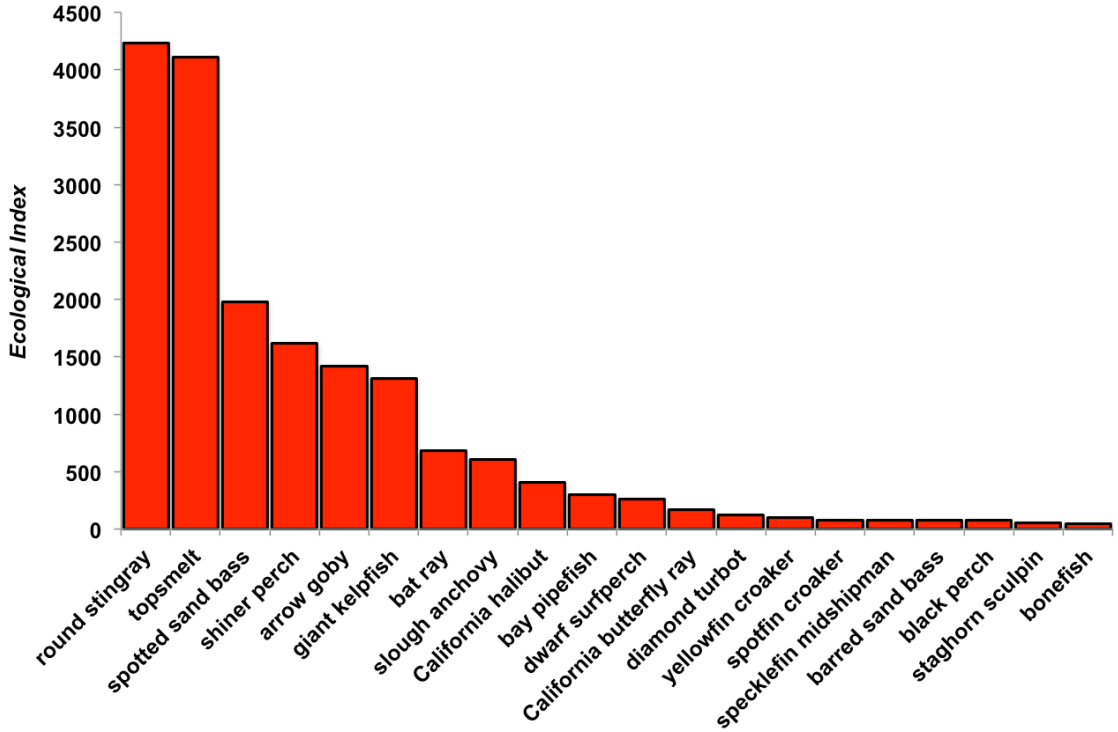



**Figure 13.** Top 20 species of San Diego Bay fishes ranked by Ecological Index, April and July 2012.

**Spotted sand bass (*Paralabrax maculatofasciatus*) was ranked 3rd in ecological importance in San Diego Bay in 2012.**

**Table 13.** Relative abundance, relative biomass, frequency of occurrence, and Ecological Index (E.I.) of San Diego Bay fishes, April and July, 2012.

| Rank | Scientific Name | Common Name | % Abundance | % Biomass | Frequency | E.I. |
|---|---|---|---|---|---|---|
| 1 | *Urobatis halleri* | round stingray | 3.79 | 38.55 | 100 | 4234.10 |
| 2 | *Atherinops affinis* | topsmelt | 37.82 | 3.29 | 100 | 4110.82 |
| 3 | *Paralabrax maculatofasciatus* | spotted sand bass | 1.92 | 17.89 | 100 | 1981.36 |
| 4 | *Cymatogaster aggregata* | shiner perch | 12.59 | 3.58 | 100 | 1617.36 |
| 5 | *Clevelandia ios* | arrow goby | 14.12 | 0.08 | 100 | 1419.77 |
| 6 | *Heterostichus rostratus* | giant kelpfish | 11.19 | 1.91 | 100 | 1309.80 |
| 7 | *Myliobatis californica* | bat ray | 0.08 | 8.99 | 75 | 679.53 |
| 8 | *Anchoa delicatissima* | slough anchovy | 9.07 | 0.68 | 62.5 | 609.37 |
| 9 | *Paralichthys californicus* | California halibut | 0.46 | 3.57 | 100 | 403.03 |
| 10 | *Syngnathus leptorhynchus* | bay pipefish | 2.83 | 0.17 | 100 | 299.36 |
| 11 | *Micrometrus minimus* | dwarf surfperch | 2.47 | 1.03 | 75 | 262.04 |
| 12 | *Gymnura marmorata* | California butterfly ray | 0.03 | 4.45 | 37.5 | 167.91 |
| 13 | *Hypsopsetta guttulata* | diamond turbot | 0.20 | 1.20 | 87.5 | 122.59 |
| 14 | *Umbrina roncador* | yellowfin croaker | 0.11 | 1.86 | 50 | 98.34 |
| 15 | *Roncador stearnsii* | spotfin croaker | 0.03 | 2.07 | 37.5 | 78.85 |
| 16 | *Porichthys myriaster* | specklefin midshipman | 0.20 | 0.58 | 100 | 77.43 |
| 17 | *Paralabrax nebulifer* | barred sand bass | 0.24 | 0.63 | 87.5 | 75.79 |
| 18 | *Embiotoca jacksoni* | black perch | 0.46 | 1.02 | 50 | 73.99 |
| 19 | *Leptocottus armatus* | staghorn sculpin | 0.43 | 0.17 | 87.5 | 52.02 |
| 20 | *Albula vulpes* | bonefish | 0.06 | 1.17 | 37.5 | 46.12 |
| 21 | *Pleuronichthys ritteri* | spotted turbot | 0.14 | 0.67 | 50 | 40.61 |
| 22 | *Heterodontus francisci* | horn shark | 0.03 | 0.93 | 37.5 | 36.09 |
| 23 | *Scorpaena guttata* | California scorpionfish | 0.05 | 1.08 | 25 | 28.05 |
| 24 | *Paralabrax clathratus* | kelp bass | 0.28 | 0.25 | 50 | 26.48 |
| 25 | *Synodus lucioceps* | California lizardfish | 0.09 | 0.37 | 50 | 23.04 |
| 26 | *Citharichtys stigmaeus* | speckled sanddab | 0.28 | 0.12 | 50 | 20.12 |
| 27 | *Dasyatis dipterura* | diamond stingray | 0.01 | 1.44 | 12.5 | 18.02 |
| 28 | *Gibbonsia elegans* | spotted kelpfish | 0.18 | 0.06 | 75 | 17.86 |
| 29 | *Cheilotrema saturnum* | black croaker | 0.08 | 0.28 | 50 | 17.72 |
| 30 | *Mustelus californicus* | gray smoothhound | 0.02 | 0.92 | 12.5 | 11.71 |
| 31 | *Zapteryx exasperata* | banded guitarfish | 0.02 | 0.41 | 25 | 10.67 |
| 32 | *Symphurus atricauda* | California tonguefish | 0.13 | 0.07 | 50 | 10.22 |
| 33 | *Anchoa compressa* | deepbody anchovy | 0.10 | 0.05 | 62.5 | 9.48 |
| 34 | *Tridentiger trigonocephalus* | chameleon goby | 0.10 | 0.00 | 37.5 | 4.01 |
| 35 | *Ilypnus gilberti* | cheekspot goby | 0.09 | 0.00 | 37.5 | 3.53 |
| 36 | *Anisotremus davidsonii* | sargo | 0.01 | 0.25 | 12.5 | 3.23 |
| 37 | *Fundulus parvipinnis* | California killifish | 0.05 | 0.01 | 50 | 2.60 |
| 38 | *Rhacochilus vacca* | pile perch | 0.03 | 0.11 | 12.5 | 1.87 |
| 39 | *Quietula y-cauda* | shadow goby | 0.05 | 0.00 | 25 | 1.32 |
| 40 | *Hypsoblennius gentilis* | bay blenny | 0.02 | 0.01 | 37.5 | 1.18 |
| 41 | *Sardinops sagax* | Pacific sardine | 0.01 | 0.03 | 25 | 1.04 |
| 42 | *Phanerodon furcatus* | white seaperch | 0.02 | 0.01 | 25 | 0.78 |
| 43 | *Acanthogobius flavimanus* | yellowfin goby | 0.02 | 0.01 | 25 | 0.75 |
| 44 | *Scomber japonicus* | Pacific mackerel | 0.01 | 0.05 | 12.5 | 0.65 |
| 45 | *Seriphus politus* | queenfish | 0.01 | 0.01 | 25 | 0.43 |
| 46 | *Hypsurus caryi* | rainbow perch | 0.02 | 0.01 | 12.5 | 0.29 |
| 47 | *Gibbonsia metzi* | striped kelpfish | 0.02 | 0.00 | 12.5 | 0.23 |
| 48 | *Hippocampus ingens* | Pacific seahorse | 0.01 | 0.01 | 12.5 | 0.20 |
| 49 | *Pleuronichthys decurrens* | curlfin turbot | 0.01 | 0.01 | 12.5 | 0.14 |
| 50 | *Halichoeres semicinctus* | rock wrasse | 0.01 | 0.00 | 12.5 | 0.08 |
| 51 | *Cosmocampus arctus* | snubnose pipefish | 0.01 | 0.00 | 12.5 | 0.08 |
| 52 | *Strongylura exilis* | California needlefish | 0.01 | 0.00 | 12.5 | 0.07 |

## *Principle species*

**Round stingray (*Urobatis halleri*)**

Round stingray was ranked as the most ecologically important in San Diego Bay. This species was ubiquitous throughout the bay during these surveys, and were found in all sampling periods, ecoregions, depth strata and habitats. Despite only having the sixth highest numerical abundance, they account for 38.6% of the total biomass captured during the surveys – more than twice the biomass of any other single species. They were no large adult round stingray captured during this period (Figure 14). The bay is a well known nursery area for this critical species.

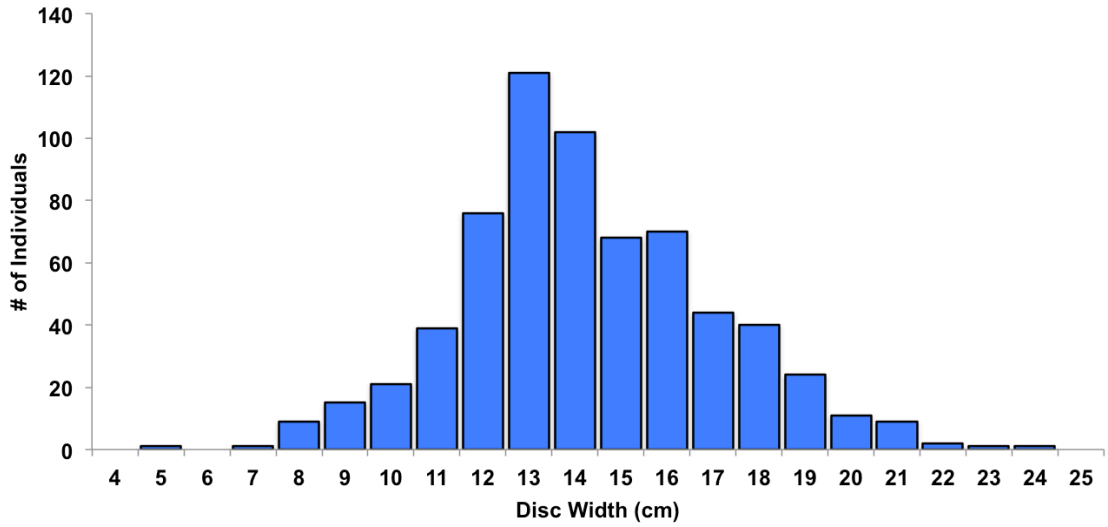



**Figure 14.** Total number of round stingray individuals by disc width (cm) from San Diego Bay, April and July 2012.

**Topsmelt (*Atherinops affinis*)**

The most predominant forage fish in the bay in 2012 was topsmelt. This species was ubiquitous throughout the bay during these surveys, and were found in all sampling periods, ecoregions, depth strata and habitats. The catch of topsmelt was primarily small individuals (2-5 cm SL) with a much less abundant set of fishes present in the 9-14 cm SL size range (Figure 15). Topsmelt were caught primarily in the intertidal depth strata, with very few individuals captured in the channel. While they were observed in all four ecoregions, the highest catches were in the North and North-Central Ecoregions.

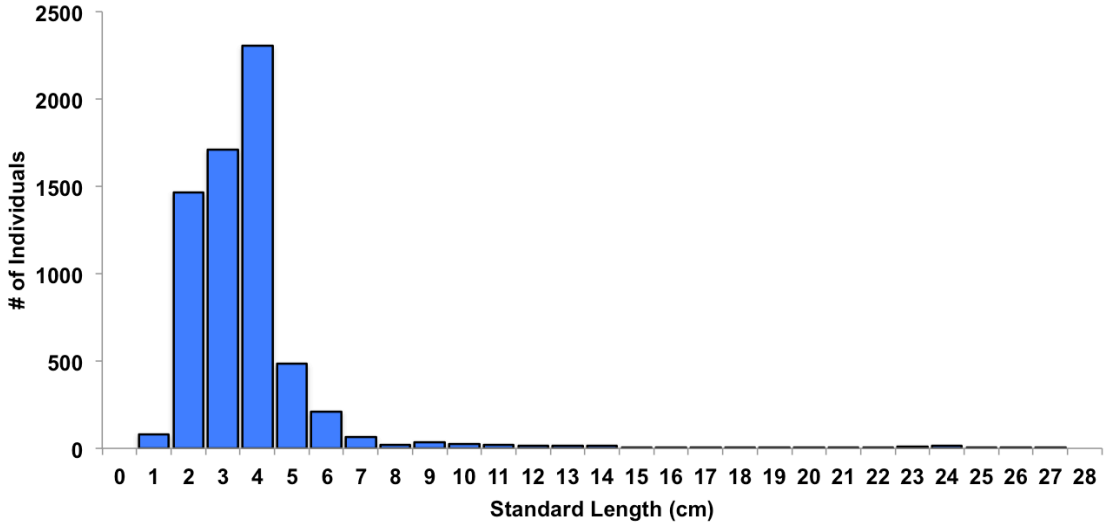



**Figure 15.** Total number of topsmelt individuals by standard length (cm) from San Diego Bay, April and July 2012.

**Spotted sand bass (*Paralabrax maculatofasciatus*)**

Spotted sand bass are the ubiquitous mesocarnivore in San Diego Bay. In 2012, they ranked third in Ecological Index – a product of having the second highest biomass despite only having the ninth highest numerical abundance. This important recreational fish species primarily utilizes bays and estuaries along the Southern California coastline. There was a bimodal distribution in size classes of spotted sand bass (Figure 16) indicating the presence of both juveniles and adult fish.

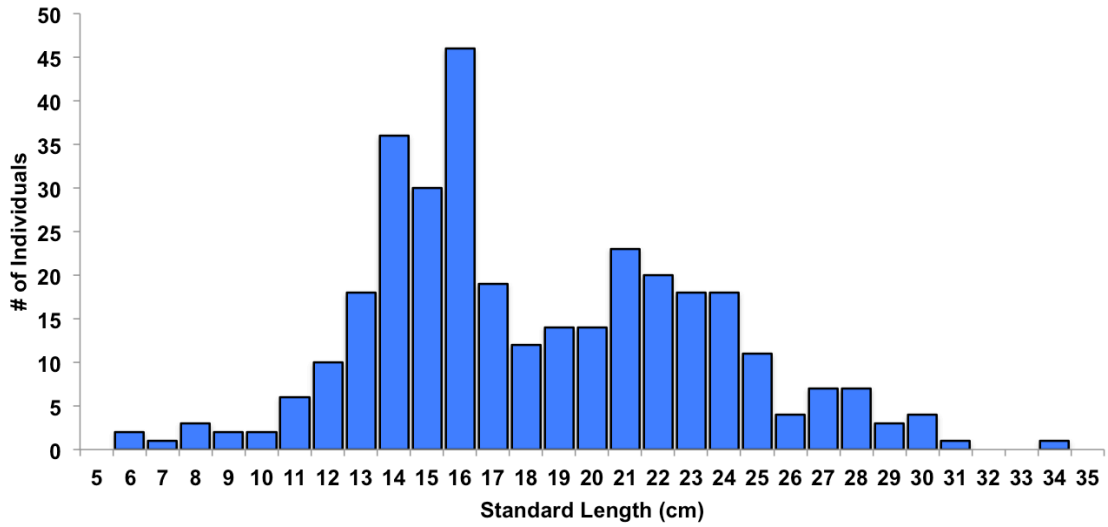



**Figure 16.** Total number of spotted sand bass individuals by standard length (cm) from San Diego Bay, April and July 2012.

**Shiner perch (*Cymatogaster aggregata*)**

Shiner perch ranked fourth in the Ecological Index. They were found in all ecoregions, depth strata and habitats. But, like topsmelt, there were very few individuals (2) found in the channel stations. Adult shiner perch, which live offshore, are known to utilize the bay for reproduction. Thus the bimodal distribution (Figure 17) is an indication of this life history pattern. Some larger individuals were present, but the bulk of the stock was young fishes that were typically associated with eelgrass beds in the North-Central, South-Central, and South Ecoregions.

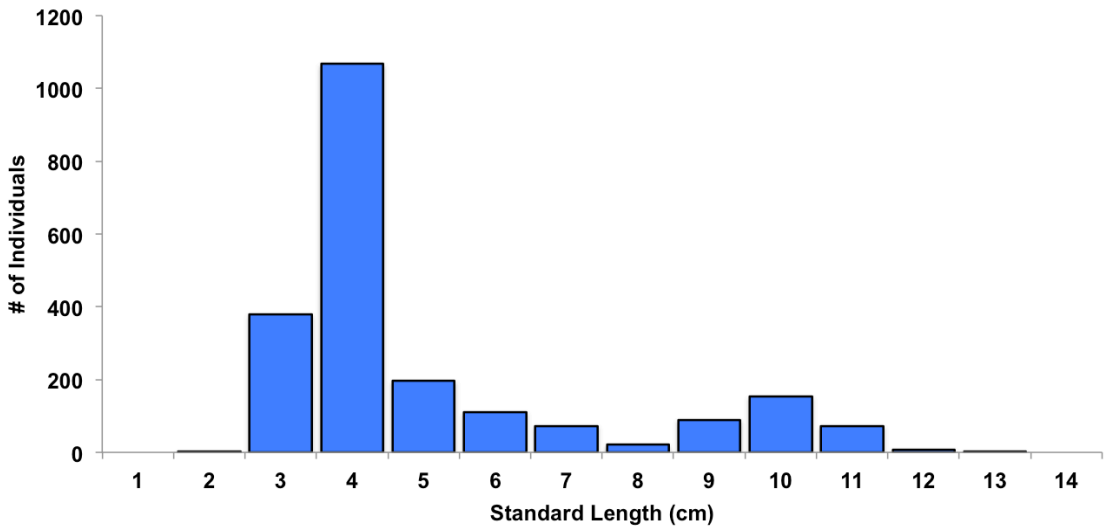



**Figure 17.** Total number of shiner perch individuals by standard length (cm) from San Diego Bay, April and July 2012.

**Arrow goby (*Clevelandia ios*)**

Arrow gobies were found in all of the ecoregions, but like shiner perch and topsmelt, very few (3) were found at channel stations. These small fish (Figure 18) were more abundant in the vegetated (1,828) versus non-vegetated (607) stations. They were the second most abundant fish in the survey comprising 14.1% of the catch, but due to their small size only 0.08% of the biomass.

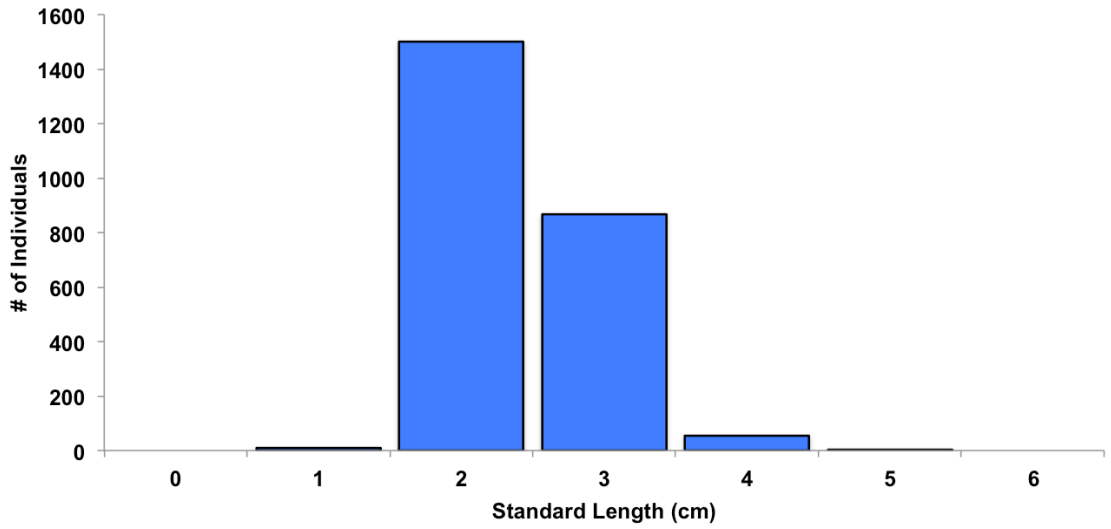



**Figure 18.** Total number of arrow goby individuals by standard length (cm) from San Diego Bay, April and July 2012.

**Giant kelpfish (*Heterostichus rostratus*)**

Giant kelpfish were present in all ecoregions, though mostly in the North and North-Central Ecoregions. They were found in both vegetated and non-vegetated habitats in the nearshore and intertidal depth strata (though not at any channel stations), however, more than 20 times the number of individuals was taken in the nearshore strata (1,847) than the intertidal (85). 98.7% of the giant kelpfish captured were juveniles, and all but one individual (35 cm SL) were less than 20 cm SL (Figure 19).

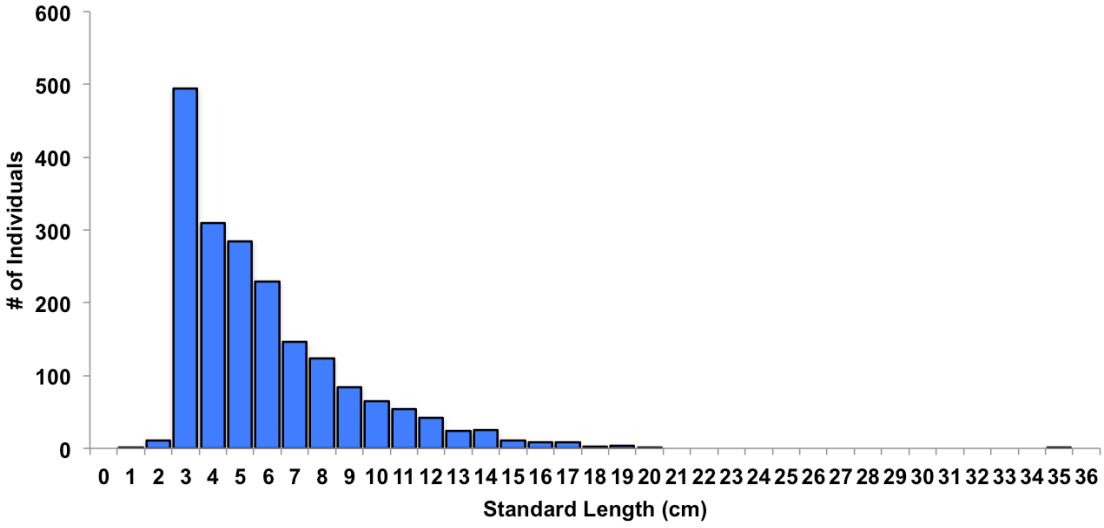
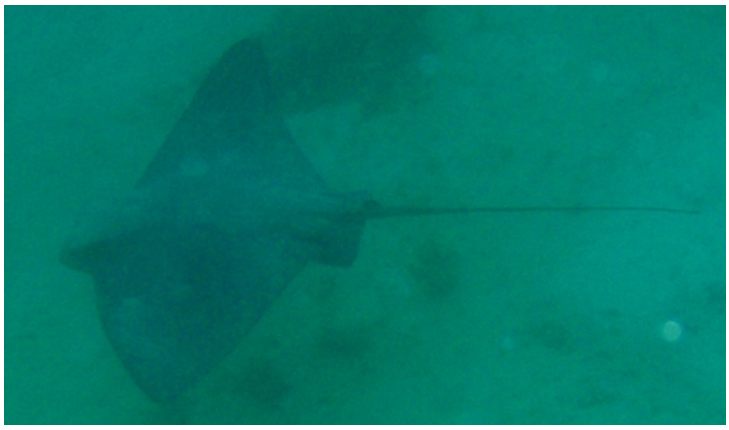



**Figure 19.** Total number of giant kelpfish individuals by standard length (cm) from San Diego Bay, April and July 2012.

**Bat ray (*Myliobatis californica*)**



Though only 13 individuals were captured during the entire survey accounting for only 0.08% of the numerical abundance, this species ranked seventh in Ecological Index by accounting for nearly 9% of the total biomass and being caught in the three southernmost ecoregions during both survey periods. They were caught in all depth strata and habitats, though not found in the North Ecoregion. The largest of the species were captured by purse seine in the channel during the April sampling period, with the smallest being captured by beach seine in the intertidal during the July sampling period (Figure 20). Given that bat rays range from 20-31 cm disc width (DW) at birth and may reach sexual maturity at 62 cm DW (Martin and Cailliet 1988), these catches may provide evidence that the large individuals enter the South and South-Central Ecoregions during the spring to breed and pup, and the pups are the individuals caught during the July sampling period.

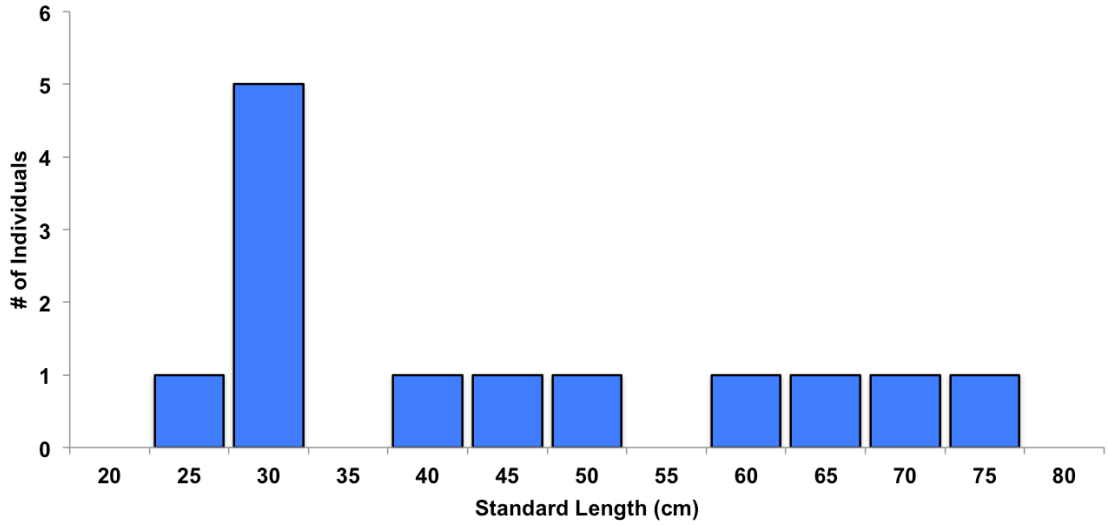



**Figure 20.** Total number of bat ray individuals by disc width (cm) from San Diego Bay, April and July 2012.

**Slough anchovy (*Anchoa delicatissima*)**

This species was ranked eighth in terms of Ecological Index, because it was the fifth highest catch (9.07%) during the 2012 surveys – far lower than the 35.3% in 2008. They were present at all habitats and depth strata, though not found in the North Ecoregion. This previously dominant species appeared to be replaced by topsmelt during this study period. Nearly all of the slough anchovies were less than 70 mm SL and had a bimodal distribution (Figure 21). The entirety of the catch smaller than 5 cm SL was from the July sampling period when young-of-the-year were present suggesting that these two peaks in size distribution are indeed two different cohorts and not an artifact of temporal sampling.

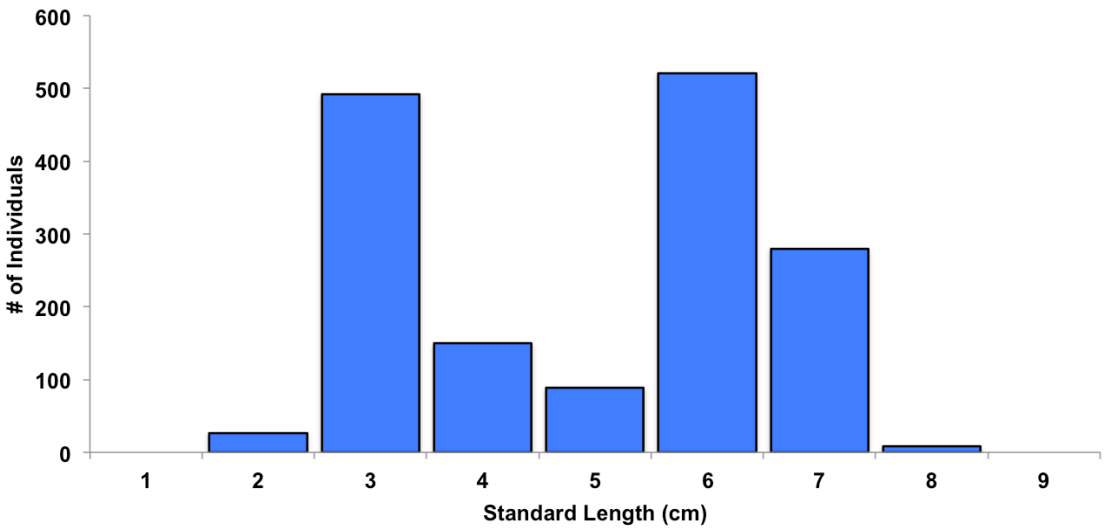
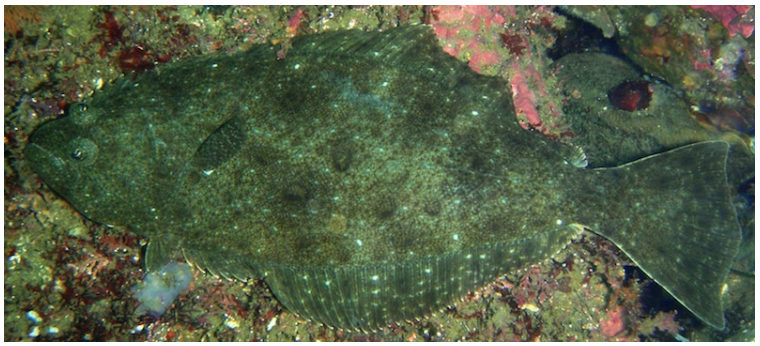



**Figure 21.** Total number of slough anchovy individuals by standard length (cm) from San Diego Bay, April and July 2012.

**California halibut (*Paralichthys californicus*)**



California halibut are known to recruit to estuaries and move in and out of them as adults. Our findings are consistent with this life history strategy. A few larger individuals of this commercially and recreationally important species were captured, but primarily the bay serves as a nursery area for young halibut that were found throughout the bay in every depth strata and habitat (Figure 22).

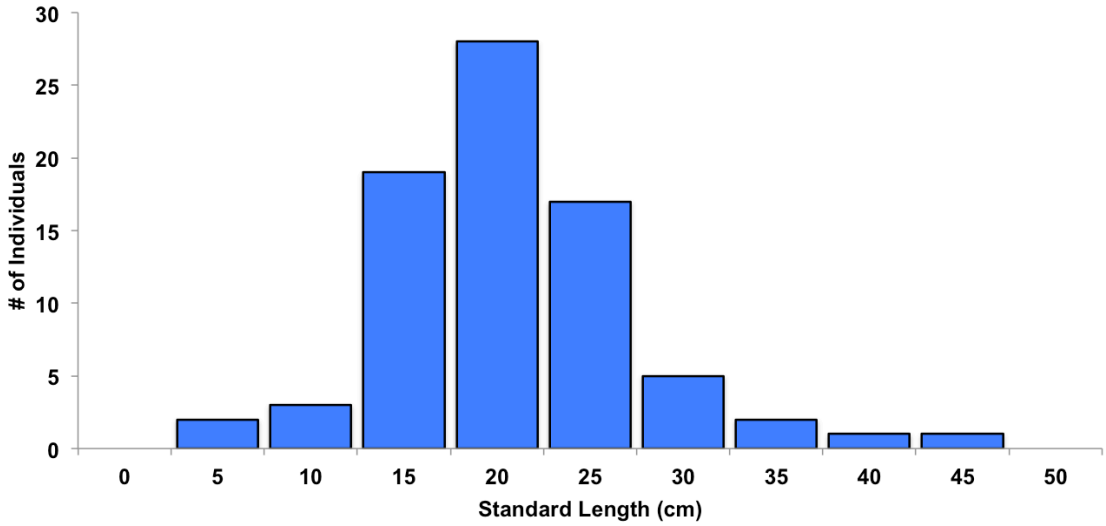



**Figure 22.** Total number of California halibut individuals by standard length (cm) from San Diego Bay, April and July 2012.

**Bay pipefish (*Syngnathus leptorhynchus*)**

Bay pipefish ranked tenth in the Ecological Index, and a total of 488 bay pipefish were surveyed in all four ecoregions. In addition to being found in all four ecoregions, they were also found in all habitats and depth strata, however only a single individual was captured in the channel. Bay pipefish were caught far more frequently at nearshore stations (445) than in the intertidal stations (42). The distribution of size classes (Figure 23) indicates that all age classes were present during this sampling period.

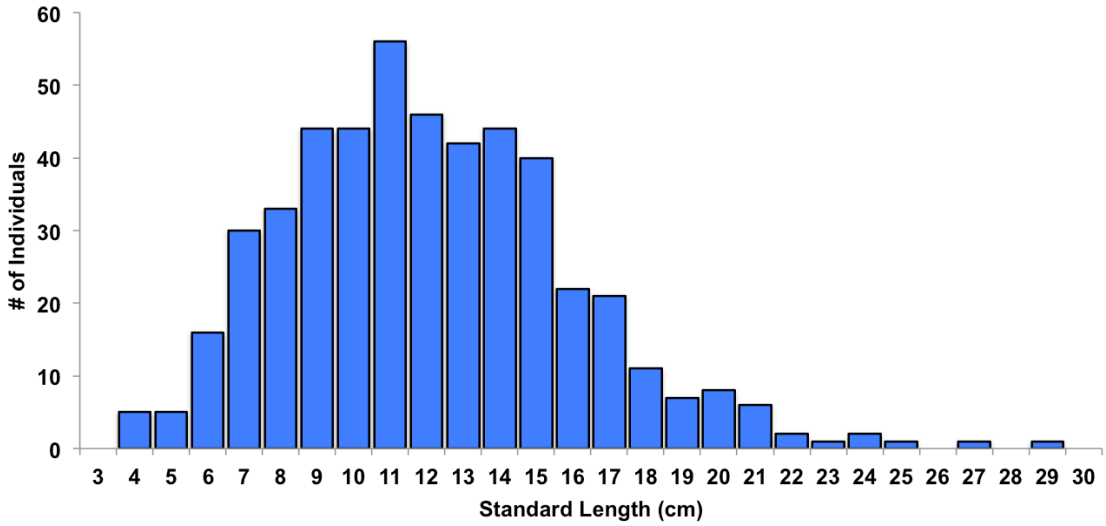



**Figure 23.** Standard length (SL) versus total catch (# individuals) of bay pipefish.

## *Catch by Sampling Method*

The greatest number of species were collected in the purse seines (39 species each), followed by beam trawl (29), large seine (24), otter trawl (21), small seine (15) and square enclosure (9) (Tables 14 and 15). The beam trawl captured the greatest number of fish, catching a total of 5,379. Large numbers of fishes were also caught by the small seine (4,938), large seine (3,864) and purse seine (2,592). Catches in the otter trawl were smaller (456) and only 34 fishes were collected in the square enclosure (Table 14). The greatest amount of biomass was captured in the purse seine (169.4 kg), with high biomass also captured in the beam trawl (100.2 kg) and otter trawl (59.5 kg). The large seine (15.9 kg) and small seine (3.1 kg) captured lower amounts of biomass, and the square enclosure only captured 99 g of fishes (Table 15).

**Retrieving the purse seine in the South-Central Ecoregion, July 2012**

The purse seine was most effective sampling the schooling fishes (slough anchovy, shiner perch, and topsmelt). The beam trawl was most effective for catching benthic nearshore and eelgrass fishes (arrow goby, shiner perch, and giant kelpfish). The square enclosure primarily caught arrow gobies. The large and small beach seines were particularly effective at catching topsmelt. The top species caught in the otter trawls was round stingray. The highest density of fishes was captured in the small seine (1.659 individuals/$m^2$) followed by the square enclosure (0.708 individuals/$m^2$; Table 16). The purse seines and beam trawls produced the highest biomass values (7.95 g/$m^2$ and 7.20 g/$m^2$, respectively). The square enclosures captured the third highest biomass value (2.06 g/$m^2$) mainly due to the capture of two juvenile spotted sand bass. The large and small beach seines produced similar amounts of biomass (1.50 and 1.04 g/$m^2$, respectively), and the otter trawls produced the smallest amount of biomass (0.684 g/$m^2$; Table 16).

**Table 14.** Total catch (# of individuals) of fish species taken in San Diego Bay, April and July 2012, by sampling method.

| BEAM TRAWL | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **#** | **%** |
| *Heterostichus rostratus* | giant kelpfish | 1,804 | 33.54 |
| *Cymatogaster aggregata* | shiner perch | 1,001 | 18.61 |
| *Clevelandia ios* | arrow goby | 664 | 12.34 |
| *Anchoa delicatissima* | slough anchovy | 602 | 11.19 |
| *Syngnathus leptorhynchus* | bay pipefish | 436 | 8.11 |
| *Micrometrus minimus* | dwarf surfperch | 378 | 7.03 |
| *Urobatis halleri* | round stingray | 225 | 4.18 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 64 | 1.19 |
| *Embiotoca jacksoni* | black perch | 54 | 1.00 |
| *Paralabrax clathratus* | kelp bass | 33 | 0.61 |
| *Gibbonsia elegans* | spotted kelpfish | 27 | 0.50 |
| *Paralabrax nebulifer* | barred sand bass | 23 | 0.43 |
| *Tridentiger trigonocephalus* | chameleon goby | 15 | 0.28 |
| *Atherinops affinis* | topsmelt | 7 | 0.13 |
| *Cheilotrema saturnum* | black croaker | 7 | 0.13 |
| *Ilypnus gilberti* | cheekspot goby | 5 | 0.09 |
| *Paralichthys californicus* | California halibut | 5 | 0.09 |
| *Heterodontus francisci* | horn shark | 4 | 0.07 |
| *Scorpaena guttata* | California scorpionfish | 4 | 0.07 |
| *Gibbonsia metzi* | striped kelpfish | 3 | 0.06 |
| *Hypsoblennius gentilis* | bay blenny | 3 | 0.06 |
| *Phanerodon furcatus* | white seaperch | 3 | 0.06 |
| *Porichthys myriaster* | specklefin midshipman | 3 | 0.06 |
| *Gymnura marmorata* | California butterfly ray | 2 | 0.04 |
| *Leptocottus armatus* | staghorn sculpin | 2 | 0.04 |
| *Zapteryx exasperata* | banded guitarfish | 2 | 0.04 |
| *Citharichtys stigmaeus* | speckled sanddab | 1 | 0.02 |
| *Halichoeres semicinctus* | rock wrasse | 1 | 0.02 |
| *Hypsopsetta guttulata* | diamond turbot | 1 | 0.02 |
| | **Total** | **5,379** | |
| | **# of species** | 29 | |

| OTTER TRAWL | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **#** | **%** |
| *Urobatis halleri* | round stingray | 158 | 34.65 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 51 | 11.18 |
| *Paralichthys californicus* | California halibut | 51 | 11.18 |
| *Citharichtys stigmaeus* | speckled sanddab | 42 | 9.21 |
| *Anchoa delicatissima* | slough anchovy | 34 | 7.46 |
| *Porichthys myriaster* | specklefin midshipman | 27 | 5.92 |
| *Pleuronichthys ritteri* | spotted turbot | 23 | 5.04 |
| *Symphurus atricauda* | California tonguefish | 18 | 3.95 |
| *Hypsopsetta guttulata* | diamond turbot | 13 | 2.85 |
| *Paralabrax nebulifer* | barred sand bass | 11 | 2.41 |
| *Synodus lucioceps* | California lizardfish | 8 | 1.75 |
| *Cheilotrema saturnum* | black croaker | 4 | 0.88 |
| *Scorpaena guttata* | California scorpionfish | 4 | 0.88 |
| *Clevelandia ios* | arrow goby | 3 | 0.66 |
| *Tridentiger trigonocephalus* | chameleon goby | 3 | 0.66 |
| *Atherinops affinis* | topsmelt | 1 | 0.22 |
| *Cymatogaster aggregata* | shiner perch | 1 | 0.22 |
| *Gymnura marmorata* | California butterfly ray | 1 | 0.22 |
| *Leptocottus armatus* | staghorn sculpin | 1 | 0.22 |
| *Myliobatis californica* | bat ray | 1 | 0.22 |
| *Zapteryx exasperata* | banded guitarfish | 1 | 0.22 |
| | **Total** | **456** | |
| | **# of species** | 21 | |

| PURSE SEINE | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **#** | **%** |
| *Cymatogaster aggregata* | shiner perch | 959 | 37.00 |
| *Anchoa delicatissima* | slough anchovy | 627 | 24.19 |
| *Atherinops affinis* | topsmelt | 339 | 13.08 |
| *Urobatis halleri* | round stingray | 220 | 8.49 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 202 | 7.79 |
| *Heterostichus rostratus* | giant kelpfish | 43 | 1.66 |
| *Micrometrus minimus* | dwarf surfperch | 28 | 1.08 |
| *Embiotoca jacksoni* | black perch | 23 | 0.89 |
| *Umbrina roncador* | yellowfin croaker | 19 | 0.73 |
| *Paralabrax clathratus* | kelp bass | 15 | 0.58 |
| *Paralichthys californicus* | California halibut | 14 | 0.54 |
| *Albula vulpes* | bonefish | 11 | 0.42 |
| *Syngnathus leptorhynchus* | bay pipefish | 10 | 0.39 |
| *Anchoa compressa* | deepbody anchovy | 8 | 0.31 |
| *Myliobatis californica* | bat ray | 8 | 0.31 |
| *Synodus lucioceps* | California lizardfish | 8 | 0.31 |
| *Hypsopsetta guttulata* | diamond turbot | 6 | 0.23 |
| *Rhacochilus vacca* | pile perch | 6 | 0.23 |
| *Roncador stearnsii* | spotfin croaker | 6 | 0.23 |
| *Symphurus atricauda* | California tonguefish | 5 | 0.19 |
| *Citharichtys stigmaeus* | speckled sanddab | 4 | 0.15 |
| *Paralabrax nebulifer* | barred sand bass | 4 | 0.15 |
| *Porichthys myriaster* | specklefin midshipman | 4 | 0.15 |
| *Mustelus californicus* | gray smoothhound | 3 | 0.12 |
| *Cheilotrema saturnum* | black croaker | 2 | 0.08 |
| *Gibbonsia elegans* | spotted kelpfish | 2 | 0.08 |
| *Pleuronichthys ritteri* | spotted turbot | 2 | 0.08 |
| *Sardinops sagax* | Pacific sardine | 2 | 0.08 |
| *Seriphus politus* | queenfish | 2 | 0.08 |
| *Anisotremus davidsonii* | sargo | 1 | 0.04 |
| *Clevelandia ios* | arrow goby | 1 | 0.04 |
| *Dasyatis dipterura* | diamond stingray | 1 | 0.04 |
| *Gymnura marmorata* | California butterfly ray | 1 | 0.04 |
| *Heterodontus francisci* | horn shark | 1 | 0.04 |
| *Hippocampus ingens* | Pacific seahorse | 1 | 0.04 |
| *Leptocottus armatus* | staghorn sculpin | 1 | 0.04 |
| *Phanerodon furcatus* | white seaperch | 1 | 0.04 |
| *Pleuronichthys decurrens* | curlfin turbot | 1 | 0.04 |
| *Scomber japonicus* | Pacific mackerel | 1 | 0.04 |
| | **Total** | **2,592** | |
| | **# of species** | 39 | |

**Table 14** (continued).

| LARGE SEINE | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **#** | **%** |
| *Atherinops affinis* | topsmelt | 2,998 | 77.59 |
| *Anchoa delicatissima* | slough anchovy | 244 | 6.31 |
| *Cymatogaster aggregata* | shiner perch | 206 | 5.33 |
| *Clevelandia ios* | arrow goby | 144 | 3.73 |
| *Heterostichus rostratus* | giant kelpfish | 76 | 1.97 |
| *Leptocottus armatus* | staghorn sculpin | 44 | 1.14 |
| *Urobatis halleri* | round stingray | 40 | 1.04 |
| *Syngnathus leptorhynchus* | bay pipefish | 24 | 0.62 |
| *Micrometrus minimus* | dwarf surfperch | 19 | 0.49 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 12 | 0.31 |
| *Anchoa compressa* | deepbody anchovy | 9 | 0.23 |
| *Hypsopsetta guttulata* | diamond turbot | 9 | 0.23 |
| *Paralichthys californicus* | California halibut | 8 | 0.21 |
| *Quietula y-cauda* | shadow goby | 8 | 0.21 |
| *Acanthogobius flavimanus* | yellowfin goby | 3 | 0.08 |
| *Embiotoca jacksoni* | black perch | 3 | 0.08 |
| *Fundulus parvipinnis* | California killifish | 3 | 0.08 |
| *Hypsurus caryi* | rainbow perch | 3 | 0.08 |
| *Myliobatis californica* | bat ray | 3 | 0.08 |
| *Paralabrax nebulifer* | barred sand bass | 3 | 0.08 |
| *Citharichtys stigmaeus* | speckled sanddab | 2 | 0.05 |
| *Gibbonsia elegans* | spotted kelpfish | 1 | 0.03 |
| *Gymnura marmorata* | California butterfly ray | 1 | 0.03 |
| *Strongylura exilis* | California needlefish | 1 | 0.03 |
| | **Total** | **3,864** | |
| | **# of species** | 24 | |

| SMALL SEINE | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **#** | **%** |
| *Atherinops affinis* | topsmelt | 3,184 | 64.48 |
| *Clevelandia ios* | arrow goby | 1,611 | 32.62 |
| *Anchoa delicatissima* | slough anchovy | 59 | 1.19 |
| *Leptocottus armatus* | staghorn sculpin | 26 | 0.53 |
| *Syngnathus leptorhynchus* | bay pipefish | 15 | 0.30 |
| *Urobatis halleri* | round stingray | 12 | 0.24 |
| *Cymatogaster aggregata* | shiner perch | 7 | 0.14 |
| *Heterostichus rostratus* | giant kelpfish | 6 | 0.12 |
| *Hypsopsetta guttulata* | diamond turbot | 6 | 0.12 |
| *Ilypnus gilberti* | cheekspot goby | 5 | 0.10 |
| *Fundulus parvipinnis* | California killifish | 3 | 0.06 |
| *Cosmocampus arctus* | snubnose pipefish | 1 | 0.02 |
| *Micrometrus minimus* | dwarf surfperch | 1 | 0.02 |
| *Myliobatis californica* | bat ray | 1 | 0.02 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 1 | 0.02 |
| | **Total** | **4,938** | |
| | **# of species** | 15 | |

| SQUARE ENCLOSURE | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **#** | **%** |
| *Clevelandia ios* | arrow goby | 15 | 44.12 |
| *Ilypnus gilberti* | cheekspot goby | 6 | 17.65 |
| *Heterostichus rostratus* | giant kelpfish | 3 | 8.82 |
| *Syngnathus leptorhynchus* | bay pipefish | 3 | 8.82 |
| *Fundulus parvipinnis* | California killifish | 2 | 5.88 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 2 | 5.88 |
| *Gibbonsia elegans* | spotted kelpfish | 1 | 2.94 |
| *Paralichthys californicus* | California halibut | 1 | 2.94 |
| *Quietula y-cauda* | shadow goby | 1 | 2.94 |
| | **Total** | **34** | |
| | **# of species** | 9 | |

**Dwarf surfperch (*Micrometrus minimus*) captured by beam trawl in the South-Central Ecoregion, April 2012**

**Table 15.** Total biomass (g) of fish species taken from San Diego Bay, April and July 2012, by sampling method.

| BEAM TRAWL | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **Mass** | **%** |
| *Urobatis halleri* | round stingray | 66,886 | 66.75 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 9,830 | 9.81 |
| *Heterostichus rostratus* | giant kelpfish | 5,925 | 5.91 |
| *Cymatogaster aggregata* | shiner perch | 3,288 | 3.28 |
| *Micrometrus minimus* | dwarf surfperch | 2,785 | 2.78 |
| *Heterodontus francisci* | horn shark | 2,350 | 2.35 |
| *Scorpaena guttata* | California scorpionfish | 2,195 | 2.19 |
| *Paralabrax nebulifer* | barred sand bass | 1,475 | 1.47 |
| *Paralichthys californicus* | California halibut | 1,080 | 1.08 |
| *Gymnura marmorata* | California butterfly ray | 890 | 0.89 |
| *Embiotoca jacksoni* | black perch | 862 | 0.86 |
| *Zapteryx exasperata* | banded guitarfish | 760 | 0.76 |
| *Syngnathus leptorhynchus* | bay pipefish | 485 | 0.48 |
| *Porichthys myriaster* | specklefin midshipman | 450 | 0.45 |
| *Paralabrax clathratus* | kelp bass | 308 | 0.31 |
| *Gibbonsia elegans* | spotted kelpfish | 186 | 0.19 |
| *Hypsopsetta guttulata* | diamond turbot | 175 | 0.17 |
| *Anchoa delicatissima* | slough anchovy | 136 | 0.14 |
| *Hypsoblennius gentilis* | bay blenny | 49 | 0.05 |
| *Cheilotrema saturnum* | black croaker | 25 | 0.02 |
| *Clevelandia ios* | arrow goby | 19 | 0.02 |
| *Leptocottus armatus* | staghorn sculpin | 19 | 0.02 |
| *Phanerodon furcatus* | white seaperch | 13 | 0.01 |
| *Tridentiger trigonocephalus* | chameleon goby | 7 | 0.01 |
| *Gibbonsia metzi* | striped kelpfish | 3 | <0.01 |
| *Citharichtys stigmaeus* | speckled sanddab | 3 | <0.01 |
| *Halichoeres semicinctus* | rock wrasse | 2 | <0.01 |
| *Ilypnus gilberti* | cheekspot goby | 2 | <0.01 |
| *Atherinops affinis* | topsmelt | 1.1 | <0.01 |
| | **Total** | **100,208** | |
| | **# of species** | 29 | |

| OTTER TRAWL | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **Mass** | **%** |
| *Urobatis halleri* | round stingray | 23,700 | 39.83 |
| *Gymnura marmorata* | California butterfly ray | 12,000 | 20.17 |
| *Paralichthys californicus* | California halibut | 7,542 | 12.67 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 5,669 | 9.53 |
| *Hypsopsetta guttulata* | diamond turbot | 2,805 | 4.71 |
| *Pleuronichthys ritteri* | spotted turbot | 2,244 | 3.77 |
| *Scorpaena guttata* | California scorpionfish | 1,550 | 2.60 |
| *Porichthys myriaster* | specklefin midshipman | 1,020 | 1.71 |
| *Zapteryx exasperata* | banded guitarfish | 665 | 1.12 |
| *Paralabrax nebulifer* | barred sand bass | 494 | 0.83 |
| *Synodus lucioceps* | California lizardfish | 482 | 0.81 |
| *Myliobatis californica* | bat ray | 420 | 0.71 |
| *Cheilotrema saturnum* | black croaker | 395 | 0.66 |
| *Citharichtys stigmaeus* | speckled sanddab | 350 | 0.59 |
| *Symphurus atricauda* | California tonguefish | 150 | 0.25 |
| *Anchoa delicatissima* | slough anchovy | 9 | 0.01 |
| *Leptocottus armatus* | staghorn sculpin | 6 | 0.01 |
| *Cymatogaster aggregata* | shiner perch | 3 | 0.01 |
| *Tridentiger trigonocephalus* | chameleon goby | 2 | <0.01 |
| *Clevelandia ios* | arrow goby | 2 | <0.01 |
| *Atherinops affinis* | topsmelt | 0.1 | <0.01 |
| | **Total** | **59,506** | |
| | **# of species** | 21 | |

| PURSE SEINE | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **Mass** | **%** |
| *Paralabrax maculatofasciatus* | spotted sand bass | 45,254 | 26.71 |
| *Urobatis halleri* | round stingray | 36,576 | 21.59 |
| *Myliobatis californica* | bat ray | 29,300 | 17.30 |
| *Atherinops affinis* | topsmelt | 8,239 | 4.86 |
| *Cymatogaster aggregata* | shiner perch | 8,072 | 4.76 |
| *Roncador stearnsii* | spotfin croaker | 7,200 | 4.25 |
| *Umbrina roncador* | yellowfin croaker | 6,465 | 3.82 |
| *Dasyatis dipterura* | diamond stingray | 5,000 | 2.95 |
| *Albula vulpes* | bonefish | 4,060 | 2.40 |
| *Paralichthys californicus* | California halibut | 3,480 | 2.05 |
| *Mustelus californicus* | gray smoothhound | 3,200 | 1.89 |
| *Embiotoca jacksoni* | black perch | 2,525 | 1.49 |
| *Anchoa delicatissima* | slough anchovy | 1,633 | 0.96 |
| *Gymnura marmorata* | California butterfly ray | 1,100 | 0.65 |
| *Hypsopsetta guttulata* | diamond turbot | 947 | 0.56 |
| *Heterodontus francisci* | horn shark | 900 | 0.53 |
| *Anisotremus davidsonii* | sargo | 880 | 0.52 |
| *Synodus lucioceps* | California lizardfish | 800 | 0.47 |
| *Paralabrax clathratus* | kelp bass | 569 | 0.34 |
| *Cheilotrema saturnum* | black croaker | 552 | 0.33 |
| *Porichthys myriaster* | specklefin midshipman | 540 | 0.32 |
| *Micrometrus minimus* | dwarf surfperch | 523 | 0.31 |
| *Rhacochilus vacca* | pile perch | 400 | 0.24 |
| *Heterostichus rostratus* | giant kelpfish | 351 | 0.21 |
| *Scomber japonicus* | Pacific mackerel | 160 | 0.09 |
| *Paralabrax nebulifer* | barred sand bass | 120 | 0.07 |
| *Anchoa compressa* | deepbody anchovy | 113 | 0.07 |
| *Sardinops sagax* | Pacific sardine | 104 | 0.06 |
| *Symphurus atricauda* | California tonguefish | 98 | 0.06 |
| *Pleuronichthys ritteri* | spotted turbot | 80 | 0.05 |
| *Citharichtys stigmaeus* | speckled sanddab | 45 | 0.03 |
| *Hippocampus ingens* | Pacific seahorse | 35 | 0.02 |
| *Pleuronichthys decurrens* | curlfin turbot | 20 | 0.01 |
| *Seriphus politus* | queenfish | 20 | 0.01 |
| *Phanerodon furcatus* | white seaperch | 16 | 0.01 |
| *Syngnathus leptorhynchus* | bay pipefish | 12 | 0.01 |
| *Leptocottus armatus* | staghorn sculpin | 10 | 0.01 |
| *Gibbonsia elegans* | spotted kelpfish | 7 | <0.01 |
| *Clevelandia ios* | arrow goby | 0.5 | <0.01 |
| | **Total** | **169,405** | |
| | **# of species** | 39 | |

**Table 15** (continued).

| LARGE SEINE | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **Mass** | **%** |
| *Urobatis halleri* | round stingray | 5,473 | 34.50 |
| *Atherinops affinis* | topsmelt | 2,494 | 15.72 |
| *Gymnura marmorata* | California butterfly ray | 1,500 | 9.46 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 1,464 | 9.23 |
| *Myliobatis californica* | bat ray | 1,275 | 8.04 |
| *Cymatogaster aggregata* | shiner perch | 962 | 6.06 |
| *Anchoa delicatissima* | slough anchovy | 560 | 3.53 |
| *Leptocottus armatus* | staghorn sculpin | 464 | 2.93 |
| *Paralichthys californicus* | California halibut | 336 | 2.12 |
| *Heterostichus rostratus* | giant kelpfish | 333 | 2.10 |
| *Micrometrus minimus* | dwarf surfperch | 263 | 1.66 |
| *Hypsopsetta guttulata* | diamond turbot | 228 | 1.44 |
| *Embiotoca jacksoni* | black perch | 152 | 0.96 |
| *Paralabrax nebulifer* | barred sand bass | 100 | 0.63 |
| *Anchoa compressa* | deepbody anchovy | 72 | 0.45 |
| *Syngnathus leptorhynchus* | bay pipefish | 52 | 0.33 |
| *Acanthogobius flavimanus* | yellowfin goby | 44 | 0.27 |
| *Clevelandia ios* | arrow goby | 32 | 0.20 |
| *Hypsurus caryi* | rainbow perch | 20 | 0.13 |
| *Citharichtys stigmaeus* | speckled sanddab | 15 | 0.09 |
| *Fundulus parvipinnis* | California killifish | 11 | 0.07 |
| *Gibbonsia elegans* | spotted kelpfish | 10 | 0.06 |
| *Quietula y-cauda* | shadow goby | 2 | 0.01 |
| *Strongylura exilis* | California needlefish | 0.05 | <0.01 |
| | **Total** | **15,862** | |
| | **# of species** | 24 | |

| SMALL SEINE | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **Mass** | **%** |
| *Urobatis halleri* | round stingray | 1,580 | 50.86 |
| *Atherinops affinis* | topsmelt | 712 | 22.92 |
| *Myliobatis californica* | bat ray | 290 | 9.34 |
| *Clevelandia ios* | arrow goby | 201 | 6.48 |
| *Cymatogaster aggregata* | shiner perch | 141 | 4.54 |
| *Leptocottus armatus* | staghorn sculpin | 78 | 2.52 |
| *Syngnathus leptorhynchus* | bay pipefish | 30 | 0.97 |
| *Anchoa delicatissima* | slough anchovy | 26 | 0.82 |
| *Hypsopsetta guttulata* | diamond turbot | 17 | 0.55 |
| *Heterostichus rostratus* | giant kelpfish | 11 | 0.36 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 8 | 0.26 |
| *Fundulus parvipinnis* | California killifish | 8 | 0.25 |
| *Micrometrus minimus* | dwarf surfperch | 2 | 0.06 |
| *Cosmocampus arctus* | snubnose pipefish | 1 | 0.03 |
| *Ilypnus gilberti* | cheekspot goby | 0.8 | 0.03 |
| | **Total** | **3,106** | |
| | **# of species** | 15 | |

| SQUARE ENCLOSURE | | | |
|---|---|---|---|
| **Scientific Name** | **Common Name** | **Mass** | **%** |
| *Paralabrax maculatofasciatus* | spotted sand bass | 67 | 67.58 |
| *Heterostichus rostratus* | giant kelpfish | 18 | 18.16 |
| *Clevelandia ios* | arrow goby | 6 | 5.90 |
| *Ilypnus gilberti* | cheekspot goby | 2 | 2.12 |
| *Syngnathus leptorhynchus* | bay pipefish | 2 | 2.11 |
| *Paralichthys californicus* | California halibut | 2 | 2.02 |
| *Gibbonsia elegans* | spotted kelpfish | 1 | 1.01 |
| *Fundulus parvipinnis* | California killifish | 0.6 | 0.61 |
| *Quietula y-cauda* | shadow goby | 0.5 | 0.50 |
| | **Total** | **99** | |
| | **# of species** | 9 | |

**Giant kelpfish (*Heterostichus rostratus*) caught in a beam trawl in the South-Central Ecoregion, July 2012**

**Table 16.** Comparison of mean densities and biomass densities by gear type for San Diego Bay 1994-1999 and April and July 2005, April and July 2008, June 2009 (from Pondella and Williams 2009b), and April and July 2012.

| 1994-1999 | | April/July 2005 | | April/July 2008 | | June 2009 | | April/July 2012 | |
|---|---|---|---|---|---|---|---|---|---|
| Gear | #/m² | Gear | #/m² | Gear | #/m² | Gear | #/m² | Gear | #/m² |
| BT | 0.080 | BT | 1.164 | BT | 0.223 | BT | - | BT | 0.386 |
| OT | 0.009 | OT | 0.032 | OT | 0.004 | OT | - | OT | 0.005 |
| PS | 1.770 | PS | 0.569 | PS | 0.390 | PS | 0.485 | PS | 0.122 |
| LS | 0.369 | LS | 0.676 | LS | 0.171 | LS | - | LS | 0.366 |
| SS | 2.338 | SS | 0.440 | SS | 0.702 | SS | - | SS | 1.659 |
| SE | 3.583 | SE | 1.042 | SE | 0.542 | SE | 1.542 | SE | 0.708 |
| **Grand Mean** | **1.358** | **Grand Mean** | **0.654** | **Grand Mean** | **0.339** | **Grand Mean** | **1.014** | **Grand Mean** | **0.541** |
| | | | | | | | | | |
| Gear | g/m² | Gear | g/m² | Gear | g/m² | Gear | g/m² | Gear | g/m² |
| BT | 2.232 | BT | 5.137 | BT | 3.496 | BT | - | BT | 7.199 |
| OT | 1.678 | OT | 1.425 | OT | 0.416 | OT | - | OT | 0.684 |
| PS | 6.306 | PS | 5.579 | PS | 3.910 | PS | 5.355 | PS | 7.949 |
| LS | 1.051 | LS | 1.684 | LS | 1.114 | LS | - | LS | 1.502 |
| SS | 0.272 | SS | 0.216 | SS | 0.256 | SS | - | SS | 1.044 |
| SE | 0.636 | SE | 0.176 | SE | 12.313 | SE | 0.542 | SE | 2.063 |
| **Grand Mean** | **2.029** | **Grand Mean** | **2.370** | **Grand Mean** | **3.617** | **Grand Mean** | **2.949** | **Grand Mean** | **3.407** |

**Kelp bass (*Paralabrax clathratus*) caught by beam trawl in the North Ecoregion, April 2012**

## *Best Estimates of Density and Standing Stock*

Density estimates used for the standing stock assessment were determined using the *Best Estimate of Density* within each Ecoregion. The best density estimate was determined in the following manner:

1) Sample densities estimated by gear type for each species were averaged over all samples within the three depth strata (Intertidal, Nearshore, and Channel).
2) The maximum density for each species by gear type within each depth stratum was determined to be the *Best Estimate of Density* for that species within that depth stratum.
3) The proportional aerial coverage of the three depth strata within the Ecoregion was determined previously by Allen et al. (2002) were used for the current study. These aerial proportions were then used to weight the *Best Estimate of Density* within the depth strata by species. A weighted average was then taken among these best estimates over the three depth strata for each species.
4) The sum of the weighted densities of all species represented *Best Estimate of Density* (numerical and biomass) for each depth stratum and Ecoregion was calculated.

Standing stock estimates were calculated by multiplying the best estimates by the total area of the individual Ecoregions and San Diego Bay, as a whole (Table 17). The best estimate for the total stock size was 16,153,537 fishes (Table 18). With an estimated surface area of 4858 ha (Table 17) this gives an overall fish density 0.33 individuals/$m^2$ (Table 18). The highest estimate was of giant kelpfish (3.7 million), followed by topsmelt (2.8 million), arrow goby (2.4 million), shiner perch (2.0 million), and slough anchovy (1.4 million). Schooling and avian forage fishes unsurprisingly dominated the stock estimate for the bay.

The total best estimate of biomass standing stock was 459,754 kg (Table 19). This gives an overall estimate of 9.46 g/$m^2$. Interestingly, the stock size estimate in 2012 was far lower than in any other survey, though the biomass standing stock was the highest of any other survey (Table 20). This is undoubtedly due to the comparatively low number of small schooling fishes and high number of large predators like round stingrays, spotted sand bass and bat rays. Also of note, biomass standing stock reported in both Pondella et al. 2005 and Pondella and Williams 2009a were underestimated, as they were originally calculated by each ecoregion (rather than each species) which introduces a significant amount of error, as was described in Allen et al. 2002. More accurate estimates are reported in Table 20.

**Table 17.** Estimates of area coverage of depth strata within each Ecoregion of San Diego Bay. Proportions and areas were used to weigh density and estimate standing stocks of fisheries.

| % Area Ecoregion | Intertidal | Nearshore | Channel |
|---|---|---|---|
| **North** | 6 | 33 | 60 |
| **North-Central** | 5 | 38 | 57 |
| **South-Central** | 3 | 61 | 36 |
| **South** | 4 | 84 | 13 |

| Hectares/Habitat Ecoregion | Intertidal | Nearshore | Channel | TOTAL | % of Bay |
|---|---|---|---|---|---|
| **North** | 61 | 327 | 593 | 982 | 20 |
| **North-Central** | 41 | 307 | 460 | 808 | 17 |
| **South-Central** | 51 | 1227 | 726 | 2005 | 41 |
| **South** | 40 | 890 | 133 | 1064 | 22 |
| **# Hectares** | 194 | 2751 | 1913 | 4858 | |
| **% Bay Area (Allen 2002)** | 4 | 57 | 39 | | |

**San Diego Bay, with eelgrass shown in green (as described by a Merkel and Associates survey in 2011) and ecoregion borders in white**

**Table 18.** Best estimate of densities and stock estimates, April and July 2012.

| Scientific Name | Common Name | Best Estimate of Density (#/m$^2$) | | | Weighted Mean | Stock Estimate |
|---|---|---|---|---|---|---|
| | | *Channel* | *Nearshore* | *Intertidal* | | |
| *Heterostichus rostratus* | giant kelpfish | | 0.12960 | 0.06250 | 0.07637 | 3,710,088 |
| *Atherinops affinis* | topsmelt | 0.00324 | 0.02224 | 1.06989 | 0.05674 | 2,756,222 |
| *Clevelandia ios* | arrow goby | 0.00003 | 0.04770 | 0.54133 | 0.04886 | 2,373,440 |
| *Cymatogaster aggregata* | shiner perch | 0.00014 | 0.07191 | 0.01951 | 0.04182 | 2,031,831 |
| *Anchoa delicatissima* | slough anchovy | 0.00999 | 0.04325 | 0.02311 | 0.02947 | 1,431,794 |
| *Syngnathus leptorhynchus* | bay pipefish | 0.00014 | 0.03132 | 0.06250 | 0.02041 | 991,437 |
| *Micrometrus minimus* | dwarf surfperch | | 0.02716 | 0.00180 | 0.01555 | 755,439 |
| *Urobatis halleri* | round stingray | 0.00182 | 0.01616 | 0.00403 | 0.01008 | 489,824 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 0.00127 | 0.01358 | 0.04167 | 0.00990 | 481,116 |
| *Ilypnus gilberti* | cheekspot goby | | 0.00036 | 0.12500 | 0.00520 | 252,846 |
| *Embiotoca jacksoni* | black perch | | 0.00388 | 0.00028 | 0.00222 | 107,972 |
| *Gibbonsia elegans* | spotted kelpfish | | 0.00194 | 0.02083 | 0.00194 | 94,194 |
| *Fundulus parvipinnis* | California killifish | | | 0.04167 | 0.00167 | 80,967 |
| *Paralichthys californicus* | California halibut | 0.00059 | 0.00091 | 0.02083 | 0.00158 | 76,924 |
| *Paralabrax clathratus* | kelp bass | 0.00028 | 0.00237 | | 0.00146 | 70,980 |
| *Paralabrax nebulifer* | barred sand bass | 0.00013 | 0.00165 | 0.00028 | 0.00100 | 48,700 |
| *Quietula y-cauda* | shadow goby | | | 0.02083 | 0.00083 | 40,483 |
| *Umbrina roncador* | yellowfin croaker | | 0.00134 | | 0.00076 | 37,030 |
| *Tridentiger trigonocephalus* | chameleon goby | 0.00003 | 0.00108 | | 0.00063 | 30,492 |
| *Albula vulpes* | bonefish | | 0.00077 | | 0.00044 | 21,438 |
| *Leptocottus armatus* | staghorn sculpin | 0.00001 | 0.00014 | 0.00874 | 0.00044 | 21,173 |
| *Myliobatis californica* | bat ray | 0.00070 | 0.00021 | 0.00034 | 0.00041 | 19,835 |
| *Hypsopsetta guttulata* | diamond turbot | 0.00015 | 0.00042 | 0.00202 | 0.00038 | 18,442 |
| *Synodus lucioceps* | California lizardfish | 0.00009 | 0.00056 | | 0.00036 | 17,333 |
| *Citharichtys stigmaeus* | speckled sanddab | 0.00048 | 0.00028 | 0.00019 | 0.00036 | 17,309 |
| *Anchoa compressa* | deepbody anchovy | | 0.00056 | 0.00085 | 0.00036 | 17,248 |
| *Cheilotrema saturnum* | black croaker | 0.00005 | 0.00050 | | 0.00030 | 14,796 |
| *Acanthogobius flavimanus* | yellowfin goby | | | 0.00028 | 0.00028 | 13,801 |
| *Porichthys myriaster* | specklefin midshipman | 0.00031 | 0.00028 | | 0.00028 | 13,675 |
| *Symphurus atricauda* | California tonguefish | 0.00021 | 0.00035 | | 0.00028 | 13,664 |
| *Rhacochilus vacca* | pile perch | | 0.00042 | | 0.00024 | 11,694 |
| *Roncador stearnsii* | spotfin croaker | | 0.00042 | | 0.00024 | 11,694 |
| *Pleuronichthys ritteri* | spotted turbot | 0.00026 | 0.00014 | | 0.00018 | 8,906 |
| *Scorpaena guttata* | California scorpionfish | 0.00005 | 0.00029 | | 0.00018 | 8,828 |
| *Heterodontus francisci* | horn shark | | 0.00029 | | 0.00016 | 7,957 |
| *Gibbonsia metzi* | striped kelpfish | | 0.00022 | | 0.00012 | 5,968 |
| *Hypsoblennius gentilis* | bay blenny | | 0.00022 | | 0.00012 | 5,968 |
| *Phanerodon furcatus* | white seaperch | | 0.00022 | | 0.00012 | 5,968 |
| *Mustelus californicus* | gray smoothhound | | 0.00021 | | 0.00012 | 5,847 |
| *Sardinops sagax* | Pacific sardine | 0.00014 | 0.00007 | | 0.00010 | 4,616 |
| *Gymnura marmorata* | California butterfly ray | 0.00001 | 0.00014 | 0.00009 | 0.00009 | 4,380 |
| *Zapteryx exasperata* | banded guitarfish | 0.00001 | 0.00014 | | 0.00009 | 4,196 |
| *Seriphus politus* | queenfish | | 0.00014 | | 0.00008 | 3,898 |
| *Halichoeres semicinctus* | rock wrasse | | 0.00007 | | 0.00004 | 1,989 |
| *Anisotremus davidsonii* | sargo | | 0.00007 | | 0.00004 | 1,949 |
| *Dasyatis dipterura* | diamond stingray | | 0.00007 | | 0.00004 | 1,949 |
| *Hippocampus ingens* | Pacific seahorse | | 0.00007 | | 0.00004 | 1,949 |
| *Pleuronichthys decurrens* | curlfin turbot | | 0.00007 | | 0.00004 | 1,949 |
| *Scomber japonicus* | Pacific mackerel | | 0.00007 | | 0.00004 | 1,949 |
| *Cosmocampus arctus* | snubnose pipefish | | | 0.00034 | 0.00001 | 653 |
| *Hypsurus caryi* | rainbow perch | | | 0.00028 | 0.00001 | 552 |
| *Strongylura exilis* | California needlefish | | | 0.00009 | <0.00001 | 184 |
| | **Grand Total:** | 0.02014 | 0.42389 | 2.06929 | 0.33251 | 16,153,537 |

**Table 19.** Best estimate of biomass densities and standing stock, April and July 2012.

| Scientific Name | Common Name | Best Estimate of Biomass ($g/m^2$) | | | Weighted Mean | Standing Stock (kg) | MT |
|---|---|---|---|---|---|---|---|
| | | Channel | Nearshore | Intertidal | | | |
| *Urobatis halleri* | round stingray | 0.2724 | 4.8050 | 0.5309 | 2.8663 | 139,246 | 139 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 0.1734 | 3.0984 | 1.3958 | 1.8896 | 91,795 | 92 |
| *Myliobatis californica* | bat ray | 3.8499 | 0.1372 | 0.1207 | 1.5845 | 76,977 | 77 |
| *Atherinops affinis* | topsmelt | 0.0724 | 0.5437 | 0.2393 | 0.3477 | 16,891 | 17 |
| *Cymatogaster aggregata* | shiner perch | 0.0007 | 0.5677 | 0.0911 | 0.3275 | 15,912 | 16 |
| *Roncador stearnsii* | spotfin croaker | | 0.5068 | | 0.2889 | 14,032 | 14 |
| *Umbrina roncador* | yellowfin croaker | | 0.4550 | | 0.2594 | 12,600 | 13 |
| *Heterostichus rostratus* | giant kelpfish | | 0.4256 | 0.3750 | 0.2576 | 12,515 | 13 |
| *Dasyatis dipterura* | diamond stingray | | 0.3519 | | 0.2006 | 9,745 | 10 |
| *Paralichthys californicus* | California halibut | 0.0867 | 0.2344 | 0.0417 | 0.1691 | 8,213 | 8.2 |
| *Albula vulpes* | bonefish | | 0.2858 | | 0.1629 | 7,913 | 7.9 |
| *Mustelus californicus* | gray smoothhound | | 0.2252 | | 0.1284 | 6,237 | 6.2 |
| *Micrometrus minimus* | dwarf surfperch | | 0.2001 | 0.0249 | 0.1150 | 5,589 | 5.6 |
| *Gymnura marmorata* | California butterfly ray | 0.1379 | 0.0774 | 0.1420 | 0.1036 | 5,033 | 5.0 |
| *Embiotoca jacksoni* | black perch | | 0.1777 | 0.0144 | 0.1019 | 4,949 | 4.9 |
| *Scorpaena guttata* | California scorpionfish | 0.0178 | 0.1577 | | 0.0968 | 4,704 | 4.7 |
| *Heterodontus francisci* | horn shark | | 0.1688 | | 0.0962 | 4,675 | 4.7 |
| *Anchoa delicatissima* | slough anchovy | 0.0269 | 0.1015 | 0.0530 | 0.0705 | 3,423 | 3.4 |
| *Paralabrax nebulifer* | barred sand bass | 0.0057 | 0.1060 | 0.0095 | 0.0630 | 3,060 | 3.1 |
| *Hypsopsetta guttulata* | diamond turbot | 0.0322 | 0.0667 | 0.0216 | 0.0514 | 2,498 | 2.5 |
| *Anisotremus davidsonii* | sargo | | 0.0619 | | 0.0353 | 1,715 | 1.7 |
| *Synodus lucioceps* | California lizardfish | 0.0055 | 0.0563 | | 0.0343 | 1,664 | 1.7 |
| *Zapteryx exasperata* | banded guitarfish | 0.0076 | 0.0546 | | 0.0341 | 1,657 | 1.7 |
| *Porichthys myriaster* | specklefin midshipman | 0.0117 | 0.0380 | | 0.0262 | 1,275 | 1.3 |
| *Cheilotrema saturnum* | black croaker | 0.0045 | 0.0389 | | 0.0239 | 1,162 | 1.2 |
| *Paralabrax clathratus* | kelp bass | 0.0077 | 0.0361 | | 0.0236 | 1,147 | 1.1 |
| *Syngnathus leptorhynchus* | bay pipefish | 0.0001 | 0.0348 | 0.0435 | 0.0216 | 1,050 | 1.0 |
| *Rhacochilus vacca* | pile perch | | 0.0282 | | 0.0160 | 780 | 0.8 |
| *Pleuronichthys ritteri* | spotted turbot | 0.0258 | 0.0056 | | 0.0133 | 645 | 0.6 |
| *Gibbonsia elegans* | spotted kelpfish | | 0.0133 | 0.0208 | 0.0084 | 410 | 0.4 |
| *Scomber japonicus* | Pacific mackerel | | 0.0113 | | 0.0064 | 312 | 0.3 |
| *Clevelandia ios* | arrow goby | 0.0000 | 0.0014 | 0.1219 | 0.0057 | 276 | 0.3 |
| *Sardinops sagax* | Pacific sardine | 0.0141 | 0.0003 | | 0.0057 | 274 | 0.3 |
| *Anchoa compressa* | deepbody anchovy | | 0.0080 | 0.0068 | 0.0048 | 233 | 0.2 |
| *Symphurus atricauda* | California tonguefish | 0.0017 | 0.0069 | | 0.0046 | 224 | 0.2 |
| *Acanthogobius flavimanus* | yellowfin goby | | | 0.0041 | 0.0041 | 200 | 0.2 |
| *Citharichtys stigmaeus* | speckled sanddab | 0.0040 | 0.0032 | 0.0014 | 0.0034 | 167 | 0.2 |
| *Leptocottus armatus* | staghorn sculpin | 0.0001 | 0.0014 | 0.0440 | 0.0026 | 124 | 0.1 |
| *Hypsoblennius gentilis* | bay blenny | | 0.0035 | | 0.0020 | 97 | 0.10 |
| *Ilypnus gilberti* | cheekspot goby | | 0.0001 | 0.0438 | 0.0018 | 88 | 0.09 |
| *Hippocampus ingens* | Pacific seahorse | | 0.0025 | | 0.0014 | 68 | 0.07 |
| *Pleuronichthys decurrens* | curlfin turbot | | 0.0014 | | 0.0008 | 39 | 0.04 |
| *Seriphus politus* | queenfish | | 0.0014 | | 0.0008 | 39 | 0.04 |
| *Phanerodon furcatus* | white seaperch | | 0.0011 | | 0.0006 | 30 | 0.03 |
| *Fundulus parvipinnis* | California killifish | | | 0.0125 | 0.0005 | 24 | 0.02 |
| *Quietula y-cauda* | shadow goby | | | 0.0104 | 0.0004 | 20 | 0.02 |
| *Tridentiger trigonocephalus* | chameleon goby | <0.001 | 0.0005 | | 0.0003 | 14 | 0.01 |
| *Gibbonsia metzi* | striped kelpfish | | 0.0002 | | 0.0001 | 6 | 0.01 |
| *Halichoeres semicinctus* | rock wrasse | | 0.0001 | | 0.0001 | 4 | <0.01 |
| *Hypsurus caryi* | rainbow perch | | | 0.0019 | 0.0001 | 4 | <0.01 |
| *Cosmocampus arctus* | snubnose pipefish | | | 0.0003 | <0.001 | 1 | <0.01 |
| *Strongylura exilis* | California needlefish | | | <0.001 | <0.001 | 0.01 | <0.01 |
| | **Grand Total:** | 4.7590 | 13.1036 | 3.3714 | 9.4639 | 459,754 | 460 |

**Table 20.** Stock estimates and biomass standing stock; 1994-1999, April and July 2005, April and July 2008, and April and July 2012.

| | 1994-1999 (Allen et al. 2002) | April/July 2005 (corrected from Pondella et al. 2006) | April/July 2008 (corrected from Pondella and Williams 2009a) | April/July 2012 (Present Study) |
|---|---|---|---|---|
| **Stock Estimate (#)** | 84,776,769 | 56,320,404 | 24,776,133 | 14,249,941 |
| **Standing Stock (kg)** | 342,427 | 339,268 | 246,492 | 459,754 |

**Bay blenny (*Hypsoblennius gentilis*) caught by beam trawl in the North-Central Ecoregion, July 2012**

**Table 21.** Best estimate of biomass densities and standing stocks for avian forage species and fisheries species. Estimates are for each depth strata and within each Ecoregion of San Diego Bay, 2012.

**Forage Fishes**

| Ecoregion | Best Estimate of Biomass (g/m$^2$) *Channel* | *Nearshore* | *Intertidal* | Weighted Mean | *Standing Stock (kg)* | *MT* |
|---|---|---|---|---|---|---|
| North | 0.04673 | 2.21757 | 0.67554 | 0.80037 | 7,860 | 8 |
| North-Central | 0.07939 | 1.81070 | 1.56250 | 0.81144 | 6,556 | 7 |
| South-Central | 0.23986 | 0.93342 | 0.51227 | 0.67110 | 13,456 | 13 |
| South | 0.09009 | 0.42513 | 0.31151 | 0.38128 | 4,057 | 4 |
| | | | | **Total:** | 31,929 | 32 |

**Commercial and Recreational Fishes**

| Ecoregion | Best Estimate of Biomass (g/m$^2$) *Channel* | *Nearshore* | *Intertidal* | Weighted Mean | *Standing Stock (kg)* | *MT* |
|---|---|---|---|---|---|---|
| North | 0.31033 | 4.04251 | 0.16667 | 1.53023 | 15,027 | 15 |
| North-Central | 0.21588 | 5.93384 | 5.58333 | 2.65708 | 21,469 | 21 |
| South-Central | 0.36036 | 4.55110 | 0.30606 | 2.91508 | 58,447 | 58 |
| South | 0.40372 | 4.84516 | 0.26591 | 4.13305 | 43,976 | 44 |
| | | | | **Total:** | 138,919 | 139 |

## *Avian Forage Species*

Forage species are primarily surface dwelling schooling fish that are accessible to diving avian predators, especially terns. Generally, forage fishes are small silvery-sided fishes that are found in large schools. These schooling fishes are generally not habitat specific and move throughout the bay's ecosystem. Ten species of important forage fishes (Pondella and Williams 2011) were captured during this study. The most abundant forage fishes were topsmelt, arrow goby, giant kelpfish, slough anchovy and shiner perch (Table 2). These species were primarily found at small (juvenile) size classes (<50 mm SL) appropriate for nesting birds to feed their young in the area. The typical timing for the recruitment of fishes to San Diego Bay begins in the spring and continues through the summer and this is what was observed in 2012. The biomass standing stock estimate for forage fish was nearly 32 MT (Table 21).

**Table 22.** Best estimate of biomass standing stock for forage fish species by ecoregion, 2012.

| Ecoregion | Common Name | Best Estimate of Biomass ($g/m^2$) | | | Weighted Mean | *Standing Stock (kg)* | *MT* |
|---|---|---|---|---|---|---|---|
| | | *Channel* | *Nearshore* | *Intertidal* | | | |
| **North** | topsmelt | 0.04673 | 1.89640 | 0.67016 | 0.69406 | 6,816 | 6.8 |
| | arrow goby | | 0.00006 | 0.00417 | 0.00027 | 3 | <0.1 |
| | shiner perch | | 0.10966 | | 0.03619 | 355 | 0.4 |
| | giant kelpfish | | 1.05612 | 0.25000 | 0.36352 | 3,570 | 3.6 |
| | staghorn sculpin | | | 0.04508 | 0.00270 | 27 | <0.1 |
| | dwarf surfperch | | 0.70747 | 0.03977 | 0.23585 | 2,316 | 2.3 |
| | Pacific sardine | | 0.00113 | | 0.00037 | 4 | <0.1 |
| | | | | | | | |
| **North-Central** | deepbody anchovy | | 0.00507 | | 0.00193 | 19 | <0.1 |
| | slough anchovy | | 0.20552 | | 0.07810 | 767 | 0.8 |
| | topsmelt | 0.07939 | 0.09468 | 0.55432 | 0.10895 | 1,070 | 1.1 |
| | arrow goby | | 0.00194 | 0.31250 | 0.01636 | 161 | 0.2 |
| | shiner perch | | 1.47917 | 0.18952 | 0.57156 | 5,613 | 5.6 |
| | giant kelpfish | | 0.46236 | 1.25000 | 0.23820 | 2,339 | 2.3 |
| | staghorn sculpin | | | 0.06364 | 0.00318 | 31 | <0.1 |
| | dwarf surfperch | | 0.08477 | 0.03409 | 0.03392 | 333 | 0.3 |
| | | | | | | | |
| **South-Central** | deepbody anchovy | | 0.00760 | | 0.00464 | 46 | <0.1 |
| | slough anchovy | 0.10191 | 0.18553 | 0.17928 | 0.15524 | 1,524 | 1.5 |
| | topsmelt | 0.07883 | 0.10206 | 0.11008 | 0.09393 | 922 | 0.9 |
| | arrow goby | 0.00005 | 0.00158 | 0.04245 | 0.00225 | 22 | <0.1 |
| | shiner perch | 0.00282 | 0.63148 | 0.18598 | 0.39179 | 3,847 | 3.8 |
| | California killifish | | | 0.05000 | 0.00150 | 15 | <0.1 |
| | giant kelpfish | | 0.13736 | 0.00530 | 0.08395 | 824 | 0.8 |
| | staghorn sculpin | | 0.00431 | 0.02595 | 0.00341 | 33 | <0.1 |
| | dwarf surfperch | | | 0.00379 | 0.00011 | 1 | <0.1 |
| | Pacific sardine | 0.05631 | | | 0.02027 | 199 | 0.2 |
| | | | | | | | |
| **South** | deepbody anchovy | | 0.01914 | 0.02727 | 0.01717 | 169 | 0.2 |
| | slough anchovy | 0.00563 | 0.03899 | 0.03277 | 0.03480 | 342 | 0.3 |
| | topsmelt | 0.08446 | 0.08164 | 0.04971 | 0.08155 | 801 | 0.8 |
| | arrow goby | 0.00005 | 0.00198 | 0.21989 | 0.01047 | 103 | 0.1 |
| | shiner perch | 0.00014 | 0.32816 | 0.04583 | 0.27751 | 2,725 | 2.7 |
| | California killifish | | | 0.01062 | 0.00042 | 4 | <0.1 |
| | giant kelpfish | | 0.04667 | 0.00027 | 0.03921 | 385 | 0.4 |
| | staghorn sculpin | 0.00028 | 0.00282 | 0.04125 | 0.00405 | 40 | <0.1 |
| | dwarf surfperch | | 0.00805 | 0.02197 | 0.00764 | 75 | 0.1 |

## *Fisheries Species*

During this study, 12 species were captured which have importance in either the recreational or commercial fisheries in California (Table 21). Including all Ecoregions, standing stock estimates of fisheries species totaled 139 MT. Estimates were greatest at the South-Central Ecoregion (58 MT), followed by the South (44 MT), North-Central (21 MT) and North Ecoregions (15 MT).

**Table 23.** Best estimate of biomass standing stock for recreational/commercial fishery species by ecoregion, 2012.

| Ecoregion | Common Name | Best Estimate of Biomass ($g/m^2$) | | | Weighted Mean | *Standing Stock (kg)* | *MT* |
|---|---|---|---|---|---|---|---|
| | | *Channel* | *Nearshore* | *Intertidal* | | | |
| **North** | black croaker | | 0.15484 | | 0.05110 | 502 | 0.5 |
| | black perch | | 0.61937 | 0.03106 | 0.20626 | 2,025 | 2.0 |
| | kelp bass | 0.03097 | 0.12190 | | 0.05881 | 578 | 0.6 |
| | spotted sand bass | | 2.84966 | | 0.94039 | 9,235 | 9.2 |
| | barred sand bass | | 0.00402 | | 0.00133 | 13 | <0.1 |
| | California halibut | 0.23908 | 0.29561 | 0.16667 | 0.25100 | 2,465 | 2.5 |
| | Pacific sardine | | 0.00113 | | 0.00037 | 4 | <0.1 |
| | California scorpionfish | 0.07125 | 0.63075 | | 0.25090 | 2,464 | 2.5 |
| | | | | | | | |
| **North-Central** | black croaker | 0.01816 | 0.00342 | | 0.01165 | 114 | 0.1 |
| | black perch | | 0.09150 | 0.02652 | 0.03609 | 354 | 0.4 |
| | kelp bass | | 0.02252 | | 0.00856 | 84 | 0.1 |
| | spotted sand bass | 0.16228 | 4.54673 | 5.58333 | 2.09942 | 20,616 | 20.6 |
| | barred sand bass | | 0.02815 | | 0.01070 | 105 | 0.1 |
| | California halibut | 0.03544 | 0.48986 | 0.01136 | 0.20692 | 2,032 | 2.0 |
| | spotfin croaker | | 0.16892 | | 0.06419 | 630 | 0.6 |
| | queenfish | | 0.00422 | | 0.00160 | 16 | <0.1 |
| | yellowfin croaker | | 0.58136 | | 0.22092 | 2,169 | 2.2 |
| | | | | | | | |
| **South-Central** | bonefish | | 0.31813 | 0.00833 | 0.19431 | 1,908 | 1.9 |
| | black croaker | | 0.00374 | | 0.00228 | 22 | 0.0 |
| | kelp bass | | 0.00014 | | 0.00009 | 1 | 0.0 |
| | spotted sand bass | 0.30405 | 2.75901 | 0.25000 | 1.79995 | 17,676 | 17.7 |
| | barred sand bass | 0.01333 | 0.03448 | 0.03788 | 0.02697 | 265 | 0.3 |
| | California halibut | 0.04321 | 0.11543 | 0.01818 | 0.08651 | 850 | 0.8 |
| | spotfin croaker | | 1.18243 | | 0.72128 | 7,083 | 7.1 |
| | Pacific sardine | 0.05631 | | | 0.02027 | 199 | 0.2 |
| | queenfish | | 0.00141 | | 0.00086 | 8 | <0.1 |
| | yellowfin croaker | | 0.16892 | | 0.10304 | 1,012 | 1.0 |
| | | | | | | | |
| **South** | bonefish | | 0.82489 | | 0.69291 | 6,804 | 6.8 |
| | spotted sand bass | 0.31926 | 2.23818 | 0.18712 | 1.92906 | 18,943 | 18.9 |
| | barred sand bass | 0.00938 | 0.35920 | | 0.30294 | 2,975 | 3.0 |
| | California halibut | 0.08446 | 0.04310 | 0.07879 | 0.05034 | 494 | 0.5 |
| | spotfin croaker | | 0.67568 | | 0.56757 | 5,574 | 5.6 |
| | yellowfin croaker | | 1.06982 | | 0.89865 | 8,825 | 8.8 |

## *Southern (Panamic) Species Found in San Diego Bay*

San Diego Bay is known for being the northern edge of the range for a number of southern fishes that are not typically distributed throughout the Southern California Bight (Table 24). During the study, six species with primarily southern distributions were taken (Table 25). These fishes were mostly found in the South Ecoregion, though the banded guitarfish was found solely in the North Ecoregion and a single diamond stingray was captured in the North-Central Ecoregion.

**Table 24.** Panamic species previously recorded in San Diego Bay.

| Scientific Name | Common Name | First Recorded SDB Collection Date | Citation |
|---|---|---|---|
| *Albula vulpes* | bonefish | prior to 1918 | Starks (1918) |
| *Caranx caballus* | green jack | 1857 | Girard (1858) |
| *Caranx caninus* | Pacific crevalle jack | 16 Mar 1972 | Miller and Lea (1972) |
| *Caranx sexfasciatus* | bigeye trevally | Nov 1990 | Lea and Walker (1995) |
| *Cetengraulis mysticetus* | anchoveta | 1980-1986 | Duffy (1987) |
| *Chanos chanos* | milkfish | 22 Mar 1982 | Duffy and Bernard (1985) |
| *Cynoscion parvipinnis* | shortfin corvina | common | Jordan and Gilbert (1880) |
| *Dasyatis dipterura* | diamond stingray | 1880 (type locale) | Jordan and Gilbert (1880) |
| *Gymnura marmorata* | California butterfly ray | 1864 (type locale) | Cooper (1864) |
| *Haemulon flaviguttatum* | Cortez grunt | May 1991 | Lea and Rosenblatt (1992) |
| *Hippocampus ingens* | Pacific seahorse | 1855 (type locale) | Girard (1858) |
| *Hyporhamphus rosae* | California halfbeak | 1880 (type locale) | Jordan and Gilbert (1880) |
| *Mugil curema* | white mullet | 25 May 1985 | Lea et al. (1988) |
| *Pseudupeneus grandisquamous* | red goatfish | 1998 | Allen et al. (2002) |
| *Scomberomorus sierra* | Pacific sierra | Dec 1995 | Williams et al. (2011) |
| *Selene brevoorii* | Mexican lookdown | Nov 1990 | Lea and Walker (1995) |
| *Strongylura exilis* | California needlefish | common | Fitch and Lavenberg (1975) |
| *Zapteryx exasperata* | banded guitarfish | 1880 (type locale) | Jordan and Gilbert (1880) |

**California butterfly ray (*Gymnura marmorata*) and Pacific seahorse, both caught by purse seine in the South Ecoregion, April 2012**

**Table 25.** Abundance of Panamic species collected in San Diego Bay by ecoregion, April and July 2012.

| | | Ecoregions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | North | | North-Central | | South-Central | | South | |
| Scientific Name | Common Name | *April* | *July* | *April* | *July* | *April* | *July* | *April* | *July* |
| *Albula vulpes* | bonefish | | | | | 2 | | 6 | 3 |
| *Dasyatis dipterura* | diamond stingray | | | | 1 | | | | |
| *Gymnura marmorata* | California butterfly ray | | | | 1 | | 1 | 3 | |
| *Hippocampus ingens* | Pacific seahorse | | | | | | | 1 | |
| *Strongylura exilis* | California needlefish | | | | | | 1 | | |
| *Zapteryx exasperata* | banded guitarfish | 2 | 1 | | | | | | |

**Diamond stingray (*Dasyatis dipterura*) caught by purse seine in the North-Central Ecoregion, July 2012; this was the first recorded catch of this Panamic species from any of the San Diego Bay surveys from 1994-present**

## *Indigenous Bay and Estuary Fishes*

As the largest estuary in Southern California, San Diego Bay provides critical habitat for bay and estuary fishes. The high productivity rate coupled with the abundance of juvenile fishes in the bay highlights the importance of the bay as a nursery habitat. The bay contains extensive shallow water eelgrass habitat that supports a unique assemblage of juvenile and adult fishes. San Diego Bay serves as critical habitat for many fishes that, in turn support surrounding nearshore ecosystems. Juvenile fishes migrate out of the bay to surrounding habitats. And, these fishes provide a critical forage base for important and endangered avian species. Southern California indigenous bay and estuary fishes represented 14.38% of the total catch in this survey (Table 26).

**California killifish (*Fundulus parvipinnis*) captured by small seine in the South Ecoregion, April 2012**

**Table 26.** Indigenous bay/estuarine species taken in San Diego Bay by ecoregion in April and July, 2012.

| | | Ecoregions | | | | |
|---|---|---|---|---|---|---|
| **Scientific Name** | **Common Name** | ***North*** | ***North-Central*** | ***South-Central*** | ***South*** | ***Total*** |
| *Anchoa compressa* | deepbody anchovy | | 1 | 2 | 14 | 14 |
| *Anchoa delicatissima* | slough anchovy | | 270 | 546 | 750 | 750 |
| *Clevelandia ios* | arrow goby | 32 | 267 | 638 | 1501 | 1501 |
| *Fundulus parvipinnis* | California killifish | | | 3 | 5 | 5 |
| *Hypsoblennius gentilis* | bay blenny | 2 | 1 | | | |
| *Ilypnus gilberti* | cheekspot goby | | 6 | 4 | 6 | 6 |
| *Paralabrax maculatofasciatus* | spotted sand bass | 34 | 136 | 73 | 89 | 89 |
| *Quietula y-cauda* | shadow goby | | | 1 | 8 | 8 |
| *Syngnathus leptorhynchus* | bay pipefish | 121 | 98 | 159 | 110 | 110 |
| | **% of total catch:** | 4.45% | 13.80% | 41.67% | 62.83% | 14.38% |

## *Invasive Species*

**The invasive yellowfin goby (*Acanthogobius flavimanus*) captured by large seine in the South Ecoregion, April 2012**

In addition to being a warm-water refuge for southern species, San Diego Bay is also a major port-of-entry and commercial shipping hub. Releases of ballast water and historically disturbed habitat provide ideal opportunities for invasive species to establish themselves in the bay. In 2012, sampling yielded two species of previously known invaders, the yellowfin goby (*Acanthogobius flavimanus*) and the chameleon goby (*Tridentiger trigonocephalus*). The yellowfin goby was first described inside tidal marshes of the South Ecoregion by Williams et al. (1998), the same general location in which three individuals were captured in 2012. This species has been reported in many brackish and freshwater areas in California where they pose a threat to native fish species as predators, and although low-salinity requirements of this species appear to limit its expansion potential, no eradication or control efforts for this invasive have been successful (Molnar et al. 2008). Williams et al. (1998) recommended management actions that reduce off-season freshwater inflows and return tidal action to impounded saltmarsh areas in order to favor native species and prevent further spread of exotics.

The chameleon goby was first captured in San Diego Bay in January 1995 during the Allen et al. (2002) survey, and subsequently described with additional records by Pondella and Chinn (2005). A total of 18 chameleon goby were caught during July 2012 surveys, accounting for just 0.1% of the total catch during that period. However, this species was captured in the channel, nearshore vegetated, and nearshore non-vegetated areas, and in all ecoregions but the North, and though numbers still remain relatively low, the widespread nature of the catch may be a sign of a sustained invasion and self-recruiting population of chameleon goby within the bay. Despite the possibility of competing with native species for habitat, this invader has not become sufficient enough of a problem to require management action, and there are no known natural controls in California's marine environment (Molnar et al. 2008). Ironically, the chameleon goby may actually be controlled by yellowfin goby predation (Meng et al. 1994).

**The invasive chameleon goby (*Tridentiger trigonocephalus*) captured by otter trawl in the South Ecoregion, July 2012**

## *Comparison of the Current and Historical April and July Surveys*

Diversity and richness were determined for April and July from the previous surveys (Allen 1999, Pondella et al. 2006, Pondella and Williams 2009a) to allow direct comparisons of the data sets. The 1995-1998 survey years were used for the comparison because these were the only years from the Allen et al. (2002) where both April and July were sampled. Overall, 2012 Shannon-Wiener Diversity estimates in each ecoregion were very strong – almost identical to the 2008 values – and among the highest values for any sampling period (Table 27, Figure 24). Species richness for 2012 was among the highest in the range of values for the North-Central, South-Central and South Ecoregions for any survey period, but among the lowest for the North Ecoregion (Table 26; Figure 26).

**Table 27.** Shannon-Wiener diversity (H') values for April and July surveys by ecoregion and year.

| | Sampling Years | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ecoregion** | ***1995*** | ***1996*** | ***1997*** | ***1998*** | ***2005*** | ***2008*** | ***2012*** |
| North | 0.74 | 0.39 | 0.89 | 1.34 | 1.77 | 1.72 | 1.56 |
| North-Central | 1.46 | 0.66 | 1.34 | 0.87 | 1.47 | 1.62 | 1.63 |
| South-Central | 1.32 | 1.72 | 1.12 | 0.34 | 2.01 | 1.88 | 1.92 |
| South | 1.93 | 1.84 | 1.35 | 0.59 | 1.06 | 2.03 | 1.84 |

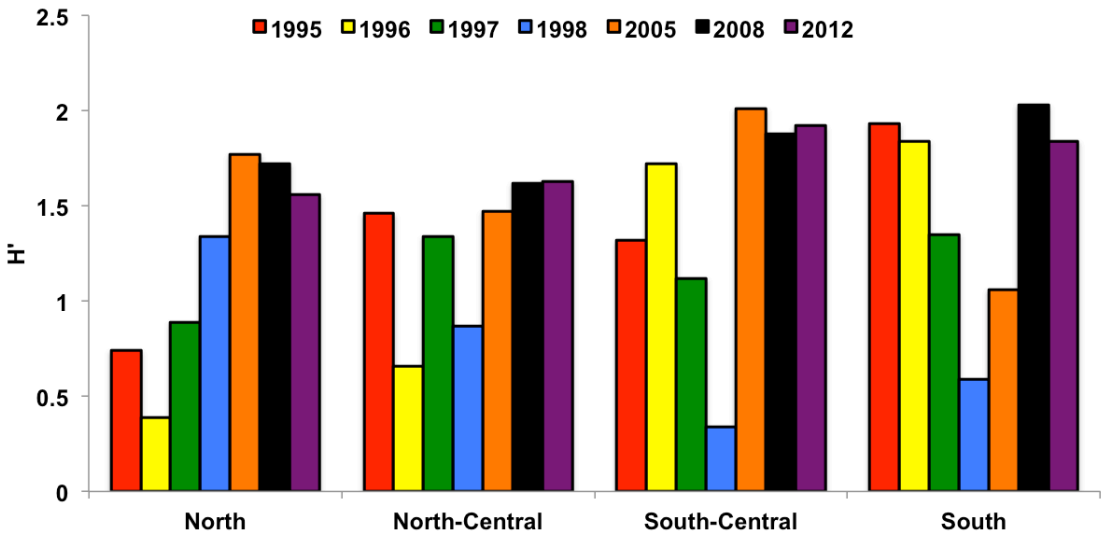



**Figure 24.** Shannon-Wiener diversity (H') values for April and July surveys by ecoregion and year.

**Table 28.** Species richness values for April and July surveys by ecoregion and year.

| | Sampling Years | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ecoregion** | ***1995*** | ***1996*** | ***1997*** | ***1998*** | ***2005*** | ***2008*** | ***2012*** |
| North | 37 | 39 | 27 | 33 | 38 | 33 | 30 |
| North-Central | 34 | 34 | 31 | 26 | 38 | 27 | 37 |
| South-Central | 33 | 23 | 27 | 22 | 25 | 23 | 32 |
| South | 36 | 24 | 26 | 30 | 23 | 25 | 29 |

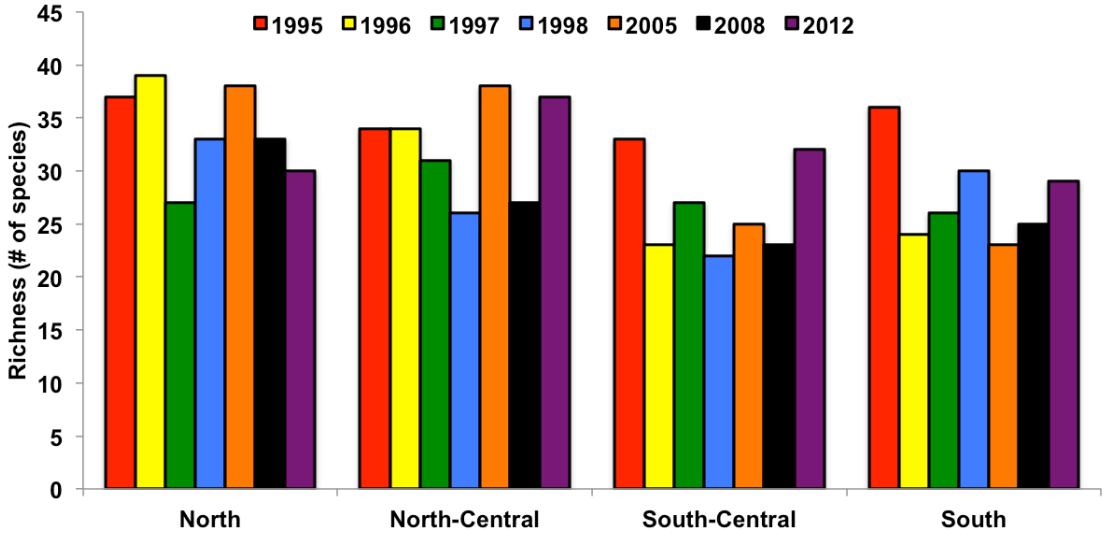



**Figure 25.** Species richness values for April and July surveys by ecoregion and year.

**Diamond turbot (*Hypsopsetta guttulata*) captured by beam trawl in the North-Central Ecoregion, April 2012**

Total catch and biomass from the April and July sampling periods were also compared from 1995-1998, 2005, 2008 and 2012. Overall, catch in 2012 at the North Ecoregion was equal or lower than all other sampling years, below average in the North-Central Ecoregion, and about average in the South-Central and South Ecoregions (Table 29; Figure 26). Total abundance in the North and North-Central Ecoregions were heavily influenced by large schools of northern anchovies that were captured during the 1995-1998 sampling periods. Estimates of total biomass were in the middle to high end of the range of all surveys at each ecoregion (Table 30; Figure 27). Specifically, biomass was higher in the North and South-Central Ecoregions than at any other time, likely due to high catches of larger fishes (i.e. round stingray, spotted sand bass, bat ray). Overall, the current community statistics were comparable to the previous surveys, though a strong increase in both abundance and biomass from the most recent survey in 2008 was evident.

**Table 29.** Total catch for April and July surveys by ecoregion.

| | Sampling Years | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ecoregion** | ***1995*** | ***1996*** | ***1997*** | ***1998*** | ***2005*** | ***2008*** | ***2012*** |
| North | 59,178 | 91,175 | 8,978 | 14,484 | 4,237 | 7,233 | 4,244 |
| North-Central | 19,523 | 112,964 | 8,718 | 11,603 | 12,537 | 3,355 | 5,645 |
| South-Central | 22,403 | 3,623 | 10,659 | 8,267 | 2,346 | 2,666 | 3,422 |
| South | 5,063 | 3,153 | 4,735 | 14,738 | 5,336 | 2,438 | 3,952 |

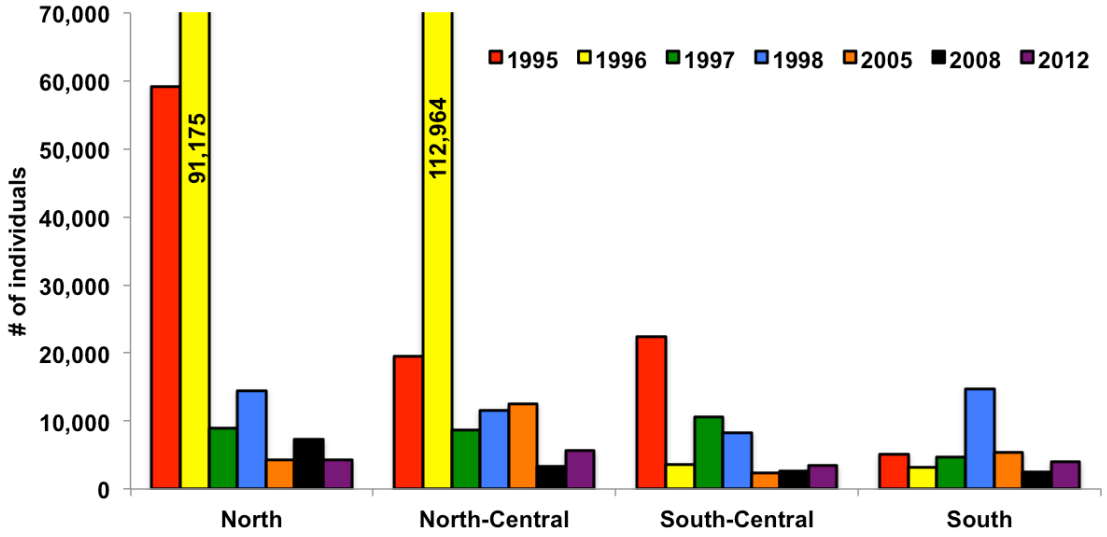



**Figure 26.** Total catch for April and July surveys by ecoregion.

**Table 30.** Total biomass (kg) of fishes captured during April and July surveys by ecoregion.

| | Sampling Years | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ecoregion** | ***1995*** | ***1996*** | ***1997*** | ***1998*** | ***2005*** | ***2008*** | ***2012*** |
| North | 111.9 | 195.4 | 70.1 | 58.7 | 58.9 | 36.3 | 119.6 |
| North-Central | 97.5 | 192.3 | 88.4 | 74.4 | 121.0 | 55.3 | 83.0 |
| South-Central | 102.4 | 46.6 | 65.4 | 33.2 | 34.2 | 42.9 | 70.7 |
| South | 89.2 | 75.8 | 48.2 | 52.3 | 77.4 | 49.0 | 74.8 |

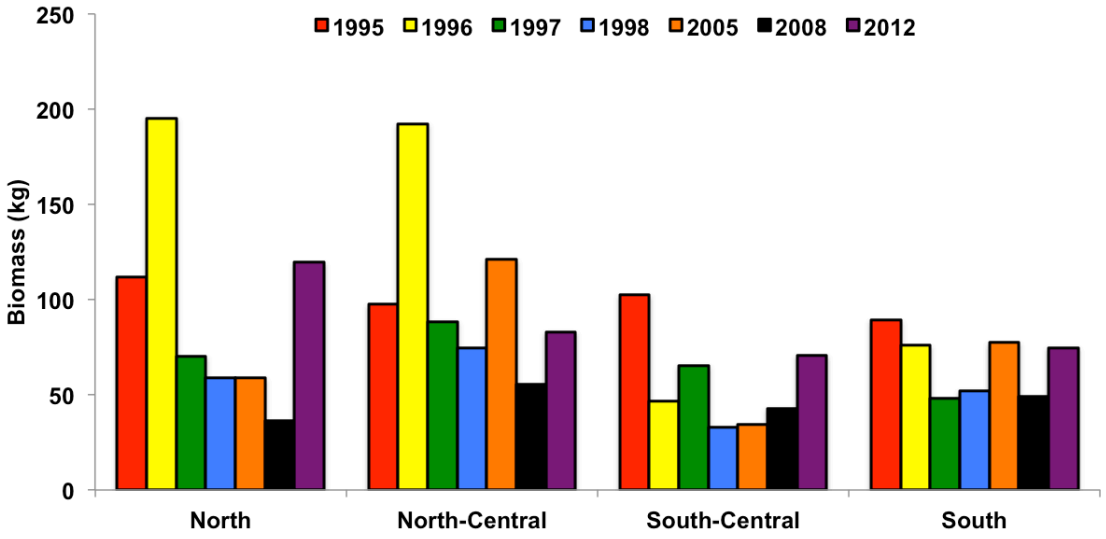



**Figure 27.** Total biomass (kg) of fishes captured during April and July surveys by ecoregion.

**Spotted turbot (*Pleuronichthys ritteri*) captured by otter trawl in the North-Central Ecoregion, April 2012**

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**Osprey (*Pandion haliaetus*) perched near Sweetwater Channel in the South-Central Ecoregion**

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BT | 1 | V | NS | 24-Jul-12 | 2012 | 7 | Urobatis halleri | 28300 | g |
| 3 | PS | 2 | C | C | 22-Apr-12 | 2012 | 4 | Myliobatis californica | 25150 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Urobatis halleri | 20000 | g |
| 4 | OT | 1 | C | C | 13-Apr-12 | 2012 | 4 | Gymnura marmorata | 12000 | g |
| 2 | PS | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 7800 | g |
| 2 | PS | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 5000 | g |
| 2 | PS | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Dasyatis dipterura | 5000 | g |
| 3 | PS | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Roncador stearnsii | 4200 | g |
| 1 | PS | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Urobatis halleri | 4200 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 4200 | g |
| 1 | PS | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 4100 | g |
| 3 | PS | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 3900 | g |
| 2 | OT | 1 | C | C | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 3760 | g |
| 1 | BT | 3 | V | NS | 24-Jul-12 | 2012 | 7 | Urobatis halleri | 2900 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 2800 | g |
| 2 | PS | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 2750 | g |
| 1 | OT | 3 | C | C | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 2500 | g |
| 2 | PS | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 2500 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 2500 | g |
| 3 | PS | 1 | C | C | 22-Apr-12 | 2012 | 4 | Myliobatis californica | 2200 | g |
| 2 | PS | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 2200 | g |
| 1 | OT | 3 | C | C | 24-Jul-12 | 2012 | 7 | Paralichthys californicus | 2200 | g |
| 4 | BT | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 2190 | g |
| 2 | OT | 2 | C | C | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 2124 | g |
| 1 | PS | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 2100 | g |
| 4 | PS | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Umbrina roncador | 2100 | g |
| 2 | PS | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 2000 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 1900 | g |
| 4 | OT | 1 | C | C | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 1800 | g |
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 1800 | g |
| 4 | LS | 2 | V | I | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 1800 | g |
| 4 | OT | 2 | C | C | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 1670 | g |
| 4 | PS | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 1650 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 1600 | g |
| 4 | LS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 1600 | g |
| 3 | PS | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 1500 | g |
| 3 | LS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Gymnura marmorata | 1500 | g |
| 1 | OT | 3 | C | C | 16-Apr-12 | 2012 | 4 | Scorpaena guttata | 1400 | g |
| 4 | PS | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Umbrina roncador | 1400 | g |
| 4 | PS | 1 | V | NS | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 1400 | g |
| 4 | PS | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Roncador stearnsii | 1400 | g |
| 2 | OT | 3 | C | C | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 1400 | g |
| 1 | BT | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Scorpaena guttata | 1385 | g |
| 4 | BT | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 1350 | g |
| 4 | PS | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 1300 | g |
| 4 | BT | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 1270 | g |
| 4 | BT | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 1250 | g |
| 2 | PS | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 1200 | g |
| 2 | OT | 2 | C | C | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 1200 | g |
| 4 | SS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 1200 | g |
| 1 | BT | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 1165 | g |
| 1 | OT | 1 | C | C | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 1100 | g |
| 1 | PS | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 1100 | g |
| 3 | PS | 1 | NV | NS | 22-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 1100 | g |
| 4 | PS | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Mustelus californicus | 1100 | g |
| 4 | PS | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Mustelus californicus | 1100 | g |
| 4 | PS | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Gymnura marmorata | 1100 | g |
| 2 | PS | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 1100 | g |
| 3 | PS | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 1100 | g |
| 1 | OT | 2 | C | C | 24-Jul-12 | 2012 | 7 | Paralichthys californicus | 1100 | g |
| 1 | OT | 3 | C | C | 16-Apr-12 | 2012 | 4 | Paralichthys californicus | 1000 | g |
| 1 | PS | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 1000 | g |
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Paralichthys californicus | 1000 | g |
| 4 | PS | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Roncador stearnsii | 1000 | g |
| 4 | PS | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 1000 | g |
| 4 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Mustelus californicus | 1000 | g |
| 4 | PS | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 1000 | g |
| 1 | PS | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 1000 | g |
| 4 | PS | 1 | NV | NS | 27-Jul-12 | 2012 | 7 | Albula vulpes | 1000 | g |
| 2 | OT | 1 | C | C | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 1000 | g |
| 2 | OT | 2 | C | C | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 1000 | g |
| 4 | OT | 1 | C | C | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 1000 | g |
| 4 | LS | 3 | NV | I | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 1000 | g |
| 3 | PS | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 950 | g |
| 4 | PS | 1 | NV | NS | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 950 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BT | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 918 | g |
| 4 | PS | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Albula vulpes | 910 | g |
| 1 | OT | 1 | C | C | 16-Apr-12 | 2012 | 4 | Paralichthys californicus | 900 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 900 | g |
| 4 | PS | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 900 | g |
| 1 | PS | 1 | V | NS | 24-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 900 | g |
| 1 | PS | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Heterodontus francisci | 900 | g |
| 2 | PS | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 900 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Umbrina roncador | 900 | g |
| 4 | BT | 1 | V | NS | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 900 | g |
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Anisotremus davidsonii | 880 | g |
| 2 | PS | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Myliobatis californica | 850 | g |
| 1 | BT | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Scorpaena guttata | 810 | g |
| 3 | PS | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 802 | g |
| 3 | OT | 3 | C | C | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 800 | g |
| 3 | PS | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 800 | g |
| 4 | PS | 1 | V | NS | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 800 | g |
| 4 | PS | 3 | NV | NS | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 800 | g |
| 2 | BT | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Heterodontus francisci | 800 | g |
| 3 | OT | 2 | C | C | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 800 | g |
| 3 | OT | 3 | C | C | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 800 | g |
| 1 | BT | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Heterodontus francisci | 790 | g |
| 4 | BT | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 780 | g |
| 4 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Myliobatis californica | 750 | g |
| 4 | PS | 1 | NV | NS | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 750 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 710 | g |
| 3 | OT | 2 | C | C | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 700 | g |
| 1 | PS | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 700 | g |
| 1 | PS | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Paralichthys californicus | 700 | g |
| 1 | PS | 3 | V | NS | 24-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 700 | g |
| 2 | PS | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 700 | g |
| 4 | PS | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 700 | g |
| 1 | OT | 3 | C | C | 24-Jul-12 | 2012 | 7 | Urobatis halleri | 700 | g |
| 1 | OT | 3 | C | C | 24-Jul-12 | 2012 | 7 | Pleuronichthys ritteri | 700 | g |
| 2 | BT | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 700 | g |
| 2 | BT | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 700 | g |
| 2 | BT | 3 | NV | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 700 | g |
| 3 | BT | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 700 | g |
| 3 | BT | 1 | NV | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 700 | g |
| 3 | OT | 1 | C | C | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 700 | g |
| 4 | BT | 1 | V | NS | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 700 | g |
| 4 | BT | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Gymnura marmorata | 690 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 690 | g |
| 1 | OT | 2 | C | C | 16-Apr-12 | 2012 | 4 | Zapteryx exasperata | 665 | g |
| 2 | BT | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 660 | g |
| 4 | PS | 2 | V | NS | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 650 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralichthys californicus | 640 | g |
| 2 | OT | 1 | C | C | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 640 | g |
| 4 | BT | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 640 | g |
| 1 | BT | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 630 | g |
| 4 | BT | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 630 | g |
| 1 | BT | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Micrometrus minimus | 622 | g |
| 3 | PS | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Albula vulpes | 620 | g |
| 4 | BT | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 613 | g |
| 2 | OT | 2 | C | C | 15-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 610 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Synodus lucioceps | 605 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 600 | g |
| 4 | PS | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Albula vulpes | 600 | g |
| 1 | PS | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 600 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Roncador stearnsii | 600 | g |
| 3 | PS | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 600 | g |
| 3 | PS | 1 | NV | NS | 26-Jul-12 | 2012 | 7 | Umbrina roncador | 600 | g |
| 2 | BT | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 600 | g |
| 2 | BT | 1 | NV | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 600 | g |
| 2 | OT | 1 | C | C | 25-Jul-12 | 2012 | 7 | Hypsopsetta guttulata | 600 | g |
| 3 | OT | 2 | C | C | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 600 | g |
| 4 | OT | 3 | C | C | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 600 | g |
| 4 | LS | 2 | V | I | 27-Jul-12 | 2012 | 7 | Myliobatis californica | 600 | g |
| 1 | PS | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 590 | g |
| 2 | OT | 3 | C | C | 15-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 585 | g |
| 1 | BT | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Zapteryx exasperata | 560 | g |
| 1 | PS | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 550 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Cheilotrema saturnum | 550 | g |
| 3 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 550 | g |
| 2 | PS | 3 | NV | NS | 25-Jul-12 | 2012 | 7 | Anchoa delicatissima | 550 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | OT | 2 | C | C | 24-Jul-12 | 2012 | 7 | Pleuronichthys ritteri | 535 | g |
| 1 | BT | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Heterodontus francisci | 530 | g |
| 3 | PS | 1 | NV | NS | 22-Apr-12 | 2012 | 4 | Albula vulpes | 510 | g |
| 3 | OT | 1 | C | C | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 500 | g |
| 3 | BT | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 500 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 500 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 500 | g |
| 1 | PS | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Hypsopsetta guttulata | 500 | g |
| 4 | PS | 2 | V | NS | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 500 | g |
| 4 | PS | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 500 | g |
| 2 | BT | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 500 | g |
| 2 | BT | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 500 | g |
| 2 | OT | 3 | C | C | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 500 | g |
| 3 | BT | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 500 | g |
| 3 | BT | 3 | V | NS | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 500 | g |
| 4 | BT | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 500 | g |
| 4 | BT | 2 | NV | NS | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 500 | g |
| 1 | BT | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 480 | g |
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Umbrina roncador | 475 | g |
| 3 | PS | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 471 | g |
| 2 | LS | 3 | V | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 454 | g |
| 4 | OT | 3 | C | C | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 450 | g |
| 4 | PS | 3 | C | C | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 450 | g |
| 3 | LS | 2 | NV | I | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 439 | g |
| 1 | BT | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 430 | g |
| 1 | BT | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Micrometrus minimus | 427 | g |
| 4 | OT | 1 | C | C | 13-Apr-12 | 2012 | 4 | Myliobatis californica | 420 | g |
| 4 | PS | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Albula vulpes | 420 | g |
| 3 | LS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 420 | g |
| 2 | BT | 1 | NV | NS | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 418 | g |
| 2 | OT | 1 | C | C | 15-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 410 | g |
| 3 | PS | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Paralichthys californicus | 410 | g |
| 3 | OT | 2 | C | C | 22-Apr-12 | 2012 | 4 | Paralichthys californicus | 400 | g |
| 3 | BT | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 400 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Rhacochilus vacca | 400 | g |
| 1 | PS | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 400 | g |
| 2 | PS | 2 | NV | NS | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 400 | g |
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 400 | g |
| 3 | PS | 1 | NV | NS | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 400 | g |
| 3 | PS | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 400 | g |
| 1 | PS | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Urobatis halleri | 400 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Paralichthys californicus | 400 | g |
| 2 | BT | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 400 | g |
| 2 | BT | 3 | NV | NS | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 400 | g |
| 2 | OT | 1 | C | C | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 400 | g |
| 2 | OT | 3 | C | C | 25-Jul-12 | 2012 | 7 | Hypsopsetta guttulata | 400 | g |
| 3 | BT | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 400 | g |
| 3 | BT | 2 | NV | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 400 | g |
| 4 | OT | 2 | C | C | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 400 | g |
| 4 | OT | 2 | C | C | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 400 | g |
| 3 | LS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Myliobatis californica | 400 | g |
| 4 | LS | 2 | NV | I | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 400 | g |
| 4 | OT | 2 | C | C | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 390 | g |
| 2 | PS | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Umbrina roncador | 390 | g |
| 3 | PS | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 384 | g |
| 2 | BT | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 378 | g |
| 1 | BT | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Micrometrus minimus | 371 | g |
| 1 | PS | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 370 | g |
| 3 | PS | 2 | NV | NS | 26-Jul-12 | 2012 | 7 | Myliobatis californica | 350 | g |
| 2 | PS | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 320 | g |
| 1 | PS | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 320 | g |
| 2 | LS | 1 | V | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 314 | g |
| 1 | OT | 2 | C | C | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 310 | g |
| 2 | LS | 2 | V | I | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 310 | g |
| 4 | OT | 3 | C | C | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 309 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 306 | g |
| 4 | LS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 304 | g |
| 4 | BT | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 303 | g |
| 3 | OT | 1 | C | C | 22-Apr-12 | 2012 | 4 | Paralichthys californicus | 300 | g |
| 3 | BT | 2 | NV | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 300 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Micrometrus minimus | 300 | g |
| 3 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 300 | g |
| 3 | PS | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 300 | g |
| 4 | PS | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 300 | g |
| 4 | PS | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Umbrina roncador | 300 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | PS | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 300 | g |
| 1 | PS | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 300 | g |
| 1 | PS | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 300 | g |
| 2 | PS | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Umbrina roncador | 300 | g |
| 3 | PS | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 300 | g |
| 3 | PS | 3 | V | NS | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 300 | g |
| 4 | PS | 1 | V | NS | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 300 | g |
| 2 | BT | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 300 | g |
| 2 | BT | 1 | NV | NS | 25-Jul-12 | 2012 | 7 | Urobatis halleri | 300 | g |
| 3 | BT | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 300 | g |
| 3 | BT | 3 | V | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 300 | g |
| 3 | BT | 3 | NV | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 300 | g |
| 1 | BT | 3 | V | NS | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 299 | g |
| 2 | SS | 3 | NV | I | 15-Apr-12 | 2012 | 4 | Myliobatis californica | 290 | g |
| 2 | OT | 2 | C | C | 15-Apr-12 | 2012 | 4 | Pleuronichthys ritteri | 288 | g |
| 3 | PS | 3 | NV | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 286 | g |
| 2 | BT | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 281 | g |
| 4 | SS | 1 | V | I | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 280 | g |
| 4 | LS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Myliobatis californica | 275 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 270 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 269 | g |
| 2 | BT | 2 | NV | NS | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 260 | g |
| 4 | PS | 1 | C | C | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 260 | g |
| 2 | OT | 3 | C | C | 25-Jul-12 | 2012 | 7 | Porichthys myriaster | 260 | g |
| 2 | OT | 3 | C | C | 15-Apr-12 | 2012 | 4 | Porichthys myriaster | 250 | g |
| 4 | OT | 3 | C | C | 13-Apr-12 | 2012 | 4 | Porichthys myriaster | 250 | g |
| 3 | PS | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 250 | g |
| 4 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 250 | g |
| 1 | BT | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Porichthys myriaster | 250 | g |
| 3 | PS | 3 | C | C | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 245 | g |
| 3 | PS | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Anchoa delicatissima | 241 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 240 | g |
| 1 | BT | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Urobatis halleri | 240 | g |
| 1 | LS | 3 | NV | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 236 | g |
| 1 | BT | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 233 | g |
| 2 | OT | 1 | C | C | 15-Apr-12 | 2012 | 4 | Paralichthys californicus | 230 | g |
| 2 | OT | 2 | C | C | 15-Apr-12 | 2012 | 4 | Paralichthys californicus | 230 | g |
| 4 | OT | 1 | C | C | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 230 | g |
| 1 | BT | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Heterodontus francisci | 230 | g |
| 1 | BT | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 227 | g |
| 1 | BT | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 222 | g |
| 2 | BT | 3 | NV | NS | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 220 | g |
| 4 | PS | 1 | C | C | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 220 | g |
| 2 | LS | 3 | V | I | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 220 | g |
| 4 | PS | 3 | C | C | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 215 | g |
| 2 | OT | 3 | C | C | 15-Apr-12 | 2012 | 4 | Pleuronichthys ritteri | 210 | g |
| 2 | LS | 3 | V | I | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 210 | g |
| 2 | OT | 1 | C | C | 15-Apr-12 | 2012 | 4 | Pleuronichthys ritteri | 201 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 201 | g |
| 1 | BT | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Porichthys myriaster | 200 | g |
| 3 | OT | 3 | C | C | 22-Apr-12 | 2012 | 4 | Paralichthys californicus | 200 | g |
| 3 | BT | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 200 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 200 | g |
| 3 | PS | 2 | NV | NS | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 200 | g |
| 1 | LS | 1 | V | I | 16-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 200 | g |
| 1 | PS | 3 | V | NS | 24-Jul-12 | 2012 | 7 | Embiotoca jacksoni | 200 | g |
| 2 | PS | 3 | NV | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 200 | g |
| 3 | PS | 3 | V | NS | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 200 | g |
| 3 | PS | 2 | NV | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 200 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 200 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Zapteryx exasperata | 200 | g |
| 2 | BT | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 200 | g |
| 2 | BT | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Gymnura marmorata | 200 | g |
| 2 | BT | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 200 | g |
| 2 | OT | 2 | C | C | 25-Jul-12 | 2012 | 7 | Paralichthys californicus | 200 | g |
| 2 | OT | 2 | C | C | 25-Jul-12 | 2012 | 7 | Hypsopsetta guttulata | 200 | g |
| 3 | BT | 2 | NV | NS | 26-Jul-12 | 2012 | 7 | Paralichthys californicus | 200 | g |
| 3 | BT | 3 | NV | NS | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 200 | g |
| 3 | OT | 2 | C | C | 26-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 200 | g |
| 4 | OT | 3 | C | C | 27-Jul-12 | 2012 | 7 | Paralichthys californicus | 200 | g |
| 1 | LS | 2 | NV | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 193 | g |
| 2 | LS | 2 | V | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 193 | g |
| 1 | OT | 2 | C | C | 16-Apr-12 | 2012 | 4 | Pleuronichthys ritteri | 190 | g |
| 1 | BT | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 190 | g |
| 2 | OT | 2 | C | C | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 190 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | PS | 3 | NV | NS | 15-Apr-12 | 2012 | 4 | Porichthys myriaster | 190 | g |
| 4 | LS | 2 | V | I | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 190 | g |
| 3 | LS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 188 | g |
| 2 | OT | 3 | C | C | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 185 | g |
| 3 | BT | 1 | NV | NS | 26-Jul-12 | 2012 | 7 | Heterostichus rostratus | 183 | g |
| 3 | LS | 3 | NV | I | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 181 | g |
| 2 | BT | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 180 | g |
| 2 | PS | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 180 | g |
| 4 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 180 | g |
| 3 | LS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 180 | g |
| 4 | LS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 180 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 175 | g |
| 1 | BT | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 170 | g |
| 2 | PS | 1 | C | C | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 170 | g |
| 3 | PS | 2 | NV | NS | 22-Apr-12 | 2012 | 4 | Anchoa delicatissima | 170 | g |
| 3 | LS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 170 | g |
| 2 | BT | 3 | NV | NS | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 166 | g |
| 4 | LS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 163 | g |
| 1 | BT | 1 | V | NS | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 163 | g |
| 1 | BT | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 161 | g |
| 2 | BT | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 161 | g |
| 1 | OT | 2 | C | C | 16-Apr-12 | 2012 | 4 | Citharichtys stigmaeus | 160 | g |
| 4 | OT | 1 | C | C | 13-Apr-12 | 2012 | 4 | Paralichthys californicus | 160 | g |
| 3 | PS | 1 | NV | NS | 22-Apr-12 | 2012 | 4 | Scomber japonicus | 160 | g |
| 4 | PS | 2 | C | C | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 160 | g |
| 3 | PS | 2 | C | C | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 160 | g |
| 2 | BT | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 160 | g |
| 1 | BT | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 157 | g |
| 1 | OT | 3 | C | C | 16-Apr-12 | 2012 | 4 | Citharichtys stigmaeus | 150 | g |
| 2 | BT | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 150 | g |
| 2 | BT | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Micrometrus minimus | 150 | g |
| 4 | BT | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Paralichthys californicus | 150 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Paralichthys californicus | 150 | g |
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Porichthys myriaster | 150 | g |
| 4 | PS | 1 | C | C | 13-Apr-12 | 2012 | 4 | Atherinops affinis | 150 | g |
| 4 | PS | 2 | C | C | 13-Apr-12 | 2012 | 4 | Paralichthys californicus | 150 | g |
| 1 | PS | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 150 | g |
| 1 | PS | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 150 | g |
| 3 | PS | 3 | V | NS | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 150 | g |
| 3 | PS | 3 | V | NS | 26-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 150 | g |
| 1 | OT | 2 | C | C | 24-Jul-12 | 2012 | 7 | Scorpaena guttata | 150 | g |
| 3 | LS | 1 | NV | I | 26-Jul-12 | 2012 | 7 | Urobatis halleri | 150 | g |
| 3 | PS | 3 | C | C | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 140 | g |
| 1 | OT | 3 | C | C | 24-Jul-12 | 2012 | 7 | Synodus lucioceps | 140 | g |
| 2 | OT | 1 | C | C | 25-Jul-12 | 2012 | 7 | Cheilotrema saturnum | 140 | g |
| 4 | OT | 3 | C | C | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 140 | g |
| 3 | PS | 2 | C | C | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 135 | g |
| 3 | BT | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 130 | g |
| 3 | BT | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 130 | g |
| 2 | PS | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Paralichthys californicus | 130 | g |
| 2 | PS | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Urobatis halleri | 130 | g |
| 4 | PS | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Paralichthys californicus | 130 | g |
| 2 | LS | 3 | V | I | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 130 | g |
| 1 | BT | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Micrometrus minimus | 125 | g |
| 2 | PS | 1 | C | C | 25-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 125 | g |
| 3 | PS | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 125 | g |
| 3 | LS | 2 | NV | I | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 122 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Embiotoca jacksoni | 122 | g |
| 1 | SS | 3 | NV | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 121 | g |
| 4 | OT | 3 | C | C | 13-Apr-12 | 2012 | 4 | Paralichthys californicus | 120 | g |
| 3 | PS | 2 | C | C | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 120 | g |
| 4 | PS | 2 | NV | NS | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 120 | g |
| 4 | BT | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 120 | g |
| 1 | SS | 2 | NV | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 116 | g |
| 1 | SS | 3 | V | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 114 | g |
| 1 | PS | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Micrometrus minimus | 110 | g |
| 2 | PS | 1 | C | C | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 110 | g |
| 2 | PS | 2 | NV | NS | 15-Apr-12 | 2012 | 4 | Paralichthys californicus | 110 | g |
| 3 | PS | 1 | NV | NS | 22-Apr-12 | 2012 | 4 | Anchoa delicatissima | 110 | g |
| 3 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 110 | g |
| 2 | LS | 1 | V | I | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 110 | g |
| 3 | BT | 1 | NV | NS | 26-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 110 | g |
| 4 | BT | 2 | V | NS | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 110 | g |
| 4 | LS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Paralichthys californicus | 110 | g |
| 2 | PS | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Anchoa delicatissima | 109 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | BT | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 109 | g |
| 3 | BT | 2 | NV | NS | 22-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 108 | g |
| 4 | LS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 106 | g |
| 3 | PS | 1 | C | C | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 101 | g |
| 3 | BT | 3 | NV | NS | 26-Jul-12 | 2012 | 7 | Heterostichus rostratus | 101 | g |
| 3 | BT | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 100 | g |
| 3 | BT | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 100 | g |
| 4 | BT | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 100 | g |
| 1 | PS | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Paralichthys californicus | 100 | g |
| 1 | PS | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 100 | g |
| 1 | PS | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Porichthys myriaster | 100 | g |
| 1 | PS | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Synodus lucioceps | 100 | g |
| 1 | PS | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 100 | g |
| 1 | PS | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 100 | g |
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 100 | g |
| 2 | PS | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Porichthys myriaster | 100 | g |
| 2 | PS | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 100 | g |
| 2 | PS | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 100 | g |
| 3 | PS | 3 | C | C | 22-Apr-12 | 2012 | 4 | Sardinops sagax | 100 | g |
| 4 | PS | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 100 | g |
| 2 | LS | 2 | V | I | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 100 | g |
| 2 | SS | 2 | V | I | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 100 | g |
| 1 | PS | 3 | V | NS | 24-Jul-12 | 2012 | 7 | Paralichthys californicus | 100 | g |
| 1 | PS | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Urobatis halleri | 100 | g |
| 2 | PS | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Paralichthys californicus | 100 | g |
| 4 | PS | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 100 | g |
| 2 | OT | 2 | C | C | 25-Jul-12 | 2012 | 7 | Cheilotrema saturnum | 100 | g |
| 2 | OT | 3 | C | C | 25-Jul-12 | 2012 | 7 | Cheilotrema saturnum | 100 | g |
| 3 | BT | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 100 | g |
| 3 | BT | 1 | NV | NS | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 100 | g |
| 3 | LS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 100 | g |
| 4 | SS | 3 | NV | I | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 100 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Micrometrus minimus | 95 | g |
| 1 | BT | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 95 | g |
| 4 | LS | 3 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 95 | g |
| 2 | BT | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 94 | g |
| 4 | PS | 1 | C | C | 27-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 92 | g |
| 2 | BT | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 91 | g |
| 1 | OT | 3 | C | C | 16-Apr-12 | 2012 | 4 | Pleuronichthys ritteri | 90 | g |
| 1 | BT | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 90 | g |
| 2 | OT | 1 | C | C | 15-Apr-12 | 2012 | 4 | Synodus lucioceps | 90 | g |
| 2 | OT | 2 | C | C | 15-Apr-12 | 2012 | 4 | Synodus lucioceps | 90 | g |
| 3 | BT | 1 | NV | NS | 22-Apr-12 | 2012 | 4 | Paralichthys californicus | 90 | g |
| 4 | BT | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 90 | g |
| 2 | PS | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 90 | g |
| 2 | PS | 3 | NV | NS | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 90 | g |
| 3 | PS | 3 | C | C | 22-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 90 | g |
| 4 | OT | 2 | C | C | 27-Jul-12 | 2012 | 7 | Paralichthys californicus | 90 | g |
| 4 | OT | 2 | C | C | 27-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 90 | g |
| 1 | PS | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 89 | g |
| 1 | BT | 3 | V | NS | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 88 | g |
| 1 | LS | 1 | NV | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 83 | g |
| 1 | LS | 2 | NV | I | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 82 | g |
| 2 | PS | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 82 | g |
| 1 | OT | 3 | C | C | 24-Jul-12 | 2012 | 7 | Porichthys myriaster | 80.5 | g |
| 2 | BT | 2 | NV | NS | 15-Apr-12 | 2012 | 4 | Micrometrus minimus | 80 | g |
| 3 | OT | 2 | C | C | 22-Apr-12 | 2012 | 4 | Porichthys myriaster | 80 | g |
| 3 | OT | 3 | C | C | 22-Apr-12 | 2012 | 4 | Synodus lucioceps | 80 | g |
| 2 | PS | 3 | NV | NS | 15-Apr-12 | 2012 | 4 | Synodus lucioceps | 80 | g |
| 3 | PS | 3 | C | C | 22-Apr-12 | 2012 | 4 | Urobatis halleri | 80 | g |
| 2 | OT | 3 | C | C | 25-Jul-12 | 2012 | 7 | Paralichthys californicus | 80 | g |
| 4 | BT | 2 | NV | NS | 27-Jul-12 | 2012 | 7 | Urobatis halleri | 80 | g |
| 3 | LS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 80 | g |
| 2 | BT | 1 | NV | NS | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 78 | g |
| 1 | BT | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Gibbonsia elegans | 75 | g |
| 2 | OT | 3 | C | C | 15-Apr-12 | 2012 | 4 | Synodus lucioceps | 75 | g |
| 2 | SS | 2 | NV | I | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 75 | g |
| 4 | LS | 2 | NV | I | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 75 | g |
| 3 | LS | 3 | V | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 71 | g |
| 3 | BT | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Heterostichus rostratus | 71 | g |
| 3 | OT | 3 | C | C | 22-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 70 | g |
| 3 | PS | 2 | C | C | 22-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 70 | g |
| 2 | LS | 1 | V | I | 15-Apr-12 | 2012 | 4 | Leptocottus armatus | 70 | g |
| 1 | BT | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 70 | g |
| 1 | OT | 1 | C | C | 24-Jul-12 | 2012 | 7 | Symphurus atricauda | 70 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | SS | 1 | V | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 70 | g |
| 2 | LS | 3 | V | I | 25-Jul-12 | 2012 | 7 | Embiotoca jacksoni | 70 | g |
| 3 | LS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 70 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 69 | g |
| 3 | PS | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Anchoa delicatissima | 68 | g |
| 2 | LS | 3 | V | I | 15-Apr-12 | 2012 | 4 | Leptocottus armatus | 68 | g |
| 3 | PS | 3 | C | C | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 68 | g |
| 4 | BT | 3 | NV | NS | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 66 | g |
| 1 | LS | 1 | V | I | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 65 | g |
| 4 | LS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Anchoa compressa | 64 | g |
| 4 | BT | 1 | V | NS | 27-Jul-12 | 2012 | 7 | Heterostichus rostratus | 64 | g |
| 1 | BT | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 62 | g |
| 3 | PS | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 61 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Symphurus atricauda | 60 | g |
| 4 | LS | 3 | NV | I | 22-Apr-12 | 2012 | 4 | Leptocottus armatus | 60 | g |
| 4 | PS | 3 | NV | NS | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 60 | g |
| 1 | BT | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 60 | g |
| 4 | OT | 1 | C | C | 27-Jul-12 | 2012 | 7 | Paralichthys californicus | 60 | g |
| 4 | LS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Micrometrus minimus | 58 | g |
| 4 | SS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Clevelandia ios | 56.3 | g |
| 1 | OT | 2 | C | C | 24-Jul-12 | 2012 | 7 | Symphurus atricauda | 56 | g |
| 2 | OT | 3 | C | C | 15-Apr-12 | 2012 | 4 | Cheilotrema saturnum | 55 | g |
| 2 | SE | 1 | NV | I | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 55 | g |
| 4 | LS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Paralichthys californicus | 55 | g |
| 4 | PS | 2 | NV | NS | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 55 | g |
| 1 | OT | 1 | C | C | 24-Jul-12 | 2012 | 7 | Porichthys myriaster | 55 | g |
| 4 | BT | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Heterostichus rostratus | 55 | g |
| 1 | BT | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 54 | g |
| 1 | BT | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 51 | g |
| 1 | PS | 1 | C | C | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 50 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 50 | g |
| 1 | PS | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Pleuronichthys ritteri | 50 | g |
| 3 | PS | 1 | NV | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 50 | g |
| 4 | PS | 1 | V | NS | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 50 | g |
| 1 | LS | 2 | V | I | 16-Apr-12 | 2012 | 4 | Paralichthys californicus | 50 | g |
| 2 | LS | 1 | V | I | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 50 | g |
| 4 | BT | 1 | V | NS | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 50 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Paralabrax clathratus | 50 | g |
| 3 | OT | 3 | C | C | 26-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 50 | g |
| 4 | OT | 1 | C | C | 27-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 50 | g |
| 2 | LS | 2 | V | I | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 50 | g |
| 2 | BT | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 48 | g |
| 2 | LS | 3 | NV | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 48 | g |
| 2 | BT | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 46 | g |
| 2 | BT | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Micrometrus minimus | 45 | g |
| 2 | LS | 2 | V | I | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 45 | g |
| 4 | LS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Paralichthys californicus | 43 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 42 | g |
| 3 | PS | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Anchoa delicatissima | 42 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 42 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Anchoa delicatissima | 42 | g |
| 1 | SS | 2 | V | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 42 | g |
| 2 | SS | 3 | NV | I | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 41 | g |
| 1 | BT | 1 | V | NS | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 41 | g |
| 3 | BT | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 40 | g |
| 3 | LS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 40 | g |
| 1 | PS | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 40 | g |
| 4 | PS | 1 | NV | NS | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 40 | g |
| 2 | BT | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 40 | g |
| 2 | BT | 3 | NV | NS | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 40 | g |
| 3 | OT | 1 | C | C | 26-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 40 | g |
| 3 | OT | 3 | C | C | 26-Jul-12 | 2012 | 7 | Paralichthys californicus | 40 | g |
| 4 | OT | 3 | C | C | 27-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 40 | g |
| 1 | LS | 2 | V | I | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 40 | g |
| 2 | LS | 1 | V | I | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 40 | g |
| 2 | LS | 3 | V | I | 25-Jul-12 | 2012 | 7 | Micrometrus minimus | 40 | g |
| 3 | LS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 40 | g |
| 3 | LS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Paralichthys californicus | 40 | g |
| 4 | BT | 2 | NV | NS | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 39 | g |
| 2 | LS | 1 | NV | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 38.4 | g |
| 2 | BT | 3 | NV | NS | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 38 | g |
| 1 | PS | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 38 | g |
| 4 | BT | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Anchoa delicatissima | 36.5 | g |
| 4 | PS | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Hippocampus ingens | 35 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 34 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | LS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Acanthogobius flavimanus | 34 | g |
| 1 | PS | 2 | C | C | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 34 | g |
| 3 | PS | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 34 | g |
| 3 | BT | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 34 | g |
| 1 | LS | 1 | NV | I | 16-Apr-12 | 2012 | 4 | Leptocottus armatus | 33 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Gibbonsia elegans | 32 | g |
| 1 | BT | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 31 | g |
| 2 | OT | 3 | C | C | 15-Apr-12 | 2012 | 4 | Paralichthys californicus | 31 | g |
| 2 | BT | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 31 | g |
| 2 | PS | 3 | C | C | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 31 | g |
| 4 | SS | 2 | V | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 30.5 | g |
| 3 | OT | 3 | C | C | 22-Apr-12 | 2012 | 4 | Porichthys myriaster | 30 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 30 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Pleuronichthys ritteri | 30 | g |
| 1 | PS | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Symphurus atricauda | 30 | g |
| 2 | PS | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 30 | g |
| 4 | PS | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Anchoa compressa | 30 | g |
| 4 | PS | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 30 | g |
| 2 | LS | 2 | NV | I | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 30 | g |
| 2 | LS | 1 | V | I | 15-Apr-12 | 2012 | 4 | Paralichthys californicus | 30 | g |
| 1 | PS | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 30 | g |
| 2 | PS | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Paralabrax clathratus | 30 | g |
| 1 | OT | 1 | C | C | 24-Jul-12 | 2012 | 7 | Citharichtys stigmaeus | 30 | g |
| 2 | BT | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Hypsoblennius gentilis | 30 | g |
| 2 | BT | 1 | NV | NS | 25-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 30 | g |
| 2 | OT | 2 | C | C | 25-Jul-12 | 2012 | 7 | Pleuronichthys ritteri | 30 | g |
| 3 | BT | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Heterostichus rostratus | 30 | g |
| 1 | LS | 1 | V | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 30 | g |
| 2 | LS | 1 | V | I | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 30 | g |
| 3 | LS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Leptocottus armatus | 30 | g |
| 1 | BT | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 29 | g |
| 2 | BT | 3 | NV | NS | 15-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 28 | g |
| 4 | BT | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Micrometrus minimus | 28 | g |
| 3 | LS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 28 | g |
| 1 | BT | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 27 | g |
| 1 | PS | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Hypsopsetta guttulata | 27 | g |
| 3 | BT | 2 | NV | NS | 26-Jul-12 | 2012 | 7 | Heterostichus rostratus | 27 | g |
| 4 | BT | 1 | NV | NS | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 27 | g |
| 2 | PS | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 26.8 | g |
| 2 | BT | 2 | NV | NS | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 26 | g |
| 3 | BT | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Heterostichus rostratus | 26 | g |
| 4 | BT | 2 | V | NS | 27-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 26 | g |
| 4 | SS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 26 | g |
| 2 | BT | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 25 | g |
| 1 | LS | 3 | NV | I | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 25 | g |
| 2 | SS | 2 | V | I | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 25 | g |
| 4 | LS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Leptocottus armatus | 25 | g |
| 1 | PS | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 25 | g |
| 1 | PS | 1 | C | C | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 25 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 25 | g |
| 3 | PS | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 25 | g |
| 4 | PS | 2 | V | NS | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 25 | g |
| 4 | BT | 2 | V | NS | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 25 | g |
| 1 | LS | 1 | V | I | 24-Jul-12 | 2012 | 7 | Leptocottus armatus | 25 | g |
| 3 | LS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Leptocottus armatus | 25 | g |
| 2 | PS | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 24.3 | g |
| 1 | BT | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 24 | g |
| 1 | PS | 3 | C | C | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 24 | g |
| 4 | BT | 2 | NV | NS | 27-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 24 | g |
| 1 | PS | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Paralabrax clathratus | 23 | g |
| 4 | BT | 3 | NV | NS | 27-Jul-12 | 2012 | 7 | Heterostichus rostratus | 23 | g |
| 3 | SS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Clevelandia ios | 23 | g |
| 1 | PS | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Paralabrax maculatofasciatu | 22 | g |
| 1 | SS | 1 | NV | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 22 | g |
| 1 | BT | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 21 | g |
| 2 | BT | 3 | NV | NS | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 21 | g |
| 4 | LS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Atherinops affinis | 21 | g |
| 2 | BT | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Gibbonsia elegans | 21 | g |
| 2 | LS | 2 | NV | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 21 | g |
| 3 | LS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 21 | g |
| 4 | SS | 1 | V | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 21 | g |
| 3 | BT | 2 | NV | NS | 22-Apr-12 | 2012 | 4 | Heterostichus rostratus | 20 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Citharichtys stigmaeus | 20 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Pleuronichthys decurrens | 20 | g |
| 1 | PS | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 20 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 20 | g |
| 2 | PS | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 20 | g |
| 3 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Anchoa delicatissima | 20 | g |
| 4 | PS | 3 | C | C | 13-Apr-12 | 2012 | 4 | Urobatis halleri | 20 | g |
| 4 | PS | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Anchoa compressa | 20 | g |
| 4 | PS | 1 | V | NS | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 20 | g |
| 4 | PS | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 20 | g |
| 1 | LS | 3 | V | I | 16-Apr-12 | 2012 | 4 | Leptocottus armatus | 20 | g |
| 2 | LS | 1 | V | I | 15-Apr-12 | 2012 | 4 | Hypsurus caryi | 20 | g |
| 1 | BT | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Embiotoca jacksoni | 20 | g |
| 2 | BT | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 20 | g |
| 2 | BT | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 20 | g |
| 3 | BT | 3 | V | NS | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 20 | g |
| 2 | LS | 1 | V | I | 25-Jul-12 | 2012 | 7 | Micrometrus minimus | 20 | g |
| 2 | LS | 1 | V | I | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 20 | g |
| 2 | LS | 2 | V | I | 25-Jul-12 | 2012 | 7 | Micrometrus minimus | 20 | g |
| 2 | LS | 3 | V | I | 25-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 20 | g |
| 2 | SS | 1 | V | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 20 | g |
| 4 | SS | 1 | NV | I | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 20 | g |
| 1 | BT | 1 | V | NS | 24-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 19.9 | g |
| 1 | BT | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 19 | g |
| 2 | BT | 2 | NV | NS | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 19 | g |
| 2 | BT | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 19 | g |
| 3 | BT | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 19 | g |
| 4 | OT | 2 | C | C | 13-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 19 | g |
| 2 | SS | 3 | NV | I | 15-Apr-12 | 2012 | 4 | Leptocottus armatus | 19 | g |
| 1 | PS | 1 | V | NS | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 19 | g |
| 3 | BT | 3 | V | NS | 26-Jul-12 | 2012 | 7 | Heterostichus rostratus | 19 | g |
| 2 | BT | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 18 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Anchoa compressa | 18 | g |
| 4 | PS | 2 | V | NS | 27-Jul-12 | 2012 | 7 | Anchoa compressa | 18 | g |
| 1 | OT | 3 | C | C | 24-Jul-12 | 2012 | 7 | Symphurus atricauda | 18 | g |
| 4 | BT | 2 | NV | NS | 27-Jul-12 | 2012 | 7 | Heterostichus rostratus | 18 | g |
| 4 | SS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Leptocottus armatus | 17.6 | g |
| 1 | BT | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 17 | g |
| 2 | BT | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 17 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Hypsoblennius gentilis | 17 | g |
| 1 | BT | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 17 | g |
| 3 | BT | 3 | NV | NS | 26-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 17 | g |
| 1 | BT | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Gibbonsia elegans | 16 | g |
| 4 | LS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 16 | g |
| 3 | PS | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Heterostichus rostratus | 16 | g |
| 3 | PS | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Anchoa compressa | 16 | g |
| 1 | BT | 1 | V | NS | 24-Jul-12 | 2012 | 7 | Gibbonsia elegans | 16 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Paralabrax clathratus | 16 | g |
| 2 | PS | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Phanerodon furcatus | 15.6 | g |
| 4 | BT | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 15.1 | g |
| 3 | BT | 2 | NV | NS | 22-Apr-12 | 2012 | 4 | Leptocottus armatus | 15 | g |
| 1 | PS | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Synodus lucioceps | 15 | g |
| 1 | PS | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 15 | g |
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Seriphus politus | 15 | g |
| 1 | LS | 1 | V | I | 16-Apr-12 | 2012 | 4 | Leptocottus armatus | 15 | g |
| 1 | LS | 3 | V | I | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 15 | g |
| 4 | LS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 15 | g |
| 1 | PS | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Paralabrax clathratus | 15 | g |
| 2 | PS | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Anchoa delicatissima | 15 | g |
| 2 | LS | 2 | V | I | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 15 | g |
| 1 | LS | 3 | NV | I | 16-Apr-12 | 2012 | 4 | Leptocottus armatus | 14 | g |
| 2 | PS | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Anchoa delicatissima | 14 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Paralabrax nebulifer | 14 | g |
| 3 | BT | 1 | NV | NS | 26-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 14 | g |
| 2 | SS | 3 | NV | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 13.8 | g |
| 2 | BT | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 13 | g |
| 2 | BT | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Gibbonsia elegans | 13 | g |
| 4 | LS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 13 | g |
| 3 | BT | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 12 | g |
| 1 | LS | 2 | V | I | 16-Apr-12 | 2012 | 4 | Leptocottus armatus | 12 | g |
| 2 | SE | 3 | NV | I | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 12 | g |
| 3 | PS | 2 | C | C | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 12 | g |
| 1 | BT | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 12 | g |
| 3 | LS | 3 | NV | I | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 12 | g |
| 4 | BT | 3 | NV | NS | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 11 | g |
| 4 | BT | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 11 | g |
| 3 | PS | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Anchoa compressa | 11 | g |
| 2 | SS | 3 | NV | I | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 11 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | OT | 1 | C | C | 16-Apr-12 | 2012 | 4 | Citharichtys stigmaeus | 10 | g |
| 1 | BT | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 10 | g |
| 1 | PS | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 10 | g |
| 1 | PS | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Citharichtys stigmaeus | 10 | g |
| 1 | PS | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 10 | g |
| 1 | PS | 3 | V | NS | 16-Apr-12 | 2012 | 4 | Micrometrus minimus | 10 | g |
| 1 | PS | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 10 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Citharichtys stigmaeus | 10 | g |
| 2 | PS | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 10 | g |
| 2 | PS | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 10 | g |
| 3 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 10 | g |
| 3 | PS | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 10 | g |
| 4 | PS | 3 | C | C | 13-Apr-12 | 2012 | 4 | Anchoa delicatissima | 10 | g |
| 4 | PS | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Leptocottus armatus | 10 | g |
| 4 | PS | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Anchoa delicatissima | 10 | g |
| 4 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 10 | g |
| 4 | PS | 1 | V | NS | 13-Apr-12 | 2012 | 4 | Anchoa delicatissima | 10 | g |
| 4 | PS | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Heterostichus rostratus | 10 | g |
| 4 | PS | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Anchoa delicatissima | 10 | g |
| 2 | LS | 1 | NV | I | 15-Apr-12 | 2012 | 4 | Leptocottus armatus | 10 | g |
| 2 | LS | 2 | NV | I | 15-Apr-12 | 2012 | 4 | Citharichtys stigmaeus | 10 | g |
| 2 | LS | 3 | NV | I | 15-Apr-12 | 2012 | 4 | Leptocottus armatus | 10 | g |
| 2 | LS | 1 | V | I | 15-Apr-12 | 2012 | 4 | Micrometrus minimus | 10 | g |
| 2 | LS | 1 | V | I | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 10 | g |
| 2 | LS | 2 | V | I | 15-Apr-12 | 2012 | 4 | Leptocottus armatus | 10 | g |
| 2 | SS | 3 | V | I | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 10 | g |
| 4 | LS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Leptocottus armatus | 10 | g |
| 2 | PS | 1 | NV | NS | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 10 | g |
| 4 | PS | 1 | V | NS | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 10 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 10 | g |
| 2 | BT | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Micrometrus minimus | 10 | g |
| 2 | BT | 3 | NV | NS | 25-Jul-12 | 2012 | 7 | Micrometrus minimus | 10 | g |
| 3 | BT | 3 | V | NS | 26-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 10 | g |
| 1 | LS | 1 | V | I | 24-Jul-12 | 2012 | 7 | Gibbonsia elegans | 10 | g |
| 1 | LS | 1 | V | I | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 10 | g |
| 1 | LS | 2 | V | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 10 | g |
| 1 | LS | 3 | V | I | 24-Jul-12 | 2012 | 7 | Atherinops affinis | 10 | g |
| 2 | SS | 1 | V | I | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 10 | g |
| 2 | SE | 1 | V | I | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 10 | g |
| 3 | LS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 10 | g |
| 3 | LS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Micrometrus minimus | 10 | g |
| 3 | LS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Heterostichus rostratus | 10 | g |
| 3 | SS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Leptocottus armatus | 10 | g |
| 3 | LS | 1 | NV | I | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 10 | g |
| 4 | SS | 3 | NV | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 9.5 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Gibbonsia elegans | 9 | g |
| 4 | BT | 3 | NV | NS | 13-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 9 | g |
| 2 | SS | 2 | NV | I | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 9 | g |
| 4 | BT | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 9 | g |
| 4 | OT | 1 | C | C | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 8.5 | g |
| 1 | PS | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 8.3 | g |
| 2 | SS | 2 | NV | I | 15-Apr-12 | 2012 | 4 | Paralabrax maculatofasciatu | 8 | g |
| 2 | SS | 2 | NV | I | 15-Apr-12 | 2012 | 4 | Leptocottus armatus | 8 | g |
| 3 | LS | 3 | V | I | 22-Apr-12 | 2012 | 4 | Leptocottus armatus | 8 | g |
| 4 | LS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Anchoa compressa | 8 | g |
| 1 | PS | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Symphurus atricauda | 8 | g |
| 2 | SS | 3 | V | I | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 8 | g |
| 4 | SS | 1 | NV | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 8 | g |
| 2 | BT | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 7.8 | g |
| 4 | SS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 7.6 | g |
| 3 | SS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Clevelandia ios | 7.5 | g |
| 4 | LS | 2 | V | I | 27-Jul-12 | 2012 | 7 | Acanthogobius flavimanus | 7.5 | g |
| 4 | SS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Fundulus parvipinnis | 7.1 | g |
| 3 | SS | 2 | V | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 7.05 | g |
| 1 | OT | 3 | C | C | 16-Apr-12 | 2012 | 4 | Synodus lucioceps | 7 | g |
| 2 | BT | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Phanerodon furcatus | 7 | g |
| 4 | LS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 7 | g |
| 1 | BT | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 7 | g |
| 1 | BT | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 7 | g |
| 1 | BT | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Embiotoca jacksoni | 7 | g |
| 2 | BT | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 7 | g |
| 4 | BT | 1 | V | NS | 27-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 7 | g |
| 1 | LS | 2 | V | I | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 7 | g |
| 2 | BT | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Cheilotrema saturnum | 6.9 | g |
| 3 | BT | 2 | NV | NS | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 6.5 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | BT | 1 | NV | NS | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 6.4 | g |
| 3 | SS | 1 | V | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 6.2 | g |
| 2 | BT | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Phanerodon furcatus | 6 | g |
| 3 | BT | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 6 | g |
| 4 | OT | 1 | C | C | 13-Apr-12 | 2012 | 4 | Leptocottus armatus | 6 | g |
| 2 | SS | 2 | NV | I | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 6 | g |
| 3 | LS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Paralichthys californicus | 6 | g |
| 3 | LS | 1 | V | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 6 | g |
| 3 | SS | 3 | V | I | 22-Apr-12 | 2012 | 4 | Leptocottus armatus | 6 | g |
| 1 | SS | 2 | NV | I | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 6 | g |
| 4 | BT | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 6 | g |
| 3 | BT | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 6 | g |
| 4 | LS | 2 | V | I | 13-Apr-12 | 2012 | 4 | Leptocottus armatus | 5.9 | g |
| 4 | SS | 2 | V | I | 13-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 5.5 | g |
| 1 | BT | 3 | NV | NS | 24-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 5.5 | g |
| 4 | LS | 3 | NV | I | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 5.5 | g |
| 4 | SS | 2 | V | I | 13-Apr-12 | 2012 | 4 | Leptocottus armatus | 5.4 | g |
| 2 | OT | 2 | C | C | 15-Apr-12 | 2012 | 4 | Porichthys myriaster | 5 | g |
| 2 | BT | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 5 | g |
| 2 | BT | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 5 | g |
| 3 | OT | 1 | C | C | 22-Apr-12 | 2012 | 4 | Porichthys myriaster | 5 | g |
| 3 | BT | 2 | NV | NS | 22-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 5 | g |
| 3 | BT | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 5 | g |
| 4 | OT | 1 | C | C | 13-Apr-12 | 2012 | 4 | Paralabrax nebulifer | 5 | g |
| 1 | PS | 2 | C | C | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 5 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Micrometrus minimus | 5 | g |
| 1 | PS | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 5 | g |
| 1 | PS | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Citharichtys stigmaeus | 5 | g |
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 5 | g |
| 3 | PS | 2 | C | C | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 5 | g |
| 3 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Seriphus politus | 5 | g |
| 4 | PS | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Anchoa delicatissima | 5 | g |
| 4 | PS | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 5 | g |
| 4 | PS | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Anchoa delicatissima | 5 | g |
| 2 | LS | 1 | NV | I | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 5 | g |
| 2 | LS | 3 | NV | I | 15-Apr-12 | 2012 | 4 | Citharichtys stigmaeus | 5 | g |
| 2 | SS | 2 | NV | I | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 5 | g |
| 2 | SE | 1 | NV | I | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 5 | g |
| 2 | LS | 1 | V | I | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 5 | g |
| 2 | LS | 2 | V | I | 15-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 5 | g |
| 4 | LS | 2 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 5 | g |
| 4 | LS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Fundulus parvipinnis | 5 | g |
| 1 | PS | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 5 | g |
| 3 | PS | 3 | NV | NS | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 5 | g |
| 3 | PS | 3 | NV | NS | 26-Jul-12 | 2012 | 7 | Heterostichus rostratus | 5 | g |
| 4 | PS | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 5 | g |
| 2 | BT | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Cheilotrema saturnum | 5 | g |
| 3 | BT | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Cheilotrema saturnum | 5 | g |
| 3 | BT | 3 | NV | NS | 26-Jul-12 | 2012 | 7 | Cheilotrema saturnum | 5 | g |
| 4 | BT | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 5 | g |
| 2 | SS | 2 | V | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 5 | g |
| 2 | SS | 3 | V | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 5 | g |
| 2 | LS | 1 | NV | I | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 5 | g |
| 3 | SS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 5 | g |
| 4 | LS | 1 | V | I | 27-Jul-12 | 2012 | 7 | Leptocottus armatus | 5 | g |
| 4 | LS | 2 | V | I | 13-Apr-12 | 2012 | 4 | Fundulus parvipinnis | 4.9 | g |
| 4 | SS | 2 | V | I | 13-Apr-12 | 2012 | 4 | Clevelandia ios | 4.9 | g |
| 1 | SS | 1 | V | I | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 4.8 | g |
| 4 | BT | 1 | V | NS | 13-Apr-12 | 2012 | 4 | Clevelandia ios | 4.5 | g |
| 1 | PS | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 4.5 | g |
| 4 | SS | 2 | NV | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 4.5 | g |
| 4 | SS | 2 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 4.1 | g |
| 1 | BT | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 4 | g |
| 1 | LS | 2 | NV | I | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 4 | g |
| 3 | LS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Leptocottus armatus | 4 | g |
| 1 | PS | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Gibbonsia elegans | 4 | g |
| 1 | PS | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Sardinops sagax | 4 | g |
| 4 | PS | 1 | NV | NS | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 4 | g |
| 4 | PS | 3 | NV | NS | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 4 | g |
| 1 | BT | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 4 | g |
| 2 | BT | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 4 | g |
| 3 | BT | 3 | V | NS | 26-Jul-12 | 2012 | 7 | Tridentiger trigonocephalus | 4 | g |
| 3 | BT | 2 | NV | NS | 26-Jul-12 | 2012 | 7 | Cymatogaster aggregata | 4 | g |
| 3 | BT | 3 | NV | NS | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 4 | g |
| 4 | BT | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 4 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | LS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 4 | g |
| 4 | SS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Hypsopsetta guttulata | 4 | g |
| 4 | SS | 3 | V | I | 13-Apr-12 | 2012 | 4 | Atherinops affinis | 3.9 | g |
| 4 | BT | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Leptocottus armatus | 3.9 | g |
| 4 | SS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 3.6 | g |
| 4 | SS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Leptocottus armatus | 3.3 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 3.1 | g |
| 1 | BT | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 3 | g |
| 1 | BT | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Paralabrax clathratus | 3 | g |
| 1 | BT | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Gibbonsia metzi | 3 | g |
| 2 | BT | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 3 | g |
| 3 | BT | 1 | NV | NS | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 3 | g |
| 4 | OT | 3 | C | C | 13-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 3 | g |
| 4 | BT | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Citharichtys stigmaeus | 3 | g |
| 1 | PS | 2 | V | NS | 16-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 3 | g |
| 1 | LS | 1 | V | I | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 3 | g |
| 2 | SS | 2 | V | I | 15-Apr-12 | 2012 | 4 | Leptocottus armatus | 3 | g |
| 2 | SS | 3 | V | I | 15-Apr-12 | 2012 | 4 | Leptocottus armatus | 3 | g |
| 4 | LS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 3 | g |
| 4 | LS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Leptocottus armatus | 3 | g |
| 1 | SS | 2 | NV | I | 16-Apr-12 | 2012 | 4 | Leptocottus armatus | 3 | g |
| 1 | PS | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Micrometrus minimus | 3 | g |
| 1 | PS | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Gibbonsia elegans | 3 | g |
| 3 | PS | 1 | V | NS | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 3 | g |
| 1 | BT | 3 | V | NS | 24-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 3 | g |
| 3 | BT | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 3 | g |
| 3 | BT | 1 | NV | NS | 26-Jul-12 | 2012 | 7 | Cheilotrema saturnum | 3 | g |
| 4 | BT | 2 | NV | NS | 27-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 3 | g |
| 4 | OT | 1 | C | C | 27-Jul-12 | 2012 | 7 | Porichthys myriaster | 3 | g |
| 1 | SE | 3 | V | I | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 3 | g |
| 2 | SS | 2 | V | I | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 3 | g |
| 3 | SS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 3 | g |
| 4 | LS | 3 | NV | I | 27-Jul-12 | 2012 | 7 | Hypsopsetta guttulata | 3 | g |
| 4 | SS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Clevelandia ios | 2.9 | g |
| 2 | SS | 2 | NV | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 2.7 | g |
| 2 | OT | 2 | C | C | 15-Apr-12 | 2012 | 4 | Symphurus atricauda | 2.5 | g |
| 2 | BT | 3 | NV | NS | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 2.5 | g |
| 3 | LS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Clevelandia ios | 2.5 | g |
| 4 | LS | 1 | V | I | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 2.5 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 2.3 | g |
| 4 | LS | 1 | V | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 2.2 | g |
| 1 | BT | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Hypsoblennius gentilis | 2 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Halichoeres semicinctus | 2 | g |
| 2 | BT | 1 | NV | NS | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 2 | g |
| 2 | BT | 2 | NV | NS | 15-Apr-12 | 2012 | 4 | Embiotoca jacksoni | 2 | g |
| 2 | BT | 3 | NV | NS | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 2 | g |
| 3 | PS | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 2 | g |
| 3 | PS | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 2 | g |
| 1 | SE | 2 | V | I | 16-Apr-12 | 2012 | 4 | Paralichthys californicus | 2 | g |
| 1 | LS | 2 | NV | I | 16-Apr-12 | 2012 | 4 | Heterostichus rostratus | 2 | g |
| 2 | SS | 1 | NV | I | 15-Apr-12 | 2012 | 4 | Atherinops affinis | 2 | g |
| 2 | LS | 3 | V | I | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 2 | g |
| 2 | SS | 2 | V | I | 15-Apr-12 | 2012 | 4 | Micrometrus minimus | 2 | g |
| 2 | SS | 3 | V | I | 15-Apr-12 | 2012 | 4 | Heterostichus rostratus | 2 | g |
| 2 | SS | 3 | V | I | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 2 | g |
| 2 | SE | 1 | V | I | 15-Apr-12 | 2012 | 4 | Ilypnus gilberti | 2 | g |
| 2 | SE | 2 | V | I | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 2 | g |
| 3 | LS | 3 | NV | I | 22-Apr-12 | 2012 | 4 | Paralichthys californicus | 2 | g |
| 3 | LS | 2 | V | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 2 | g |
| 4 | SS | 3 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 2 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Cheilotrema saturnum | 2 | g |
| 2 | PS | 3 | V | NS | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 2 | g |
| 3 | BT | 1 | NV | NS | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 2 | g |
| 4 | BT | 3 | NV | NS | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 2 | g |
| 4 | OT | 1 | C | C | 27-Jul-12 | 2012 | 7 | Tridentiger trigonocephalus | 2 | g |
| 3 | LS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 2 | g |
| 3 | SS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 2 | g |
| 3 | LS | 1 | NV | I | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 2 | g |
| 3 | LS | 2 | NV | I | 26-Jul-12 | 2012 | 7 | Heterostichus rostratus | 2 | g |
| 4 | LS | 1 | V | I | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 2 | g |
| 4 | LS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 2 | g |
| 4 | LS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Acanthogobius flavimanus | 2 | g |
| 4 | LS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Quietula y-cauda | 2 | g |
| 4 | SS | 2 | V | I | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 2 | g |
| 4 | SS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 2 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | SE | 1 | V | I | 13-Apr-12 | 2012 | 4 | Clevelandia ios | 1.9 | g |
| 2 | BT | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Gibbonsia elegans | 1.8 | g |
| 2 | BT | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 1.75 | g |
| 4 | BT | 1 | V | NS | 13-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 1.7 | g |
| 2 | BT | 2 | NV | NS | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 1.5 | g |
| 2 | SS | 2 | V | I | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 1.5 | g |
| 4 | BT | 3 | NV | NS | 27-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 1.5 | g |
| 4 | SS | 2 | V | I | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 1.5 | g |
| 4 | SS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 1.5 | g |
| 4 | LS | 3 | NV | I | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 1.5 | g |
| 1 | SS | 3 | V | I | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 1.4 | g |
| 4 | BT | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Clevelandia ios | 1.3 | g |
| 3 | LS | 3 | NV | I | 26-Jul-12 | 2012 | 7 | Anchoa delicatissima | 1.3 | g |
| 2 | BT | 2 | NV | NS | 25-Jul-12 | 2012 | 7 | Tridentiger trigonocephalus | 1.25 | g |
| 3 | BT | 1 | NV | NS | 22-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 1.2 | g |
| 4 | BT | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Heterostichus rostratus | 1.2 | g |
| 4 | BT | 1 | V | NS | 27-Jul-12 | 2012 | 7 | Anchoa delicatissima | 1.2 | g |
| 4 | LS | 2 | NV | I | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 1.2 | g |
| 3 | BT | 1 | NV | NS | 22-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 1.1 | g |
| 4 | LS | 2 | V | I | 13-Apr-12 | 2012 | 4 | Clevelandia ios | 1.06 | g |
| 1 | OT | 1 | C | C | 16-Apr-12 | 2012 | 4 | Symphurus atricauda | 1 | g |
| 1 | OT | 3 | C | C | 16-Apr-12 | 2012 | 4 | Symphurus atricauda | 1 | g |
| 1 | BT | 2 | NV | NS | 16-Apr-12 | 2012 | 4 | Cymatogaster aggregata | 1 | g |
| 2 | BT | 2 | NV | NS | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 1 | g |
| 2 | BT | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 1 | g |
| 2 | BT | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 1 | g |
| 2 | BT | 2 | V | NS | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 1 | g |
| 2 | BT | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 1 | g |
| 3 | OT | 1 | C | C | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 1 | g |
| 3 | BT | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Heterostichus rostratus | 1 | g |
| 4 | OT | 1 | C | C | 13-Apr-12 | 2012 | 4 | Clevelandia ios | 1 | g |
| 4 | BT | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Clevelandia ios | 1 | g |
| 4 | BT | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Ilypnus gilberti | 1 | g |
| 1 | PS | 1 | V | NS | 16-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 1 | g |
| 3 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Heterostichus rostratus | 1 | g |
| 3 | PS | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Heterostichus rostratus | 1 | g |
| 3 | PS | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 1 | g |
| 3 | PS | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Heterostichus rostratus | 1 | g |
| 1 | LS | 2 | NV | I | 16-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 1 | g |
| 2 | SE | 1 | NV | I | 15-Apr-12 | 2012 | 4 | Gibbonsia elegans | 1 | g |
| 2 | SS | 3 | V | I | 15-Apr-12 | 2012 | 4 | Cosmocampus arctus | 1 | g |
| 2 | SE | 1 | V | I | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 1 | g |
| 2 | SE | 2 | V | I | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 1 | g |
| 2 | SE | 3 | V | I | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 1 | g |
| 3 | LS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Heterostichus rostratus | 1 | g |
| 3 | LS | 2 | NV | I | 22-Apr-12 | 2012 | 4 | Leptocottus armatus | 1 | g |
| 3 | LS | 2 | NV | I | 22-Apr-12 | 2012 | 4 | Heterostichus rostratus | 1 | g |
| 3 | LS | 3 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 1 | g |
| 3 | LS | 2 | V | I | 22-Apr-12 | 2012 | 4 | Hypsopsetta guttulata | 1 | g |
| 3 | SS | 3 | V | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 1 | g |
| 1 | PS | 2 | V | NS | 24-Jul-12 | 2012 | 7 | Heterostichus rostratus | 1 | g |
| 2 | PS | 1 | V | NS | 25-Jul-12 | 2012 | 7 | Heterostichus rostratus | 1 | g |
| 2 | OT | 1 | C | C | 25-Jul-12 | 2012 | 7 | Symphurus atricauda | 1 | g |
| 1 | SS | 2 | NV | I | 24-Jul-12 | 2012 | 7 | Clevelandia ios | 1 | g |
| 2 | SS | 1 | NV | I | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 1 | g |
| 3 | LS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Fundulus parvipinnis | 1 | g |
| 3 | SS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Clevelandia ios | 1 | g |
| 4 | LS | 2 | V | I | 27-Jul-12 | 2012 | 7 | Hypsopsetta guttulata | 1 | g |
| 4 | BT | 2 | V | NS | 27-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 0.9 | g |
| 1 | SS | 1 | NV | I | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 0.8 | g |
| 3 | BT | 2 | NV | NS | 26-Jul-12 | 2012 | 7 | Tridentiger trigonocephalus | 0.8 | g |
| 4 | SS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Fundulus parvipinnis | 0.8 | g |
| 4 | BT | 2 | V | NS | 27-Jul-12 | 2012 | 7 | Heterostichus rostratus | 0.7 | g |
| 3 | SE | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Fundulus parvipinnis | 0.6 | g |
| 1 | SS | 2 | V | I | 16-Apr-12 | 2012 | 4 | Atherinops affinis | 0.6 | g |
| 1 | OT | 1 | C | C | 24-Jul-12 | 2012 | 7 | Paralichthys californicus | 0.6 | g |
| 3 | OT | 1 | C | C | 26-Jul-12 | 2012 | 7 | Porichthys myriaster | 0.53 | g |
| 2 | BT | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | BT | 2 | NV | NS | 22-Apr-12 | 2012 | 4 | Gibbonsia elegans | 0.5 | g |
| 3 | BT | 2 | NV | NS | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | BT | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | BT | 1 | V | NS | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | BT | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 0.5 | g |
| 3 | BT | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | BT | 2 | V | NS | 22-Apr-12 | 2012 | 4 | Gibbonsia elegans | 0.5 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | BT | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | BT | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 0.5 | g |
| 3 | BT | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Gibbonsia elegans | 0.5 | g |
| 4 | BT | 3 | V | NS | 13-Apr-12 | 2012 | 4 | Heterostichus rostratus | 0.5 | g |
| 2 | PS | 1 | V | NS | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | PS | 2 | C | C | 22-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 0.5 | g |
| 3 | PS | 3 | NV | NS | 22-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 0.5 | g |
| 3 | PS | 3 | V | NS | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 0.5 | g |
| 2 | SS | 1 | NV | I | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 2 | SS | 3 | NV | I | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 2 | SE | 1 | NV | I | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | LS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | LS | 2 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 0.5 | g |
| 3 | LS | 2 | NV | I | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | SE | 2 | NV | I | 22-Apr-12 | 2012 | 4 | Quietula y-cauda | 0.5 | g |
| 3 | LS | 1 | V | I | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.5 | g |
| 3 | LS | 1 | V | I | 22-Apr-12 | 2012 | 4 | Leptocottus armatus | 0.5 | g |
| 4 | SS | 2 | V | I | 13-Apr-12 | 2012 | 4 | Ilypnus gilberti | 0.5 | g |
| 3 | PS | 3 | NV | NS | 26-Jul-12 | 2012 | 7 | Paralabrax clathratus | 0.5 | g |
| 1 | OT | 1 | C | C | 24-Jul-12 | 2012 | 7 | Urobatis halleri | 0.5 | g |
| 2 | OT | 1 | C | C | 25-Jul-12 | 2012 | 7 | Porichthys myriaster | 0.5 | g |
| 3 | BT | 2 | V | NS | 26-Jul-12 | 2012 | 7 | Tridentiger trigonocephalus | 0.5 | g |
| 4 | BT | 3 | V | NS | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 0.5 | g |
| 2 | LS | 3 | V | I | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 0.5 | g |
| 2 | SS | 1 | V | I | 25-Jul-12 | 2012 | 7 | Clevelandia ios | 0.5 | g |
| 3 | LS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 0.5 | g |
| 3 | LS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Clevelandia ios | 0.5 | g |
| 4 | SS | 1 | NV | I | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 0.5 | g |
| 2 | BT | 3 | V | NS | 15-Apr-12 | 2012 | 4 | Ilypnus gilberti | 0.4 | g |
| 4 | SS | 2 | V | I | 13-Apr-12 | 2012 | 4 | Atherinops affinis | 0.4 | g |
| 4 | BT | 2 | V | NS | 13-Apr-12 | 2012 | 4 | Gibbonsia elegans | 0.4 | g |
| 3 | LS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Clevelandia ios | 0.4 | g |
| 2 | OT | 2 | C | C | 25-Jul-12 | 2012 | 7 | Porichthys myriaster | 0.36 | g |
| 2 | LS | 2 | V | I | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 0.3 | g |
| 2 | BT | 3 | NV | NS | 25-Jul-12 | 2012 | 7 | Tridentiger trigonocephalus | 0.3 | g |
| 3 | BT | 2 | NV | NS | 26-Jul-12 | 2012 | 7 | Ilypnus gilberti | 0.3 | g |
| 2 | LS | 3 | V | I | 25-Jul-12 | 2012 | 7 | Clevelandia ios | 0.3 | g |
| 3 | SS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Ilypnus gilberti | 0.3 | g |
| 3 | SS | 3 | V | I | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 0.27 | g |
| 4 | BT | 1 | NV | NS | 13-Apr-12 | 2012 | 4 | Porichthys myriaster | 0.25 | g |
| 1 | OT | 2 | C | C | 24-Jul-12 | 2012 | 7 | Porichthys myriaster | 0.25 | g |
| 1 | BT | 1 | NV | NS | 16-Apr-12 | 2012 | 4 | Clevelandia ios | 0.2 | g |
| 1 | BT | 3 | NV | NS | 16-Apr-12 | 2012 | 4 | Gibbonsia metzi | 0.2 | g |
| 4 | SS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Heterostichus rostratus | 0.2 | g |
| 3 | SS | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 0.2 | g |
| 2 | LS | 2 | V | I | 15-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 0.2 | g |
| 2 | BT | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Tridentiger trigonocephalus | 0.2 | g |
| 3 | LS | 2 | NV | I | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 0.2 | g |
| 4 | LS | 1 | NV | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 0.2 | g |
| 1 | BT | 1 | NV | NS | 24-Jul-12 | 2012 | 7 | Paralabrax clathratus | 0.15 | g |
| 1 | BT | 3 | V | NS | 24-Jul-12 | 2012 | 7 | Paralabrax clathratus | 0.12 | g |
| 2 | SE | 3 | NV | I | 15-Apr-12 | 2012 | 4 | Clevelandia ios | 0.1 | g |
| 3 | LS | 2 | V | I | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.1 | g |
| 4 | SE | 3 | NV | I | 22-Apr-12 | 2012 | 4 | Ilypnus gilberti | 0.1 | g |
| 3 | SS | 3 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 0.1 | g |
| 3 | SE | 1 | NV | I | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.1 | g |
| 1 | BT | 2 | NV | NS | 24-Jul-12 | 2012 | 7 | Paralabrax clathratus | 0.1 | g |
| 2 | BT | 3 | NV | NS | 25-Jul-12 | 2012 | 7 | Paralabrax clathratus | 0.1 | g |
| 2 | OT | 2 | C | C | 25-Jul-12 | 2012 | 7 | Atherinops affinis | 0.1 | g |
| 2 | LS | 2 | V | I | 25-Jul-12 | 2012 | 7 | Clevelandia ios | 0.1 | g |
| 2 | SE | 1 | V | I | 25-Jul-12 | 2012 | 7 | Clevelandia ios | 0.1 | g |
| 3 | LS | 2 | V | I | 26-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 0.1 | g |
| 3 | LS | 2 | NV | I | 26-Jul-12 | 2012 | 7 | Atherinops affinis | 0.1 | g |
| 4 | LS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 0.1 | g |
| 4 | SS | 1 | V | I | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 0.1 | g |
| 4 | SS | 3 | V | I | 27-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 0.1 | g |
| 4 | LS | 1 | NV | I | 27-Jul-12 | 2012 | 7 | Heterostichus rostratus | 0.1 | g |
| 4 | LS | 2 | NV | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 0.1 | g |
| 4 | SS | 3 | NV | I | 27-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 0.1 | g |
| 4 | SE | 3 | V | I | 13-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 0.09 | g |
| 3 | SS | 2 | V | I | 22-Apr-12 | 2012 | 4 | Clevelandia ios | 0.08 | g |
| 4 | BT | 2 | NV | NS | 13-Apr-12 | 2012 | 4 | Atherinops affinis | 0.06 | g |
| 4 | SS | 2 | NV | I | 22-Apr-12 | 2012 | 4 | Syngnathus leptorhynchus | 0.05 | g |
| 2 | BT | 2 | V | NS | 25-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 0.05 | g |
| 3 | OT | 3 | C | C | 26-Jul-12 | 2012 | 7 | Tridentiger trigonocephalus | 0.05 | g |

# Field Notes and Data

| Station | SamplingMethod | Replicate | V/NV/C | I/NS/C | SampleDate | Year | Month | Species | Biomass | BiomassUnits |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | BT | 1 | V | NS | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 0.05 | g |
| 4 | BT | 1 | NV | NS | 27-Jul-12 | 2012 | 7 | Syngnathus leptorhynchus | 0.05 | g |
| 4 | BT | 2 | NV | NS | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 0.05 | g |
| 1 | LS | 1 | V | I | 24-Jul-12 | 2012 | 7 | Clevelandia ios | 0.05 | g |
| 1 | SE | 2 | V | I | 24-Jul-12 | 2012 | 7 | Clevelandia ios | 0.05 | g |
| 2 | SE | 3 | V | I | 25-Jul-12 | 2012 | 7 | Clevelandia ios | 0.05 | g |
| 3 | LS | 1 | V | I | 26-Jul-12 | 2012 | 7 | Strongylura exilis | 0.05 | g |
| 4 | SS | 2 | NV | I | 27-Jul-12 | 2012 | 7 | Atherinops affinis | 0.05 | g |
| 4 | SE | 1 | NV | I | 27-Jul-12 | 2012 | 7 | Clevelandia ios | 0.05 | g |
| 4 | LS | 2 | V | I | 13-Apr-12 | 2012 | 4 | Atherinops affinis | 0.04 | g |
| 3 | SS | 2 | NV | I | 22-Apr-12 | 2012 | 4 | Atherinops affinis | 0.02 | g |
| 4 | SS | 1 | V | I | 13-Apr-12 | 2012 | 4 | Atherinops affinis | 0.01 | g |
| 2 | PS | 2 | C | C | 15-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 2 | PS | 3 | C | C | 15-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 1 | SE | 1 | V | I | 16-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 1 | SE | 3 | V | I | 16-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 1 | SS | 3 | NV | I | 16-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 1 | SE | 1 | NV | I | 16-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 1 | SE | 2 | NV | I | 16-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 1 | SE | 3 | NV | I | 16-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 2 | SE | 2 | NV | I | 15-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 2 | SS | 1 | V | I | 15-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 3 | SE | 3 | NV | I | 22-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 3 | SE | 1 | V | I | 22-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 4 | SE | 1 | NV | I | 22-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 4 | SE | 2 | NV | I | 22-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 4 | SE | 2 | V | I | 13-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 1 | PS | 3 | C | C | 16-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 3 | SE | 2 | V | I | 22-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 3 | SE | 3 | V | I | 22-Apr-12 | 2012 | 4 | No fish | 0 | g |
| 2 | PS | 2 | C | C | 25-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 4 | PS | 2 | C | C | 27-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 1 | SE | 1 | V | I | 24-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 1 | SE | 1 | NV | I | 24-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 1 | SE | 2 | NV | I | 24-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 1 | SE | 3 | NV | I | 24-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 2 | SE | 2 | V | I | 25-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 2 | SE | 1 | NV | I | 25-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 2 | SE | 2 | NV | I | 25-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 2 | SE | 3 | NV | I | 25-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 3 | SE | 1 | V | I | 26-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 3 | SE | 2 | V | I | 26-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 3 | SE | 3 | V | I | 26-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 3 | SS | 1 | NV | I | 26-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 3 | SS | 2 | NV | I | 26-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 3 | SS | 3 | NV | I | 26-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 3 | SE | 1 | NV | I | 26-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 3 | SE | 2 | NV | I | 26-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 3 | SE | 3 | NV | I | 26-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 4 | SE | 1 | V | I | 27-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 4 | SE | 2 | V | I | 27-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 4 | SE | 3 | V | I | 27-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 4 | SE | 2 | NV | I | 27-Jul-12 | 2012 | 7 | No fish | 0 | g |
| 4 | SE | 3 | NV | I | 27-Jul-12 | 2012 | 7 | No fish | 0 | g |