

Salton Sea Fisheries Long-term Monitoring

Draft Quarterly Report: Winter 2005

Salton Sea Program
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Introduction:

The California Department of Fish and Game (CDFG) is monitoring the status and trends of the Salton Sea fisheries. This will require a compilation of sampling results over several years. In the spring of 2003, Department personnel started quarterly sampling at fourteen stations around the sea, as the basis of a long term monitoring program. To allow comparison of current and future monitoring efforts by CDFG to past results, the following protocol was adapted from those previously used by researchers at the Salton Sea.

Each quarter, if conditions allow, this protocol will produce about 816 net-hours of sampling. After each quarter's sampling is completed this draft report will be prepared, summarizing the numbers and species of fish netted, and calculating the overall and species-based catch-per-unit-effort (CPUE). This report will also offer qualitative comments on the condition and breeding status of each species. After annual repetitions of seasonal sampling, enough data will be collected to allow statistical tests for significant differences in numbers, seasonality, and site use, by and among the four species of fish.

Methods:

The sampling sites comprise three broad habitat types: pelagic (3 sites), near-shore (8 sites), and estuarine (3 sites). The pelagic sites are in the approximate middles of the north basin, south basin and inter-basin areas of the Sea. The near-shore sites are spaced widely apart, four each, near the west and east shores, to capture as much breadth of habitat as possible. The estuarine sites are in the body of the Sea, close enough to the mouths of the New, Alamo, and Whitewater Rivers, to be under the influence of their outflows. See Table 1. for the exact locations of all sites.

Sampling takes place during each of the putative seasons, as follows: spring- April and May; summer- July and August; fall- October and November; winter- January and February. We will attempt to compress the total sampling period into as few days as possible, to the extent that the weather, equipment maintenance, and personnel scheduling constraints allow. Nets are typically set at one or two sites in the morning, and hauled in after approximately 24 hours. The exact number of hours set is recorded for each net, to the nearest quarter-hour.

Fish are sampled by deploying multi-panel monofilament gill nets with 6 X 30 foot panels of 0.5, 1, 2, 3, and 4 inch mesh. Two nets are set at all sites at the water's surface. The nets are set far enough apart to allow room for maneuvering a boat during setting and retrieval, usually 100-200 meters. The nets at near-shore and estuarine sites are set in 2.5 to 4.5 meters of water, typically 200-300 meters from the shore.

Two additional nets are set at the bottom of water column at the three pelagic sites. The conditions fish experience at the bottom in deep water is different enough from the surface water,

in dissolved oxygen, light, food availability and temperature, that this can be considered a discrete habitat, and thus we sample it as though it were a separate site.

At the time of each set and retrieval, water depth, water temperature, conductivity, salinity, and dissolved oxygen are measured and recorded.

When nets are pulled in the following day, all fish are removed and immediately stored on ice. Data are collected from these fish as soon as possible, almost always the same day they are hauled in.

All fish are identified to species level and counted. For the four sport fish in the Salton Sea, (tilapia, Gulf croaker, orangemouth corvina and sargo) weights, lengths (fork length), sex, physical condition, and reproductive status are recorded. Fish above five pounds are weighed to the nearest ounce. Fish below five pounds are weighed to the nearest half ounce. Lengths of fish under 50 centimeters are recorded to the nearest millimeter. Lengths of fish over 50 centimeters are recorded to the nearest centimeter. The sex of all adult fish is determined by dissection. A sample of at least ten fish of each species is also dissected to determine physical condition and breeding status.

Changes to Protocol for Year Two:

Our protocol is designed to elucidate long-term trends in the fisheries. Until very recently, deep water habitats have provided some low level of productivity for the fisheries, and were important habitat components to sample. Since we began sampling, however, our three deep water sites have been completely unproductive, a costly element of our efforts, and the least probable site for fish use, given the severe reduction in population size which we have discovered.

We have therefore temporarily eliminated sampling at the three deep water sites, which reduces our efforts by 288 net-hours, to a quarterly total effort of 528 net-hours. We leave these sites in the protocol, since they will likely provide useful information about population trends and habitat use, should the fisheries rebound to levels which allow robust comparisons among these and the other sampling sites.

All future comparisons of CPUE that we make will be among quarterly data sets that exclude previously sampled deep-water sites from the calculations. The CPUE values for our first year will then be higher overall, but the comparison between years will be valid. Our data are not designed to determine absolute numbers, but to show trends.

Results:

The Winter 2005 sampling session took place from January 5 through February 9. We sampled a total of 512 net-hours at 11 sites.

Table 2. shows the numbers of fishes sampled at each site. Total numbers of fish sampled, with CPUE in parentheses, were: 34 tilapia (0.066). No other fish were caught.

All tilapia were in a single size class composed of fish from 125 to 197 mm long. Consistent with tilapia sampled during the last year, these fish were in very good to excellent condition, and apparently not food-limited. All individuals examined were sexually mature; several females were clearly in a post-reproductive state.

Discussion:

Although our sample size was small this season, the sizes of individual tilapia were consistent with our observations of a dominant size class (Size Class 2, below) this year. The

following table presents the range of sizes and their relative percentages of this year's sampling results.

Sample Period	Size Class 1.			Size Class 2.			Size Class 3.		
	Range (mm)	n	%	Range (mm)	n	%	Range (mm)	n	%
Spring '04	67-70	4	22	134-173	14	78	----	0	---
Summer '04	60-70	785	31	120-160	1,751	69	180-200	8	<1
Fall '04	64-79	11	2	120-197	615	98	265-290	4	<1
Winter '05	----	0	---	125-197	34	100	----	0	---

Chart 1. shows a comparison of CPUEs from this and last year's sampling sessions. The columns labeled 2002 are from an initial sampling period undertaken from June 10, 2002 through March 13, 2003. These data should be roughly comparable to later efforts, although they are not an exact replication of the sites included in our current protocol.

The Winter 2005 sampling period completed a second year of monitoring the Salton Sea fisheries. Chart 2. shows a comparison of results for tilapia during the two years, by season. Note that the scale is logarithmic, for ease of viewing. The year-to-year percent increases are in parentheses below the seasons. Although denoted as years 2003 and 2004, the Winter seasons' sampling actually took place in January and February of the following calendar years.

Note that each season's results this year, were at least several times that of the results for the same season of the previous year. In our last report, we predicted a relatively robust tilapia fishery in 2005, barring large fish kills from any exceptionally cold winter weather. Recent mild temperatures and heavy winter rains have further increased the likelihood we will see this happen.

Although a recent rebound of the tilapia population is apparent from our sampling results, the historical context for these population levels remains sobering. Our highest CPUE, of 4.8 fish/net-hour during the Summer period, reflects a reduction of over 90% from sampling results recorded in the Summer of 1999 (CPUE for tilapia of 55 fish/net-hour) by Riedel, Costa-Pierce and Caskey..

No Gulf croaker, orangemouth corvina, or sargo were sampled this period. These three marine sport fish species have been undetectable by gill netting since mid-May, 2003. In addition, none have been detected in fish kills, or reported by anglers during the last six months.

The abundance of prey, and the beneficial input of fresh water from the winter rains, will present improved conditions for the marine species in 2005. Conditions may be as optimal as any that can be expected in the next several years, allowing any remnant populations to reproduce this year. Department personnel will be conducting bioacoustic surveys in an attempt to detect breeding aggregations of corvina and croaker this spring and summer.

Table 1. Locations of Sampling Sites

SITE NAME	HABITAT TYPE	UTM COORDINATES
Whitewater River	Estuarine	11S 0587948
		3707343
New River	Estuarine	11S 0621567
		3666958
Alamo River	Estuarine	11S 0628480
		3675635
North Shore	Near-shore	11S 0598465
		3709237
North Wister	Near-shore	11S 0628368
		3685497
Bat Caves	Near-shore	11S 0607427
		3699864
South Salton City	Near-shore	11S 0604971
		3682198
North Desert Shores	Near-shore	11S 0589366
		3699424
The Dome	Near-shore	11S 0596997
		3690022
The Cliffs	Near-shore	11S 0615062
		3691509
Test Base	Near-shore	11S 0608813
		3672196
North Basin	Pelagic	11S 0596156
		3701218
Inter-basin	Pelagic	11S 0606837
		3689452
South Basin	Pelagic	11S 0618275
		3678697

Table 2.

Date	Site	Net-hours	Tilapia	Croaker	Corvina	Sargo	Other	Total Fish	CPUE
1/5/2005	Alamo River	47	1	0	0	0	0	1	0.02
1/5/2005	North Wister	47	4	0	0	0	0	4	0.09
1/10/2005	The Cliffs	43	4	0	0	0	0	4	0.09
1/12/2005	Bat Caves	46	11	0	0	0	0	11	0.24
1/12/2005	North Shore	46	9	0	0	0	0	9	0.20
1/18/2005	The Dome	46	0	0	0	0	0	0	0.00
1/18/2005	South Salton City	45	1	0	0	0	0	1	0.02
1/20/2005	White Water River	48	0	0	0	0	0	0	0.00
1/20/2005	North Desert Shores	49	3	0	0	0	0	3	0.06
2/3/2005	Test Base	48	1	0	0	0	0	1	0.02
2/8/2005	New River	48	0	0	0	0	0	0	0.00
Totals		512	34	0	0	0	0	34	0.066

Chart 1

Comparison of CPUEs

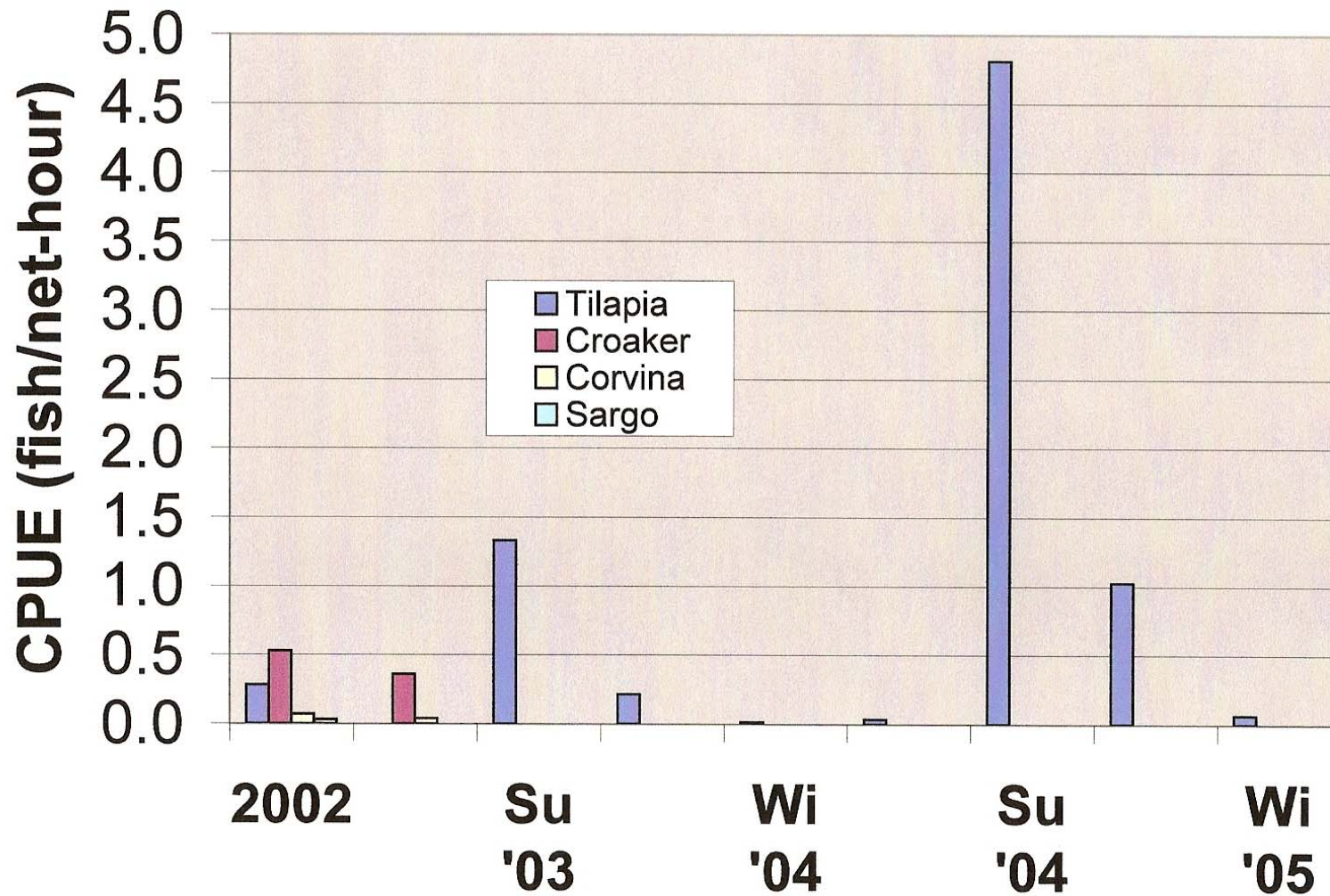


Chart 2

Tilapia Year-to-Year

