

34 NORTH CONTRACT (16-12) PROJECT DELIVERABLES:

EMP: Fish / DJFMP : <http://emp.baydeltalive.com/projects/11283>

Tab 1: What is DJFMP?

ENVIRONMENTAL MONITORING PROGRAM: FISH

< Benthic Monitoring >

What Is DJFMP?
How Are Fish Monitored?
Reporting Requirements
Metadata

DELTA JUVENILE FISH MONITORING PROGRAM (DJFMP)

The Delta Juvenile Fish Monitoring Program (DJFMP) conducts annual monitoring of juvenile fishes, participates in multi-agency research activities, and contributes to several technical and management committees within the region.

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GEOGRAPHIC RANGE OF CURRENT FIELD WORK:

There are currently fifty-eight (58) beach seine sites located on the Lower Sacramento and San Joaquin Rivers, North, Central and South Delta and San Francisco Bay. Three (3) boat trawling stations are also regularly sampled. These are located at Sherwood Harbor on the Sacramento River, Chipps Island in Suisun Bay and Mossdale Crossing County Park on the San Joaquin River. In addition, special studies have been conducted throughout the years (i.e., Liberty Island, Delta Cross Channel, VAMP, Six Year Study, etc).

SAMPLE FREQUENCY:

The number of days that a given trawl location or seine site is sampled has varied by location and by season.

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Title: Adult Delta Smelt

Author: Dave Giordano, California Fish

Tab 2 : Monitoring

ENVIRONMENTAL MONITORING PROGRAM: FISH

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DELTA JUVENILE FISH MONITORING PROGRAM (DJFMP) MONITORING

All monitoring data are collected by Lodi Fish & Wildlife Office. Since 2000, 3 trawl sites and 58 beach seine sites have been sampled weekly or biweekly within the Estuary and lower Sacramento and San Joaquin rivers

BEACH SEINING:

For on-shore sampling, a 50' (15.2 m) beach seining net is used. One person holds one end of the net on shore while the other person wades out to either the length of the net, a maximum 1.2 m depth or to where a break or obstruction occurs on the slope. The depth and distance out from shore is recorded in meters, which are pre-marked on each net.

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TRAWLING:

On mid-water boat trawls, the cod end of the net is tied with a quick release knot and thrown overboard when the boat operator has given the signal to toss. The Amsteel lines on the hydraulic spools are let out until the net has reached the proper distance from the boat (Chipps Island 45.7 m; Sherwood Harbor 30.5 m). The hydraulic spools are locked in place and the boat maintains a steady trawl speed for 20 minutes. Once time has been reached, the hydraulic spools are engaged to bring the net back in. Crew members haul the net back into the boat and pile it loosely in the stern of the boat. The cod end

DJFMP Trawl and Seine Locations

Delta Juvenile Fish Monitoring Program Trawl and Seine Locations in the Sacramento-San Joaquin Bay Delta.

More

Tab3: reporting

ENVIRONMENTAL MONITORING PROGRAM: FISH

Benthic Monitoring

What Is DJFMP? How Are Fish Monitored? Reporting Requirements Metadata

REPORTING REQUIREMENTS FOR DJFMP

Intensive sampling during the fall months provides near real-time data for managing water project operations. In addition to providing Chinook salmon data for the Sacramento Catch Index, the DJFMP provides weekly catch reports for other species of management concern, including salmonids, smelts, and the Sacramento splittail. These reports are provided to the DAT group and also to the Delta Operations for Salmonids and Sturgeon working group (a technical advisory group for the WDMT and NMFS).

READ MORE

RESULTS FOR THE 2012-2013 FIELD SEASON: OVERVIEW

During the 2012 and 2013 field seasons, 8,659 trawl samples were collected without any severe gear malfunctions. We completed 2,306 trawls at the Chipps Island Trawl Site, 3,496 trawls at the Mossdale Trawl Site, and 2,857 trawls at the Sacramento Trawl Site.

READ MORE

2010-2011 DJFMP Annual Report (Final Draft)

2016-03-24

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USFW Delta Juvenile Fish Monitoring Program Review

2016-02-18

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2012 and 2013 Annual Report for the Juvenile...

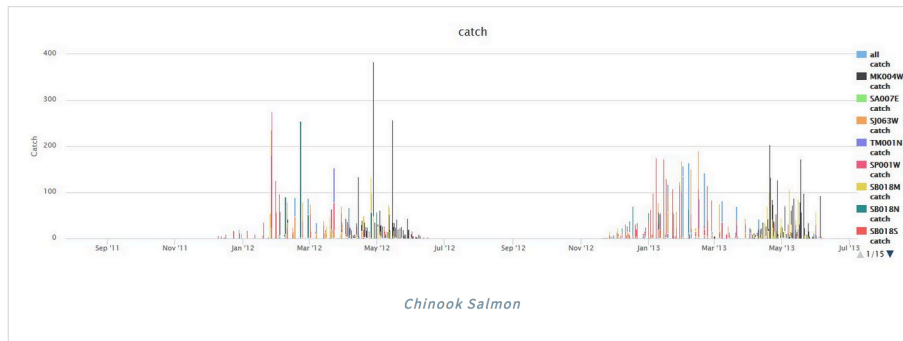
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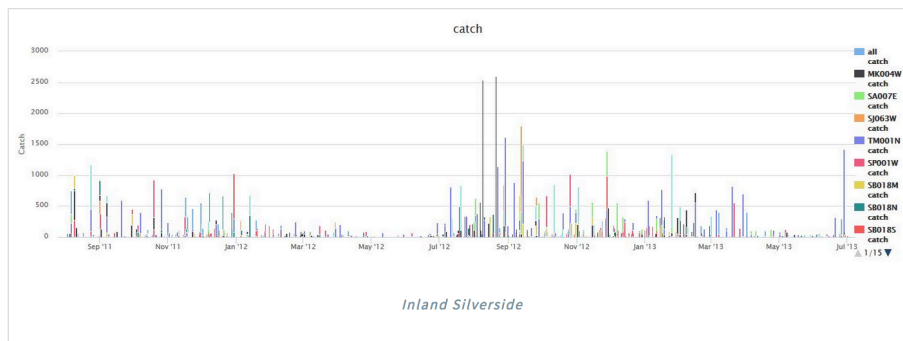
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CATCH GRAPHS: TOP SPECIES FOR THE 2012 AND 2013 FIELD SEASONS

Chinook Salmon:



Inland Silverside:



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RESULTS FOR THE 2012-2013 FIELD SEASON: FISH ASSEMBLAGE

A total of 355,181 fishes, representing 83 species, was collected within samples (beach seines and trawls) used for assemblage analyses during the 2012 and 2013 field seasons (does not include marked or unidentified fish;).

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RESULTS FOR THE 2012-2013 FIELD SEASON: WATER QUALITY

We collected 43,052 water quality samples during the 2012 and 2013 field seasons: 12,619 water temperature, 10,393 conductivity, 10,313 dissolved oxygen, and 9,727 turbidity samples.

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tab 4: metadata

ENVIRONMENTAL MONITORING PROGRAM: FISH

< Benthic Monitoring >

What Is DJFMP? How Are Fish Monitored? Reporting Requirements Metadata

Metadata for the Stockton Fish and Wildlife Office's Delta Juvenile Fish Monitoring Program

Last Updated August, 2014

Note: The information on this page is modified from the full Metadata Document which can be found [here](#).

To learn more about the United States Fish and Wildlife Service Delta Juvenile Fish Monitoring Program or USFW DJFMP click [here](#).

Purpose/Objective:

The original objective of the Delta Juvenile Fish Monitoring Program in the 1970's and 1980's was to monitor effects of water projects in the Delta on abundance, distribution and survival of juvenile fall run Chinook salmon in the lower Sacramento and San Joaquin Rivers and the San Francisco Estuary. This objective was broadened in the 1990's to include relative abundance and distribution of all races of juvenile Chinook salmon. In 2001, the program objectives were broadened further to reflect the value of gathering information on non-salmonid species. Species information at times has also been recorded for jellyfish and crustaceans spp. that are encountered as well.

General Category of data collected:

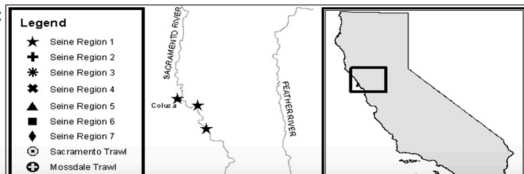
Native and non-native species of fish found within the San Francisco Estuary and lower Sacramento and San Joaquin Rivers.

Geographic range of current field work:

There are currently fifty-eight (58) beach seine sites located on the Lower Sacramento and San Joaquin Rivers, North, Central and South Delta and San Francisco Bay (Table 2; Figure 1). Three (3) boat trawling stations are also regularly sampled (Table 3; Figure 1). These are located at Sherwood Harbor on the Sacramento River, Chipps Island in Suisun Bay and Mossdale Crossing County Park on the San Joaquin River. In addition, special studies have been conducted throughout the years (i.e., Liberty Island, Delta Cross Channel, VAMP, Six Year Study, etc).

Each sampling site is designated by a Station Code which displays the abbreviations of the body of water sampled (Table

Current
Beach
Seine



Fish in the sf estuary project: <http://emp.baydeltalive.com/projects/12152>

Tab 1: What are the types of fish in the sf estuary?

FISH IN THE SAN FRANCISCO ESTUARY

< Benthic Monitoring >

What Are The Types Of Fish In The SF Estuary? What Are Resident Fish? What Are Migratory Fish? What Fish Use The San Francisco Estuary As A Nursery?

WHAT ARE THE TYPES OF FISH IN THE SAN FRANCISCO ESTUARY?

The diverse habitats of SF Estuary support over 100 native and non-native species of fish. Although fishes demonstrate a wide spectrum of life-history characteristics, this portal groups species into the following categories:

- Resident: The estuary is primary residence habitat for all fish life stages
- Migratory: Fish must transition between freshwater and the ocean to complete their life cycle
- Nursery: Fish that reside primarily in the ocean as adults, but rear in the estuary. This includes species that migrate seasonally to the estuary to reproduce and species
- Invasive: Non-native species that have made the estuary their home

Some of the most abundant fish species in the SF Estuary have experienced sharp population declines leading to legal status as threatened or endangered (see SF Estuary Fish Trends). Multiple stressors are causing native fish population declines, including lack of sufficient freshwater flows, diversion of freshwater for human uses, deterioration of water quality, extensive habitat alteration and degradation, introduced species, and climate change.

WHY ARE FISH IMPORTANT?

Fish in the SF Estuary are important for a variety of economic, cultural and ecological reasons. Recreational and commercial fisheries stimulate local economies. Commercially important fish include Chinook Salmon and Pacific Herring. Striped Bass and White Sturgeon are popular with sport anglers. Native Americans value fish resources such as Chinook Salmon and Pacific Lamprey for spiritual, cultural and economic purposes. A variety of species such as Northern Anchovy, smelts, herring, sculpins, and gobies, serve an important role as forage species. Chinook Salmon adults provide nutrients as they decay in rivers upstream after spawning.



Title: Chinook Salmon USGS

Author: USGS

Tab 2: What are Resident fish?

FISH IN THE SAN FRANCISCO ESTUARY

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What Are The Types Of Fish In The SF Estuary? What Are Resident Fish? What Are Migratory Fish? What Fish Use The San Francisco Estuary As A Nursery?

WHAT ARE RESIDENT FISH?

Many fish use the SF Estuary for only particular parts of their life cycle, such as a nursery area or migratory corridor. Some species, however, reside here for all or most of their lives and do not migrate out to the ocean. This includes endemic species (those found nowhere else in the world) like Delta Smelt and Splittail and more broadly distributed species such as Longjaw Mudsucker, Longfin Smelt, and Tule Perch. Because they spend most of their lives within the estuary, these species are particularly susceptible to changes in the estuarine environment. The following species were chosen as key representative resident species:

DELTA SMELT (*HYPOMESUS TRANSPACIFICUS*)

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LONGFIN SMELT (*SPIRINCHUS THALEICHTHYS*)

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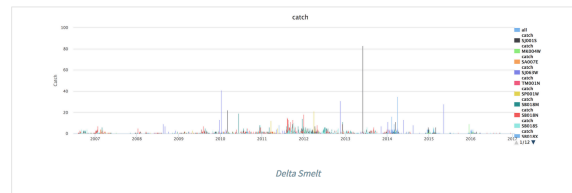
SPLITTAIL (*POGONICHTHYS MACROLEPIDOTUS*)

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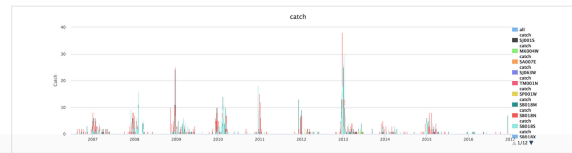
Resident Fish Trends in the San Francisco Estuary

Data from the US Fish and Wildlife Service

Delta Smelt 10 Year Catch Trend Graph



Longfin Smelt 10 Year Catch Trend Graph



Tab 3: What are migratory fish?

FISH IN THE SAN FRANCISCO ESTUARY

< Benthic Monitoring >

What Are The Types Of Fish In The SF Estuary? What Are Resident Fish? What Are Migratory Fish? What Fish Use The San Francisco Estuary As A Nursery?

WHAT ARE MIGRATORY FISH?

Many estuarine fish migrate to habitats with different depths or salinities during their life cycles. Some fish must migrate between fresh and saltwater to complete their life cycle. Anadromous fish spawn in freshwater, juveniles migrate to the ocean where most of their growth occurs, and maturing fish return to freshwater to complete their life cycle. Anadromous fish species traverse the San Francisco Estuary twice during their lives on their way from their natal streams and then back to their spawning grounds in the rivers of the Central Valley. Anadromous species of the SF Estuary include four distinct populations of Chinook Salmon, Steelhead (migratory Rainbow Trout), Green Sturgeon, White Sturgeon, Striped Bass, and Pacific Lamprey. Below, we describe a few of the anadromous fish species that are commonly used to track the health of the San Francisco Estuary.

CHINOOK SALMON (ONCORHYNCHUS TSHAWYTSCHA)

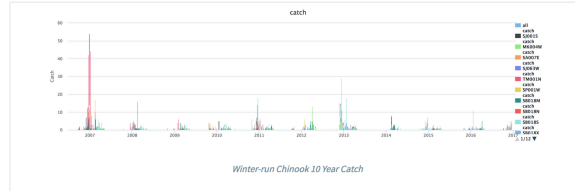
Chinook Salmon (*Oncorhynchus tshawytscha*), also known as King Salmon, is the largest member of the group of fish species known as Pacific Salmon. These fish once spawned in most of the perennial rivers from central California through Alaska. Their homing behavior -- returning to spawn in the same waterway where they incubated as eggs -- and variation in run timing led to some isolation and subsequent divergence among populations of different rivers; even within rivers, different distinct populations (known as runs) can co-exist without interbreeding. The Sacramento River and its tributaries support four distinct runs of Chinook Salmon, more types than any river system in North America. These runs -- Winter, Spring, Fall, and Late-Fall -- are distinguished by the season during which adults return to freshwater to spawn and other behavioral, life history, ecological, and genetic differences. As a result, each run may represent the health of different estuarine and riverine habitats.

The following are more in-depth descriptions of individual Chinook Salmon populations:

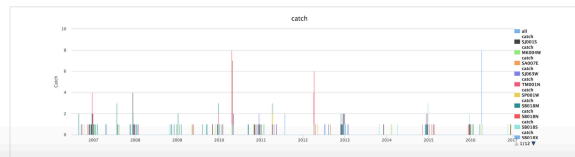
Migratory Fish Trends in the San Francisco Estuary

Data from the US Fish and Wildlife Service

Winter-run Chinook Salmon 10 Year Catch



Latefall-run Chinook Salmon 10 year Catch



Tab 4: what fish use the sf estuary as a nursery?

FISH IN THE SAN FRANCISCO ESTUARY

< Benthic Monitoring >

What Are The Types Of Fish In The SF Estuary? What Are Resident Fish? What Are Migratory Fish? What Fish Use The San Francisco Estuary As A Nursery?

WHAT FISH USE THE SAN FRANCISCO ESTUARY AS A NURSERY?

Fish in the San Francisco Estuary include species that live in marine, brackish, and freshwater habitats, and those that transition across all these habitats. Here we consider species that use the estuary for:

- **Reproduction and nursery habitat** - fishes that use protected estuarine habitats for spawning or live birth of young and early rearing, but move to the coastal ocean to complete growth or mature; surf perches, some sharks, and Pacific Herring are included in this group.
- **Nursery habitat** - fishes that reproduce in the ocean but whose larvae or juveniles seek protected estuarine habitats for early rearing for several months to a year; this group includes many flatfish.

4 representative species are introduced below that capture the ecological diversity and varied life history traits of fish species using the estuary as a nursery. For information on other species, see the [Report on the 1980-1995 Fish, Shrimp, and Crab Sampling in the San Francisco Estuary](#).

PACIFIC HERRING (CLUPEA PALLASII)

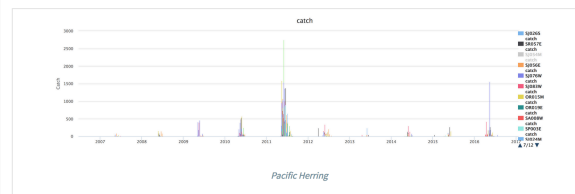
Pacific Herring is a native marine fish found along the Pacific coasts of North America and northeast Asia. The SF Estuary is one of the most important spawning areas in the Pacific for these fish. Once a year, herring enter the estuary and lay eggs in San Francisco, San Pablo, and Richardson bays from late fall through early spring, beginning their lives in the shallow areas of the estuary before gradually migrating into deeper water and finally back into the ocean.

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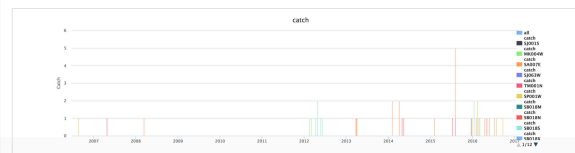
Nursery Fish Trends in the San Francisco Estuary

Data from the US Fish and Wildlife Service

Pacific Herring 10 Year Catch Trend Graph



California Halibut 10 Year Catch Trend Graph



How are fish surveyed in the sf estuary?: <http://emp.baydeltalive.com/projects/12203>

Bay Study:

HOW ARE FISH SURVEYED IN THE SAN FRANCISCO ESTUARY?

< Benthic Monitoring >

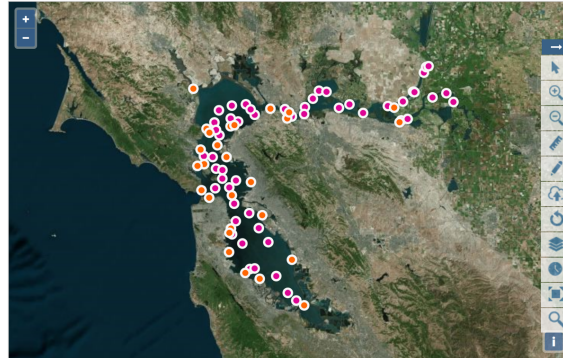
How And Where Are Fish Surveyed In The San Francisco Estuary? Bay Study Suisun Marsh Juvenile Fish Monitoring Salvage Salmon Surveys US Fish And Wildlife DJFMP Spring Kodiak Trawl

Adult Stiped Bass Program Smelt Larval Survey 20mm Survey Summer Townet Survey Fall Midwater Trawl

SAN FRANCISCO BAY STUDY:

The San Francisco Bay Study (Bay Study) was established in 1980 to determine the effects of freshwater outflow on the abundance and distribution of fish and mobile crustaceans in the San Francisco Estuary, primarily downstream of the Sacramento-San Joaquin Delta. The California Department of Fish and Wildlife has sampled monthly at 35 fixed locations throughout the estuary. Sampling ranges from south of the Dumbarton Bridge in South San Francisco Bay, to just west of Alcatraz Island in Central San Francisco Bay, throughout San Pablo and Suisun bays, north to the confluence Steamboat and Cache sloughs on the Sacramento River, and east to Old River Flats on the San Joaquin River.

At each location a single tow is conducted with a midwater trawl towed through the water column and an otter trawl towed along the bottom. Since the start of the survey, additional sampling locations have been added for a total of 52 locations currently sampled monthly. This survey counts, identifies, and measures mostly small (25-200 mm long) resident, migrant and nursery fishes that occupy open-water and bottom habitats.



Bay Study Stations

Pink circles indicate open water boat stations and orange circles indicate beach seine stations

DJFMP:

HOW ARE FISH SURVEYED IN THE SAN FRANCISCO ESTUARY?

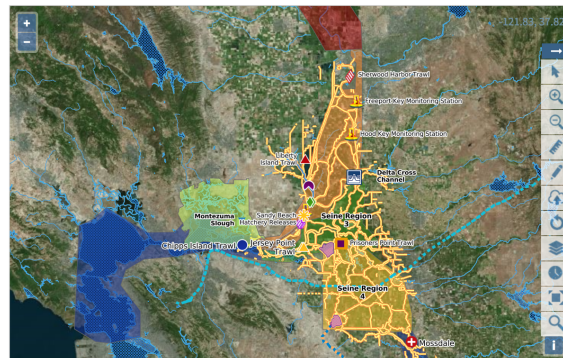
< Benthic Monitoring >

How And Where Are Fish Surveyed In The San Francisco Estuary? Bay Study Suisun Marsh Juvenile Fish Monitoring Salvage Salmon Surveys US Fish And Wildlife DJFMP Spring Kodiak Trawl

Adult Stiped Bass Program Smelt Larval Survey 20mm Survey Summer Townet Survey Fall Midwater Trawl

US FISH AND WILDLIFE SURVEYS

The abundance of juvenile Chinook Salmon (all races) emigrating from the Central Valley's tributaries on their way to the ocean is estimated by the US Fish and Wildlife Service Delta Juvenile Fish Monitoring Program that operates in and around the Delta. The Delta Juvenile Fish Monitoring Program (DJFMP) conducts annual monitoring of juvenile fishes, participates in multi-agency research activities, and contributes to several technical and management committees within the region. Surface trawl sampling is conducted several days per week at Garcia Bend on the Sacramento River and Mossdale on the San Joaquin River to collect juvenile salmonids and other migratory fishes entering the Delta, and at Chipps Island to capture fishes exiting the Delta. In addition, a beach seine survey is conducted roughly weekly from Colusa downstream on the Sacramento River and from the Tuolumne River confluence downstream on the San Joaquin River, and throughout the Delta; additional hauls are made at locations in San Pablo Bay and Central San Francisco Bay.



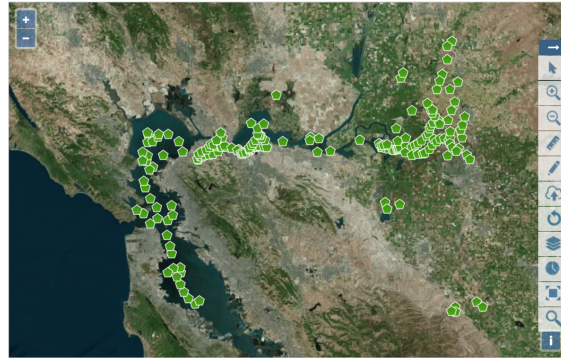
DJFMP Delta Map

Fall midwater trawl:

FALL MIDWATER TRAWL

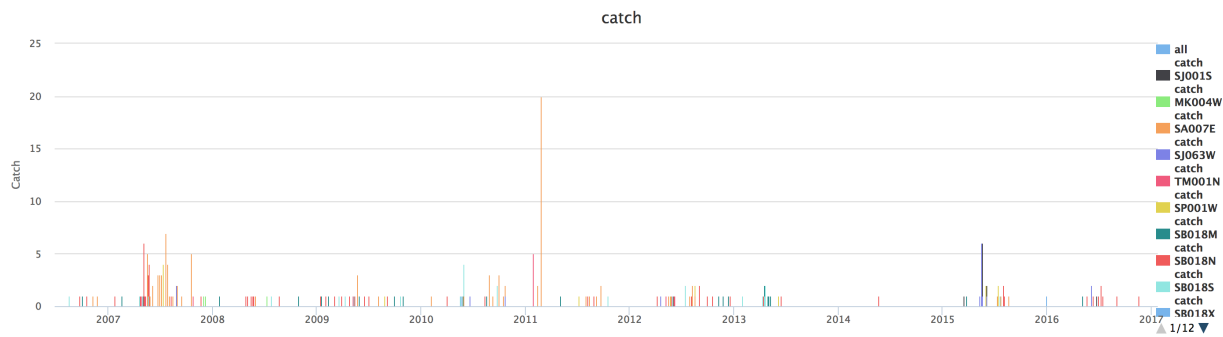
Since 1967, California Department of Fish and Wildlife has sampled 100 fixed locations that range from San Pablo Bay upstream to Stockton on the San Joaquin River, Hood on the Sacramento River, and the Sacramento Deep Water Ship Channel. once a month between September and December using a net that is towed behind a boat. A single tow, throughout the water column, is conducted at each location. This survey counts, identifies, and measures mostly small (30-150 mm) resident and migratory fishes that occupy open-water habitats. The FMWT was initiated to determine the relative abundance and distribution of age-0 striped bass (*Morone saxatilis*) in the estuary, but the data has also been used for other upper estuary pelagic species, including delta smelt (*Hypomesus transpacificus*), longfin smelt (*Spirinchus thaleichthys*), American shad (*Alosa sapidissima*), splittail (*Pogonichthys macrolepidotus*), and threadfin shad (*Dorosoma petenense*).

Sampling takes approximately 9 days per month to complete. Historically, FMWT sampling occasionally began as early as July (1972) or August (1968-1973, 1993-1994, 1996-1997) and sometimes continued past December to March (1968-1973, 1978, 1991-2001) or beyond (1992-1995). The consistent January-March midwater trawl sampling conducted from 1991-2001 to track movements of mature adult delta smelt was replaced in 2002 with the more effective Spring Kodiak Trawl.

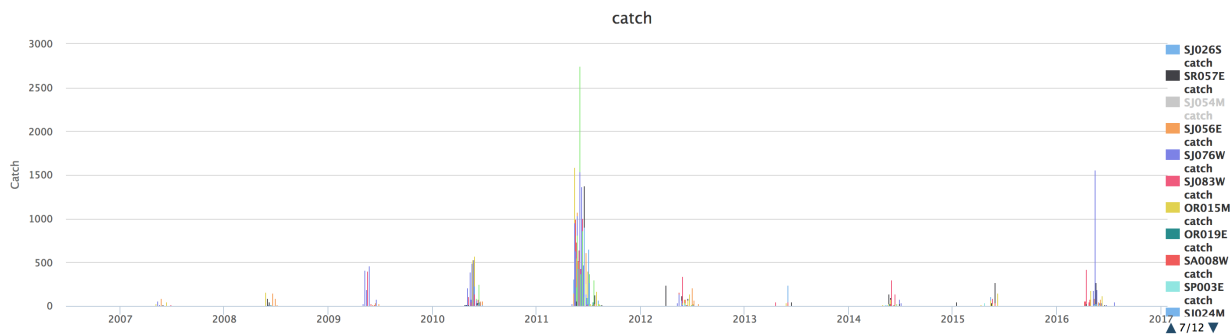


Fall Midwater Trawl Locations

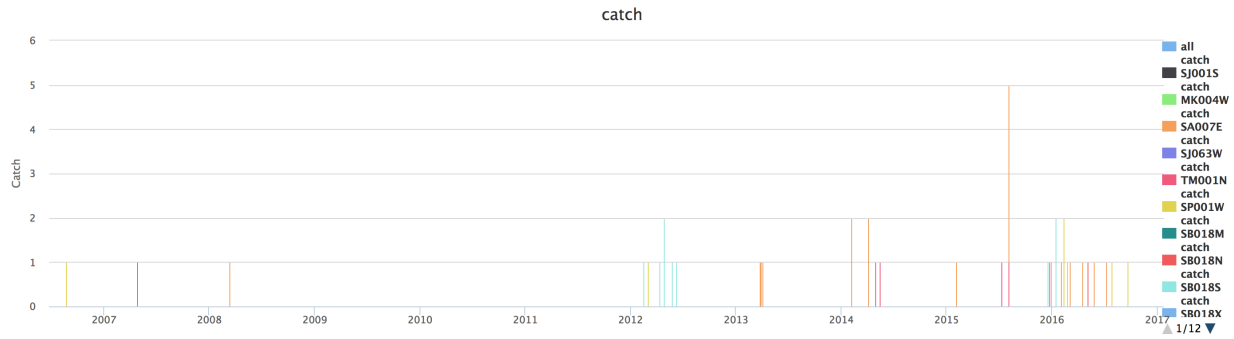
STARRY FLOUNDER 10YR



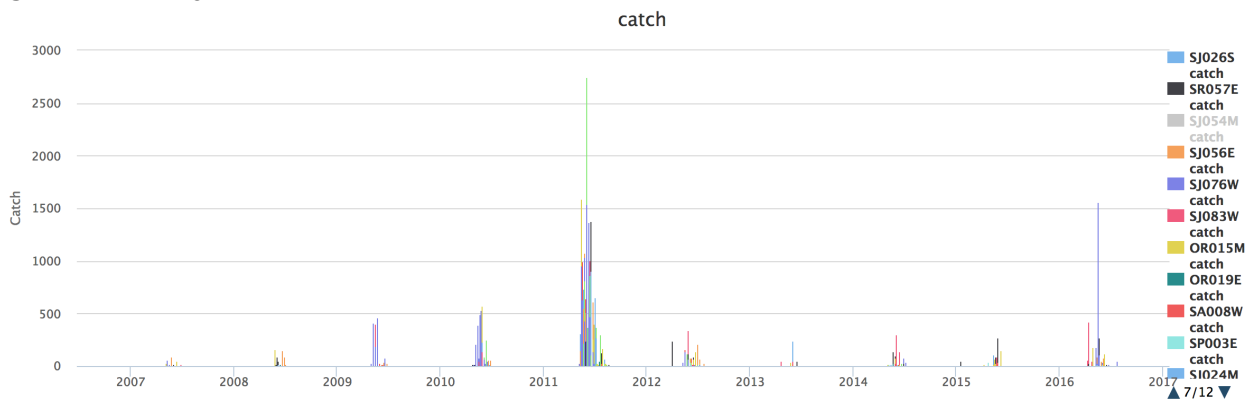
PACIFIC HERRING 10YR



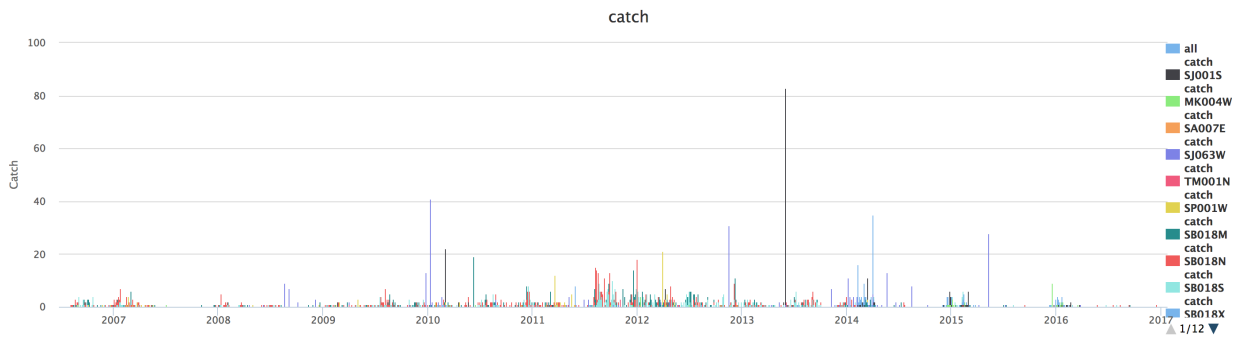
CALIFORNIA HALIBUT 10YR



SPLITTAIL 10YR



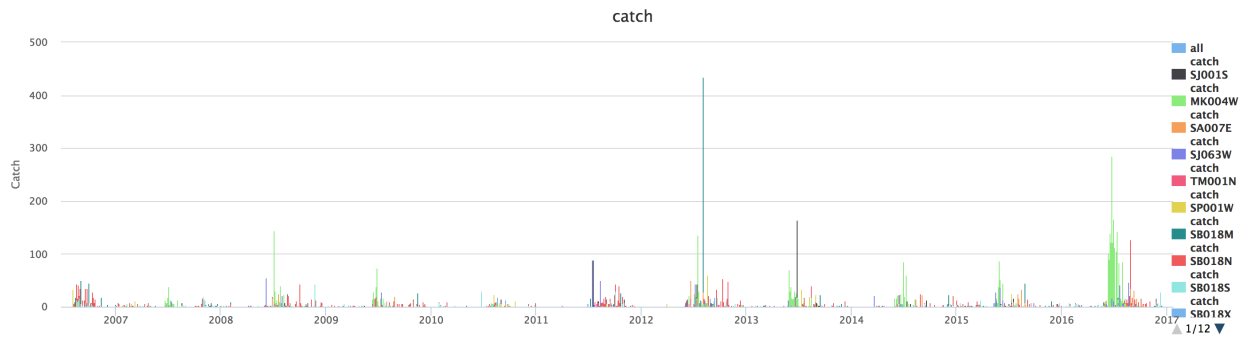
DELTA SMELT 10YR



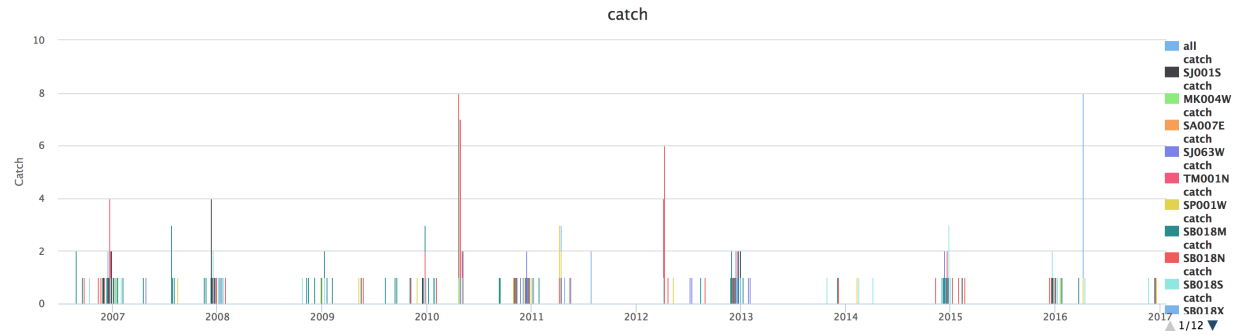
STRIPED BASS 10YR



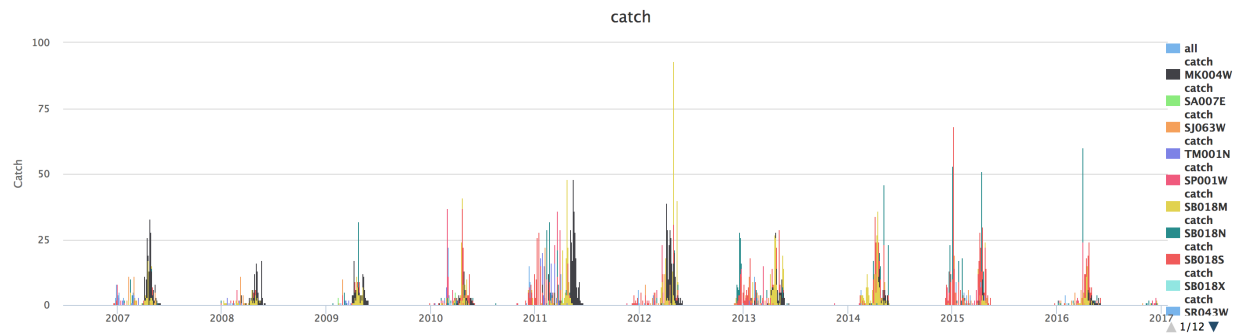
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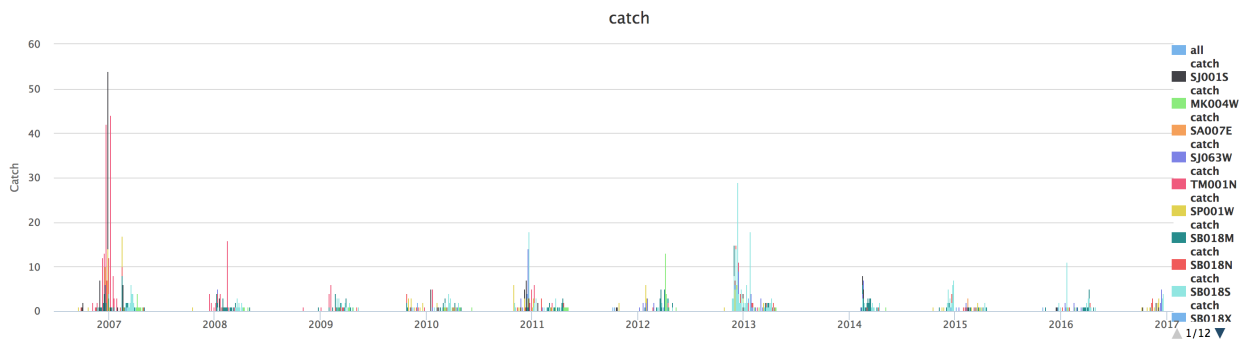
LATEFALL RUN CHINOOK 10YR



SPRING RUN CHINOOK 10YR



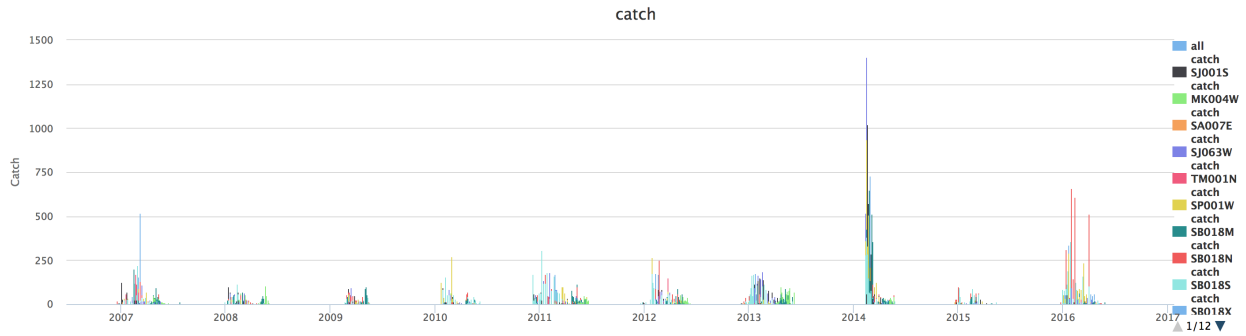
WINTER RUN CHINOOK 10YR



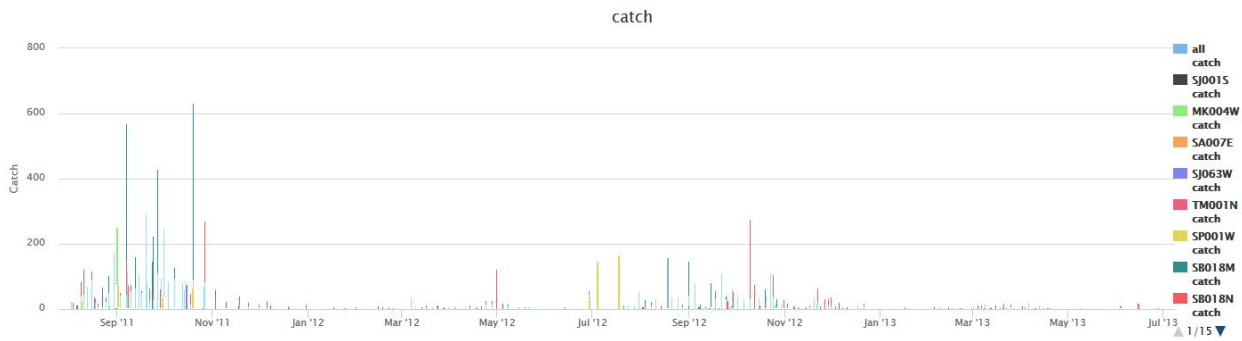
FALL RUN CHINOOK 10YR



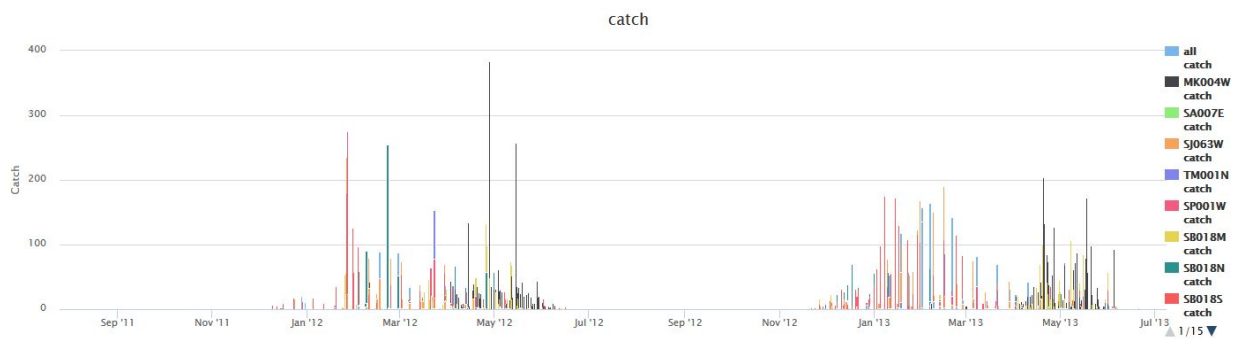
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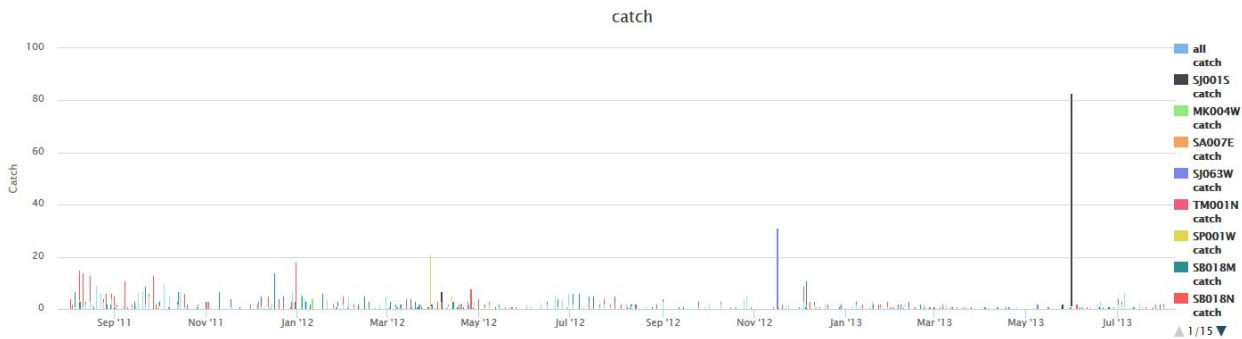
AMERICAN SHAD 2012 AND 2013 SEASONS



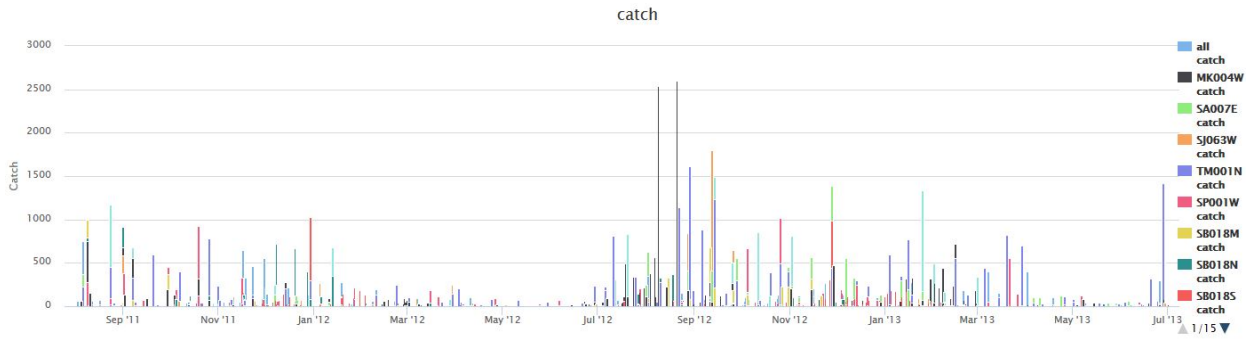
CHINOOK ALL RUNS 2012 AND 2013 SEASONS



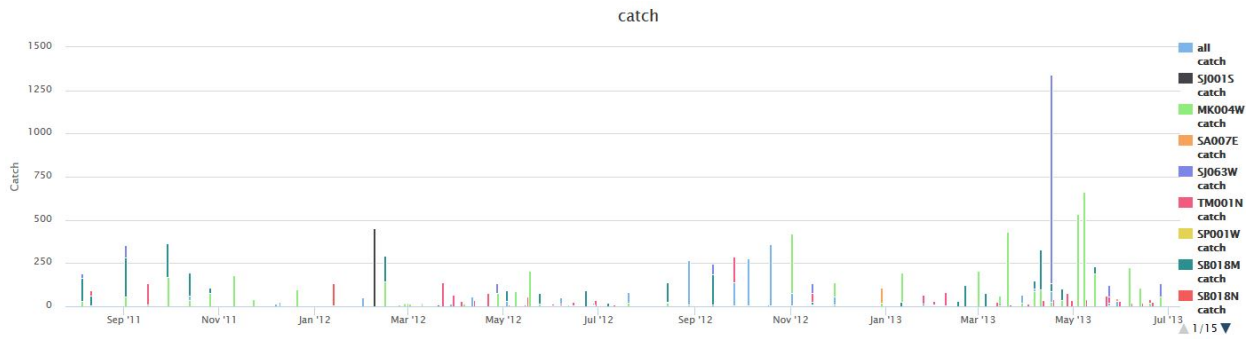
DELTA SMELT 2012 AND 2013 SEASONS



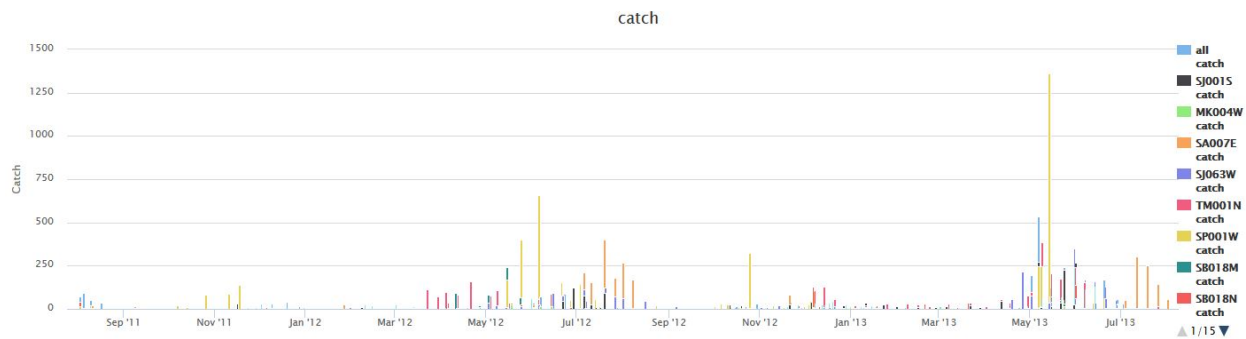
INLAND SILVERSIDE 2012 AND 2013 SEASONS



RED SHINER 2012 AND 2013 SEASONS



SACRAMENTO SUCKER 2012 AND 2013 SEASONS



THREADFIN SHAD 2012 AND 2013 SEASONS

