



## Giacomini Fish Assemblage, Tomales Bay, Marin County CA

A summary of the fish assemblages found in Giacomini Wetlands, pre and post restoration, October 2009

### Pre-Restoration Fish Species

#### Native Species

- \*Tidewater Goby
- \*Threespine Stickleback
- \*Arrow Goby



Tidewater Goby

Tidewater gobies are endemic to California. The males build burrows and the females compete for the males attention. A federally listed endangered species, they are typically found in lagoons or estuaries where the brackish water has low velocities.



Threespine Stickleback

Threespine sticklebacks are found in North America, Europe, and Asia. They have armor plating and sharp spines in their dorsal and pectoral fins. Sticklebacks appear in both anadromous and freshwater forms.



Arrow Goby

Arrow gobies are found along the Pacific coast. They are found in lagoons, tidal sloughs, and estuaries where they can find their preferred habitat of mud flats.

#### Invasive Species

- \*Mosquitofish
- \*Yellowfin Goby



Yellowfin Goby

Yellowfin Goby were first collected in San Francisco Bay, where they were introduced from Asia. They can be found in habitats ranging from fresh to salt water, so long as the area is shallow and soft-bottomed.



Mosquitofish

Introduced for mosquito control purposes, mosquitofish are hardy and well adapted to a variety of environments from salt marshes to ponds, lakes, and streams.

### Fishes Expected After Restoration

#### Native Species

- \*Tidewater Goby
- \*Threespine Stickleback
- \*Arrow Goby
- \*Coho Salmon
- \*Leopard Shark
- \*Bay Pipefish
- \*Starry Flounder
- \*Top Smelt
- \*Staghorn Sculpin
- \*Saddleback Gunnel
- \*Shiner Surfperch
- \*White Sturgeon
- \*Plainfin Midshipman

#### Invasive Species

- \*Mosquitofish
- \*Yellowfin Goby

Estuarine fishes cover a wide variety of species. Because of the ever-changing nature of an estuary, the assemblage of fish species reflects the complexity of environmental conditions. Estuaries may be used as a breeding and nursery ground for marine fish, such as the leopard sharks, or as a holding place as fish make the transition from fresh water to saline water, such as with the coho salmon. There are species like the gobies, topsmelt, and bay pipes that spend their entire lives within the estuary, but some are only transient visitors that move in to feed briefly before returning to the open ocean. Because estuaries are connected to both the open ocean and to rivers or streams, they have a changing gradient of saline and fresh water depending on tide and time of year.



Coho Smelt

Coho are an anadromous salmonid listed as endangered by the Federal Government. Their three-year life-cycle can include time spent in estuarine systems while they make the transition from freshwater to salt-water fish. Estuary habitat can be beneficial to the coho as an area to feed and grow before reaching the open waters of the ocean.



Bay Pipefish

Bay Pipefish are often found in shallow water with abundant vegetation, such as eelgrass. Like seahorses, bay pipefish males carry the eggs until giving birth to living young.



Juvenile Starry Flounder

Starry Flounders are primarily marine or estuarine fish and can be found along the west coast. They feed on a variety of bottom invertebrates.



Saddleback Gunnel

The saddleback gunnel is a long, slender fish found in inshore areas. They are not a commonly caught fish.



White Sturgeon

Photo from Monterey Bay Aquarium



Leopard Shark

The leopard shark can be found in bays and along beaches, feeding on invertebrates and small fish.



Staghorn Sculpin

Easily recognizable by the antler-like projections on their gill covers, staghorns are found from Alaska to Baja California in shallow coastal waters. Although they are primarily estuarine and marine fish, they can be found in fresh water habitat.

### References

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Shiner Surfperch

The shiner perch can be found along the Pacific coast, usually in shallow marine waters, bays, and estuaries. In bays, their abundance may be an indicator of environmental quality.

#### White Sturgeon

White sturgeons are one of the largest and most ancient fish of the bony fish species. They are found in salt water along the west coast, from Alaska to Mexico, but the only self-sustaining spawning populations are found in the Sacramento, Columbia, and Fraser Rivers. They spend most of their lives in estuaries, moving in response to changing salinities, and shift into the fresh water systems to spawn.



Plainfin Midshipman

The plainfin midshipman is found along the west coast in bays and estuaries. It is known for making an audible humming sound during breeding season, which the males use to attract the females.



Topsmelt

Topsmelt can be found along the west coast. They prefer sloughs, estuaries, and shallow bays. They are one of the most abundant fish in bays and estuaries in California.

### Long-term Fish Monitoring Program

#### Fish Sampling Sites



#### Fish Sampling Locations

As part of the Giacomini Wetland Restoration Project, a fish monitoring program was established to document the pre and post-restoration fish assemblage within the project area. In addition to sampling aquatic habitat within the restoration area (purple), sampling was conducted in the old Tomasini slough (blue), the mainstem of Lagunitas Creek (yellow), and an undiked tidal wetland (red) immediately north of the work area. Data from each of these monitoring zones are aggregated to analyze fish community response. While the old Tomasini slough was not removed or modified during restoration, monitoring will continue in this area to determine if the species assemblage will change due to the realignment of Tomasini Creek and the adjacent wetland restoration area.

### Pre-Restoration Results

Twenty seven locations were selected within and adjacent to the project area for long-term fish monitoring. For comparison purposes, results from sample locations within each of the four main sampling areas are aggregated. Pre-restoration sample results showed that the fish community within the restoration area was dominated by stickleback and mosquitofish. A higher diversity of species was observed in the three other monitoring areas outside of the Giacomini pastures.

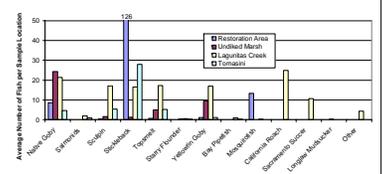


Figure 1 Average number of fish per station, 2005-2008.

### Post Construction Results

National Park Service staff will continue to monitor the restoration area to determine the success of estuarine fish species as they recolonize the restoration area. Although we anticipate that the aquatic habitat will continue to adjust in the restoration area as a result of continued tidal channel adjustment and flood scour and deposition, changes in the fish assemblages present in the restoration area have already been observed.

Figure 2 Average number of fish per station for each monitoring zone, June 2009.

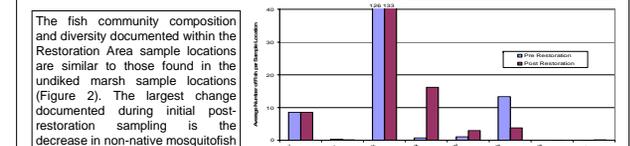


Figure 3 Average fish per station within Restoration Area. Pre-restoration results include 2005-2008. Post-restoration includes June 2009 only.