

**Field Note**  
**December 18, 2008**

**Non-native Sacramento Pikeminnow (*Ptychocheilus grandis*) Investigation**  
**Humboldt Bay Tributary: Martin Slough**  
**November 2008**

On August 7, 2008, California Department of Fish and Game's (CDFG) Natural Stocks Assessment Project (NSAP) based in Arcata, California, captured one non-native Sacramento pikeminnow (pikeminnow) in Martin Slough in the 17<sup>th</sup> Hole Pond on the Eureka Municipal Golf Course (Figure 1). This was the first documented observation of pikeminnow in any Humboldt Bay tributary. From August-October 2008, CDFG conducted numerous pikeminnow sampling trips in Martin Slough and Creek and the Elk River/Slough watershed and found no additional pikeminnow (CDFG October 30, 2008 Field Note). However, on November 6, 2008 during their regularly scheduled monthly sampling for juvenile salmonids, NSAP captured two more pikeminnow in Martin Slough. One pikeminnow was captured in the 17<sup>th</sup> Hole Pond on the Eureka Municipal Golf Course and the other was captured in Martin Slough about 300 feet downstream of the pond. Both pikeminnow were 215 mm FL. Following the capture of these two additional pikeminnow CDFG organized two intensive pikeminnow sampling efforts on November 10 and 19 in and near the 17<sup>th</sup> Hole Pond. This field note summarizes the results of the continued CDFG Sacramento pikeminnow eradication sampling efforts in Martin Slough, a tributary to Swain Slough, thence Elk River, thence Humboldt Bay.

**November 10, 2008**

CDFG crews returned to the 17<sup>th</sup> Hole Pond area and conducted intensive seining to capture pikeminnow. Crews set a block net across the center of the pond to limit the area pikeminnow could escape from the seining effort. We also placed smaller block nets at the inlet and outlet of the pond to keep pikeminnow from leaving the pond during our sampling. In one half of the pond, crews set a 150 X 10 ft net along the edge of the bull rush in an attempt to keep pikeminnow from fleeing into heavy brush during seine hauls (Figure 2). The other half of the pond did not have this type of exclusion net. Crews concurrently sampled each half of the pond with 100 ft seine nets and made a total of approximately 20 sets. In the slough downstream of the pond, crews installed a fyke net/trap and conducted hauls with a 30 ft seine net in an effort to herd fish into the fyke net/trap. After this, crews also made numerous seine hauls in Martin Slough from the 17<sup>th</sup> Hole Pond downstream to the golf course property line (Figures 1 and 2). Finally, crews used a 30 ft seine net to sample the roughly ¼ mile section from the tide gate at the mouth of Martin Slough upstream to the intersection of Meyers Ave and Pine Hill Road (Figure 1).

Field crews captured one pikeminnow in the 17<sup>th</sup> Hole Pond. It was about the same size as the pikeminnow captured on November 6 (we did not take a FL measurement). We also captured 43 juvenile coho salmon, seven cutthroat trout, >1,000 threespine stickleback, and 50-100 sculpin. All captured coho salmon and cutthroat trout were held in live cages just upstream of the pond during the seining effort. All fish were released at the end of the day. Three coho salmon and one cutthroat trout contained a PIT tag applied by NSAP in Martin Slough. The coho had been at large from 4 to 123 days and the cutthroat had been at large for 32 days. We did not measure or tag any salmonids during this effort. Crews seining the mouth of Martin Slough captured two coho salmon and three tidewater goby.

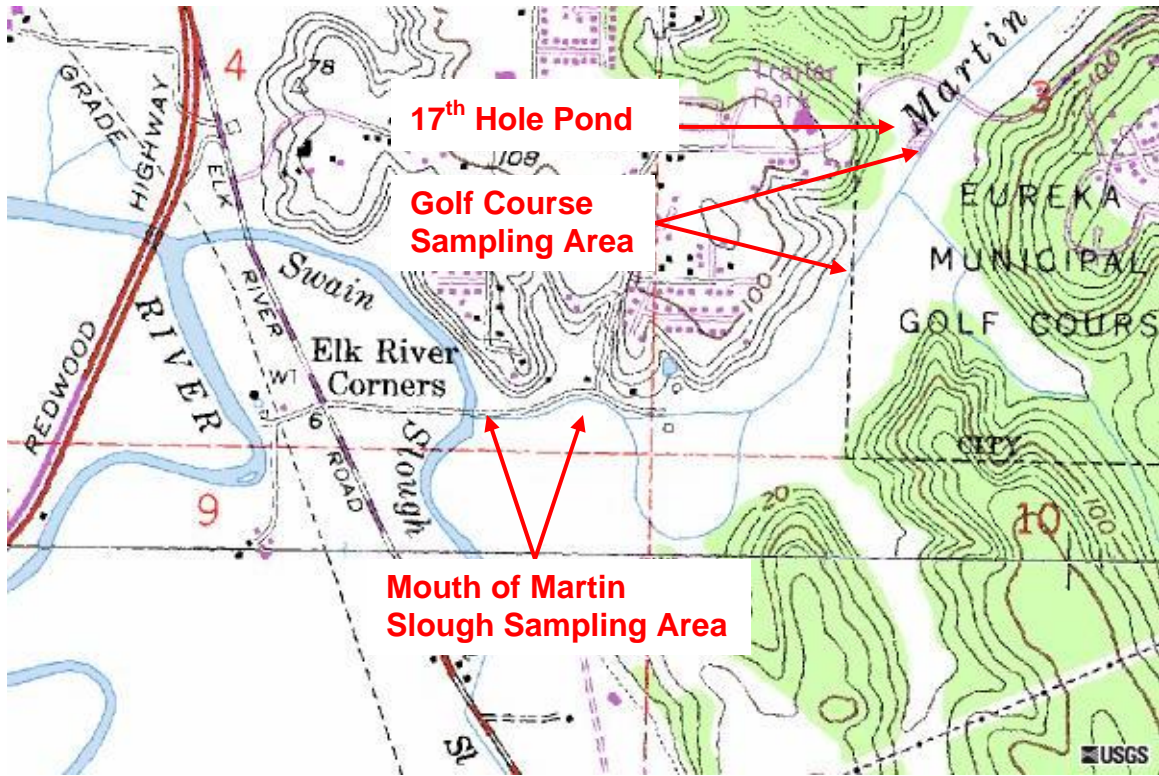


Figure 1. Sacramento pikeminnow sampling locations in lower Martin Slough during November 2008 eradication effort.

#### November 19, 2008

After the capture of the pikeminnow on November 6 and 10, and because all four pikeminnow had been captured in, or very near the 17<sup>th</sup> Hole Pond, CDFG decided to focus increased pikeminnow eradication efforts in the pond rather than attempt another basin wide sampling effort. CDFG proposed to isolate the pond from Martin Slough with inflatable bladder dams, then, temporarily drain or very nearly drain the pond in order to increase the effectiveness of seining and electrofishing in capturing pikeminnow. CDFG was able to identify funding to contract with the Humboldt Fish Action Council (HFAC) to install the dams and drain the pond with water pumps. CDFG also contacted and obtained concurrence from National Marine Fisheries Service, U.S. Fish and Wildlife Service, Army Corps of Engineers, North Coast Regional Water Quality Control Board, and City of Eureka to conduct this project.

Prior to bladder dam installation, USFWS and CDFG crews conducted tidewater goby sampling at the dam sites in the pond and in Martin Slough downstream of the pond. The crews also installed exclusion nets to keep tidewater goby away from the dam sites. HFAC and their sub-contractor Water Structures Unlimited, installed the bladder dams at the inlet and outlet of the pond (Figure 2), and began to drain the pond (Figure 3). Crews set a block net across the center of the pond to limit the area pikeminnow could escape from the nets. Crews concurrently sampled each half of the pond with 100 ft seine nets and made a total of approximately 20 sets.



Figure 2. Setting 150 foot net to block Sacramento pikeminnow access to vegetation ringing 17<sup>th</sup> Hole Pond (top). Martin Slough sampling areas on Eureka Municipal Golf Course and temporary inflatable dam sites on 17<sup>th</sup> Hole Pond (bottom).

USFWS and DFG personnel also conducted electrofishing within the pond once the water was drawn down and seining was no longer practical due to the nearly waist deep mud. Two large sit-on-top kayaks were used to carry a back-pack electrofishing crew. One kayak contained a paddler and another person to operate a Smith Root Model 12B POW backpack electrofisher. The other kayak contained a paddler and a netter. The pond continued to be drained as electrofishing was in progress. Water depths varied from 0.5 feet to 2 feet for the duration of the sampling period. The entire pond area was sampled at least twice. Electrofisher settings were set low to first check for tidewater goby presence. After goby were not found, the electrofisher settings were tested and adjusted upwards to determine the most effective settings.

Seining field crews captured two pikeminnow in the 17<sup>th</sup> Hole pond. They ranged from 219 to 220 mm FL, about the same size as the pikeminnow captured on November 6 and 10. Seining crews also captured 33 juvenile coho salmon, one juvenile steelhead, eight cutthroat trout, >1,000 threespine stickleback, 50-100 sculpin (predominately prickly sculpin), and numerous rough-skinned newts and northwestern salamanders. USFWS crews also captured one tidewater goby at the pond outlet dam site, three goby in the pond, and 16 goby in Martin Slough on golf course property downstream of the pond. All captured salmonids were held in live cages and gobies in aerated buckets during the seining effort and released at the end of the day. Six coho salmon and one cutthroat trout contained a PIT tag applied by NSAP in Martin Slough. The coho had been at large from 13 to 132 days and the cutthroat had been at large for 41 days. We did not measure or tag any salmonids during this effort.

Numerous threespine stickleback and a few sculpin were the only fish observed while electrofishing. A few Northwestern salamanders were also captured and/or observed. No fish or salamander mortalities were observed. Once fisheries biologists were satisfied that electrofishing coverage was adequate, electrofishing and pond draining operations were terminated. The upstream, then downstream dams were removed to allow return of water flow to fill pond.



Figure 3. Inflatable dam in place on upstream end of 17<sup>th</sup> hole pond (left). Pumps used to drain pond (right).

CDFG is continuing to conduct follow-up pikeminnow surveys and eradication efforts. We conducted two additional smaller scale sampling efforts in the 17<sup>th</sup> Hole Pond and the golf course section of Martin Slough downstream of the pond on December 2 and 11, 2008. We captured no pikeminnow on either day. The results of our previous surveys are being used by CDFG to develop a pikeminnow monitoring plan. These plans will include further fish sampling in Martin Slough and other tidal portions of Humboldt Bay tributaries. Future efforts may also include further surveys of pond habitat in Martin Creek to look for source populations of pikeminnow and fish migrant trapping in the Elk River basin to determine if pikeminnow have moved into this adjacent watershed.

### **Management Implications**

Sacramento pikeminnow are not native to the Humboldt Bay watershed. They have been implicated as a significant contributor to the decline of salmonids and other native fishes in the Eel River after their introduction into that basin. If pikeminnow become established in the Humboldt Bay basin they will have a number of negative effects.

- 1) Pikeminnow >200 mm SL will feed almost exclusively on fish (Moyle 2002), including young salmon and steelhead and other native aquatic species. Nakamoto and Harvey (2003) found that fish became a major portion of pikeminnow diet after they exceeded 250 mm SL. Pikeminnow inhabiting the freshwater-estuary ecotone of Martin Slough (and other Humboldt Bay tributaries) will encounter and may also prey upon other protected fish species such as tidewater goby and longfin smelt.
- 2) Juvenile pikeminnow may also compete with juvenile salmonids and other native fishes for food and habitat resources.
- 3) One of the habitat restoration methods being touted for Martin Slough and other Humboldt Bay tributaries is constructing off channel rearing ponds for juvenile coho to use for over winter rearing. This type of low velocity pool habitat is also favored by pikeminnow (Moyle 2002). Therefore, creating this habitat may benefit pikeminnow and encourage young salmonids to move into areas with an abundance of predators.
- 4) Pikeminnow may be able to use Martin Slough as a stepping stone to other Humboldt Bay tributaries and even the Mad River. If pikeminnow become established in Martin Slough they may be able to migrate to other Humboldt Bay tributaries during high freshwater flow events. Sacramento pikeminnow are rarely found in salinities >5 ppt, but have been found in Suisun Marsh in salinities as high as 8 ppt (Moyle 2002). Also, one study conducted on the closely related Colorado pikeminnow found a 50% mortality rate after 96 hours exposure to 13.7 ppt saltwater (Nelson and Flickinger 1992). During a moderate stream flow at low tide in November 2008, NSAP measured water salinities in Martin, Swain, and Elk River Sloughs and found them to be  $\leq 6$  ppt which, according to the above research, is fresh enough to allow pikeminnow to move from Martin Slough to the Elk River. During high stream flows the surface waters of Humboldt Bay may have low enough salinities for pikeminnow to withstand brackish water conditions long enough to move into adjacent watersheds like Jacoby, Freshwater and Salmon Creeks. If they become established in North Bay tributaries they may be able to move into the Mad River at high river flows. The larger pools and warmer summer water temperatures in the Mad River are probably similar to the Eel River and potentially allow pikeminnow to flourish there.

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