SUISUN CREEK

PREDATORY FISH SPECIES INVENTORY
AND
JUVENILE STEELHEAD DISTRIBUTION STUDY

PREPARED BY

NAPA COUNTY RESOURCE CONSERVATION DISTRICT
1303 JEFFERSON ST. SUITE 500B NAPA, CALIFORNIA 94559

CONTACT:
JONATHAN KOEHLER
SENIOR BIOLOGIST
(707) 252 - 4188 X 109
JONATHAN@NAPARCD.ORG

DECEMBER, 2008

FUNDED BY:
THE CALFED WATERSHED PROGRAM
AND
THE SAN FRANCISCO FOUNDATION

INTRODUCTION

As part of the Suisun Creek Watershed Program, the Napa County Resource Conservation District (RCD) completed a snorkel survey of Suisun Creek in September 2008. The purpose of this survey was to document the fish community composition of Suisun Creek with particular focus on predatory fish species and juvenile steelhead distribution and abundance.

The Suisun Creek watershed covers an area of approximately 53 square miles in Napa and Solano Counties (Figure 1). The creek has one major on-stream dam, which forms Lake Curry near the top of the watershed. This dam represents the upper extent of anadromy for steelhead. There are approximately 11.5 miles of stream between Lake Curry and the tidally influenced estuarine portion of Suisun Creek, which flows into Suisun Marsh south of the town of Cordelia. Suisun Creek has one major tributary, Wooden Valley Creek, which is also known to support a steelhead population.

In recent years, there has been discussion about altering the release schedule from Lake Curry to benefit steelhead populations. On one hand, releasing additional cold water throughout the summer may create more favorable habitat conditions for steelhead rearing. However, temperature monitoring data from Suisun Creek suggests that pulses of cold water quickly become unsuitably warm a short distance downstream from the dam (Jackson et al. 2007). These warmer reaches create favorable habitat conditions for more tolerant fish species that prey upon juvenile steelhead as they migrate to the ocean. Therefore, releasing additional cold water throughout the year may improve habitat conditions for steelhead immediately below the dam, but it may also have the adverse impact of creating significantly more warm-water habitat in the lower sections of Suisun Creek.

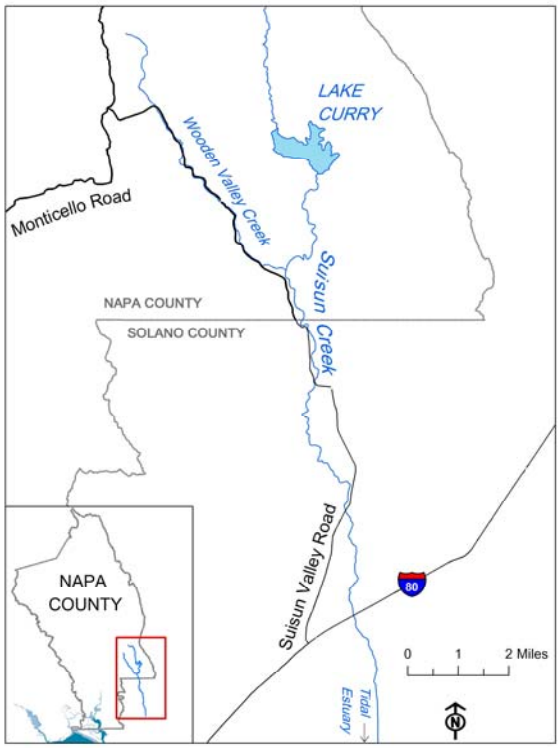

Figure 1. Suisun Creek location map

METHODS

To determine fish assemblage composition, distribution, and habitat associations, a snorkel survey was completed between September 22, 2008 and September 29, 2008 (Figure 2). The survey was conducted by Jonathan Koehler and Chad Edwards of the NCRCD. A total of 9.9 miles of Suisun Creek was surveyed during the course of five field days (Figure 3). The survey began below Cordelia Road where the channel was no longer tidally influenced. No surveying was conducted in the tidally influenced estuarine portion of Suisun Creek due to poor water clarity. Landowner access was somewhat limited at the uppermost extent of Suisun Creek just below Lake Curry, and approximately 1.6 total stream miles in reach 5 were not surveyed. The unsurveyed section included approximately 5,400 feet of channel just downstream of the dam and an additional 3,500 feet just upstream of the Wooden Valley Crossroad (Figure 3)

Water temperature was measured with handheld thermometers throughout the survey. Streamflow was visually estimated at key transitional points, such as sections where the channel went dry or where flow resumed. All observations were recorded on waterproof notebooks and referenced to GPS waypoints. A total of 100 GPS points were collected during the survey and converted into a GIS layer. Photographs were also taken along the entire stream length and at several underwater locations to document fish species and general habitat conditions. Photos were linked to spatial coordinates in a GIS layer of the survey.

Figure 2. Chad Edwards diving a pool in lower Suisun Creek.

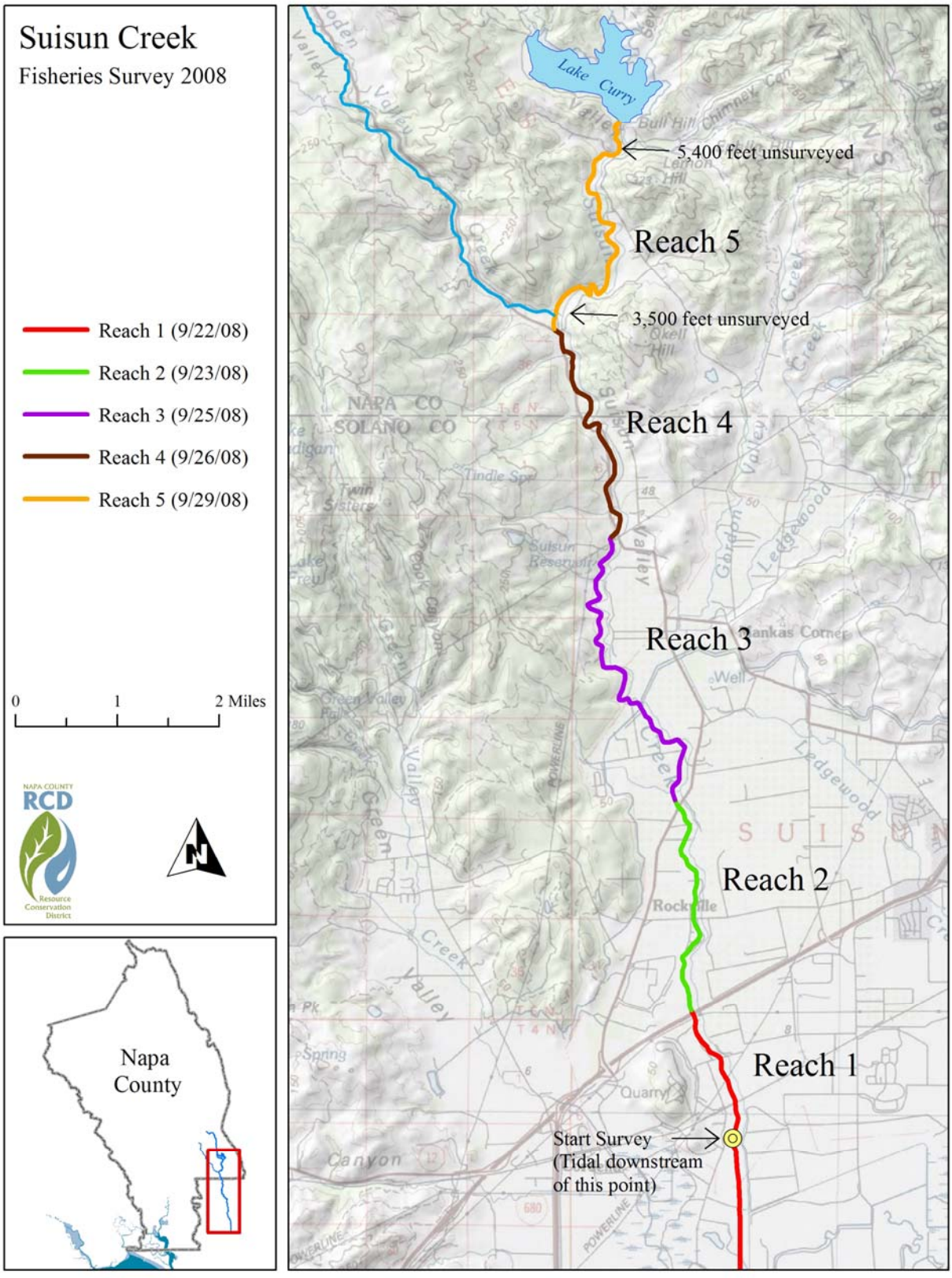

Figure 3. Suisun Creek survey reach map. Note: the unsurveyed sections in Reach 5 were due to limited landowner permission.

RESULTS AND DISCUSSION

A total of eleven fish species were documented in Suisun Creek, including seven native and four non-native species (Table 1). Native species included Sacramento pikeminnow, California roach, Sacramento sucker, threespine stickleback, tule perch, steelhead (rainbow trout), and riffle sculpin. Non-native fish species were very sparsely scattered throughout the survey, with only a few individual sightings. The four non-native species observed were bluegill, carp, goldfish, and western mosquitofish.

Leidy (2007) lists a total of 21 fish species known to currently or historically occur in Suisun Creek including 12 natives and 9 introduced species. We observed three species not listed in Leidy (2007, p. 193) - riffle sculpin, goldfish, and western mosquitofish. Additionally, we did not observe hitch, Sacramento blackfish, delta smelt, prickly sculpin, golden shiner, fathead minnow, rainwater killifish, striped bass, black crappie, largemouth bass, or green sunfish, which are all known to occur in Suisun Creek (Leidy 2007). These species would be expected to be more abundant in the tidally-influenced lower reaches that we did not survey (Moyle 2002). We also did not observe Chinook salmon or Pacific lamprey, which are known to occur in Suisun Creek. However, our survey period did not target these two species.

Common Name	Scientific Name	Abundance	Habitat Association	Size Range (inches)	Comments
Sacramento Pikeminnow	*Ptychocheilus grandis*	High	Pool/Glide	3" – 20"	Extremely abundant throughout survey. Largest fish observed in Reaches 3 & 4.
California Roach	*Hesperoleucus symmetricus*	High	All	1" – 4"	Extremely abundant throughout survey.
Sacramento Sucker	*Catostomus occidentalis*	High	All	3" – 14"	Common throughout survey. Mixed with schools of roach and pikeminnow.
Threespine Stickleback	*Gasterosteus aculeatus*	High	Pool/Glide	1"-2"	Common throughout survey. Often only species in stagnant pools (Reach 3)
Tule Perch	*Hysterocarpus traski*	Moderate	Pool	3"-6"	Common, but not abundant throughout survey.
Steelhead	*Oncorhynchus mykiss*	Moderate	Riffle/Run	3" – 12"	Mostly young of year throughout survey. A few larger, possibly resident, trout in Reach 4 and 5. Highest overall steelhead abundance in Reaches 4 & 5.
Riffle Sculpin	*Cottus gulosus*	Moderate	Riffle/Run	2"-3"	Common in flowing water. Difficult to observe due to habitat preference.
Bluegill	*Lepomis macrochirus*	Low	Pool	3" – 6"	Sporadically observed throughout survey. Several schools in Reach 2.
Western Mosquitofish	*Gambusia affinis*	Low	Pool/Glide	1"-2"	Abundant in Reach 1, but not found in most of survey. Likely introduced for vector control.
Carp	*Cyprinus carpio*	Low	Pool	12" – 14"	Several skeletons found in Reach 3. No live carp observed.
Goldfish	*Carassius auratus*	Low	Pool	6"	One live goldfish observed in Reach 4 with mixed school of native minnows.

Table 1. Fish species observed in Suisun Creek during five-day snorkel survey.

No non-native predatory species (e.g. largemouth and smallmouth bass or green sunfish) were observed. Smallmouth bass have been observed in Suisun Creek in recent years (J. Beuttler pers. comm.), but we did not observe any during this survey.

Reach 1 was characterized as a low gradient plane-bed channel with abundant canopy and instream shelter. A few juvenile steelhead were observed in small pockets of high quality habitat in Reaches 1 and 2; however there was very little suitable rearing habitat available in these reaches. A short section of Reach 2 and much of Reach 3 was intermittent with unsuitable stagnant isolated pools (Figures 4 and 5). Most of these pools had poor water clarity and contained no fish. However, a few isolated pools in Reaches 2 and 3 contained clear water and supported Californinia roach, threespine stickleback, Sacramento sucker, and Sacramento pikeminnow.

A marked transition was noted in the uppermost section of Reach 3, where the channel gradient increased and habitat conditions were generally better for steelhead rearing. We observed an increase in streamflow at the top of Reach 3 (Figure 9), and instream cover from tree roots and undercut banks was more abundant upstream of this section. Juvenile steelhead abundance increased in this section as well (Figure 10), especially in areas with swiftly flowing water. Reach 4 and 5 had the highest densities of juvenile steelhead. Sacramento pikeminnow remained abundant in Reaches 4 and 5; however they tended to be restricted to pools and glides, while steelhead were always associated with riffles and runs.

Water temperatures taken with handheld thermometers ranged from 15.5° to 20° C during the survey. The highest temperature (20° C) was measured in Reach 3 below a pipe outlet, which was discharging clear water into the creek. It is unknown what the source of this water was.

A total of eight beaver dams were observed during the survey, including five in the upper section of Reach 3 and the lower section of Reach 4, and a series of three dams in Reach 5 (Figure 6).

Figure 4. Dry channel in Reach 3, Suisun Creek.

Figure 5. Isolated pool in lower Reach 3, Suisun Creek.

Figure 6. Beaver dam in Reach 4, Suisun Creek.

Figure 7. High quality steelhead rearing habitat in Reach 4, Suisun Creek.

Figure 8. Shallow open glide habitat favored by minnows and suckers. Reach 4, Suisun Creek.

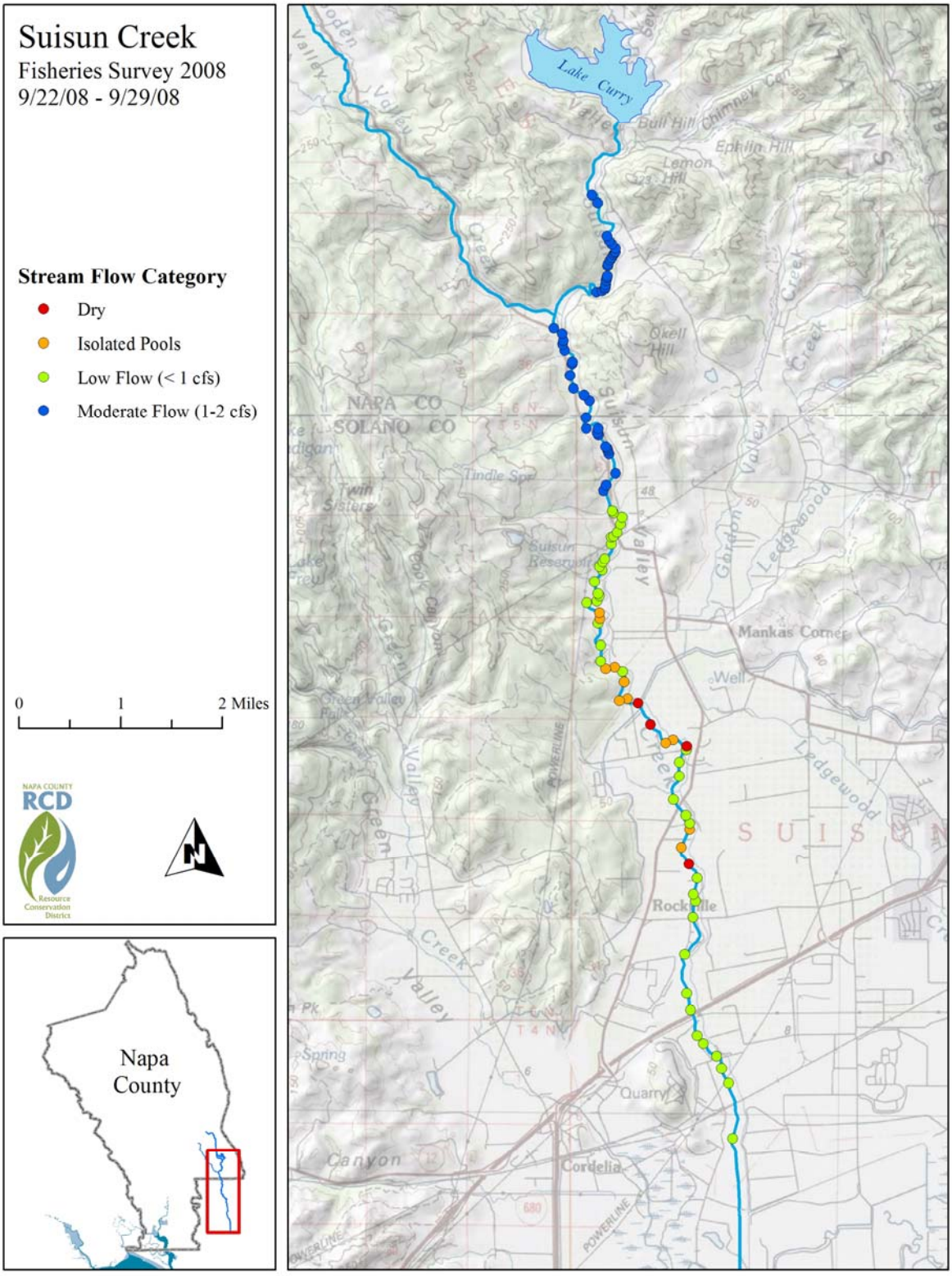

Figure 9. Stream flow observations made along Suisun Creek between 9/22/08 and 9/29/08. Values represent visual estimates.

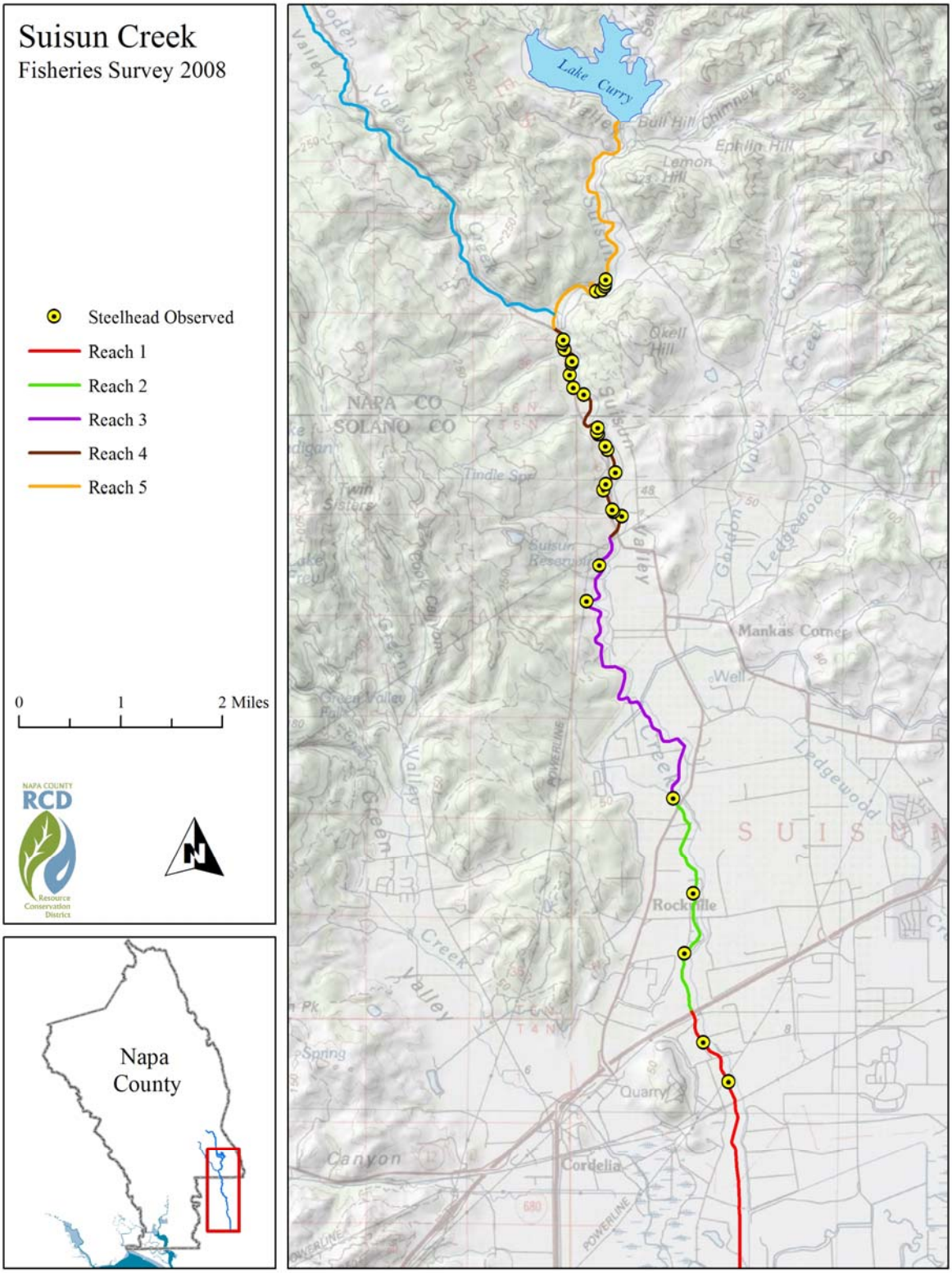

Figure 10. Juvenile steelhead distribution map

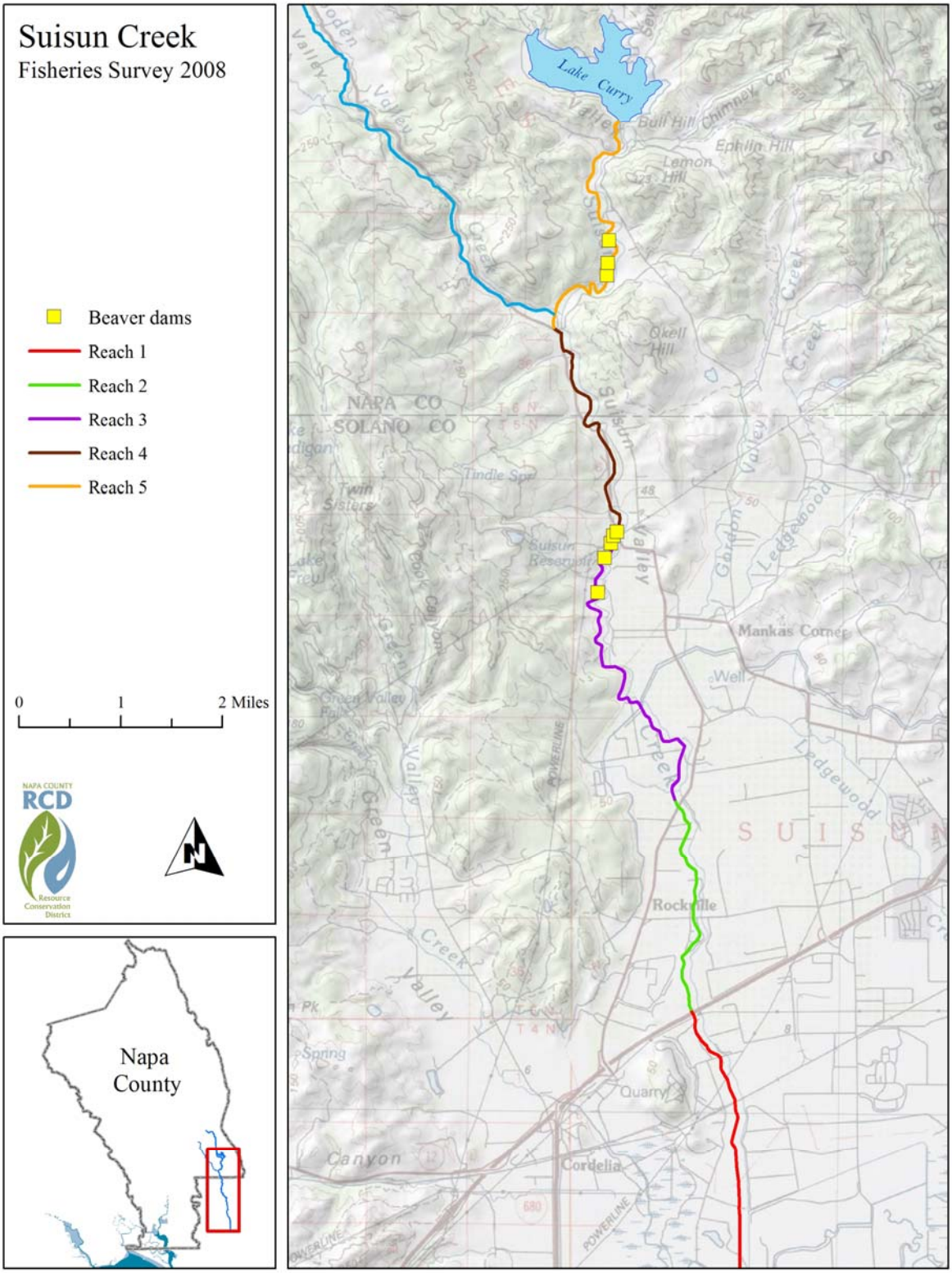

Figure 11. Beaver dams observed in Suisun Creek.

Figure 12. Juvenile steelhead observed in reach 4, Suisun Creek.

Figure 13. Adult Sacramento pikeminnow in reach 4, Suisun Creek.

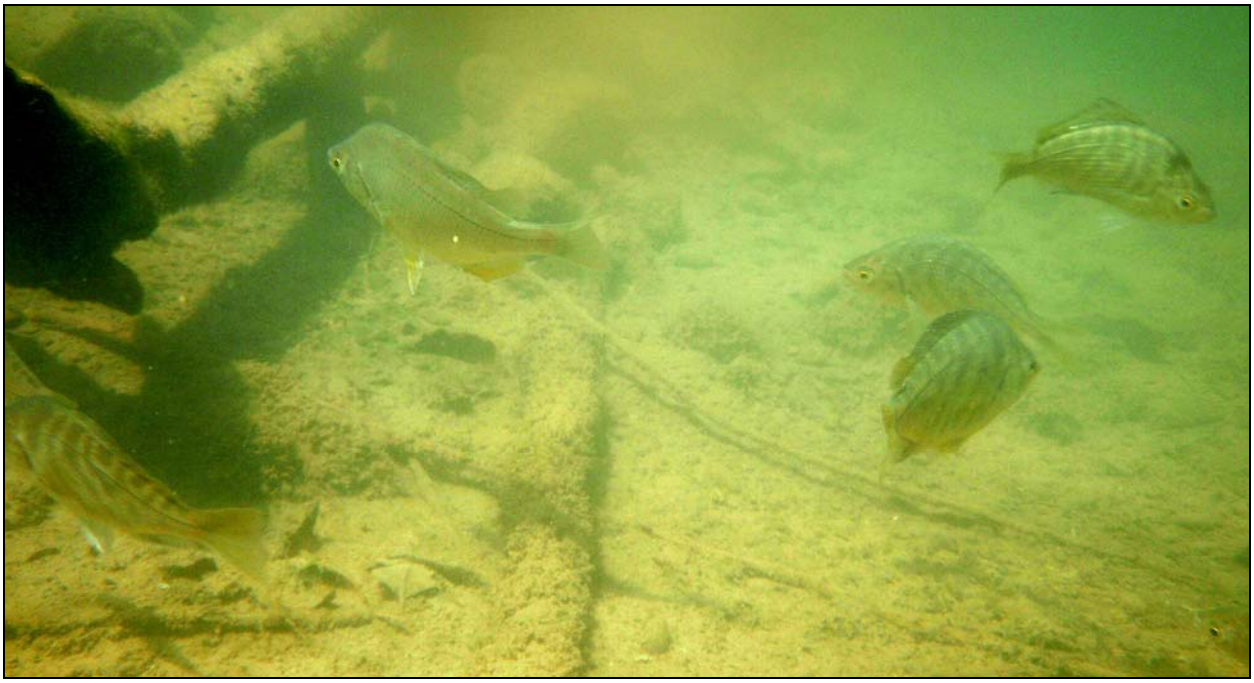

Figure 14. Tule perch in reach 2, Suisun Creek.

Figure 15. California roach school in reach 4, Suisun Creek.

Figure 16. Riffle sculpin in reach 5, Suisun Creek.

Figure 17. Carp skeleton in reach 3, Suisun Creek.

CONCLUSIONS

- No exotic predatory fish species were observed during this survey. Previous observations of these species, including bass and other sunfish, may have been the result of occasional intentional introductions or accidental spillovers from stock ponds and Lake Curry during high flow. This suggests that conditions in the non-tidally-influenced portion of Suisun Creek are not suitable for maintaining self-sustaining populations of these species.

- Sacramento pikeminnow was the only large piscivorous fish species observed in this survey. Given their high abundance and distribution throughout the entire length of Suisun Creek, pikeminnow are likely significant predators on juvenile steelhead. Further predator-prey studies would be needed to determine the extent to which this is occurring.

- Bluegill were present in several sections of Suisun Creek and appear to have established a small self-sustaining population. Degraded habitats in Reaches 2 and 3 tended to have the highest abundances of bluegill.

- Based on our observations during this study, the native fish assemblage in Suisun Creek appears to be mostly intact. Abundances of the seven native fish species observed were relatively high throughout the survey. Introduced species may be more common in the lower tidally-influenced reaches as the creek transitions into Suisun Marsh.

- Juvenile steelhead were distributed throughout the entire survey, with the highest abundances in Reaches 4 and 5, and the lowest abundance in reach 3. Suitable steelhead rearing habitat was very sparse in Reaches 1, 2, and 3.

- No major fish passage barriers were observed. The Suisun Valley Road Bridge is a potential low-flow obstacle, but it appears to be easily passable by adult steelhead during winter flows. Beaver dams were observed in Reaches 3, 4 and 5, however, they would be expected to wash out during a typical winter storm and not block adult steelhead passage.

REFERENCES

Beuttler, J., California Sportfishing Protection Alliance, telephone conversation with J. Koehler, NCRCD, October 8, 2008, regarding Suisun Creek survey.

Jackson, D., Laurel Marcus and Associates. 2007. Effect of dam releases on stream temperature in Suisun Creek.

Leidy, R.A. 2007. Ecology, assemblage structure, distribution, and status of fishes in streams tributary to the San Francisco Estuary, California. SFEI Contribution #530. San Francisco Estuary Institute. Oakland, CA. http://sfei.org/leidy_No530/index.html

Moyle, P. B. 2002. Inland fishes of California, revised and expanded. University of California Press, Berkeley.