

5B. Management of invasive species in the Cosumnes and Mokelumne River Basins

Cosumnes River

The Cosumnes River basin has a number of distinct habitat types that require different management strategies to reduce the impact of invasive species.

1. Mountain meadows. There are two meadow systems in the headwaters that are dominated by alien brook trout and brown trout. Historically, the streams in these meadows were most likely fishless, because they occur above waterfalls and other high gradient barriers. Without fish, they presumably contained large populations of amphibians including the mountain yellow-legged frog (*Rana muscosa*), which has been proposed for listing as a threatened species. The small size of the streams suggests that they could easily be treated with rotenone in late summer to eradicate the trout. Small populations of frogs are still present, so they would presumably recolonize the streams quickly. Thus eradication of alien trout and management of the meadows for native aquatic life should be investigated.

2. North Fork and South Fork foothill reaches. Populations of California roach (and Sacramento suckers) exist above natural barriers to invasion by redeye bass. Taxonomic work by W. J. Jones (Monterey Bay Aquarium Research Institute) indicates the roach are fairly distinctive and may deserve recognition as a distinct taxon. It is therefore important that these populations be protected from predation by alien fishes. Annual surveys should be conducted for the presence of alien fishes, especially redeye bass and green sunfish, and if they are detected, to have a strategy in place for eradication. A survey

should be conducted on public and private land above these reaches to see if there are stock ponds containing invasive fishes (e.g., green sunfish) that might create problems in the future.

3. Redeye bass reaches. The lower ends of the three forks and the mainstem Cosumnes are dominated by redeye bass, to the detriment of native fishes. If present trends continue, native fishes will be virtually absent from these areas in a few years. It would be highly desirable to eradicate redeye bass and other alien fishes from this area, but, given the size of the system, the probability of success, even if resources were available, would be low. Nevertheless, some effort should be made to develop and evaluate eradication or reduction strategies for the reaches above Latrobe Falls, a presumed barrier to upstream movement. Part of any strategy for reduction of alien impacts would be to work with private landowners to find ways to reduce the impact of stock ponds as a source of alien fishes in the river.

4. Deer Creek. This tributary supports several native fishes, including California roach, in its upper reaches, including reaches receiving water from a sewage treatment plant. The native fishes reach appears to have been protected from invasion by redeye bass by the highly altered nature (alternately dry and polluted) of the lowermost reaches. Unfortunately, green sunfish have recently invaded the native fish area and are having a negative impact on the roach populations. A management plan needs to be developed for this creek to prevent it from becoming just another degraded creek full of alien fish, frogs, and invertebrates.

5. Mainstem, non-tidal reach. This one permanent reach ceases to flow each summer as the result of ground water pumping. The only water is in a few large pools in the upper end of the reach. The pools contain a few Sacramento suckers and pikeminnows but the dominant fishes are predatory basses (4 species of *Micropterus*). There is consequently little flowing-water habitat for rearing juvenile native fishes and the pools are full of predators. Restoration of permanent summer flows to the lower Cosumnes would increase shallow-water rearing habitat for the suckers and pikeminnows, not only resulting from spawning of resident fishes but from spawning of fish migrating up from the Delta. This would result in a net increase in native fishes in both Delta and stream habitats, provided a control program was also initiated for the bass. Presumably, intense angling or electrofishing in the pools could remove a high percentage of the large fish every year. Improvement in flows and reduction in predators would also presumably improve conditions for juvenile chinook salmon survival.

6. Tidal floodplain. Our studies of floodplain fishes indicate that (1) YOY native fishes use the floodplain in February-April for rearing, (2) splittail typically spawn on the floodplain in March-April, (3) native fishes know how to get off the floodplain to avoid being stranded, and (4) alien fishes dominate permanent habitats surrounding and in the floodplains (sloughs, ditches, ponds). Thus, a strategy for managing floodplains for native fishes and to discourage aliens is to have fairly complete and continuous flooding from January-April, followed by rapid and complete draining. All ponds and ditches on the floodplain proper should therefore be set up to drain completely. On the Cosumnes

River Preserve, ponds 1 and 2 should be provided with gates on the main drainage ditches, so levels and draining can be manipulated. They could serve as prototypes for managing ponds on floodplains in the Central Valley. There is considerable potential for managing such ponds in ways to increase their potential for rearing salmon, splittail, and other native fishes, while discouraging aliens. Such management could also be compatible with their use by migratory waterfowl.

Another habitat that should be investigated for their potential to rear native fishes are the lagunitas basins adjacent to the flood plain. They are highly seasonal but are not heavily used by fish besides common carp, presumably because water backs into them, rather than flowing through them. Connecting them to the river in a way to provide more flow-through flooding could provide more habitat for native fishes by increasing the amount of tidal floodplain.

Mokelumne River

The Mokelumne River both above and below Pardee Reservoir is a highly regulated system for production of water and power. Fortuitously, flow regimes that keep river sections cool and flowing in the summer months seem to favor native fishes in reaches above the reservoir, although the trout populations are a mixture of native (rainbow trout) and non-native (brown trout, brook trout) species. Below Camanche Dam, the flow regime is highly altered with comparatively little variation compared to historic patterns. It is also largely confined between levees. Nevertheless, the reach contains a large number of fish species, both resident and migratory (from the Delta), and is apparently significant habitat for some increasingly rare native species, such as hitch.

Overall, the basic strategy to improve the Mokelumne River as habitat for native fishes by discouraging aliens should be to (1) manage flow regimes to favor native fishes wherever possible and (2) investigate and implement habitat improvement measures that favor native fishes wherever possible, such as levee setbacks and spawning gravel enhancement.