

Precision of catch-rates for Rio Grande Silvery Minnow with increasing survey effort.

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Poster Presentation

Collection of reliable information is important for managers and researchers using data from large-scale monitoring programs, such as the monitoring program for Rio Grande Silvery Minnow (RGSM) in New Mexico. Monitoring programs must balance cost, accuracy, and precision of population estimates or indices against specific information needs. We evaluated how precision increased with increasing effort. Currently, the monitoring program for RGSM relies on 20 fixed sites, each 200m in length, sampled with a seine in 18-20 discrete mesohabitats. We sampled 20 additional, randomly-chosen sites, with 20 hauls in 200m, 40 hauls in 200m, and 40 hauls in 400m. We used randomization to examine how the addition of cumulative sites or seine hauls increased the precision of catch-per-unit-effort (CPUE). We observed no appreciable increase in precision after 15 cumulative seine hauls, regardless of site length. Precision increased with each cumulative random site from 20 to 40 total sites. However, precision increased only about 35% while requiring a 100% increase in effort and cost. Because of large variability among sites (from 0 to >50 RGSM/100m²), it is unlikely increasing effort at a site will result in more precise estimates. We conclude increasing the number of sample sites will increase precision, but might be prohibitively costly to obtain very precise estimates of CPUE (e.g. 95% confidence intervals that are +/- 50% of the mean). In the case of RGSM, such precise estimates are not required for current monitoring objectives, and those resources might be better allocated to other research.

An evaluation of three different feeds to improve growth and survival of rainbow trout in Arizona state hatcheries

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Poster Presentation

The Arizona Game and Fish Department (AGFD) invests substantial resources to produce healthy trout to meet fishing demands. Over 69% of Arizona anglers fish for trout and natural reproduction often cannot keep up with angler demand. The most produced fish for recreational fishing in Arizona is the rainbow trout (*Oncorhynchus mykiss*) and AGFD has seen an increase in mortality in recent years, mainly in the early life stages (fry and fingerling). Large portions of fish can get diseases at these early life stages but it is not clear whether disease is the ultimate cause of mortality. Hatchery personnel have identified feed quality as potentially one of these limiting factors. Nutrition at early life stages is critical for growth,

condition and survival to make thriving adults. Therefore, we have initiated a study to evaluate three different types of feed (Rangen®, BioOregon®, and BioOregon® with probiotic) and determine their impact on hatchery production for early life stages of trout reared in Arizona hatcheries. The study will be conducted onsite at three AGFD hatcheries focusing on both the fry (eight weeks after first feeding) and fingerling size of rainbow trout (when fish are moved to outdoor raceways). This project is currently being conducted and will conclude in fall of 2018.

Native Fish in the Classroom: Bringing Clarity to Fish in Turbid Habitat

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Poster Presentation

For a desert state like New Mexico, water is an important yet rare resource. That is why many organizations seek to connect people to these limited water sources, in order to better understand and protect them and the creatures that live in desert waters. That is what led to the development of Native Fish In the Classroom (NFIC), a US Fish and Wildlife Service (USFWS) project dedicated to educate young students about the native fish that inhabit the Rio Grande. It does this with the help of Bosque School students who assist USFWS biologists collect fish from the river. Once the native fish are collected, and complete a quarantine, they are transported to around a dozen New Mexico school classrooms and are used to teach the students about their local environment. I surveyed all of the teachers involved in NFIC. I found that 9 of the 11 schools utilizing the program are public and that 9 of them use the program with older elementary school students. All of the teachers said that the program supports core learning requirements for their students and 7 of them strongly believed that the students have a stronger connection to the Rio Grande because of the program. These results suggest NFIC is going over very well with both the students and teachers taking part in it.

Do Scales Protect Fish From Electroshock?

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Poster Presentation

Some biologists hold the opinion that scales protect fish from electroshock by increasing resistance to penetration of the electrical field during electrofishing. However, comparison of lightly-scaled species and heavily-scaled species is invalid because any differences in response are confounded by other species characteristics. At a fish farm along the Snake River in September 2016, I conducted a preliminary test on four Koi *Cyprinus carpio*, two with common-variant scale pattern (complete coverage) and two with mirror-variant pattern (partial coverage). Fish were exposed, one at a time, to a uniform field of 60-Hz pulsed DC in a test tank to determine electrical field intensity at immobilization threshold. One pair of Koi (42-43 cm) was immobilized at 0.55 V/cm (mirror) and 0.69 V/cm (common). The other pair (48-49 cm) was immobilized at 0.39 V/cm (mirror) and 0.51 V/cm (common). Because common variants were immobilized at higher thresholds than mirror variants, preliminary results indicated that scales seem to provide some electroshock protection. A rigorous experiment is planned for 2017.

Colorado Pikeminnow: Forgotten Predator of the Lower Colorado River

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Poster Presentation

Colorado Pikeminnow *Ptychocheilus lucius* were historically one of the most abundant fish in the Lower Colorado River in the pre-dam era. By the 1970's they had been extirpated from below Glen Canyon Dam. In 2002, when recovery goals for Colorado Pikeminnow were written it was determined that no conservation actions conducted downstream of Glen Canyon Dam would count toward recovery. This decision was to be re-evaluated during 5-year status reviews, but has not occurred. Adult Colorado Pikeminnow still persist in the Verde River and hundreds of miles of the mainstem Colorado River below Glen Canyon Dam still match Colorado Pikeminnow life history requirements. Arguments against repatriation of Colorado Pikeminnow into the lower basin are typically based on fears over potential adverse impacts to other endangered native fishes. These fears appear to be largely unfounded based on gape to body-depth relationships and behavioral adaptations of co-evolved native species. Juvenile humpback chub *Gila cypha* and razorback sucker *Xyrauchen texanus* quickly outgrow the gape of all but the largest Pikeminnow. Additional data and improved understanding of Colorado Pikeminnow biology indicates revision of the recovery goals may be warranted, to include management actions and recovery criteria for Colorado Pikeminnow in the lower Colorado River Basin.