<u>Estimating the Abundance and Distribution of Salmonid Piscivores in the Sacramento - San Joaquin Delta Using DIDSON Acoustic Cameras</u> – Christopher M. Loomis

The Sacramento - San Joaquin Delta is the largest estuarine system on the west coast of the Americas and a major component of the largest watershed in California. Among the over 700 species that call the Delta home, the salmonids, including four runs of Chinook Salmon (*Oncorhynchus tshawytscha*) and one run of steelhead (*Oncorhynchus mykiss*), are among the most well-known and sought after fish. Although the delta watershed once supported impressive numbers of these fish, their populations have fragmented and dwindled with major land and water-use alterations made since the 19th century. Many salmonids populations are imperiled and though the causes for decline are not fully understood, low survival rates have been observed for emigrating juveniles. Models predict that for some of these salmonid runs, juvenile survival during emigration may be the greatest factor for preserving genetic diversity.

A recent review of salmonid predation studies of the Delta suggest that the role piscivorous fish play in the overall mortality of juvenile salmonids is poorly understood. Predator abundance, distribution, and population fluctuations throughout the Delta are relatively unknown. Predators including largemouth bass (*Micropterus salmoides*), striped bass (*Morone saxatilis*), Sacramento pikeminnow (*Ptychocheilus grandis*), white catfish (*Ameiurus catus*), channel catfish (*Ictalurus punctatus*), and black crappie (*Pomoxis nigromaculatus*) are all common to the Delta and known to consume salmonids. However, empirical evidence linking salmonid mortality to predation is lacking and has been identified as a primary research need in the Delta. Our ability to make qualitative inferences about the scale and effects of predation at the population level are greatly hindered by this lack of information.

The goal of this study is to develop survey methods using DIDSON acoustic cameras that provide a reliable estimate for the relative abundance and distribution of salmonid predator fishes throughout the Delta. Traditional methods to assess abundance are highly invasive and too time and labor intensive to be applied over broad regions and may not be applicable across the variable habitat types. Acoustic cameras are non-invasive and also have the advantage of much higher target resolution over other sonar methods; it should be easier to distinguish predators from non-predators. Combined with the concurrent predation event study and ongoing acoustic telemetry studies conducted by the Pacific Southwest Research Station, this abundance information will allow us to bridge the data gaps between mortality and predation and provide valuable insight into the ecological relationships at play within our study region.