

List of the current anadromous fish (steelhead, salmon, and sturgeon) projects being conducted by NOAA at the South West Fisheries Science Center.

Date: 13 October 2011

Central Valley activities:

SHIRAZ model (16b. from NAS/BoR list)

- 1) **Description:** Adaptation of SHIRAZ model to Central Valley and Delta Region (using SLAM software). Model will allow for examination of changes in available habitat and types of habitat in response to changes in stream discharge; approach will allow for examining changes in margin habitat in Delta. Model output will help identify areas of uncertainty and assist with planning future research and monitoring needs.
- 2) **P.I.:** S. Lindley, collaborators to include Beechie and Green (NWFSC) and Hendrick (R2 Consultants)
- 3) **Funding source:** SWR-PRD, pending BoR funds (no BoR funds to date)
- 4) **Start date:** Feb 2011
- 5) **End date:** Jan 2014
- 6) **Current status:** first scoping meeting held; base model being implemented in SLAM

Dynamic Energy Budget (DEB) studies of CV salmonids

- 1) **Description:** Development of DEBs for CV salmonids. Dynamic energy budgets (DEB) link physiological processes of individual organisms, such as ingestion, assimilation, respiration, growth and reproduction, in a single framework. Current approaches/models available; need to adapt for CV.
- 2) **P.I.:** S. Lindley
- 3) **Funding source:** SWR-PRD, NASA.
- 4) **Start date:** October 2010
- 5) **End date:** October 2011
- 6) **Current status:** UCSB postdoc working on egg model to couple with river temperature model and a complete life cycle model for Chinook.

Augmentation of funding for continuing acoustic tagging studies of CV smolts

- 1) **Description:** Funding will expire this year for acoustic tagging studies in CV, Delta, and SF Bay. Funding will provide for additional tags and labor/equipment to keep receivers in operation
- 2) **P.I.:** S. Lindley
- 3) **Funding source:** SWR-PRD
- 4) **Start date:** October 2010
- 5) **End date:** July 2011
- 6) **Current status:** 200 tagged late-fall Chinook have been released and have likely migrated through the river; receivers are being downloaded. A proposal to do analogous studies on fall and spring Chinook was declined funding by the Bay

Delta Science program, so this will likely be the last in-river survival estimates for Sacramento Chinook.

Acoustic tagging studies of CV fall-, winter-, and spring-run Chinook salmon smolts

- 1) **Description:** Funding has been received this year (FY11) for acoustic tagging studies in Central Valley, Delta, and San Francisco Bay using a new tag/receiver technology called JSAT (Juvenile Salmon Acoustic Tag) which allows tagging of sub-yearling Chinook salmon for the purpose of studying downstream migration and survival. Funding will cover the installation of a new array of JSAT receivers in the Central Valley and tagging of 1,400 hatchery fall-, spring-, and winter-run Chinook salmon per year, for three years.
- 2) **P.I.:** S. Hayes, S. Lindley
- 3) **Funding source:** CDFG-ERP
- 4) **Start date:** October 2011
- 5) **End date:** October 2013
- 6) **Current status:** Finalizing contract to commence funding.

Focused acoustic tag study – Predator and prey behavior at CD/Delta pumps and screens (17a from NAS/BoR list)

- 1) **Description:** Focused research project at pumps/screens to observe predator and prey behavior at these locations; quantify predation rates at screen and nearby. Tags, receivers, labor, misc. equipment needed.
- 2) **P.I.:** S. Lindley and S. Hayes
- 3) **Funding source:** SWR-PRD, pending BoR funds (but no BoR to date).
- 4) **Start date:** November 2010
- 5) **End date:** November 2014
- 6) **Current status:** initial field work underway; migration of tagged smolts through heavily instrumented area around Sacramento screen complete. Working on quantifying predator abundance with DIDSON; estimating relative predation rates with prey tethering; predator diets.

Science Support for SWR Sacramento Winter-Run Chinook Biological Assessment and Opinion of Ocean Salmon Fisheries

- 1) **Description:** Data analysis, estimation, and forecast of ocean fishery impacts depending on PFMC fishery management measures. Assist SWR in development of a management policy framework that will specify the allowable fishery impact rate as a function of stock status.
- 2) **P.I.:** M. Mohr
- 3) **Funding source:** Internal and SWR-SFD
- 4) **Start date:** FY10
- 5) **End date:** FY12
- 6) **Current status:** Work for 2010 Biological Assessment and Opinion was completed and was reviewed favorably by the CIE. Management strategy evaluation is currently underway to develop the management policy framework component of this work.

Integrated genetic monitoring project

- 1) **Description:** This project will address a critical need for an appropriate database to store genetic information. Needs include labor for database/software development.
- 2) **P. I.:** C. Garza and E. Anderson
- 3) **Funding source:** Internal, SWR-PRD, not fully funded
- 4) **Start date:** FY10
- 5) **End date:** FY13
- 6) **Current status:** Database efforts are being merged with those of the West Coast Salmon GSI Collaboration, to leverage previous efforts and provide standardized reporting.

Genetic analysis of hatchery broodstock

- 1) **Description:** Processing of approximately 1,000 tissue samples from California salmon and steelhead hatcheries. Funds for labor and reagents.
- 2) **P. I.:** C. Garza
- 3) **Funding source:** Internal, SWR-PRD, funding for 2010-2011 samples only
- 4) **Start date:** FY10
- 5) **End date:** ongoing
- 6) **Current status:** Samples have been collected for all broodstock from the spring Chinook salmon program at Feather River Hatchery and the late-fall Chinook salmon program at Coleman NFH, as well as all Chinook salmon at the Trinity River Hatchery. Preliminary processing has been completed for Central Valley samples, but not Trinity River Hatchery samples.

Develop new linked hydrological and ecological models

- 1) **Description:** Develop a high-resolution water quality model coupled with fish bioenergetics to support real-time water operations and forecasting
- 2) **P.I.:** E. Danner
- 3) **Funding source:** NASA grant
- 4) **Start date:** Ongoing, transition to operations
- 5) **End date:** Preliminary results in FY 2011, final results in FY 2014
- 6) **Current status:** Funding ends April 2011. Model will be operational and on line at that time; 4+ manuscripts are in preparation for peer-reviewed journals. Fish diet data for critical bioenergetics model parameters are being evaluated now.

Hatcheries

- 1) **Description:** Support evaluation of impacts of hatcheries on listed and non-listed salmonids
- 2) **P.I.:** C. Garza
- 3) **Funding source:** Internal, pending BoR
- 4) **Start date:** FY 2011
- 5) **End date:** FY 2013, and continuing thereafter

- 6) **Current status:** Samples have been collected for all steelhead spawning to date for 2010-11 season. Late fall and spring Chinook salmon broodstock have been sampled, but not processed.

San Joaquin River Restoration Project – Programmatic support for salmon and steelhead reintroductions and NMFS evaluation of HGMPs and ESA permit applications (Decision support tool)

- 1) **Description:** Contribute to technical planning and implementation of salmon and steelhead reintroduction into the San Joaquin River Restoration Area
- 2) **P.I.:** C. Garza
- 3) **Funding source:** Internal, SWR-PRD, not fully funded
- 4) **Start date:** FY10
- 5) **End date:** ongoing
- 6) **Current status:** HGMP for Spring Chinook salmon edited and reviewed. Contributions provided for Reintroduction Strategies document. Extensive technical advice provided to CDFG, USFWS, BoR, and SWR staff. Genetic evaluation of spring-run populations in the Central Valley partially complete. Work has begun on spring-run donor stock decision support document.

Center support for OCAP implementation

- 1) **Description:** Assist SWRO with organization of a life cycle modeling workshop
- 2) **P.I.:** S Lindley
- 3) **Funding source:** Unfunded
- 4) **Start date:** January 2011
- 5) **End date:** April 2011
- 6) **Current status:** Lindley participating on weekly organizing committee calls

Center support for OCAP litigation

- 1) **Description:** SWFSC economist prepared a declaration summarizing his research pertaining to impacts on agricultural employment associated with 2009 Delta export restrictions. The research involves use of zipcode-level employment data to compare employment trends in districts affected by the restrictions (Greater Westlands Water District, Kings-Kern SWP Area) with a control area that was not affected. Results suggest little difference in employment changes between the affected and control areas
- 2) **P.I.:** C. Thomson (C. Spier)
- 3) **Funding source:** Internal (travel paid by SWR-PRD, remainder internal)
- 4) **Start date:** February 2011
- 5) **End date:** March 2011
- 6) **Current status:** Declaration prepared and submitted to DOJ. Possible participation at hearing March 7-11, 2011 in Fresno may also be needed.

Life history plasticity in steelhead

- 1) **Description:** Field, lab, and modeling studies addressed the decision of age-0 *O. mykiss* to emigrate, remain in freshwater for at least a second year, or mature. We compared these patterns in two Central Valley rivers (American and

Mokelumne) and two central coast creeks (Scott and Soquel). Major differences in growth and life history expression were observed between the two regions as well as between the 2 rivers in the Central Valley.

- 2) **SWFSC P.I.:** S. Sogard
- 3) **Funding source:** CalFed
- 4) **Start date:** February 2006
- 5) **End date:** November 2010
- 6) **Current status:** The most recent publication resulting from this project, entitled “Contrasts in habitat characteristics and life history patterns of *Oncorhynchus mykiss* in California’s central coast and the Central Valley”, with authors S. M. Sogard, J. E. Merz, W. H. Satterthwaite, M. P. Beakes, D. R. Swank, Em M. Collins, R. G. Titus, and M. Mangel, has been conditionally accepted pending revisions for publication in Transactions of the American Fisheries Society have resulted from this project, several more are in progress.

Evaluating and predicting habitat suitability for California salmon: improving models through a holistic perspective

- 1) **Description:** Relationships between water flows and quality and quantity of suitable habitat juvenile steelhead and Chinook salmon were examined using field studies and habitat models calibrated for conditions fish experience in the American and Mokelumne Rivers. Instream flow models (River 2D) were modified to incorporate bioenergetics and seasonal variation in growth potential and habitat availability in the two systems for the two species.
- 2) **SWFSC P.I.:** S. Sogard
- 3) **Funding source:** California Energy Commission, Instream Flow Assessment Program
- 4) **Start date:** January 2009
- 5) **End date:** December 2010
- 6) **Current status:** The manuscript “Evaluating methods for quantifying juvenile Chinook salmon habitat in a regulated California river”, with authors M. P. Beaks, J. W. Moore, N. Retford, R. Brown, J. E. Merz, and S. M. Sogard, is currently in review (Canadian Journal of Fisheries and Aquatic Sciences).

Prey colonization and patterns in abundance with flow for restored side channels in the Mokelumne River

- 1) **Description:** Restored side channel in Central Valley rivers are intended to mimic natural shallow habitats seasonal available to juvenile salmonids during periods of increased flow via dam releases. We monitored the development and succession of prey communities (primarily early life stages of insects) throughout scheduled flow releases from Camanche Dam to determine the quantity and quality of food available to juvenile steelhead and Chinook salmon. The patterns associated with the rise and fall of water in the side channels will be compared to the patterns associated with prey delivery during rainstorms in coastal streams.
- 2) **SWFSC P.I.:** S. Sogard
- 3) **Funding source:** Internal, unfunded after September 2011
- 4) **Start date:** January 2010

- 5) **End date:** December 2012
- 6) **Current status:** Samples have been collected for 3 scheduled releases on the Mokelumne River and 4 winter storms on Scott Creek. Identification of prey taxa is nearing completion and data analysis will begin soon.

Stanislaus River juvenile salmonid survival study

- 1) **Description:** If funded, this project will use radio tags and acoustic tags to estimate spatially explicit mortality rates of juvenile steelhead and Chinook salmon emigrating downstream in the Stanislaus River. If there are hot spots of higher mortality, habitat characteristics of those locations will be examined and compared to reaches with lower predation risk.
- 2) **SWFSC P.I.:** S. Sogard
- 3) **Funding source:** Anadromous Fish Restoration Program, USFWS
- 4) **Start date:** September 2011
- 5) **End date:** December 2012
- 6) **Current status:** This project has been approved for funding and will begin Fall 2011.