

2010 Sturgeon Research Information Table (time line:submit the information by Mar. 30, 2010; submit it to Jeffrey.Jahn@NOAA.GOV and qliu@water.ca.gov)

Researcher(s): Name & E-mail & phone contact	Affiliation	Study Title & major objectives	Research type	Research status (completed, on-going, proposed, identified for future)	Funding Source & Awarded Amount	Publications & reports	ESA Authorization Type with Permit #	Scientific Collection permit Status	Species	Life Stage	
	UC, DWR, USBR, CDFG, NMFS etc		Scientific, Regulatory, Management.				4(d), 7, 10	Yes, No or pending	Sturgeon, Green or white	(fry?), larval, juvenile, adult	
Zachary_Jackson@fws.gov Bill Poytress (bill_poytress@fws.gov)	USFWS / CDFG RBFWO	San Joaquin River System Sturgeon Tagging and Acoustic Receiver Installation Project Sacramento River Green Sturgeon Spawning Ground and Larval Drift Characterization Surveys	Scientific Management and Scientific	Just beginning on-going	AFRP \$35,000, CDFG \$28,500 . USBR CVPIA b10. Amount varies by year	Poytress et al 2009, Poytress et al 2010 (in prep)	4(d) pending 10- See Shirley Witalis (NOAA) for details	pending Yes	Both Green	adult eggs, larvae and YOY juveniles	
Mike Parsley mparsley@usgs.gov, 509 538-2299 x 247 Mike Parsley, mparsley@usgs.gov, 509 538-2299 x 247. Jason Romine, jromine@usgs.gov. Bjorn van der Leeuw, bvanderleeuw@usgs.gov	USGS USGS	Green sturgeon use of Baker Bay Green sturgeon use of coastal navigation channels	Scientific, Regulatory.	completed ongoing	USACE USACE	Parsley, M.J., 2009, Detections of acoustic-tagged green sturgeon in Baker Bay on the lower Columbia River during September – November 2008; U.S. Geological Survey Open-File Report 2009-1026, 10 p none yet	na 7, 10	na pending	Green Green	adult juvenile, adult	
Andrea Schreier, amdrauch@ucdavis.edu, (530) 752-6351	UCD	Range-wide population structure of white sturgeon	Scientific (with management applications)	On-going	CDFG, Idaho Power, Spokane Tribe of Indians	One preliminary technical report	NA	Pending (currently renewing from 2009)	White	Juvenile and adult	
Alicia Seesholtz aseeshol@water.ca.gov (916) 376-9848	DWR	Passage, Distribution and Potential Spawning Areas of Adult Green Sturgeon in the Lower Feather River Objectives: 1) determine if there are adult migration barriers; 2) evaluate migration patterns including residence times and factors affecting them; 3) identify distribution and habitat preferences; 4) determine potential spawning grounds which can be target areas for egg and larval surveys; and 5) provide CDWR, FERC, NOAA Fisheries and CDFG with data to make management decisions concerning future monitoring programs, operational changes of the facilities and/or habitat enhancement within the lower Feather River.	Scientific, Regulatory, Management.	On-going	State Water Project Funds	Provide written reports to NMFS according to timelines in FERC license; publish if possible	4(d), 7, 10	Yes, No or pending	Oroville Facilities BiOp - Section 7	Yes	Sturgeon, Green or white (fry?), larval, juvenile, adult
Alicia Seesholtz aseeshol@water.ca.gov (916) 376-9848	DWR	Lower Feather River Green Sturgeon Spawning Survey Objectives: 1) Determine if spawning occurs in the lower Feather River; 2) identify spatial and temporal distribution; 3) characterize habitat preferences; 4) determine if eggs are viable; and 5) provide CDWR, FERC, NOAA Fisheries and CDFG with data to make management decisions concerning future monitoring programs, operational changes of the facilities and/or habitat enhancement within the lower Feather River.	Regulatory & Management	Pilot (2010 1st year)	State Water Project Funds	Provide written reports to NMFS according to timelines in FERC license; publish if possible	Oroville Facilities BiOp - Section 7	Yes	Green (primarily) and white	Adult Eggs	
Alicia Seesholtz aseeshol@water.ca.gov (916) 376-9848	DWR	Adult Green Sturgeon Passage, Abundance and Distribution in the Lower Feather River Objectives: 1) determine if there are adult migration barriers; 2) describe distribution; 3) evaluate the effect of Oroville Facilities operations on passage success and distribution; 4) estimate the annual abundance of adult green sturgeon; and 5) provide CDWR, FERC, NOAA Fisheries and CDFG with data to make management decisions concerning future monitoring programs, operational changes of the facilities and/or habitat enhancement within the lower Feather River.	Regulatory & Management	Pilot (2010 1st year)	State Water Project Funds	Provide written reports to NMFS according to timelines in FERC license; publish if possible	Oroville Facilities BiOp - Section 7	Yes	Green (primarily) and white	Adult	

Paul Bergman pbergman@fishscience.s.net 530-888-7773 Richard Corwin, rcorwin@usbr.gov, 530-528-0512	Cramer Fish Sciences USBR	Movement and Habitat Use of Green Sturgeon in the Feather River Drainage, California. • Identify potential sturgeon holding habitat in the Feather River Drainage • Evaluate movement and habitat use of spawning green sturgeon in the Feather River Drainage by capturing and releasing acoustically-tagged adult green sturgeon Monitoring of Fish Entrainment at the Red Bluff Research Pumping Plant. Monitoring activities for winter-run Chinook salmon are conducted in compliance with the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA-NMFS) February 2, 1993, biological opinion (BO) for the RBRPP and the amendment to the BO dated February 20, 2001.	Scientific - assisting management Regulatory	January through September 2010 On going	AFRP - \$100,000 USBR	Pursuant to the February 20, 2001 amendment to the Red Bluff Research Pumping Plant 1993 Biological Opinion, the Bureau of Reclamation submits two reports each year summarizing the number of fish entrained into the pumping plant. One report is submitted in November and the other in August, summarizing data collected from August through October and from November through July, respectively. Reports are sent out to NMFS and California Department of Fish and Game.	None - for now covered under DWR 4(d) rule	None - for now covered under DWR 4d permits SC-00528, Current to 10-10-2010	Both Green	Adult juvenile
Richard Corwin, rcorwin@usbr.gov, 530-528-0512; Joshua Israel, Ph.D., jaisrael@usbr.gov, 530-848-9073; Bill Poytress, Bill_Poytress.@fws.gov , 530-527-3043 ext 231.	USBR, UC-Davis, and USFWS	Sacramento Green Sturgeon Migration and Population Assessment. Increase the understanding of Sacramento river green sturgeon migrations, spawning, habitat preferences, population dynamics in the vicinity of the Red Bluff Diversion Dam (RBDD). 1. Verify spawning activities through egg and larval sampling. 2. Evaluate potential impacts of the RBDD on adult green sturgeon migration, spawning, and behavior. 3. Refine our knowledge of spawning grounds and habitat associations of adult of green sturgeon. Monitoring and Evaluation of the Potential Impacts of the RBDD on Green Sturgeon (S&T grant)	Scientific and Management.	2007-2010	USBR , CVPIA P.L. 102-575, Section 340 (b)(10) and Fish & Wildlife Coordination Act, as amended, 16 U.S.C. Section 661 et seq of 1956, Funding: Energy & Water Development Appropriations Act, 2007, P.L. 110-5, 4th Continuing Resolution and USBR Research & Development Office, Science & Technology Grant (Monitoring & Evaluation of Potential Impacts of the RBDD	Conducted prior to take prohibitions. However, Take was granted by CDFG Scientific Collection permit.	SC-00528, Current to 10-10-2010	Green	Adult, eggs, and larval.	
Richard Corwin, rcorwin@usbr.gov, 530-528-0512	USBR, UC-Davis, and USFWS	NMFS Biological Opinion on the Long-Term Operations of Central Valley Project and State Water Project Operation, Criteria, and Plan. June 4, 2009. Reasonable and Prudent Alternatives. Appendix 2-B Summary of Proposed Conservation Measures to Offset Operations of the Red Bluff Diversion Dam. Table 3: Recommended Conservation Measures for Green sturgeon	Regulatory and Management.	2010 start and 3-5 years duration	USBR		Section 7	SC-00528, Current to 10-10-2010	Green	Adult, eggs, larval and juveniles .
Serge Doroshov, Joel Van Eenennaam, sidoroshov@ucdavis.edu, jpvaneennaam@ucdavis.edu, 530-759-0655	UC, Davis	Maturation and Spawning of Captive Green Sturgeon	Scientific	Ongoing, and submitted proposal for continued funding	DFG-ERP \$ 137,870 (10/07-9/10). Proposal submitted to the Species of Concern, Internal Grants FY 2010, for \$30,309 (9/10-0/11)	DFG-ERP semi-annual reports	Unknown; these are northern DPS stock except for two Sacramento stock, caught in RBDD screw traps 13 years ago.	SCP expired (last collection of Klamath River broodstock in 2003)	Green Sturgeon	adult

Dennis Cocherell 925-963-1621 decocherell@ucdavis.edu Dr. Joseph Cech 530-752-3103 jcech@ucdavis.edu Dr. Peter A Klimley apklimley@ucdavis.edu	UC Davis, Wildlife, Fish, and Conservation Biology Department	1) Juvenile Green Sturgeon Temperature and Salinity preference. 2) Larval and juvenile sturgeon fish screen and louver experiments. 3) Incision suture type/method effects on sturgeons 4) Sturgeon swimming energetics. 5) Unscreened diversion effects on larval and juvenile sturgeons 6) Downstream displacement velocity versus substrate experiments	Scientific laboratory research	On going and proposed	ERP CDFG	In progress	N/A	N/A	Green and white Sturgeon (Hatchery Fish)	fry, larval, and juvenile
Jan Hoover, Jan.J.Hoover@usace.army.mil, 601-634-3996 Krista Boysen, 601-885-4442, Krista.A.Boysen@usace.army.mil	USACE, ERDC	Green Sturgeon Population Assessment	Scientific	Ongoing	For FY2010:	None to date		Pending - Pete Klimley at UC Davis	Green and white	Sub-adult and adult
		1. w/UC Davis - Telemetry study to establish movements			1. 218 K					
		2. w/UC Davis - Fish census to establish population size			2. 180 K					
		3. w/Applied Biomathematics - Population modeling to establish viability and management options			3. 100 K					
Klimley (PI, apklimley@ucdavis.edu, 530 752-5830), J. Cech (jcech@ucdavis.edu, (530) 752-3103), S. Doroshov (sidoroshov@ucdavis.edu, (530) 752-7603), and B. May (bpmay@ucdavis.edu, (530) 754-8123)	UCD	Population Biology, Life History, Distribution, and Environmental Optima of Green Sturgeon	Scientific	ongoing	Department of Fish and Game (DFG), \$470,603/ 2 years	Semi-annual reports,cluster poster at CALFED Science Conference		in hand: 80 post larvae/year, 10 adult/year	Green	Juvenile/Adult
		Determine preference to temperature and salinity gradients with annular apparatus			DFG, \$101,982/ 2 years	Semi-annual reports,cluster poster at CALFED Science Conference			Green	Juvenile/Adult
		Use of ultrasound to determine the reproductive readiness of males and females to spawn.			DFG, 137,879/ 2 years	Semi-annual reports,cluster poster at CALFED Science Conference			Green	Adults
		Use PCR to determine number of spawners in Sacramento River			DFG, \$213,814/ 2 years	Semi-annual reports,cluster poster at CALFED Science Conference		in hand: 50 postlarvae/year		Juvenile
Klimley (PI, apklimley@ucdavis.edu, 530 752-5830); Task 1, M. Nafus (mgnafus@ucdavis.edu, (208) 571-6265), E. Miller (eam2169@columbia.edu, (510) 919-3267) Task 2, E. Mora (eamora@ucdavis.edu, (714) 642-6559), R. Battleson (Rbattleson@gmail.com, (805) 850-9355)	UCD	Biological Studies of Green Sturgeon in Sacramento/San Joaquin Watershed	Scientific/Regulatory	ongoing	United State Army Corps of Engineers (US ACE), Sacramento, \$679,610/3 years	Seminars given at Biotelemetry Laboratory on proposed studies as fieldwork has yet to start		7 pending: 80 adult green/year and 80 adult white/year	Green/White	Adult
	UCD/DWR	Use Didson sonar and submersible video to estimate population size of adult green sturgeon			US ACE, \$430,620/3 years	Seminars given at Biotelemetry Laboratory on proposed studies as fieldwork has yet to start			Green	Adult
Klimley (PI, apklimley@ucdavis.edu, 530 752-5830); E. Chapman (edchapman@ucdavis.edu, (530) 752-5372), A. Hearn (arhearn@ucdavis.edu, (530) 400-7475)	UCD	SF Bay LTMS Fish Tracking Study	Regulatory	ongoing	US ACE, San Francisco, \$477,719	Annual report; talk at LTMS sponsored symposium on the effect of dredging on fishes in San Francisco Bay		7	Green	Adult
Klimley (PI, apklimley@ucdavis.edu, 530 752-5830)	UCD	Studies of green sturgeon as conservation measures to offset operations of Red Bluff Diversion Dam			United State Bureau of Reclamation (US BOR)			OCAP 7	Green	Adult and juvenile

B. May	UCD	Make genetic-based estimates of spawner abundance above and below Red Bluff Diversion Dam derived from kinship reconstruction, Integration of genetic and census estimates of green sturgeon population size to assess effective population to census size ratio	Scientific/Regulatory	Pending	US BOR, \$241,124/3 years	Manuscript accepted by Canadian Journal of Fisheries and Aquatic Sciences	OCAP 7	80 post larvae	Green	Adult/Juvenile
Thomas M. and A. Hearn (Klimley, PI)	UCD	Evaluate how individual green sturgeon orient to the gates at the RBDD using VPS system in conjunction with Richard Corwin and Robert Chase of the BOR; 2. Continue tracking of additional green sturgeon to validate the behavioral patterns observed in 2008	Scientific, Regulatory	Pending	US BOR, \$270,516/3 years	Seminars given at Biotelemetry Laboratory on proposed studies as fieldwork has yet to start	OCAP 7	Pending, 20 adults/year	Green	Adults
Hearn A. and M. Thomas (Klimley, PI)	UCD	Monitor movements of green sturgeon with RAP system and characterize flow regime with ADCP to determine sediment type and current regime necessary for spawning.	Scientific	Pending	US BOR, \$477,608/3 years	Seminars given at Biotelemetry Laboratory on proposed studies as fieldwork has yet to start	OCAP 7	Pending, 10 adults/year	Green	
Thomas, M. and A. Hearn (Klimley, PI)	UCD	Place coded ultrasonic beacons on juveniles and monitor with an array of 150 tag detecting monitors in Delta and San Francisco Bay.	Scientific	Pending	US BOR, \$463,453/3 years		OCAP 7	Pending, 80 juveniles/year		Juveniles
Van Eenennaam J (jvaneennaam@ucdavis.edu, (530) 752-2058) (Doroshov, PI)	UCD	Capture adults, strip them of gametes, fertilize them, and rear young in captivity.	Scientific	Pending	US BOR, \$229,305		OCAP 7	Pending, 4 adult males, 2 adult females	Green	Juveniles
Cocherell, D. (decocherell@ucdavis.edu, (925) 963-1621) (Doroshov, PI)	UCD	Determine the swimming performance and behavior of young green sturgeon, including effects of positive barriers (screens), passive barriers (louvers), and behavioral deterrent devices (near-field vibrations and strobe-light flashes).	Scientific	Pending	US BOR, \$244,657		OCAP 7		Green	Juveniles

Location	Timeframe	Sampling Frequency	Collection Methods	Procedures	Details / Comments
HUC Watershed, Stream, Estuary, attach document w/ coordinates	years (2010-2015)	monthly, bi-weekly, daily,	efish, hook-line, trawl, seine, traps, etc.	tagging, marking, scales, stomach pumping	brief project description; location description; funding strategies; project cooperators.
San Joaquin River and trisbs	2010-2015	bi-weekly	hook-line, trammel net, trotline	acoustic tagging	This project will provide presence, movement, and general habitat-use information for sturgeon in the San Joaquin River system. This project will allow future research to focus on a more detailed investigation of habitat use to guide habitat restoration and management efforts.
Sacramento River, Between GCID and ACID	2008-2012	Seasonally March - August	Egg mat, benthic D net, fyke, screwtrap	Sample and release YOY mostly; sacrifice eggs, subsample and sacrifice juveniles for genetics and transfer some live fish for UCD juvenile telemetry study.	See Poytress et al. 2009; cooperative project between USBR (Red Bluff) and UC Davis. Need additional funds to cover entire spawning reach on Sacramento River; current study focused around Red Bluff Diversion Dam.
Mouth of the Columbia River	2008	na	na	telemetry detections of previously tagged fish	Green sturgeon were present in Baker Bay and the Ilwaco navigation channel in September, 2008
Coos Bay, OR and Columbiba River Estuary	2009-2011	na	gillnetting	telemetry detections of previously tagged fish	May rely on others with permits to capture and tag fish for us.
Range-wide (in CA samples from San Pablo Bay, Suisun Bay, Napa River, Sac River)	2006 - 2010	I receive samples from CDFG - primarily adult sturgeon population monitoring but also some bycatch from other studies	CDFG uses trammel nets to capture adult sturgeon during monitoring	Fin clip	Project will be examining the population structure of the white sturgeon across the species' range. We hope genetic differences between populations can be used by wildlife forensics professionals to ID the source of poached white sturgeon materials. I am collaborating with Jeff Rodzen at the CDFG Wildlife Forensics lab on this project. Marty Gingras (CDFG Bay Delta office) has helped coordinate sampling effort as part of the CDFG adult sturgeon monitoring program.
HUC Watershed, Stream, Estuary, attach document w/ coordinates	years (2010-2015)	monthly, bi-weekly, daily,	efish, hook-line, trawl, seine, traps, etc.	tagging, marking, scales, stomach pumping	brief project description; location description; funding strategies; project cooperators.
Lower Feather River from river mile 0 (confluence with the Sacramento River at Verona; 38°47'08.70"N 121°37'17.94"W) upstream to 67 (Fish Barrier Dam near the Feather River Hatchery in Oroville; 39°31'13.26"N 121°33'51.03"W). LOWER FEATHER RIVER from river mile 0 (confluence with the Sacramento River at Verona; 38°47'08.70"N 121°37'17.94"W) upstream to 67 (Fish Barrier Dam near the Feather River Hatchery in Oroville; 39°31'13.26"N 121°33'51.03"W).	2010-2015 (likely longer)	2x/wk Mar-Apr; up to 4x/wk May - July (possibly Sept Nov if evidence suggests they are still in- river)	Hook-n-line (primarily); fyke; trammel nets (last resort)	Acoustic and PIT tagging; genetic samples	This study aims to examine passage success, distribution, habitat usage, residence time and the influences of environmental variables (i.e., flow, temperature, substrate and depth). The Oroville Dam prevents migration to the upper river so it is important to discover if there are suitable spawning or holding areas in the lower river.
Lower Feather River from river mile 0 (confluence with the Sacramento River at Verona; 38°47'08.70"N 121°37'17.94"W) upstream to 67 (Fish Barrier Dam near the Feather River Hatchery in Oroville; 39°31'13.26"N 121°33'51.03"W).	2010-2015 (likely longer)	2x/wk late Mar-Jul	Egg mats (artificial substrates)	collecting for verification, genetics	Primarily this study aims to determine if green sturgeon spawn in the lower Feather River. If spawning is confirmed, identify how Oroville Facilities operations may impact sturgeon spawning through effects of flow, temperature and habitat. This project will provide valuable information by determining if there is a potential second spawning population of SDPS green sturgeon and to evaluate the existing quality and quantity of habitat in the lower Feather River.
Lower Feather River from river mile 0 (confluence with the Sacramento River at Verona; 38°47'08.70"N 121°37'17.94"W) upstream to 67 (Fish Barrier Dam near the Feather River Hatchery in Oroville; 39°31'13.26"N 121°33'51.03"W).	2010-2015 (likely longer)	Likely 2x/month; more if sightings dictate the need; possibly year-round	DIDSON	Observation	This pilot aims to begin development and implementation of a monitoring and evaluation study that will estimate the annual abundance of adult green sturgeon in the Lower Feather River; describe their distribution in time and space; and investigate the effect of Oroville Facilities operations on their passage success and distribution.

Feather River and Yuba River	<p>2010 bi-weekly Monitoring of fish entrainment will be conducted as long as the pumping plant is in operation.</p> <p>January-June 15th and September 1st-December.</p> <p>However, the exact dates of monitoring varies depending on the water needs of the Tehama-Colusa Canal Authority.</p> <p>Each week when at least one of the three pumps is operated for three or more days, entrainment monitoring is conducted over a 24 hour period.</p>	<p>hook-line, trammel netting Pumps and holding tanks</p>	<p>Vemco acoustic tagging, measurements, tissue sample Measured and released.</p>	<p>Migratory behavior of green sturgeon (<i>Acipenser medirostris</i>) in the Feather River basin is poorly understood. Acoustic tagging data which addresses holding, migration and spawning behavior for sturgeon will help identify key habitat features, and better document factors inhibiting accessibility to upstream habitats (e.g. flow regime, passage barriers) in the Feather and Yuba rivers. Given the fairly substantial network of acoustic receivers already present in both rivers, we propose to utilize the existing receiver network to track movements of adult green sturgeon. Fish entrainment monitoring is conducted to determine the performance of the two Archimedes lifts, the internal helical pump, and the wedge-wire screen brushes in maintaining a relatively safe environment for fish to pass through the pumping plant and back out to the Sacramento River via the bypass system. Fish that are entrained into the pumping plant are diverted into holding tanks where they are then removed, anesthetized using MS-222, identified to species, measured for length, and inspected for any injuries and or mortalities. They are then allowed to recover in river water and returned to the river via the fish bypass system.</p>
<p>Research Area: Pacific Ocean State: CA Sub Basin (4th Field HUC): Sacramento-Lower Thames Stream Name: Sacramento River Begin Mile: 243.0 End Mile: Township: 27 N Range: 3 W Section: 29 Latitude: 40 07 45 Longitude: -122 12 35</p> <p>Location Description: Located downstream of the Red Bluff Diversion Dam on the west bank of the Sacramento River.</p>	<p>2007-2010 Adult: April, May and June or until Take of ten adults. Eggs: March through July. Larval: April through August.</p>	<p>Adults: Gill net or hook and line. Eggs: egg mats. Larval: screw trap, D-nets and fyke nets.</p>	<p>Adults: Acoustic tag, PIT Tag, measured, fin clip for genetic sample and released. Eggs: sacrifice for genetic analysis. Larval: sacrifice for genetics and raised and released for juvenile acoustic telemetry studies.</p>	<p>My section of this research was to monitor the movements of adults. Ten adults were taken in 2008 and ten adults in 2009, with 10 to be taken in in the spring of 2010. All were and will be acoustically tagged and their movements monitored with a mobile tracking receiver and stationary receivers during their residency in the upper Sacramento River between Keswick Dam and Hamilton City.</p>
<p>Research Area: Pacific Ocean State: CA Sub Basin (4th Field HUC): Sacramento-Lower Thames Stream Name: Sacramento River Begin Mile: 215.0 End Mile: 435.0 Township: 27 N. Also, the Delta at this time no exact location has been determined.</p> <p>Range: 3 W Section: 29 Latitude: 40 07 45 Longitude: -122 12 35</p> <p>Location Description: Located downstream of the Red Bluff Diversion Dam on the west bank of the Sacramento River.</p> <p>UC Davis Aquatic Facilities; Putah Creek Aquaculture Facility</p>	<p>2010 start and 3-5 years duration</p> <p>Adult: March through May or when Take of ten adults. Eggs: March through July. Larval: April through August.</p> <p>2007-2011 annually</p>	<p>Adults: Gill net or hook and line. Eggs: egg mats. Larval: screw trap, D-nets and fyke nets. Juveniles will be raised from captured larval and eggs.</p> <p>Adults: Acoustic tag, PIT Tag, measured, fin clip for genetic sample and released. Eggs: sacrifice for genetic analysis. Juveniles will be raised from eggs and captured larvae until large enough to insert acoustic tags and released.</p> <p>None; captive broodstock</p>	<p>Adults: Acoustic tag, PIT Tag, measured, fin clip for genetic sample and released. Eggs: sacrifice for genetic analysis. Juveniles will be raised from eggs and captured larvae until large enough to insert acoustic tags and released.</p> <p>annual ultrasound and gonad biopsies</p>	<p>Although, the proposed Conservation Measures for Green Sturgeon will mostly be conducted by UC-Davis researchers, I will be Reclamation's representative during various aspects of the studies. Genetic Evaluation of Green Sturgeon Effective Spawning Population: Reclamation would direct a genetic study to evaluate effective spawner abundance above and below RBDD, and conduct comparisons with general census estimates to allow correlations between seasonal habitat conditions and reproductive success. Telemetric Studies of Movements of Adult Green Sturgeon Including the Effects of RBDD. Reclamation would direct a telemetric study to monitor movement throughout the Sacramento River with special emphasis in the immediate vicinity of RBDD. Specific objectives would include intensive evaluation of green sturgeon behavior at RBDD, monitoring of behavioral and migrational patterns throughout the river and location of additional aggregation sites. Characterization of green Sturgeon Spawning Grounds. Reclamation would direct a study involving the tagging of 10 wild adult sturgeon during their upstream migration in the months of march through May. Analysis of the tracking data will provide information regarding ideal spawning conditions. Juvenile Green Sturgeon Movements and Identification of Critical rearing Habitat. Reclamation would direct a study to determine the rearing habitat of juvenile green sturgeon within the river, delta and bay. Ultrasonic telemetry will Continue observations on growth and maturation of broodfish, with an emphasis on development of non-invasive sampling techniques using ultrasound, and monitor final maturation and attempt spawning of mature broodfish.</p>

UC Davis Fish Physiology Laboratory and Center of Aquatic Biology and Aquaculture	years (2010-2013)	N/A	N/A	All research conducted and reviewed by the UC's Animal care and use protocol committee	We plan to help fill gaps in the scientific literature using equipment and facilities in our laboratory.
	2009-2013	Varies with task	Varies with task	Varies with Task	
1. Systemwide		1. Bi-annual	1. Nets	1. Tagging; rays for age and growth	
2. RM 196-301		2. Annual	2. DIDSON and videography	2. Counts	
3. n/a		3. n/a	3. n/a	3. n/a	
Upper Sacramento River, Delta	2008-2010	Spring	Adults; gill net; post larvae; screw traps	Internal implantation of depth-sensing transmitters (adults), coded beacons (juveniles)	Task 4: Telemetric studies
UC Davis, Center for Aquatic Biology and Aquaculture				Determine preference to temperature and salinity gradients with annular apparatus	Task 5: Physiological studies
UC Davis, Center for Aquatic Biology and Aquaculture				Use of ultrasound to determine the reproductive readiness of males and females to spawn.	Task 6: Developmental studies
Upper Sacramento River		Spring	Screw traps	Use PCR to determine number of spawners in Sacramento River	Task 7 : Genetic studies
Grizzly, Susuin, and San Pablo Bay	2010-2012	Spring/summer		Implantation of coded ultrasonic beacons, removal of fin clip for aging, tissue and blood for carbon isotope analysis	Task 1: Tracking Movements of Migratory Green Sturgeon
Upper Sacramento River		Late spring		Use Didson sonar and submersible video to estimate population size of adult green sturgeon	Task 2: Estimating Size of Green Sturgeon Populations
San Pablo and San Francisco Bays	2009-2010	N/A	N/A	N/A	Monitor bay movements from green sturgeon tagged in other UCD studies along with late fall run Chinook and steelhead smolts
Upper Sacramento River and Delta	2010-2013				

Upper Sacramento River and Delta	2010-2013		Screw trap	Make genetic-based estimates of spawner abundance above and below Red Bluff Diversion Dam derived from kinship reconstruction, Integration of genetic and census estimates of green sturgeon population size to assess effective population to census size ratio	Task 1: Genetic Evaluation of Green Sturgeon (<i>Acipenser medirostris</i>) in the Sacramento River, California
Upper Sacramento River and Delta	2010-2013	Spring	Gill nets	Evaluate how individual green sturgeon orient to the gates at the RBD using VPS system in conjunction with Richard Corwin and Robert Chase of the BOR; 2. Continue tracking of additional green sturgeon to validate the behavioral patterns observed in 2008	Task 2: Telemetric studies of Movements of Adult Green Sturgeon, Including the Effects of the Red Bluff Diversion Dam
Upper Sacramento River and Delta	2110-2013	Spring	Gill nets	Monitor movements of green sturgeon with RAP system and characterize flow regime with ADCP to determine sediment type and current regime necessary for spawning.	Task 3: Characterization of Green Sturgeon Spawning Grounds
Delta and San Francisco Bay	2110-2013	Spring	Screw traps, or grow out of post larvae from spawning of adults at CABA	Place coded ultrasonic beacons on juveniles and monitor with an array of 150 tag detecting monitors in Delta and San Francisco Bay	Task 4: Juvenile Green Sturgeon Movements and Identification of Critical Rearing Habitat
UC Davis	2010-2012		Gill nets	Capture adults, strip them of gametes, fertilize them, and rear young in captivity	Task 5: Spawning of Wild Caught Sacramento River Green Sturgeon and Rearing of Juveniles for use in Telemetry Studies
UC Davis	2010-2012			Determine the swimming performance and behavior of young green sturgeon, including effects of positive barriers (screens), passive barriers (louvers), and behavioral deterrent devices (near-field vibrations and strobe-light flashes).	Task 6: Larval and Juvenile Green and White Sturgeon Swimming Performance and Behavior: Responses to Fish-protection Screens and Louvers.