

Final Report

DELTA SCIENCE PROGRAM: GRANT AGREEMENT NO. 1049

PROJECT TERM: 11/9/07 – 6/30/13,

PROJECT TITLE: ESTIMATING JUVENILE CHINOOK SALMON SPRING AND WINTER RUN ABUNDANCE AT CHIPPS ISLAND

CONTRACTOR/GRANT RECIPIENT CONTACT INFORMATION

Program Administrator

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 INSTITUTION:
 ADDRESS:
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Principal Investigator/Lead Principal Investigator (PI)

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Funding Source: Bay-Delta Stewardship Council

Project Location: U.S. Fish and Wildlife Service, Stockton Fish and Wildlife Office, Lodi, CA

Brief Description of Project: Estimate the absolute abundance of winter and spring run juvenile salmon at Chipps Island.

Primary Objective to be Achieved: The objective of the project is to develop a sampling plan to collect DNA samples from the catch of juvenile salmon at Chipps Island and expand results to estimate absolute abundance for winter and spring run for three years. These estimates would then be used to compare to other estimates of abundance earlier in their life cycle.

BUDGET SUMMARY (All tasks should exactly match those identified in the project Scope of Work.)

Current Fiscal year is between July 1, 2012 and June 30, 2013. Budget is based on newest version included in the 2012 non-cost time extension dated 9/21/12.

TASK/SUBTASK	% COMPLETE (BY DOLLARS)	AMOUNT INVOICED (CURRENT FISCAL YEAR)	AMOUNT INVOICED TO DATE (ALL YEARS)	AMOUNT REMAINING IN AGREEMENT	PROJECTED EXPENDITURES (REMAINDER OF STATE FISCAL YEAR)
Task 1	100	\$ 0	\$20,264.48	\$ 0	\$ 0
Task 2	100	\$ 0	\$6,725.19	\$ 0	\$ 0
Task 3	100	\$ 0	\$324,583.66	\$ 0	\$ 0
Task 4	101	\$ 49,586.28	\$82,309.97	\$ -864.50	\$ -864.50
Task 5	72	\$ 28,023.35	\$36,732.53	\$14,152.67	\$14,152.67
Total	97	\$ 77,609.63	\$470,615.83	\$13,288.17	\$13,288.17

PROJECT STATUS TO DATE (BY TASK) (CUMULATIVE OVERVIEW, WITH MOST RECENT INFORMATION FIRST)

PROJECT MANAGEMENT (TASKS 1-5 - COMPLETED)

THE FINAL EFFICIENCY REPORT, THE ABUNDANCE REPORT AND A DRAFT MANUSCRIPT ON ABUNDANCE AS WELL AS A ONE PAGE PROJECT SUMMARY FOR THE PUBLIC IS BEING SUBMITTED AT THE SAME TIME AS THIS FINAL PROGRESS REPORT. A SECOND MANUSCRIPT ON EFFICIENCY AT CHIPPS ISLAND WILL BE FORTHCOMING WITHIN THE NEXT 90 DAYS.

DR. MICHAEL BANKS HAS COMPLETED AND SUBMITTED A MANUSCRIPT TO ANIMAL GENETICS ON 5/31/13 ON THE BASELINES USED TO DETERMINE RUN USING DNA. HE IS AWAITING REVIEW OF HIS MANUSCRIPT BY THE JOURNAL. THE NAME OF THE MANUSCRIPT IS ENTITLED "TESTING ADVANCES IN MOLECULAR DISCRIMINATION AMONG CHINOOK SALMON LIFE HISTORIES: EVIDENCE FROM A BLIND TEST". THE MANUSCRIPT WAS SENT TO LINDSAY CORREA ON 6/3/13. MICHAEL BANKS WILL SOON BE POSTING HIS BASELINE DATA AT: SCHOLARSARCHIVE@OSU.

STATISTICIAN BRIAN PYPER FROM CRAMER FISH SCIENCES HAS FINISHED TWO WHITE PAPERS; 1) ESTIMATING TRAWL EFFICIENCY AT CHIPPS ISLAND AND 2) ESTIMATING ABUNDANCE OF WINTER AND SPRING RUN AT CHIPPS ISLAND. ABUNDANCE IS BEING CALCULATED BY EXPANDING THE GENETIC CATCH BY RACE AT CHIPPS ISLAND USING ESTIMATES OF TRAWL EFFICIENCY. THE TWO WHITE PAPERS HAVE BEEN SUBMITTED, AND SUBSETS OF THE KEY INFORMATION WILL BE INCLUDED IN TWO MANUSCRIPTS – ONE ON EFFICIENCY AND ONE ON ABUNDANCE, WITH DRAFTS FORTHCOMING.

THE PI REQUESTED AND RECEIVED (11/27/12) A FOURTH NO-COST EXTENSION TO MODIFY THE GRANT END DATE FROM 12/31/12 TO 6/30/13 TO FINISH UP TASK 5. WHILE THE TEAM HAS MADE GOOD PROGRESS, THE PI REQUESTED MORE TIME TO FINALIZE PRODUCTS. PROCESSING SAMPLES, INTEGRATING DATABASES, EVALUATING THE CWT METHOD FOR ESTIMATING TRAWL EFFICIENCY AND THE WRITING OF TWO MANUSCRIPTS HAVE TAKEN LONGER THAN ANTICIPATED AND HAS RESULTED IN DELAYS IN STARTING ON FINAL PRODUCTS.

WE REQUESTED AND RECEIVED (12/14/11) A THIRD NO-COST EXTENSION WITH AN END DATE OF 12/31/12.

WE HAVE BEEN NOTIFIED THAT OUR DELTA SCIENCE TECHNICAL CONTACT HAS BEEN CHANGED TO LINDSAY E. CORREA AS OF 7/21/11.

ON 2/7/11, A SECOND, NO-COST EXTENSION WAS REQUESTED FOR EXTENDING THE END DATE OF THE CONTRACT TO 12/31/2012, HOWEVER THE EXTENSION WAS ONLY GRANTED UNTIL 6/30/12.

WE HAVE SUBMITTED INFORMATION (1/20/10) TO FINALIZE OUR SECTION 10 ESA PERMIT WITH NATIONAL MARINE FISHERIES SERVICE. WE HAVE INCLUDED TISSUE SAMPLING FROM JUVENILE CHINOOK SALMON CAUGHT IN SAMPLING AT CHIPPS ISLAND AND SACRAMENTO FOR OUR ANNUAL STATE-ISSUED SCIENTIFIC COLLECTING PERMIT.

WE HAD FORMALLY REQUESTED A GRANT AMENDMENT ON 8/26/09 TO CHANGE THE SCOPE OF THE PROJECT AND FOR A NO-COST TIME EXTENSION TO 6/30/2011. ON 9/17/09 MELISSA KEASEY EMAILED US THAT SYLVIA VALVERDE, CHIEF OF FISCAL SERVICES INDICATED WE DID NOT NEED A SCOPE MODIFICATION TO RUN 3 SETS OF MICROSATELLITES (INSTEAD OF 2) SINCE THERE WAS NO INDICATION OF HOW MANY MICROSATELLITES WERE TO BE USED IN THE ORIGINAL SCOPE OF WORK. THIS FIRST NO-COST EXTENSION WAS APPROVED 9/15/09.

WE WERE NOTIFIED BY DR. LAUREN HASTINGS IN AN EMAIL ON 7/7/09, THAT WE COULD RESTART WORK ON THE PROJECT. THE ALLOTMENT FOR OUR AGREEMENT #1049 WAS \$220,000 FOR FY09/10.

ALL ACTIVITIES WERE SUSPENDED AS OF 12/19/08 PER THE STOP WORK ORDER ISSUED BY CALFED.

PRIOR TO THE STOP WORK ORDER ON, WE HAD EMAILED A REQUEST (12/08/08) TO DR. LAUREN HASTINGS, CALFED DEPUTY DIRECTOR FOR SCIENCE, ABOUT USING AN ADDITIONAL SET OF MICROSATELLITE MARKERS TO BETTER DISTINGUISH CENTRAL VALLEY SPRING RUN CHINOOK. WE HAD NOT PROCESSED THE FIRST YEAR OF SAMPLES UNTIL THIS ISSUE WAS RESOLVED.

TASK 1 SAMPLING PLAN: (COMPLETED)

THE FOURTH YEAR OF SAMPLING AT CHIPPS ISLAND AND SACRAMENTO WAS COMPLETED ON 6/30/11.

SAMPLING PROPOSED FOR YEAR 4 STARTED IN OCTOBER OF 2010. THE SAME SAMPLING PLAN WAS USED BOTH AT CHIPPS ISLAND AND SACRAMENTO AS IN THE PREVIOUS 3 YEARS .

THE SAMPLING PLAN FOR YEAR 3 OF THE PROJECT WAS IMPLEMENTED. (THE SAME SAMPLING PLAN WAS USED IN YEAR 3 AS WAS USED IN YEAR 1 AND 2).

DISCUSSIONS ON UPDATING SAMPLING PLAN FOR YEAR 2 WERE CONDUCTED AND IMPLEMENTED. (COMPLETED 11/08).

DESIGN SAMPLING PLAN FOR YEAR 1 (COMPLETED 1/30/08)

TASK 2: COLLECT AND SEND DNA SAMPLES TO MICHAEL BANKS AT OREGON STATE UNIVERSITY: (COMPLETED)

ALL SAMPLES HAVE BEEN COLLECTED AND SENT TO THE CALIFORNIA DEPARTMENT OF FISH AND GAME'S TISSUE ARCHIVE LAB AND THEN ON TO MICHAEL BANKS AT OREGON STATE UNIVERSITY. OREGON STATE RECEIVED THE 2011 SAMPLES (N = 4374) FROM THE TISSUE ARCHIVE LAB IN TWO BATCHES ON 09/08/11 AND 09/20/11.

THE FOURTH YEAR OF SAMPLES (AUG 2010 – JUNE 2011) WERE SENT TO THE CALIFORNIA DEPARTMENT OF FISH AND GAME'S TISSUE ARCHIVE LAB ON 8/12/11 FOR SPLITTING PRIOR TO SENDING TO OREGON STATE. APPROXIMATELY 4200 SAMPLES WERE COLLECTED DURING YEAR 4.

APROXIMATELY 1833 SAMPLES FROM PART OF YEAR 3 (JAN 2010 TO AUG 2010) WERE SENT TO THE ARCHIVE LAB ON 3/29/11.

SAMPLES FROM YEAR 2 AND SOME FROM YEAR 3 (JULY 2008 – JAN 2010) WERE SENT TO THE DFG ARCHIVE LAB FOR SPLITTING AND SENT TO DR. MICHAEL BANKS AT OREGON STATE ON 7/12/10 FOR PROCESSING. SAMPLES FROM YEAR 2 (JULY 2008 TO JULY 2009), INCLUDED 817 TISSUE SAMPLES FROM CHIPPS ISLAND AND 776 TISSUE SAMPLES FROM SACRAMENTO. AN ADDITIONAL 8 SAMPLES WERE COLLECTED BETWEEN AUGUST 1,2009 AND JANUARY 6,2010 AND INCLUDED SAMPLES FROM BOTH SACRAMENTO AND CHIPPS ISLAND.

SAMPLES COLLECTED FROM YEAR 1 WERE SENT TO THE DFG TISSUE ARCHIVE LAB WHERE THEY WERE SPLIT AND SENT TO DR. MICHAEL BANKS AT OREGON STATE UNIVERSITY ON 11/20/08. FOR YEAR 1, 472 SAMPLES WERE COLLECTED AT CHIPPS ISLAND BETWEEN NOVEMBER 2007 AND JULY 2008 AND AN ADDITIONAL 291

SAMPLES WERE COLLECTED AT SACRAMENTO BETWEEN MARCH 2008 AND JUNE 2008. ONLY TWO SAMPLES WERE COLLECTED AT BENICIA ON 2/12/08.

TASK 3: ANALYZE DNA SAMPLES (COMPLETED)

ON 6/6/12, THE RUN ASSIGNMENTS FROM THE REMAINING 2011 SAMPLES FROM SACRAMENTO WERE SENT TO THE PRINCIPAL INVESTIGATOR. ON 4/9/12 COMPLETED RUN ASSIGNMENTS FROM THE REMAINING CHIPPS ISLAND SAMPLES WERE SENT TO THE PRINCIPAL INVESTIGATOR. SOME SAMPLES FROM CHIPPS ISLAND IN 2011 WERE UNABLE TO PROVIDE ENOUGH DATA TO ASSIGN RACE (~362).

AS OF 2/15/12, MICHAEL BANKS AND DAVE JACOBSON OF OREGON STATE HAD PROCESSED A PORTION OF THE 2011 SAMPLES, (3074 TOTAL; CHIPPS ISLAND = 2977; AND SACRAMENTO = 95), BY EXTRACTING DNA AND AMPLIFYING THE 21 MICROSATELLITE LOCI. THE CHIPPS ISLAND SAMPLES HAD BEEN PRIORITIZED FOR PROCESSING OVER THOSE FROM SACRAMENTO TO BETTER MEET OUR DELIVERABLE DEADLINES. CHIPPS ISLAND SAMPLES ARE TO BE COMPLETED BY MARCH 2012 WITH SACRAMENTO SAMPLES TO BE COMPLETED BY JUNE 2012.

ON 10/21/11, OREGON STATE PROVIDED THE PRINCIPAL INVESTIGATOR WITH THE MOST LIKELY RUN ASSIGNMENTS INFERRED FROM DNA EXTRACTION AND AMPLIFICATION OF 21 MICROSATELLITES FOR 1147 OF THE THIRD YEAR (2010) SAMPLES. DR. BANKS AND DR. JACOBSON REPORTED THE MOST LIKELY RUN ASSIGNMENT USING BOTH 21 AND A SUBSET OF 16 MICROSATELLITES. THEY ALSO RE-SUMMARIZED THE RUN ASSIGNMENTS FOR YEAR 1 AND 2 SAMPLES USING BOTH 16 AND 21 MICROSATELLITES.

ON 10/20/10, THE GENETIC ANALYSES FROM THE 2ND YEAR OF SAMPLES (JULY 2008- JANUARY 2010) WERE EMAILED TO THE PRINCIPAL INVESTIGATOR.

ON 2/11/10 THE FIRST YEARS' RESULTS FROM DNA TYPING SAMPLES USING 3 SETS OF MICROSATELLITES WERE RELEASED TO THE PRINCIPAL INVESTIGATOR. THE FIRST YEAR OF SAMPLES WERE TAKEN BETWEEN 10/2007 – 7/2008.

TASK 4: ESTIMATE TRAWL EFFICIENCY AND ABUNDANCE (COMPLETED)

THE STATISTICIAN HAS DEVELOPED AND IMPLEMENTED THE FRAMEWORK FOR ESTIMATING TRAWL EFFICIENCY AND ABUNDANCE. CHARACTERIZING THE UNCERTAINTY IN THE GENETIC ASSIGNMENTS HAS BEEN A CHALLENGING ASPECT OF DOING THE CALCULATIONS.

THE PRINCIPAL INVESTIGATOR INTEGRATED THE DATABASES FROM CATCHES AT CHIPPS ISLAND WITH THOSE FROM THE ARCHIVE LAB AND OREGON STATE UNIVERSITY TO PROVIDE TO THE STATISTICIAN FOR EXPANDING SAMPLES BY RACE.

EVALUATIONS OF TRAWL EFFICIENCY HAVE BEEN CONDUCTED USING CODED WIRE TAG RECOVERIES. WE FOUND LITTLE EVIDENCE OF ASSOCIATIONS BETWEEN TRAWL EFFICIENCY AND THE FACTORS EXAMINED. THE RESULTS SUGGEST THAT USING THE PAIRED CWT RELEASES HAS LIMITED ABILITY TO DISCERN FACTORS AFFECTING TRAWL EFFICIENCY DUE TO VARIABLE MARINE SURVIVAL RATES AMONG DOWNSTREAM AND UPSTREAM RELEASE GROUPS. THUS WE WILL APPLY A SIMPLE MEAN ESTIMATE OF TRAWL EFFICIENCY (ACROSS ALL YEARS AND TESTS) INSTEAD TO EXPAND CATCHES TO ABUNDANCE. A COMPARISON BETWEEN DIFFERENT METHODS HAS ALSO BEEN INCLUDED. BRIAN PYPHER OF CRAMER FISH SCIENCES IS WORKING ON A MANUSCRIPT TO DESCRIBE THIS PROCESS.

DISCUSSIONS WITH THE STATISTICAL COOPERATOR ON HOW BEST TO ESTIMATE TRAWL EFFICIENCY AND ABSOLUTE ABUNDANCE AT CHIPPS ISLAND STARTED IN OCTOBER, 2011. A TEST DATABASE DEVELOPED BY THE PRINCIPAL INVESTIGATOR WAS SENT TO THE STATISTICIAN ON 1/16/12, FOR REVIEW AND DISCUSSION. THE STATISTICAL TEAM ASSEMBLED A DATABASE WHICH WAS REVIEWED BY THE PRINCIPAL INVESTIGATOR FOR USE IN MODELING TRAWL EFFICIENCY. ESTIMATES OF TRAWL EFFICIENCY WERE MODELED TO DETERMINE IF FLOW, TEMPERATURE, SIZE OF FISH, OR SECCHI DISK READINGS HAVE AN INFLUENCE ON ESTIMATES OF TRAWL EFFICIENCY AT CHIPPS ISLAND DEVELOPED FROM THE RECOVERY OF PAIRED OR SINGLE RELEASES OF CODED WIRE TAG FISH. MULTIPLE PROCESSES FOR EXPANDING CATCH WILL BE DEVELOPED AND COMPARED. ONCE THESE PROCESSES ARE FULLY ESTABLISHED THEY WILL BE APPLIED TO THE GENETIC CATCH OF WINTER AND SPRING RUN SALMON AT CHIPPS ISLAND FOR ESTIMATING ABSOLUTE ABUNDANCE.

NO WORK ON THIS ELEMENT OF THE STUDY OCCURRED BETWEEN 11/08 AND 10/11.

THE PI AND THE STATISTICAL COOPERATOR STARTED PRELIMINARY DISCUSSIONS IN 11/08 ON ALTERNATIVES FOR ESTIMATING TRAWL EFFICIENCY AND ABUNDANCE FROM THE FIRST YEAR OF SAMPLES BUT A PLAN HAS NOT YET BEEN FINALIZED. FURTHER DISCUSSIONS IN MAY OF 2009 DETERMINED THE ISSUE SHOULD BE REVISITED AFTER ALL OF THE SAMPLES HAD BEEN COLLECTED AND PROCESSED. THE INTERRUPTION IN SAMPLING DURING FEBRUARY OF 2008, WILL POTENTIALLY PRECLUDE CALCULATION OF MEANINGFUL ABUNDANCE ESTIMATES DURING THE FIRST YEAR OF THE PROJECT.

TASK 5: REPORTING (COMPLETED)

BRIAN PYPYER, TOMMY GARRISON AND STEVE CRAMERM WITH INPUT FROM THE PI, MICHAEL BANKS AND DAVE JACOBSON HAVE PREPARED TWO WHITE PAPERS ON DOCUMENTING THE PROCESS OF ESTIMATING TRAWL EFFICIENCY AND EXPANDING CATCH BY RUN TO ESTIMATE ABUNDANCE AT CHIPPS ISLAND. IN ADDITION, THE PI AND BRIAN PYPYER ARE DEVELOPING A DRAFT MANUSCRIPT ON THE ABUNDANCE OF WINTER AND SPRING RUN AT CHIPPS ISLAND. A SECOND MANUSCRIPT, BY PYPYER, ON TRAWL EFFICIENCY AT CHIPPS ISLAND IS PLANNED FOR THE NEAR FUTURE. WE WOULD LIKE TO HAVE BOTH MANUSCRIPTS PUBLISHED IN THE SAME VOLUME OF THE SAN FRANCISCO ESTUARY AND WATERSHED SCIENCE.

MICHAEL BANKS HAS SUBMITTED A MANUSCRIPT TO ANIMAL GENETICS ON 5/31/13 ON THE GENETIC BASELINE FOR DETERMINING WHICH SET OF MICROSATELLITES TO USE FOR DETERMINING RACE. THE BASELINE DATA IS POSTED AT:

THE PI PRESENTED A POSTER AT THE DELTA SCIENCE CONFERENCE IN OCTOBER OF 2012, ENTITLED "COMPARISON OF RACE COMPOSITIONS USING LENGTH-AT-DATE CRITERIA AND GENETICS FOR CATCH OF JUVENILE CHINOOK SALMON AT SACRAMENTO AND CHIPPS ISLAND IN 2007-2011". BRIAN PYPYER ALSO SUBMITTED AN ABSTRACT ON ESTIMATING TRAWL EFFICIENCY AT CHIPPS ISLAND, BUT WAS NOT SELECTED TO GIVE AN ORAL PRESENTATION. HE DID NOT ELECT TO GIVE A POSTER INSTEAD, DUE TO PROJECT WORKLOAD.

A DRAFT MANUSCRIPT ON THE GENETIC BASELINE FOR DETERMINING WHICH SET OF MICROSATELLITES TO USE FOR DETERMINING RACE WAS SENT TO THE PRINCIPAL INVESTIGATOR ON 1/13/12. FOLLOWING A PRESENTATION AT A GENETICS PWT MEETING ON 8/29/11, OREGON STATE REQUESTED AUGMENTING THE BASELINE FOR THE BLIND TEST BY ANOTHER 89 SAMPLES RESULTING IN A NEW TOTAL OF 624, BECAUSE THE RESULTS OF THE PREVIOUS BLIND TEST INDICATED SPRING RUN WERE POORLY REPRESENTED. THE EXPANDED BLIND TEST RESULTS WERE ANALYZED AND SYNTHESIZED INTO A DRAFT MANUSCRIPT IN PREPARATION FOR SUBMISSION TO THE PEER REVIEW JOURNAL: ANIMAL GENETICS. MICHAEL BANKS MADE A PRESENTATION OF THESE UPDATED FINDINGS AT A MEETING OF IEP GENETICS PWT IN SACRAMENTO ON 1/18/12. ADDITIONAL STATISTICAL ANALYSIS, FINAL EDITING OF THE MANUSCRIPT, AND REVIEW AMONG CO-AUTHORS IS STILL UNDERWAY.

AN OUTLINE OF A MANUSCRIPT WAS EMAILED TO THE PRINCIPAL INVESTIGATOR ON 11/29/10 ENTITLED: TESTING ADVANCES IN MOLECULAR DISCRIMINATION AMONG CALIFORNIA'S CHINOOK SALMON LIFE-HISTORIES – EVIDENCE FROM A BLIND TEST, BY MICHAEL BANKS, D.P. JACOBSON, C.A. GREIG, V.K. RASHBROOK, W.R. ARDREN, I. MEUSNIER AND K.G. O'MALLEY.

ON 9/28/10, DR. MICHAEL BANKS GAVE AN ORAL PRESENTATION AT THE 2010 BAY-DELTA SCIENCE CONFERENCE ENTITLED: PROGRESS IN MOLECULAR DISCRIMINATION AMONG CALIFORNIA'S CHINOOK SALMON. MRS. BRANDES (PI) ALSO PRESENTED A POSTER AT THE SAME CONFERENCE ENTITLED: COMPARISON OF RACE USING LENGTH-AT-DATE CRITERION AND GENETICS FOR CATCH OF JUVENILE CHINOOK SALMON AT SACRAMENTO AND CHIPPS ISLAND IN 2007-2008.

ELEVEN SEMI-ANNUAL PROGRESS REPORTS HAVE PREVIOUSLY BEEN SUBMITTED: MARCH 2008, SEPTEMBER 2008, MARCH 2009, SEPTEMBER 2009, MARCH 2010, SEPTEMBER 2010, MARCH 2011, SEPTEMBER 2011, MARCH 2012, SEPTEMBER 2012 AND MARCH 2013.

PROJECT-WIDE STATUS

ACHIEVED OBJECTIVES, FINDINGS, AND CONTRIBUTIONS:

THE OBJECTIVE OF THIS PROJECT IS TO ESTIMATE THE ABSOLUTE ABUNDANCE OF WINTER AND SPRING RUN JUVENILE SALMON AT CHIPPS ISLAND. THE COOPERATIVE AGREEMENTS FOR THE STATISTICAL AND GENETICS WORK ARE IN PLACE AND THE STATISTICAL SAMPLING PLAN FOR THE FIRST YEAR WAS COMPLETED. NO-COST EXTENSIONS TO DECEMBER 2012 WERE PROCESSED FOR BOTH COOPERATORS.

THE SAMPLING PLAN, FOR TAKING TISSUE SAMPLES AT CHIPPS ISLAND (DATED 1/24/08), WAS COMPLETED BY CRAMER FISH SCIENCES, INC. DUE TO THE REDUCED SAMPLING AT CHIPPS ISLAND, FEWER SAMPLES WERE OBTAINED THAN ESTIMATED. TISSUE SAMPLING WAS INITIATED AT SACRAMENTO USING THE SAMPLING PLAN DEVELOPED FOR CHIPPS ISLAND. DISCUSSIONS ON THE SAMPLING PLAN FOR YEAR 2 WERE CONDUCTED IN 11/2008. THE SAMPLING PLAN IN YEAR 2, YEAR 3 AND YEAR 4 WAS THE SAME AS IN YEAR 1, BUT INCORPORATED LESS SUB-SAMPLING DUE TO FEWER SALMON COLLECTED THAN ANTICIPATED.

FOUR YEARS OF SAMPLING HAS BEEN COMPLETED. THE RESULTS FROM ALL YEARS OF SAMPLING, AT BOTH SAMPLING LOCATIONS HAVE BEEN RELEASED TO THE PRINCIPAL INVESTIGATOR. THE MANUSCRIPT IDENTIFYING THE BEST SET OF MICROSATELITES FOR DIFFERENTIATING JUVENILE CHINOOK SALMON FOR YEAR 2, 3 AND 4 OF THE PROJECT WAS WRITTEN JOINTLY BY DR. MICHAEL BANKS OF OREGON STATE (AND OTHER CO-AUTHORS). ADDITIONAL SAMPLES WERE ADDED TO THE BASELINE, SINCE SPRING RUN FROM DEER AND MILL CREEKS WERE POORLY REPRESENTED IN A PREVIOUS BASELINE. THE RESULTS OF THE EXPANDED BASELINE WERE PRESENTED AT THE INTERAGENCY ECOLOGICAL PROGRAM'S GENETICS PROJECT WORK TEAM ON 1/18/12. A PRESENTATION ON THE PREVIOUS SET OF BASELINE TESTS WAS GIVEN AT THE BAY DELTA SCIENCE CONFERENCE IN SEPTEMBER OF 2010 AND AT THE INTERAGENCY ECOLOGICAL PROGRAM'S GENETICS PROJECT WORK TEAM ON 8/29/11. ONLY ONE SET OF MICROSATELLITES WERE USED FOR PROCESSING SAMPLES IN YEAR 2, 3 AND 4, ALTHOUGH A SUBSET (16) OF THE 21 MICROSATELLITES HAVE BEEN REPORTED TO FACILITATE FUTURE COMPARISONS TO GENETICALLY SAMPLED JUVENILE SALMON FROM THE DELTA FISH FACILITIES WHERE ONLY 16 MICROSATELLITES WERE USED.

COMPARISONS OF RACE BY GENETICS, USING THE BEST SET OF MICROSATELITES, WAS USED TO COMPARE TO THE FISHER LENGTH CRITERIA FOR THE FIRST YEAR OF SAMPLES, IN A POSTER PRESENTED BY THE PI AT THE 2010 DELTA SCIENCE CONFERENCE. IT WAS FOUND THAT MOST WINTER RUN ARE DESIGNATED AS WINTER RUN, BUT MANY FISH IDENTIFIED AS WINTER RUN USING THE FISHER LENGTH CRITERIA ARE NOT GENETICALLY WINTER RUN. TRUE SPRING RUN AND WINTER RUN OVERLAP IN THEIR LENGTH AND TIMING PAST CHIPPS ISLAND DURING THE MONTH OF MARCH. AN UPDATED SUMMARY OF THE TIMING AND RELATIVE ABUNDANCE OF

WINTER AND SPRING RUN WAS INCLUDED IN A POSTER PRESENTED AT THE 2012 DELTA SCIENCE CONFERENCE.

LASTLY, WORK HAS BEEN COMPLETED ON ESTIMATING TRAWL EFFICIENCY FOR EXPANDING CATCH TO ESTIMATE ABSOLUTE ABUNDANCE AT CHIPPS ISLAND. BRIAN PYPER HAS COMPLETED HIS WORK TWO WHITE PAPERS TO DESCRIBE THE PROCESSES OF ESTIMATING EFFICIENCY AND ESTIMATING ABUNDANCE. ONE MANUSCRIPT IS BEING DRAFTED ON ESTIMATING ABUNDANCE AND ONE MANUSCRIPT WILL BE FORTHCOMING ON ESTIMATING TRAWL EFFICIENCY AT CHIPPS ISLAND.

PROBLEMS OR DELAYS ENCOUNTERED:

THE GENETICS ASPECT OF THE PROJECT WAS MODIFIED SOMEWHAT TO ADDRESS SOME CONCERNS VOICED BY DR. CARLOS GARZA OF NOAA ABOUT WHICH MICROSATELLITES TO RUN TO ASSESS RACE OF JUVENILE SALMON. DR. MICHAEL BANKS AGREED TO RUN BOTH THE ORIGINALLY PROPOSED 16 MICROSATELLITES AND THE ADDITIONAL 13 MICROSATELLITES ASSOCIATED WITH THE GAPS STANDARD TO DISTINGUISH SPRING AND WINTER RUN IN THE DELTA. THE GAPS STANDARD USES DNA MICROSATELLITES MARKERS THAT HAVE BEEN STANDARDIZED AMONG MULTIPLE GENETICS LABORATORIES ON THE WEST COAST (SEEB, ET AL., 2007). SINCE THE NUMBERS OF SAMPLES WE COLLECTED WERE LOWER THAN ANTICIPATED DURING THE FIRST YEAR, THERE WAS MONEY AVAILABLE IN THE BUDGET TO COVER RUNNING BOTH SETS OF MICROSATELLITES. A THIRD SET OF MICROSATELLITES (22) WERE ALSO RUN AS THEY WERE HYPOTHESIZED TO BETTER DISTNIQUISH SPRING RUN IN THE CENTRAL VALLEY. IT WAS FINALLY DETERMINED THAT 21 MICROSATELLITES WAS THE BEST FOR DETERMINING WINTER AND SPRING RUN IN THE CENTRAL VALLEY OF CALIFORNIA.

ON FEBRUARY 5TH 2008 SAMPLING AT CHIPPS ISLAND WAS SUSPENDED DUE TO THE INCIDENTAL CATCH OF DELTA SMELT. ON FEBRUARY 8TH SAMPLING STARTED AT BENICIA. ON MARCH 10TH, SAMPLING WAS REINSTATED AT CHIPPS ISLAND AT A FREQUENCY OF TO TWO TO THREE DAYS A WEEK. ONCE SAMPLING WAS REINITIATED AT CHIPPS ISLAND IT WAS NO LONGER CONDUCTED AT BENICIA. SAMPLING WAS ALSO INITIATED IN MARCH OF 2008 AT SACRAMENTO.

THE NUMBER OF SAMPLES FOR MOST YEARS OF THE STUDY WAS MUCH LOWER THAN WHAT WE ANTICIPATED WHEN WRITING THE PROPOSAL. THE ORIGINAL PROPOSAL BUDGETED FOR 3000 SAMPLES PER YEAR FOR 3 YEARS AT CHIPPS ISLAND. THE COMBINATION OF LOW ABUNDANCE AND LESS SAMPLING AT CHIPPS ISLAND RESULTED IN FEWER SAMPLES FROM CHIPPS ISLAND THAN ANTICIPATED. IN FEBRUARY OF 2008, WHEN SAMPLING BECAME UNCERTAIN AT CHIPPS ISLAND, WE REQUESTED CONCURANCE FROM CALFED SCIENCE TO EXPAND SAMPLING TO INCLUDE SAMPLING AT SACRAMENTO. SAMPLING AT CHIPPS ISLAND AND SACRAMENTO HAS CONTINUED THROUGH YEAR 2, 3 AND 4 OF THE PROJECT. IN 2011, THE NUMBER OF SAMPLES WERE GREATER (4374), THAN IN ANY OF THE PREVIOUS 3 YEARS. THE TOTAL NUMBER OF SAMPLES AT CHIPPS ISLAND AND SACRAMENTO FOR ALL FOUR YEARS (8573) WAS JUST SLIGHTLY LESS THAN THE 9000 ESTIMATED IN THE PROPOSAL FOR CHIPPS ISLAND ALONE.

THE STOP WORK AND OTHER ADMINISTRATIVE ISSUES DELAYED PROGRESS ON THIS PROJECT. WE WERE DELAYED WITH THE STOP WORK ORDER AND IN PROCESSING SAMPLES BETWEEN 12/8/08 AND 9/15/09 WAITING TO GET OFFICIAL APPROVAL FROM CALFED SCIENCE ON USING THREE SETS OF MICROSATELLITES (INSTEAD OF TWO) FOR DISTINGUISHING RACE. IN ADDITION, COMPENSATING FOR THE LACK OF COMPLETE SEASONAL SAMPLING AT CHIPPS ISLAND IN 2008 BY COMPLETING A FOURTH YEAR OF SAMPLING ALSO RESULTED IN A DELAY IN THE COMPLETION OF THE PROJECT. THESE VARIOUS DELAYS RESULTED IN OUR REQUESTS AND APPROVAL FOR FOUR NO-COST EXTENSIONS FOR THE PROJECT.

WE SENT IN OUR APPLICATION TO NOAA FOR A PERMIT MODIFICATION FOR THE REINSTATEMENT OF FIN-CLIPPLING UNMARKED JUVENILE SALMON AT CHIPPS ISLAND ON APRIL 4, 2008. AN UPDATE WAS SENT IN JANUARY 2010 TO ADDRESS QUESTIONS AND WAS PUT INTO AN ONLINE DATABASE.

THE PEER REVIEWED MANUSCRIPT FOR IDENTIFYING THE POWER OF THE DIFFERENT SETS OF MICROSATELITTES FOR DISTINGUISHING RACE WAS DELAYED DUE TO THE NEED TO EXPAND THE ORIGINAL BASELINE USED. DR. MICHAEL BANKS HAD PROJECTED TO HAVE A DRAFT SUBMITTED FOR PEER REVIEW BY THE END OF SEPTEMBER 2012, BUT IT WASN'T COMPLETED UNTIL MAY 2013. THE DRAFT HAS BEEN COMPLETED BUT AND SENT TO THE JOURNAL, ANIMAL GENETICS.

BRIAN PYPER OF CRAMER FISH SCIENCES COMPLETED TWO WHITE PAPERS AND ONE MANUSCRIPT DESCRIBING THE PROCESS FOR ESTIMATING TRAWL EFFICIENCY AND FOR ESTIMATING ABUNDANCE OF WINTER AND SPRING RUN AT CHIPPS ISLAND . THESE WHITE PAPERS AND DRAFT MANUSCRIPT HAVE TAKEN LONGER TO PRODUCE THAN ORIGINALLY THOUGHT AND DELAYED COMPLETING THE PROJECT. SPECIFICALLY ESTIMATING TRAWL EFFICIENCY AND EXPANDING CATCH TO ABUNDANCE WERE MORE COMPLICATED THAN ENVISIONED, BUT ADDRESSING THE COMPLEXITIES HAVE RESULTED IN A BETTER END-PRODUCT.

DELIVERABLES:

WHITE PAPER ON DESCRIBING SAMPLING AND EXPANSION METHODOLOGY FOR ESTIMATING ABSOLUTE ABUNDANCE AT CHIPPS ISLAND AND SACRAMENTO (ABUNDANCE WHITE PAPER).

WHITE PAPER DESCRIBING TRAWL EFFICIENCY AT CHIPPS ISLAND (TRAWL EFFICIENCY WHITE PAPER)

ONE PAGE PROJECT SUMMARY

DRAFT ABUNDANCE MANUSCRIPT FOR PUBLICATION

PRESENTATION TO OTHER SCIENTISTS DOING LIFE-CYCLE MODELING IN THE DELTA – TBA. WE PROPOSE A BROWN BAG LUNCHEON AT DELTA SCIENCE DURING THE FALL OF 2013.

2012 DELTA SCIENCE CONFERENCE POSTER PRESENTATION: BRANDES ET AL., OCTOBER, 2012

2010 DELTA SCIENCE CONFERENCE PRESENTATIONS (TWO): BANKS ET AL., BRANDES ET AL., SEPTEMBER, 2010.

SEMI-ANNUAL PROGRESS REPORTS WERE SENT TO DELTA SCIENCE ON MARCH 1, AND SEPTEMBER 1, 2008, MARCH 1 AND SEPTEMBER 1, 2009, AND MARCH 1, SEPTEMBER 1, 2010, MARCH 1 AND SEPTEMBER 1, 2011, MARCH 2012, SEPTEMBER 2012 AND MARCH 2013.

THE INTIAL ONE PAGE PROJECT SUMMARY WAS SUBMITTED ON 11/9/07. A MODIFIED ONE PAGE SUMMARY WAS SUBMITTED ON 9/28/12.

PERSONNEL CHANGES:

AS OF JULY 2009, BRIAN PYPER. THE BIostatisticAN INITIALLY SELECTED TO WORK ON THIS PROJECT, HAS RETURNED TO CRAMER FISH SCIENCES AND IS AVAILABLE TO RESUME WORK ON THIS PROJECT. TOMMY GARRISON, ALSO WITH CRAMER FISH SCIENCES, HAS BEEN ADDED AS OF OCTOBER 2011 TO HELP ON THE STATISTICAL AND MODELING ASPECTS OF THE PROJECT. HE REPLACES CASEY JUSTICE, FROM CRAMER FISH SCIENCES, THAT WORK ON THE PROJECT INITIALLY.

ORIGINALLY, ERIC VOLKMAN WAS TO ASSIST IN OVERSEEING THE COLLECTION OF DNA AT THE SAMPLING SITES. HE LEFT THE STOCKTON FISH AND WILDLIFE SERVICE OFFICE AND PETE HRODEY REPLACED HIM. AS OF OCTOBER 2010, PETE HRODEY, LEFT THE STOCKTON (STFWO) OFFICE AND WAS NO LONGER RESPONSIBLE FOR THE COLLECTION OF TISSUE SAMPLES AT SACRAMENTO AND CHIPPS ISLAND. THIS RESPONSIBILITY WAS THEN ASSUMED BY JOHN NETTO, THE LEAD SUPERVISORY FISH BIOLOGIST WITH THE INTERAGENCY ECOLOGICAL PROGRAM'S DELTA JUVENILE FISH MONITORING PROGRAM (DJFMP). AS OF AUGUST 2011, JOHN NETTO LEFT THE DJFMP AND DENISE BARNARD (BIOLOGICAL TECHNICIAN WITH DJFMP) HELPED ORGANIZE THE REMAINING SAMPLES FOR SENDING TO THE ARCHIVE LAB. DENISE HAD HELPED ORGANIZE SAMPLES FOR SENDING TO THE ARCHIVE LAB, IN THREE OF THE LAST FOUR YEARS.

CONTRACT MODIFICATIONS:

THE FIRST NO-COST TIME EXTENSION WAS VERBALLY GRANTED ON 7/22/09 AND SIGNED BY CALFED BAY-DELTA PROGRAM ON 9/15/09. THE NEW END DATE OF THE CONTRACT WAS EXTENDED TO 6/30/2011

A SECOND NO-COST TIME EXTENSION WAS REQUESTED ON 2/7/11 TO EXTEND THE PROJECT END DATE TO DECEMBER 31, 2012. THE SECOND NO-COST TIME EXTENSION WAS GRANTED, BUT ONLY TO 6/30/12

A THIRD NO-COST TIME EXTENSION WAS REQUESTED ON 11/2/11 TO EXTEND THE PROJECT END DATE TO DECEMBER 31, 2012. THE THIRD NO-COST TIME EXTENSION WAS GRANTED TO 12/31/12.

A FOURTH NO-COST TIME EXTENSION WAS REQUESTED ON 9/17/12 AND SIGNED BY DELTA SCIENCE ON 11/27/12 TO EXTEND THE PROJECT END DATE TO JUNE 30, 2013. THE FOURTH NO-COST TIME EXTENSION WAS GRANTED TO 6/30/13.

NOTES/OTHER:

A PROPOSAL TO SUPPLEMENT THIS PROJECT WAS SUBMITTED TO CALFED SCIENCE'S 2007 SUPPLEMENTAL PROPOSAL SOLICITATION PROCESS, BUT IT WAS NOT RECOMMENDED FOR FUNDING. THE SUPPLEMENTAL PROPOSAL WOULD HAVE FUNDED ANALYZING SCALES FROM THE SAME INDIVIDUALS THAT ARE BEING SAMPLED FOR DNA TO DETERMINE IF SCALES COULD ASSIGN INDIVIDUALS TO THE SAME RACE AS DNA. IF IT WAS FOUND TO BE RELIABLE, USING SCALES TO DETERMINE RACE, WOULD BE A MUCH CHEAPER AND EASIER ALTERNATIVE THAN ANALYZING DNA.

LITERATURE CITED:

SEEB L.W., A. ANTONOVICH, M.A. BANKS, T.D. BEACHAM, M.R. BELLINGER, S.M. BLANKENSHIP, M.R. CAMPBELL, N.A. DECOVICH, J.C. GARZA, C.M. GUTHRIE III, T.A. LUNDRIGAN, P. MORAN, S.R. NARUM, J.J. STEPHENSON, K.J. SUPRNAULT, D.J. TEEL, W.D. TEMPLIN, J.K. WENBBURE, J.K. WENBURG, S.F. YOUNG AND C.T. SMITH. DEVELOPMENT OF A STANDARDIZED DNA DATABASE FOR CHINOOK SALMON. FISHERIES, VOL 32 NO 11. NOVEMBER, 2007. PGS 540-552.