

U.S Fish & Wildlife Service

California-Nevada Fish Health Center

National Wild Fish Health Survey Annual Progress Report FY 2014

Prepared by Ken Nichols



February 2015



U.S. Fish and Wildlife Service
California-Nevada Fish Health Center
24411 Coleman Fish Hatchery Rd
Anderson, CA 96007
(530) 365-4271 Fax: (530) 365-7150



California-Nevada Fish Health Center

National Wild Fish Health Survey Annual Progress Report FY 2014

Center staff conducted the National Wild Fish Health Survey (NWFHS) in 2013 by working with partners to collect fish tissue samples and performing laboratory tests for major fish pathogens in accordance with standardized procedures (NWFHS Laboratory Procedures Manual – 2009). This data is entered into a national database and is accessible to the public and resource managers, via the web, and can be viewed at:

<http://www.fws.gov/wildfishsurvey/database/>

Field collection and laboratory work performed by:

Scott Foott, Project leader
Kim True, Assistant Project Leader
Ron Stone, Fish Biologist
Anne Bolick Fish Biologist
Ken Nichols, Fish Biologist

Notice

The mention of trade names or commercial products in this report does not constitute endorsement or recommendation for use by the Federal government. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the US Fish and Wildlife Service.

Table of Contents

Overview	1
Laboratory Methods	2
Project Summaries:	3
Natural Origin Late Fall Chinook Adult	3
Feather River Juvenile Chinook Pathogen Survey, Spring 2014	4
Feather River Wakasagi (<i>Hypomesus japonicus</i>), Spring 2014	5
Lower Sacramento River Juvenile Chinook salmon prognosis study, Spring 2014	6
Pathogen survey using Inland Silverside (<i>Menidia beryllina</i>) as a surrogate species for threatened Delta smelt in the San Joaquin-Sacramento Delta at Liberty Island, Autumn 2013	8
Lower San Joaquin and Merced River Pathogen Survey	10
Disease Screening of Feral Lahontan cutthroat trout (<i>Oncorhynchus clarki henshawi</i>) Broodstock in Pyramid Lake, NV	12
Winter Chinook Fish Health Inspection	13
Virological Examination of adult Lost River Suckers and 0+ Fathead Minnows from Upper Klamath Lake, Oregon 2014	14
Health Evaluation of Juvenile Coho Salmon from Scott River Fish Rescue.....	15
Appendix 1. NWFHS Summary Table for FY 2014.....	16
Appendix 2. Partners and Sample Sites	17

Overview

The National Wild Fish Health Survey (NWFHS) is a program conducted by the U.S. Fish and Wildlife Service’s fish health centers to assess the prevalence and distribution of major fish pathogens in wild fish populations. The CA-NV Fish Health Center (Center) has partnered with numerous federal and state agencies, tribal governments, universities, non-profit and educational organizations, private companies and private landowners to collect fish at over 200 collection sites. Over 20,000 fish have been tested for major fish pathogens in the last 18 years (Table 1). The Center’s sampling effort to date comprises a rich diversity of fish species in California, Nevada and Southern Oregon and has provided fish health information that did not exist prior to the NWFHS’s inception in 1997.

Table 1. Total number of fish sampled in each state by fiscal year

Fiscal Year	Arizona	California	Nevada	Oregon	Total
1997		258	6	37	301
1998	20	561	163	255	999
1999		767	308		1075
2000		1158	212		1370
2001		2734			2734
2002		1426	99		1525
2003		1217	191	20	1428
2004		387	179	715	1281
2005		1183	130	105	1418
2006	243	1336	85	16	1680
2007		593	19		612
2008	60	319	22		401
2009		1003	78	127	1208
2010		797		25	822
2011		864			864
2012		866	60	10	936
2013		828	64	86	978
2014		599	120	3	722
Totals	323	16896	1736	1399	20354

Each year, the center focuses on specific disease issues that are important to our region such as emerging diseases, health issues in species of special concern or of importance to our partners for managing the fishery resource. Other projects supported by the NWFHS are reoccurring from year to year in order to provide annual trends in disease prevalence for naturally reproducing populations.

In 2014, the NWFHS focused on health screenings of imperiled stocks of fish with surveys conducted for the Central Valley Winter-run Chinook salmon (*Oncorhynchus tshawytscha*), Lost River Sucker (*Deltistes luxatus*) and Lahontan Cutthroat trout (*Oncorhynchus clarki henshawi*). Pathogen surveys were also performed on Fall-run Chinook salmon (*Oncorhynchus tshawytscha*). Pathogens detected included the bacteria: *Renibacterium salmoninarum* and *Aeromonas salmonicida*; Infectious Hematopoietic Necrosis virus; and parasites: *Tetracapsuloides bryosalmonae*, *Ceratomyxa shasta* and *Parvicapsula minibicornis*.

Our survey work would not be possible without the support of numerous partners including: Pyramid Lake Paiute Tribe, California Department of Fish and Wildlife, California Department of Water Resources, Nevada Division of Wildlife, U.S. Bureau of Reclamation, U.S. Geologic Survey, Oregon Department of Fish and Wildlife, FISHBIO, and U.S. Fish and Wildlife Service.

Laboratory Methods

The methods used in the NWFHS to collect, process and test fish tissues are standardized throughout the labs participating in the survey. The detailed procedures and laboratory protocols can be found in [The National Wild Fish Health Survey Procedures Manual](#) (Heil 2009).

Project Summaries:

Natural Origin Late Fall Chinook Adult

Case Numbers: 14-018, 14-021

Principal Investigator(s): S. Foott

Sample Date(s): 1/15/2014, 1/22/2014

Estimated funds expended: \$500

Objective: Monitor the disease status of adult salmonid populations in the upper Sacramento basin. Natural origin late-fall Chinook salmon are captured at the base of Keswick Dam and transferred to CNFH for egg collection.

Partners:

Name	Agency	Email	Phone
Scott Hamelberg	USFWS –Coleman NFH	Scott_Hamelberg@fws.gov	(530) 365-8622

Results:

Species	Total Fish	Tissue	Assay	No. Samp	Pool Size	No. Pos	Pathogen
Chinook Salmon	6	Kidney	Virology	2	1	0	
		OF	Virology	4	1	1	IHNV
		Kidney	Bacteriology	2	1	0	
		Kidney	<i>Rs-DFAT</i>	2	1	0	
		OF	<i>Rs-DFAT</i>	4	1	1	<i>Renibacterium salmoninarum</i>

Narrative Summary: Natural origin Late-Fall adults are captured at the base of Keswick Dam and transferred to LSNFH for egg collection. In 2014, 6 naturally produced fish were sampled. IHNV was detected in none (0/2) of male kidney samples and 25% (1/4) of ovarian fluid samples. *Renibacterium salmoninarum* was detected in 25% (1/4) of ovarian fluid and none (0/2) of male kidney tissue samples tested by direct fluorescent antibody technique.

Final Report Reference:

Feather River Juvenile Chinook Pathogen Survey, Spring 2014

Case Numbers: 14- 34,35,41,42,52,53,62,63,78,79

Principal Investigator(s): JS Foott

Sample Date(s): March 12- May 16, 2014

Estimated funds expended: \$6000

Objective: Determine prevalence and severity of *Ceratomyxa shasta* and *Parvicapsula minibicornis* infection between low flow and high flow reach populations. Assay for viral and bacterial pathogens.

Partners:

Name	Agency	Email	Phone
Jason Kindopp	Cal.Dept Water Resources	jason.kindopp@water.ca.gov	530-534-2381

Results: A total of 226 juvenile Chinook were sampled. *Aeromonas-Pseudomonas* bacteria were isolated from the kidney of 19% (19 of 100). No virus was detected in 29 pooled samples representing 106 fish. *Renibacterium salmoninarum* was not observed by direct FAT in 24 pooled kidneys sample (48 fish).

Prevalence of infection (positive/total) for *C.shasta* (Cs) and *P. minibicornis* (Pm) by histology (histo) and QPCR (PCR) as well fish identified as clinical disease (disease).

		H	G	H	G	H	G	H	G	H	G
		12-Mar		26-Mar		10-Apr		24-Apr		16-May	
Cs histo	POI	10/10	2/13	12/12	0/10	ND	0/14	4/7	2/7	5/15	0/15
Cs histo	disease	7/10	1/13	12/12	0/10	ND	0/14	1/7	0/7	1/15	0/15
Cs QPCR	POI	12/12	0/12	12/12	1/12	11/11	0/10	6/12	0/12	6/12	1/12
Cs QPCR	disease	11/12	0/12	11/12	0/12	11/11	0/10	1/12	0/12	3/12	1/12
Pm histo	POI	10/10	2/13	12/12	0/10	ND	0/14	4/7	0/7	10/15	0/15
Pm histo	disease	4/10	0/13	2/12	0/10	ND	0/14	3/7	0/7	2/15	0/15

ND not done

Narrative Summary: The Feather R. appears to have a yet undefined "*C.shasta* infectious zone" in the higher flow reach. Prevalence and severity of both *C.shasta* and *Parvicapsula minibicornis* infection was much higher in Feather R. salmon collected from the high flow reach (Herringer trap, 68% *C.shasta* and 82% *P. minibicornis*) than the low flow (Gateway trap, 5% *C.shasta* and 3% *P. minibicornis*). Severe ceratomyxosis occurred in high flow fish collected between 12March and 10April. Reduced prevalence in later high flow reach Feather R. collections may be related to out-migration of juveniles from the low flow reach or seasonal changes in actinospore concentrations. In contrast to the Klamath R., ceratomyxosis occurred in Feather R. salmon when water temperature was $\leq 12^{\circ}\text{C}$ (12March). No other significant bacterial or viral infection was detected in salmon. It is likely that *C.shasta* infection is exerting a strong negative impact on Feather R. natural Chinook production.

Final Report Reference: Sacramento and Feather River Juvenile Chinook Pathogen Survey Spring 2014, JS Foott, CA-NV Fish Health Center, USFWS, Anderson CA
July 28, 2014, <http://www.fws.gov/canvfhc/reports.asp>

Feather River Wakasagi (*Hypomesus japonicus*), Spring 2014

Case Numbers: 14- 33,41,52

Principal Investigator(s): JS Foott

Sample Date(s): March 12- April 10, 2014

Estimated funds expended: \$300

Objective: Assay for viral, parasitic and bacterial pathogens in this non-native smelt.

Note: These fish were not included in the NWFHS database or sample totals because the species has not yet been added to the list (no estimate as to when this may happen)

Partners:

Name	Agency	Email	Phone
Jason Kindopp	Cal. Dept Water Resources	jason.kindopp@water.ca.gov	530-534-2381

Results: A total of 19 adult Wakasagi were collected from the Heringer RST between March 12 and April 10, 2014. They ranged in fork length from 52 -90 mm. No virus was detected in a 10 fish sample collected on March 12. *Aeromonas*-*Pseudomonas* bacteria were isolated from the kidney of 86% (6 of 7). Histological examination of 7 fish showed severe gill hyperplasia associated with amoeba and *Chilodonella* sp. (presumptive) infections in 4 of 5 fish collected on March 12 (Fig. 2).

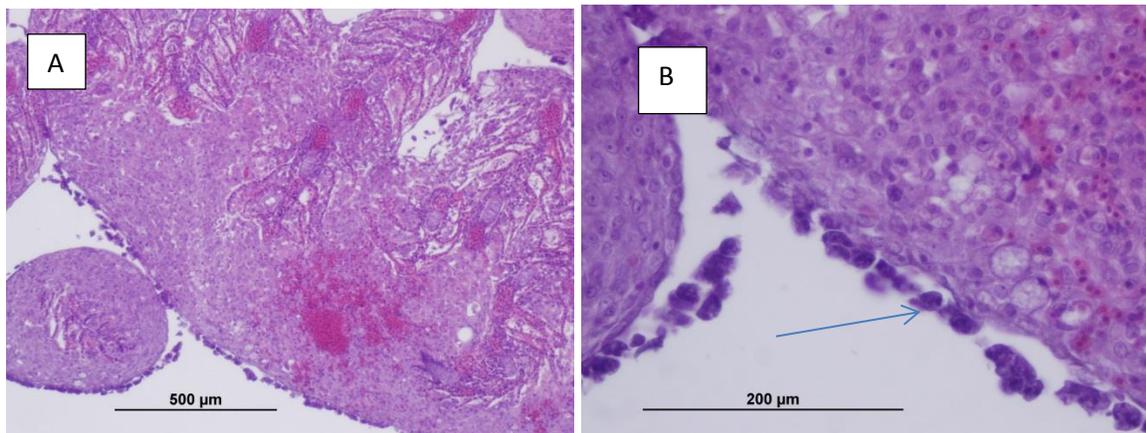


Figure 2. Hyperplastic Wakasagi gill (A) and higher magnification showing amoeba on epithelial surface (B).

Final Report Reference: Sacramento and Feather River Juvenile Chinook Pathogen Survey Spring 2014, JS Foott, CA-NV Fish Health Center, USFWS, Anderson CA. July 28, 2014, <http://www.fws.gov/canvfhc/>

Lower Sacramento River Juvenile Chinook salmon prognosis study, Spring 2014

Case Numbers: 14- 49,50,55,56

Principal Investigator(s): JS Foott

Collection Date(s): March 21- April 4, 2014

Estimated funds expended: \$3000

Objective: Determine prognosis of *C.shasta* and *Parvicapsula* infections. Assay for viral and bacterial pathogens

Partners:

Name	Agency	Email	Phone
Diane Coulon Tisdale RST	Cal.Dept Fish and Wildlife	Diane.Coulon@wildlife.ca.gov	530-895-5002
Chris McKibbin Knight's Landing RST	Cal.Dept Fish and Wildlife	Chris.McKibbin@wildlife.ca.gov	916-202-9325

Results: A total of 110 salmon were obtained from the RSTs at Knight's Landing (K) and above Tisdale ramp (T) between March 21 and April 4, 2014. These dates were targeted to maximize collection of larger natural juveniles, as late in spring as possible, prior to Coleman NFH release smolts. Salmon were transported to the FHC wetlab and held for 9 – 14d in 350L circular tanks at 18°C and fed frozen tubifex worms. The original intent was to hold fish for 21d so as to allow for the development of ceratomyxosis. Mortality was frozen and later assayed for *C.shasta* DNA by QPCR. Mortality ranged from 18 – 69% and the rapid onset dictated early sampling of the survivors at 9 – 14d post-capture (Table 1). QPCR analysis determined that 91 – 100% of the mortalities had *C.shasta* DNA in the intestine suggestive of clinical disease ($Cq \leq 34$). The exact cause of death was not determined and a low percentage of fish showed columnaris lesions. Additionally, *Ichthyophthirius multifiliis* was present in the capture groups as evident in gill histology of 2 survivor fish (2 of 68 sections, 3%). *Aeromonas-Pseudomonas* bacteria were isolated from the kidney of 23% (10 of 43) of the survivors with prevalence increasing with each collection group. No virus was detected in 11 pooled samples representing 32 fish. *Renibacterium salmoninarum* was not observed by direct FAT in 5 pooled kidneys sample (20 fish). A common histological observation in survivors was inflammation of the visceral adipose tissues. *Parvicapsula minibicornis* was seen in the kidneys of 91%- 100% of each collection group (overall prevalence of 97%). Glomerulonephritis and interstitial hyperplasia (inflammatory response) occurred in 24% (17 of 70) sections. *Ceratomyxa shasta* in survivor fish was seen in 33 – 69% of the sample groups with 9 – 25% of the intestines showing clinical signs of disease (Table 2). A gross clinical sign, of intestine hemorrhage or catarrhal exudate, was observed in 25 and 33% of the later 2 collection groups. Combining mortality QPCR and survivor histology results the overall prevalence of *C.shasta* infection was 74%. On 17April, the Red Bluff FWO submitted 5 juvenile Chinook histology samples to the FHC in response to a local mortality event (later found to be associated with CDFW fish salvage). Asymptomatic infections of both *Parvicapsula* and *C.shasta* were observed in 2 of 5 fish.

Table 1. Lower Sacramento Chinook collection dates from the RSTs at Knight’s Landing (K) and Tisdale (T) combined and held at the wetlab for 9 – 14d. The number of fish collected, mortality (mort), and prevalence of *C.shasta* infection by QPCR in the mortality subdivided into low DNA (lowPOS) and high DNA (CI POS).

Collect date	Site	fish collected	days captivity	mort	%mort	MORT CS POI (N)	PCR	lowPOS	CI POS
21-Mar	T	20							
	K	20	14	15	38%	100%	16	1	15
26-Mar	T	12							
	K	20	13	22	69%	95%	21	0	20
3-Apr	T	20							
	K	0	12	9	45%	100%	4	0	4
7APR	T	18							
	K	20	9	7	18%	100%	7	0	7

Table 2. Lower Sacramento Chinook captivity survivor histological examination of Gastrointestinal tract (GI (N)) samples for *C. shasta* (CS+). Data reported as prevalence of infection (POI), number and POI of sections demonstrating clinical disease, the overall prevalence of CS infection of both QPCR mortality and histological survivor samples.

Collect date	GI (N)	CS +	CS POI	CS		Histo+PCR
				disease	disPOI	CS POI
21-Mar	24	9	38%	4	17%	63%
26-Mar	9	3	33%	1	11%	77%
3-Apr	16	11	69%	4	25%	75%
4-Apr	19	10	45%	2	9%	70%

Final Report Reference: Sacramento and Feather River Juvenile Chinook Pathogen Survey Spring 2014,JS Foott, CA-NV Fish Health Center, USFWS, Anderson CA
 July 28, 2014, <http://www.fws.gov/canvfhc/reports.asp>

Pathogen survey using Inland Silverside (*Menidia beryllina*) as a surrogate species for threatened Delta smelt in the San Joaquin-Sacramento Delta at Liberty Island, Autumn 2013

Case Numbers: 14-006, 14-010

Principal Investigator(s): R. Stone

Sample Date(s): 24October and 07November, 2013

Estimated funds expended: \$3000

Objective: Determine prevalence and severity of infection for bacterial and viral infection of Inland Silversides in the San Joaquin-Sacramento Delta at Liberty Island 2013.

Partners:

Name	Agency	Email	Phone
Denise Barnard, Biological Science Technician (Field Crew Leader)	Stockton Fish and Wildlife Office, USFWS	denise_barnard@fws.gov	(209) 334-2968 ex.307

Results:

Species	Total Fish	Tissue	Assay	No. Samp	Pool Size	No. Pos	Pathogen
Silver side	60	Triangle cut	Virology	12	5	0	
	40	Kd	Bacteriology	40	1	12	Aeromonas /Pseudomonas
	20	Whole Body	Histology	20	1	0	<i>Mycobacterium spp.</i>

Narrative Summary: A total of 80 Inland Silversides were collected by beach seine from the north site at Liberty Island on 24October and 07November 2013. Inland Silversides were used as surrogate species for the Delta smelt (*Hypomesus transpacificus*), listed as threatened under the Endangered Species Act in 1993, as they are known to inhabit the same waters and similar habitats. No gross signs of infection were observed internally or externally in any of the fish sampled. A total of 60 fish were sampled for virological examination (triangle cut to include both kidney and spleen) on Epithelioma Papulosum Cyprini (EPC), Chinook Salmon Embryo (CHSE-214) and Fat Head Minnow (FHM) cell lines. Collectively these cell lines are known to be sensitive to IHNV, IPNV, LMBV, OMV, SVCV and VHSV; no virus was isolated from the samples taken. No virus has been isolated from ~860 Inland Silversides sampled from 2009-2013.

Asymptomatic infections of common gram-negative bacteria (*Aeromonas – Pseudomonas sp.*) were observed in 12/40 (30%) of the kidney samples obtained. Twenty specimens were collected, fixed and processed for histological examination. Sagittal sections were cut and stained with an Acid Fast Bacteria kit (American Master*TechInc. Lodi CA) for *Mycobacteria*. No acid fast bacteria were observed in the tissues.

Table 1. Approximate water conditions at the time of sampling on both 24October and 07November, 2013. Water conditions are reported as: Water temperature in degrees Fahrenheit, Electrical Conductivity in micro Siemens per centimeter, Water Turbidity in nephelometric turbidity units and Flow in cubic feet per second (http://cdec.water.ca.gov/cgi-progs/Meta?station_id=SRV).

Date	Water Temperature (F)	Electrical Conductivity (uS/cm)	Water Turbidity (ntu)	Flow (cfs)
24October, 2013	63	500	5.8	~-60,000
07November, 2013	57.5	325	9.8	~-50,000

Final Report Reference: **Pathogen survey using Inland Silverside (*Menidia beryllina*) as a surrogate species for threatened Delta smelt in the San Joaquin-Sacramento Delta at Liberty Island 2013** R Stone, CA-NV Fish Health Center, USFWS, Anderson CA

Lower San Joaquin and Merced River Pathogen Survey

Case Numbers: 14-047, 14-058, 14-069, 14-070, 14-071, 14-080

Principal Investigator(s): Ken Nichols

Sample Date(s): 2 April – 19 May, 2014

Estimated funds expended: \$5,000

Objective:

In the spring of 2014, the CA-NV Fish Health Center performed pathology sampling on juvenile Chinook salmon in the Merced (Upper – Gallo, and Lower – Hatfield or McConnell) and San Joaquin (Mossdale trawl) Rivers. Sampling was performed under the USFWS National Wild Fish Health Survey (NWFHS) to collect prevalence information on selected fish pathogens in wild populations. *Tetracapsuloides bryosalmonae*, the myxosporean parasite responsible for proliferative kidney disease (PKD), has caused mortality in juvenile Chinook at Merced River Hatchery previously and has been found at high levels in naturally produced Merced River Chinook out-migrants. In 2014, an outbreak of PKD at Merced River Hatchery in conjunction with drought conditions triggered an early release of the hatchery fish by trucking to delta release sites. This unusual condition provided the opportunity to monitor the health of the natural population later into the season than has been available previously.

Partners:

Name	Agency	Email	Phone
Gretchen Murphey Domenic Giudice	CDFW	Gretchen.Murphey@wildlife.ca.gov Domenic.Giudice@wildlife.ca.gov	(209) 853-2533
John Montgomery	FISHBIO	JohnMontgomery@fishbio.com	(209) 847-6300

Results: Gallo Site (upper Merced River)

Species	Total Fish	Tissue	Assay	No. Samp	Pool Size	No. Pos	Pathogen
Chinook salmon	51	Kd	Bacteriology	51	1	0	
		Kd/Spln	Viral	26	2	0	
		Kd	Rs-FAT	26	2	0	
		Kd	Histo	50	1	22	<i>Tetracapsuloides bryosalmonae</i>

Results: Hatfield and McConnell sites (lower Merced River)

Species	Total Fish	Tissue	Assay	No. Samp	Pool Size	No. Pos	Pathogen
Chinook salmon	51	Kd	Bacteriology	51	1	0	
		Kd/Spln	Viral	26	2	0	
		Kd	Rs-FAT	26	2	0	
		Kd	Histo	50	1	22	<i>Tetracapsuloides bryosalmonae</i>

Results: Mossdale Trawl (San Joaquin River)

Species	Total Fish	Tissue	Assay	No. Samp	Pool Size	No. Pos	Pathogen
Chinook salmon	51	Kd	Bacteriology	51	1	0	
		Kd/Spln	Viral	26	2	0	
		Kd	Rs-FAT	26	2	0	
		Kd	Histo	50	1	22	<i>Tetracapsuloides bryosalmonae</i>

Narrative Summary:

Juvenile Chinook salmon were sampled at 4 sites on the Merced and San Joaquin Rivers in April and May 2014. Pathology samples were collected to screen for bacterial and viral pathogens. Fish heads were frozen and assayed in the lab for brain acetylcholinesterase activity. Kidney tissue was examined by histopathology for the prevalence and severity of *T. bryosalmonae* infection. No obligate bacterial or viral fish pathogens were detected in any of the fish sampled. *Tetracapsuloides bryosalmonae* infections were observed in 54% (45/84) of fish by histological examination of kidney tissues. Significant kidney inflammation (rated as multifocal or diffuse lesions) was noted in 32% (27/84) of fish by histology. Brain AChE activity rates ranged from 179 to 285 units (nmol thiocholine*min⁻¹*mg protein⁻¹). Significant differences in AChE activity levels were observed between sample dates at the Gallo and Mossdale sites (P<0.0001, Kruskal-Wallis test). The *Tb* infections were the most significant health issue noted in these fish.

Final Report Reference:

Nichols, K. 2014. Lower San Joaquin and Merced River Pathogen Survey – Spring 2014. US FWS, California-Nevada Fish Health Center. Anderson, CA.

Disease Screening of Feral Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) Broodstock in Pyramid Lake, NV

Case Numbers: 14-067

Principal Investigator(s): R. Stone

Sample Date(s): 29 April, 2014

Estimated funds expended: \$1500

Objective: Inspection of Feral Lahontan cutthroat trout broodstock for listed pathogens of concern.

Partners:

Name	Agency	Email	Phone
Nancy Vucinich	Pyramid Lake Fisheries	nvucinich@plpt.nsn.us	775-476-0500 ext. 18

Results:

Species	Total Fish	Tissue	Assay	No. Samp	Pool Size	No. Pos	Pathogen
Lahontan cutthroat trout	30	Ovarian Fluid	Virology	6	5	0	
	30	Kidney	Virology	6	5	0	
	30	Ovarian Fluid	FAT	30	1	0	
	30	Kidney	FAT	30	1	0	
	30	Kidney	Bacteriology	30	1	10	<i>Aeromonas salmonicida</i>

Narrative Summary: The Lahontan cutthroat trout is a threatened species native to the drainages once part of Lake Lahontan in Northwestern Nevada, parts of California and Oregon. Pyramid Lake is the largest remnant of Lake Lahontan and is entirely within the Pyramid Lake Indian Reservation governed by the Pyramid Lake Paiute Tribe. The Lahontan cutthroat, extirpated from Pyramid Lake due to water diversions in the early 20th century, has been reintroduced and sustained by tribal hatcheries. The fish health center monitors the health of the feral adult broodstock. A total of 60 fish were sampled at the time of spawn as adult fish return to the egg collection facility near Sutcliffe. No virus or *R. salmoninarum* was detected (0/60). The bacterial pathogen *Aeromonas salmonicida* was detected in 33% (10/30) fish sampled.

Final Report Reference:

Winter Chinook Fish Health Inspection

Case Numbers: 14-073

Principal Investigator(s): Anne Bolick

Sample Date(s): 5/06/14 – 7/30/14

Estimated funds expended: \$4500

Objective:

Winter run Chinook salmon were listed as endangered by California Department of Fish and Wildlife (CDFW) in 1989 and the National Marine Fisheries Service (NMFS) in 1994. In 1997, Bureau of Reclamation developed a mainstem Sacramento River rearing facility, Livingston Stone NFH, at the base of Shasta Dam. The facility has been successful in meeting captive production goals; however the propagation of winter Chinook salmon at Livingston Stone NFH is intended to be a temporary measure that will cease when the naturally spawning population has been recovered.

Adult winter Chinook salmon broodstock are collected from the Sacramento River at the Keswick Dam fish trap. The objective of this fish health inspection was to inspect adult broodstock from Keswick Dam for fish health pathogens of concern.

Partners:

Name	Agency	Email	Phone
John Rueth	USFWS	john_rueth@fws.gov	530-275-0549

Results:

Species	Total Fish	Tissue	Assay	No. Samp	Pool Size	No. Pos	Pathogen
Winter Run Chinook salmon	117	Kidney	Virology	58	1	4	IHNV
		Ovarian Fluid	Virology	59	1	7	IHNV
		Kidney	Rs DFAT	65	1	0	

Narrative Summary:

Adult Winter Chinook salmon were collected from May through July, 2014. Laboratory assays were conducted according to the USFWS Standard Procedures for Aquatic Animal Health Inspections. Culturable bacterial pathogens were not detected by direct culture of kidney tissue onto appropriate growth media. Non-culturable or fastidious bacteria (*R. salmoninarum*) was not detected by direct fluorescence antibody testing (DFAT) which detects a specific *R. salmoninarum* antigen located on the cell surface. Infectious hematopoietic necrosis virus (IHNV) was detected in 9% (11/117) of fish collected. Cell culture was observed for cytopathic effects for a 28 day period, and cell culture positive samples for IHNV were confirmed by immunohistochemistry.

Final Report Reference:

Virological Examination of adult Lost River Suckers and 0+ Fathead Minnows from Upper Klamath Lake, Oregon 2014

Case Numbers: 14-074

Principal Investigator(s): R. Stone

Sample Date(s): 06 June, 2014

Estimated funds expended: \$0.00

Objective: Screening for virological pathogens in Lost River Suckers and short nose suckers in Upper Klamath Lake, Oregon for the purposes of importation.

Partners:

Name	Agency	Email	Phone
Mark Johnson	USGS	majohnson@usgs.gov	541-273-8689 ext 204

Results:

Species	Total Fish	Tissue	Assay	No. Samp	Pool Size	No. Pos	Pathogen
Lost River Sucker	1	Ovarian Fluid	Virology	1	1	0	
Short nose sucker	1	Milt	Virology	1	1	0	
Short nose sucker	2	Ovarian Fluid	Virology	1	1	0	

Narrative Summary: Lack of recruitment into Lost River Sucker spawning populations in Upper Klamath Lake is a primary factor preventing their recovery. Poor water quality, algal toxins (microcystin), predation and disease have been suggested as causes for high juvenile sucker mortality. The CA-NV Fish Health Center conducted pathogen screening on adult LRS which were spawned lake side to produce juvenile suckers to be used as sentinels both in the lake and laboratory investigations. The FHC partnered with the USGS Klamath Falls Field Station to capture adult sucker. A total of 3 suckers were screened for viral pathogens, no virus was detected.

Final Report Reference:

Health Evaluation of Juvenile Coho Salmon from Scott River Fish Rescue

Case Numbers: 14-099

Principal Investigator(s): Scott Foott

Sample Date(s): 7/9/2014

Estimated funds expended: \$1500

Objective: In support of rescue efforts of stranded Scott River juvenile coho salmon, the CDFW requested that CA-NV Fish Health Center health screening. In previous years the CA-NV FHC had performed diagnostic sampling on stranded coho dying due to unknown causes. This work was intended to continue that effort.

Partners:

Name	Agency	Email	Phone
Jennifer Bull	CDFW	Jennifer.Bull@wildlife.ca.gov	(530) 842-0805

Results:

Species	Total Fish	Tissue	Assay	No. Samp	Pool Size	No. Pos	Pathogen
Coho salmon	60	Gill	Wet Mount	6	1	0	
		Skin	Wet Mount	6	1	0	
		Kidney	Viral	13	4	0	
		Kidney	FAT-Rs	26	2	0	
		Kidney	Bacte-BHIA	30	1	0	
		Intestine	PCR-Cs	28	1	5	<i>Ceratomyxa shasta</i>
		Kidney	PCR-Pm	28	1	9	<i>Parvicapsula minibicornis</i>
		Kidney	PCR-Rs	28	1	0	
		Gill	Histology	15	1	0	
		Kidney	Histology	20	1	0	
		Intestine	Histology	20	1	0	

Narrative Summary:

No significant infections or conditions were observed at the time of sampling. Light infections of *C. shasta* and *P. minibicornis* were observed, and those would possibly progress to the point they were a health concern.

Final Report Reference:



Appendix 1. NWFHS Summary Table for FY 2014

NWFHS Case#	Collection Date(s)	Location	Species	Partners	Number of Fish	Significant Findings
14-006	10/24/2013	Liberty Island	Inland Silversides	USFWS	30	
14-010	11/7/2013	Liberty Island	Inland Silversides	USFWS	30	
14-018	1/15/2014	Keswick fish trap	Chinook	USFWS	2	
14-021	1/22/2014	Keswick fish trap	Chinook	USFWS	4	IHNV
14-034	3/12/2014	Herringer trap	Chinook	CDWR	34	<i>C. shasta</i> , <i>P. minibicornis</i>
14-035	3/12/2014	Gateway trap	Chinook	CDWR	24	<i>C. shasta</i> , <i>P. minibicornis</i>
14-041	3/26/2014	Herringer trap	Chinook	CDWR	12	<i>C. shasta</i> , <i>P. minibicornis</i>
14-042	3/26/2014	Gateway trap	Chinook	CDWR	24	
14-047	4/2/2014	Gallo Ranch	Chinook	CDFW	20	<i>T. bryosalmonae</i>
14-048	4/2/2014	McConell SP	Chinook	CDFW	1	
14-049	4/4/2014	Knights Landing	Chinook	CDFW	16	<i>C. shasta</i>
14-050	4/8/2014	Knights Landing	Chinook	CDFW	19	<i>C. shasta</i>
14-052	4/17/2014	Gateway trap	Chinook	CDWR	14	
14-058	4/17/2014	Gallo Ranch	Chinook	CDFW	20	<i>T. bryosalmonae</i>
14-062	4/24/2014	Herringer trap	Chinook	CDWR	24	<i>C. shasta</i> , <i>P. minibicornis</i>
14-063	4/24/2014	Gateway trap	Chinook	CDWR	12	<i>C. shasta</i>
14-067	4/29/2014	Pyramid Lake, NV	Lahontan cutthroat	Pyramid Lake Tribe	60	<i>A. Salmonicida</i>
14-069	4/29/2014	Mosdale trawl	Chinook	CDFW	8	
14-070	4/30/2014	Gallo Ranch	Chinook	CDFW & FISHBIO	11	<i>T. bryosalmonae</i>
14-071	4/30/2014	Hatfield SP	Chinook	FISHBIO	6	
14-073	5/6/2014	Keswick fish trap	Chinook	USFWS	65	IHNV
14-074	5/6/2014	Upper Klamath Lake	Lost River Sucker	USGS	1	
14-074	5/6/2014	Upper Klamath Lake	Shortnose Sucker	USGS	2	
14-078	5/16/2014	Herringer trap	Chinook	CDWR	15	<i>C. shasta</i>
14-079	5/6/2014	Gateway trap	Chinook	CDWR	16	
14-080	5/19/2014	Mosssdale trawl	Chinook	CDFW	20	<i>T. bryosalmonae</i>
14-092	6/17/2014	Marlette Lake, NV	Rainbow	NDoW	60	
14-099	7/9/2014	Scott River, CA	Coho	CDFW	52	
14-109	8/26/2014	Liberty Island	Inland Silversides	USFWS	60	
14-118	9/15/2014	Liberty Island	Inland Silversides	USFWS	60	
Total Fish					722	

Appendix 2. Partners and Sample Sites



Map ID	State	County	Waterbody	Site	Cooperator
1	OR	Klamath	Upper Klamath Lake	Sucker Springs	USGS
2	CA	Siskiyou	Scott River	Scott trap	CDFW
3	CA	Shasta	Sacramento River	Keswick adult trap	USFWS
4	NV	Washoe	Pyramid Lake	Sutcliffe	Pyramid Lake Fisheries
5	CA	Butte	Feather River	Gateway RST	CDWR
6	CA	Butte	Feather River	Herringer RST	CDWR
7	NV	Washoe	Marlette Lake	Marlette adult collection	NDOW
8	CA	Yolo	Sacramento River	Knights Landing RST	CDFW
9	CA	Solano	Cache Slough	Liberty Island	USFWS
11	CA	Merced	Merced River	Gallo Ranch	CDFW, FISHBIO
12	CA	Merced	Merced River	McConnell State Park	CDFW
13	CA	Merced	Merced River	Hatfield State Park	FISHBIO