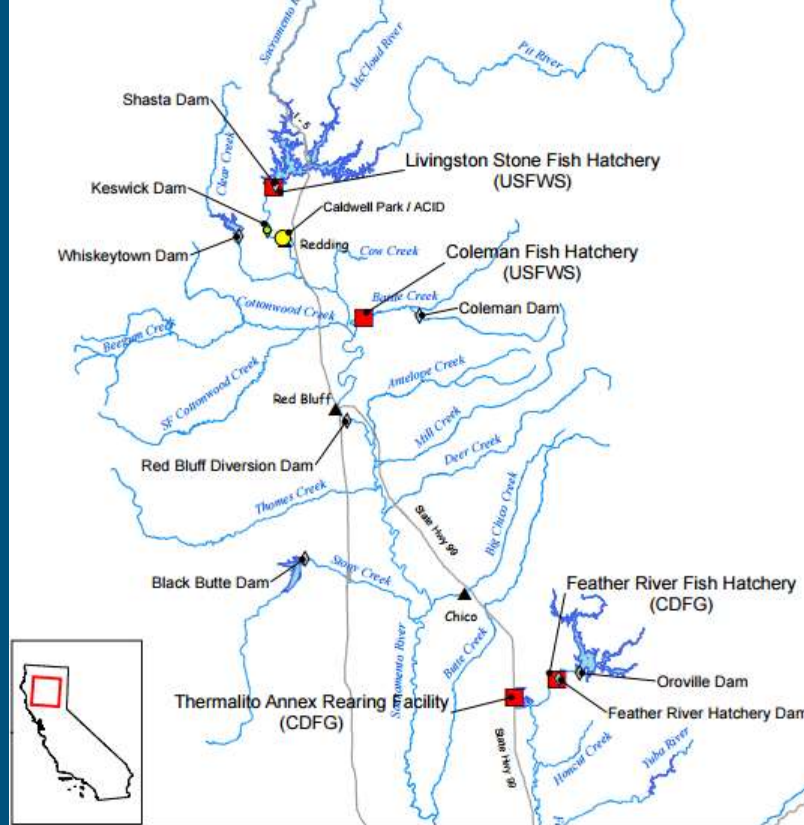


Livingston Stone National Fish Hatchery

Shasta Lake, CA



Kaitlin Gooding
Fish Biologist



Livingston Stone Hatchery Winter Chinook Program

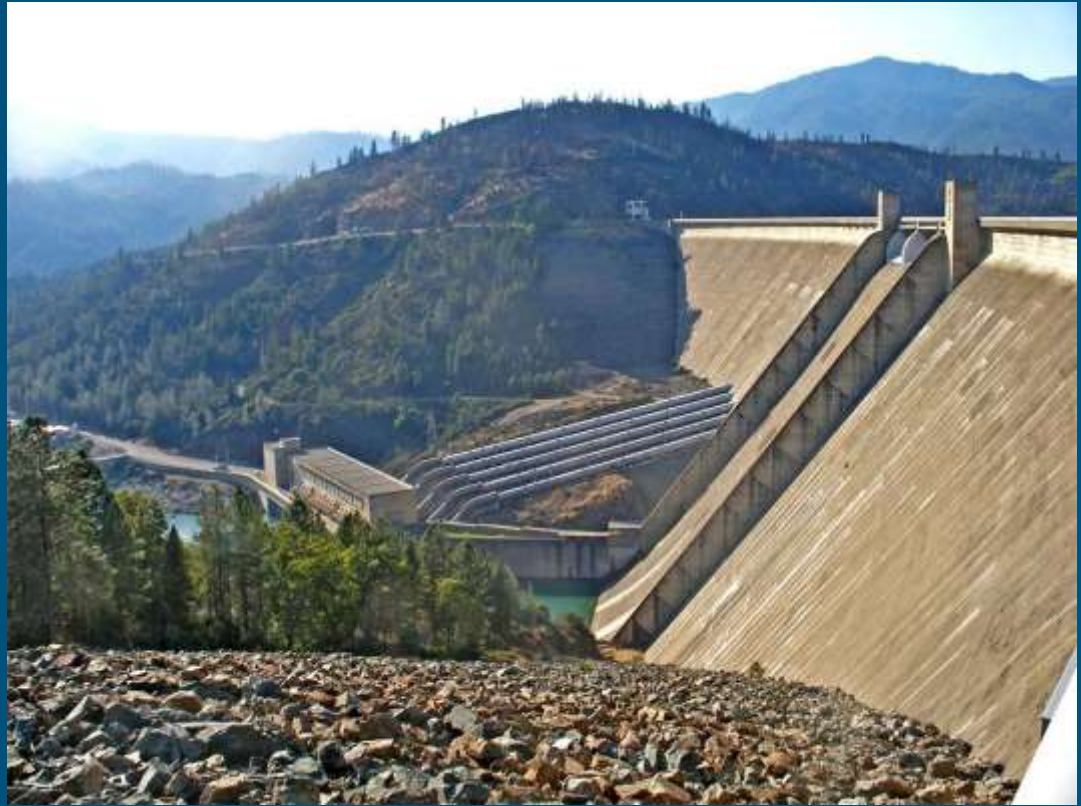
- | | |
|-----------------------------|------------------------|
| Lakes and Other Waterbodies | Hatcheries |
| Rivers | Juvenile Release Sites |
| Roads | Adult Collection Sites |
| Cities | Dams |

1 in = 18 miles

0 4 8 16 24 32 Miles

Water Source

- Flow Through System
- No Water Treatment
- Subject to lake water temperatures



Shasta Dam Temperature Control Device

Allows managers at Shasta Dam to withdraw water from a range of depths

Provides ideal water temperature for rearing salmon (50° - 56°F).

Failed in 2014 due to drought and lake level (not enough cold water)



Species at Livingston Stone NFH

Winter Run Chinook Salmon

(*Oncorhynchus tshawytscha*)

Status:

Threatened on August 4, 1989

Endangered on January 4, 1994

Today, only the one population of winter-run Chinook salmon spawning downstream of Keswick Dam exists.



Delta Smelt

(*Hypomesus transpacificus*)

Status:

Threatened on March 5, 1993

Delta smelt are found only from the Suisun Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano and Yolo counties.



A Look at the Facilities...



A Look at the Facilities...

Winter Run Chinook Program

Two 20 ft. Adult Circulares
holding up to 120 adults



A Look at the Facilities...

Winter Run Chinook Program



Malachite Green

A Look at the Facilities...

Winter Run Chinook Program



288 Incubator Trays



A Look at the Facilities...

Winter Run Chinook Program

60 30" Circulars – 5,000 fish per tank



A Look at the Facilities...

Winter Run Chinook Program

32 Rectangular Tanks



A Look at the Facilities...

Winter Run Chinook Program

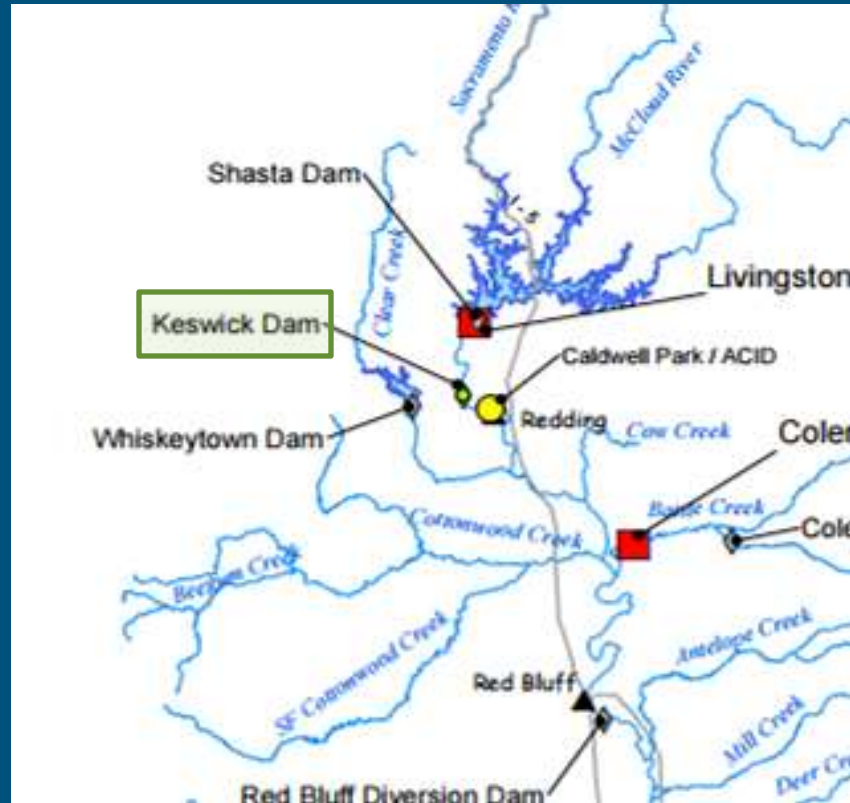
19 12 ft. Circulars



Keswick Dam



Keswick Dam



Keswick Dam



Winter Run Program

Adult Collection

Minimization of genetic impacts:

180 adults or 15% of run-size estimate

Captured from full spectrum of run timing (Dec – July)



Adult Spawning

Split egg lots to maximize genetic diversity

Cryopreservation also part of the genetic management plan



Winter Run Program

Incubation and Rearing

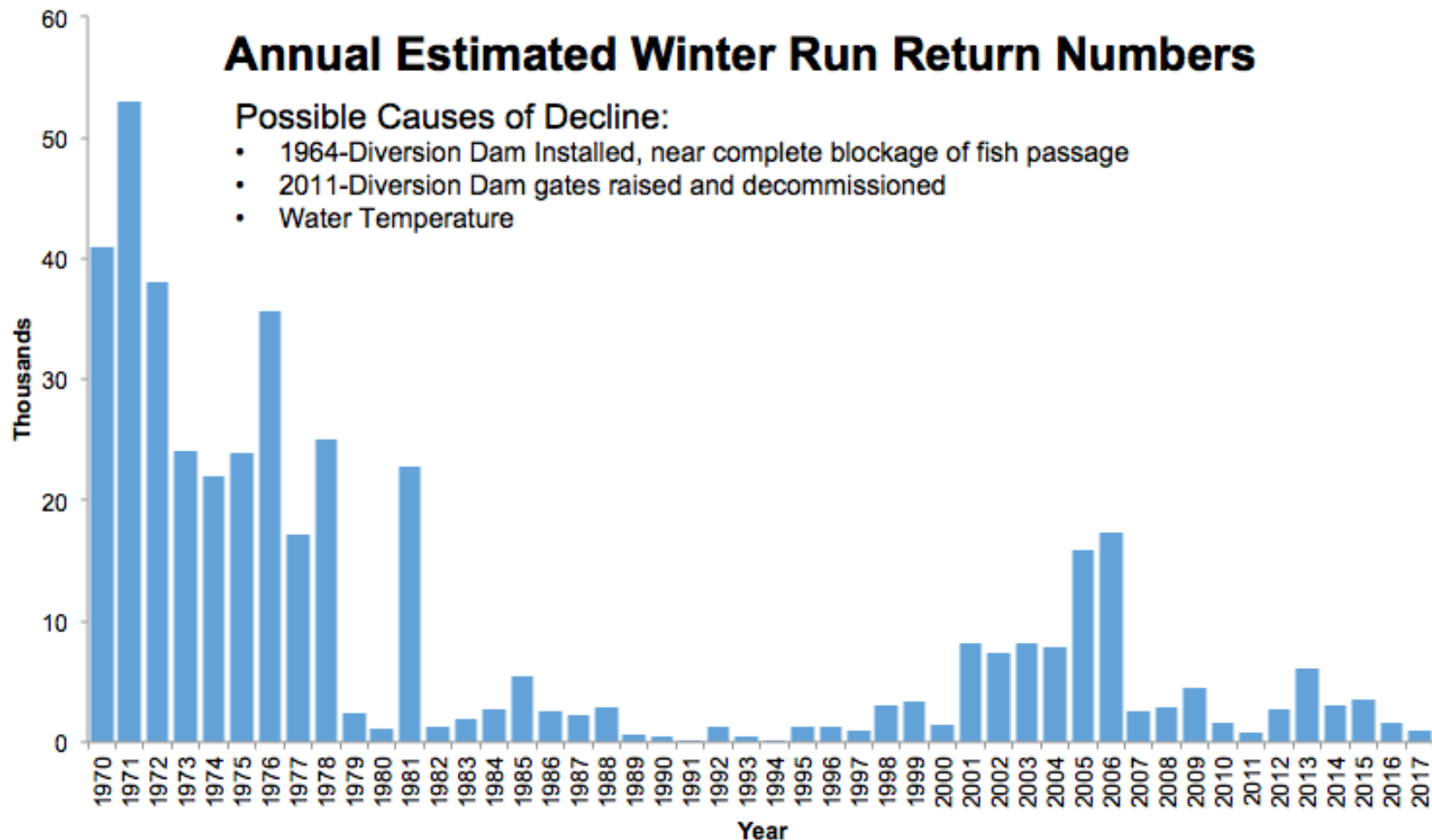
Individual family group incubation and early rearing are an integral part of the Genetic Management Plan.



Annual Estimated Winter Run Return Numbers

Possible Causes of Decline:

- 1964-Diversion Dam Installed, near complete blockage of fish passage
- 2011-Diversion Dam gates raised and decommissioned
- Water Temperature



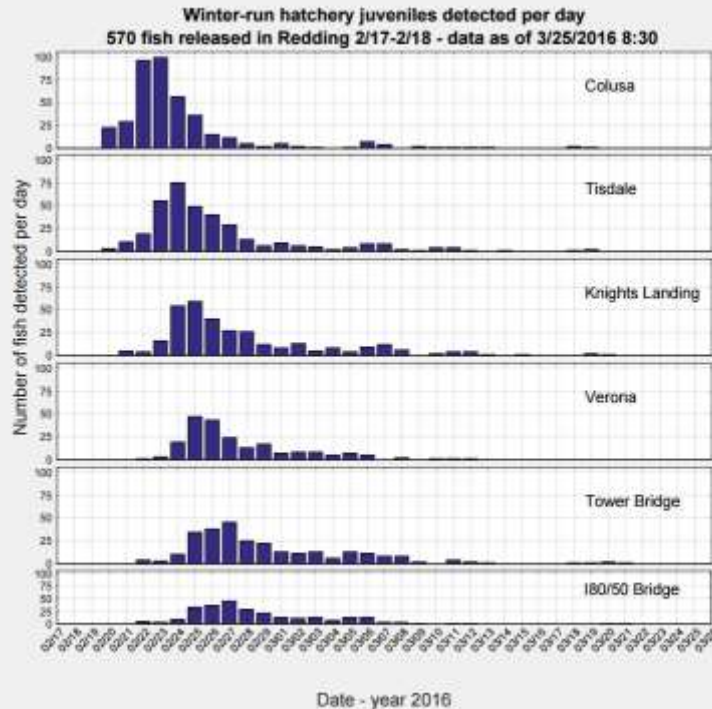
Winter Run Program

Tagging and Release

This year, over 200,000 juvenile Chinook salmon will be coded-wire tagged and released into Caldwell Park in Redding.



Acoustic Tag Study



Some fish traveled over 500 river miles in as little as 5 days

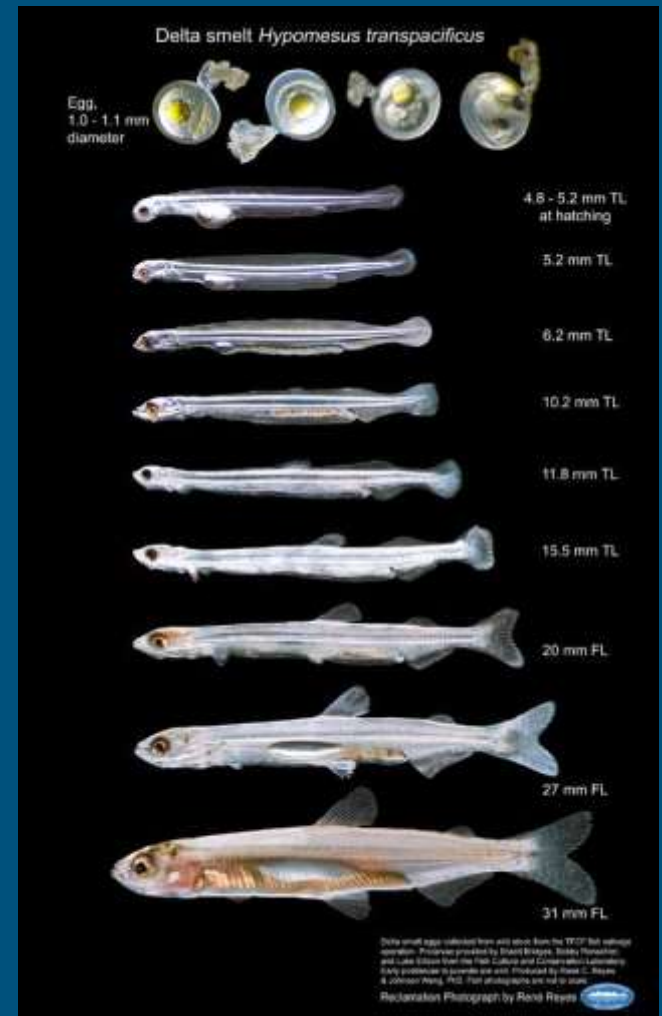
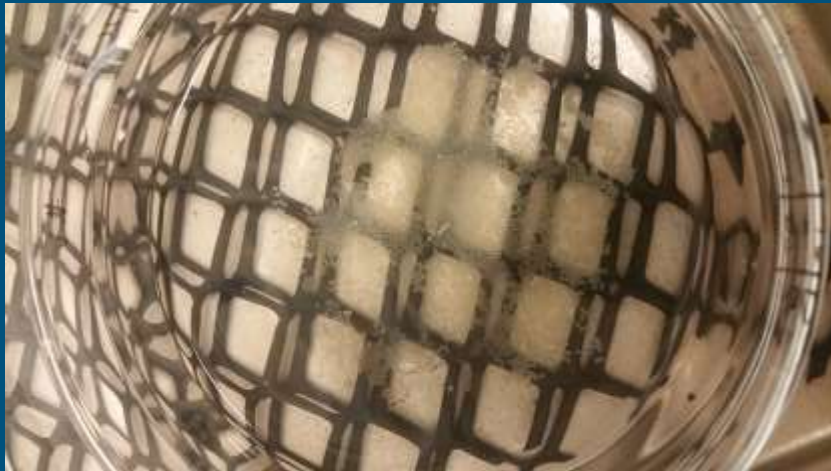
Location	rkm of location	Total Fish detected	FASTEST FISH ID: 4AAR			
			First arrival	Travel Time (days)	Speed (rkm/day)	Speed (miles/day)
Redding	540.4	285	2/17/2016 18:00			
Colusa	314.4	198	2/20/2016 5:40	2.5	90.9	56.5
Tisdale	269.2	176	2/20/2016 20:38	0.6	72.5	45.0
Knights Landing	224.1	161	2/21/2016 11:09	0.6	74.6	46.3
Verona	203.5	108	* went through this area when receivers not operating			
Tower Bridge	172.0	133	2/22/2016 4:22	0.7	72.6	45.1
180 Bridge	170.8	127	2/22/2016 4:54	0.0	53.9	33.5
Hood	138.9	75				
Middle River	150	0				

rkm of location = distance via mainstem path from Golden Gate Bridge, GG Bridge = 0 rkm.
Travel Time = arrival date to location - minus arrival date of location above / distance
Verona receivers not online until 2/22/2016 13:23, went offline on 3/12/2016
Hood receiver online starting 2/26/2016 14:35, went offline on 3/7/2016
180/50 receivers stopped working on 3/9/16 16:00



Delta Smelt

- Maintain a refugial Population for UC Davis Fish Conservation and Culture Lab (FCCL)
- Perform in-house studies and spawning exercises



A Look at the Facilities...

Delta Smelt Program



- UV Disinfection
- Rotifer and Artemia Harvest
- Refugial Population
- Live Spawning



A Look at the Facilities...

Delta Smelt Program



- Delta Smelt are live spawners
- Eggs stick to the side of jars as they mature
- Bentonite is mixed in with the eggs to loosen them from the sides of the jar once eyed up
- Eggs can then be sorted and counted

A Look at the Facilities...

Delta Smelt Program

- Once eggs are sorted, they are placed in hatching jars
- Temperature controlled
- Swim out as they hatch



A Look at the Facilities...

Delta Smelt Program



- Recirculating system with flow through option
- Bio Filter
- Temperature controlled
- UV Water Disinfection

A Look at the Facilities...

Delta Smelt Program

- Flow through system
- Effluent UV Disinfection for possible pathogens
- Vibratory feeders



Rotifers

- *Brachionus plicatilis*
- First live prey offered to smelt larvae
- In constant production and harvest at the hatchery



Artemia

- Brine Shrimp
- Offered to more mature smelt larvae
- New batches cultured daily from frozen cysts



Livingston Stone NFH



FIGURE 1. The founders of Baird Hatchery: Myron Green, Livingston Stone, and William T. Perrin. Photograph taken in San Francisco in 1873.

Thank you!

Any Questions?