

Summary of Spring 2013 Field Monitoring

With locations chosen for observing egg and larval development of Clear Lake Hitch (*Lavinia exilicauda chi*)

Intent

A field study was planned for observation of eggs and larval hitch in their natural environment during migration and spawning in spring 2013. The intent was to 1) observe exactly the immediate microenvironment in which hitch spawn and in which eggs either develop successfully or fail, and 2) observe and record larval hitch development in their natural habitat, their growth rate, and their preferred rate of movement downstream. This would include a comparison of 2 or more locations and stretches of creek habitat for observations of preferred microhabitat and estimated TL.

Background

A small study from spring 2012 indicated that larval hitch are susceptible to water temperatures and appeared to do well in an environment above 15°C but below 25°C, with nighttime variations in temperature. As they grew, they appeared able to handle greater variations. Many of those in a cooler environment perished within 3 days at temperatures at or below 15°C; then their population stabilized as temperatures were generally above 15°C. In a sustained warmer environment (5°C ≥ the cooler environment), all perished overnight on day 12. (study online at www.rootlets.com/papers/study-spring2012.pdf).

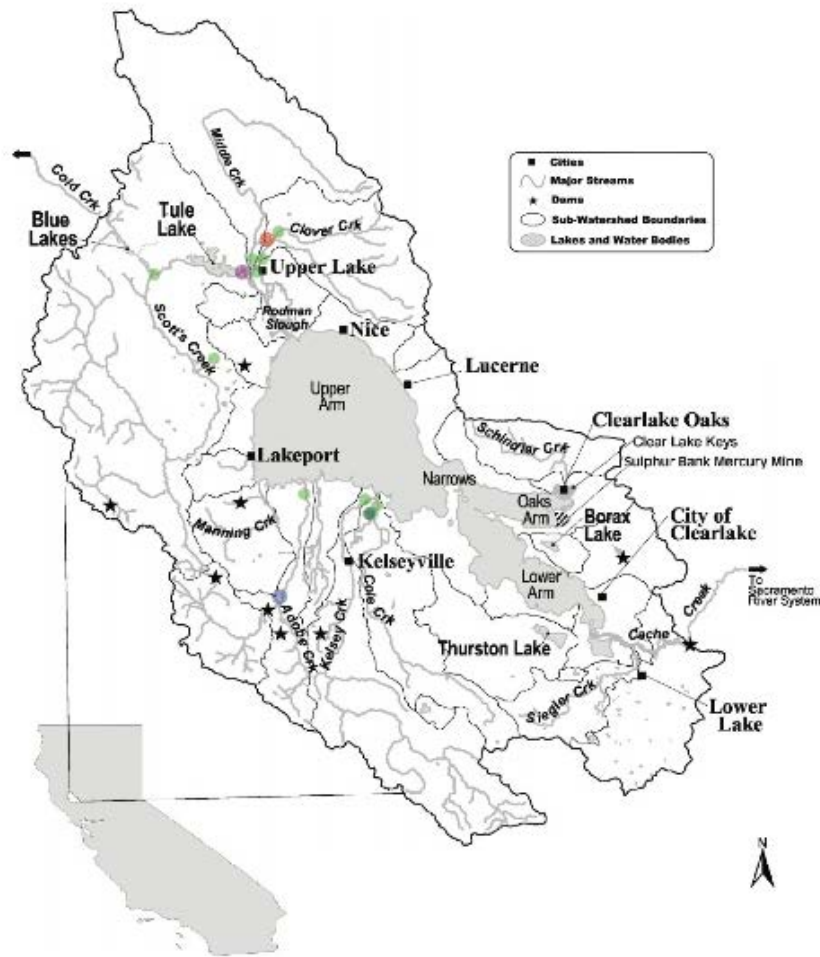
Locations

Four specific locations were selected because of their potential habitat for developing eggs and larvae, anticipated to be flooded, grassy or marshy areas where larval hitch have often been found in recent years, and because there were also stretches of accessible creek banks where juveniles could be followed.

No hitch were observed there during the 2013 spring migration. These locations were monitored twice weekly in case a later migration occurred and also to monitor critical habitat when hitch would normally spawn, eggs and larvae develop, and juveniles return downstream.

The four locations were Cole Creek at Clark Drive, Adobe Creek at Bell Hill Road, Scotts Creek below Tulelake Dam, and Clover Bypass at Elk Mountain Road.

Other places checked for presence of migrating fish were Adobe Creek at Soda Bay Road, Cole Creek at Soda Bay Road, Alley Creek at Pitney Lane Bridge, Clover Creek at Bridge Arbor Drive, Middle Creek at Hwy 20, Scotts Creek at Blue Lakes exit, unnamed creek (Scotts Creek watershed) along Eickhoff Road, and lower Middle Creek along Bridge Arbor Drive. Kelsey Creek at Soda Bay Road was checked more often than the others, and on two occasions a single dead hitch was observed; access was not available there.



Cole at Clark Drive
 Adobe at Bell Hill Drive
 Scotts below Tulelake Dam
 Clover Bypass at Elk Mountain Drive

Other monitoring sites
 Cole at Soda Bay Road
 Kelsey at Soda Bay Road
 Scotts at Blue Lakes exit
 Unnamed along Eickhoff Rd (Scotts)
 Middle at Hwy 20
 Clover at Bridge Arbor Drive
 Middle at gate on bridge Arbor Drive
 Adobe at Soda Bay Road

Map, ref. Suchanek et al "Evaluating And Managing A Multiply-Stressed Ecosystem At Clear Lake, California: A Holistic Ecosystem Approach" pg.3, 2002, online at www.des.ucdavis.edu/faculty/Richerson/Clear%20Lake%20overview.pdf

(Figure 121.1 Map of Clear Lake and surrounding watershed, with locations of dams.) Layers with colors, S.Franson

Sites were monitored for temperatures of water and ambient air, environment including cloud cover and estimated wind speed and direction, a general overview of wildlife observed and heard, water, and substrate. Barriers were documented. Digital photography recorded immediate habitat, the lay of the land, and any changes occurring at the four sites chosen for repeat checks.

Equipment used:

Olympus digital camera

DeLorme Earthmate PN-60

Cooper handheld air/water digital thermometer

Portable field 10x scope

Jepson manual for reference, University of California Press, ©1993

Four locations chosen for potential for observing egg and larval development

Four sites were monitored twice weekly from 3.9.2013 until migration events were not occurring, or until fish passage was compromised and migration could not have occurred.

The following were observed at some point at each of the four locations. Vegetative cover included willows, *Salix sp.*, oak *Quercus sp.*, Himalayan blackberries, *Rubus armeniacus*, various ruderal grasses, herbaceous growth, and ag fields either alongside creeks or in the background. Wildlife seen and mostly heard included several species of passerines including white crowned sparrow, *Zonotrichia leucophrys*, golden crowned sparrow, *Zonotrichia atricapilla*, American and lesser goldfinches, *Carduelis tristis* and *Carduelis psaltria*, American cliff swallows, *Petrochelidon pyrrhonota*, red-winged blackbirds, *Agelaius phoeniceus*, Brewer's blackbirds, *Euphagus cyanocephalus*, raptors, red-shouldered hawk, *Buteo lineatus*, red-tailed hawk, *Buteo jamaicensis*, quail, *Callipepla californica*, Northern mockingbird, *Mimus polyglottos*, acorn woodpecker, *Melanerpes formicivorus*, Nuttall's woodpecker, *Picoides nuttallii*, scrub jay, *Aphelocoma coerulescens*, American crow, *Corvus brachyrhynchos*, turkey vulture *Cathartes aura*, flying, swimming, and terrestrial insects, polliwogs, and California toad, *Bufo boreas*.

Cole at Clark Drive

near the bridge, N 38°59.8605', W 122°48.2985'

approximately 20 ' downstream, N 38°59.8344', W 122°48.9976'

In 2012 hitch were observed migrating at this location, and in 2010 numerous hitch were stranded upstream of this location.

Domestic chickens were heard, mourning doves, *Zenaida macroura* were heard, and deer, probably *Odocoileus virginianus* tracks were observed on banks and in the creek. One doe and fawn were observed in oak woodland on the hillside nearby.

Water was clear although levels and flows decreased over time. Algal growth accumulated along banks and rocks. Small rock dams were situated at various intervals instream, creating small pools in the creek. Rocks were apparently adjusted as water levels decreased, and small streamlets still flowed around edges. Substrate consisted of estimated ~30% cobble, 60% gravel, 10% sand, and silt. The site was rather exposed, and bank degradation was estimated at ~50%.

Monitoring was done twice weekly from 3.9.2013 to 4.10.2013 until the drying creek and reduced flows created conditions in which migration could not have occurred, and it was discontinued.

On 3.13.2013



On 4.10.2013



Adobe at Bell Hill Road

N 38°57.4472', W 122°53.4624

In 2012 adult, larval and juvenile hitch were seen at this location. In 2010 numerous juveniles including what were thought to be hitch were observed immediately downstream.

This site is open to agland, and riparian vegetation is often in clusters in or along the streambed, which is fairly wide and leveed. There were occasional pairs of mallards, *Anas platyrhynchos*, a great white egret, *Ardea alba*, and a great blue heron, *Ardea herodias*. A domestic dog was present on occasion. Juveniles, possibly Sacramento suckers, *Catostomus occidentalis* were present in large numbers, ranging from 1 to 3 cm. TL, from 4.10.2013 to 4.21.2013.

4.14.2013



Water was clear overall although levels were reduced over time. Substrate varied considerably, including cobble, gravel, sand and silt. Barriers consisted of culverts exiting downstream of the road, elevated above the creek, large boulders, a rock dam, and a reservoir into which water was diverted via a small inlet. Juvenile fish were detected entering the inlet from the reservoir to the creek and being drawn into it from the creek to the reservoir. On 3.17.2013 water levels were low and the inlet was dry, but it was deepened and allowed water into the reservoir.

Downstream, water was pooled in vegetation and boulders. Most pools emptied into the creek proper. 3 unidentified fish appearing to be ~3 cm. TL were seen in one of these pools.

Monitoring here occurred twice weekly from 3.9.2013 to 4.21.2013, when pooling further downstream interrupted fish passage, and no further migrations could occur.



Adobe downstream, 3.9.2013

Adobe upstream, 3.9.2013



Adobe directly upstream of the image above, 3.9.2013





Adobe upstream about 4 ½ weeks later, on 4.21.2013

Clover Bypass at Elk Mountain Road

N 38°57.4423', W 122°54.1538'

Hitch were seen migrating upstream at this location in April 2009, and unidentified juveniles were numerous in 2010. An adult Sacramento sucker was migrating upstream on 3.10.2013.

This area is open and leveed with a broad streambed and occasional groupings of riparian vegetation along the streambed. Grasses cover the sloping sides of the Bypass. On one occasion 2 pair of mallards, *Anas platyrhynchos* were in pooled areas, 1 pair upstream and 1 pair downstream. A female wild turkey, *Meleagris gallopavo* was spotted on a levee, and raccoon, *Procyon lotor*, tracks were noticed at the edge of a pooled area.

Water was clear; over time with reduced water levels, algae formed along banks and substrate, which was estimated at 25% cobble, 50% gravel, 10% sand, and 15% silt. This Bypass is manmade and kept relatively free of material that could impede high water runoff.

This site was checked twice weekly from 3.10.2013 to 4.14.2013, when it appeared that water levels were reduced by $\sim 1/2$ only from a few days earlier. Alley Creek upstream of the Bypass, at Pitney Bridge, had less water as well. Both locations had stretches of undergravel flow but no fish passage, and monitoring was discontinued.

Sacramento sucker, 3.10.2013



Clover Bypass NE, 3.13.2013

Clover Bypass SW, 3.13.2013





Clover Bypass NE, 4.14.2013

Clover Bypass SW, 4.14.2013



Scotts below Tulelake Dam

N 39°9.3916', W 122°55.5370'

Juvenile hitch were seen in Scotts Creek and in paddies at this location in 2010. Currently access to paddies there is posted. Scotts Creek exits a culvert from circling around Tulelake, into a pool that is downstream of a small dam. Both the exit and pool were monitored.

Tulelake offers extensive wetland habitat for wildlife. Scotts Creek via Rodman Slough is its entrance. Lower Scotts Creek is leveed as is one lower side of Tulelake. Downstream of Tulelake numerous black crowned night herons, *Nycticorax nycticorax* were noted on tree branches, as well as several species of herons including green herons,

Butorides virescens. Pelagic cormorants, *Phalacrocorax pelagicus* were in trees and in flight. American white pelicans, *Pelecanus erythrorhynchos* foraged in Tulelake, 2 scaups, *Aythya sp.* were seen in flight, mallards, *Anas platyrhynchos*, and 1 pair plus 3 females, of common mergansers, *Mergus merganser* were seen on several occasions. An American kestrel, *Falco sparverius* was heard, a western pond turtle, *Actinemys marmorata* and a Western grebe, *Aechmophorus occidentalis* were observed in pooled water, and several ground squirrels, *Spermophilus sp.* were observed on different occasions. Several large, unidentified fish were noticed in the pooled area.

Water was initially clear, then on 3.24.2013 it grew turbid as water was pumped from Tulelake into the pooled area below the dam, and any visibility was gone. On 4.6.2013 pumping stopped and small schools of unidentified juvenile fish appeared at the downstream mouth of the culvert. Pumping seemed to have lessened or stopped by 4.17.2013. Water depth varied but was ±meters; water was cooler than the other 3 sites.

This location, that is, the exit from the culvert into the pool and the pool, was monitored twice weekly, from 3.10.2013 to 4.21.2013. No fish had been seen for several monitoring days in the pooled area, and no predators had been seen. Water was murky with poor visibility and debris and algae on its surface, and monitoring was discontinued.

Pooled area, 3.10.2013



Pooled area with Tulelake in the distance 3.14.2013



Leveed Scotts Creek as it enters pooled area below dam 3.14.2013



Tulelake beyond the dam. Scotts Creek is channeled along the left side. 3.20.2013

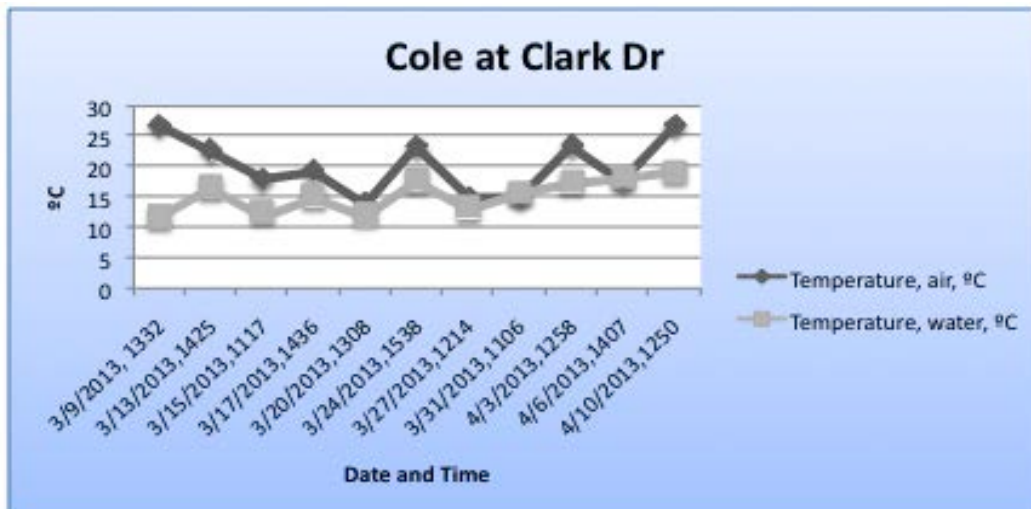


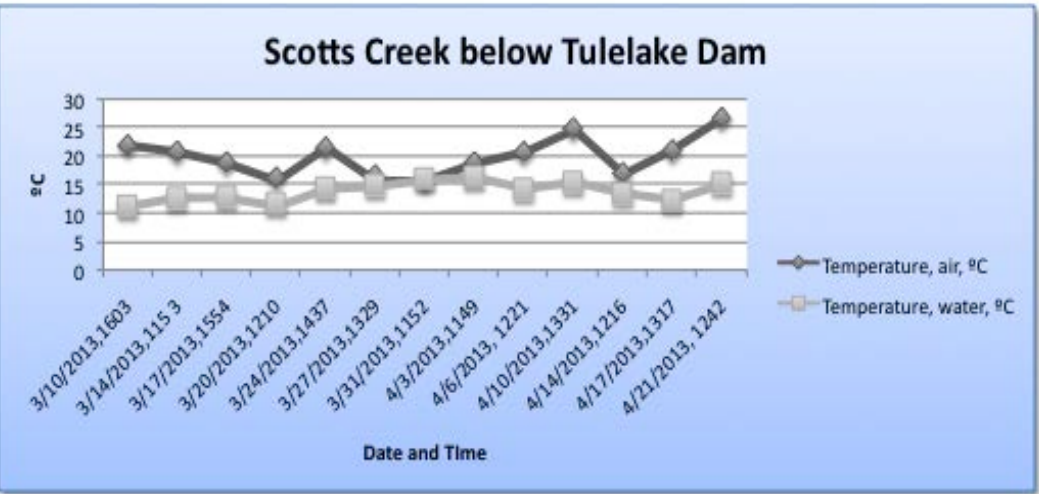
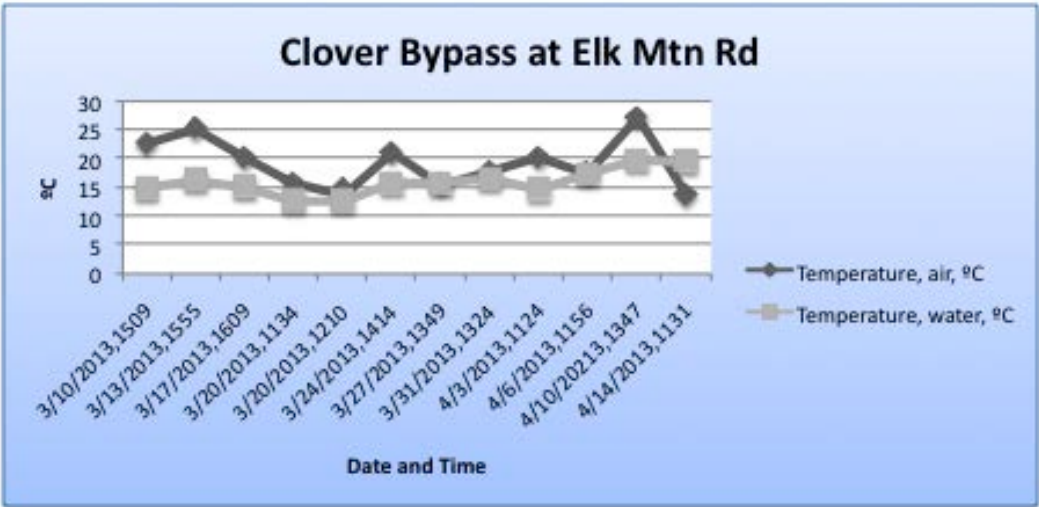
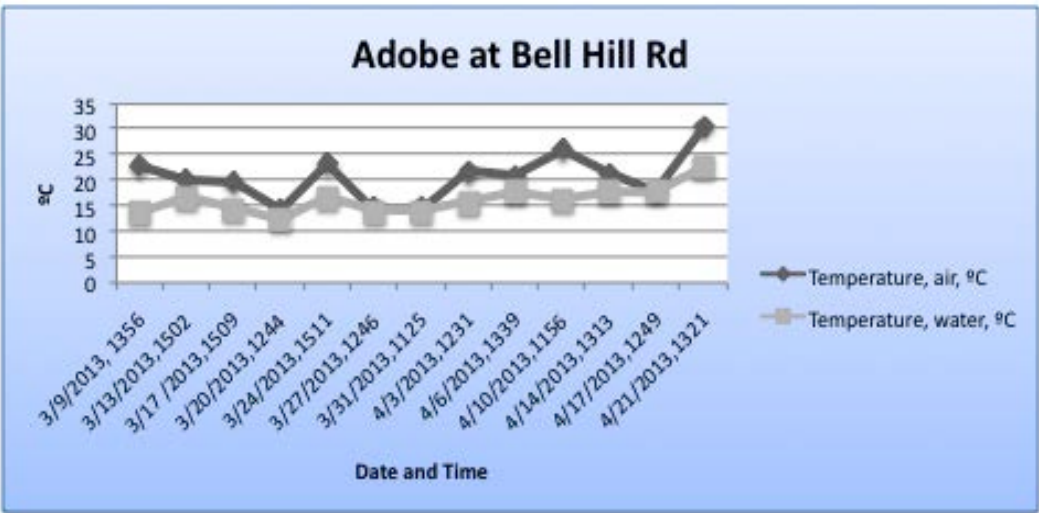
Water pumping from Tulelake, 3.24.2013



Temperatures at the four locations

Temperatures of ambient air and water are important because habitat susceptibility potentially endangers this part of the hitch life cycle. Global warming will not help.





Locations monitored intermittently

<u>Location</u>	<u>Date, Time</u>	<u>Hitch</u>
Adobe at Soda Bay Rd N 39°0.5384', W 122°52.1489'	3.9.2013, 1254	0
Kelsey at Soda Bay Rd N 39°0.6486', W 122°50.1172'	monitored 8 times, from 3.9.2013 to 4.10.2013	2 dead
Cole at Soda Bay Rd N 39°9.3838', W 122°55.5484'	monitored 5 times from 3.17.2013 to 3.27.2013	0
Alley at Pitney Bridge N 39°10.4726', W 122°53.4893'	3.10.2013, 1529	0
Clover at Bridge Arbor N 39°9.4282', W 122°54.4169'	3.10.2013, 1541	0
Middle at Hwy 20 N 39°9.8107', W 122°54.9569'	monitored 3 times 2 from 3.10.2013, and on 4.3.2012 (~200'S)	0
Unnamed along Eickhoff Rd N 39°6.9860', W 122°57.3563' N 39°6.2215', W 122°57.2893'	4.6.2013, 1456 monitored 2 locations where juveniles were observed in previous years	0
Scotts at Blue Lakes exit 39°9.2380', W 122°59.3329'	4.6.2013, 1521	0
Lower Middle at Bridge Arbor gate N 38°57.4570', W 122°54.8714'	monitored 4 times from 4.21.2013 to 5.16.2013	0

Unidentified juveniles, possibly Sacramento suckers, were seen at this location.

4.21.2013, lower Middle



5.16.2013, lower Middle



In review, changes occurred at each of the four locations.

Cole Creek at Clark Drive had little flow, with small rock dams, and eventually no fish passage.

There were barriers in the form of culverts and groupings of boulders at Adobe Creek at Bell Hill Road, and an inlet into a reservoir was dry, then drew in water, then released water. Juvenile fish were drawn into it and also moved downstream from the reservoir.

Water was diminished by about half within four days, at Clover Bypass at Elk Mountain Road, with no fish passage almost overnight as the outcome.

Scotts Creek at Tulelake always had water, although Tulelake itself was pumped dry of water, debris, and fish (pers.comm.).

Lower Middle Creek had lower water on 5.4.2013 than on 5.16.2013, when it appeared to have risen by ~2-3 cm.

Only observations are noted here. A study was not undertaken because no hitch, eggs, or larvae were found.

Cited:

Map, ref. Suchanek et al "Evaluating And Managing A Multiply-Stressed Ecosystem At Clear Lake, California: A Holistic Ecosystem Approach" pg.3, 2002, online at www.des.ucdavis.edu/faculty/Richerson/Clear%20Lake%20overview.pdf (Figure 121.1 Map of Clear Lake and surrounding watershed, with locations of dams.)

Referenced:

Franson, S., "Observations of Larval Development of Clear Lake Hitch, *Lavinia exilicauda chi*, with Regard to Differences in Temperature in Their Environment, an Individual Study, Spring 2012, www.rootlets.com/papers/study-spring2012.pdf