

Observations of Spring Fish Migration with a Focus on Hitch, *Lavinia exilicauda chi* Fish, Wildlife, and Riparian Habitat in Northshore Tributaries, Clear Lake Basin, Spring 2022

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Routine, basic, weekly observations during potential spring migration and spawning, at set locations along northshore tributaries of Clear Lake, are summarized and the data collected is graphed. For a cohesive approach the same fundamental information has been noted since 2013.

* I was unable to reach 3 creek banks, at the Tulelake, Clover Bypass, and Middle north locations, this year and observed them from the nearest point possible. I wanted to omit them since monitoring has always targeted fish but chose to include observations because adult and juvenile fish have been observed before at each location.

For this reason monitoring for environment, wildlife, and indications of fish such as ripples, sounds, odor, presence of predators, and more, were recorded for any changes in habitat, by maintaining consistency with previous years' monitoring.

Summary

This year monitoring occurred from 13.March.2022 to 29.May.2022 in northshore tributaries of Clear Lake, Lake County, California, for sightings of Clear Lake Hitch, *Lavinia exilicauda chi*, during migration, spawning, and passage of juveniles downstream.

Adult hitch, *Lavinia exilicauda chi*, were seen migrating exhibiting spawning behavior, some with a light tan/salmon colored wash on their sides, on 3 occasions, 27. March, 1.April, and 3.April, and at one location, Middle Creek south, along the creek bank's location coordinates and continuing roughly 50 feet upstream. They turned back at that point and were not seen further north in Middle Creek. Fish were identified using head and body style, fin style and placement, coloration, markings, and behavior. A resident who lives close by had seen them earlier as well (pers. communication). They are deep-bodied, and some at times found themselves on their sides in shallow waters but appeared to rest and make their way to deeper water. *The image below is a link to a video clip.*



Egg masses were not clearly visible, but 3 juveniles ~1cm. TL were seen on 1.April, tightly hugging the creek bank at this location. They quickly swam out of sight but were believed to be juvenile hitch vs. Sacramento suckers, from body style, countershading colors, and behavior. They would have developed from 4-6 cm. to ~1.0 cm, strong enough to handle milder currents next to the creek bank.

Exact triggers for hitch migration are not known. Given the ephemeral nature of Clear Lake tributaries, opportunism would be important. Water temperatures of 16°C to 18°C appear to be important for egg development and juvenile survival (ref. [Observations of Larval Development....](#), 2012). Adult Sacramento suckers, *Catostomus occidentalis*, were seen at this location and further north in Middle Creek, at Rancheria Bridge on 24 April. Juvenile Sacramento suckers 1.0 to 1.25 cm. were seen heading downstream at Middle south on 15., 22., and 29.May.

Creeks were flowing but rainfall was limited. Observations of hitch were reported and water levels remained fairly stable at Middle Creek south and north locations during migration, spawning, and returning passage for adults and juveniles. At the Clover Bypass location, levels rapidly fell and by 15.May that location was dry. Earlier, flow appeared to be impeded, likely near its confluence with Middle Creek where winter storm debris and sandbars accumulate, and where low levels from agricultural usage often impact water flow and fish passage. Access at that point is not public and is posted. Any obstruction could not be confirmed.

Water levels rose after rain events but were never high this year overall. Water levels and flow can vary quickly and considerably from runoff and from drawdown for crop irrigation. Levels in Tulelake remained low but stable; an agricultural easement for environmental purposes exists there. During observations Clover Bypass was the only creek that became dry.

Gravel bars were substantially more exposed over time and resulted in braiding and channeling. Instream grasses, instream herbaceous growth, and riparian vegetation especially closer to creek banks surged with spring rains. In Middle Creek instream algae developed early on creek substrates but largely washed away with spring rains. It grew at the Clover Bypass location and to some extent at the Tulelake location. Fish passage was conserved in Middle Creek, existed in Tulelake, the pond below its dam, and Scotts Creek, but failed in Clover Bypass.

At all locations during and after rain events water clarity was diminished, and silt load with surface debris increased. Water clarity usually improved quickly with the exception of the Tulelake site, where water was always brown to greenish-brown and opaque. Several species of algae grew on substrate as water warmed, but with the exception of the Clover Bypass location, surface mats had not formed or were small when observations ended.

Wind, wind gusts, rain or light rain, cloud cover, and temperature influenced wildlife activity. Wildlife activity increased as spring progressed but was significantly reduced in comparison to previous years and was inhibited when people were present. Absence of wildlife including predators was truly startling at Middle south when hitch were observed migrating and spawning. The opposite was true when Sacramento suckers were seen there.

Methods

All locations were monitored as best as possible.

Where fish were seen, counts were based on observation rather than timed intervals. Field notes were recorded and digital images were taken at each location for each monitoring event, images with attention to angles that would capture small changes. Monitoring ceased after water levels subsided, there was limited or no flow at locations, juvenile fish were few or absent, and no migrating adults had been seen for several weeks.

The first day of monitoring included a description of immediate and peripheral vegetation, substrate, creek and bank degradation, aquatic, horizontal, and vertical habitat, significant features in the environment, and GPS coordinates. Creek bank degradation was estimated for current creek banks that have been leveed with creeks having been redirected.

Numbers and TL of fish at all locations were estimated, as fish were not removed from streams to be examined and measured. At each observation event at each location field notes included but were not limited to fish counts, estimates for water depth, flow, and clarity, cloud cover,

wind speed and direction, ambient air and water temperatures, wildlife heard, seen, in flight, on and in water, and evidence of its presence including scat, tracks, paths, bowers, hollows, disturbed brush or grasses, and other changes in the environment. If wildlife could be identified accurately by sight or vocalization, those species were noted. Ever-present individuals and unidentified individuals belonging to large groups such as passerines were counted in that manner. Please see the wildlife summary.

Wind speed and direction along with gusts were estimated. Wind direction at the five locations can and does vary due to weather, biogeography, and geomorphology. Estimated highs and lows for wind speed and wind direction were graphed along with cloud cover.

Depth was estimated using permanent reference points on creek banks and in channels. Flow was estimated at a center point instream by timing the movement of light surface debris, simple but fairly accurate and consistent over time. Deep and shallow estimated depth and estimated flow were graphed.

Equipment

Equipment consisted of an Olympus digital camera, an iPhone SX-Max, a DeLorme Earthmate PN-60, and a Cooper handheld digital thermometer with extension. Resources occasionally consulted were Google Earth Pro 7.3.4.8642 (64-bit), a Jepson manual (University of California Press, ©1993), the Guide to the Coastal Marine Fishes of California (Daniel J. Miller and Robert N. Lea, California Fish Bulletin Number 157, Department of Fish and Game, State of California, 1972), the Handbook to the Orders and Families of Living Mammals (Timothy E. Lawlor, 2nd ed., Mad River Press, Rt. 1, Box 151-B, Eureka, CA 95501, 1979), A Field Guide to Mammals, North America north of Mexico (William H. Burt, and Richard P. Grossenheider, Peterson Field Guides, 3rd Ed., Houghton Mifflin Co., Boston, New York, ©1980), and the Field Guide to the Birds of North America (2nd Ed., National Geographic Society).

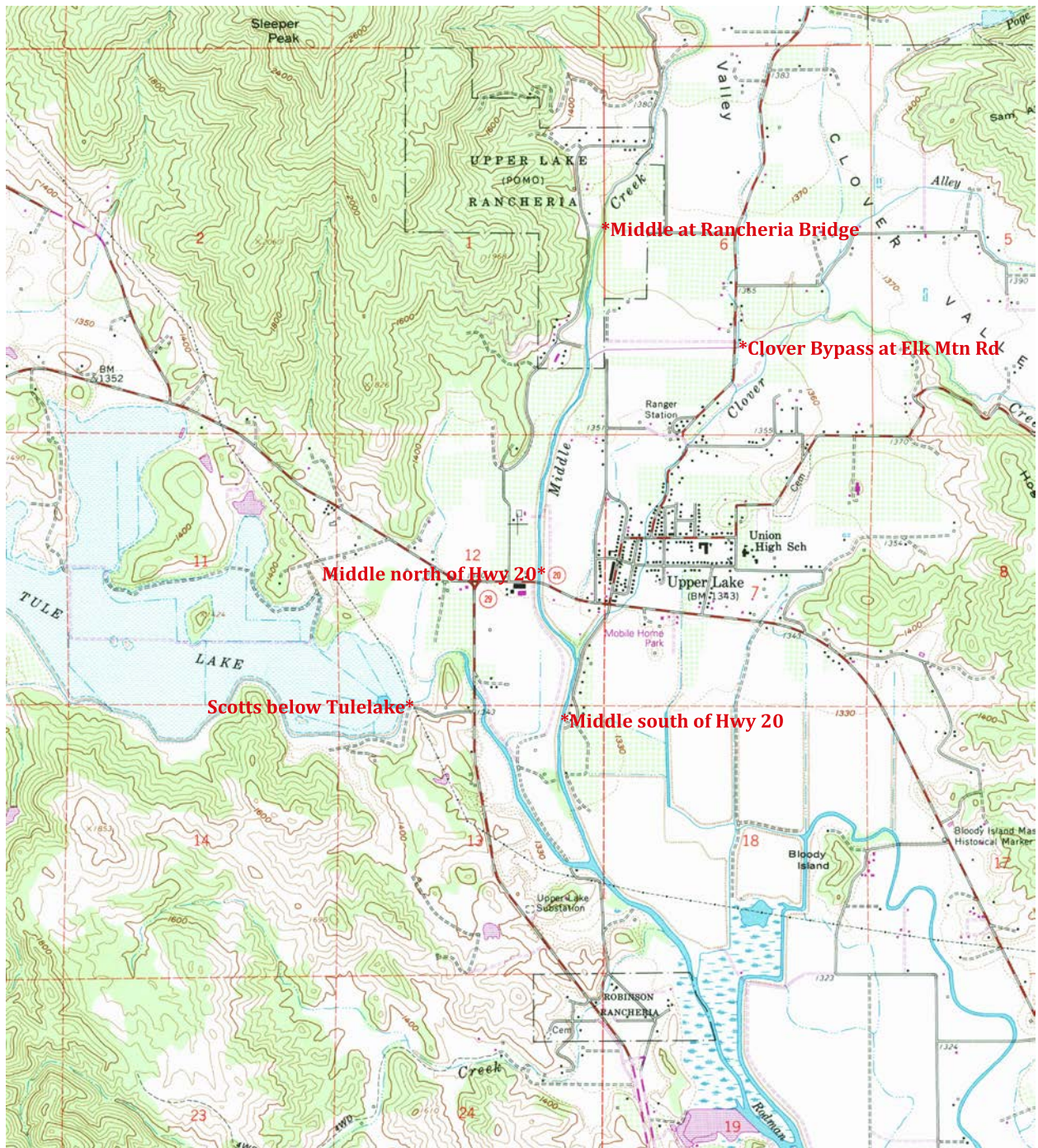
3.27.22, Middle Creek south location
Individuals managed to make their way upstream.



3.27.22, Middle Creek south location
This individual rested and returned to deeper water.



Monitoring Locations



Map derived from a portion of quadrangle map, Upper Lake, CA 39122-B8-TF-024, courtesy of United States Geological Survey, in cooperation with California Department of Water Resources; Control by USGS, NOS, NOAA, and USCE, compiled from imagery taken 1957

Following are the 2 locations at which fish migration was observed.

Middle Creek South

N 39°9.4648", W 122°54.8602" elev. 1332

Adult and juvenile hitch, *Lavinia exilicauda chi*, and adult and juvenile Sacramento suckers, *Catostomus Occidentalis*, were seen at this location, hitch (on 3.21.22, 4.1.22, 4.3.22) a few weeks before suckers (on 4.24.22), when water temperatures were a few degrees warmer. Water temperatures then cooled but warmed again toward the end of monitoring.

Hitch appeared to pool about 50 feet above this creek bank location and were not seen further upstream. Suckers were seen ~ 2 miles north at the Rancheria Bridge location. 3 juveniles at 1 cm. suspected to be hitch due to body style, countershading colors, and behavior were observed on 4.1.22. They would have grown to 1 cm from 4-6 cm, better able to handle current next to the creek bank. 300 juvenile Sacramento suckers at 1 cm were seen on 5.15.22, 200 at 1 cm on 5.22.22, and 5 at 1.25 cm on 5.29.22.

Notably, predators were few or absent when hitch were present.

Riparian vegetation lines the channel and extends roughly 50 feet east to the second tier levee bench, beyond which ruderal grasses, wildflowers, and vetch grow. The western bank supports a narrow, steep strip of riparian vegetation between the channel and a dirt road. There is horizontal and vertical habitat east and west, and thick understory. Further east are homes, orchards, and vineyards. Further west is a demolished pear orchard. Approximations for substrate were cobble 30%, gravel 40%, sand 20%, and silt 10%, with bank degradation of 50% due to levees and encroaching 4x4 vehicles. The channel is basically protected.

Water in the channel was clear save immediately following storm events, when levels rose quickly and receded quickly, leaving surface debris. Fewer storm events this spring resulted in clear, clean water with water levels from 0.5 m to 0.2 m, 0.1 m at creek bank. Instream gravel bars became increasingly exposed.

Water temperature was taken near the creek bank where juvenile fish have been normally seen. Migrating adults were observed all across the channel.



3.13.2022, 1521

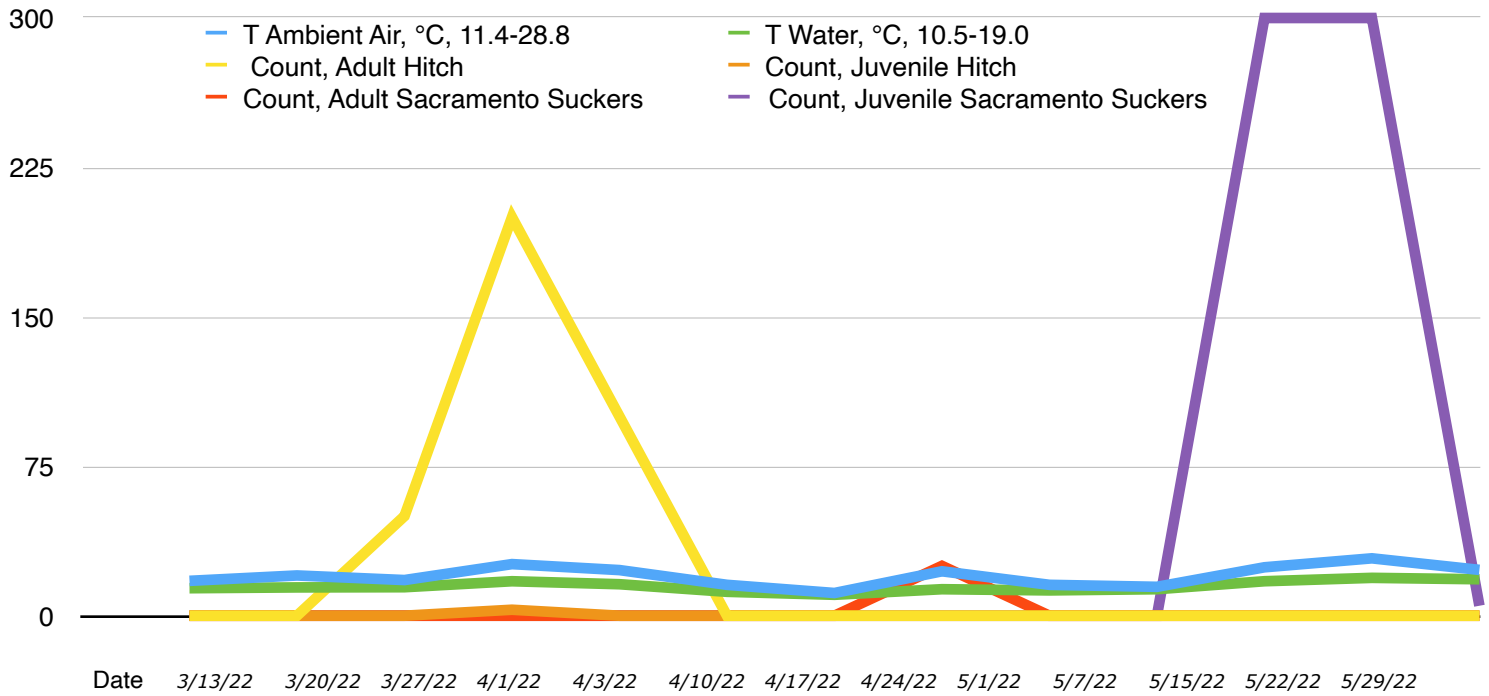


5.29.2022, 1351

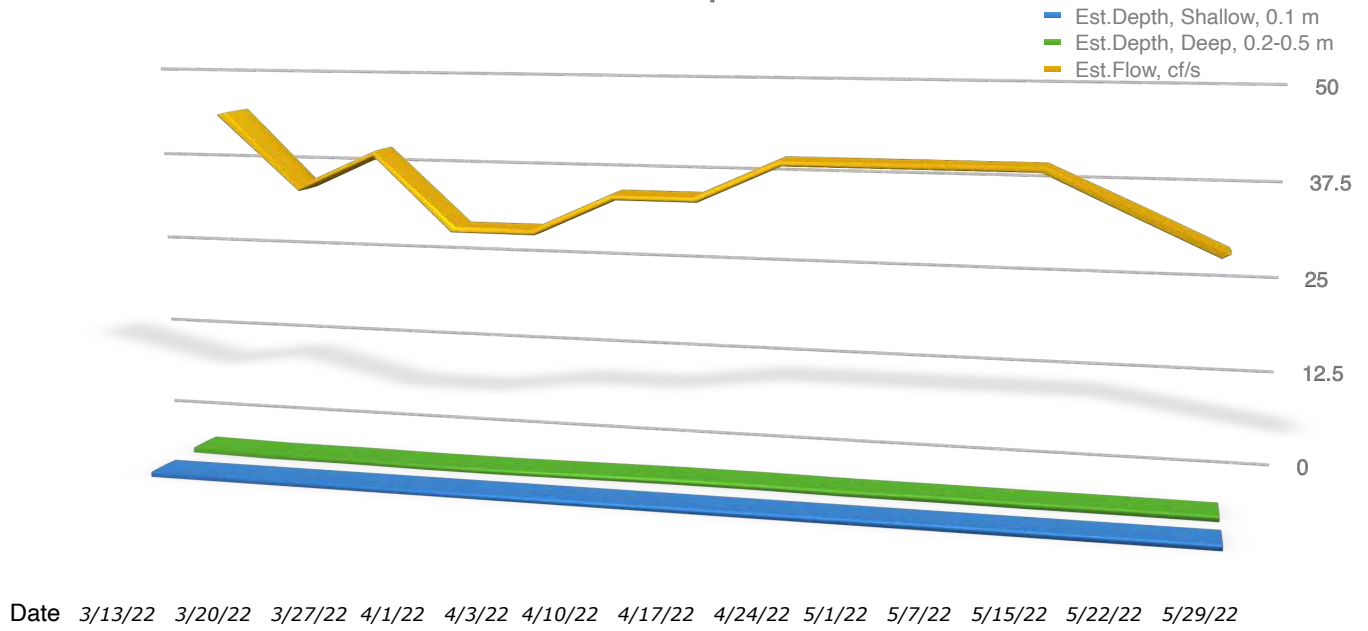


4.1.22, 1300
 Adult hitch gathered in a quiet area on the opposite side of the creek. They were not observed more than 10 or 20 ft further upstream of this pool.

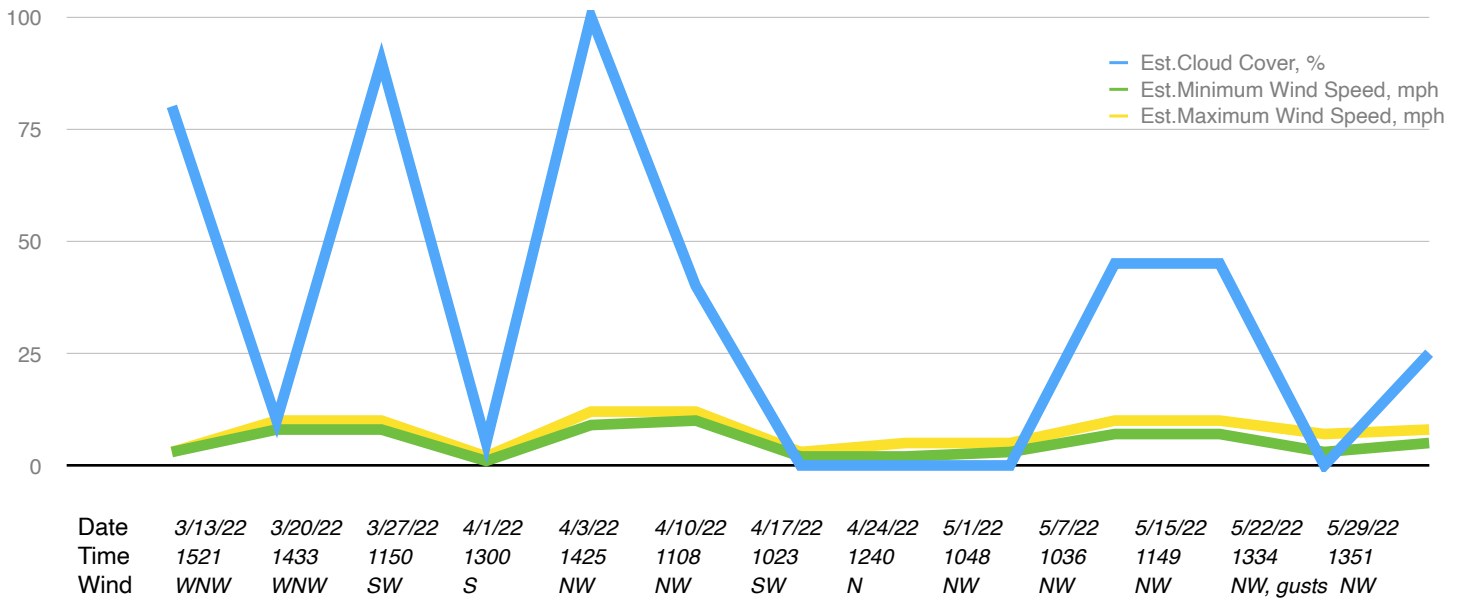
Middle South: Temperatures and Fish Count



Middle South: Depth and Flow



Middle South: Cloud Cover and Estimated Wind Speed





4.3.22, 1425 Middle Creek south
 Lerneae or anchor worm, parasitic copepod crustaceans, have been observed on many hitch, often to the point of greatly reduced health and vulnerability to influences they could normally handle.

3.27.22, 1150 Middle Creek south
 Maneuvering in shallow waters causes injuries to abdomens, sometimes serious and likely fatal, seen in previous years during tagging events.

Middle Creek South: Brief Summary of Fish Count, Wildlife, and Immediate Environment

3/13/22 1521		3/20/22 1433
<p>Vegetation: poplar sp., salix sp., Himalayan blackberries, ruderal grasses, wildflowers: various, herbaceous and shrubby understory, California bay laurel</p> <p>Habitat: 10-60 ft. vertical habitat, 10-50 ft; horizontal habitat and understory of grasses, shrubby growth including Himalayan blackberries; small inlet along the side of the stream</p> <p>Substrate: 30% cobble, 40% gravel, 20% sand, 10% silt</p> <p>Bank degradation ~50%</p>	<p>Leveed stream that is slightly braided from gravel bars, with orchards on either side; site is protected from surrounding environment</p> <p>Water: clear, reduced levels</p> <p>No fish seen</p> <p>Heard: few passerines Seen: 1 dog, dog and human footprints</p>	<p>Water clear; beginning growth of instream algae on substrate, catkins and early leaf on willows</p> <p>No fish seen</p> <p>Heard: few passerines, toads, traffic Seen: spider, elm beetles, tracks: dog, human, tires Flight: crow, woodpecker, gnats, flies</p>
3/27/22 1150	4/1/22 1300	4/3/22 1425
<p>Water: clear, trees leafing out, growth, grasses</p> <p>~50 adult hitch observed heading upstream and downstream, and spawning behavior: some with a very light salmon-warm tan wash on their sides</p> <p>Heard: passerines, wind, lawnmower, traffic Seen: 2 humans, dog, deer Flight: butterfly, crow</p>	<p>Water: clear, early growth on trees and shrubs, algal growth along creek banks expanding</p> <p>~200 adult hitch observed, in small groups and traveling upstream; 3 juveniles, 1 cm, likely hitch from body style and color, observed next to a protected bank; no egg masses seen</p> <p>Heard: passerines, traffic Seen: tracks- human, dog Flight: great blue heron, California towhee</p>	<p>Water: clear, slight algal growth on substrate and near banks; grasses growing</p> <p>~100 adult hitch in small groups and pairs traveling upstream but only about 20 ft past this location; spawning behavior; no egg masses seen</p> <p>Heard: acorn woodpecker, toads, wind, traffic Seen: elm beetles Flight: 2 woodpeckers, great blue heron, crow, insects</p>

4/10/22 1108	4/17/22 1023	4/24/22 1240
<p>Water: clear, slight algal growth on substrate; grasses heading out trees leafed out, catkins on willows, large branch down near path</p> <p>No adult or juvenile fish seen</p> <p>Heard: passerines, wind, crow Seen: black cat, tracks- human, dog, tires Flight: crow</p>	<p>Water: clear, no surface algae, reduced on substrate; grasses seeding; vetch, poppies in bloom; odor of fish</p> <p>No adult or juvenile fish seen</p> <p>Heard: passerines, acorn woodpecker, mourning dove, American robin, cricket, traffic Seen: cricket on ground Flight: downy woodpecker, acorn woodpecker, mourning dove, insects</p>	<p>Water: clear, clean; grasses seeding, poppies blooming, odor of fish</p> <p>~25 Sacramento suckers traveling upstream, downstream, with breeding colors, and spawning behavior</p> <p>Heard: passerines, crow, acorn, Nuttall's, and downy woodpeckers, osprey, traffic Seen: tracks- human, deer, raccoon, tires Flight: cliff swallows, crow, insects</p>
5/1/22 1048	5/7/22 1036	5/15/22 1149
<p>Water: clear, clean; increased foliage and grasses, wildflowers in bloom; odor of feces</p> <p>No adult or juvenile fish seen</p> <p>Heard: passerines, mourning dove, American robin, cricket Seen: tracks - dog, human, tire - fresh; dog scat, lizard, fresh gopher mound, possible skunk scat Flight: butterfly, 2 crows, 3 California towhees, seeds, insects</p>	<p>Water: clear, clean; grasses seeding, wildflowers bloom, odor of feces; fresh trash discarded; fresh, large tire tracks in creek</p> <p>No adult or juvenile fish seen</p> <p>Heard: passerines, cricket, wind, traffic Seen: California towhee Flight: butterfly, 2 California towhees, insects</p>	<p>Water: clear, clean; loose algae clumps instream; aquatic insects; grass seeds drying, vetch and wildflowers in bloom; odor of mugwort</p> <p>~300 juvenile Sacramento suckers 1 cm observed near bank's edge at 2 locations</p> <p>Heard: passerines, cliff swallows, American robin, cricket, wind, traffic, plane Seen: dog and coyote scat, dog tracks, dog Flight: hairy woodpecker, cliff swallows, butterfly</p>
5/22/22 1334	5/29/22 1351	
<p>Water: clear, clean, loose algae floating downstream; vetch, poppies blooming; grasses drying and seeds in air</p> <p>~200 juvenile Sacramento suckers 1 cm very near bank and out of current, and heading downstream</p> <p>Heard: American robin, traffic Seen: 2 Brewer's blackbirds on instream gravel bar, near edge and foraging on juvenile fish, tracks- human, dog, tires Flight: cliff swallows, butterflies, insects</p>	<p>Water: clear, algae developing on substrate; aquatic insects instream; gravel bars more exposed; wildflowers and poppies blooming; grasses continuing to seed</p> <p>5 juvenile Sacramento suckers ~1.25 cm and 1, 1 cm</p> <p>Heard: passerines, American robin, wind, traffic Seen: American robin, small dog, tracks- dog, human, tires, raccoon scat Flight: 2 crows, insects</p>	

Middle Creek at Rancheria Bridge

N 39° 10.9495', W 122° 54.7975' elev. 1376

This location was monitored from Rancheria Bridge, on Rancheria Road. Access to the creek bank is not public. Middle Creek is normally clear at this site, and both adult fish and juveniles ~2 cm and more can be seen from the bridge. For many recent years Sacramento suckers and juvenile rainbow trout (*Oncorhynchus mykiss*), that live upstream, have been observed. No hitch have been seen above the 4 weirs that were built decades ago, although historically hitch were seen in this area (anecdotal information, pers.comm.).

This spring on 4.24.22 adult Sacramento suckers, many in breeding colors, were seen in the creek above and below Rancheria Bridge, 7 below although over the bridge apron, and ~50 above.

Middle Creek here is leveed on both sides. To the west, a road is roughly 50 ft from the creek bank. Beyond the road is a hillside. Overall there is oak woodland, with madrone, manzanita, some white pine, shrubs, grasses, and herbaceous growth. Strips of poplar, white alder, California bay laurel, willow, Himalayan blackberries, and ruderal grasses line the creek on either side. To the east are walnut orchards. The 2018 Ranch Fire burned over the hillside and in places reached the creek.

The channel is protected but for an area perhaps 100 ft in length on the west bank, cleared after the fire. Boulders and woody debris are in and along the creek. Approximations for substrate were 15% cobble, 55% gravel, 20% sand, and 10% silt. Bank degradation was estimated at 25% because the creek is enclosed by levees,

Riparian vegetation offering horizontal and vertical habitat lines both sides of the channel that is shallow above the bridge apron but flows more quickly over the apron and first weir. Gravel bars grew more exposed over time below the bridge and especially above it. Water was clear with some surface debris after storm events.

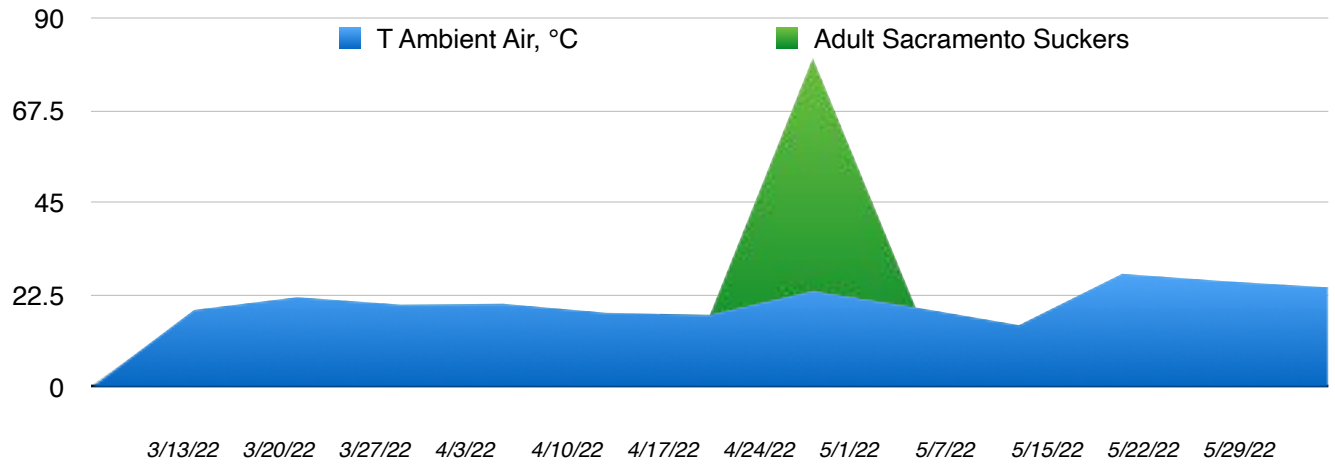


3.13.22 1654

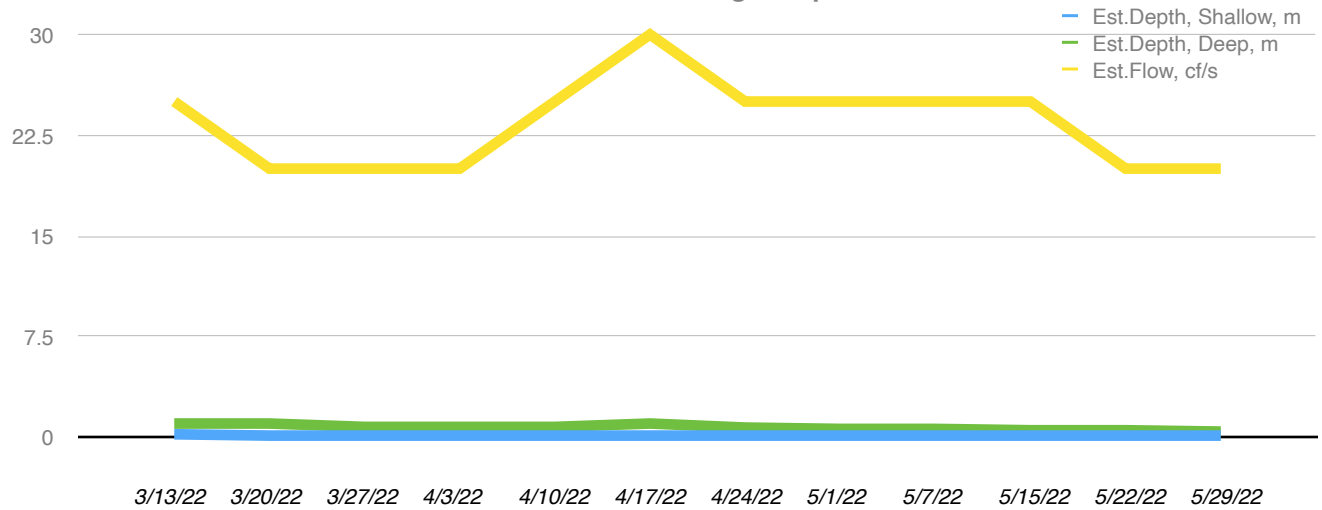


5.29.22 1419

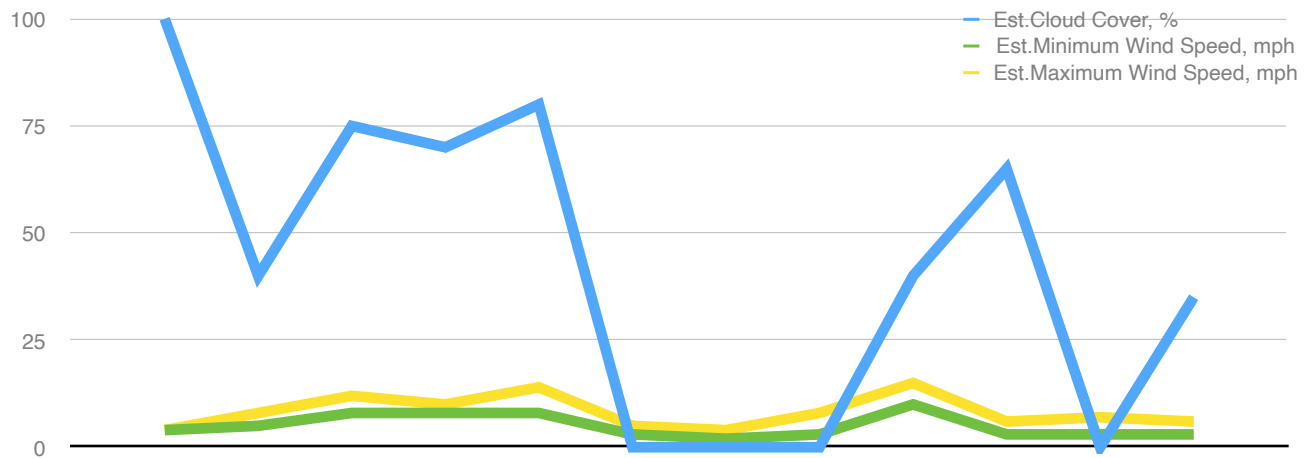
Middle at Rancheria Bridge: Temperature and Fish Count



Middle at Rancheria Bridge: Depth and Flow



Middle at Rancheria Bridge: Cloud Cover and Estimated Wind Speed



Date	3/13/22	3/20/22	3/27/22	4/3/22	4/10/22	4/17/22	4/24/22	5/1/22	5/7/22	5/15/22	5/22/22	5/29/22
Time	1654	1504	1234	1534	1134	1049	1336	1121	1036	1216	1406	1419
Wind	WNW	W	SW	NW	W, gusts	W	N	N	NW	NW	NW	WNW

Middle Creek at Rancheria Bridge: Brief Summary of Fish Count, Wildlife, and Immediate Environment

3/13/22 1654		3/20/22 1504
<p>Vegetation: sailx sp, white alder, poplar, California bay laurel, Himalayan blackberries, herbaceous plants and shrubs, grasses on the sides and near the top of the levee, wildflowers including wild mustard</p> <p>Habitat: vertical habitat 5-50 ft, horizontal habitat instream and bank to 30 ft, understory of shrubs and herbaceous plants; broad gravel bars instream, bridge apron on the south side of the bridge, the first of 4 weirs ~15 ft. from the apron</p>	<p>Substrate: cobble 15%, gravel 55%, sand 20%, silt 10%</p> <p>Bank degradation: 10-25%</p> <p>Leveed channel that is fairly well protected on either side</p> <p>Water: clear with surface and in stream algal growth</p> <p>No fish seen</p> <p>Heard: passerines, red shouldered hawk, water, vehicles</p>	<p>Water: clear, heavy growth of in stream and surface algae</p> <p>Odor of woodsmoke, and smoke seen in a field to the east; odor of blooms of a bay laurel</p> <p>No fish seen</p> <p>Heard: passerines, kestrel, woodpecker, dog, crow, frogs</p> <p>Seen: vehicles</p> <p>Flight: passerines, butterfly</p>
3/27/22 1234	4/3/22 1534	4/10/22 1134
<p>Water: clear, in stream and surface algae increasing, plants growing on substrate</p> <p>No fish seen</p> <p>Heard: passerines, frogs</p> <p>Seen: raven; vehicle</p> <p>Flight: turkey vulture</p>	<p>Water: clear, in stream and surface algae expanding; instream plant growth; vetch blooming</p> <p>No fish seen</p> <p>Heard: passerines, water</p> <p>Seen: 2 turkey vultures with a dead opossum; vehicle</p> <p>Flight: 3 Brewer's blackbirds, 1 crow</p>	<p>Water: clear, substrate and surface algal growth; plants expanding on substrate; grasses heading out, trees with leaves, catkins, vetch and wild mustard blooming</p> <p>No fish seen</p> <p>Heard: passerines, Nuttall's woodpecker, cliff swallows, water</p> <p>Seen at water's edge: crow</p> <p>Flight: 1 passerine, cliff swallows, 2 crows</p>
4/17/22 1049	4/24/22 1336	5/1/22 1121
<p>Water: clear, levels up, surface algae gone, algae on substrate decreased in bulk; gravel along bank decreased in breadth; grasses seeding, wildflowers blooming</p> <p>No fish seen</p> <p>Heard: passerines, cliff swallows, water</p> <p>Seen: vehicles</p> <p>Flight: cliff swallows, butterfly</p> <p>Cliff swallows nesting on bridge undercarriage</p>	<p>Water: clear, clean; vetch blooming</p> <p>7 adult Sacramento suckers seen below the bridge, on apron; ~50 observed above the bridge; all adult and many in breeding colors</p> <p>Heard: passerines, cliff swallows, Nuttall's woodpecker, water</p> <p>Seen: vehicles</p> <p>Flight: cliff swallows</p>	<p>Water: clear, clean, slight surface debris; gravel bars more exposed; increased instream plant growth; wildflowers blooming, grasses seeding and with increased growth</p> <p>No fish seen</p> <p>Heard: passerines, cliff swallows, water, plane, traffic</p> <p>Flight: 2 crows, numerous cliff swallows, butterflies</p>

5/7/22 1036	5/15/22 1216	5/22/22 1406
<p>Water: clear, clean; surface debris, instream plant growth increased; increased exposure of gravel bars; grasses cut near road, wildflowers blooming</p> <p>No fish seen</p> <p>Heard: passerines, acorn woodpecker, cliff swallows, wind, plane Seen: vehicles Flight: cliff swallows, butterflies</p>	<p>Water: clear, clean but with surface debris; increased instream plant growth; vetch and wildflowers blooming</p> <p>No fish seen</p> <p>Heard: passerines, cliff swallows, water, traffic Seen: human Flight: cliff swallows, butterflies</p>	<p>Water: clear, surface debris; increased growth of instream plants; some algae; dry grasses, vetch blooming</p> <p>No fish seen</p> <p>Heard: passerines, cliff swallows, downy woodpecker, frog, traffic Seen: cliff swallows, butterflies, insects, seeds</p>
5/29/22 1419		
<p>Water: clear, levels down; steadily increasing instream plant growth; vetch, morning glory blooming</p> <p>No fish seen</p> <p>Heard: acorn woodpecker, passerines, cliff swallows, water, wind, plane Flight: cliff swallows, butterflies, insects, turkey vulture</p>		

Following are the 3 locations at which observations occurred from a distance.

Scotts Creek below Tulelake Dam

Normally, N 39° 9.9607', W 122° 55.1711' elev. 1330
This year, N 39° 9'24.09" W 122° 55'31.23" elev. 1338 (Google Earth Pro)

Water clarity at this location was opaque. Adult fish were spotted jumping or their presence detected due to sound, ripples, or gathering of foraging predators, especially American white pelicans, *Pelecanus erythrorhynchos*. One adult fish seen when jumping in the lake was large and could have been a carp, Family Cyprinidae. Another fish was heard jumping in Scotts Creek below the dam. The dam was never under water this year. Predators tended to congregate above the dam.

After runoff from storm events settled, water levels followed Clear Lake levels.

The pool is surrounded by tules, shrubs, trees, understory, and ruderal grasses. Adjacent hills are primarily oak woodland. Horizontal and vertical riparian habitat is present. Approximations for substrate, as best as could be seen, were cobble 0%, gravel 15%, sand, 5%, and silt 80%. Bank degradation was estimated at 50% due to the altered landscape and diverted Scotts Creek channel.

Water levels and flow were estimated for the pool below the dam.

Wildlife sightings increased as spring progressed, vegetation leafed out, grasses and wildflowers appeared, with bees, butterflies, ants, and other insect life. Storm systems, wind, ambient air temperature, and cloud cover affected wildlife presence and movement. Wildlife was noted as heard, in or on water, in flight, and observed, on a bank, a berm, a branch, a log, the dam, or the ground.

Adult fish migrating upstream to Tulelake from Clear Lake and juveniles returning downstream traveled via Scotts Creek. Tulelake is included in an agricultural easement and normally remains partially full, with manmade islands. Scotts Creek is redirected into a channel

around the southwest edge of Tulelake, into a pool below a dam downstream of the lake, and from which Scotts Creek continues to the western arm of Rodman Slough and Clear Lake. The dam was not underwater this year. Fish needed to enter through access points in the Scotts Creek channel.



3.13.2022, 1554



5.29.2020, 1334

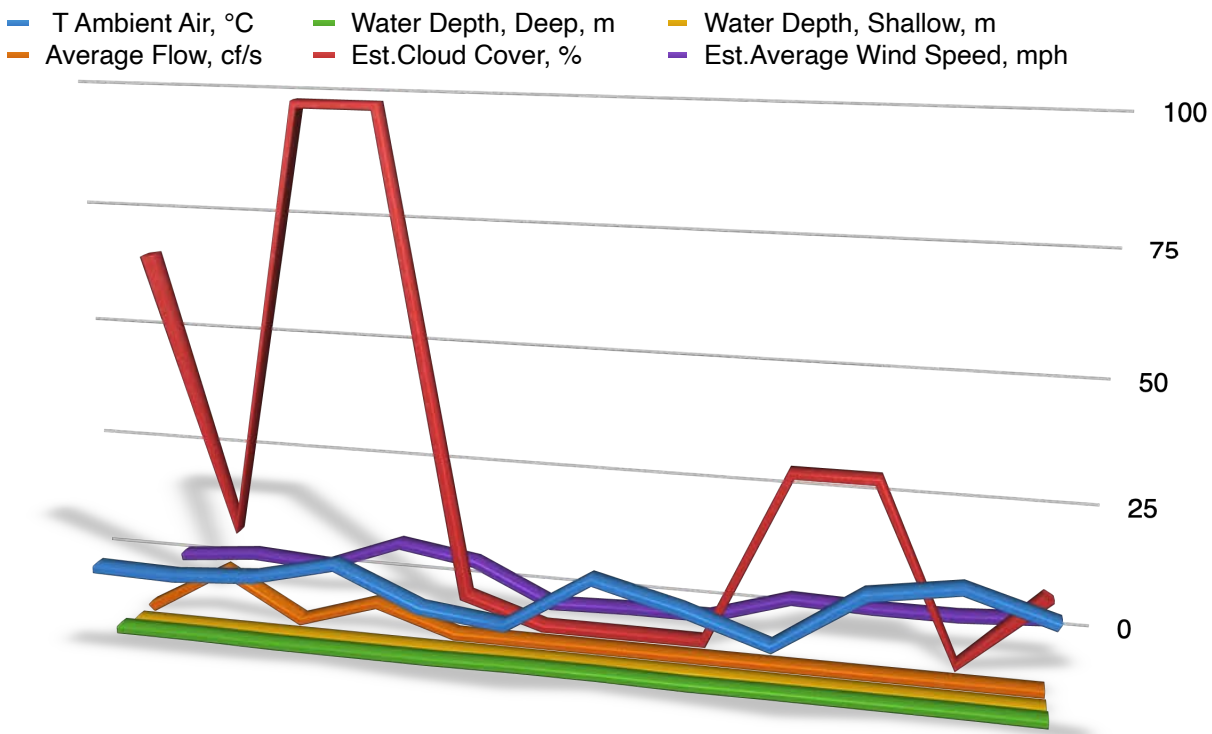


3.20.22 1407



3.20.22 1407

Tulelake: Temperature, Water Depth and Flow, Cloud Cover, Wind



Date	3/13/22	3/20/22	3/27/22	4/3/22	4/10/22	4/17/22	4/24/22	5/1/22	5/7/22	5/15/22	5/22/22	5/29/22
Time	1554	1407	1122	1407	1048	959	1223	1032	1018	1124	1316	1334
Wind	WNW	W	NNE,NNW	NW	NW	NW	NW	NW	N	NW	NW	NW

Tulelake: Brief Summary of Fish Count, Wildlife, and Immediate Environment-1

3/13/22 1554		3/20/22 1407
Vegetation: poplar <i>sp.</i> , sailx <i>sp.</i> , oak <i>sp.</i> , ruderal grasses, herbaceous shrubs and plants, Himalayan blackberries, poison oak; numerous logs and trash strewn about the area	Water: green-brown, opaque No fish or ripples seen Heard: passerines Seen: woodpecker <i>sp.</i> storing acorns, also vocalizing Flight: sparrow <i>sp.</i>	Water: green-brown, opaque; wind creating waves on lake. No fish or ripples seen but predators are present 3 large red slider turtles on log in pool; Heard: passerines, Canada geese Seen: ~50 American white pelicans on berm, great white egret on branch Water: pair mallards, common merganser, male Flight: 2 passerines, passerines, 2 crows, osprey
Habitat: vertical and horizontal, instream woody debris, oak woodland beyond immediate site		
Substrate as well as could be observed: 0% cobble, 5% gravel, 15% sand, 80% silt		
Bank degradation ~50%		

3/27/22 1122	4/3/22 1407	4/10/22 1048
<p>Water brown, cloudy</p> <p>Trees leafing out, odor of woodsmoke</p> <p>No fish or ripples seen, but predators are on lake and above dam</p> <p>Heard: passerines, Nuttall's woodpecker, acorn woodpecker, traffic</p> <p>Seen: ~40 American white pelicans on berm</p> <p>Water: 5 A w. Pelicans, 1 pelagic cormorant</p> <p>Flight: 2 great blue herons, 1 a.w.pelican, 2 acorn woodpeckers</p>	<p>Water green-brown, opaque</p> <p>Vetch in bloom</p> <p>No fish or ripples, but predators are on the lake and just above the dam</p> <p>Heard: wind, passerines</p> <p>No wildlife seen</p> <p>Water: 1 pelagic cormorant</p> <p>Flight: 1 passerine, butterfly</p>	<p>Water green-brown, opaque; water rough; vetch blooming</p> <p>No fish ripples, or predators seen</p> <p>Heard: few passerines, acorn woodpecker, wind, traffic</p> <p>Flight: insects, 2 acorn woodpeckers, 1 mourning dove, 1 passerine</p>
4/17/22 1048	4/24/22 1223	5/1/22 1032
<p>Water grey-green, calm, levels slightly up; lupines blooming</p> <p>No fish seen; ripples were observed above the dam</p> <p>Heard: passerines, Nuttall's woodpecker, acorn woodpecker, plane, traffic</p> <p>Water: 2 American white pelicans, 1 pelagic cormorant</p> <p>Flight: great white egret, woodpecker <i>sp.</i></p>	<p>Water green opaque, clean; vetch blooming</p> <p>No fish or ripples seen</p> <p>Heard: passerines, Nuttall's woodpecker, traffic</p> <p>Seen: 8 American white pelicans on berm</p> <p>Flight: cliff swallows, crow, insects, butterflies, bees</p>	<p>Water grayish, opaque; wildflowers blooming</p> <p>Fish observed jumping in distance, no ripples, or predators seen</p> <p>Heard: passerines, acorn woodpecker, Nuttall's woodpecker, cliff swallows, loggerhead shrike</p> <p>Seen: acorn woodpecker</p> <p>Flight: cliff swallows, downy woodpecker, crow, insects, butterflies, bees</p>
5/7/22	5/15/22 1124	5/22/22 1316
<p>Water green, opaque; increased growth in grasses; fresh trash dumped</p> <p>Fish jumped in distance, in lake; no ripples or predators seen</p> <p>Heard: passerines, acorn woodpecker, titmouse, wind, plane</p> <p>Seen: 2 people, dog, bike, car</p> <p>Flight: crow, Brewer's blackbird, bees, butterfly</p>	<p>Water grey-green, opaque; vetch, wildflowers blooming</p> <p>No fish seen; splash heard from creek; predator seen</p> <p>Heard: passerines, traffic, plane</p> <p>Seen: acorn woodpecker</p> <p>Flight: 2 crows, bald eagle, butterfly, seeds</p>	<p>Water brown, opaque; grasses drying, wildflowers blooming</p> <p>No fish, ripples, or predators seen</p> <p>Heard: passerines, mourning dove, wind, traffic</p> <p>Flight: mourning dove, crow, bees, butterflies, insects, beetle</p>
5/29/22 1334		
<p>Water green-brown, opaque; levels appear stable over time- water apparently not being released from Clear Lake; late wildflowers, Himalayan blackberries blooming</p> <p>No fish, ripples, or predators seen</p> <p>Heard: passerines, acorn woodpecker, California. Towhees, wind, traffic</p> <p>Flight: butterflies, insects</p>		

Clover Bypass at Elk Mountain Road

Normally, N 39° 10.5621', W 122° 54.1750' elev 1368

This year, N 39° 10'35.00" W 122° 54'10.69" elev 1365 (Google Earth Pro)

Clover Bypass, the channel resulting from the confluence of Alley and Clover Creeks to its confluence with Middle Creek, was assessed only for habitat this year. The creek bank itself could not be accessed. Observations and data of the area were noted from a short distance.

Adult and juvenile fish have migrated through this channel further northeast to Alley Creek. The channel here is leveed with broad benches on north and south sides. A barrier downstream for fish passage where Clover Bypass enters Middle Creek can occur from braiding and debris from winter storms. Drawdown from irrigation occurs upstream. By mid- to late spring the channel is narrow and shallow and is dry earlier than other creeks.

On the far side of the levee to the south are homes, vineyards, and orchards. To the north are vineyards, orchards, and homes with a small area of oak woodland.

Shrubby and herbaceous growth grew rapidly and were thick several feet from the creek bank. Infrequent small groups of willow grew next to the channel and provided some pooling and shady areas. Abundance of grasses covered levee sides, with access roads at the tops. Protection for the channel is extremely limited.

Approximations for substrate were cobble 20%, gravel 50%, sand 10%, and silt 20%. Bank degradation was difficult to assess because the area is leveed and often cleared, but is probably 50% to 75% leaving a small channel with annual shrubby growth and few small trees. Vertical habitat was limited from roughly 3 to 15 ft. Horizontal habitat other than grasses extended ~5 to 20 ft from the creek bank.

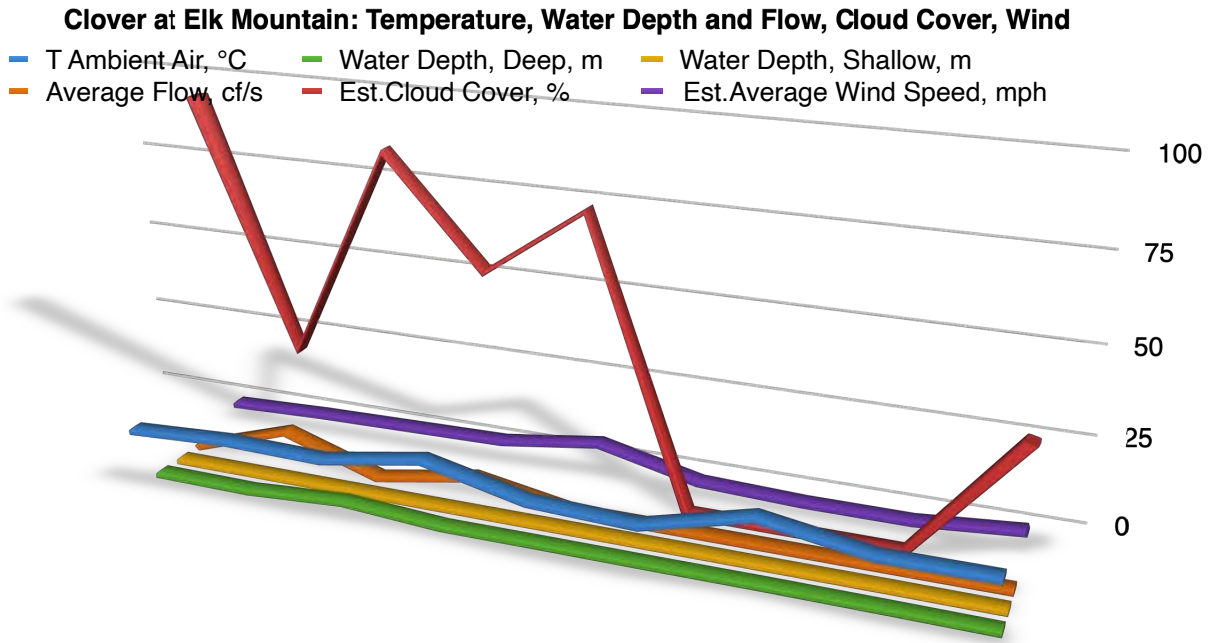
Algae developed and increased on substrate and on the surface especially near the creek bank. Flow decreased suggesting a barrier downstream, and as obvious drawdown began. Water remained clear until the channel dried.



3.13.22 1714



5.7.22 1100



Date	3/13/22	3/20/22	3/27/22	4/3/22	4/10/22	4/17/22	4/24/22	5/1/22	5/7/22
Time	1714	1520	1253	1546	1148	1103	1347	1205	1100
Wind	NNW	WNW	SW	W	W, gusts	SW	NW	NW	W

Clover Bypass: Brief Summary of Immediate Environment

3/13/22 1714		3/20/22 1520
Vegetation: Leveed channel with broad benches on north and south, covered with grasses and some wildflowers; annual and perennial shrubs, herbs, and wildflowers near creek bank; very occasional clumps of sailx sp. along the channel	Substrate: cobble 20%, gravel 50%, sand 10%, silt 20%	Water: clear; heavy instream and surface algal growth; grasses growing thickly on levee banks
Habitat: 3-15 ft vertical, 5-20ft horizontal, ~75 ft grasses along sloping levee banks; limited protection for the channel; extended to north and south are orchards, vineyards, limited oak woodland, and homes	Water: clear, flow not rapid and appears restricted; surface and instream algal growth	No evidence of fish observed
Bank degradation: ~60%, unnatural due to levees	No evidence of fish observed	Heard: passerines, mourning dove, frogs
	Heard: passerines, Brewer's blackbird	Seen: passerines
		Flight: passerines, butterflies

3/27/22 1253	4/3/22 1546	4/10/22 1148
<p>Water: clear; overcrowded with instream and surface algae; suggestive of blockage downstream, likely at the confluence with Middle Creek; grasses growing rapidly</p> <p>No evidence of fish observed</p> <p>Heard: passerines, red winged blackbird, dog barking</p>	<p>Water: clear; extreme growth of instream and surface algae; grasses growing thickly and rampantly; wildflowers blooming, shrubs blooming, willows leafing</p> <p>No evidence of fish observed</p> <p>Heard: passerines, red winged blackbird, 2 dirt bikes Seen: 8 red winged blackbirds Flight: turkey vulture, 2 crows</p>	<p>Water:clear; instream and surface algal growth; grasses growing profusely; wild mustard and vetch blooming; willows half way leafed out</p> <p>No evidence of fish observed and no predators seen</p> <p>Heard: passerines, traffic Seen: 1 wild turkey on levee road</p>
4/17/22 1103	4/24/22 1347	5/1/22 1205
<p>Water: clear; instream algae ; ripples on water's surface at one place where vegetation was bending and moving in the channel indicating some flow</p> <p>No evidence of fish observed</p> <p>Heard: passerines, cliff swallows, Brewer's blackbird, cricket, traffic Seen: Brewer's blackbird Flight: Swainson's hawk, cliff swallows, butterfly, insects</p>	<p>Water: clear, clean; channel narrowing considerable and braided into small (~2 ft wide) channels; grasses taller,; wildflowers in bloom</p> <p>No evidence of fish observed</p> <p>Heard: passerines, cliff swallows, traffic Flight: cliff swallows, nesting under the bridge, insects</p>	<p>Water: appears clear; channel difficult to see and from the bridge, is perhaps 1-2 ft wide; instream and surface algae continuing to increase; greatly increased vegetative growth; wildflowers blooming</p> <p>No evidence of fish observed</p> <p>Heard: passerines, cliff swallows Seen: vehicles Flight: cliff swallows, butterflies</p>
5/7/22 1100		
<p>Water: Sheen suggests water but when observed from above, on the bridge, the channel is dry</p> <p>Grasses are seeding and vetch is blooming</p> <p>No fish passage</p> <p>Heard: passerines, cliff swallows, traffic, plane Seen: vehicles Flight: cliff swallows, butterflies</p>		

This area of Middle Creek was observed at a fair distance from the normally used creek bank location that could not be accessed this year. Information is obviously basic and very limited, however fish observed at the Middle Creek south location would have travelled ~0.8 miles to arrive at the Middle Creek north location. Migrating hitch were not observed traveling upstream of a pooled area at the Middle Creek south location.

Observations here were to see if the Middle Creek north area in general had a similar appearance. It did.

Middle Creek North

Normally, N 39° 9.8408', W 122° 54.9685' elev. 1339
This year, N 39° 9'48.12" W 122° 54'56.30" elev 1350 (Google Earth Pro)

The creek here is north of a bridge on Hwy 20. Middle Creek is leveed with a broad bench to the east, a steep side to the west, and roads at the tops of the levee. A pear orchard is east of the levee, and homes with walnut orchards are to the west. Riparian habitat lines Middle Creek, ~50 ft to the east and ~25 ft to the west.

The eastern broad levee bench supports profuse, tall grasses, and herbaceous growth that in spring provide cover for wildlife. Insects, bees, and lizards are prolific here. Especially on the eastern levee road, people, dogs, joggers, trucks or similar vehicles, and dirt bikes are often present or they leave tracks.

Fish could not be seen from this observation point, but Sacramento suckers were observed further upstream at the Rancheria Bridge location, and they will have passed through the creek here.

Clear water with good flow that matched the location to the south could be seen. From Middle Creek Bridge, braiding around gravel bars and profuse instream plant growth was plainly visible by 4.3.22. By 4.10.22 prolific surface and instream algal growth was visible. Plant and algal growth did not occur like this at the Middle Creek south location, from which 0.10 miles upstream is its confluence with a diverted Clover Creek..

Riparian vegetation along the channel is primarily grasses, herbaceous plants, shrubs and trees that offer horizontal and vertical habitat and shade. Woody debris, gravel bars, and this year abundant instream plants created niches.



3.20.22, 1547

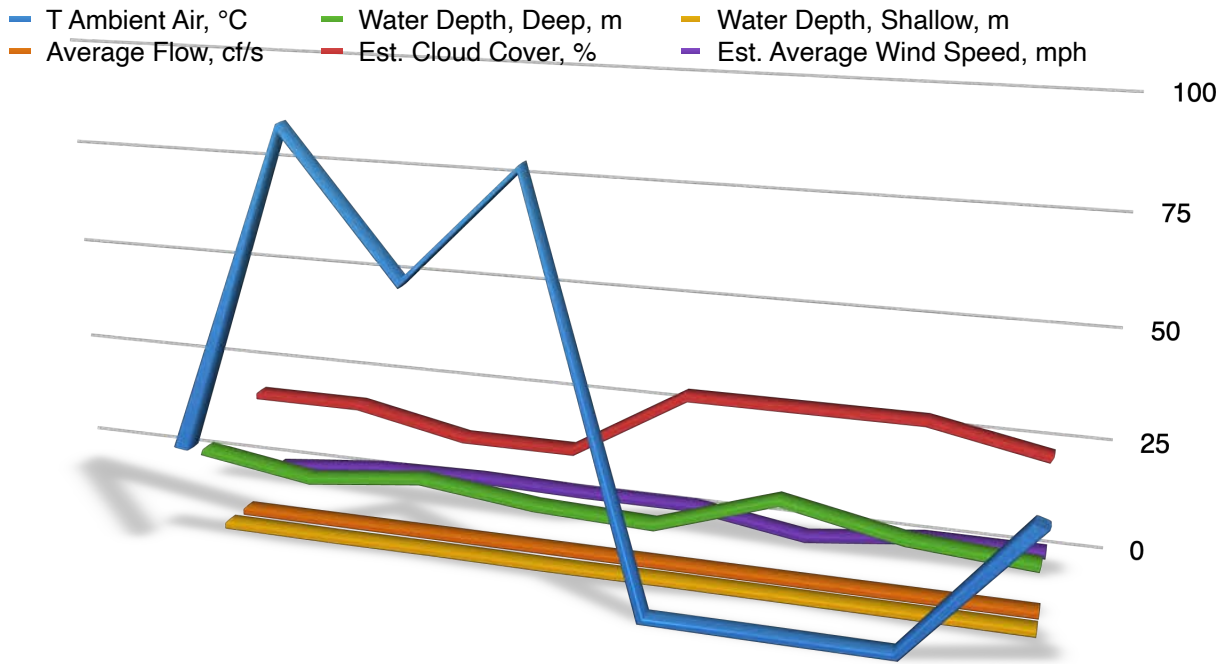


3.27.22, 1308



5.7.22, 1121

Middle North: Temperature, Water Depth and Flow, Cloud Cover, Wind



Date	3/13/22	3/20/22	3/27/22	4/10/22	4/17/22	4/24/22	5/1/22	5/7/22	5/15/22
Time	1714	1547	1308	1558	1202	1126	1358	1205	1121
Wind	—	NW	SW	W	WNW	W	N	NW	NW

Middle Creek North: Brief Summary of Fish Count, Wildlife, and Immediate Environment-4

3/20/22 1547		3/27/22 1308
Vegetation: riparian growth lines both side of the channel; sail sp., poplar, California bay laurel, Himalayan blackberries, herbaceous plants, shrubby growth, grasses; profuse ruderal grasses, herbs, and wildflowers levee bench to the east	Substrate and creek bank: not evaluated this year; last year: 30% cobble, 30% gravel, 20% sand, 20% silt; bank degradation 40%	Water: clear; surface and instream algae
Habitat: 5-75 ft vertical, ~25 ft west and ~50 ft east horizontal; broad gravel bars instream, woody growth and debris instream and along banks; levee benches offer habitat for smaller and larger wildlife; homes, pear and walnut orchards further west and east	Water: clear, surface algae observed; willows leafing out	No fish seen
	No evidence of fish observed	Heard: passerines, traffic, plane Seen: jogger on levee Flight: 2 passerines, 7 crows
	Heard: passerines, frog Flight: crow, Western bluebird	

4/3/22 1558	4/10/22 1202	4/17/22 1126
<p>Water: clear, instream algae, surface algae near banks; braiding around gravel bars vetch blooming, trees leafing out</p> <p>No evidence of fish observed, no predators seen</p> <p>Heard: passerines, crow, traffic Flight: 1 crow, 1 turkey vulture</p>	<p>Water: clear, easily seen prolific instream and surface algal growth; channel braided around gravel banks; instream plant growth; grasses growing, vetch blooming</p> <p>No evidence of fish observed; no ripples or predators seen</p> <p>Heard: passerines, traffic Flight: 2 crows, 1 turkey vulture</p>	<p>Water: clear, instream algae in places, instream plant growth; vetch blooming, grasses seeding</p> <p>No evidence of fish observed, 1 predator seen</p> <p>Heard: passerines, cliff swallows, traffic Seen: 3 deer, 1 adult and 2 juveniles Flight: cliff swallows, great blue heron, Brewer's blackbird, insects</p>
4/24/22 1358	5/1/22 1205	5/7/22 1121
<p>Water: clear, clean; as seen from bridge: creek narrows above bridge into small, braided channels; increased instream plant growth</p> <p>No evidence of fish observed although Sacramento suckers were observed downstream and upstream</p> <p>Heard: cliff swallows Flight: cliff swallows, 1 turkey vulture, butterflies, bees</p>	<p>Water: clear, clean with light surface debris; increased vegetative growth, vetch blooming</p> <p>No evidence of fish observed</p> <p>Heard: passerines, cliff swallows, American robin, traffic Flight: cliff swallows, 2 crows, various insects, bees, butterflies, seeds</p>	<p>Water: clear, clean; increased plant growth on substrate; vetch blooming</p> <p>No evidence of fish observed</p> <p>Heard: passerines, cliff swallows, traffic Flight: 1 crow, insects, seeds</p>
<p>5/15/22: Vegetation prevents further observation from turnout, but from bridge, significant braiding and heavy plant growth on substrate observed</p>		

Vegetation

Riparian vegetation included willows, *Salix sp.*, oak, *Quercus sp.*, cottonwood, *Populus sp.* primarily *fremonti*, white alder, *Alnus rhombifolia*, and California bay laurel, *Umbellularia californica*. Shrubs and shrubby growth at most locations consisted of Himalayan blackberries, *Rubus armeniacus*, poison oak, *Toxicodendron diversilobum*, various ruderal grasses and wild grains, herbaceous growth indigenous and invasive, various sedges, Fam. Cyperaceae, and tules, *Schoenoplectus acutus*, primarily along one side of the pool at Tulelake and very occasionally near lower levee tiers along creek banks at other locations.

Algae on substrate and instream had already begun to appear when monitoring began but washed away after storm events. Instream plant growth occurred at 4 of 5 locations, Tulelake being the exception.

Surrounding environments were roads, meadows, hillsides, oak woodland, orchards, and residences.

Wildlife

Paths that lead to creek banks often contain evidence of wildlife, and some of those were not accessed this year. Even so, there was noticeably less wildlife, although wildlife especially avian was always present and always influenced by weather patterns, intrusive sounds, and presence of people. Rain, drizzle, sustained winds and gusts suppressed all wildlife activity. It normally increased as temperatures warmed. A variety of insects, especially bees, butterflies, mosquitoes, and spiders were prolific in warmer weather as vegetation bloomed. Toads were not heard as often this spring as in years past.

Animals or evidence of them not seen this year were American kestrel, *Falco sparverius*, Cooper's hawks, *Accipiter cooperii*, sharp-shinned hawks, *Accipiter striatus*, bald eagles, *Haliaeetus leucocephalus*, golden eagle, *Aquila chrysaetos*, red-tailed hawk, *Buteo jamaicensis*, domestic horse, *Equus ferus caballus*, black bear, *Ursus americanus*, mountain lion, *Puma concolor*, feral swine, *Sus scrofa*, American mink, *Neovison vison*, and red fox, *Vulpes vulpes*.

These animals are known to frequent the Tulelake area and the Middle Creek corridor. Habitat in those areas supports moderately complex food webs although watersheds continue to recover from the Ranch fire in 2018. Areas here and there have been cleared. There appear to be small but discernible changes in ecology.

Waterfowl not observed this year were American coot, *Fulica americana*, ring-necked duck, *Aythya collaris*, Western grebe, *Aechmophorus occidentalis*, and Clark's grebe, *Aechmophorus clarkii*. These have often been present at Tulelake.

Individuals of other avian families not observed this spring were black crowned night heron, *Nycticorax nycticorax*, green-backed heron, Snowy egret, *Egretta thula*, *Butorides striatus*, black phoebe, *Sayornis nigricans*, Stellar's jay, *Cyanocitta stelleri*, and California quail, *Callipepla californica*.

Animals identified with confidence by sight, vocalizations, tracks, and scat are listed below, in no particular order. Vocalizations were often too numerous to count. 'Passerine' included perching birds such as white crowned sparrow, golden crowned sparrow, house sparrow, American goldfinch, lesser goldfinch, songbirds, and more.

White crowned sparrow, *Zonotrichia leucophrys*
Golden crowned sparrow, *Zonotrichia atricapilla*
House sparrow, *Passer domesticus*
American goldfinch, *Carduelis tristis*
Lesser goldfinch, *Carduelis psaltria*
Western bluebird, *Sialia mexicana*
Oak titmouse, *Baeolophus inornatus*
American cliff swallow, *Petrochelidon pyrrhonota*
Red-winged blackbird, *Agelaius phoeniceus*
Brewer's blackbird, *Euphagus cyanocephalus*

Mourning dove, *Zenaida macroura*
 Northern mockingbird, *Mimus polyglottos*
 Acorn woodpecker, *Melanerpes formicivorus*
 Nuttall's woodpecker, *Picoides nuttallii*
 Downy woodpecker, *Picoides pubescens*
 Hairy woodpecker, *Leuconotopicus villosus*
 Scrub jay, *Aphelocoma coerulescens*
 California towhee, *Meolzone crissalis*
 American robin, *Turdus migratorius*
 Bushtit, *Aegithalos caudatus*
 Wild turkey, *Meleagris gallopavo*,
 American crow, *Corvus brachyrhynchos*
 Common raven, *Corvus corax*,
 Turkey vulture, *Cathartes aura*
 Red-shouldered hawk, *Buteo lineatus*
 Swainson's hawk, *Sialia mexicana*
 Loggerhead shrike, *Lanius ludovicianus*
 Osprey, *Pandion haliaetus*
 Waterfowl and herons:
 American white pelican, *Pelecanus erythrorhynchos*
 Canada goose, *Branta canadensis*
 Common merganser, *Mergus merganser*
 Mallard, *Anas platyrhynchos*
 Greater and lesser scaups, *Aythya marila* and *Aythya affinis*
 Great white egret, *Casmerodius albus*
 Pelagic cormorant, *Phalacrocorax pelagicus*
 Great blue heron, *Ardea herodias*
 Flying and terrestrial insects and aquatic macroinvertebrates
 California toad, *Bufo boreas*
 Lizard, *Sceloporus sp.*
 Ground squirrel, *Otospermophilus beecheyi*
 Grey squirrel, *Sciurus griseus ssp.*
 Raccoon, *Procyon lotor s*
 Skunk, *Mephitis mephitis*
 Opossum, *Didelphis virginiana*
 Coyote, *Canis latrans*
 Deer, *Odocoileus virginianus*: tracks, paths, and hollows seen on creek banks and in tall grasses
 Gopher, Fam. Geomyidae, fresh mounds
 Mole, Fam. Talpidae, fresh mounds and runs
 Domestic dog, *Canis familiaris*
 Domestic cat, *Felis catus*
 Domestic rooster, *Gallus gallus domesticus*

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