Observations of Fish Migration with a Focus on Hitch, *Lavinia exilicauda chi*: Fish, Wildlife, and Habitat in Northshore Tributaries, Clear Lake Basin, Spring 2020

S Franson

Simple observations specific to a time and location are summarized and graphed. Similar to last year, more details are included. These were not reported in earlier years, but the same information was noted and is available on field sheets beginning in 2013. SF

Summary

This year monitoring occurred from 6.March.2020 to 29.May.2020 in northshore tributaries of Clear Lake for sightings of Clear Lake Hitch, *Lavinia exilicauda chi*, during migration, spawning, and passage of juveniles downstream. No hitch were seen.

Creeks were flowing but rainfall was limited. On 3 occasions adults identified as Sacramento suckers, *Catostomus occidentalis*, were observed. Sacramento sucker juveniles from 1.0 to 4.0 cm. were occasionally observed at the Middle Creek south and north locations and at the Clover Bypass location, where flow was likely impeded near its confluence into Middle Creek, where winter storm debris or sandbars often impact water flow and fish passage. Access there is not public and is posted; any obstruction could not be confirmed. Rainbow trout juveniles, *Oncorhynchus mykiss*, 1.5 to 4 cm, were seen pooled upstream of Rancheria Bridge, or moving upstream from there. No other species were seen this year.

Water levels in all creeks fell quickly after rain events temporarily raised them. Levels were never high this year, and some creek levels fell precipitously when agricultural irrigation began. Levels in Tulelake remained stable because an agricultural easement exists, although they fell little by little and had been already low when observations began. Creeks did not run completely dry; they haven't since the Ranch Fire in 2018 burned the Middle Creek watershed's vegetation.

People were occasionally encountered at two locations especially as late winter temperatures eased. Their presence appeared to inhibit fish and wildlife, especially at the Tulelake location when an encampment that had been about 30 ft. from the observation point was shifted to water's edge. The final week, a small boat was tethered at the observation point. Few fish had been observed in Tulelake proper, and only 1 juvenile 4 cm bass had been seen the previous week at the observation point. Precautions for the pandemic were respected, but migration was effectively past and very few fish had been observed there and elsewhere. The wise solution was to end observations a week ahead of the usual time in early June.

Fish seen this year were adult and juvenile Sacramento suckers, *Catostomus occidentalis*, and juvenile rainbow trout, *Oncorhynchus mykiss*. Fish were identified using coloration, markings, head and body style, fin style and placement. Behavior was also recognized. Throughout monitoring no juvenile hitch and relatively few juvenile suckers were seen heading downstream.

Gravel bars became substantially more exposed over time, resulting in braiding and channeling. Instream grasses and riparian vegetation grew and expanded exponentially this year. Instream algae developed quickly on creek substrates. Adequate fish passage could still be found in side and/or center channels that continued to decrease in width and depth. At times barriers to fish passage develop from siltation, graveling, storm debris buildup, or anthropogenic causes, especially at the confluence of Clover Bypass and Middle Creek.

Lower water levels overall, unusual spring weather patterns with unusually warm early temperatures, then falling temperatures, and repeats, plus rain events with thunderstorms and high wind gusts, might not have stimulated a hitch migration event this spring. Exact triggers for hitch migration are not known. Given the ephemeral quality of Clear Lake tributaries, opportunism is probably important.

Thunderstorms, wind, wind gusts, rain or light rain, cloud cover, and temperature impacted wildlife activity. Rain or light rain did not occur on monitoring days this year, but wind, at times strong gusts, did. Wildlife activity increased as ambient air temperatures rose and trees leafed out, but it was substantially suppressed by human occupation.

Methods

The same methods for collecting field data have been used since 2013, at the same locations, using the same field sheets, allowing for consistency over time.

The first day of monitoring encompassed recording GPS coordinates, a description of immediate and peripheral vegetation, substrate, creek and bank degradation, aquatic, horizontal, and vertical habitat, and significant features in the environment. Creek bank degradation was estimated as a function of *current* creek banks. Only in upper reaches of tributaries could creek banks be described as natural or somewhat natural, as northshore creeks are leveed.

Numbers and TL of fish at all locations were estimated as accurately as possible. 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 all of which were impacted by storm events, 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 were able to be identified accurately by sight or vocalization, those species were noted. This year, 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 were graphed with cloud cover, including estimated directions and times.

Near creek banks water is shallow and in a main channel, deeper. Depth was estimated using permanent reference points on creek banks and in channels. Both deep and shallow estimated depth and flow were graphed. Water levels in these streams can vary quickly and considerably from runoff and from drawing for crop irrigation. Flow was estimated at a center point instream by timing the movement of light surface debris, inexact but consistent over time.

Access to the creek is posted and denied at the Rancheria Bridge site, and water temperatures could not be monitored. At Tulelake this spring, water was so low that even with a thin rope extension for a temperature gauge, water could not be reached consistently, and the bank there was precipitous. This was the first year that has happened.

At all locations during and after rain events, water clarity was diminished, silt load increased, and surface debris was plentiful. Water clarity eventually improved with the exception of the Tulelake site, where water was always brown to greenish-brown and opaque with varying degrees of translucence. As temperatures warmed and water levels dropped, several species of algae grew on substrate. Surface mats were small or had not formed when observations ended.

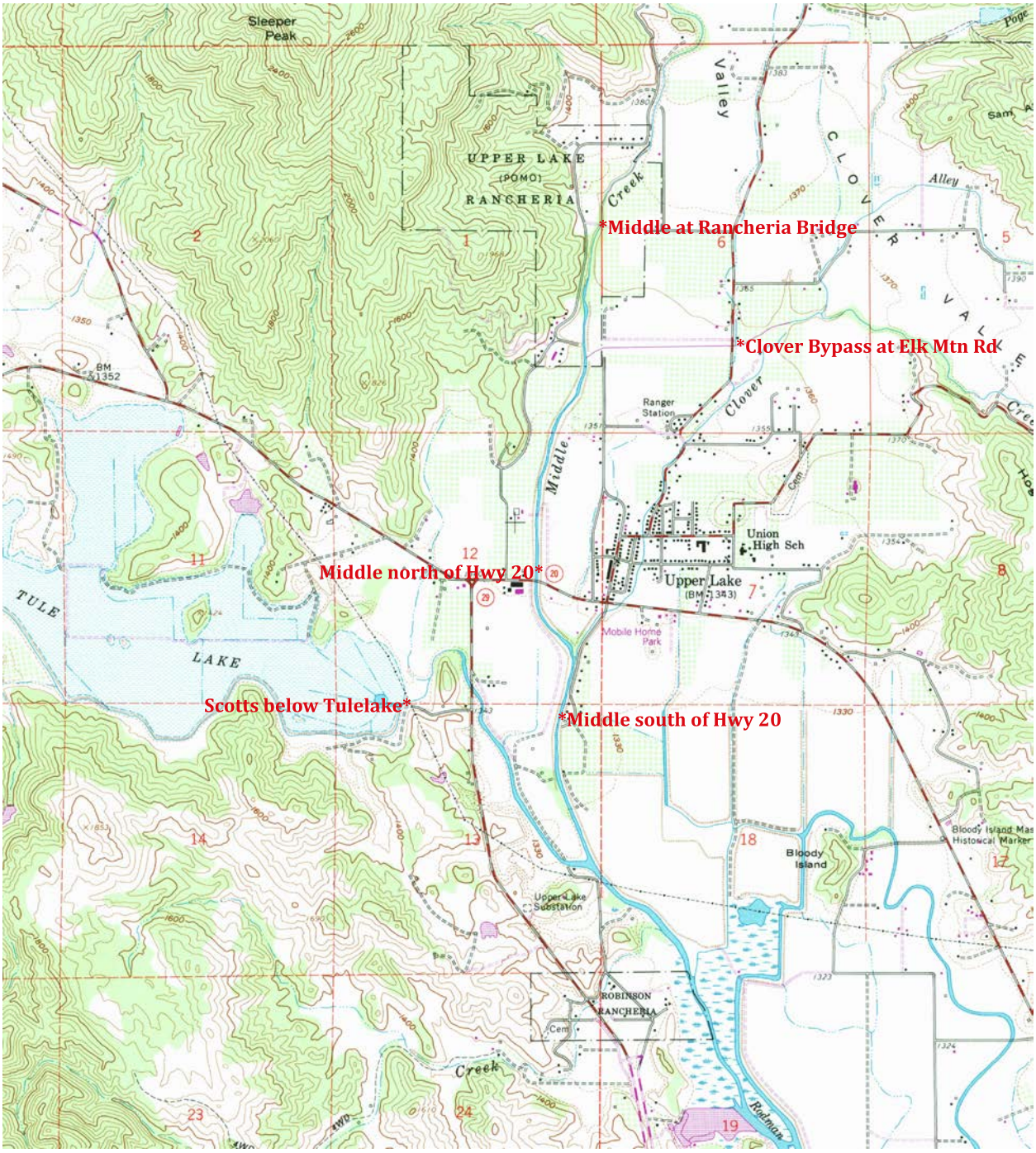
Observations normally required 2 to 2.5 hours to complete. Counts were based on observation rather than timed intervals. Digital images were taken at each location, at each observation event, with care to similarity for angle and approach, in order to represent small changes in the environment digitally as well as on field sheets.

Monitoring ceased after water levels subsided, there was limited or no flow in places, juvenile fish were few or absent, and no migrating adults had been seen for several weeks.

Equipment

Equipment consisted of an Olympus digital camera, a DeLorme Earthmate PN-60, and a Cooper handheld digital thermometer with extension. Among resources consulted were Google Earth Pro 7.3.3.7699 (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).

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

Scotts Creek below Tulelake Dam

N 39° 9.9607', W 122° 55.1711' elev. 1330

Adult fish migrating upstream from Clear Lake, and juveniles returning downstream, travel via Scotts Creek. Tulelake was included in an agricultural easement and now has water and manmade islands the year around. Fish migrate over the dam above the pool when water levels are high, or through a culvert from the pool into a diverted Scotts Creek, entering Tulelake above it or at places from the diverted channel.

Water clarity at this location is always opaque at best, translucence varies, and one can see and at least partially identify juveniles that are clustered and migrating downstream, near water's edge at the observation point. Adult fish were spotted jumping or their presence detected due to sound, ripples, or gathering of foraging predators. One adult fish seen when jumping was large and likely a carp, Family Cyprinidae, and one 4 cm. juvenile near the bank was a bass, *Micropterus sp*.

The dam was never under water this year. It is always a partial barrier, less, when water levels are higher. The dam attracts predators, including larger fish that congregate when prey items gather above or below it. After runoff from a rain events settle, water levels are basically similar to Clear Lake. Wildlife frequents this entire area.

There is horizontal and vertical riparian habitat. The pool is surrounded by tules, shrubs, trees, and understory. Adjacent hills are primarily oak woodland.

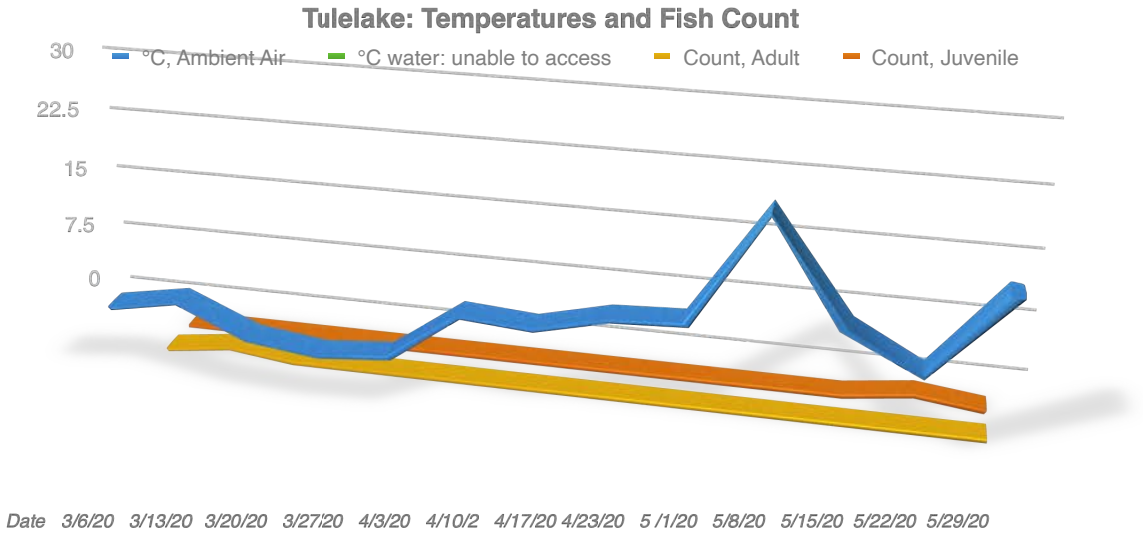
Water levels and flow were estimated for the pool below the dam. Scotts Creek continues toward Rodman Slough through this pool.

At this location, wildlife sightings and vegetative growth increased with seasonal change, although storm systems, wind, and cloud cover affected wildlife movement. Wildlife was noted as heard, in or on water, in flight, and seen generally on a bank, a berm a branch, the dam, or the ground.

This year, a camper and dog were near the site. Wildlife movement was limited. On the last monitoring day, a tent that had been further away was moved directly onto the observation point, and a small boat was at the bank where juvenile fish would have been observed. Given the lack of fish sightings, the culmination of fish migration for this year, and the pandemic, this day became the last day of observations.

3.6.2020, 0939

5.29.2020, 0848


Tulelake: Temperatures and Fish Count
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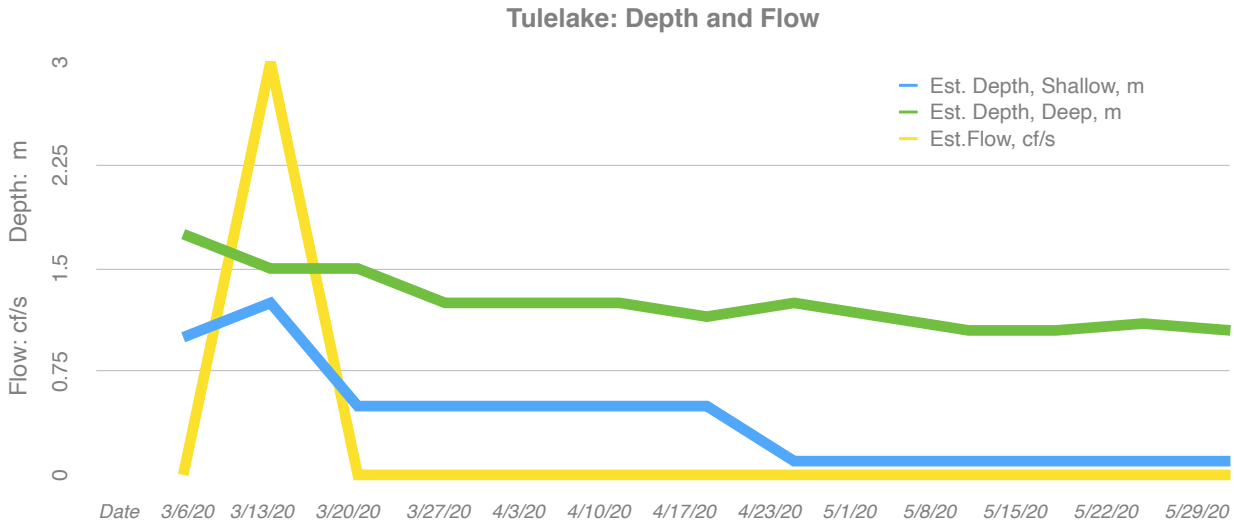
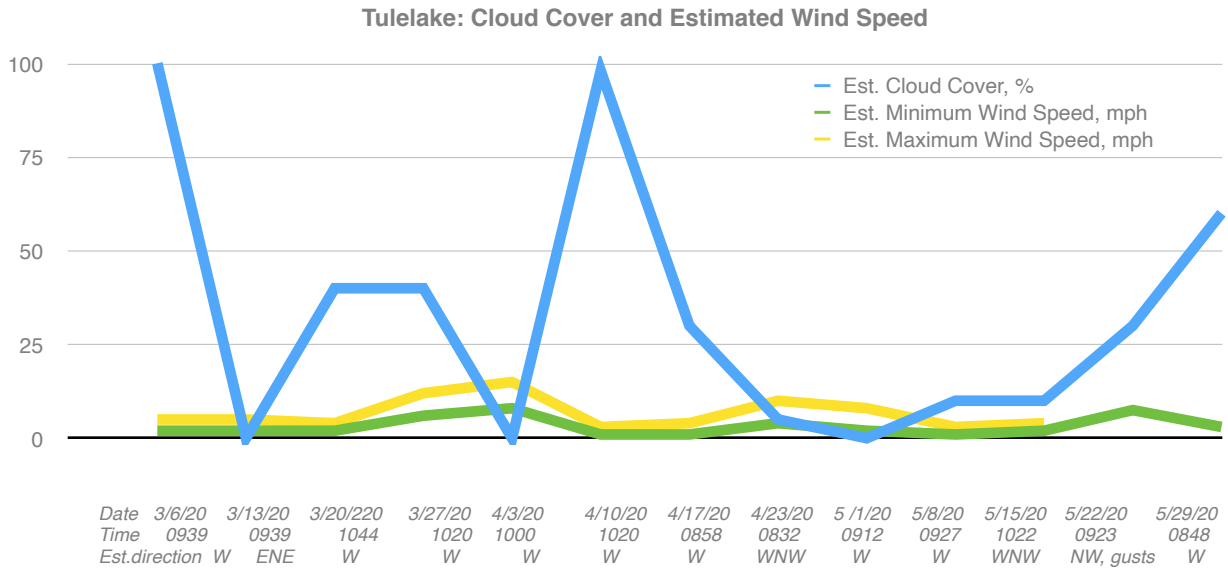
°C water: unable to access
Count, Adult
Count, Juvenile
30
22.5
15
7.5
0
Date 3/6/20 3/13/20 3/20/20 3/27/20 4/3/20 4/10/2 4/17/20 4/23/20 5 /1/20 5/8/20 5/15/20 5/22/20 5/29/20


Tulelake: Depth and Flow
Est. Depth, Shallow, m
Est. Depth, Deep, m
Est.Flow, cf/s
Flow: cf/s
Depth: m
0
0.75
1.5
2.25
3
Date 3/6/20 3/13/20 3/20/20 3/27/20 4/3/20 4/10/20 4/17/20 4/23/20 5/1/20 5/8/20 5/15/20 5/22/20 5/29/20


Tulelake: Cloud Cover and Estimated Wind Speed
Est. Cloud Cover, %
Est. Minimum Wind Speed, mph
Est. Maximum Wind Speed, mph
100
75
50
25
0
Date 3/6/20 3/13/20 3/20/220 3/27/20 4/3/20 4/10/20 4/17/20 4/23/20 5 /1/20 5/8/20 5/15/20 5/22/20 5/29/20
Time 0939 0939 1044 1020 1000 1020 0858 0832 0912 0927 1022 0923 0848
Est.direction W ENE W W W W W WNW W W WNW NW, gusts W

4.3.2020: Direction and culvert that connects a diverted Scotts Creek into its channel below Tulelake

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

3/6/2020 0939		3/13/2020 0939
Vegetation: poplar *sp.*, willow *sp.*, ruderal grasses, herbaceous shrubs and plants, Himalayan blackberries Habitat: vertical and horizontal, instream woody debris, oak woodland beyond immediate site Substrate: 5% cobble, 5% gravel, 5% sand, 85% silt Bank degradation ~70%	Water: murky, brown, no translucence No fish seen; In flight: great blue heron, passerines, 4 pelagic cormorants, 1 great white egret, 2 Canada geese On water: 1 scaup, 3 pelagic cormorants and several on a distant bank	Water: brown, muddy, opaque, level lw Numerous logs and trash strewn about the area Fish: 1 large, jumping above dam; 1 large turtle in pool; Heard: black crowned night heron, acorn woodpecker, passerines, western grebes Seen: 2 great white egrets on berm Flight: 2 passerines, male mallard, 2 crows, 8 Canada geese, 1 great blue heron
3/20/2020 1044	**3/27/2020 1020**	**4/3/2020 1000**
Water brown, opaque; no surface debris No fish, but 1 set of ripples Heard: 2 acorn woodpeckers, crow, loggerhead shrike Flight: passerines, 1 pelagic cormorant, 5 crows, great blue heron, 1 turkey vulture, 1 golden eagle On water: pelagic cormorant, western grebe, 2 Canada geese Seen: pelagic cormorant Observation: more wildlife and predators than previous week	Water green-brown, opaque, levels markedly down; ripples only from wind No fish seen; Heard: acorn woodpecker, ag sprayer, Brewer's blackbird, passerines Seen: 5 pelagic cormorants taking flight On water: 1 pelagic cormorant Flight: 2 great blue herons, 2 crows, 2 Canada geese	Water green-brown, opaque, levels markedly down; ripples only from wind No fish seen; Heard: acorn woodpecker, ag sprayer, Brewer's blackbird, passerines Seen: 5 pelagic cormorants taking flight On water: 1 pelagic cormorant Flight: 2 great blue herons, 2 crows, 2 Canada geese

4/10/2020 1020	4/17/2020 0858	4/23/2020 0832
Water brown, opaque; ripples in Scotts Creek No fish seen although ripples were observed Heard: passerines, scorn woodpecker, osprey Flight: great blue heron, pelagic cormorant, crow Seen: 6 pelagic cormorants On water: black crowned night heron, 5 drifting turtles	Water brown, cloudy No fish seen; large ripples observed above dam and in pool below Heard: passerines, acorn woodpecker, 2 pelagic cormorants On water: 1 pelagic cormorant Seen: many large tire tracks, 2 ground squirrels, insects Flight: 9 pelagic cormorants, 2 great blue herons, 2 swallows (probably cliff swallows)	Water brown, cloudy; unable to see into it; waves on Tulelake; poppies in bloom Closed tent next to site No fish seen Heard: passerines, traffic, osprey, Nuttail's woodpecker, loggerhead shrike, mourning dove, wind Flight: 2 ospreys
5/1/2020 0912	**5/8/2020 0927**	**5/15/2020 1022**
Water brown, cloudy; unable to see into it; waves on Tulelake; poppies in bloom Closed tent next to site No fish seen Heard: passerines, traffic, osprey, Nuttail's woodpecker, loggerhead shrike, mourning dove, wind Flight: 2 ospreys	Water brown, cloudy; unable to see into it; waves on Tulelake; poppies in bloom Closed tent next to site No fish seen Heard: passerines, traffic, osprey, Nuttail's woodpecker, loggerhead shrike, mourning dove, wind Flight: 2 ospreys	Water green-brown, opaque; vetch, blackberries blooming; A fisherman on dam reported seeing 10 bald eagles at his home along Tulelake. He reported catching catfish. No fish seen Heard: traffic, acorn woodpecker, passerines, Nuttail's woodpecker Flight: butterfly, (cliff) swallow, turkey vulture On water: 2 western grebes Seen: 2 vehicles, tent
5/22/2020 0923	**5/29/2020 0848**	**after 5/29/2020**
Water brown, opaque Water is likely the same level as Clear Lake Vetch, blackberries in bloom Herbaceous growth increasing in height 1 4-cmj juvenile bass *sp.* seen heard: traffic, amor woodpecker, passerines, crow, (cliff) swallows Seen: 2 CA quail On water: 1 western grebe Flight: (cliff) swallow, 2 crows, 1 turkey vulture, 2 woodpeckers	Water brown, opaque, still Plants in bloom in general area No fish seen *small boat was pulled into the area where juvenile fish would have been seen Heard: traffic, acorn woodpecker, loggerhead shrike, crickets, passerines, green backed heron Seen: 12 American white pelicans on berm; human, dog, tent, and car On water: 2 western grebes Flight: 1 turkey vulture, swallows, bees, butterflies	Monitoring ceased on 5/29/2020: *Migrating adults had not been seen in some time *Juveniles migrating downstream were either not seen or were very few, seen intermittently The current covid-19 pandemic precautionary care.

Middle Creek South

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

Both migrating adult fish and returning juveniles pass this location on Middle Creek. Two migrating adult Sacramento suckers and ten 1.5 to 3.0 cm juvenile Sacramento suckers, ***Catostomus occidentalis***, were observed on three separate monitoring days. These were the smaller of two species or subspecies of ***Catostomus occidentalis***. No fish were seen on the last two monitoring days.

On the eastern bank, riparian vegetation lines the channel and extends roughly 50 feet to the second tier levee bench, where ruderal grasses, wildflowers, and vetch grow to the levee top, that is Bridge Arbor Road. The western bank also supports a narrow, steep strip of riparian vegetation between the channel and a dirt road that tops the levee. Horizontal and vertical habitat exists along this stretch of Middle Creek. To the east, the levee protects homes, orchards, and vineyards. To the west, the levee protects a pear orchard and a home further south.

Water in the channel was clear except immediately after storm events, when levels rose quickly and receded quickly, usually with surface and storm debris. Fewer storm events this spring resulted in good water clarity and consistently falling water levels that were elevated when monitoring began and winter runoff was still occurring, and immediately after storm events.

Instream gravel bars became increasingly exposed. This spring, invasive grasses rapidly increased instream, on or near gravel bars and along banks. When monitoring ended they had not yet blocked parts of the channel.

Habitat for wildlife is vertical to at least 60 feet with thick understory and horizontal to the first levee tier. Wildlife sightings and vegetative growth increased with seasonal change, although winds and cloud cover affected wildlife movement. This year no rain events occurred on monitoring days. Wildlife was noted as heard, in or on water, in flight, and seen generally on a bank, a berm, a gravel bar, a branch, or on the ground.

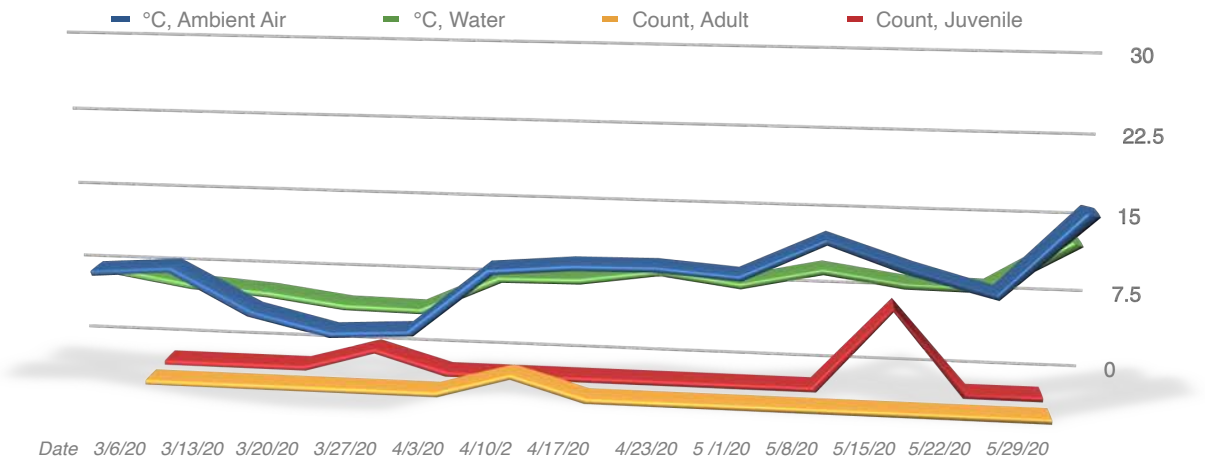
Water temperature was taken closer to the creek bank where juvenile fish have been normally seen. Migrating adults have normally been observed in deeper water.

Lack of significant rain meant that creek banks were not flooded. Levels were low all spring.

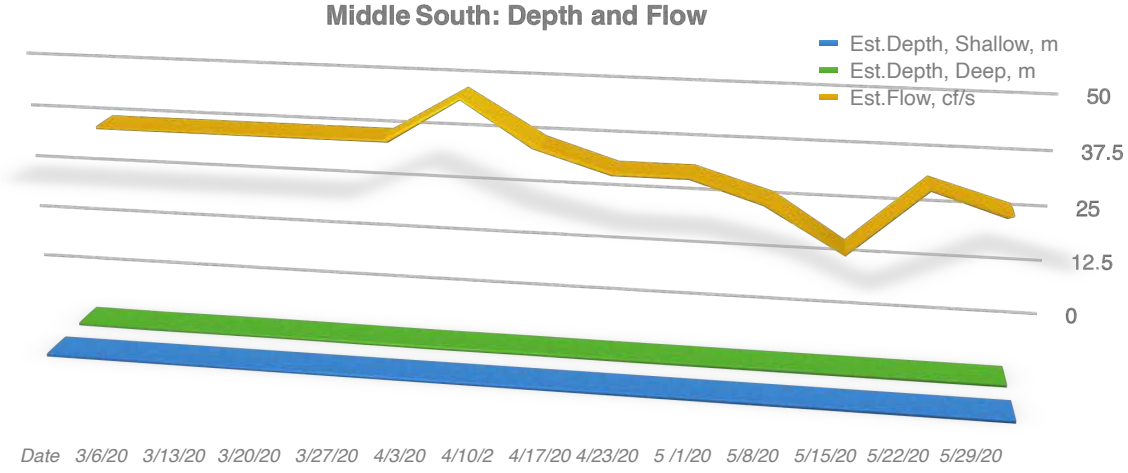
3.6.2020, 1005

5.22.2020, 1005

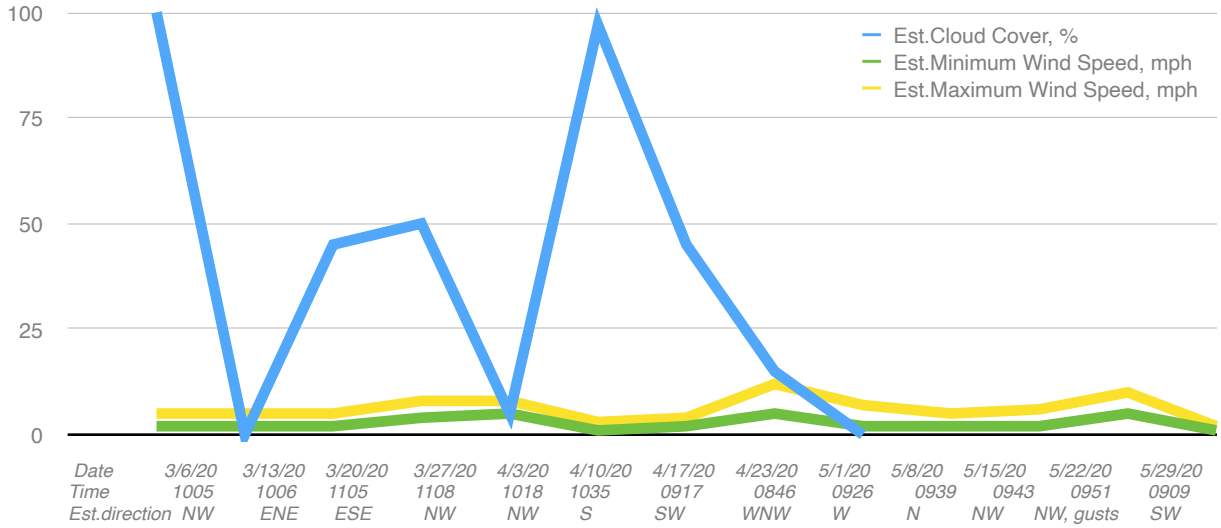
Middle South: Temperature and Fish Count



Middle South: Depth and Flow



Middle South: Cloud Cover and Estimated Wind Speed



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

3/6/2020 1005		3/13/2020 1006
Vegetation: riparian herbs, mugwort, ruderal grasses, willow sp., poplar sp., California bay laurel lining banks, invasive grasses instream, wild mustars Habitat: 10-85 ft. vertical habitat, horizontal habitat of grasses, shrubby growth including Himalayan blackberries; instream gravel bars and grasses, woody debris, algae on substrate; odor of decay Substrate:10% cobble, 40% gravel, 25% sand, 25% silt Bank degradation ~50%	Leveed stream with orchards on either side Water: clear, levels extremely low No fish seen Heard: acorn woodpecker, downy woodpecker, numerous passerines Seen: ground beetles, aquatic insects	Water clear; algae on substrate and grasses instream; slight odor of decay No fish seen Heard: numerous passerines, crow, acorn woodpecker Seen: ground and aquatic insects In flight: crow, osprey, 3 passerines, 1 pair mallards, eagle - likely but uncertain Tracks along path and creek bank were indeterminate as soil and sand are too dry to have held impressions.
3/20/2020 1105	3/27/2020 1108	4/3/2020 1018
Water: clear, instream plants developing and growing No fish seen Heard: Brewer's blackbird, numerous passerines, acorn woodpecker, mallard In flight: 3 crows, 7-8 California quail, passerines, insects Seen: ground insects, 1 jackrabbit in brush	Water: clear, levels down, algae on substrate, instream plants and herbs on bank developing 2 1.0 cm.juvenile Sacramento suckers observed Heard: passerines, crow, ag sprayer In water: aquatic insects, O.R.V. tracks instream In flight: 3 crows, downy or hairy woodpecker	Water: clear, grassland plants growing instream; mustard California poppies blooming on levee bench and on opposite bank No fish seen Heard: ag sprayer, plane, passerines, woodpeckers drilling Seen: fresh O.R.V. trails, wild turkey tracks In flight: insects, passerines Odor of spray prevalent
4/10/2020 1035	4/17/2020 0917	4/23/2020 0846
Water: clear, grasses crowing, California poppies in bloom 2 migrating adult Sacramento suckers seen and 1 dead and partially eaten adult Sacramento sucker in stream Heard: crows, Stellar's jay, acorn woodpecker, red-tailed hawk in flight: 4 turkey vultures circling location, passerines Seen: 3 crows, O.R.V. tracks to stream bed, human tracks, turkey tracks	Water: clear, instream plants, grasses growing; odor of mugwort No fish seen Heard: passerines, mourning doves, crickets, red-shouldered hawk, crows Seen: truck, O.R.V. trails, raccoon tracks In flight: insects, cliff swallows, seeds being blown, crow, 2 hairy woodpeckers, 1 great blue heron In water: 1 pr. mallards, insects	Water: clear, levels down, increasing instream f=grasses and algae on substrate No fish seen Heard: cricket, frog, traffic, American robin, crow, acorn woodpecker, Nuttail's woodpecker, wind, water Seen: dog, dog tracks, truck tracks In flight: 2 turkey vultures, passerines, seeds in the air, insects, bees, crow

5/1/2020 0926	5/8/2020 0939	5/15/2020 1043
Water: clear, levels down, instream grasses increasing, algae increasing on substrate Vetch, poppies blooming, grass growing on levee bench No fish seen Heard: numerous passerines, red-shouldered hawk, ag prayer, Nuttail's woodpecker, cricket Seen: tracks - dog, human, fresh and deep truck tracks on path to monitoring location, with a ~8 t. diameter disturbed area to the side On and in water: 2 great blue herons, 1 male common merganser In flight: insects, turkey vulture	Water: clear with grass and algae growing instream and on substrate Ruderal grasses drying, herbaceous growth increasing, vetch and wildflowers blooming No fish seen Heard: American robin, passerines, mourning dove, crickets, bees, acorn woodpecker, mallard Seen: tracks- man, dog, skunk, downy woodpecker, mole mound, ground insects in flight: Brewer's blackbird, insects, turkey vulture, crow carrying item in bill In water: aquatic insects Odor of skunk	Water: clear, instream grasses growing, algae increasing on substrate Vetch, mustard, poppies in bloom, herbaceous growth growing quickly and more dense 8 1.5-3.0 cm. juvenile Sacramento suckers observed Heard: ag sprayer, numerous passerines, traffic, western meadowlark, crickets In flight: insects, butterfly, bees Seen: California quail, dirt bike tracks near bank Insects on and in water
5/22/2020 0951	5/29/2020 0909	after 5/29/2020
Water: clear, stream broader across than previous week, instream grasses increasing, algae on substrate increasing Herbaceous growth increasing, wildflowers blooming, grasses on levee bench drying A splash was observed but no fish was seen Heard: ag sprayer, wind, loud bass music, passerines, American robin	Water: clear, algae on substrate and instream grasses growing quickly Trees lining bank growing quickly and more dense, odor of wildflowers No fish seen Heard: traffic, Nuttail's woodpecker, acorn woodpecker, crickets, passerines, plane Seen: ground spiders, northern mockingbird on electric wire, feral pig tracks, raccoon scat In flight: Brewer's blackbird, crow, turkey vulture On and in water: numerous insects Odor of decay	Monitoring ceased on 5/29/2020: *Migrating adults had not been seen in some time *Juveniles migrating downstream were either not seen or were very few, seen intermittently The current covid-19 pandemic required precautionary care.

Middle Creek at Rancheria Bridge

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

Monitoring occurs here on a bridge over Middle Creek, on Rancheria Road. Migrating adult fish are normally easily observed instream to the south and north, but access to creek banks is posted. In years past, what might be two subspecies of adult Sacramento suckers, *Catostomus occidentalis*, distinctly different from one another in appearance, color, and TL, have been observed migrating upstream. Adult and juvenile rainbow trout normally come downstream and cluster north of the bridge apron.

The channel is set close to hills to the west, with primarily oak woodland, madrone, manzanita, some white pine, and shrubs, grasses, and herbaceous growth. It is contained by a levee to the east with orchards and vineyards beyond. Miles upstream, it forks into Middle Creek West and Middle Creek East. Each continues for many more miles.

Historically hitch migrated and spawned over several miles north of Rancheria Bridge (anecdotal information, pers. communication). Four weirs were constructed south of Rancheria Bridge late last century to deter graveling, braiding, and silt deposition (public information). The lowest weir at the confluence of Middle Creek and Clover Bypass silted over time and does not appear to be a barrier for hitch, as four or five were seen in Clover Bypass in 2009 (pers. observation). The weir immediately below the bridge still has a reach for fish to jump but it also offers rough fish passage near one bank. Large boulders were used in the two remaining weirs (pers. observation).

In 2004 a feed ball of threadfin shad, *Dorosoma petenense,* was seen in a pool below the first weir, and rainbow trout live in the upper reaches of Middle Creek. Adult Sacramento suckers have been seen migrating above the bridge (pers. observation). However hitch have not been seen in this stretch of the channel, above the lowest weir, since monitoring began in 2011 and had not been seen before that from 2004 to 2008 (pers. observation). From 2008 to 2010, this area of Middle Creek was not personally checked for hitch.

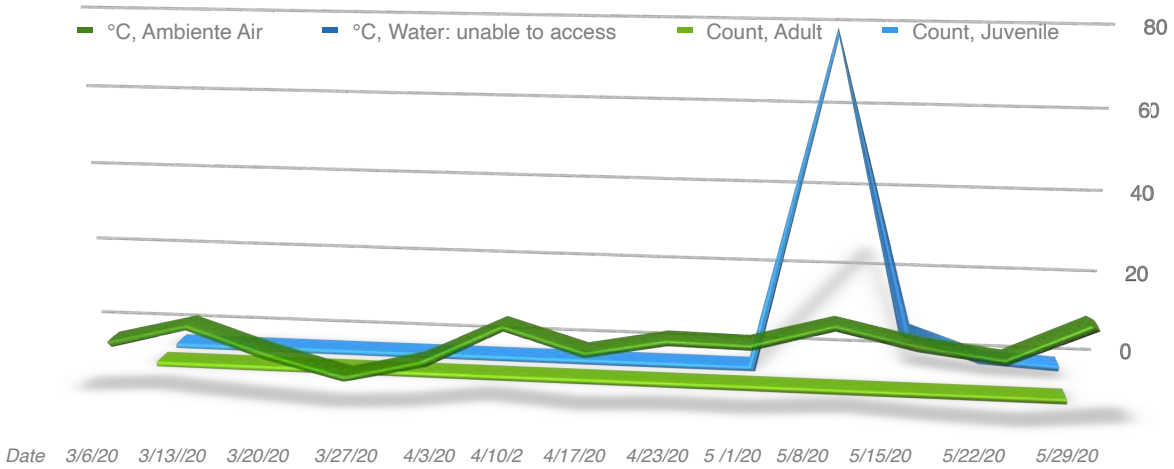
This year, a total of 97 juvenile rainbow trout, *Oncorhynchus mykiss*, were seen north of Rancheria Bridge over 4 monitoring events.

Riparian vegetation offering horizontal and vertical habitat lines both sides of the channel, quiet and shallow above the bridge apron but flowing quickly over the apron and first weir. Woody debris creates small, protected areas instream near banks. This year gravel banks forming above and below the bridge became exposed. Water was clear with some debris after storm events had passed.

3.6.2020, 1035

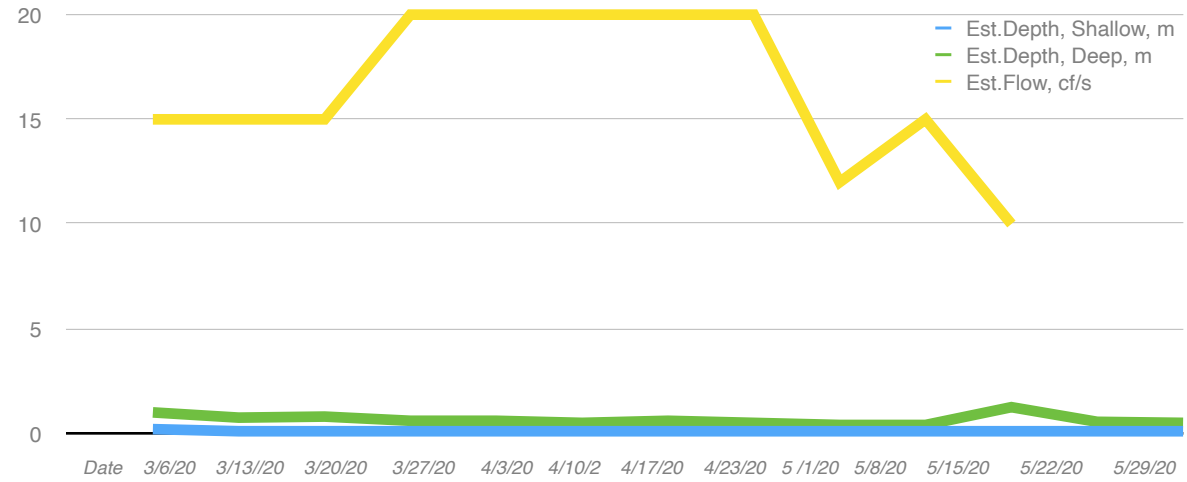
5.29.2020, 1028

Middle at Rancheria Bridge: Temperatures and Fish Count



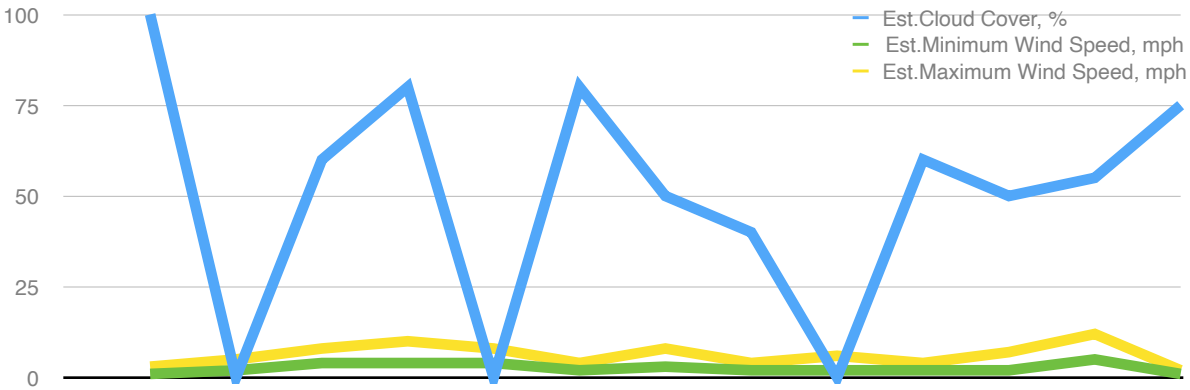
Date	3/6/20	3/13//20	3/20/20	3/27/20	4/3/20	4/10/2	4/17/20	4/23/20	5 /1/20	5/8/20	5/15/20	5/22/20	5/29/20

Middle at Rancheria Bridge: Depth and Flow

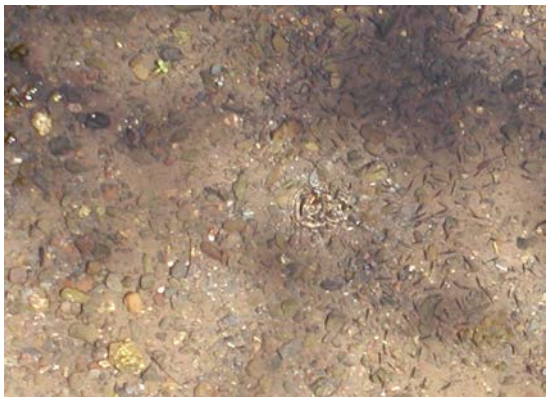


Date	3/6/20	3/13//20	3/20/20	3/27/20	4/3/20	4/10/2	4/17/20	4/23/20	5 /1/20	5/8/20	5/15/20	5/22/20	5/29/20

Middle at Rancheria Bridge: Cloud Cover and Estimated Wind Speed



Date	3/6/20	3/13/20	3/20/20	3/27/20	4/3/20	4/10/20	4/17/20	4/23/20	5/1/20	5/8/20	5/15/20	5/22/20	5/29/20
Time	1035	1028	1124	1128	1045	1101	0934	0910	0949	1006	1106	1017	0934
Est.direction	W	E	S	WNW	NW	S	SW	W	NW	S	E	NW, gusts	SW



5.8.2020, 1006

5.29.2020, 0934

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

3/6/2020 1035		3/13/2020 1028
Vegetation lining the immediate creek bank:riparian growth of willow sp., white alder, poplar, California bay, Himalayan blackberries, herbaceous plants and shrubs, grasses near the top of the levee, wildflowers including wild mustard Leveed channel: hills with oak woodland, white pine, shrubs, grasses` to the west, walnut orchards extending across the Middle Creek valley to the east Habitat: 5-60 ft. vertical habitat, horizontal habitat of grasses, shrubby growth, broad gravel bars instream, woody growth and some debris in stream and along banks, bridge apron on the south side of the bridge, the first of 4 weirs ~15 ft. from the apron	Substrate: 5% cobble, 10% gravel, 65% sand, 20% silt Bank degradation ~40% Water: clear, large gravel bar to the north of the bridge; grasses, algae, woody debris instream Odor of woodsmoke, odor of blooms of a bay laurel No fish seen Heard: 3 species of passerines, Stellar's jay, rushing water, farm equipment On water: 1 pr mallards	Water: clear, surface foam, large gravel bar above bridge Odor of woodsmoke, and smoke seen in a field to the east; odor of blooms of a bay laurel No fish seen Heard: water, passerines Seen: large, unidentified bird perched at the top of a tree in the distance In flight: 2 turkey vultures, 1 passerine On water: 1 pr mallards
3/20/2020 1124	**3/27/2020 1128**	**4/3/2020 1045**
Water: clear, no surface debris No fish seen Heard: water, passerines, seedeater, plane, California towhee In flight: cliff swallows, insects, Brewer's blackbird Seen: California towhee On water: 2 female and 1 male common merganser, 2 pr. mallards Odor of woodsmoke; traffic on bridge	Water: clear, reduced moss on substrate, gravel bars increasingly exposed No fish seen Heard: Stellar's jay, traffic, passerines, water Seen: traffic In flight: crow	Water: clear, slight surface debris, gravel bars more prominent Grass on levee growing taller, wild mustard blooming, trees beginning to leaf out No fish seen Heard: water, passerines, scrub jay, Stellar's jay, mourning doves Seen: traffic In flight: 1 turkey vulture, cliff swallows, 4 mallards just above water On water: 2 mallards

4/10/2020 1101	4/17/2020 0934	4/23/2020 0910
Water: clear, surface debris, algae on substrate No fish seen Heard: water, passerines, numerous swallows, indeterminate tracks in bank gravel	Water: clear, surface foam, moss on substrate No fish seen Heard: farm equipment,passerines, water, acorn woodpecker, red-shouldered hawk, chain saw; In flight: cliff swallows, insects Odor of woodsmoke, wild mustard blooming	Water: clear, levels down, some surface debris, algae on substrate, gravel bar ever more prominent Wildflowers blooming No fish seen Heard: water, chain saw, passerines, swallows, American robin Seen: traffic, older pickup with bearded owner and belongings parked off the road In flight: 2 mourning doves, cliff swallows
5/1/2020 0949	5/8/2020 1006	5/15/2020 1106
Water: clear, surface foam, instream herbaceous growth, increasing algae on substrate No fish seen Heard: water, numerous passerines, swallows, acorn woodpecker Seen: vehicle (car) In flight: butterflies, swallows, insects On water: 2 male mallards	Water: clear, organic matter on surface, levels down, sandbar above bridge increasingly exposed Grasses on levee bank tall, wildflowers blooming 80 juvenile rainbow trout ~1.5-4 cm. seen above bridge Heard: water, passerines, Stellar's jay, American robin Seen: crow on asphalt In flight: cliff swallows, insects	Water: clear, algae increasing on substrate, sandbar sandbar above bridge more exposed Wildflowers, grasses tall and forming seeds 10 juvenile rainbow trout ~3-4 cm; identification by body style, coloration Heard: swallows, passerines, traffic, water In flight: 1 turkey vulture, cliff swallows, insects, seeds dispersing
5/22/2020 1017	5/29/2020 0934	after 5/29/2020
Water: clear Grasses drying 4 juvenile rainbow trout ~4 cm; identification by body style and color Heard: American robin, water, swallows In flight: insects, c life swallows On water: male mallard	Water: clear, algae on substrate increased, surface debris sandbar above bridge more exposed Grasses, oats, wildflowers in bloom 3 4-5 cm juvenile rainbow trout north of bridge, oriented upstream, identified by body stye and coloration Heard: water, traffic, passerines, swallows, downy woodpecker Seen: traffic In flight: cliff swallows, butterflies, insects On water: small ripples	Monitoring ceased on 5/29/2020: *Migrating adults had not been seen in some time *Juveniles migrating downstream were either not seen or were very few, seen intermittently The current covid-19 pandemic required precautionary care.

Clover Bypass at Elk Mountain Road

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

This location is slightly under a bridge that crosses Clover Bypass, the channel resulting from the confluence of Alley and Clover Creeks to its confluence with Middle Creek. The channel is broadly leveed on north and south sides to divert potential flooding away from Upper Lake. In 2005 it overtopped, and parts of Upper Lake were under water (pers.communication, pers.observation). Water levels from storm events rise and fall quickly here, and water can entirely disappear in late spring.

Fish migrating up Middle Creek and juveniles returning downstream have been seen here. This year 40 adult and 38 juvenile Sacramento suckers were observed. A barrier for fish passage where Clover Bypass enters Middle Creek often occurs from braiding and piles of debris from winter storms. That area is posted and cannot be accessed to check for potentially stranded fish.

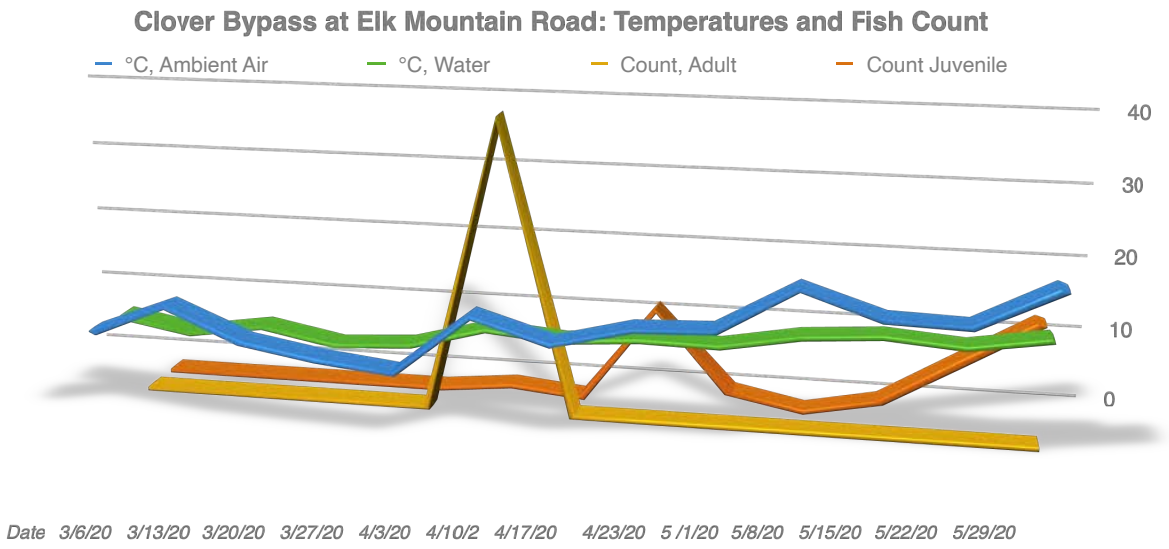
The stream is not deep or wide after storm runoff subsides. Flow and clarity were usually fair. Riparian shrubs and herbs became thickly clumped near banks and occasional trees or small groupings of trees lined them. Grasses and shrubs covered levee sides, with access roads at the tops.

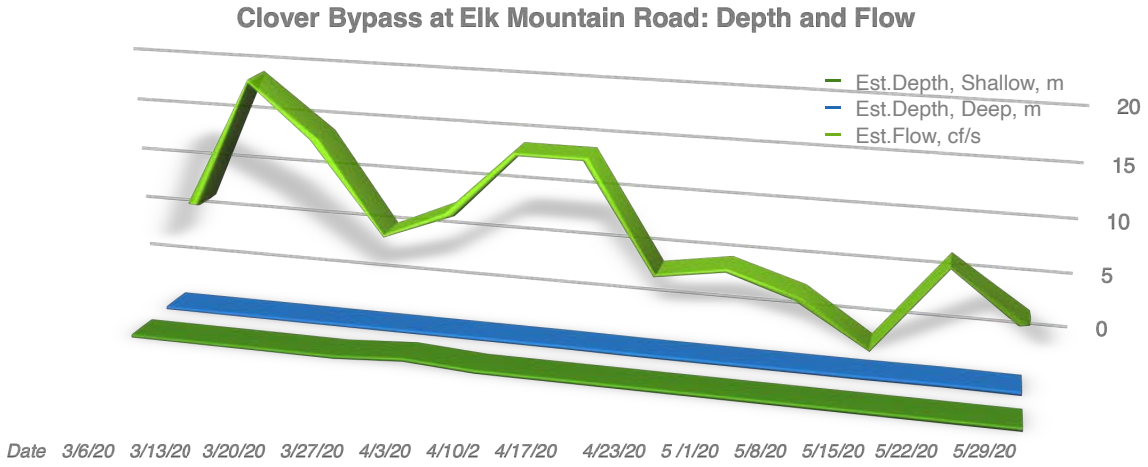
Grasses and herbaceous vegetation grew thickly on levee shelves this year. Minimal riparian vegetation was seen downstream and upstream. Shrubby vegetation and young trees had taken root along banks and grew quickly, providing more instream habitat and shady niches than was previously available. Gravel bars that began channel braiding were more pronounced this year. Vertical habitat was limited, about 3, to 8, to 15 ft.

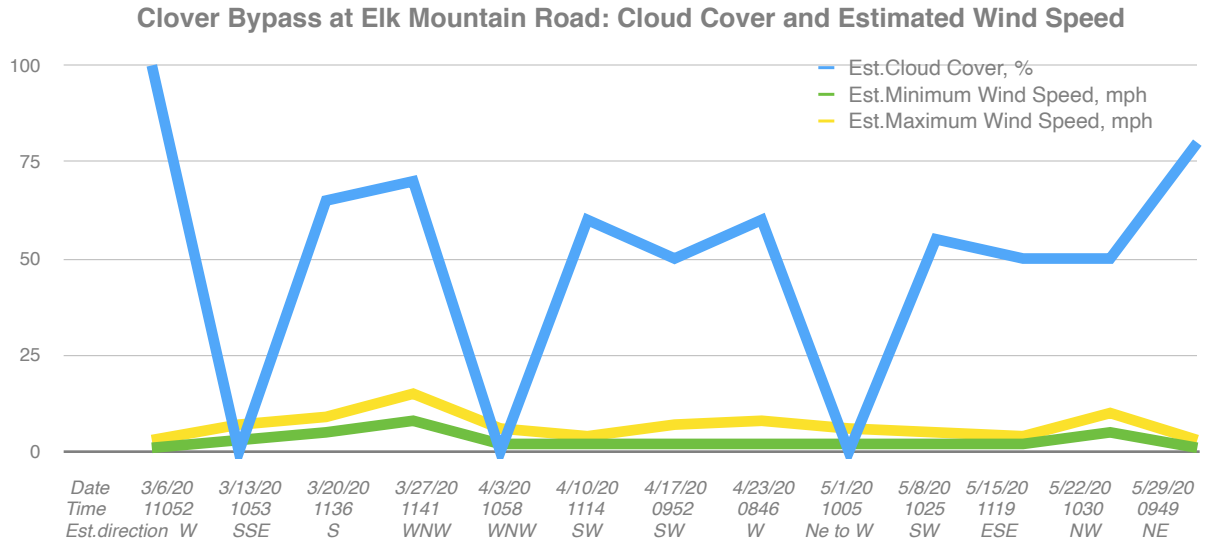
On the far side of the levee to the south are homes, vineyards, and orchards. To the north are also vineyards, orchards, and homes. Here, levee benches are open. Paths led to the creek through grasses on the sides of the levees. Leveed waterways in the northshore are wildlife corridors (pers. observations past and present).

3.6.2020, 1052

5.29.2020, 0949


Clover Bypass at Elk Mountain Road: Temperatures and Fish Count
°C, Ambient Air
°C, Water
Count, Adult
Count Juvenile
40
30
20
10
0
Date 3/6/20 3/13/20 3/20/20 3/27/20 4/3/20 4/10/2 4/17/20 4/23/20 5 /1/20 5/8/20 5/15/20 5/22/20 5/29/20


Clover Bypass at Elk Mountain Road: Depth and Flow
Est.Depth, Shallow, m
Est.Depth, Deep, m
Est.Flow, cf/s
20
15
10
5
0
Date 3/6/20 3/13/20 3/20/20 3/27/20 4/3/20 4/10/2 4/17/20 4/23/20 5 /1/20 5/8/20 5/15/20 5/22/20 5/29/20


Clover Bypass at Elk Mountain Road: Cloud Cover and Estimated Wind Speed
Est.Cloud Cover, %
Est.Minimum Wind Speed, mph
Est.Maximum Wind Speed, mph
100
75
50
25
0
Date 3/6/20 3/13/20 3/20/20 3/27/20 4/3/20 4/10/20 4/17/20 4/23/20 5/1/20 5/8/20 5/15/20 5/22/20 5/29/20
Time 11052 1053 1136 1141 1058 1114 0952 0846 1005 1025 1119 1030 0949
Est.direction W SSE S WNW WNW SW SW W Ne to W SW ESE NW NE

Clover Bypass: Brief Summary of Fish Count, Wildlife, and Immediate Environment-3

3/6/2020 1052		3/13/2020 1053
Leveed creek with broad benches to north and south, sides covered thickly with ruderal and seeded grasses; herbaceous plants, shrubby growth, and occasional willow sp. along banks 3-15 ft. sporadic vertical habitat; ~75 ft horizontal, sloping habitat along levee banks; Extended habitat: orchards, vineyards, and homes to north and south Pillars support bridge at the small monitoring area; creek otherwise unprotected; No canopy: sparse cover where willows are scarce	Gravel bars and grasses instream; 20% cobble, 30% gravel, 40% sand, 10% silt; bank degradation 60% Water: clear; grasses, algae, debris instream No fish seen Heard: passerines, Brewer's blackbird Seen: Brewer's blackbird, human tracks, beer bottles in water: 2 sp aquatic insects	Water: clear, algae on substrate; grass on levee side growing, shrubby growth filling in levee bench on north side No fish seen Heard: Brewer's blackbird, red-winged blackbird, passerines, mourning dove, California quail In flight: 1 crow, 2 passerines
3/20/2020 1136	3/27/2020 1141	4/3/2020 1058
Water: clear, algae on substrate No fish seen Heard: passerines, swallows, plane Seen: spiders, ORV tracks on levee bench In flight: insects, ~50 cliff swallows in water: seeds, aquatic insects	Water: clear, instream plants growing and filling in, algae on substrate; blooming mustard; herbs, grasses, stubby growth expanding on levee bench No fish seen Heard: few passerines SeenL ORV tail on levee bench In flight: insects In water: aquatic insects	Water: clear, slower, developing instream plant growth Growth on levee bench exploding; grasses and thistles growing; woodsmoke nearby; mustard blooming No fish seen Heard: passerines, swallows Seen: passerines, traffic, ORV tracks, horse tracks In flight: numerous cliff swallows, 1 crow On water: water skeeters
4/10/2020 1114	4/17/2020 0952	4/23/2020 0846
Water: clear, levels down; algae increasing on substrate; seeds on surface; grass, shrubs, herbs growing taller on levee bench ~40 Sacramento sucker adults returning downstream: fish had extended snouts but was unable to see caudal fin clearly; 1 juvenile Sacramento sucker 1.5 cm Heard: frog, passerines, swallows, Brewer's blackbird Seen: red-winged blackbird, mole mounds on levee bench In flight: numerous cliff swallows In water: aquatic insects	Water: clear, algae growing on substrate; grasses, herbaceous growth on levee bench growing thicker and taller No fish seen Heard: passerinws, swallows, Brewer's blackbird, red-winged blackbird, traffic, farm equipment Seen: ORV tracks In flight: cliff swallows, insects In water: macroinvertebrates, small insects	Water: clear, reduced levels; algae increasing on substrate; grasses growing instream; grasses, herbaceous growth expanding on levee bench Juvenile Sacramento suckers: 2 @ 1.0 cm, 3 @ 1.5 cm, 8 @ 2-3 cm Heard: passerines, swallows, traffic, California quail, Brewer's blackbird, red-winged blackbird Seen: jogger on bridge In flight: cliff swallows, Brewer's blackbid=rd insects, male mallard In water: numerous and varied insects

5/1/2020 1005	5/8/2020 1025	5/15/2020 1119
Water: clear, levels down; growth continuing to develop instream; algae increasing on substrate; slight surface debris; grasses, shrubs growing on levee; shrubby growth near creek high and thick 2 1.5 cm juvenile Sacramento suckers Heard: red-winged blackbird, mourning dove, American robin, swallows Seen: person walking by, red-winged blackbird In flight: insects, cliff swallows, crow in water: insects	Water: clear, levels down; instream growth proliferating, algae increasing; grasses and herbaceous growth on levee bench and along creek bank increasing, growing tall No fish seen Heard: swallows, Brewer's blackbird, passerines, mourning dove, traffic, California quail Seen: mole mound, Brewer's blackbird In flight: cliff swallows, bees In water: a variety of insects	Water: clear, algae continuing to increase on substrate; grasses, herbs on levee bench and near creek bank greatly increasing in height and girth, and blooming; creek likely blocked downstream because there is no current 2 2.5 cm Sacramento suckers Heard: traffic, swallows, red-winged blackbird Seen: Brewer's blackbird, red-winged blackbird exhibiting protective behavior, 3 persons on bridge In flight: damselfly, 1 turkey vulture, cliff swallows In water: insects
5/22/2020 1030	**5/29/2020 0949**	**after 5/29/2020**
Water: clear, organic matter on surface, algae continuing to grow on substrate, instream grasses and herbs growing quickly; growth on levee benches exploding; wildflowers blooming Juvenile Sacramento suckers: 1 @ 3-4 cm, 5 @ 1.5-2 cm, 2 @1 cm Heard: traffic, Brewer's blackbird, red-winged blackbird, swallows, crickets, bass music In flight: dragonfly, bees, cliff swallows, Brewer's blackbird, red-winged blackbird, turkey vulture In water: numerous aquatic insects	Water: clear, very slow; instream grasses, algae on substrate and surface growing quickly; grasses, herbs, wildflowers on levee bench growing exponentially 12 juvenile Sacramento suckers from 2 to 4. cm Heard: traffic, swallows, red-winged blackbird, vehicle, mourning dove, cliff swallows landing on nests under bridge Seen: red-winged blackbird In flight: cliff swallows, bees, insects, butterflies, red-winged blackbird In water: numerous insects	Monitoring ceased on 5/29/2020: *Migrating adults had not been seen in some time *Juveniles migrating downstream were either not seen or were very few, seen intermittently The current covid-19 pandemic required precautionary care.

5.29.2020, 0949

Middle Creek North

N 39° 9.8408', W 122° 54.9685' elev. 1339

This location is north of a bridge on Hwy 20, over Middle Creek. Access is on the east side, along the broad levee bench, across open meadow, and through riparian habitat lining Middle Creek. A pear orchard is east of the levee. Across the creek to the west, there is no bench and a narrow, less gentle incline to the top of the levee. A residence is on the other side. Riparian vegetation, grasses, and shrubby plants line the creek along the bank. This location is fairly protected and secluded and is accessed by a lightly used wildlife trail.

Adult fish migrating upstream in Middle Creek and juveniles returning downstream pass this location. This year, 20 adult Sacramento suckers were seen migrating upstream, 40 returning downstream, and 10 larger, heavier Sacramento suckers with dissimilar markings and color, possibly a subspecies, headed upstream, 3 exhibiting spawning behavior. A total of 57 juvenile Sacramento suckers were seen heading downstream.

The channel is broad and shallow with gravel bars extending into its center. These grew more exposed as temperatures warmed. Storm event runoff temporarily affected water quality and clarity that was otherwise good. This year there were no rain events on monitoring days. Flow was faster earlier in the year and after rain events and tapered off as temperatures warmed.

Strips of riptarian vegetation lining each side of the channel are about 25 ft. wide to the west and 50 feet wide to the east. They are primarily grasses, herbaceous plants, shrubs and trees that offer horizontal and vertical habitat for wildlife and instream shade. Instream niches result from woody debris and gravel bars near banks. This year there were abundant instream grasses.

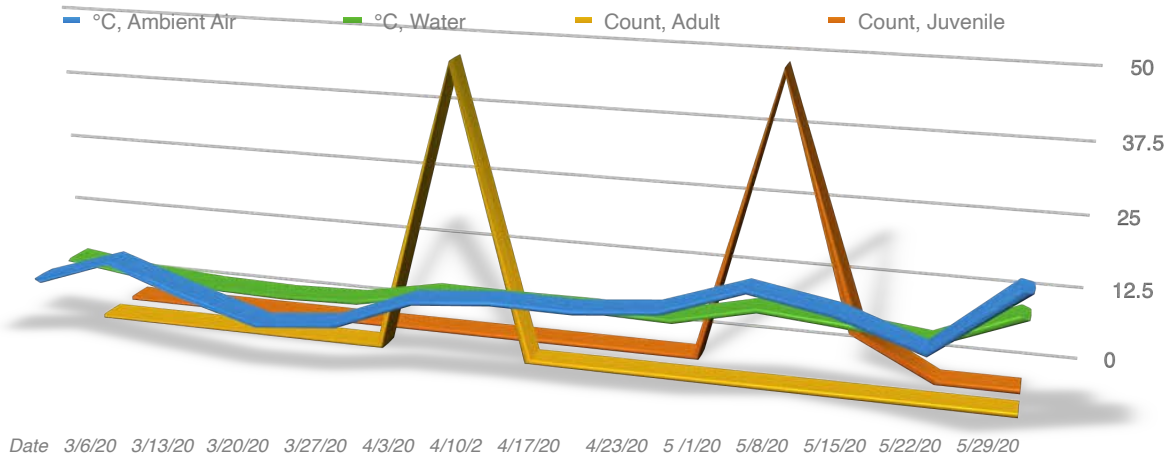
Grasses, wildflowers, and vetch grow profusely and tall on the broad levee bench to the east, before it inclines to the top. In very late spring, bowers and paths in tall grasses are evidence of wildlife frequenting the area. Insects, bees, and lizards are prolific here.

Levees on the east and west sides are topped with easily traveled roadways. Especially to the east, people, dogs, joggers, trucks or similar vehicles, and dirt bikes are often present or they leave tracks.

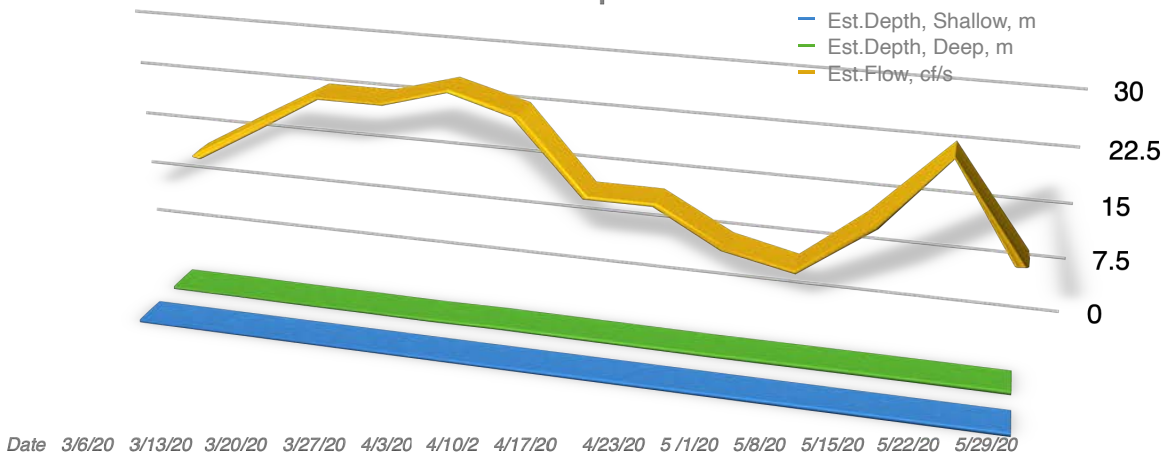
3.6.2020, 1125

5.29.2020, 1012

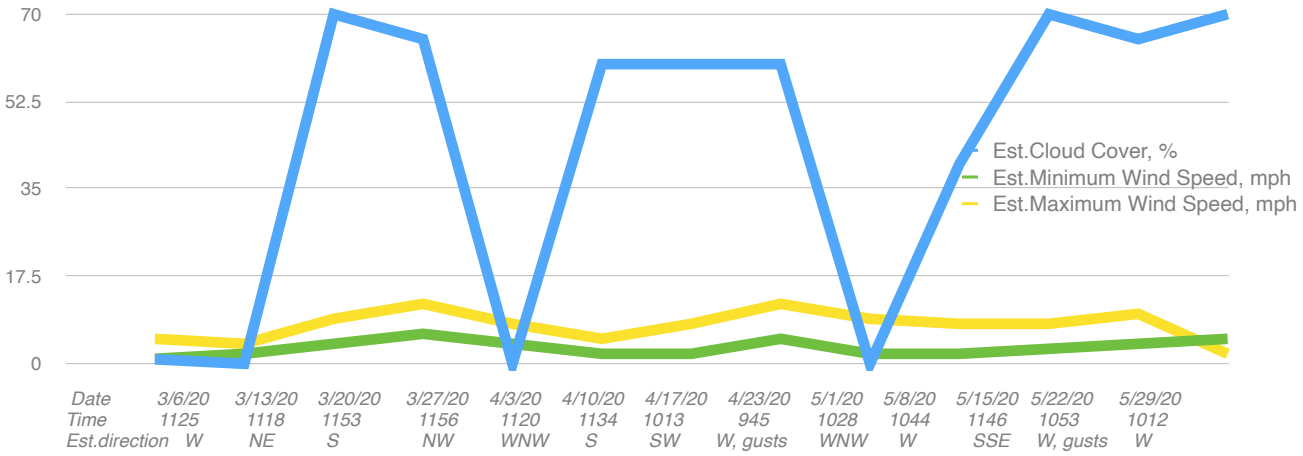
Middle North: Temperature and Fish Count



Middle North: Depth and Flow



Middle North: Cloud Cover and Estimated Wind Speed



5.29.2020, 1012

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

3/6/2020 1125		3/13/2020 1118
Both sides of the channel are lined with riparian vegetation, about 25 ft.wide strip to the west, about 50 ft. wide strip to the east. The western bank inclines sharply to the levee top; the eastern bank extends into a broad meadow that is the levee bench. Vegetation: along bank: willow sp., poplar, California bay laurel, herbaceous plants, shrubby growth, grasses, Himalayan blackberries; ruderal grasses, curly dock, vetch, wildflowers in open area to east Habitat: 5-75 ft. vertical, 25-50 100 ft. horizontal; broad gravel bars instream, woody growth, debris along banks	Substrate: 30% cobble, 30% gravel, 20% sand, 20% silt; bank degradation 40% Water: clear, grasses, algae growing instream No fish seen Heard: red-shouldered hawk, passerines, crows, Stellar's jay Seen: 1 great white egret in tree, coyote scat on trail In flight: 15 great white egrets, several passerines on water: 3 great white egrets, 3 mallards In water: aquatic insects	Water: clear, algae on substrate, grasses instream, gravel bars in channel No fish seen Heard: red-shouldered hawk, passerines, bushtits Seen: 2 great white egrets further upstream, ground insects, spider In flight: insects In water: aquatic insects
3/20/2020 1153	3/27/2020 1156	4/3/2020 1120
Water: clear, algae on substrate; blooming wild mustard No fish seen Heard: numerous passerines, frogs Seen: 1 black phoebe. 8 Brewer's blackbirds, 1 great white egret upstream, ground insects In flight: 1 crow, 1 turkey vulture, 3 mourning doves, 1 American robin On and in water: 4 male and 4 female mallards upstream and in grasses, aquatic insects	Water: clear, algae growing one substrate; large patches of grasses, herbs instream and on bank; wild mustard blooming, willows beginning to leaf out No fish seen Heard: passerines, Stellar's jay, California towhee, mallard Seen: ground spiders In flight: 3 crows, great white egret, 7 mallards - 5 males, 2 females On and in water: 7 mallards, 2 great white egrets, aquatic insects, pr. common mergansers	Water: clear, increased growth instream; trees leafing out No fish seen Heard: 2 red-shouldered hawkspasserines, traffic, ag sprayer, rooster, 2 dogs Seen: lizard, horse tracks on path on levee bench In flight insects, 1 crow On water: 6 mallards, 1 great white egret, 1 cattle egret

3/20/2020 1153	3/27/2020 1156	4/3/2020 1120
Water: clear, algae on substrate; blooming wild mustard No fish seen Heard: numerous passerines, frogs Seen: 1 black phoebe. 8 Brewer's blackbirds, 1 great white egret upstream, ground insects In flight: 1 crow, 1 turkey vulture, 3 mourning doves, 1 American robin On and in water: 4 male and 4 female mallards upstream and in grasses, aquatic insects	Water: clear, algae growing one substrate; large patches of grasses, herbs instream and on bank; wild mustard blooming, willows beginning to leaf out No fish seen Heard: passerines, Stellar's jay, California towhee, mallard Seen: ground spiders In flight: 3 crows, great white egret, 7 mallards - 5 males, 2 females On and in water: 7 mallards, 2 great white egrets, aquatic insects, pr. common mergansers	Water: clear, increased growth instream; trees leafing out No fish seen Heard: 2 red-shouldered hawkspasserines, traffic, ag sprayer, rooster, 2 dogs Seen: lizard, horse tracks on path on levee bench In flight insects, 1 crow On water: 6 mallards, 1 great white egret, 1 cattle egret
4/10/2020 1134	4/17/2020 1013	4/23/2020 0945
Water: clear, algae increasing on substrate, vegetation increasing instream 20 adult grey-green Sacramento suckers heading upstream, 40 returning downstream, 10 adult Sacramento suckers - large with dissimilar coloration migrating upstream Heard: passerines, ag sprayer, crow, rooster, frog, red-shouldered hawk Seen: black phoebe, ground spider, 8 great white egrets In flight: 8 turkey cultures, crow, red-shouldered hawk In water: aquatic insects	Water: clear, instream grasses growing, algae on substrate developing No fish seen Heard: passerines, traffic, crow, swallows, rooster, frog Seen: ORV tracks, human tracks, pickup tracks; crows, spiders, beetles In flight: cliff swallows, 2 great blue herons Slight odor of fish	Water: clear, levels down, light surface debris, instream grasses and algae on substrate growing; vetch and meadow grasses growing, odor of mugwort No fish seen Heard: passerines, traffic, swallows, poplar limbs cracking Seen: white truck, homeless woman In flight: bees, cliff swallows, 2 butterflies On or in water: 2 great white egrets, aquatic insects
5/1/2020 1028	5/8/2020 1044	5/15/2020 1146

Water: clear, levels down, instream growth increasing, algae on substrate increasing; vetch, thistles, morning glory blooming; grass tick and high on levee bench No fish seen Heard: traffic, numerous passerines, swallows, ag sprayer, rooster, red-shouldered hawk, crickets, sora Seen: insects On water: 1 female and 2 male mallards In flight: seeds, butterfly, insects, cliff swallows	Water: clear, levels down, instream garth and algae on substrate increasing; vetch blooming 50 1-1.5 cm juvenile Sacramento suckers observed Heard: cricket, passerines, traffic, swallows, rooster, mallard Seen: horse tracks In flight: cliff swallows, butterfly, bees On water: 3 great white egrets, 1 snowy egret	Water: clear, instream grasses, algae growing and increasing; grasses oil levee bench drying; grasses, herbs near creek growing profusely 6 juvenile Sacramento suckers 1.5-2 cm and 1 1 cm, seen Heard: passerines, red-shouldered hawk, frog, dog, rooster, traffic, swallows, meadowlark, Brewer's blackbird, dog Seen: Brewer's blaclkbird, ground insects In flight: insects, cliff swallows, bees, butterfly On or in water: pr. mallards, great white egret, various insects
5/22/2020 1053	5/29/2020 1012	after 5/29/2020
Water: clear; instream growth expanding; grasses drying on bank, levee bench; wildflowers blooming No fish seen	Water: clear, instream grasses and algae on substrate growing quickly; grasses, wildflowers blooming on levee bench No fish seen	
Water: clear; instream growth expanding; grasses drying on bank, levee bench; wildflowers blooming No fish seen Heard: traffic, passerines, American robin, chainsaw, swallows, crickets, rooster, crow Seen: ground insects, 2 great white egrets In flight: bees, several butterflies, 2 turkey vultures, swallows	Water: clear, instream grasses and algae on substrate growing quickly; grasses, wildflowers blooming on levee bench No fish seen Heard: traffic, passerines, rooster, American robins Seen: woman, dogs, upstream on levee, dog or raccoon scat In flight: insects, butterflies, Brewer's blackbird, cliff swallows, passerines In water: aquatic insects	Monitoring ceased on 5/29/2020: *Migrating adults had not been seen in some time *Juveniles migrating downstream were either not seen or were very few, seen intermittently The current covid-19 pandemic required precautionary care.

Vegetation

Riparian vegetation lines creek banks at all locations, in greater or lesser quantity and variety, and surrounds the pool at Tulelake.

In the environment close to locations, trees 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 consist 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*, as lower tiers along creek banks and around the pool at Tulelake.

Instream algal mats were beginning to form at Middle Creek North and South and Clover Bypass when monitoring ceased. Algae on substrate had already begun to appear when monitoring began.

Peripheral environments were primarily meadows, hillsides, oak woodland, orchards, and residences.

Wildlife

Notes from field sheets recorded wildlife at each location (see above). Time spent at monitoring locations was not lengthy. Written observations were summarized.

Wildlife especially avian was always present and always influenced by weather patterns and intrusive sounds or activities. Rain, drizzle, sustained winds and gusts subdued activity. In general wildlife activity increased as temperatures warmed, although there were early, unseasonably warm days this spring. A variety of insects, especially bees, butterflies, mosquitoes, and spiders were prolific in warmer weather, and small aquatic insects and macroinvertebrates were observed at 3 of 5 locations. Crickets and toads were often heard.

Notably, animals or evidence of them not seen this year were American kestrel, *Falco sparverius,* Cooper's hawks, *Accipiter cooperii, s*harp-shinned hawks, *Accipiter striatus,* bald eagles, *Haliaeetus leucocephalus,* black bear, *Ursus americanus*, mountain lion, *Puma concolor*, American mink, *Neovison vison,* and red fox, *Vulpes vulpes*.

These animals are known to frequent the Tulelake area and the Middle Creek corridor because habitat in those areas supports their prey items. Aftermath of the Ranch fire is clear, as are changes in ecology. Parts of ecosystems and microecosystems are altered, impacting niches and food webs.

Waterfowl not seen this year were American coot, *Fulica americana*, ring-necked duck, *Aythya collaris*, and Clark's grebe, *Aechmophorus clarkii.* Previously *t*hey have often been observed at the Tulelake location.

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, among others, white crowned sparrow, golden crowned sparrow, American goldfinch, lesser goldfinch.

White crowned sparrow, *Zonotrichia leucophrys*
Golden crowned sparrow, *Zonotrichia atricapilla*
American goldfinch, *Carduelis tristis*
Lesser goldfinch, *Carduelis psaltria*
American bushtit, *Psaltriparus minimus*
Black phoebe, *Sayornis nigricans*
American cliff swallow, *Petrochelidon pyrrhonota*
Red-winged blackbird, *Agelaius phoeniceus*
Brewer's blackbird, *Euphagus cyanocephalus*
Mourning dove, *Zenaida macroura*
California quail, *Callipepla californica*
Wild turkey, *Meleagris gallopavo*
Northern mockingbird, *Mimulus polyglottos*
Acorn woodpecker, *Melanerpes formicivorous*
Nuttall's woodpecker, *Picoides nuttallii*
Downy woodpecker, *Picoides pubescens*
Hairy woodpecker, *Leuconotopicus villosus*
Scrub jay, *Aphelocoma coerulescens*

Stellar's jay, *Cyanocitta stelleri*
California towhee, *Meolzone crissalis*
American robin, *Turdus migratorius*
Bushtit, *Aegithalos caudatus*
American crow, *Corvus brachyrhynchos*
Common raven, *Corvus corax*
Turkey vulture, *Cathartes aura*
Red-shouldered hawk, *Buteo lineatus*
Red-tailed hawk, *Buteo jamaicensis*
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*
- Snowy egret, *Egretta thula*
- Pelagic cormorant, *Phalacrocorax pelagicus*
- Great blue heron, *Ardea herodias*
- Black crowned night heron, *Nycticorax nycticorax*
- Green-backed heron, *Butorides striatus*,
- Western grebe, *Aechmophorus occidentalis*

Flying and terrestrial insects and aquatic macroinvertebrates
Tadpoles
California toad, *Bufo boreas*.
Ground squirrel, *Otospermophilus beecheyi*
Grey squirrel, *Sciurus griseus ssp.*
Raccoon, *Procyon lotor*
Skunk, *Mephitis mephitis*
Deer, *Odocoileus virginianus:* tracks, paths, and hollows seen on creek banks and in tall grasses
Coyote, *Canis latrans*
Gopher, Fam. Geomyidae, fresh mounds
Mole, Fam. Talpidae, fresh mounds and runs
Domestic dog, *Canis familiaris*
Domestic cat, *Felis catus*
Domestic horse, *Equus ferus caballus*
Domestic rooster, *Gallus gallus domesticus*
Feral swine, *Sus scrofa*

Image taken from research, Observations of Larval Development of Clear Lake Hitch, ….,, S. Franson, 2012

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Additional resources are at http://www.rootlets.com/environment/listsources.html.

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