Observations of Fish Migration and Habitat in Northshore Tributaries, Clear Lake Basin

Five locations were monitored during peak migration, 3.March.2017 to 16.June.2017, for sightings of Clear Lake Hitch, *Lavinia exilicauida chi*.

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Summary, Field Monitoring

Monitoring for migrating Clear Lake hitch, *Lavinia exilicauda chi*, occurred from March 3 until June 16. The same five locations that have been monitored since 2013 were checked weekly for sightings of migrating adults and then for juveniles. The species is listed as threatened by the California Department of Fish and Wildlife and is currently under consideration for listing by the U.S. Fish and Wildlife Service.

Although more winter rain events happened, water levels in all creeks dropped, as expected, throughout monitoring, with surges following spring rain events. As in 2016, water levels at the Tulelake location appeared to be more stable and to follow Clear Lake levels, but they fell at the remaining four locations with higher elevations.

Fish passage was compromised as water receded, riffles morphed into gravel bars that in some places divided stream beds and channeled flow into lower substrate, and stream width shrank. Although fish passage for juveniles of 1.5 to 4 or 5 cm still existed by 16.June at monitored locations, continuous downstream fish passage was unconfirmed since inaccessible areas exist where channels are easily blocked.

Water temperatures were chilly before March 3 and warm after June 16.

At locations in northshore tributaries **a**dults and juveniles observed this spring were not hitch. Features Clear Lake hitch exhibit both as adults and juveniles are inconsistent with adults and juveniles observed this year and in previous years after 2010.

Clear Lake hitch are endemic to the Clear Lake basin that over centuries has had tributaries with low grades. For many years they have not been seen in Middle Creek above weirs that have not filled with gravel and appear to be barriers. They are a wetland fish during part of their life cycle, requiring parameters for temperatures for healthy larval growth and for adequate fish passage. Marshes and seasonal wetlands that historically existed in the northshore watershed are for the most part gone, and at least one creek that formerly ran much of the year is now a runoff channel (pers.obs.).

In addition, juveniles of any species that are migrating downstream can often be in jeopardy. Those species that do not migrate and spawn early are imperiled. It would appear that successful migration of juvenile hitch downstream is uncertain, and that ecological equilibria with respect to the Clear Lake hitch, *Lavinia exilicauda chi*, are fragile at best.

Drought and warming trends further jeopardize the hitch life cycle, as do reduced aquifers from water diversion, water release, and uncertain groundwater recharge.

Increased habitat such as restoration projects that have wetland, marshland, and year round water with year round connections to Clear Lake would be beneficial to hitch populations.

This spring on 3.10.2017, spawning hitch and abundant egg masses were seen in Adobe Creek near Bell Hill Road, to the southwest of Clear Lake. Participants from Big Valley EPA and Robinson Rancheria Environmental Center viewed and documented them. After spawning occurred, a precipitous decrease in flow left large egg masses dry. (Pers. comm. from John Gichuki, PhD, Big Valley EPA, Big Valley Rancheria Band of Pomo Indians, 1250 Soda Bay Road, Lakeport, CA 95453)

Results of field notes for sightings of other species of adult and juvenile fish are found with information for each location. In general:

The first migrating adult Sacramento suckers, *Catostomus occidentals,* were observed on 3.17.2017 at the Middle Creek North location. The first returning juveniles were seen on 3.31.2017 at two locations, Middle Creek North and Middle Creek South.

From size, features, markings, and color, what appeared to be two distinct genera, species, or subspecies of adult suckers, at least one of which was Sacramento sucker, were observed in Middle Creek at two locations, Middle Creek North and Rancheria Bridge. What appeared to be two distinct genera, species, or subspecies of juvenile suckers, one of which was Sacramento sucker, were observed during monitoring at four locations intermittently through 6.16.2017. Creekside access at the Rancheria Bridge location is blocked, and juveniles could not be seen there although might have been among those observed downstream.

During previous years from 2005 to present, adult and juvenile rainbow trout were observed above Rancheria Bridge (pers. obs. and monitoring, and Middle Creek CRMP, 6.26.2005 and 7.9.2006). 6.30.2004, a feed ball comprised of about 200 threadfin shad lingered about 50 feet below Rancheria Bridge, years prior to construction of a weir about 15 feet below the bridge apron (this weir is included in images in results for the Rancheria Bridge location).

On 3.31.2017 approximately 40 of the larger suckers were misidentified but were not hitch. Results were corrected.

Below Rancheria Bridge, 3.31.2017
Spawning suckers

Above Rancheria Bridge, 5.5.2017
Rainbow trout

Methods

Initial field notations included immediate and peripheral vegetation and stream substrate. Subsequent modifications were noted throughout spring monitoring, for example, creek bank and gravel bar exposure and general appearance of water: clarity, debris, and developing algal growth on surface and substrate.

Field notes included estimates for water depth and flow, cloud cover, and wind speed and direction. Ambient air and water temperatures were noted. Wildlife heard, seen, in flight, in water, and evidence of having been within the immediate environment, including scat, tracks, and paths was observed.

Depth was estimated using permanent reference points. Flow was estimated by timing the movement of light surface debris. While depth and flow estimates are inexact, indications over time suggest changes and over years, suggest trends.

Time taken for observations was not extensive but consistent, occurring on Friday mornings with few exceptions and requiring 2 to 2.5 hours to complete. Counts were not based on timed intervals but on careful investigation of the environment.

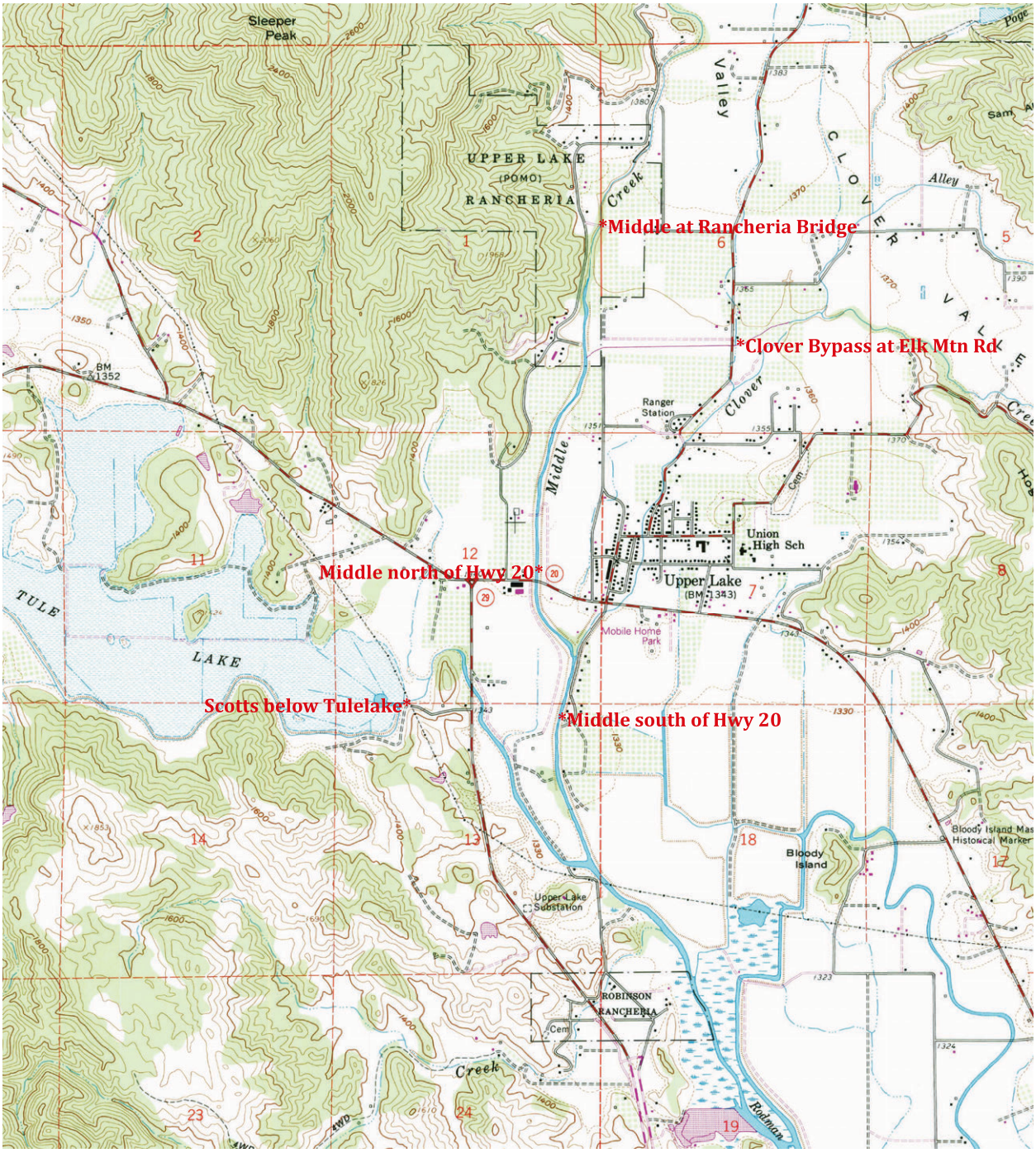
Digital images were recorded at each location, each week.

Monitoring continued weekly until flow at 4 locations was severely reduced, with channeling around gravel bars and some pooling.

Equipment included an Olympus digital camera, a DeLorme Earthmate PN-60, and a Cooper handheld digital thermometer. Resources occasionally consulted were Google Earth 7.1.5.1557, 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 the 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).

—> Note: numbers and TL of juvenile fish at all locations were estimated as accurately as possible. None were removed from streams and measured.

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° 9.6167', W 122° 55.5809' elev. 1330

Throughout monitoring, large fish were usually observed foraging below and often immediately above the dam, or the presence of a sizable wake and ripples betrayed their presence.

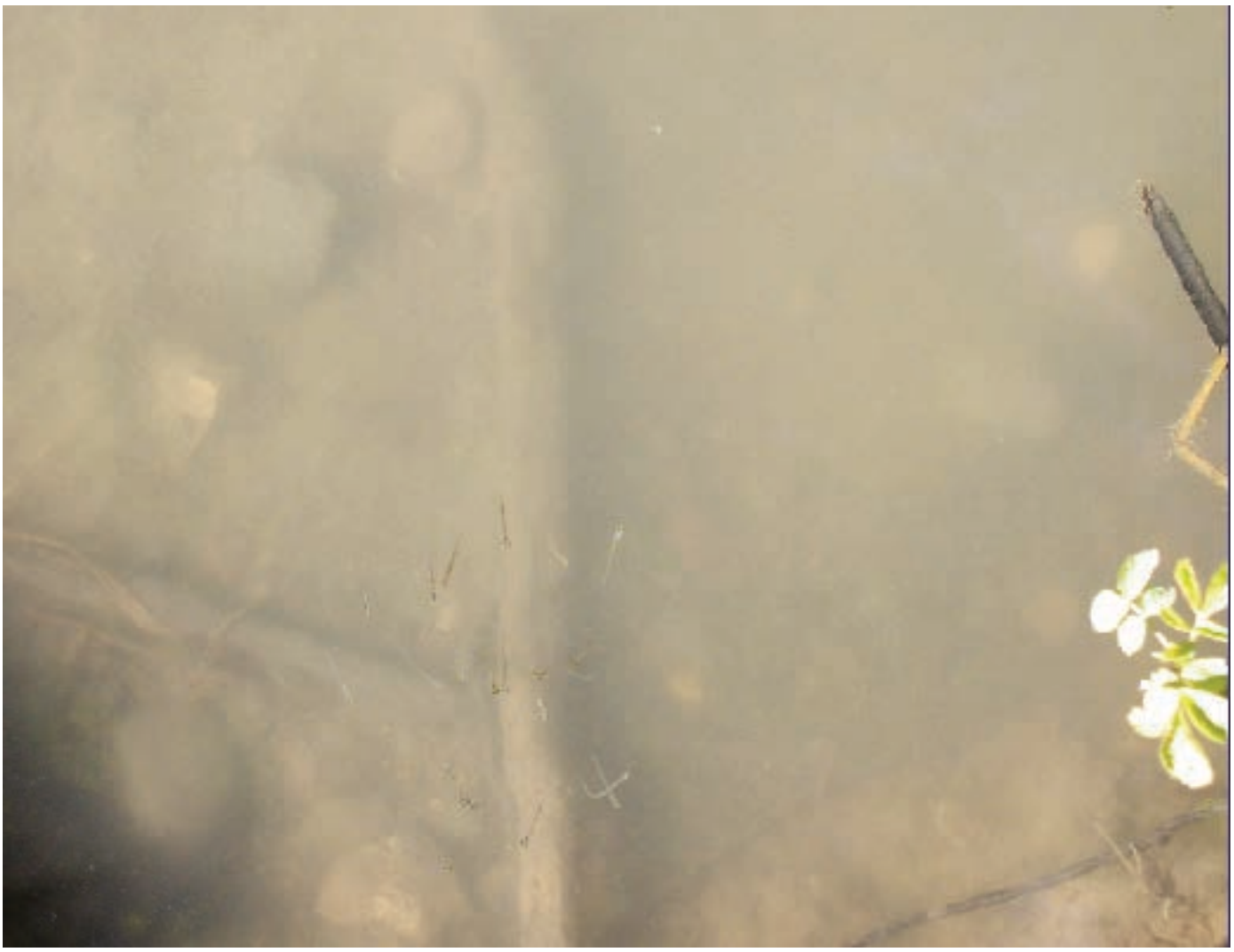
On 4.28.2017, approximately 20 juvenile fish 1.75 to 2.cm, with markings and body styles consistent with juvenile carp, *Cyprinus sp.*, (about 1/3) and large- and smallmouth bass, *Micropterus salmoides* and *Micropterus dolomieu*, and Sacramento sucker, *Catostomus occidentalis*, (about 2/3) were near water's edge.

Wildlife was abundant. Waterfowl, raptors, and a diversity of passerines and other birds were seen throughout monitoring. Evidence of presence of mammals, especially raccoon, and various reptiles was always found. Flying and crawling insects were prevalent. This was the sole location where crayfish were observed.

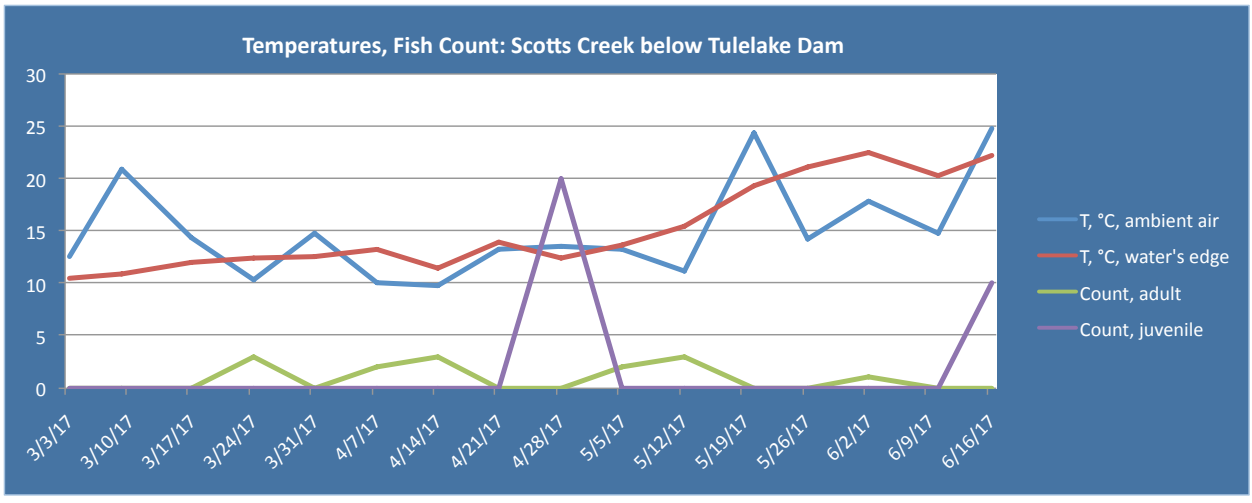
3.3.2017: dam is underwater

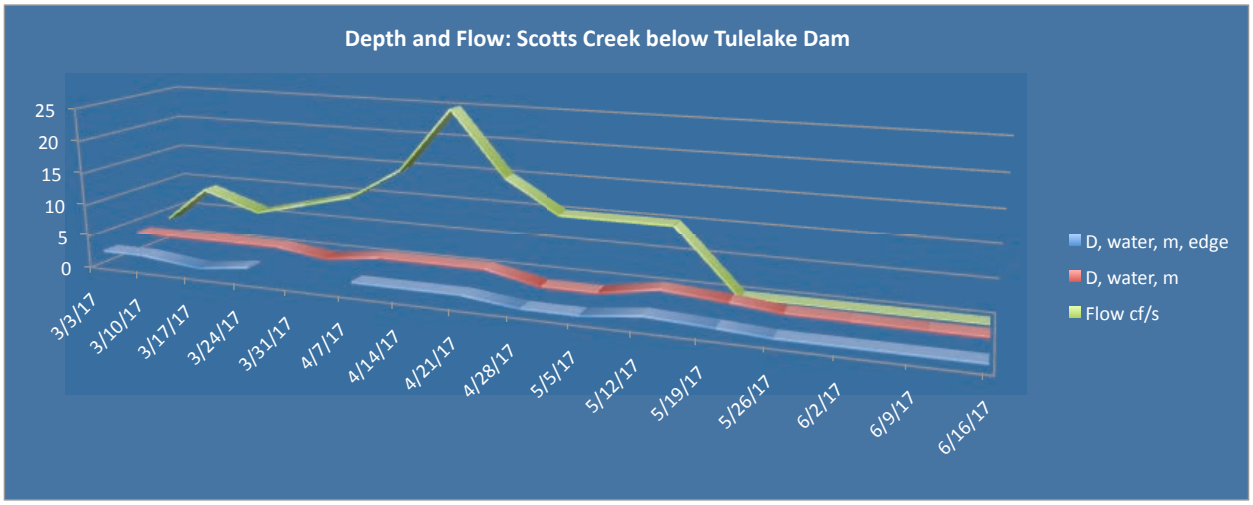
6.16.2017: dam is exposed

Below: 3.24.2017: predator at dam



4.28.2017: juveniles near bank





Middle Creek South

N 39° 9.4608', W 122° 54.88580' elev. 1332

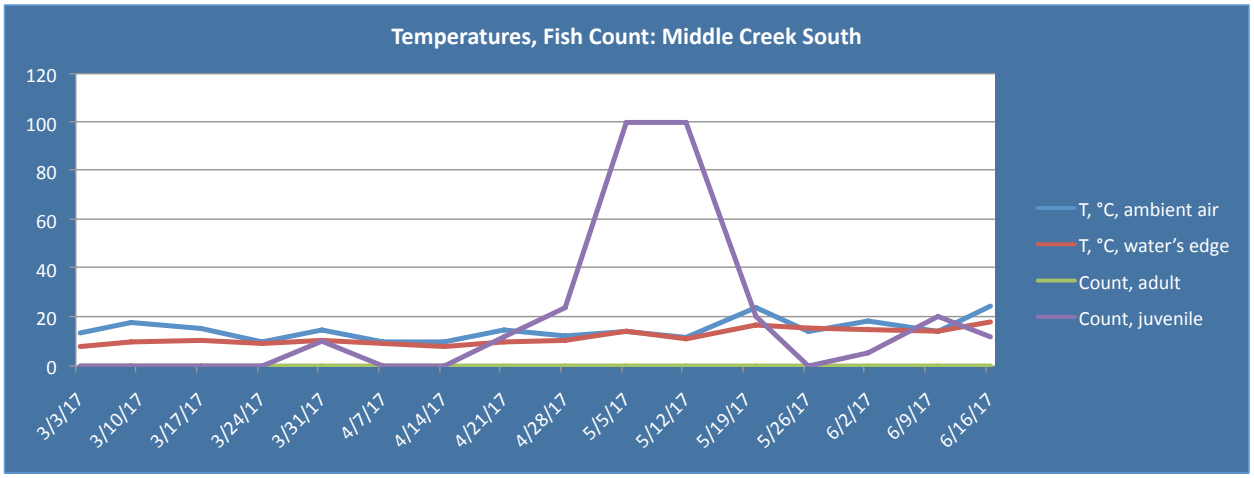
On 3.21.2017, 10 juvenile suckers estimated at 1.25 cm. were observed near water's edge. In the following weeks more juvenile suckers were seen: *4.21.2017*, 12 at 1.25 cm; *4.28.2017*, 24 at 1.25 to 2.5 cm; *5.5.2017*, 100 at 1.5 to 2.5 cm; *5.12.2017*, 100 at 1.5 to 2.5 cm; *5.20.2017*: 20 at 1.5 to 2 cm; *6.2.2017:* 5 at 2 to 6 cm; *6.10.2017*: 20 at 4 to 6 cm; *6.16.2017*: 12 at 2 to 7 cm.

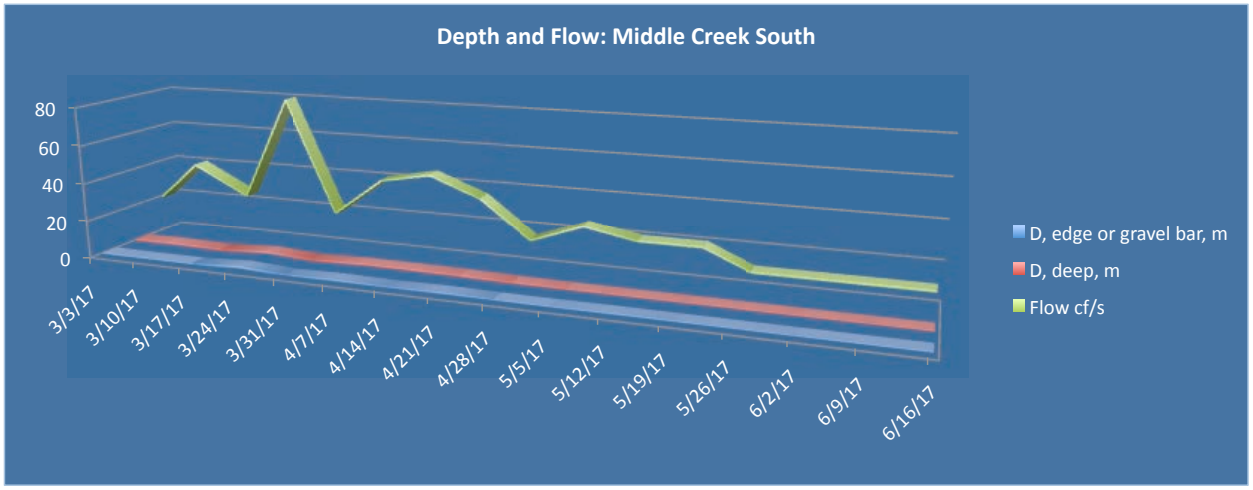
Aquatic insects and tadpoles, but no other fish, were observed. Birds of numerous species were abundant as were mammals' tracks especially raccoon, squirrel, deer, and more.

3.3.2017: in recent rains creek spilled over bank into a small draw

6.16.2017: gravel bar exposed; algal growth

5.5.2017; juvenile suckers





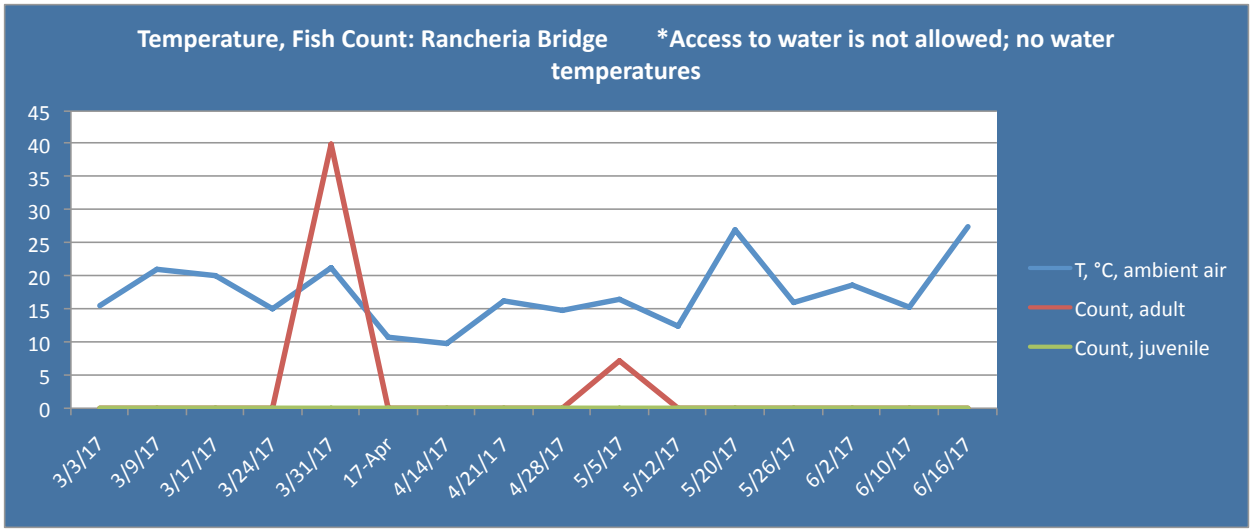
Middle Creek at Rancheria Bridge

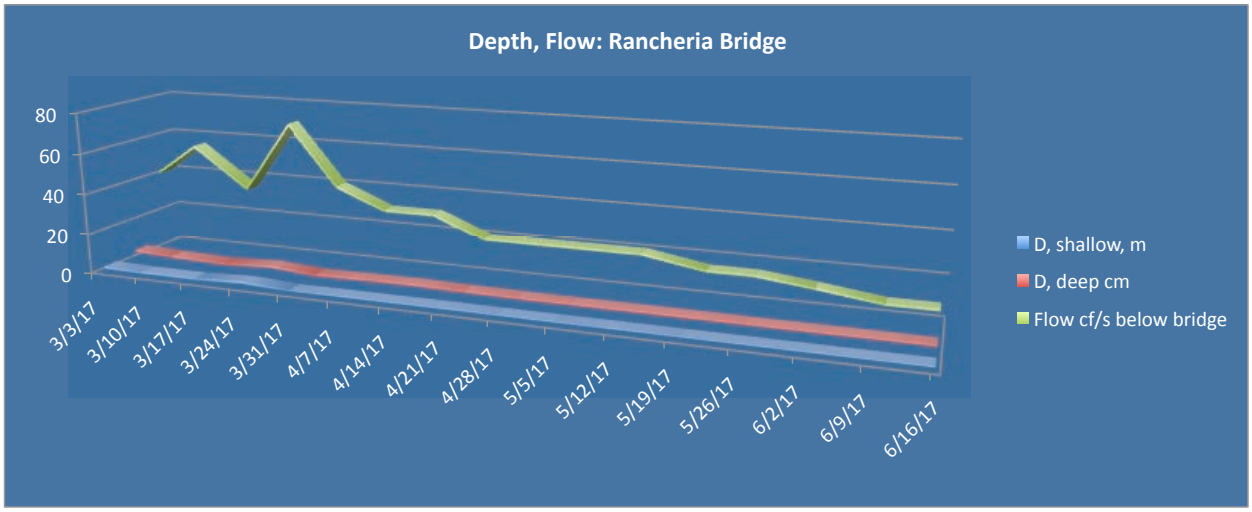
N 39° 10.9526', W 122° 54.7084' elev. 1376

Approximately 40 large suckers were observed spawning immediately above the first weir on 3.31.2017. On 5.5.2017, 7 rainbow trout were seen above the bridge, heading upstream.

In general, passerines and other birds were heard although not often seen, with the exception of swallows nesting on the underside of the bridge. Occasionally a domestic feline crossed the road or raccoon tracks were alongside the road. Other sounds included chain saws, domestic dogs, and cattle.

3.31.2017:
spawning suckers below bridge





Clover Bypass at Elk Mountain Road

N 39° 10.5670', W 122° 54.1741' elev 1368

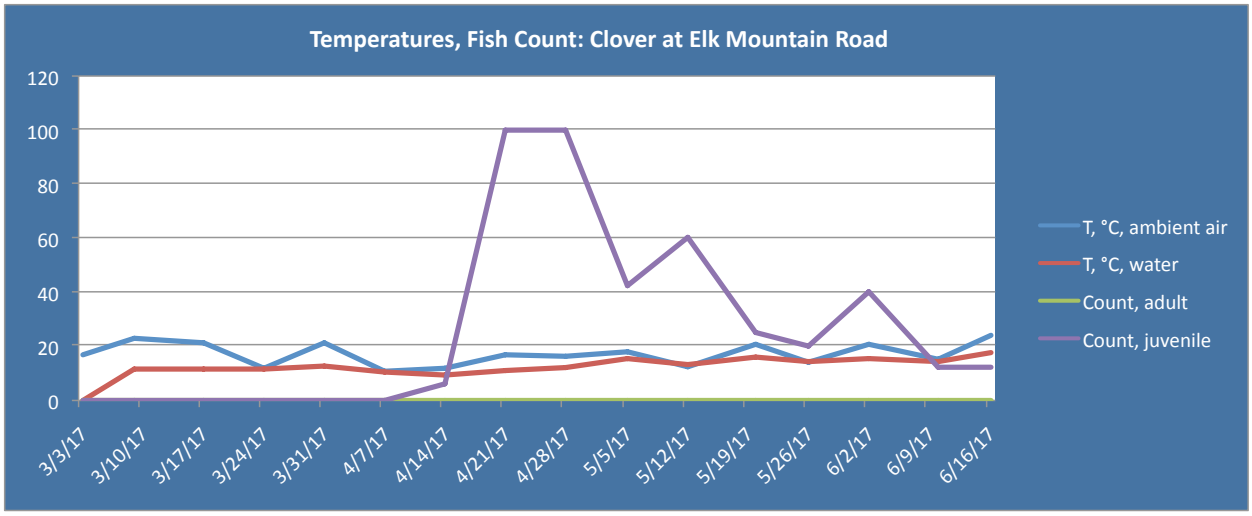
Juvenile fish seen here were suckers including juvenile Sacramento suckers. On 4.14.2017, 6 suckers at 1 to 1.5 cm were observed in a small side channel where flow was minimal. This channel eventually dried. More sightings of juvenile suckers were: *4.21.2017*: approximately 100 at 1 to 1.5 cm, around a bridge support; *4.28.2017*: approximately 100 at 1 to 1.5 cm, around a bridge support; *5.5.2017*: 2 in the small side channel and 40 near a bridge support, all at 1.5 to 2.5 cm; *5.12.2017*: 60 at 2 to 3 cm near a bridge support; *5.20.2017*: 25 at 2 to 3 cm around a bridge support, and the small side channel was dry; *5.26.2017*: 20 at 2 to 3 cm; *6.2.2017*: 40 at 2 to 5 cm; *6.10.2017*: 12 at 3 to 4 cm; *6.16.2017*: 12 at 2.5 to 5 cm.

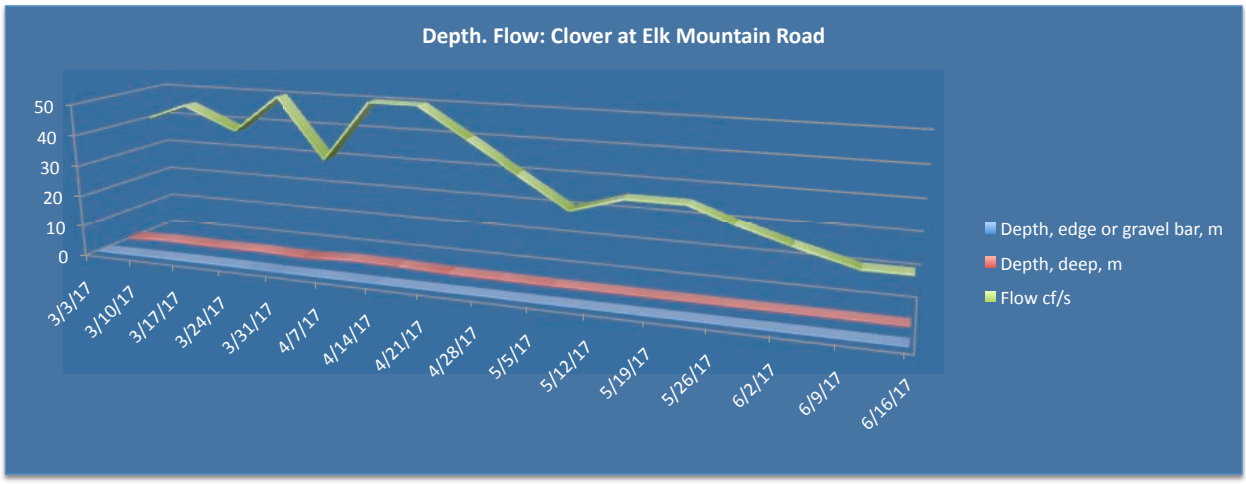
Red-winged blackbird, Brewer's blackbird, raptors, swallows that nested on the underside of the bridge, occasional quail, meadowlark, and American robin were generally observed here. Mammal tracks included raccoon, deer, skunk, mountain lion, and weasel.

3.3.2017: Creek is not full but is running well.

6.16.2017: Flow, breadth, depth are diminished.

6.10.2017: Juvenile suckers





Middle Creek North

N 39° 9.8454', W 122° 54.9914' elev. 1339

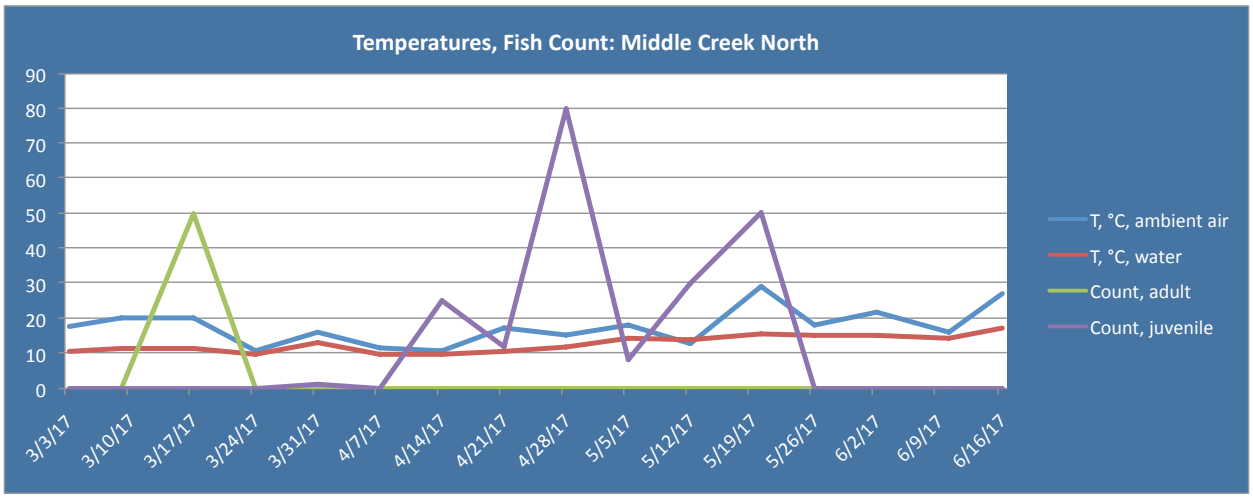
On 3.17.2017 50 adult Sacramento suckers were seen migrating upstream. Juvenile suckers were subsequently seen: *3.31.2017*: 1 1.25 cm; *4.14.2017*: 25 at 1 to 1.15 cm; *4.21.2017*: 12 at 1.25 to 1.5 cm; *4.28.2017*: 80 at 1.5 to 2 cm; *5.5.2017:* 8 at 1.5 to 2 cm; *5.12.2017*: 30 at 1.5 to 3 cm; *5.20.2017*: 50 at 1.5 to 3 cm.

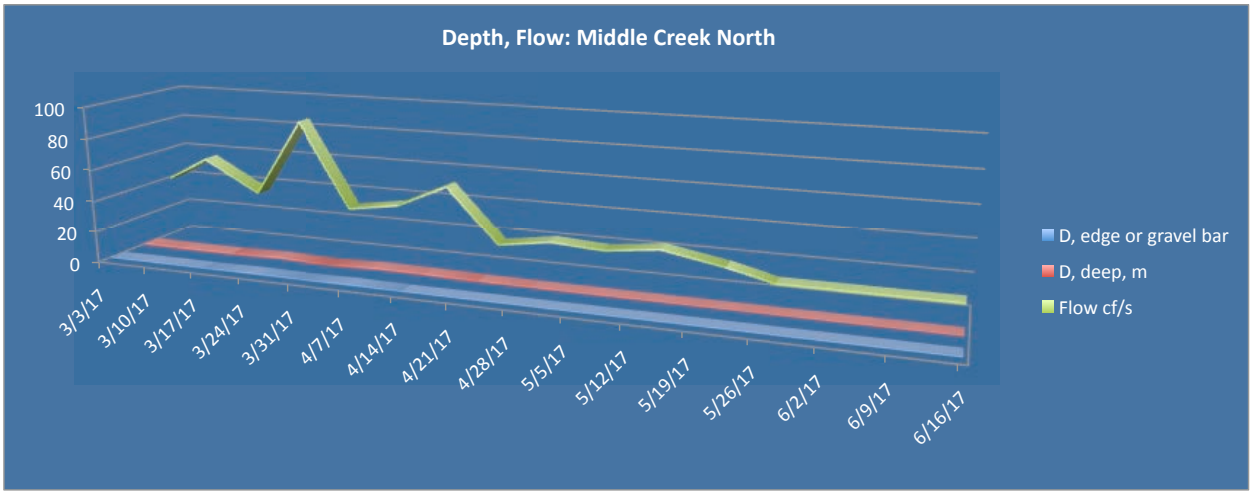
Numerous and various birds were seen and/or heard at this location. Reptiles, amphibians, and mammals were seen, or tracks, especially deer and raccoon, were seen. Insect life was prolific.

3.3.2017: bank to bank

6.16.2017: bank to bank

3.17.2017: Adult Sacramento suckers headed upstream





Vegetation

Vegetative cover at most sites included willows, *Salix sp.*, oak, *Quercus sp.*, cottonwood, *Populus sp.* primarily *fremonti*, Himalayan blackberries, *Rubus armeniacus*, poison oak, *Toxicodendron diversilobum*, and various ruderal grasses, herbaceous growth indigenous and invasive, and various sedges, Fam. Cyperaceae, along most creek banks and in Tulelake. Orchards were often within 50 to 60 m. With agricultural easements in place in the Tulelake area, water appeared to remain at Clear Lake levels with an increase during storm events. Tules, *Schoenoplectus acutus*, appear to be expanding their territory there.

As temperatures and water warmed, various species of algae grew instream and on substrate, in clumps and strands, often forming mats and covering surfaces.

Wildlife

A variety of wildlife exists at all locations. Wildlife was noted as being in the area if it was seen, heard, in flight, on water, on land, or leaving evidence such as scat, tracks, and odor (this year, skunk). Crows and turkey vultures were ubiquitous.

Species and counts are influenced by weather patterns and events. Field notes included estimated wind, direction, presence or absence of gusts, cloud cover, ambient air temperatures, and creekside water temperatures. In general, there appeared to be reduced wildlife populations during rain events and during increased wind, ≥ 8-10 mph.

Waterfowl and various species of herons and egrets consistently clustered around the Scotts Creek location. American white pelicans, bald eagles, and golden eagles were seen only in that area with the exception of 1 bald eagle at the Middle Creek South location. Various passerines and woodpeckers were observed or heard at each location. American cliff swallows nested near or at each location. Squirrel tracks and/or squirrels were common. In general there was more variety of wildlife at the Scotts Creek location and less variety at the Rancheria Bridge location, where monitoring took place on asphalt on Rancheria Bridge, although tracks often led up to the bridge and scat was observed on the bridge.

As water levels diminished in Middle Creek, ORV's and trucks left tire tracks midstream and along banks. Dogs and/or dog tracks, deer tracks, raccoon tracks, and squirrel tracks were at all locations, horse tracks at 2, domestic cats seen at 2, coyote tracks at 2, and gopher and/or mole mounds at all except Rancheria Bridge. Black bear tracks were seen at 2 locations and mountain lion at 4. Numerous passerines were heard or briefly seen in flight at all locations. Animals or their vocalizations, tracks, and scat identified with confidence are listed below, in no particular order.

People were generally not present in the immediate vicinity.

White crowned sparrow, *Zonotrichia leucophrys*
Golden crowned sparrow, *Zonotrichia atricapilla*
American and lesser goldfinch, *Carduelis tristis* and *Carduelis psaltria*
American cliff swallow, *Petrochelidon pyrrhonota*
Red-winged blackbird, *Agelaius phoeniceus*
Brewer's blackbird, *Euphagus cyanocephalus*
Ringnecked dove, *Streptopelia risoria*
Mourning dove, *Zenaida macroura*
California quail, *Callipepla californica*
Wild turkey, *Meleagris gallopavo*
Northern mockingbird, *Mimulus polyglottos*
Acorn woodpecker, *Melanerpes formicivorous*
Nuttail's woodpecker, *Picoides nuttallii*
Downy woodpecker, *Picoides pubescens*
Hairy woodpecker, *Leuconotopicus villosus*
Scrub jay, *Aphelocoma coerulescens*
Stellar's jay, *Cyanocitta stelleri*
Rufous sided towhee, *Pipilo erythrophthalmus*
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*
Cooper's hawk, *Accipiter cooperii*
Sharp-shinned hawk, *Accipiter striatus*
American kestrel, *Falco sparverius*
Osprey, *Pandion haliaetus*
Bald eagle, *Haliaeetus leucocephalus*
Golden eagle, *Aquila chrysaetos*
Waterfowl and herons:
- American white pelican, *Pelecanus erythrorhynchos*
- Canada goose, *Branta canadensis*
- Common merganser, *Mergus merganser*
- American coot, *Fulica americana*
- Mallard, *Anas platyrhynchos*
- Wood duck, *Aix sponsa*
- Greater and lesser scaups, *Aythya marila* and *Aythya affinis*
- Ring-necked duck, *Aythya collaris*
- Great white egret, *Casmerodius albus*
- Snowy egret, *Egretta thula*
- Green-backed heron, *Butorides striatus*
- Pelagic cormorant, *Phalacrocorax pelagicus*
- Black crowned night heron, *Nycticorax nycticorax*
- Great blue heron, *Ardea herodias*
- Western grebe, *Aechmophorus occidentalis*

Flying, terrestrial, and aquatic insects
Tadpoles, numerous
Crayfish, of a Superfamily: Astacoidea or Parastacoidea
California toad, *Bufo boreas*.
Ground squirrel, *Otospermophilus beecheyi*
Grey squirrel, *Sciurus griseus ssp.*
Raccoon, *Procyon lotor*
Skunk, *Mephitis mephitis*
American mink, *Neovison vison*
Deer, *Odocoileus virginianus,* and tracks, paths, and hollows seen on creek banks and in tall grasses and vetch
Black bear, *Ursus americanus*
Mountain lion, *Puma concolor*
Coyote, *Canis latrans*
Gopher snake, *Pituophis catenifer*
Gopher, Fam. Geomyidae, fresh mounds
Mole, Fam. Talpidae, fresh mounds
Domestic dog, *Canis familiaris*
Domestic cat, *Felis catus*
Domestic horse, *Equus ferus caballus*
Domestic cattle, *Bos taurus*
Domestic rooster, *Gallus gallus domesticus*

References

A more extensive listing of resources for Clear Lake hitch is at http://www.rootlets.com/environment/listsources.html.

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