

**More Kids in the Woods Phase II - Young Scientists: The Next Generation
Van Duzen Watershed Habitat Reports**



Young Scientists: The Next Generation

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Funded by: the U.S. Forest Service

December 2016

Acknowledgement

The Friends of Van Duzen River and the Eel River Recovery project teamed up to carry out the 2016 More Kids in the Woods project. Both organizations are extremely grateful for funding from the U.S. Forest Service and for our partnership with the excellent staff at Six Rivers National Forest, including Public Information Officer Lynn Wright, Mad River Ranger Dan Dill and Mad River RD biologist Krista Smith. We are very appreciative of the Trees Foundation fiscal sponsorship and to Bookkeeper Barbara Ristow for helping contractors get paid. Thanks to the Hydesville, Cuddeback, Bridgeville and Van Duzen elementary schools for cooperating, including allowing use of classrooms during

This activity would not have been possible without support of parents of students who took time to transport students and serve as chaperones. Although Barbara Domanchuk is a sub-contractor on this project in charge of making a video about the project, she donated more time than she was paid and is much appreciated by FOVD and ERRP. Rowdy Kelly, who taught the students how to fly a drone, deserves special mention for his participation as a volunteer. As was the case with the first More Kids in the Woods grant in 2013, contractors and the community donated services sufficient to provide a 100% match for the \$15,000 USFS grant. Last but not least, we really appreciated the students who opted to take time during summer to learn more about nature and to carry their knowledge and enthusiasm back into the classroom. In the long run, we hope that some of our MKIW students will explore career tracks in natural resources and help us make more discoveries about the Eel River and its magnificent tributaries like the Van Duzen.



Science team assembled at Shakefork Farm with Eel River Recovery Project fish biologist Pat Higgins at far left and MKIW director Sal Steinberg at right. Hydesville students are (l to r) Jessica, Justin, Nate, and William. Mason Rush from Fortuna High School (second from right) served as a mentor the younger students and helped collect data.

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Background

In the summer of 2016 the Friends of Van Duzen River and Eel River Recovery Project were awarded a U.S. Forest Service More Kids in the Woods grant to work with fourth graders in the Van Duzen River basin. Students from Hydesville, Cuddeback in Carlotta, Bridgeville and the Van Duzen Elementary School in above Dinsmore all visited main river segments or tributaries and conducted habitat studies. This is the second partnership with Six Rivers National Forest with the first and larger More Kids in the Woods grant completed in 2013. That project enabled hundreds of students from schools within the Van Duzen River watershed and from Fortuna High School to study at the river. They not only learned science, they wrote poetry, drew pictures, and even made videos about their experiences.

In 2016, the Pacific Southwest Region of the USFS competitively awarded MKIW project grants to applicants that could effectively engage 4th graders in meaningful and sustained outdoor experiences, thereby increasing awareness and understanding of the natural world and the benefits of forest and grassland ecosystems, and promoting physical activity as an essential component of healthy lifestyles.

Fisheries biologists and watershed scientists assisted students in understanding what constitutes a healthy stream and how to measure various parameters that allow scientific assessment. Students learned to interpret aquatic health through monitoring water temperature, fish community structure, fish habitat types, aquatic insect diversity, stream gravel quality and riparian conditions. Some background information was provided in the classroom, but most learning took place stream-side. Below you will find a summary of habitat conditions and data collected by the students in the field. Students also wrote their own reports and made presentations to their classmates in the fall of 2016.

More information is available at the FOVD website (<http://www.fovd.org/>) and ERRP website (www.eelriverrecovery.org), including video of fish and students engaged in the field.



Sal Steinberg helps one student capture an interview of three others about what they learned at Swimmers Delight on 7/12/16.

Habitat Report: Upper Van Duzen River Above Dinsmore

Students from Van Duzen Elementary School surveyed the upper Van Duzen River behind their school upstream of Dinsmore.

Date: June 8, 2016

Survey Team: Kyle, Felicia, Crista, Sal and Pat.

Water Temperature: 18C or 64.4 F

Fish Species Present: Two 2+ steelhead trout in front of pool near over-hanging cover below riffle (see October 2016 note).

Habitat Types: The upper Van Duzen River at this location is dominated by riffles, with pools comprising less than 20% of habitat by length. Optimal habitat for salmonids is at least 40% pools. The wide and shallow channel promotes warming in this reach. No structural elements to sort gravels or to force scour during winter flows.

Pool Depth: Maximum pool depth was 70 centimeters or about 2.27 feet deep. Substantial bedload movement in winter of 2015-2016 filled pool.

Cover and Large Woody Debris: There was no big wood associated with the pool surveyed or evident on the river bar in nearby riffles. Over-hanging vegetation and under-cut banks provided 40% cover for the pool.



Van Duzen River looking downstream into pool surveyed.



Young scientists from Van Duzen Elementary School, Kyle, Dalton, Hailey, Erica.

Embeddedness: Stream embeddedness is the measure of how deeply the average cobble and gravel are buried in the stream bed. Embeddedness at this location was 25% or less, but gravels are too small for spawning steelhead.

Other Wildlife Species: Adult yellow-legged frogs were present.

Aquatic Insects: Aquatic insect larvae were abundant and mostly of pollution intolerant taxa, but many were fairly newly hatched and very tiny. There were seven species of mayflies, six species of stoneflies and four species of caddisflies identified.

Stream Gravel Quality: The median particle size distribution was 43.75 cm, which is less than optimal for salmonid spawning because the bedload mobility is likely to be high. Not a lot of fine sediment, but the entire bed of the stream within the boundaries of the riparian zone appeared likely to be highly mobile during winter flows.

Riparian Conditions: Stream side trees were comprised of willow, alder and cottonwood and they supply some shade and cover. However, the channel width is so great that there is less than 10% shade on the pool surveyed

and in the rest of the reach. Conifers are on the terrace to the east of the river and on the terrace and hillslopes to the west, but have no ability to recruit into the channel or to provide shade or microclimate benefits.

Fall 2016 Update: Van Duzen at VDES maintained surface flow through September 15, 2016 when the automated temperature probe was retrieved. The pool where the probe was placed was stratified and had juvenile steelhead and hundreds of juvenile suckers. A pool upstream with spring inflow was also noted to have hundreds of sucker juveniles and a seep downstream had numerous older age steelhead or resident trout as well as yearlings and young of the year. There appeared to be cold water upwelling that coincided with good riparian cover and Cladophora. See <https://vimeo.com/eelriverrecoveryproject> for video of steelhead.



Van Duzen River at VDES with pool where water temperature probe was placed. Cold water from gravel bar augments surface flow and keeps pool cool enough for steelhead trout.



Dozens of native Sacramento sucker juveniles in a 2.5 ft deep pool below Van Duzen Elementary School.

Habitat Report: West Branch Van Duzen River

Students from Van Duzen Elementary School accompanied by ERRP guides Pat Higgins and Sal Steinberg and U.S. Forest Service biologist Krista Smith.

Date: July 12, 2016

Survey Team: Haley Grover, Kyle Phelps, Felicia Phelps, Sal Steinberg, Pat Higgins, and Krista Smith.

Water Temperature: 11.5 C or 53 F

Fish Species Present: Steelhead trout at low densities with two year old present at head of pool, one yearling and four young of the year. Very small size of fry could indicate resident trout. Definite Pacific lamprey redd way up in the watershed!

Habitat Types: Pools comprised 50% of the habitat by length, which is optimal for salmonids.

Pool Depth: The maximum pool depth was 120 cm or 3.9 ft deep, which is deep enough to rear older age steelhead juveniles.

Cover and Large Wood: Cover was provided by boulders, the bubble curtain in front of the pool, and the spaces between cobbles and boulders because there is so little fine sediment.



Sal shows Kyle how to read a GPS while USFS biologist Krista Smith looks on – West Branch Van Duzen pool at right.

Embeddedness: Stream embeddedness was 20%, which is optimal for salmonid (and lamprey) spawning.

Other Wildlife Species: Yellow-legged frog adults, including one very large female.

Aquatic Insects: Very high diversity of aquatic insect larvae and almost all mostly pollution intolerant and some larger insects. Greater than 20 EPT species (stoneflies, mayflies and caddisflies).

Stream Gravel Quality: Although stream particle size appeared to be within the optimal range for salmonids and fine sediment extremely low, the actual D50 was 45 mm, which is in the lower range of functional for salmonids. Low density of salmonid juveniles is puzzling given recent high flows (see October 2016 update).

Riparian Conditions: The canopy on the West Branch provides 75% shade to the stream and alder and willow closely encroach on the narrow, deep stream channel. Overstory is mostly old trees with species including pine, fir, oak and madrone. Some of these trees are tall enough to fall into the stream in the future and together they help create a moister and cooler microclimate over the stream.

Field Observations from October 8, 2016: Many more steelhead trout and/or resident rainbow trout were observed and recorded on video in pools of the West Fork Van Duzen when temperature probes were retrieved:

<https://vimeo.com/186156905>, <https://vimeo.com/186122005>). Insects remained very diverse.

Habitat Report: Van Duzen River at Shakefork Farm

Students from Hydesville Elementary School surveyed the Van Duzen River at the Shakefork Farm downstream of Carlotta.

Date: June 24, 2016

Survey Team: Mason, Jessica, Justin, Nate, William, Sal and Pat.

Water Temperature: 20C or 68 F

Fish Species Present: More than 100 Sacramento pikeminnow from 4-20 inches in length and several hundred California roach in pools and also many more tiny unidentifiable minnows in the warm edges of riffles.

Habitat Types: The Van Duzen River at the Shakefork Farm was comprised of 80% riffles and 20% pools, with only one pool in the reach surveyed. The wide and shallow channel promotes warming in this reach.

Pool Depth: Maximum pool depth was 120 centimeters, 1.2 meters or about 3.9 feet deep. Riffles were less than six inches deep and runs were one to two feet deep.

Cover and Large Woody Debris: Good cover from large wood and over-hanging vegetation in the front of the pool at top of reach (30% cover), but over-all large wood limited in this reach. Two, old, large stumps were also embedded in stream bed and a large coniferous tree that had washed down in winter was away from the water and on the flood terrace.



Van Duzen River pool that had pikeminnow and roach.



Students measure rock size to determine D-50.

Embeddedness: Stream embeddedness was 40%, which is greater than optimal.

Other Wildlife Species: Yellow-legged frog adults and tadpoles as well as smaller western toad tadpoles that are darker in color. Otter scat on gravel bar near pool with mostly crawfish shells.

Aquatic Insects: Aquatic insect larvae were mostly pollution intolerant but only moderate in diversity with lots of black fly larvae, the free living caddis green colored Caddisfly *Ryacophila*, and Heptiginid and Baetid mayflies. Also present were two dragonfly larvae, two types of stoneflies and a water penny beetle. No larger insects requiring stable winter conditions were found.

Stream Gravel Quality: The median particle size distribution was 55 cm, which is within the functional range for salmonid spawning. Some Chinook salmon spawning takes place at Shakefork in low flow years. Large terraces of fine sediment are at the edge of the floodplain far to the east of the active channel, but and some fines in the gravel matrix. Bed highly mobile during high flow in winter.

Riparian Conditions: Willow, alder, cottonwood and bay are the dominant riparian trees and can provide substantial over-head cover, but the floodplain is extremely wide and riparian encroaches on only one bank. Farm land borders the riparian zone to the east, but lands to the west are owned by Humboldt Redwood

Company. Conifers and bay trees provide an over-story. Young redwoods are barely over-topping the cottonwoods and have no ability to recruit into the channel or to provide shade or microclimate benefits.



Van Duzen River at Shakefork Farm on October 24, 2016. It was back to the salmon's world, but no salmon seen. Chinook tended to spawn in tributaries, not lower mainstem Van Duzen reaches in fall 2016.

Habitat Report: Grizzly Creek

Students from Hydesville Elementary School surveyed Grizzly Creek just above its convergence with the Van Duzen River in Grizzly Creek State Park.

Date: June 13, 2016

Survey Team: Pat Higgins, Sal Steinberg, Paul Trichilo, Barbara Domanchuk, and students Noah, Cara, Tia, Victoria, Jona and Tori.

Water Temperature: 14 C or 57.2 F

Fish Species Present: Steelhead trout young of the year and yearlings (4" long). Lamprey redds apparent.

Habitat Types: Grizzly Creek is dominated by flat water habitats like riffles, glides and runs and pools were only 20% by length. Optimal habitat for salmonids is at least 40% pools.

Pool Depth: Maximum pool depth was 108 centimeters or about 3.5 feet deep.

Cover and Large Woody Debris: Old growth log spanned stream but too high for fish cover. Total cover was 15% with low hanging willow branches and sunken large wood providing it.

Embeddedness: Stream embeddedness is the measure of how deeply the average cobble and gravel are buried in the stream bed. Grizzly Creek had 45% embeddedness while 25% or less is desirable for salmon and steelhead spawning.

Other Wildlife Species: Yellow-legged frogs were present and a western pond turtle was sighted in main Van Duzen above Grizzly Creek.

Stream Gravel Quality: The median particle size distribution was 73.25 cm, which is within the optimal range for salmonid spawning. Although fine sediment was low in the active channel, sediment terraces indicated considerable winter supply.

Riparian Conditions: The old growth forest within Grizzly Creek State Park provided a canopy over-story of redwood with some Douglas fir mixed in. Stream side trees included alder, willow and maple. The stream width exposed the creek to the sun during the middle of the day and the shade on the water was only 30%.



Students from Cuddeback Elementary School sample insects in Grizzly Creek.

Aquatic Insects: Aquatic insect larvae were abundant and mostly of pollution intolerant taxa, but many were fairly newly hatched and very tiny and, therefore, difficult to identify without a microscope. There were six species of mayflies, five species of stoneflies and three species of caddisflies as well as Dytiscid beetles, which are somewhat pollution tolerant.

December 8, 2016 Field Note: Cuddeback Elementary School fourth and fifth grade classes visited the summer study site on Grizzly Creek in Grizzly Creek State park and found dozens of fall Chinook spawning! The students were looking at the second wave of spawners, with activity noted below Highway 36 as early as mid-November.



Chinook salmon spawning in Grizzly Creek just upstream of the Van Duzen River on 12/8/16

Habitat Report: Hely Creek

Students from Hydesville Elementary School surveyed Hely Creek, a tributary to the Van Duzen River.

Date: June 29, 2016

Approximate Time of Day: 10:00 am – 2:00 pm

Survey Team: Sal, Paul, and interested students from Hydesville Elementary.

Air Temperature: 15.4 C / 59.7 F

Water Temperature: 12.7 C / 54.9 F

pH: 8.26

Dissolved Oxygen: 9.45 mg/L

Pool Depth: Maximum pool depth was 31 cm within the reach sampled, which is on the shallow side for salmonid rearing.

Habitat Types: Hely Creek is comprised of mostly short, gentle riffles, short glides or runs, and shallow pools in the reach surveyed. Substantial riparian vegetation provides ample shade to maintain the cool water temperatures.

Stream Flow: Rate of flow was measured using the orange peel method, whereby the time required for an orange peel to float 20 feet is recorded by students using multiple replications to account for natural variability. Average flow rate was 12.1 seconds to travel 20 feet, which converts to 1.65 feet/second.

Cover and Large Woody Debris: This part of the creek runs through older redwood forest of relatively large trees. Some large woody debris (stumps) was observed in various parts of the stream, but apparently too sparse to effectively cause sufficient scouring of pools, which showed considerable sedimentation (see embeddedness).



Hydesville students observing habitat of Hely Creek.



Dr. Trichilo helps students identify macro invertebrates.

Embeddedness: Stream embeddedness is the measure of how deeply the average cobble and gravel are buried in the stream bed. Hely Creek shows severe embeddedness to the point that many rocks and stones could not be dislodged from the stream bed, often reaching upwards of 55-75% embeddedness, whereas 25% or less is desirable for salmon and steelhead spawning.

Fish Species Present: No fish species were actively sampled during this trip, but few if any salmonids were observed in any of the shallow pools within the sample reach. No pike minnow were observed either.

Aquatic Insects: Aquatic insect juveniles and/or larvae were not abundant and those that were found were mostly pollution intolerant taxa. Among the taxa that could be identified were one type of mayfly, two types of stoneflies, and one (very large) type of caddisfly. One type of fly larva was also observed.

Stream Gravel Quality: The median particle size distribution was 52.8 cm in the section of reach sampled, suggesting it is within the optimal range for salmonids. Although fine sediment was low in the active channel, sediment terraces around this stream as well, indicated considerable winter sediment deposition.

Riparian Conditions: Similar to Grizzly Creek, the large redwoods surrounding this section of reach provide a canopy of old growth over-story for Hely Creek. Streamside trees include alder, willow, and maple. This part of the stream is predominately shaded during the middle of the day and the shade on the water is close to 80%.

Habitat Report: Van Duzen River at Swimmers Delight

Students from Hydesville and Bridgeville converged on Humboldt County Swimmers Delight Park on the Van Duzen River above Carlotta.

Date: July 13, 2016

Survey Team: Sal Steinberg, Pat Higgins, Paul Trichilo, Rowdy Kelly, Mason Rush and 22 students.

Water Temperature: 72 F.

Fish Species Present: Two year old steelhead trout seen in riffle below large pool at upper end of Swimmers Delight. Hundreds of very tiny warmwater fish larvae in the edges of the pool and in cloud under over-hanging tree limbs along the cliffs. A school of 18 large adult pikeminnow were in the cove in the long pool furthest upstream clustered around several submerged fallen trees. Pacific lamprey redds in pool tail.

Habitat Types: Pools comprised 30% of the habitat by length.

Pool Depth: The maximum pool depth was 25 ft deep.

Cover and Large Wood: Cover in the pool surveyed was provided by depth, but also by several intertwined whole trees that settled in the cover further upstream. Lots of juvenile California roach also in the log jam with some juvenile pikeminnow intermixed.



Large adult Sacramento pikeminnow in Van Duzen River pool at Swimmers Delight near submerged large wood.



Mason dives deep to make sure we aren't missing any pikeminnow in the depths.

Embeddedness: Stream embeddedness was 30%.

Other Wildlife Species: Yellow-legged frog adults. Western pond turtle.

Aquatic Insects: Diversity of aquatic insect larvae was moderate.

Stream Gravel Quality: Stream particle size was 65 mm.

Riparian Conditions: The canopy is very open on most of the Van Duzen River reach surveyed because of the width of the channel. Willows and alders comprise the riparian vegetation immediately adjacent to the stream, but there are also bare areas of gravel terrace because of recent scour and deposition on bedload. Overstory is redwood forest, which also extends into the immediate riparian zone downstream of the pool within Swimmers Delight Humboldt County Park.



Mason Rush holds a western pond turtle that he gently released back to the river.



Rowdy Kelly volunteered to show students how to fly a quad-copter drone and take aerial video of the Van Duzen riparian zone.