

CALIFORNIA STREAMING



News from CUSP Partners Around the State



Removing Codornices Creek from culvert and concrete channelization: before (left) and immediately after construction (right)

Hello, new and old friends!

Greetings from the CUSP headquarters in Sebastopol, CA! Our 2021 issue of *California Streaming* comes to you in the midst of our very own Creek School, a two-day-long intensive training for CUSP staff on how to design urban stream restoration projects from our very own Creek Doctor Riley. We are feeling excited about some of the new developments both within our own work and from our partners working on urban streams around the state. In this issue of *California Streaming*, you'll find updates on California's urban beaver populations; hear from Dr. Rick Lanman about a new southern range discovered for chinook salmon in San Jose; gain insight on the impacts of drought on urban streams from ecologist Dr. Robert Leidy; and get inspired by the Environmental Defense Council's success story in Goleta. We hope this newsletter finds you in high spirits and that we'll see more of each other this year out in the many watersheds we know and love.

IN THIS ISSUE

GREETINGS

CUSP UPDATES

NEWS FROM AROUND THE STATE

Chinook Salmon in the South Bay
Urban Beaver Update
Urban Streams and Drought
Central Coast Update

UPCOMING EVENTS & ACKNOWLEDGEMENTS

CUSP Report to Our Partners

Communications to Our State and Federal Decision Makers for the Urban Watershed Community

State of California

Many of you have received communications from us in the last three years to keep you informed about propositions being drafted by state legislators or citizen groups which propose bond acts to support state water and park needs. As a result, our CUSP partners have engaged with their legislators or participated in supporting sign on letters to let the legislators and public know of the statewide grant programs our community uses the most which need refunding through these bond acts. CUSP partners helped inform and pass Proposition 68 (2018 Drought, Water Parks, Climate).The bond acts have increasingly been directed to support individual state river conservancies, which benefits some of our partners but leaves out many of us who are not part of a state conservancy. Therefore we have encouraged decision makers to consider regional equity in the drafting of these propositions. Proposition 3, a water bond act sponsored by the Natural Heritage Institute for the fall 2018 ballot did a terrific job of representing our urban creek and river community needs for restoration, protection, land acquisition, and stormwater management but unfortunately failed to pass by only a very small percentage of voters. 34 of CUSP partners endorsed this proposition via sign-on letters.

Currently in the Spring 2021 there are two natural resources bond acts, AB1500 and SB45, under going drafting by the state legislature. Legislature action is not expected on these bond acts this year because their focus is on how to appropriate the budget surplus.

Worth A Dam, one of our valued partners, took the initiative to put on a fabulously successful California Beaver Symposium through Sonoma State University in April 2021. CUSP is proud to have been a co-sponsor of this symposium with approximate 1000 participants joining the on-line event.

CUSP coordinated with a number of you to sponsor an urban streams restoration workshop at the fall 2020 Salmonid Restoration Federation conference scheduled for Santa Cruz. We are disappointed this was cancelled due to the COVID 19 pandemic but we will look for future opportunities to assemble with each other again at an SRF conference.

National Activities

CUSP represented urban stream and river and environmental organizations in a national organizing event in Washington D.C. to promote the Green New Deal during the 2020 presidential race and prepare for potential congressional initiatives. The Biden administration infrastructure proposal now gives this concept some legs and CUSP has reached out to Congressman Huffman, a member of the House Infrastructure Committee to seek watershed, stream, fish habitat and stormwater management as part of the national infrastructure improvements.

Many regards to you and your partners,

*Josh Bradt Director
Ann Riley Restoration Director*

Updates from the CUSP Team

Codornices Creek at Kains Street

We are happy to report that the daylighting project on Codornices Creek at Kains Avenue on the boundary of Berkeley and Albany is well underway! The construction and stage one plantings have been completed. CUSP has been working closely with the neighborhood to steward the site, and through planting and weeding workdays we have seen the possibilities for the future of this urban stream unfold. We are looking forward to continuing our community workdays at the site and watching the willows take root.

Streamside Management Program for Landowners

The pandemic has not slowed down the demand for CUSP's streamside assistance program. Many landowners have sought out advice and guidance on how to take care of their backyard urban streams and protect their property from flood damages. Recent calls have been especially concerned with vegetation management along creekside corridors, with concerns ranging from invasive species management to fuel and fire risk reduction. We look forward to coordinating in-person soil bioengineering and stream stewardship workshops for landowners through the SMPL program in the fall.

Staff Goings and Comings

We wish Jackie Van Der Hout, CUSP Education and Outreach Director, the very best as she transitions from CUSP to graduate studies on the East Coast! Jackie has been instrumental in CUSP operations, newsletter development, and local & statewide communications. The organization will be bringing a volunteer member of its Statewide Steering Committee into a part time staff role! Jessica Hall, a landscape architect will be taking the position of Restoration and Policy Director, and will also continue to fill the outreach roles. Jessica is excited to be back in the nonprofit sector where she can advocate and support restoration throughout the state.

The importance of holding a vision, and advocating it as part of design and planning grew from understanding her own environment. From a young age Jessica Hall has drawn inspiration from great public spaces for their role in expressing community pride and democratic values, and in shaping a welcoming environment that facilitates public participation and wellbeing – and conversely, she recognized the consequences of neglected, abused, and poorly managed public spaces. Over time this understanding evolved to include the natural environment and the importance of habitats and ecosystem processes in providing not only important outlets for play, exploration, escape, and spiritual interconnectedness but for health and global sustainability of crucial life systems. This realization has driven her work as a landscape architect, where she has focused on the restoration and integration of natural systems, particularly streams and watershed functions, within developed urban settings.



Jessica is known in the Los Angeles area for resurrecting the histories of culverted and channelized streams, springs, and wetlands, and acting as an advocate and planner studying the feasibility of restoring or naturalizing them. Her involvement in public projects has facilitated implementation of pocket parks along several flood control channels in the LA area, and the naturalization of the Old Tujunga Wash at Johnny Carson Park in the City of Burbank. Her engagement as a former watershed coordinator also spawned studies (but led by others) of the historical ecology for Ballona Creek, to measure headwater spring flows and to develop a regional curve for the Los Angeles Basin, and she also worked with the City of Los Angeles to better protect its remaining streams, including adoption of a definition of a stream and mapping of remaining streams, and with the Tongva Springs Foundation to fund habitat restoration at the historical Kuruvungna springs site. She has worked previously in the nonprofit, educational, agency and consulting sectors. She is a Switzer Environmental Fellow, and with the Waterways Restoration institute, a 2021 Switzer Leadership Grant recipient for the Developing Critical Design Tools and Training Program.

Jessica is looking forward to interacting with CUSP members and the communities we serve in this new role.

News from Around the State

A New Known Southern Range for Chinook Salmon

INTERVIEW WITH DR. RICK LANMAN BY JACKIE VAN DER HOUT

A recently published paper has expanded the southernmost known range of Chinook Salmon, *Oncorhynchus tshawytscha*. The paper, Ancient DNA analysis of archaeological specimens extends Chinook salmon's known historic range to San Francisco Bay's tributaries and southernmost watershed, has been received with great enthusiasm by urban watershed and salmonid habitat advocates alike. Chinook were once thought to spawn only as far south as the Russian River. However, sequencing of ancient DNA from fish bones unearthed at Mission Santa Clara provide evidence that Chinook salmon spawned around 1800 CE in the Guadalupe River watershed in San Jose, California.

To learn more about the study and its implications for urban streams in California, I spoke with lead investigator Dr. Rick Lanman. Dr. Lanman is a physician specializing in cancer genomics with a passion for California's historical ecology. He has published over 120 papers in his field and five papers in the field of historical ecology, including his notable work proving that the historic range of beavers once included almost all of California. He is also the Board President for the Guadalupe-Coyote Resource Conservation District in Santa Clara County.

This interview has been edited for clarity and conciseness.

Jackie Van Der Hout: Can you tell me the path that led you to this research?

Rick Lanman: I bought my house in Los Altos on the bank of Adobe Creek from an 80-year-old man. He told me of his memories of fly fishing year-round on the creek nearby. That wouldn't be possible today, as stream runs dry half the year and fish are scarce. This piqued my curiosity about the history of this watershed, so I began to investigate it. When I contacted the water district, they said that there were no steelhead in the creek. However, I still had questions. I set out to try and understand why the stream goes dry through the lens of historical ecology. I wondered if there used to be beaver, and if the stream used to run because of beaver's effects on the water table, raising it and creating more summer flow. This led to my research on historical ecology in California generally, which includes a variety of species and geographies.

JV: What kinds of historical ecology research in California precedes your studies?

RL: There is very little understanding of historical ecology in California. This is partially due to the loss of the California Academy of Science's zoology collection during the 1906 earthquake. That museum plus Stanford's natural history museum were the only animal collections California had prior to 1900.

The quake also destroyed much of Stanford's collections, however a few specimens of steelhead survived, including a few from Adobe Creek. The latter confirmed that what the old timer had told me about catching trout in the creek was true. California's historical ecology is poorly understood because of the absence of museum specimens until well after 1900. By then, many species had been extirpated. I have worked to emphasize in my research that an absence of evidence does not equal evidence of absence.

JV: The technologies you are using, such as ancient DNA sequencing, are unique in this field and seem to be generating some very interesting results. Can you talk more about your methods?

RL: In my first published historical ecology paper, we found historical records of beaver in Coastal California and the Sierra Nevada, where there the state claimed beaver had not ever lived. In that study, we used radiocarbon dating of sticks from a buried beaver dam in the high Sierra and it confirmed that beaver had been present there until about 1850 CE. Our most recent study on Chinook ranges follows in the same vein of historical ecology research expanding known historic range of different species.

Santa Clara University oversaw an archaeological dig at Mission Santa Clara prior to university expansion. During this dig, the middens of an Ohlone rancheria were identified, and among the items found were unspecified salmonid remains (unspecified because you cannot tell trout from salmon bones by visual examination alone). This study tested the DNA of these salmonid remains, which was extracted by University of Oklahoma Professor Brian Kemp. Among the individual salmonids sampled, three individual Chinook were identified, and the remaining salmonids were identified as steelhead trout, whose freshwater-only form is known as rainbow trout *Oncorhynchus mykiss*. These results mark the very first physical proof of Chinook in the watershed, establishing a new boundary for the southernmost known run of Chinook. We had to establish that these Chinook found at the site were native to the watershed and not a result of trade or ocean fishing. We determined that these salmon were not the result of trade because only 0.3% of the 17,000-plus fish bones were from ocean or pelagic fish, there was no pelagic fishing by Indigenous peoples north of San Luis Obispo in California, and because salmon are large and average 30 lbs. so that they were filleted and dried for transport and would not have contained fish vertebrae such as those used in our study. Thus, it is reasonable to assume that these specimens were spawning within the Guadalupe River Watershed and not caught elsewhere.

JV: Why did the Chinook disappear from this watershed?

RL: When the Army Corps channelized the river around the year 2000, the salmon run was decimated. Salmon can't swim against a sheet of racing water in a concrete flat-bottomed rectangular channel; they need rocks and logs and things to rest behind. However, a few dozen Chinook salmon still survive and spawn in the Guadalupe River and its Los Gatos Creek tributary every winter. Genetic studies indicate that they are mostly Central Valley Chinook salmon, but a few have genetics that are more consistent with Chinook salmon from coastal rivers like the Russian, Klamath, and Columbia Rivers. Because of the drought (and the larger system of water infrastructure in California) fish are being trucked from Central Valley hatcheries to the ocean



. These hatchery fish don't know where their native streams are, but they are looking to return upstream and spawn. Of the salmon runs below the Delta, these fish as adults may swim up the Napa River, Walnut Creek or the Guadalupe River to spawn. I believe these Central Valley hatchery fish have swamped the genetic signal of what otherwise are coastal Chinook salmon.

JV: Locally, how have the results of this paper been received?

RL: Everyone I know in Santa Clara county wants the salmon to thrive. Public agencies are very interested and are actively considering changing the historic range maps for Chinook salmon to extend further south because of our findings.

JV: What management implications arise from the results of your research?

RL: This paper highlights that we do not know what the southern limit for Chinook really is. Most Chinook spawning habitat range maps omit the San Francisco Bay. Adjusting official National Marine Fisheries Service (NMFS) ranges of Chinook habitat to include the Bay as a part of the California Coastal Chinook (CCC) salmon evolutionary significant unit and exchanging the southern limit from Jenner (the Russian River) 120 miles further south to San Jose (the Guadalupe River) has broad management implications, as CCC salmon are an endangered species. Additionally, for the restoration and urban creek communities in the Bay Area, we now need to think about the potential for Chinook to recolonize other larger San Francisco Bay tributary streams such as the Petaluma River, San Francisquito Creek, Coyote Creek and Alameda Creek.

Many urban creek advocates focus on rainbow/steelhead trout, however now an additional focus on Chinook salmon can be brought into the landscape of restoration and advocacy work. We need to change the way we manage our streams and rethink how we restore streams based on this new information. Stanford hopefully soon will enable fish passage of Searsville Dam on San Francisquito creek. A fish ladder over the BART weir will open up Alameda Creek to migrating trout and salmon. Hopefully coastal chinook and maybe even coho salmon will return to both streams. Extending the official range of Chinook salmon from Jenner to San Jose will have a huge impact on how water districts treat their streams as well. Beavers are expanding their habitat throughout urban streams in the Bay Area, and with a bit more restoration I expect that to be a future path for salmonids as well. If we create the habitat for them to return to, they will come back.

JV: What future research questions do you hope to explore in this same vein?

RL: It is widely accepted that rainbow/steelhead went all the way down California's coast, however we now need to reconsider the historical southern limits of Chinook and coho salmon. Stanford's earliest ichthyologists put the southern range of Chinook as the Ventura River and for coho at least to the Big Sur. This paper has moved the southern range of Chinook further south already, but that doesn't mean it's the end. A recent publication found coho specimens collected as far south as northern Santa Cruz County, but today's coho do not spawn south of the Lagunitas Creek watershed in Marin. Perhaps we need to begin to also think more broadly about coho and situate that thinking within the context of watershed planning. Identification by morphology/visual examination of salmonid bones is very difficult to achieve, but ancient DNA provides a method for doing this work with precision. What remains to be done is apply the same tools that have now been tested in new contexts. I'm currently investigating the historical range of other species native to California such as tule and Roosevelt elk, trumpeter swans, wolves, and jaguars.

Urban Beaver Update

BY HEIDI PERRYMAN, WORTH A DAM

Around the country, urban beavers are gaining recognition as important aides to stream health and biodiversity in the greenbelt. As climate change worsens folks are slowly starting to take beavers more seriously: Milwaukee Metropolitan Sewage District just released a major study documenting how beaver dams can reduce flooding, and research into the benefit of beaver dams to water quality in retention ponds at NC just received funding from National Sciences. Recently beaver effect on fire received its own Op-ed in the San Francisco Chronicle!

Still in California, beavers continue to be seen mostly seen as a nuisance. A recent review of depredation permits found that in 2020 found more than 170 permits were given to kill beavers in 29 counties: authorizing the take of more than 2500 beavers. While beavers in Washington can be relocated to benefit salmon or streams, California is the only one of the 11 contiguous Western states where this is never allowed (except on tribal land) Our state seems slower than most to learn why these water-saving animals matter to our landscapes.

Once upon a time Martinez was the only city known to have urban beavers – but those days are long gone. Now there are beavers living happily in Napa, Sonoma, Oakley and Fairfield. Some of them are even welcomed by neighbors and city leaders, or close to it. While depredation still happens almost reflexively in Contra Costa and Solano Counties, I like to think the 16 famous yearlings that grew up and launched “their beaver careers from our historic downtown had something to do with their numbers increasing and their reception improving!



URBAN BEAVER LODGE IN LAUREL CREEK, FAIRFIELD: PHOTO BY E.C. WINSTEAD

Around the country, urban beavers are gaining recognition as important aides to stream health and biodiversity in the greenbelt. As climate change worsens folks are slowly starting to take beavers more seriously: Milwaukee Metropolitan Sewage District [just released a major study](#) documenting how beaver dams can reduce flooding, and research into the [benefit of beaver dams to water quality in retention ponds at UNC](#) just received funding from National Sciences. Recently beaver effect on fire received [its own Op-ed in the San Francisco Chronicle!](#) Still in California, beavers continue to be seen mostly seen as a nuisance. A recent review of depredation permits found that in 2020 found more than 170 permits were given to kill beavers in 29 counties: authorizing the take of more than 2500 beavers. While beavers in Washington can be relocated to benefit salmon or streams, California is the only one of the 11 contiguous Western states where this is never allowed (except on tribal land).

Our state seems slower than most to learn why these water-saving animals matter to our landscapes. To challenge this, Sonoma State undertook the first ever “California Beaver Summit” this year, showcasing benefit beaver can have to salmon, streams, amphibians, birds and fire resilience. The virtual event drew more than 1000 registrants, a quarter of them state employees who wanted to learn more about their ecosystem services, in addition to interested registrants from 23 states and four countries. Keynote Speakers included the acclaimed Michael Pollock of NOAA Fisheries (known for his pivotal work on the relationship between beavers and salmon habitat) Joe Wheaton of Utah State (Napa reared fluvial geomorphologist known for process based stream restoration) and researcher Emily Fairfax of CSU Channel Islands (who’s work effect on fire prevention made National Geographic last year).

A focus on beaver benefits was punctuated with practical strategies for coexistence – the how and why of living with beavers - from Massachusetts expert Mike Callahan of the Beaver Institute, and Kevin Swift of Swiftwater Design. With fast-paced and wide ranging presentations by experts from CDFW, BLM, USFS and NMFS in two dynamic half day sessions, the summit made quite an impression on attendees.

Inspired by a similar event held in New Mexico earlier in the year, the California Beaver Summit stimulated [another event to be held in Colorado in October](#). Hopefully as the beaver message makes its way across the states these kind of events will become more and more common.

Improving water quality, restoring fish habitat, removing nitrogen and reducing the damage of flooding and drought, beavers continue to offer more than they ‘cost’ in terms of management. Since the tools of living with beaver are well understood, and the benefits of allowing them to occupy our urban creeks becoming more familiar, it is high time California “Makes way for beaver”!

CDFW	112
USDA	60
RCD	19
NPS	11
DOT	7
FWS	11
BLM	4
NOAA	15
Ca state parks	5
Conservation Core	4
Waterboard	7

Urban Creeks Update from the Central Coast

BY JACKIE VAN DER HOUT

Urban creek advocates around the state are all too familiar with the threats posed to urban and suburban streams by developments, invasive species, stormwater runoff, and water extraction projects. The [Environmental Defense Council](#) (EDC) in Santa Barbara has been innovating creative solutions in the growing city of Goleta by way of the recently adopted [Goleta City Creek and Watershed Management Plan](#) (CWMP). The EDC is a nonprofit public interest environmental law firm serving Santa Barbara, Ventura, and San Luis Obispo Counties, which represents nonprofits that often cannot afford to hire private law firms. The EDC has been serving creeks in Goleta for over thirty years, and Brian Trautwein has been leading the effort as the EDC’s Environmental Analyst and Watershed Program Coordinator in implementing the CWMP.



The city of Goleta is a relatively new city. It was incorporated in 2000, and the first general plan for the city was prepared in 2006. Through the EDC’s programs and outreach, the city added the concept of the CWMP as a potential future program to protect the region’s watersheds. The EDC’s creek cleanups were instrumental in this process. In 2016, two regular participants in the creek cleanups -Kyle Richards and Stuart Kasdin -were running for city council. The idea for finally creating the CWMP took root with discussions with these two candidates during one of EDC’s creek cleanups. When they were elected to city council, they were able to develop the plan starting in August 2019 with Santa Barbara Channel Keeper, Urban Creeks Council, and the EDC.

The goal of the CWMP is to provide detailed standards of acceptable practices for protecting the ecological function, water quality, drainage, and flood control functions of Goleta’s creeks and watersheds.

An important component of the protections afforded to the watersheds of the city is enforcing a 100-foot riparian setback for a new development in the city. The CWMP sets forth the values of Goleta's creeks, threats to the creeks, and opportunities to improve creek management and restore stream habitats.

The CWMP is housed within the Public Works Department which will work on identifying impairments and implementing projects such as removal of invasive species and barriers to steelhead migration. Other actions include annual creek surveys, documenting southern California steelhead, red legged frog, and southwestern pond turtles, planting riparian trees, removing failing creek bank revetments, enforcement on illegal diversions, and stormwater management. Goleta's creeks flow from the Los Padres National Forest through Santa Barbara County's jurisdiction, through Goleta, and even include parts of the City of Santa Barbara, highlighting the importance of interagency collaboration.

The CWMP was completed and brought to the city council for adoption in November 2020. The heart of the CWMP is the Identification of Impacts (Chapter 5), and Implementation (Chapter 6). The next steps are to bring the plan into the implementation phase. This involves finding funding sources for City staff, creek monitoring, and project implementation and potentially developing a Creeks Division of city staff. Through responses to online and in-person surveys, the city has found that community members value local urban and suburban creeks and their benefits such as natural beauty and flood control.

Reflecting this interest, public access has been a central part of the watershed plan, which includes 10 separate creeks, two with public bike paths, and two sloughs. Other creeks have informal trails or flood control access roads that are used by neighbors for recreation.

Reflecting on the trajectory of this project, Brian Trautwein shared his lessons learned. At its core, this project was successful due to its robust network of partners. The EDC worked closely with City planning staff in developing the CWMP. By reaching out to businesses and non-profits, as well as garnering attention through the media, flyers, and getting the community involved, community members are invested in their local creeks because of their hands-on experiences such as creek cleanup events. The EDC's creek cleanups have allowed for the creek environment to be very visible to the community. Bringing people together to enjoy the outdoors, plant trees, and remove litter can go a long way.

Additionally, Brian emphasized the importance of outreach and building connections within the tourism and hospitality industry. Restored creeks and coastal ecosystems are important for tourism and related industries, incentivizing businesses to provide important project support and fund restoration.

The future is looking bright for Goleta's Creeks. The City has allocated funds to start to implement the CWMP. Funding has been included for a wide variety of activities, including annual creek surveys, riparian restoration/planting projects, and increased stormwater enforcement capabilities. "We see the CWMP as a model for communities throughout California. The CWMP creates a foundation for the City and community groups to implement projects to clean up, preserve, and restore urban creeks to revitalize them as wildlife habitats and areas for community members to enjoy and learn about the natural world," Brian noted in a reflection on the progress of the CWMP.

Urban Streams & Drought

INTERVIEW WITH DR. ROBERT LEIDY BY
JACKIE VAN DER HOUT

The impacts of this year's drought on California's urban streams are hard to miss. However, the ways in which urban stream restoration and advocacy groups adapt to the drought is informed by our understandings of its impacts. To better understand the ins-and-outs of drought on California's urban streams, I spoke with Dr. Robert Leidy, an ecologist with the EPA in San Francisco, board member with Friends of Sausal Creek, and researcher on California's freshwater and anadromous fishes. *This interview has been edited for clarity.*

Jackie Van Der Hout: Can you provide an overview of the impacts of drought on fish, specifically in California's urban streams?

Dr. Robert Leidy: To understand the impacts of drought on impacted streams, it helps to understand how California's native fishes tolerate drought in natural conditions. Fish in California's Mediterranean climate have adapted to survive periodic dry years and as well as droughts of long duration (e.g., decades). Refugia allow native fishes to persist through droughts in natural systems, such as permanent stream pools. Anadromous salmonids migrate from drying streams to the ocean, and then return to spawn once conditions are better. In the distant past, refugial aquatic habitats have persisted and protected fishes through historic mega-droughts, often spanning decades. California fishes have made it through very dry conditions because of high quality habitats that provide refugia. European settlers drastically altered California's streams and rivers through the construction of thousands of dams and other water infrastructure. Alteration of natural flow patterns in streams has deeply impacted fishes' ability to be resilient to droughts. In the early years of this altered water system, years with lower-than-average rainfall would see a reduction in streamflow and result in fish mortality which otherwise would not occur with intact habitat. Superimposing the impacts of natural droughts on streams already suffering from water diversions has resulted in population declines of native fishes. Additional impacts such as channelization often exacerbates the problem by reducing aquatic habitat complexity and the number of high-quality pool and riffle habitats.



During the dry season, exposed channelized streams are prone to elevated water temperatures causing stress to fishes. In many channelized streams, the lack of riparian cover, undercut banks, and natural pool and riffle sequences create environments unsuitable for many native fishes.

Pollution is another risk that is often amplified during drought in urban streams. Stormwater runoff from impervious surfaces can concentrate contaminants in remnant summer pools and very quickly cause mortality in fishes due to poor water quality. Contaminants and elevated water temperatures increases physiological stresses on native fishes in urban streams.

JV: Can you provide some background on how additional summer flows that urban streams can experience, such as environmental flows from reservoirs, play into this scenario on urban streams?

RL: Under natural historical conditions, fish would be persistent throughout their range of habitats, which would contract and expand depending on the rainfall year. Urban streams are much 'wetter' now than under historical conditions due to nuisance runoff from various urban activities, in-channel water transport for aquifer recharge (e.g., Alameda Creek in Niles Canyon), or environmental flow releases below reservoirs.

Additional flows below dams, such as environmental flows released for trout as minimum flow requirements or via water transfers, often do not replicate natural conditions on streams. During the summer months, large amounts of additional water can have many effects.

Additional flow can expand the habitat for native fishes, such as suckers and minnows that are more tolerant of warm water temperatures, in places like Alameda Creek and Coyote Creek. However, the water coming from a reservoir or aqueduct into a stream is usually relatively warm water. Elevated water temperatures may allow non-native, warm water fish (e.g., sunfish, bass) to spread and dominate fish assemblages to the detriment of native fishes. Through this, augmented flows can allow non-native fishes to invade various waters to the detriment of native fishes. Often this results in mixed fish assemblages composed of non-native and a few hardy native fishes that exist in a sort of quasi-equilibrium.

Drought and stream drying can be beneficial to native fishes adapted to Mediterranean climates by inhibiting the spread of non-native fishes and other invasive pests such as bullfrogs.

Under natural conditions, pools often stratify in the summer with cold water at the bottom due to hyporheic flow or groundwater seepage. Under natural conditions, trout would spend hot summer months in cold water layers in deep pools to survive until the fall rains. Augmented streamflows change the composition of these pools when warm water is pumped into the stream during summer months, mixing the water in the pools resulting in elevated water temperatures.

JV: And on the flip side, how do groundwater and surface water usage in urban areas affect fish habitat during drought?

RL: The Napa and Sonoma Valleys are good examples of watersheds that historically relied on stream and groundwater for growers in the summer months. Groundwater pumping for agricultural uses can accelerate the drying of streams. Because of the impacts to other species of salmon and steelhead, there has been a big effort underway in the past couple of decades for growers to put less strain on the dry-season water supply by creating storage basins that can be filled in the winter to avoid reduce reliance of summer water diversion and pumping (e.g., Russian River watershed). In addition, historically residential wells and pumps also have had detrimental impacts on dry-season streamflow.

Wells and diversions adjacent to small headwater streams that provide refugia pool habitat for salmonids have been lost due to this activity, transforming what were once intermittent or perennial streams into dry streams in the summer.

JV: For those who are involved in stewardship and restoration work, what work can be prioritized to help make urban streams more resilient to drought?

RL: A good place to start is to conduct a habitat inventory of your neighborhood stream. Cool, deep pools that act as summer refugia for fish are going to be a very critical factor in fish survival moving forward in the face of climate change. Document the deep pools on the creek by doing a walking survey in the late summer, or right before the rains in the fall.

Assess the dimensions of the pools and monitor the water temperature over the summer and fall. By doing this you are mapping pools that might function as important refugia for fish and other native aquatic organisms during droughts. You can map additional habitat in the spring and include riffles and spawning habitats.

As droughts continue and the climate changes, the pools that persist will be the ones that are likely connected to groundwater, perhaps through fault lines. These permanent pools may be somewhat decoupled from the effects of short-term droughts or climate changes. Protecting these permanent pools is very important. Once you can identify these pools, there are a whole host of measures that you and your organization can take to protect those pools. Protections can range from pollution prevention, riparian revegetation, or working with the city to ensure the pools are properly protected. Habitat protection also requires a watershed-scale approach and protecting the streams that feed the pools is also an important priority. Ensuring cold pools and critical habitat are protected is a key piece of helping urban streams during drought. Urban streams can play a very important role in the conservation of native fishes!

The California Urban Streams Partnership



The California Urban Streams Partnership (CUSP) is an organization of local, regional and statewide groups that protect, restore, and steward urban streams. We are an advocacy organization for urban wildlife, increasing the quality of city life and neighborhoods, and returning functioning ecosystems to urban environments.

CUSP was founded in 2012 to revitalize the urban streams movement in California by members of the Urban Creeks Council. Based in Berkeley, the partnership is a project of the Earth Island Institute and administered through a Statewide Steering Committee, Sacramento Urban Creeks Council and Santa Barbara Urban Creeks Council, and approximately another 150 partners statewide.

OUR PROJECTS

- The Streamside Management Program for Landowners (SMPL)
- Soil Bioengineering Workshops
- Watershed Tours
- Watershed Restoration
- Statewide Network
- Watershed Advocacy at the Capitol

SUPPORT OUR WORK WITH A TAX-DEDUCTIBLE DONATION!

<http://www.earthisland.org/cusp/donate>

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Upcoming Events



Additionally, look for our public workshop series on soil bioengineering and urban stream restoration in the winter.

CUSP will be continue to host community restoration events on a newly-daylighted portion of Codornices Creek, located on Kains street near the Berkeley and Albany border. Contact us if you would like to be involved!



Acknowledgements

CUSP thanks the Strong Foundation for Environmental Values for their support of our work and funding that allows us to publish this newsletter. We are grateful to the Mosaic initiative for their support and COVID-relief funding allowing us to adapt to a virtual workspace, as well as the Contra Costa County Fish and Wildlife Committee for supplying us with tools for our restoration programs. Additionally, we would like to thank the Schwemm Family Foundation, the City of Berkeley, and the California Department of Water Resources for their support of the Codornices Creek restoration project in Berkeley-Albany.



Photo Credits

Jackie Van Der Hout, E.C. Winstead, Ryan Hagarty (USFWS), Jessica Hall, Brian Trautwein