

Pacific Northwest Citizen and Community Science Summit

October 26-27, 2021

2021 Event Organizing Committee

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The Pacific Northwest Bumble Bee Atlas

Rich Hatfield, Xerces Society

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The Xerces Society for Invertebrate Conservation

<https://pnwBumbleBeeAtlas.org>

Bumble bees (*Bombus* spp., Apidae) are important pollinators throughout much of the world, particularly in the Northern Hemisphere. Unfortunately, there have been alarming reports of bumble bee population declines from multiple continents and an incomplete picture of the habitat needs and status of these animals is a barrier to effective conservation. Most data used to describe the range and habitat associations of these essential pollinators has been mined from museum specimens and pieced together from smaller studies. Large-scale, regional efforts, specifically directed toward understanding bumble bee populations, are lacking. To address this need, we launched the Pacific Northwest Bumble Bee Atlas in 2018. Our goal was to establish a framework to direct survey efforts throughout the region, and then recruit volunteers to conduct surveys. Using this large group of trained volunteers, we would quickly be able to produce a regional snapshot of bumble bee distribution, health, and habitat needs. Over the last four years, we have engaged over 1,000 volunteers and collected over 25,000 high quality bumble bee observations, vastly improving our understanding of bumble bee populations in the PNW. This project is one of the largest bumble bee monitoring efforts ever undertaken, and now represents one of the most comprehensive regional datasets for bumble bees in the world. These data significantly improve our ability to direct conservation efforts and manage our public lands more effectively for a critical species group.

IDAHO Master Water Stewards

Jim Ekins, PhD, University of Idaho Extension Water Outreach

IDAHO Master Water Stewards

University of Idaho Extension Water Outreach

<https://www.uidaho.edu/extension/idah2o>

Volunteer community (citizen-) science program managers can benefit from understanding participant activity patterns. It's helpful for maintaining long-term motivation and for recruiting new volunteers to balance attrition. Published in the Spring 2019 Rural Connections, and in Ekins' Summer 2020 dissertation (Community Learning in Social Resilience), the author completed a mixed methods research project about community science volunteer persistence. The objective of the study is to: 1) explore citizen science participant patterns, and 2) ask why volunteers leave. These results can inform a reflexive space for citizen science program managers and anyone considering developing such a program. The study described here adapts Heckhausen & Gollwitzer's (1987) Rubicon model of action phases, with help from Azjen's (1991) Theory of Planned Behavior, to better understand how someone becomes a volunteer citizen scientist. These models tell us that becoming an active volunteer citizen scientist requires planning out a series of steps and then successfully following through. Survey research was triangulated with actual data upload patterns cross referenced with the list of all program participants.

Water quality monitoring has long-term benefits, but so, too, does providing ongoing educational opportunities for lay community members. And while consistent volunteers can be most valuable to a water quality monitoring program, attention to continually recruiting new volunteers, and assessing the correct action level for them, will also benefit water quality volunteer programs.

The River Mile Network Crayfish Study: Lessons Learned

Janice Elvidge, National Park Service & The River Mile Network

Rick Reynolds, Engaging Every Student & The River Mile Network

Jim Ekins, University of Idaho Extension Water Outreach/The River Mile Network

Debra Berg, Retired educator, Columbia School, Hunters, WA/The River Mile Network

The River Mile Network, National Park Service

www.therivermile.org

Washington's The River Mile, Oregon's Engaging Every Student, and University of Idaho Extension Water Outreach co-administer a Columbia Basin-wide (and beyond) Crayfish Investigations community science program, directly assist with another crayfish community science program (IWRRI Crayfish Mercury Project), and provide K-12 teachers continuing education opportunities via a full-day professional workshop.

Crayfish live in waterways from mountain streams to big rivers and lakes. Crayfish can eat a wide variety of foods from varying trophic levels. Invasive crayfish population densities can become very high, with strong effects on the local waterway ecology.

Population studies of native and invasive species are rare. The ecological function of non-native crayfish is often different from that of native species. Introduction of non-native crayfish regularly results in the transformation of lakes and wetlands from clear to turbid, extirpate native species, and disrupt plant and animal communities.

Participation in the Crayfish Study is open to anyone and includes a free online course of study. Community scientists and school groups can identify crayfish species and sex, count the number of crayfish observed, geolocate observations, measure water quality, provide specimens for laboratory analysis of heavy metals, and more. All levels of participation and observation are contributing important scientific data. Data are publicly accessible via an interactive mapping app. K-12 teachers are provided robust training, educational materials, and professional in-class and field trip support by watershed experts.

This fun and interactive presentation will focus on how we administer the program, and about the various levels of crayfish investigations we lead.

Establishing and Sustaining a Community-based water monitoring program

Gary Olson, Thornton Creek Alliance Lead for Community-based Science Program
Thornton Creek Alliance

Thornton Creek is located in Northeast Seattle and Shoreline. It feeds into Lake Washington. It has a number of pollution related problems. Over 4 years ago Thornton Creek Alliance, a nonprofit grass roots organization, decided to get involved with gathering data about some of these problems with the hope of determining their sources and working with local agencies to improve the situation.

In this presentation we will describe the process we went through to establish our community-based effort by determining a meaningful problem to address and establish procedures and safe protocols that would give meaningful and verifiable data. We will talk about recruiting efforts, which included folks from the community as well as local schools and how we have sustained this effort. Finally we will share some of our data and what we have learned through our citizen science program. We will summarize with what we think are steps that can help in building a successful grass roots citizen science program.

Machine Learning for Plant Health Monitoring and Diagnosis

Peter Loyd, MSCS, Department of Computer Science, Seattle University (Presenting Author)

Kyle Fraser, CS, Department of Computer Science, Seattle University

Wan D. Bae, Associate Professor, Department of Computer Science, Seattle University
Seattle University

Urban greenery has always been valued by the public, and recent research has increasingly shown a wide variety of positive health and quality of life impacts associated with it. In the face of increased urbanization and ongoing climate change, understanding and strengthening urban greenery is particularly important. The Machine Learning Public Policy seeks to develop ways for humans to better understand urban plants in gardens, streets, and parks. Our ultimate goal is to aid both personal (e.g. in gardens and yards) and public (e.g. city services and researchers) interactions with plants by identifying issues they might have, tracking the spread of disease or stress, locating problem areas to alert professionals. To do so we collect and process photos taken by citizens and train a machine to gather and understand information from those images together with geospatial data, so that we can then use it to better understand the unique situation of individual plants and the issues facing plants of those species across a city. The study is to design classification models that determine the health condition of plants using images of plants and identify types of diseases. With the advanced techniques of image processing along with techniques in processing spatiotemporal data in GIS, we better understand how plant disease is initiated and progressed and thus can improve the accuracy of the model and effectiveness of solutions. In the future these ideas could be extended to plants in any environment, including commercial farms and in the wild.

The Great (Digital) Outdoors: How Community Science can Engage Youth in the Outdoors even while inside

Rachael Van Schoik

Science Action Club, California Academy of Sciences

calacademy.org/sac

You don't need to be an expert facilitator or trained naturalist to lead digital or in-person STEM that is authentic, meaningful, and fun. All you need is creativity, a willingness to learn alongside youth, and access to quality curriculum resources. Science Action Club (SAC) makes it easy and fun to bring the outdoors to middle school youth at home and in out-of-school time. SAC activities empower youth to connect with nature and contribute to global citizen science projects like iNaturalist. In this session, attendees will get practice with digital activities, learn tips and tricks for STEM facilitation with youth, and walk through real-life examples of success. Come learn about citizen science and how to use it to bridge the widening STEM gap.

Improving and Making Use of iNaturalist Data

Lindsey Wise, Institute for Natural Resources, Portland State University

Public: Rare Species of Oregon,

<https://www.inaturalist.org/projects/rare-species-of-oregon>

Oregon iMapInvasives

<https://www.inaturalist.org/projects/oregon-imapinvasives-collector>

iNaturalist has been growing exponentially in recent years and has become a fantastic place for engaging users in citizen science projects and passively collecting observations for many conservation and research applications. Setting up iNaturalist projects is easy, but how can you make the most of the observations in your project? This talk will focus on making use of the various Data Quality Assessment fields available in iNaturalist including via the Identity tool, how to export and use observations from iNaturalist or the GBIF iNaturalist snapshot in a spatial mapping program like ArcGIS, and the implications of Creative Commons licensing and terms of use when using those records outside of iNaturalist.

Orca Network's Whale Sighting Network: community science and so much more

Susan Berta, Orca Network

Orca Network's Whale Sighting Network

http://www.orcanetwork.org/Main/index.php?categories_file=Sightings

Orca Network's Whale Sighting Network increases awareness of the Southern Resident orcas and other whales, fostering a stewardship ethic and motivating a diverse audience to take action. The Network provides hands-on opportunities for the public to report sightings of whales, gathering important data for researchers and encouraging shore-based whale watching. The Network improves communication between researchers, agencies and the public, raising awareness about whales and related issues. As people become educated and involved through this Community Science effort, an ever-increasing amount of data is collected, and the public and researchers are informed about issues affecting whales and how to better address them. The Sighting Network began informally in the late 1990s, via a short phone list of volunteers. Through email (16,000 subscribers) and social media (182,000 Facebook followers) the Network has grown with regional participants and followers from around the world. Education is provided by staff and volunteers, displays, presentations, events, and our Langley Whale Center on Whidbey Island, WA. We have seen many changes in habitat use and occurrence of unusual species over the decades, most recently the historic decrease in use of the Salish Sea by Southern Resident orcas, and a marked increase in Transient/Bigg's orcas and Humpback whales. The Sighting Network has also actively worked with Stranding Networks and researchers in assisting to locate and track entangled whales or cetaceans out of their usual habitat. Sightings data collected has been cited in numerous research publications on orcas, Humpbacks, Gray whales and Fin whales.

Tracking Climate Change: Oregon Season Tracker a collaborative partnership

Jody Einerson, OSU Extension, Benton County - presenter

Brad Withrow-Robinson, OSU Forestry & Natural Resources Extension

Mark Schulze, HJ Andrews Experimental Forest

Oregon State University Extension Service

<https://extension.oregonstate.edu/ost>

Oregon Season Tracker (OST) links natural resource managers, educators, researchers and others in the community to the science they use through collaborative citizen science. OST volunteers gather scientific data on precipitation and plant phenology at their home, woodland, farm, ranch or school to share with other observers and research partners. OST is a joint program of OSU Extension and the HJ Andrews Experimental Forest Long Term Ecological Research (LTER) Program, along with two national organizations, National Phenology Network and Community Collaborative Rain Hail and Snow (CoCoRaHS). Our objectives are to help gather data from a much larger part of the Oregon landscape than otherwise possible and, to open new channels of communication between the public and climate researchers studying the interaction of weather, climate and local ecosystems, to the benefit of participants knowledge and understanding.

This multi-level collaboration is what makes the program work. OSU Extension brings a long history of working with volunteers (MG, MN, 4-H) and provides OST's leadership in recruiting, training and supporting local volunteers. To date over 450 people have trained as OST volunteers. HJ Andrews Forest (jointly managed by OSU and USFS) is the primary local science partner, leading research in forest and stream ecosystems, and the interactions among ecological dynamics and physical processes. They guide the OST research questions, data needs and science communication. National partners (NPN and CoCoRaHS) manage OST-gathered data, plus contributing that data to national research, and online access to data. The collaboration among the local partners of two important national networks, the Extension Service and the Long Term Ecological Research Program highlights a potentially powerful partnership in climate science education.

Urban Wetland Beaver Surveys

TWC Land Stewards

Shealyn Fuller

Megan Garvey

The Wetlands Conservancy

<https://wetlandsconservancy.org/community-science-education/>

Beavers are great indicators and sustainers of wetland health. They modify hydrology, create wildlife habitat, improve water quality, and, in so doing, often create conflict with their human neighbors. To help better understand their movements and manage this conflict, The Wetlands Conservancy collects annual data on urban beaver populations throughout Washington County. We train teams of community scientists to log signs of beaver activity along creeks and streams in wetlands. Specifically, we document the location and size of dams and lodges. This presentation will outline our wildlife survey protocol and the recruiting/training process for our community scientists. It will show examples of our findings and their usefulness to larger government agencies. The presentation will also assess community science's role as an agent of cultural change through continuing education for adults. Volunteers acting as community scientists not only learn more about the natural history of beavers and how to track/interpret their work - they learn to see ecosystems in motion behind shopping centers, next to freeway exits, or in their own back yards. This concept of a living urban landscape can encourage stakeholders like community scientists to advocate, educate, purchase, and even vote with water systems and wildlife in mind.

Engaging volunteers in monitoring the status and distribution of American pikas in the Pacific Northwest during a pandemic

Johanna Varner, Colorado Mesa University

Amanda Greenvoss, Oregon Zoo

Carlo Abbruzzese, Washington Department of Natural Resources

Erik Beever, U.S. Geological Survey, Northern Rocky Mountain Science Center and Department of Ecology, Montana State University

Steven Clark, Clark College

Cascades Pika Watch

Oregon Zoo

<https://www.oregonzoo.org/pika>

Identifying species' distributional shifts is essential to conservation, and enlisting citizen scientists has become a common monitoring tool. However, maintaining engagement during the COVID-19 pandemic was challenging for many projects. In addition to upending volunteer recruitment, training, and retention events, the pandemic also cut funding to many projects, particularly those at organizations like zoos that rely on entrance fees for revenue. Here, we summarize recent progress, challenges, and strategies for remote engagement at Cascades Pika Watch (CPW), a collaborative pika-monitoring project in the Pacific Northwest. Pikas are small, climate-sensitive mammals that are ideal for citizen science because they are charismatic, easily identified, and inexpensively surveyed. These traits, paired with concerns about recent climate-mediated pika population declines, have made pikas a popular topic for citizen science. The Oregon Zoo has hosted/housed CPW since its founding in 2011 by an interdisciplinary group of scientists, educators, managers, and conservation practitioners. Our activities range from simple sitting surveys or opportunistic pika observations, to formal abundance surveys requiring rigorous training. During the pandemic, we produced videos, held live trainings via Zoom, and managed survey effort via automated spreadsheets. We then monitored volunteer engagement through data submission and surveys on what helped them feel connected to the project or motivated to participate. Although some strategies proved useful for sustainably managing CPW, we also suffered a loss of volunteer engagement, particularly for the time-intensive abundance surveys. Future attention is needed to balance educational, scientific, and community-building objectives with resource availability and volunteer interests.

Reducing Phosphorus, Algae, and plants in a septic polluted lake

Sandy Williamson, Friends of Spanaway Lake

Friends of Spanaway Lake

spanawaylake.org

Spanaway Lake, a natural 270 acre kettle lake near Tacoma, WA, is experiencing more frequent hazardous algal blooms (HAB) and increased nuisance aquatic plant growth. The lake (zavg = 16 ft) is dominantly (~65%) groundwater fed, with an estimated residence time of <6 months. It is P-limited and classified as mesotrophic with total phosphorus (TP) ~20 µg/L. Flux measurements and hypolimnion monitoring indicate P release from bottom sediment is minimal, but TP of surface water and groundwater upgradient from the lake ranges from 20-40 µg/L due to septic tank effluent. Groundwater vents near the edges of the lake (<3m water depth) appear to be a significant source of P loading. These are recognized by low DO, 2-6 °C water temperature difference in summer and winter, and elevated P (TP up to 74 ppb). The continuous delivery of P-rich groundwater and short residence time pose a challenge for some traditional HAB mitigation methods. We are evaluating zero valent iron (ZVI) as an economical and environmentally safe means of treating P-rich groundwater as it enters the lake. Application of median 125 micron ZVI has reduced Phosphorus in microcosm and other small scale tests. We will be testing 5 micron ZVI for water stripping of P. We will also be comparing ZVI results with Phoslock results.

Citizen science as a tool for local government land use planning: lessons from one of BC's fastest growing cities

Pamela Zevit RPBio, Biodiversity Conservation Planner, City of Surrey BC

City of Surrey

Citizen Science in Surrey/City Nature Challenge/iNaturalist

<https://www.surrey.ca/vision-goals/biodiversity-conservation-strategy/citizen-science>

Larger in area than the City of Toronto, Surrey in southwest BC supports a highly diverse landscape of natural areas, agricultural land and urban/suburban areas. In 2014 Surrey was one of the first municipalities in Canada to develop and implement a city-wide biodiversity conservation strategy (BCS). One of the core components of the BCS is a network of connectivity corridors, sites and hubs (the Green Infrastructure Network or GIN). One of the Strategy's key approaches was to assess the health and integrity of the GIN, and overall biodiversity over time through monitoring indicator species. The challenge was, and is, knowing if, and where these species occurred.

In late 2019 the City joined iNaturalist with the intent of using community observations as a foundation for tracking and analyzing BCS indicator species. In spring 2020, Surrey participated in its first global City Nature Challenge (CNC). The event served the dual purposes of engaging residents and visitors in connecting to nature during the pandemic while contributing to biodiversity conservation objectives. While observers and observations have grown exponentially since 2019, providing an invaluable, real-time data resource (bolstered by continued annual participation in the CNC), capacity to curate, analyze, manage and integrate the data in a useful way has proven challenging.

This presentation will provide an overview of Surrey's citizen science journey, challenges and long-term goal for growing the citizen science community in the City.

Fifteen Years of Citizen Science in the Carpenter Creek Estuary Restoration and Monitoring Program

Melissa A. Fleming, Ph.D., Stillwaters Environmental Center
Carpenter Creek Estuary Restoration and Monitoring Program
Stillwaters Environmental Center
stillwatersenvironmentalcenter.org

Stillwaters Environmental Center began citizen science monitoring of water quality in the Carpenter Creek watershed in 2000. The Carpenter Creek estuary is utilized by juvenile salmonids during their outmigration to the Pacific Ocean, and the creek is also a spawning ground for coho and cutthroat trout, and potentially, steelhead. Stillwaters and others lobbied successfully for the replacement of two undersized culverts that were restricting natural tidal and creek flow and limiting fish access in 2012 (between Appletree Cove and estuary) and 2018 (between lower estuary and salt marsh) with large-span bridges. Since 2005, Stillwaters' Carpenter Creek Estuary Restoration and Monitoring Program has been coordinating dozens of citizen science volunteers to provide pre- and post-bridge monitoring of process, condition and biological indicators in the estuary, salt marsh and creek to allow for adaptive management of salmonid habitat recovery. Since 2013, we have also hosted 31 undergraduate and graduate research projects by students from local colleges that have expanded the scope of our work. Ten years after the first culvert removal, we are starting to assess not only the progress of ecosystem recovery but the strengths and weaknesses of our combined citizen science and intern project approach.

City Nature Challenge: A Springboard for Biodiversity Inventories and Conservation in the Pacific Northwest and Northern Rockies

Preston Andrews, Ph.D., Kinnikinnick Native Plant Society

George Gehrig, Kinnikinnick Native Plant Society and Pend Oreille Chapter Idaho Master Naturalists

Patrick Meyers, Pend Oreille Chapter Idaho Master Naturalists

City Nature Challenge: Bonner County, ID

<https://www.facebook.com/City-Nature-Challenge-Bonner-County-ID-106106278046164> and

<https://www.inaturalist.org/projects/city-nature-challenge-2021-bonner-county-id>

The inaugural City Nature Challenge (CNC) in Bonner County, Idaho took place from April 30-May 3, 2021 with participants taking photographs of plants and wildlife in Bonner County and uploading them to the iNaturalist app during the four-day observation cycle. A collaborative, friendly competition was fostered with CNC locations in Boise, Idaho and Red Lodge, Montana, with local and regional trophies awarded for the most observations and observations per capita. The Bonner County CNC was guided by a steering committee of four volunteers, representing Pend Oreille Chapter Idaho Master Naturalists, Kinnikinnick Native Plant Society, and East Bonner County Library District, who were championed by several local organizations interested in biodiversity. Although CNC Bonner County had no budget, financial support for trophies and advertising was provided by Hard Art Studios, Idaho Master Naturalists and East Bonner County Library. Research-grade quality observations, as well as Critically Imperiled to Vulnerable (NatureServe S1-S3) species were tallied. Follow-up surveys of those participants who collected the most observations were conducted to determine their motivation for participation in CNC and their likelihood of participation in other citizen science projects. Organizers will endeavor to collaborate with other localities in the Pacific Northwest and Northern Rockies during CNC 2022. The ultimate goal of the CNC Bonner County organizers is that CNC can serve as a springboard for interaction and participation in meaningful citizen-science supported research with university, agency, and other scientists to further our understanding and conservation of biodiversity in the Pacific Northwest and Northern Rockies.

Monitoring Aquatic Ecosystems through Citizen Science, Mount Rainier National Park

Katie Ewen, MS Student, Huxley College of the Environment Western Washington University

Scott Anderson, Biological Science Technician, Mount Rainier National Park

Rebecca Lofgren, Aquatic Ecologist, Mount Rainier National Park

Mount Rainier Aquatic Citizen Science Program

Aquatic and Atmospheric Program, Mount Rainier National Park

Citizen scientists assist with monitoring aquatic ecosystems throughout Mount Rainier National Park. Program objectives are to (1) engage volunteers in park science through active participation in field data collection, (2) monitor amphibian populations throughout the park, with an emphasis on the western toad, and (3) provide data to the National Park Service management team on the status of aquatic environments and dependent species within Mount Rainier National Park.

Since the establishment of this citizen science program in 2009, over 300 volunteers have participated in the project. Volunteers represent a wide range of ages, backgrounds, and experience levels with both data collection and the outdoors. While day-hiking and backpacking on extended trips, citizen scientists have observed thousands of amphibians, documented fish presence/absence, surveyed unmapped wetlands, and contributed to our knowledge of mercury in the park's lakes and wetlands by collecting dragonfly larvae samples for the nationwide Dragonfly Mercury Project. As of 2021, volunteers have contributed over 5000 hours to aquatic surveys.

Based on lessons learned, we continue to expand citizen science opportunities to monitor aquatic ecosystems throughout Mount Rainier National Park. Program success has relied on offering a range of citizen science opportunities, ensuring field surveys are accessible to a wide variety of ability levels and age groups, employing a dedicated citizen science intern lead, and maintaining small groups. Challenges include responding to the high amount of interest, accommodating both new and returning citizen scientists, and creating a study design that achieves program objectives.

Afoot and afloat: Citizen Science in the Protection Island Aquatic Reserve

Betsy Carlson, Port Townsend Marine Science Center

Protection Island Aquatic Reserve

Port Townsend Marine Science Center

<https://PTMSC.org>

In 2015 the Port Townsend Marine Science Center set up a Citizen Stewardship Committee for the WA State Department of Natural Resources Aquatic Reserve Program. As a result two citizen science projects were created. One, a monthly, boat based bird and mammal survey, grew out of an expressed need to gather fine grained data on the species using the reserve. The other, an annual intertidal monitoring all-biota inventory, replicates similar surveys done each year around Puget Sound and adds to a bigger understanding of the nearshore ecosystems.

This presentation will cover the project design, protocol, volunteer recruitment, social media and data sharing affiliated with these two unique projects.

Community Science Coordinator, Betsy Carlson, coordinates a wide variety of projects with volunteers at the Port Townsend Marine Science Center. These include Marine Mammal Stranding Network, SoundToxins, BEACH, iNaturalist BioBlitz, Mussel Monitoring (stormwater runoff)

Seattle-Tacoma City Nature Challenge - Engaging Broader Audiences

Katie Remine, Woodland Park Zoo (presenting)

Craig Standridge, Pt. Defiance Zoo & Aquarium

Zachary Hawn, Pt. Defiance Zoo & Aquarium

Olena Perry, City of Tukwila/Green Tukwila

Seattle-Tacoma Metro Area City Nature Challenge

Woodland Park Zoo

<https://www.zoo.org/conservation/naturechallenge>

Woodland Park Zoo, Point Defiance Zoo & Aquarium and Northwest Trek Wildlife Park collaborate each year to mobilize people across the Seattle-Tacoma metropolitan area (all of Snohomish, King and Pierce counties) to participate in City Nature Challenge (CNC), a global nature observation event using the iNaturalist app. Participants can support this effort by being an observer, helping others identify their observations, or better yet, both. Over the four years we have coordinated the Seattle-Tacoma CNC, we have increasingly widened our recruitment circles, offered different types of events and trainings, and modified our communication strategies in order to engage new audiences and fill in the map with observations in geographic areas where we've had fewer observations in the past. In 2020 and 2021, we had our highest participation numbers yet and in 2021 more Sea-Tac CNC observations were logged and more species were found than in any other year! For 2022, we are looking to engage a broader group of participating organizations to engage their audiences in different ways in CNC. Join us to learn, share and discuss ways to understand your audience and diversify participant engagement in short-term, low-commitment community science projects such as City Nature Challenge.

Engaging community scientists in urban carnivore research

Katie Remine, Woodland Park Zoo (presenting)

Mark Jordan, Seattle University

Robert Long, Woodland Park Zoo

Seattle Urban Carnivore Project & Carnivore Spotter

Woodland Park Zoo

www.zoo.org/seattlecarnivores; www.zoo.org/coexisting; www.urbanwildlifeinfo.org

The Seattle Urban Carnivore Project, led by Woodland Park Zoo and Seattle University, engages residents in research to increase our understanding of urban carnivore ecology and improve human-carnivore coexistence. Camera traps, when deployed by researchers and trained volunteers with a systematic sampling design, are an effective tool for monitoring urban carnivores. Community science reporting tools, although not systematic, are an alternative source of data for such studies. When reports are coupled with verifiable evidence, such as photographs, they are a good source of complementary data to camera trap data. We compared mammalian carnivore observations from camera traps to those from our online reporting tool, Carnivore Spotter, between August 2019 and August 2020 throughout the Seattle-Tacoma area. The two tools yielded complementary data for analysis. Our results demonstrated systematic biases in the geographic distribution of Carnivore Spotter reports, identifying the need for engagement in different communities than are typically reached by these types of efforts. Likewise, our initial recruitment of volunteers for camera trap teams primarily drew participants who were already connected to or living in proximity to the project lead organizations. More inclusive outreach and collaborations with community-based organizations are necessary for community science projects to ensure more representative engagement and to improve volunteer retention. Diversifying participation is critical for urban ecology community science projects, both to ensure representative geographic coverage of their data and to effectively foster human-wildlife coexistence such that people from all communities and all wildlife can thrive in our urbanizing Northwest landscapes.

Community Science Wildlife Work: Volunteers Wade into Wetlands to Inform Land Managers about Natural Resources

Katy Weil, Senior Natural Resource Scientist Metro Parks and Nature

Megan Garvey, TWC Urban Land Steward

Community Science Regional Amphibian Monitoring

Metro Parks and Nature, The Wetlands Conservancy

<https://www.oregonmetro.gov/news/dip-ponds-help-monitor-amphibian-egg-masses>

<https://www.oregonmetro.gov/news/metro-volunteer-wildlife-monitors-highlighted-on-opb-s-oregon-field-guide>

For the past 17 years, approximately 800 community science volunteers have been conducting amphibian egg mass surveys within the wetlands of 24 communities in the greater Portland region. The data collected, and experiences shared, are invaluable. Public agencies and non-profit conservation programs work together to ensure this collected information is used by natural area reserve and park managers.

Ecological monitoring of key indicator sensitive species such as the Northern red-legged frog is one method to measure ecosystem health and restoration success over time. Long-term monitoring data requires well-trained, skilled volunteer monitors working closely with natural resource scientists. Amphibian egg mass surveys are relatively easy to learn and conduct. With proper training, new volunteers can conduct them reliably.

Many community members are looking for substantial volunteer projects in which to utilize their professional skills in a way that positively impacts the environment. This program provides such an opportunity. Having more opportunities for community members to get directly involved in public lands is a great way to increase the level of service provided throughout our region. The data collected by volunteers helps guide restoration efforts and secure grant funding for future ecological work.

In this presentation we will talk about how these efforts have grown and evolved. We now have seven public agencies and non-profit programs working together to jointly recruit, train, and support our community science volunteers. We will talk about the lessons learned, the lessons yet to be learned, and the stories of successful work led by ever-innovative volunteers.

Engaging Washingtonians in water quality monitoring through Surfrider Foundation's Blue Water Task Force

Liz Schotman, Surfrider Foundation
Blue Water Task Force, Surfrider Foundation
bwtf.surfrider.org

Surfrider Foundation is a non-profit activist network dedicated to the protection and enjoyment of the world's ocean, waves, and beaches for all people. One of our primary initiatives is to ensure clean water for people to recreate in, and one of the ways we do that is through our Blue Water Task Force (BWTF), a citizen science water quality sampling program. For over 25 years, volunteers across the country have tested beaches and recreational waters for fecal indicator bacteria in order to provide coastal communities with information on where it's safe to swim, surf, or play in the water. Four of our five volunteer-run chapters in Washington State have an active BWTF program, sampling ~20 beaches located around Puget Sound and the Olympic Peninsula. Chapters partner with local agencies, organizations, and academic institutions to expand coverage when and where agency resources are limited.

Surfrider chapters also help increase community awareness and access to local water quality information by sharing agency and volunteer-generated data with the public through conventional and social media platforms. By developing a trained and committed volunteer workforce and established modes of communication between agencies and community groups, these partnerships can be particularly valuable during off-season months when agency staff is limited or in times of critical need following natural disasters, Harmful Algal Blooms, and other emergencies.

Citizen Science - A Tool For Aquatic Invasive Species Monitoring

Lisa Scott, Executive Director of OASISS (presenting author). Sierra Collins, Program Assistant, OASISS.

Okanagan Valley Aquatic Invasive Species Citizen Science Project

Okanagan and Similkameen Invasive Species Society (OASISS)

www.oasiss.ca

Each year the Okanagan valley in south-central BC (Canada) attracts thousands of tourists from outside the province. As tourism increases, so does the risk for introductions of aquatic invasive species (AIS). There are currently no reported cases of invasive mussels or clams within the Okanagan, however the mainstem lakes are classified as high risk for an introduction. To address the need for additional monitoring of Okanagan lakes for invasive mussels and clams, the Okanagan and Similkameen Invasive Species Society (OASISS) developed a citizen science project that encouraged community members to participate in AIS detection. The project offered two types of volunteer positions. The first position sought volunteers who owned private docks on the mainstem lakes. Volunteers were provided with a pair of invasive mussel monitors to deploy from their docks and were required to check them every two weeks throughout the summer. The second volunteer position sought community members to conduct shoreline surveys on Osoyoos Lake for invasive clams. During the two years of the project, a total of 38 volunteers participated, of which many were returning volunteers. Fortunately, no invasive mussels or clams were detected. This presentation will share the successes and challenges of implementing a valley-wide citizen science project. The presentation will also describe how the integration of technology can improve data reporting for citizen science projects that cover large geographic areas. The project's success highlights the usefulness of citizen science as a tool for monitoring lakes for AIS.

Snowy Plover Patrol: A Multipartner Collaboration to Monitor a Listed Species

Allison Anholt, Portland Audubon

Joe Liebezeit, Portland Audubon

Laurel Hillman, Oregon Parks and Recreation Department

Snowy Plover Patrol

Portland Audubon

<https://audubonportland.org/get-involved/community-science/snowy-plover-patrol/>

The Plover Patrol program is a successful collaboration between Portland Audubon, Oregon State Parks and Recreation, and the Oregon Biodiversity Information Center's Institute of Natural Resources. The program recruits and trains community science volunteers on the northern Oregon coast to conduct intensive surveys for Western Snowy Plovers (*Charadrius nivosus*). Snowy Plovers, listed as threatened under the Endangered Species Act, are small, camouflaged shorebirds of open sandy beaches. Due to these characteristics, they are famously difficult to monitor even for very experienced observers, and most plover monitoring programs throughout the range of the Snowy Plover are conducted by professional staff. With recent population increases, plovers began to recolonize beaches in their historic range on Oregon's North Coast, and a multipartner collaboration was born. This collaboration hinges on the efforts of over 60 trained volunteer observers. Since 2018, volunteers have conducted 325 surveys and monitored over 100 nests, a truly incredible effort for such a challenging study species. This presentation will highlight the efforts of volunteers and the benefits of utilizing a volunteer-based model for plover monitoring. The complex data collection requirements, combined with the requirements of safely monitoring federally listed species, also present unique challenges. We will discuss the training and communication strategies used to successfully overcome these challenges.

The Arbutus ARME: building community around the sacred, emergent and adaptive Pacific madrone

Michael Yadrick, Seattle Parks and Recreation

Marianne Elliot, Washington State University Extension,

Joseph Hulbert, Washington State University Extension.

Arbutus ARME

Seattle Parks and Recreation & Washington State University

<https://www.arbutusarme.org/>

Arbutus menziesii is the binomial name for Pacific madrone. A.R.M.E., pronounced like Army, is the shorthand abbreviation *Arbutus menziesii*. Like any other army, we are a force. More specifically, we are more of a botanical and community-powered collective of people focused on facilitating efforts at Pacific madrone research, conservation, restoration and education.

The ARME shares the interspecies love story we share with madrones. Celebrate this sacred and iconic tree and its cultural importance. Madrone forests refuge complex interactions and patterns, biodiversity belowground and in the tree canopy. Meanwhile, the species safeguards adaptive capacity amidst climate disruption. We highlight the relationship we have with madrone while also building the skills required to help ensure we have a future for the species.

Principle projects include education via social media @arbutusarme; citizens are encouraged to contribute to a range-wide monitoring of the range and health of madrones via TreeSnap and more recently iNaturalist project, and; a forum for researchers and madrone enthusiasts to connect at regular workshops and virtual gatherings.

There's an app for that! Implementing EDDMapS with citizen scientists for early detection and rapid response

Lauren Kuehne, Pacific Northwest Invasive Plant Council

Chelsea Dole, Pacific Northwest Invasive Plant Council

Lizbeth Seebacher, Pacific Northwest Invasive Plant Council

Pacific Northwest Invasive Plant Council

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Apps that help laypersons identify species that they encounter in the course of recreating or volunteering have revolutionized the capacity of citizen scientists to document and report occurrence of invasive plants and animals. This includes the potential to train citizen scientists to identify new and emerging invaders when they first arrive, facilitating the early detection and rapid response that is a crucial component of successful eradication. Since 2013, the Pacific Northwest Invasive Plant Council has worked in partnership with National Forests and Parks, Washington Dept. of Agriculture (WSDA), Department of Natural Resources (DNR), county noxious weed programs, and other local groups to offer a Citizen Science EDRR Invasive Plant Program. Through this program, we train citizens how to identify, record, and report priority invasive plants that they find while out on hikes, using EDDMapS.

In this presentation, we discuss the evolution of EDDMaps and the challenges and lessons learned in translating the incredible power of app-based systems into practical use by citizen scientists for early detection and rapid response. This includes the development and implementation of training modules and programs that can be integrated into existing volunteer monitoring programs (e.g., Stream Stewards, Master Gardeners) to grow the network of citizen scientists in the Pacific Northwest.

Strategies for Retaining Citizen Science Volunteers

Jennifer Marquis - WSU Extension Master Gardener Program

WSU Extension Master Gardener Program

Washington State University

<http://mastergardener.wsu.edu>

People volunteer for a variety of reasons. As leaders of Citizen Science Projects, it is imperative to know those reasons to retain good volunteers. Theoretically, volunteers go through levels of dedication to a project or program. Think of it as a continuum. In the beginning volunteers give their time because they will get something out of it, then they stick around because they have made friends or have made relationships that keep them involved and finally, they remain engaged because they are committed to the mission of the project or program.

Volunteer retention must be a key component of any citizen science program to collect reliable data that conforms with quality standards. Retention requires fostering relationships, providing training, and finally giving trust to the volunteer to complete the task. Getting to know what volunteers want and expect sends a message that their needs are important and that they are integral to project success. Volunteer training gives confidence and builds competence in eager volunteers. The hardest, but most important part of retention, is trusting them to deliver.

Relationships lead to meeting needs, training gives project leaders peace of mind, gives volunteers confidence and competence in their abilities to serve the project purpose and trust empowers volunteers. Empowered volunteers are through the continuum of volunteerism, are fully committed to the mission of the project and will give more of their time and talents than volunteers who are not as committed.

Coordinated litter assessments across WA State, using EPA's protocol

Heather Trim, Zero Waste Washington

Xenia Dolovova, Zero Waste Washington

Coordinated litter assessments across WA State

Zero Waste Washington

Zero Waste Washington is working with EPA and a large number of local community and ngo groups to conduct robust assessments of litter at volunteer-driven cleanup events in a range of settings from beaches, to creeks, parks and roadways. These are using a new Escaped Trash Assessment Protocol developed by the EPA. In the past 3 years, this effort has resulted in the quantification of everything from small plastic fragments, cigarette butts, bottles and containers, to charcoal from beach firepits, and fishing gear across Washington. This form of participatory science with community volunteers is netting high quality data that both provides information so that we can see the story of litter sources, types, and quantities across the state. In addition, volunteers are eager to hear back about the specific data from their site as well as how it compares to others. This on-the-ground community data also provides a way to assess the impact of policy changes, such as the new statewide plastic bag law and natural disturbance such as before and after Covid (quantifying masks and gloves).

MeadoWatch: a long-term community science database of wildflower phenology in Mount Rainier alpine meadows

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MeadoWatch

University of Washington

National Park Service

<https://meadowatch.org>

MeadoWatch (“MW”) is a community science project on wildflowers in Mt. Rainier (Tahoma) National Park, with data collection centered on the timing of flowering and other stages of plant reproduction. Phenology, or the timing of biological events, including flowering and other reproductive stages in wildflowers can be highly sensitive to climate, underscoring the need for long-term data on how plant populations and communities may be impacted by ongoing global climate change. As part of the MeadoWatch project, since 2013, 500+ unique volunteers and scientists have gathered data on the timing of four key reproductive phenophases (budding, flowering, fruiting, and seeding) in 17 wildflower species on 28 plots over two elevational gradients alongside popular park trails. Trained volunteers (87.2%) and UW scientists (12.8%) collected standardized data 3-9 times/week during the growing season. Taxonomic assessments were highly consistent between scientists and volunteers, with high accuracy and specificity across phenophases and species. Sensitivity, however, was lower, suggesting that a few species might be more challenging to identify in community-science projects. The MW database includes 42,000+ individual phenological observations from 17 species between 2013 and 2019, with data collection ongoing.

Response to detection of *Vespa mandarinia* in the PNW

Cassie Cichorz, Washington State Department of Agriculture

Asian giant hornet response

Washington State Department of Agriculture

<https://agr.wa.gov/hornets>

Vespa mandarinia Smith, 1852, is the largest species of *Vespa* known. In 2019 several specimens of this predatory wasp were detected in Canada and the United States, including an entire nest located and destroyed on Vancouver Island, British Columbia. The Washington State Department of Agriculture (WSDA) and the United States Department of Agriculture collaborated to survey Washington State for *Vespa mandarinia* in 2020, deploying traps staffed by agency personnel, government cooperators, and citizen scientists, and produced extensive public outreach. Agencies fielded numerous requests from media outlets and members of the public, and responded to thousands of suspected reports. Public interest grew to include an abundance of unsolicited suggestions for control and recommendation. WSDA summarized the insect taxa (and other things) that were reported as suspect *Vespa mandarinia*, and the various steps taken to keep public reporting viable without overwhelming staff. The range of management ideas offered, from the tractable to the bizarre were also discussed. Overall WSDA actively promoted and are relied heavily upon public participation and reporting in efforts to locate and eradicate the species. 15 out of the 31 detections in 2020 were indeed provided by members of the public. These ultimately led to the discovery of the first *V. mandarinia* nest in Washington in October, 2020.

So you want to start a citizen science project?

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Forest Health Watch

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<https://foresthealth.org>

The rationale for initiating a citizen or community science project is highly variable and some approaches are more successful than others. Sources of variation include, but are not limited to, the terminology, levels of participant training, methods of sample collection or participant engagement, online tools, and data transparency. Examples of important and formative questions to consider include: ‘how will this project give back to participants’ or ‘how will the project engage communities most affected by results?’. Despite the variation in rationale and approaches, there are many projects experience similar challenges. Fortunately, there are many model approaches to learn from when considering the feasibility, design, and potential impact of a project. This presentation will draw on the experiences initiating Cape Citizen Science (<https://citsci.co.za/>) and the Forest Health Watch (<https://foresthealth.org>) to share experiences, lessons learned, and recommendations for establishing a successful citizen science project.