Face-to-face meeting of the Stakeholder Advisory Committee

**DRAFT Meeting Agenda**

**November 29, 2017**

NOAA Fisheries  
Northwest Fisheries Science Center, Auditorium  
2725 Montlake Blvd. E.  
Seattle, WA, 98112

Call-in: 855-547-8255; passcode 57166#  
[Webex connection](#)

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**Meeting Purpose**

- Introduce new academic host and consortium capacity  
- Adopt the NW CSC Science Agenda for 2018-2023

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**Wednesday, November 29 (all times are Pacific Time)**

**8:30** Welcome, introductions, general updates  
*Gustavo Bisbal, NW CSC Director  
Donna Silverberg, Consultant*

**9:00** Introducing the new NW CSC Host and academic consortium  
*Amy Snover, Director, Climate Impacts Group, University of Washington*

**9:50** Upcoming NW CSC website features  
*Heidi Roop, NW CSC Communications Manager*

**10:15** Break – *coffee, tea, and refreshments provided*

**10:45** Climate and NW fisheries  
*Michelle McClure, NOAA Fisheries*

**11:15** NW CSC syntheses projects in Fiscal Year 2017  
*Gustavo Bisbal, NW CSC Director  
Jherime Kellermann, Oregon Institute of Technology*

**12:00** Working Lunch – *Lunch orders will be delivered (please bring $10 cash)*  
*Our new graduate fellows  
Meade Krosby, Deputy University Director, Climate Impacts Group, University of Washington  
NW CSC 2017 Graduate Fellow(s)*
1:00 Tribal engagement at three levels
   Chas Jones, NW CSC Tribal Liaison

1:30 Adoption of NW CSC Science Agenda 2018-2023
   Gustavo Bisbal, NW CSC Director

2:15 Discussion about the future of the Science Advisory Panel
   Amy Snover, Director, Climate Impacts Group, University of Washington
   Marty Fitzpatrick, Deputy Director, USGS Forest and Rangeland Ecosystem Science Center

2:45 Break – coffee, tea, and refreshments provided

3:15 Evaluation component of the NW CSC-Science Agenda
   Alison Meadow, University of Arizona

3:45 NW CSC Strategic Plan: our next endeavor
   Gustavo Bisbal, NW CSC Director
   Amy Snover, Director, Climate Impacts Group, University of Washington

4:15 General discussion
   Facilitated by Donna Silverberg

5:00 Next meetings
   Gustavo Bisbal, NW CSC Director

5:15 Adjourn
Welcome, introductions, general updates
Gustavo Bisbal, NW CSC Director
Donna Silverberg, Facilitator, DS Consulting

Gus and Donna welcomed the group to the Northwest Climate Science Center’s (NW CSC) Stakeholder Advisory Committee (SAC) meeting, noting that the purpose of the meeting was to introduce the new academic host and consortium capacity, and to adopt the 2018-2023 Science Agenda. Gus briefly reviewed the year at NW CSC:

- From May to September there was a Department of the Interior (DOI) moratorium that prevented the SAC from meeting in person.
- The annual SAC meeting was postponed in anticipation of an unrealized government shutdown.
- The previous NW CSC and academic “host agreement” came to an end, and a new agreement has begun between the NW CSC and the University of Washington.
- The President’s Budget (PBUD) for FY18 requested a substantial decrease in the national CSC network’s budget, a cut in the number of centers nationally, and a name change from Climate Science Center to Climate Adaptation Center. The House upheld the budget cut, however, decided to retain all eight centers; the Senate rejected the PBUD entirely, reestablishing funding, retaining centers, and preserving the name.
- NW CSC received the 2017 annual budget with only three weeks to coordinate the research; however, Gus was able to get the money awarded for research for the coming year.
  - There was a requirement that the DOI review any awards over $100,000. Because of transition limitations, NW CSC avoided giving awards over $100,000. It is expected that this cap will continue through FY18.
- NW CSC also saw staff changes: Nicole DeCrappeo and Betsy Glenn moved on to other positions and Chas Jones joined the NW CSC team as the Tribal Liaison. Depending on funding for FY18, there likely will be more people joining the team in the near future.

Gus summarized that it has been and continues to be a difficult and confusing time for the CSC network. At this point, they are waiting to see what happens with the FY18 budget and potential government shut-down. He noted that in the event of an extended continuing resolution, they will not be able to start new projects; instead, monies will have to go to existing projects.

Introducing the new NW CSC Host and academic consortium
Amy Snover, Director, Climate Impacts Group, University of Washington

For presentation slides, see file “2. Snover_0900 university consortium” on the ESAC meeting webpage.

Amy reflected that, in the Northwest, there is a rich history of engagement from a diverse group of people within climate sciences. The University of Washington and NW CSC Academic Consortium is eager to build on this strong regional foundation. Amy noted that the Academic Consortium is made up of a team of
unique experts from US Geological Services (USGS) and universities throughout the region, including University of Washington, Washington State University, Western Washington University, University of Montana, and Boise State University. Pending an approved budget extension past December 31st, 2017, the Consortium is expected to grow even more, likely to include universities in Oregon.

Amy noted that one of the strengths of the Consortium is that it is a community of practice. As such, it brings with it a number of meaningful relationships upon which the Consortium hopes to build and leverage. She provided insights on how the Consortium plans to focus their efforts:

- Co-develop strategic priorities to ensure University-USGS alignment;
- Execute research to assess climate risks, inform efforts to evaluate response options, and implement change in complex systems; and
- Assess and interpret existing knowledge for today’s decisions.

She noted that there is a cycle to ‘actionable science’: catalyze awareness, assess risk, evaluate options, implement change, then monitor and evaluate. Up to this point, much of the NW CSC’s work has focused on catalyzing awareness and assessing risks. The consortium would like to move the region further down the path towards exploring options and implementing change. Specifically, they plan to do this by:

1. Funding research that supports the Science Agenda and supports changing priorities.
2. Skills-building for managers and scientists, including workshops/webinars aimed at building capacity for people around the region to develop projects for actionable science and decision making. This effort will focus on skills to help broaden scientific participation in the CSC and provide social science skill development.
3. Student training and development, specifically for graduate student, tribal programs, and internships for underrepresented undergraduates (via the Doris Duke Foundation).
   a. Currently, the Consortium is working with eight students and would like to bring on more as funding allows. Amy noted their vision is to have the fellows/associates program develop an online training in order to allow for broader participation.
4. Running a summer training program, Bootcamp 2.0, for graduate students and professionals. This would be a 2-3 day deep dive on a particular issue.
5. Leading strategic communications to support mutual learning in and out of the network and across the region.

Amy noted that, from her perspective, the Consortium has a responsibility to reach out across the spectrum, to leaders and innovators as well as to those just entering the community of practice. They plan to help the innovators’/leaders’ work expand beyond them in order to enhance the impact and make their work transferrable, while also increasing access to resources, learning, and contributions to the body of work. Amy asked the SAC to provide input to her on how the Consortium could be an effective partner to them and their group in order to help move this work forward. SAC members were encouraged to follow-up with Amy to provide their input. Additionally, it was suggested that the rest of the Consortium attend a face-to-face SAC meeting in the future to encourage connections and learning.

→ **ACTION:** Provide input to Amy regarding how the Consortium can help move this work forward.

→ Also, consider inviting Consortium members to a future face to face SAC meeting.

In closing, Amy noted that the NW CSC has been evaluating previously funded work to determine the effectiveness of that work and to further inform the Science Agenda. Moving forward, they would like to develop an evaluation framework that allows for ongoing evaluation and real-time evaluation, instead of only retrospective evaluation. They are also looking into ways to be more effective communicating the work and outcomes to others outside of the community of practice.
Upcoming NW CSC website features
Heidi Roop, NW CSC Communications Manager

For presentation slides, see file “3. Roop_0950 Comms” on the ESAC meeting webpage.

Heidi updated the SAC on the current communications activities at the NW CSC:

- Ongoing knowledge-transfer from the previous consortium to the current, which has resulted in a lot of learning from the previous Communications Manager and others.
- Building relationships with staff at USGS/CSC Headquarters, specifically between communications and program staff.
- Providing weekly highlights and reporting to USGS regarding ongoing research, new FY17 projects, etc. This is aimed at making sure USGS is aware of the work and status of what we are doing. They then take these reports back to D.C.
- Rebuilding and designing the website. This is a great opportunity for the SAC to work together to identify how the various communication tools we use can be most effective.
- Establishing access to a new web-based marketing platform which allows for analytics on use and content.
- Working to hire a part-time Communications Manager; after receiving 98 applications they are now in the interview process.

In regards to the website overhaul, Heidi noted that step one was to look at use of the current site to see what information can be gained to improve the new site. For instance, who is using the site? What content are they accessing? And how long do they stay on the page? She noted that there are visitors from all 50 states and nearly 9,000 unique users annually who, on average, spend two minutes on the site. Thus for the redesign, they will focus on making the site more efficient and streamlined to allow visitors to get at the information they are looking for (and what the NW CSC wants to highlight), without having to click through multiple pages to find it. Additionally, the redesign will focus on telling the story of the NW CSC – who we are and what we are doing – with a focus on the CSC people, its research, training, news and events, and contact for more information.

A big focus of Heidi’s is to strategically enhance communications to communicate the actionable science process in a way that shares the whole story of the work that the CSC is doing. She noted that the communications efforts are looking into innovative tools or platforms that NW CSC can use to advance the mission and work around the region. Moving forward, the communications will focus on:

- Strategic Communications Planning;
- Website build-out;
- Establishing evaluation targets & metrics;
- Maintaining social media presence;
- Working closely with NCCWSC to amplify our efforts; and,
- Collaborating with UW’s Climate Impact Group (CIG) to develop communications trainings.

Heidi provided a survey to the group to get more information about what is helpful or missing in current communications. The group was encouraged to fill out the survey and provide their input to Heidi.

→ ACTION: Provide input to Heidi regarding communications via the communications survey.

The group also provided immediate input on the following communications issues:

**Question: Do you use the website?**
- Yes, nearly everyone in the room affirmed that they use the website.

**Question: What do you use the website for?**
- To access research, products, data, and publications.
• **Suggestion:** It would be nice to have a bibliography of products and publications; or include links to all of the publications.

• To get information on specific projects in order to keep up-to-date on the regions’ work, what has been funded, etc.
  o Generally, the project descriptions and data is meeting the SAC’s needs, however, there were mixed reactions to the being redirected to ScienceBase.
  o **Suggestion:** It would be helpful to be able to access project results and final write-ups.
  o **Suggestion:** A synthesis or analysis of the projects would be helpful.

• To get background information: Tribal strategy, transition plan, Science Agenda, etc.

• To look for products to collaborate on.

• For the list of SAC members, mainly to provide others with more information on who the SAC is.

**Question: What could Communications do to help enhance partnerships?**

• Monthly session (face-to-face or calls) with tribes to share out news and information.
  o The University of Oregon currently does these calls and NW CSC participates in them. NW CSC is also working on developing a monthly tribal-focused webinar.

• Create a framework that allows for a simplified approach to regular stakeholder engagement – use technology that allows for conversations with stakeholders, not just one way communication.
  o This might support opportunities to leverage the group’s products and outcomes so that they do not just get lost as time goes by.

• Strategize on how to coordinate everyone’s communication efforts in order to utilize what others are doing and avoid duplicating efforts.

• Clarify who the audience is and what the desired message is to allow for a strategic approach to communications.
  o Identify the hierarchy of audiences – Heidi agreed and noted that this is part of the current effort; for example, this conversation today is aimed at getting information from the SAC, which is one of the audiences.
  o Tailor the product and outcomes to the audience; for instance, develop materials specifically for lobbying efforts in D.C.

• Utilize partner resources; for example, use the national CSC’s communications center to communicate out to the broader public.

There was interest in exploring how to connect the communications work to the evaluation work that Amy spoke to earlier. Amy and Heidi are working to clarify ways to do this and test it out. This will be an ongoing effort that evolves over the next five years, and Amy and Heidi will bring their efforts back to the SAC for ideas as it evolves.

**Climate and NW fisheries**

*Michelle McClure, NOAA Fisheries*

For presentation slides, see file “4. McClure_1045 NMFS Climate” on the [ESAC meeting webpage](#).

Michelle presented her teams’ work on a species-level and salmonid-specific climate vulnerability analyses. She noted that they have identified three basic components to climate vulnerability: exposure, sensitivity, and adaptive capacity. For the purposes of their analysis, they only implicitly looked at adaptive capacity, because it is very difficult to measure. However, the group used both quantitative and qualitative approaches to look at the vulnerability of 82 different species with the goal of assessing their vulnerability to a changing climate, and to clarify the reasons for vulnerability.
This was an expert-based modeling effort that resulted in a list of ranked species signaling overall vulnerability of each species. One thing the scientists considered was their ‘certainty of the vulnerability factor’. They factored in an “uncertainty value” depending on the level of certainty. For instance, there is a high level of certainty that oceans will become more acidic with climate change; however, food web impacts are less certain, thus the uncertainty value was weighted higher. The study did not look at the vulnerability of the species that the analyzed species consume.

Overwhelmingly, experts thought that effects of climate change would have neutral to negative impacts on salmonid species vulnerability. They found that highly mobile species were less vulnerable generally and anadromous fish had low predictions of being able to change their distribution to avoid impact. The experts were able to identify “hot spots” for vulnerability, which are priority areas for management actions that could mitigate impacts.

Michelle noted that they are developing two manuscripts from this work, as well as species narratives and vulnerability scores. Managers can utilize the information to help prioritize actions and inform decisions. Michelle has already presented findings to some managers; however, she recognized that it is difficult to get this information out to everyone who might benefit from using it in decision-making, in part because many decision-making processes are not well equipped to incorporate this type of tool (for instance, harvest management). She noted that one of the most useful ways for managers to use this tool is to look at the highest exposure factors: for example, sea level rise poses a high risk to certain species, thus, managers need to consider this when thinking about riprapping projects in areas with at-risk populations.

In response to a SAC member question, Michelle noted that NMFS has not sufficiently explored opportunities to engage tribal knowledge in the vulnerability analysis, however, would be interested in doing so in the future. SAC members noted that there is a rich history of tribal knowledge and interest, both from coastal and interior tribes, which could benefit the work.

→ ACTION: Gus will provide Eliza, Laura, and David’s contact information to Michelle so that they can connect regarding tribal knowledge.

Another effort that NMFS is working to develop is a national climate science strategy that outlines a suite of actions to address the identified gaps in climate science. Efforts range from continuing the current integrated ecosystem assessment to building a coordinated climate program, and ensuring that information is well-disseminated. NMFS is trying to think proactively and move toward science and action that will help in this changing world. Michelle sees the big opportunities for this plan are in thinking hard about what questions need to be answered and tailoring the science to respond to those questions, and then working with managers to incorporate this kind of information into robust management, even when there are high levels of uncertainty.

Michelle noted that, although they have not yet begun to reach out to provide the outcomes of their work, they will do so after the manuscripts are complete. At that point, it may be worth looking into opportunities for regional data collectives to expand the work. She noted that they have many data, dependent and independent of the NMFS work, all of which are currently stored and accessible on the NMFS’ website.

NW CSC syntheses projects in Fiscal Year 2017
Gustavo Bishal, NW CSC Director
Jherime Kellermann, Oregon Institute of Technology

For presentation slides, see file “5. Gus_1115 FY17 projects” and “6. Kellermann_1115 Phenology” on the ESAC meeting webpage.

Gus reviewed the six science synthesis projects for FY17. He noted that these projects focus on the tribal, federal, and state stakeholder priorities, are consistent with both the old and new Science Agendas, as well as
the Guiding Principles, and are relatively short in duration (products should be available between January and March 2018).

The six FY17 projects include:

1. **Changing Wildfire, Changing Forests: A Synthesis on the Effects of Climate Change on Fire Regimes and Vegetation in the Pacific Northwest** – A synthesis project on wildfire regimes, patterns on forest vegetation, etc. Products include a state of the knowledge report, and a four-page easily digestible informative document. This work will be conducted by the University of Washington and US Forest Service.

2. **Spoilt for Choice: a Review of Downscaled Climate Datasets for the Pacific Northwest** – A down-scaled modelling effort that looks at a collective set of models to clarify which models are helpful for what. This work will be conducted by Oregon State University.

3. **Climate Change Impacts on Invasive Species in the Northwest: A Synthesis and Path Forward** – Looking at terrestrial and aquatic invasive species status and impact. This work will be conducted by the USGS and Oregon Wildlife Institute.

4. **Extremes to Ex-Streams: Ecological Drought Adaptation Synthesis Project** – Exploring to what extent there is science to support management actions around climate adaptation implemented due to ecological drought. This work will be conducted by EcoAdapt.

5. **Phenology and Climate Change in the Pacific Northwest: Status and Resources for Management and Decision Making** – Looking at the lifecycle timing, changes, and interactions for plants and animals. This work will be conducted by the Oregon Institute for Technology.

6. **Will Climate Warming Affect Locations or Timing of Availability of Food Sources from Native Northwestern Shrubs?** – Looking at flowering and fruiting of plants of particular interest to tribes (First Foods). This is a bit more intensive than the other studies and will last two years. Products include an online tool to overlay climate factors impact on foods. This work will be conducted by University of Idaho, Mt. Baker-Snoqualmie National Forest, Cedar River Watershed, Gifford Pinchot National Forest, CBI, Skokomish Indian Tribe, Quinault Indian Nation, Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, and USFS.

In regards to the last study noted, there was inquiry as to how the study will manage sensitive tribal information? Gus noted that, similar to every NW CSC project, there would be a detailed data management plan. Additionally, the USGS has developed guidelines to address the sensitivity of tribal information and they have a Data Manager Steward to help navigate this.

Gus introduced Jherime Kellermann who provided more detail on his project, **Phenology and Climate Change in the Pacific Northwest: Status and Resources for Management and Decision Making**.

Jherime explained that phenology is the timing of reoccurring single lifecycle events; it is fundamental to species biology and ecology, an interaction of genetic and environmental controls, and is evolutionarily adapted to local-regional conditions. However, climate change is altering conditions faster than species can evolve. He pointed to the climate change trends, such as higher annual temperatures, declining snowpack and reduced snow-water-equivalent, and variable precipitation; noting that these changes have significant impacts on natural systems and species phenology. The capacity of a species to adapt to climate change depends on the flexibility of their phenology and how they interact with other species’ phenology. Impacts to changes in phenology can impact processes such as forest health, fisheries migration timing, wildfire, plant invasions and encroachment, changes in wildlife populations (migration, diseases, predator-prey/herbivore dynamics), and even recreational use.

In order to understand phenology and impacts from climate change there needs to be a large scale monitoring effort; so large that many researchers are turning to citizen-scientists to provide expansive monitoring. These citizen-scientist monitoring programs vary in geographic and ecological scope, complexity, methods and more; however, they produce a plethora of information across many different landscapes. Quality control varies across the programs: some programs have so much data that it overcomes quality control, some have
strict training and volunteer programs to ensure a regular and consistent connection to the program, while others allow data to be narrowly selected to filter out noise. Jherime introduced the group to a few monitoring programs and explained that his 2017 synthesis will provide:

- A summary of the relevant literature;
- A guide to the currently available monitoring programs, and,
- A summary of the USA-National Phenology Network database for the Northwest.

Jherime noted that there is still a lot of room for these programs to grow and expand. In the meantime, they are evolving and utilizing many different data sources, thus providing a rich body of information that can be helpful for climate science.

Our new graduate fellows

Meade Krosby, Deputy University Director, Climate Impacts Group, University of Washington
NW CSC 2017 Graduate Fellow(s)


Meade explained that the goal of the NW CSC Graduate Fellowship program is to support research aligned with the NW CSC’s Science Agenda and to build capacity for actionable science among early career scientists. The first cohort of 2018 Graduate Fellows includes eight graduate students from the five consortium universities and includes partnerships with state, federal and tribal governments (all fellows must have a practitioner partner).

Building capacity for actionable science for the fellows will include online skills building modules that explore the theory and practice of linking science to action, science communication, social science and collaborative research methods, and best practices for tribal engagement.

Meade introduced the fellows and welcomed Ben Dittbrenner and Kimberly Cook to present their work.

Ben presented on the Sky Beaver Project, noting that historically, beaver spanned throughout the region and occupied nearly all flat and slow streams that had woody vegetation. However, in the early 1900’s they were extirpated throughout most of their range. He explained that beavers are ecosystem engineers, creating dams, holding back and slowing down water, creating different habitats, and building up sediments in incised channels. Thus far, Ben’s work has sought to:

- Characterize beaver population levels in the Snohomish Basin.
- Relocate problem animals into the basin – taking nuisance beavers from lowland areas (especially where landowners are planning to trap and kill), create beaver families and release them into a more suitable habitat. There has been a focus on relocating the beaver onto US Forest Service lands to avoid landowner concerns around increased flooding.
- Look at what the beavers are doing - monitor sites above, in and below the system. Looked at how much water is being held in the system, water flow changes, and what types of animals are attracted to the beaver-influenced changes.

Ben found that beavers can create systems of dams that lead to the development of wetland complexes. Also, they can impact water temperature changes, as water is pushed into the hyporheic zone and cooled substantially. Additionally, they saw significant vegetation changes in the narrow valley forested systems that they worked in, mainly in the form of a shift to faster growing shrub species. Ben was unsure of the long-term impacts on evapotranspiration, however, noted that he could consider that in the upcoming modelling effort.
Moving forward, Ben will use NW CSC funds to continue his research to look at whether the beavers combined hydrological benefits might have a mitigating impact for climate change. The objectives of his research are to:

- Construct a watershed model using Sky Beaver Project data to identify the cumulative effect on hydrology.
- Compare the modeled hydrologic benefits of beavers to anticipated impacts of climate change on local hydrology.
- Determine the minimum level of site occupancy required to mitigate climate impacts.

In regards to how this work can be used to inform management, Ben noted that so far they have seen site level benefits that can be used to: identify the effectiveness of relocation as a climate adaptation tool; prioritize relocation for greatest benefit; and make policy and management recommendations.

In response to inquiry, Ben noted that he is not currently collecting information on potential impacts from beavers on salmon in- and out-migration, although it is a hot topic. He said that according to studies, juveniles seem to out-migrate fine; however, adults appear to hold below the dam until water is high enough and then they pass the dams. There are unknowns for sure, however, before Europeans, beavers and salmonids co-existed, so it is likely that they still can.

Kim Cook presented her work on montane amphibians, specifically looking at how climate change affects montane amphibians and how her research can be translated into conservation strategies. She noted that frogs and toads are intrinsically linked to montane lakes that are affected by climate change because their reproductive success relies on these waterways and the hydro-period is becoming shorter. For example, eggs are laid, however, if the pool dries before they hatch or the tadpoles do not have sufficient water, the population suffers. Increased threats from pathogens are also impacting montane amphibians, as well as the additional threats resulting from the interactive nature of temperature changes, disease, and impacts to the immune systems of amphibians.

Through her research, Kim has concluded that there are multiple interactive threats to montane amphibians, including climate and disease and that there is a need to understand these interactions better. Although there are compounding and other potential factors impacting the frogs that Kim studied, she noted that disease seems to be the prominent driver to their decline. She noted that in her research she studied the Cascade frog specifically because it is very similar to the endangered yellow-legged frog, thus lessons can be transferred.

One objective of Kim’s research is to translate her findings into conservation measures. She suggested that extending the hydro-period and developing effective treatments for disease (for example, using a fungicide to treat pathogens) are two tangible ways that managers and management could support the species.

**Tribal engagement at three levels**
*Chas Jones, NW CSC Tribal Liaison*

For presentation slides, see file “10. Chas_0100 Tribal” on the ESAC meeting webpage.

Chas presented on how the NW CSC is engaging tribes at the local, regional and national scale. He noted that he was recently hired to be the Tribal Liaison for NW CSC through the Affiliated Tribes of Northwest Indians (ATNI) and his goals are to learn the following from the tribes:

- What resources are important?
- How are resources at risk?
- What projects would improve tribal resilience? And,
- How can NW CSC help tribal resilience projects succeed?
Chas explained that NW CSC is helping to fund tribal projects at the local level. Since 2011, they have funded 13 tribal research projects and in 2015 funded a more regional Columbia River Basin effort to assess the tribes’ capacity to address climate change. From 2016-2017, NW CSC has been working with the tribes to build capacity to assess vulnerability to climate change, assess the impact of climate change on the availability of food sources, and held a tribal climate camp. They are currently working on the approach for 2018 tribal engagement.

At the regional level, NW CSC has provided funding for tribal conferences and summits, and Chas is working with regional networks, on summits, and building connections to help support capacity.

Finally, at the national level, NW CSC is working via the Bureau of Indian Affairs and the CSC National Tribal Liaison Network to develop a webinar series, contribute to the national tribal climate change adaptation efforts, and collaborating with other CSCs on tribal engagement.

There was inquiry as to whether Chas has had the opportunity to visit any of the tribes. He noted that he has been trying to meet tribal members via meetings or direct introductions, and did participate in a fall Chinook monitoring effort with Siletz members. SAC members noted that they appreciated Chas’ approach to getting to know tribal members and his efforts to listen and learn from tribal members. They encouraged him to continue working to build relationships with visits to each of the tribes.

**Adoption of NW CSC Science Agenda 2018-2023**

*Gustavo Bisbal, NW CSC Director*

For presentation slides, see file “11. Gus_0130 Science Agenda” on the ESAC meeting webpage.

Gus presented the final 2018-2023 Science Agenda, noting that this is the culmination of three years of collaborative work between the NW CSC and SAC. Guiding this agenda are seven principles:

1. Let resource management priorities drive science opportunities
2. Focus on climate adaptation science
3. Support co-produced actionable science
4. Emphasize synthesis and interpretation
5. Capitalize on partnerships and leveraging
6. Encourage innovation
7. Maintain flexibility

The Agenda outlines management priorities, science opportunities based on those priorities, and clarifies the level of available knowledge for each priority. Gus noted that the question now is: how do we implement this agenda? To which he noted there are a number of factors, not limited to funding, decisions at the Department of the Interior, staffing, and such. However, the NW CSC is now moving forward towards implementation.

Gus asked the SAC if, after reviewing the document and seeing that most of their suggestions were included, they were ready to move forward with this agenda for the next five years. The SAC responded with a resounding “yes”!

- **AGREEMENT:** The SAC agreed that they are ready to support and help to implement the 2018-2023 Science Agenda.

Gus thanked the SAC for their hard work and offered celebratory chocolates for a job well done!

**Discussion about the future of the Science Advisory Panel**

*Amy Snover, Director, Climate Impacts Group, University of Washington*

*Marty Fitzpatrick, Deputy Director, USGS Forest and Rangeland Ecosystem Science Center*
Amy asked the SAC to reflect on the process and lessons learned from bringing the Science Advisory Panel (SAP) together with the SAC to develop the Science Agenda. She reminded the group that the SAP was put together to provide capacity from the science side of things, in order for the managers to get a better idea of what the science could provide to management. She encouraged the group to think about how well it worked and what lessons they have learned to take forward. The SAC shared the following initial thoughts:

- The interaction was enormously useful and the Science Agenda is fundamentally more useful because it went through the SAP/SAC lens.
- The process was helpful, but limited to the perspectives of those on the teams. In the future it would be good to take a more comprehensive approach to getting input from partners and member entities.
- It was challenging to get the word out about the SAP/SAC regionally in order to make sure that the right people from partner agencies/organizations were at the table.
- The focused and specific task of the SAP/SAC made it so that the work was achievable with a group of volunteers; however, if the decision were to take a deeper dive into particular research, this approach would likely not be sustainable.
- Moving forward, it might be helpful to have the SAP involved in RFP development at a broad scoping level. It would be important to establish protocols to ensure that their level of involvement does not create any conflict of interest, as many of the SAP members may wish to apply for research funding.

Amy noted that the terms and objectives that the SAC asked of the SAP were clear and had an end date; she wondered whether there are other SAC planning or processes that would benefit from this higher-level, strategic scientific input. The SAC shared the following initial ideas for future SAP engagement:

- Help with sequencing and priorities of the Science Agenda.
- Help to inform evaluation; specifically, the five-year evaluation plan and how it might advance ideas into the future.
- Mentoring from SAP members for individual project PI/PDs.
- Provide scientific oversight for all SAC products.
- Strategizing with the SAC on actionable science.

Lastly, Amy asked the SAC how the NW CSC could help them cast a wider net for input on management priorities, as well as challenges within their agencies. The SAC shared the following initial thoughts:

- Keep the information flowing through skills seminars and boot camps to provide opportunities to learn from the community of practice.
- Conduct an annual survey for the broader community to weigh in on priorities.
- Continue encouraging and engaging in organic conversations on climate change management priorities; create opportunities for this non-systematic approach as well.
- Help keep a pulse on what is going on in the broader communities and bring this to the annual agenda review and evaluation.
- Explore opportunities to engage from a social science perspective.

Amy thanked the SAC for their input and noted that this is the start of an ongoing conversation that the NW CSC and University Consortium are eager to engage in with the SAC.

**Evaluation component of the NW CSC-Science Agenda**  
*Alison Meadow, University of Arizona*

For presentation slides, see file “13. Meadow_0315 Evaluation” on the [ESAC meeting webpage](#).
Plan will incorporate both the Evaluation Plan and the Science Agenda. She provided examples of the evaluation questions and methods of information gathering, noting that some of these questions/methods could be eliminated if there are resource limitations. The intention is for the evaluation methods to capture more than just the tangible outputs; for instance, relationship and community impacts are important outcomes to capture. Alison suggested the following questions and methods for gathering the desired evaluation information:

**Evaluation Question: To what extent was the Agenda developed collaboratively with the SAC?**

**Method:** Develop a short electronic survey to administer to SAC members, aimed at gathering their perspectives. Responses will be anonymous and will go to NW CSC leadership.

**Evaluation Question: Have resource managers been active participants in NW CSC-funded research projects? How has their participation influenced outcomes and impacts?**

**Method:** Online or emailed survey to all resource managers who were identified as participants in NW CSC-funded projects. Responses can be anonymous and will go to NW CSC leadership. This survey would go out immediately post-project and yearly thereafter (up to three surveys, however, the survey could narrow over time). This survey is aimed at evaluating at the uses and impacts and thus needs to go directly to the resource managers. This effort will help document how people have been involved and the impact of the involvement, allowing the CSC to identify and work to remove barriers to participation and impact.

**Evaluation Question: Are projects designed to include stakeholders throughout and to focus on stakeholders’ science needs?**

**Method:** Create proposal review guidance for external proposal reviewers that asks the reviewers to consider how collaborative the proposal development process was. This is an early intervention to improve projects.

**Evaluation Question: Are products and tools accessible to (and used by) resource managers?**

**Method:** Use online search engines to trace project outputs (citations) to see where they are used beyond the immediate project. This would be an annual search and findings would be input into a database for ongoing tracking.

**Evaluation Question: Is the research being funded by the NW CSC having an impact on resource management decisions in the region?**

**Method:** Utilize the information that you already have to gauge the impact that the NW CSC is having in a cumulative manner. This will help to tell the story of impacts and see where there is opportunity to have greater impact.

Alison explained that the next steps are to finalize the evaluation and implementation plans, determine how to use the information gathered, collect the data, and then use that data to inform program decisions. This will be an adaptive process and the NW CSC can reassess the evaluation process as needed.

SAC members shared that, generally, the evaluation plan looks good. Members expressed interest in the opportunity to provide more input after a more in-depth review, potentially via one-on-one conversations, targeted interviews, or sharing out drafts of surveys. It was noted that the details of the surveys will be important and will play a significant role in the success of the efforts. Additionally, the SAC thought that the closer aligned this effort can be with the national CSC network’s goals, the better.

Alison noted that in developing this evaluation she is considering “impact” and “use” broadly, for example a change in management. She noted that there may be a need for more philosophical discussion for the SAC as they move forward in order to get at the cumulative effect of the science from an actionable science perspective.
NW CSC Strategic Plan: our next endeavor  
Gustavo Bisbal, NW CSC Director  
Amy Snover, Director, Climate Impacts Group, University of Washington

For presentation slides, see file “14. Gus_0345 Strategic Plan” on the ESAC meeting webpage.

Gus explained that he and Amy have started talking about the Strategic Plan and are eager to bring the SAC into the conversation. Gus expects SAC participation will be requested via conversations, surveys and webinars. He plans to work quickly with a goal of wrapping up the planning effort within six months, starting in January 2018. Additionally, Gus noted that the plan would be condensed to around 10-15 pages in length.

Due to national CSC network direction, there are a number of Strategic Plan aspects that are fixed and not open for group input, such as the mission and pillars/themes. However, the vision of the Strategic Plan is up for the SAC to determine. Various documents already discussed will be pulled into the plan, for example the Science Agenda and the Evaluations Plan (although it will be more extensive to cover more than just the Science Agenda); the Tribal Engagement, Education and Training, and Communications Plans will also be developed and included.

The Plan will be as specific as possible in describing the objectives and strategies; still, Gus believes it should retain a level of flexibility in order to stay relevant given the uncertainties with the budget. This will be a five-year plan, with supplemental annual work plans providing greater detail on the budget and work for each upcoming year.

_Suggestion:_ It was suggested that training be added to the “core services and products”.

Gus noted that he is looking for SAC input through this process and that timing will be limited. The group suggested reconvening in March for a two-day face-to-face meeting to work on the plan. Prior to that meeting, there will be emails and webinars aimed at initiating work on the plan in order to make the March session as productive as possible.

→ **ACTION:** Gus will coordinate a two-day face-to-face SAC meeting in March 2018 to work on the Strategic Plan; prior to that the SAC will meet via webinar and email to begin work on the plan.

**General discussion**

Donna noted that the SAC’s time together for this meeting was nearing the end and asked for their thoughts at this point in the process. SAC members shared that they are excited about the scope of work that they discussed, the University Consortium, and the level of engagement from the SAC, as well as the increased energy behind tribal engagement efforts. It is clear that there are strong partnerships, as well as opportunities to continue building relationships that move the work forward. Despite some challenges and uncertainties, the group has been able to move forward and will continue to do so. In moving forward, the group noted they will have to take care not to duplicate efforts. They also noted they are very interested in bringing in more social scientists to help broaden the groups’ understanding and ideas. The SAC saw a lot of opportunity to learn from the social sciences.

Additionally, the group noted that the process has been fun and that, as a result of the structures and systems they have developed together, they will be able to move forward and continue producing meaningful work and results together. Members were encouraged by each other’s dedication and focus on climate impacts and noted new and inspiring growth in the field.

Donna thanked Gus and the SAC for their commitment and hard work and adjourned the session.
MEETING PARTICIPANTS

States
Idaho Department of Fish and Game: Leona Svancara
Montana Department of Natural Resources: Michael Downey
Oregon Department of Fish and Wildlife: David Jepsen
Washington Department of Fish and Wildlife: Lynn Helbrecht

Tribes
Columbia River Inter-Tribal Fish Commission: Laura Gephart
Cow Creek Band of Umpqua Indians: Kelly Coates
NW Indian Fisheries Commission: Eliza Ghitis

Federal
Bonneville Power Administration: Chris Furey
Bureau of Indian Affairs: David Redhorse
Bureau of Land Management: Louisa Evers
Great Basin Landscape Conservation Commission: John Tull
Great Northern Landscape Conservation Cooperative: Yvette Converse, Sean Finn
Northwest Climate Science Center: Gus Bisbal, Chas Jones, Aaron Ramirez
National Park Service: Chris Lauver
National Oceanic and Atmospheric Administration: Michelle McClure, Mark Storm, Kevin Werner
Natural Resource Conservation Service: Jolyne Lee
North Pacific Landscape Conservation Cooperative: John Mankowski
US Department of Agriculture NW Climate Hub: Holly Prendeville
US Environmental Protection Agency: Linda Anderson-Carnahan, Bruce Duncan
US Forest Service: Katherine Smith
US Geological Survey: Marty Fitzpatrick

Others (SAC-SAP members or facilitators)
DS Consulting: Donna Silverberg, Emily Stranz
Oregon Tech: Jherime Kellermann
University of Arizona: Alison Meadow
University of Washington: Amy Snover, Meade Krosby, Heidi Roop, Kim Cook, Ben Dittbrenner, Ronda Strauch
Leveraging the NW Community of Practice

Federal
State
Tribal
Academic
Multi-Stakeholder Partnership
Actionable Science for Climate Adaptation

**Researcher Inputs**
- Synthesize and translate existing scientific knowledge

**Manager Inputs**
- Articulate management mission and challenges

**Catalyze Awareness**
- Share past experiences to direct research toward important vulnerabilities; Identify connections with management goals

**Assess Risks**
- Identify entry points for alternative actions; Prioritize based on risk tolerance, windows of opportunity, available resources

**Evaluate Options**
- Gather and direct technical, human, and financial resources

**Implement Change**
- Provide “best practice” frameworks for success and performance assessment

**Monitor & Evaluate**
- Measure performance and adjust activities

**Collect and analyze information about exposure, sensitivity, and adaptive capacity**

**Document processes and strategies to compare to other organizations and regions**
Supporting the NW CSC Science Agenda

1. **Co-developing strategic priorities** to ensure University-USGS alignment

2. **Executing research** to assess climate risks and inform efforts to *evaluate* response options and *implement change* in complex systems

3. **Assessing and interpreting** existing knowledge for today’s decisions
Building knowledge & capacity for climate adaptation

1. Annual competitive research funding*
2. Skills-building for scientists and managers
3. Student training and development
   • Graduate students, incl. a focus on tribal programs*
   • Applied climate science internships for underrepresented undergraduates
4. Bootcamp 2.0: Scientists’ and managers’ collaborative deep dive on priority issues
5. Strategic communications: Supporting mutual learning & action*
Learn more today…

<table>
<thead>
<tr>
<th>Meade Krosby &amp; Ronda Strauch</th>
<th>Research &amp; graduate training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heidi Roop</td>
<td>Communications</td>
</tr>
<tr>
<td>Gus &amp; Amy</td>
<td>Strategic planning</td>
</tr>
</tbody>
</table>
NW Climate Science Center Communications: looking to the future

Heidi A. Roop
NW CSC Interim Communications Manager & Climate Impacts Group Strategic Communications Lead
Current Activities

Knowledge transfer from previous consortium *(ongoing)*

Building relationships with USGS/CSC communications & program staff

Weekly highlights & reporting to USGS - ongoing research, new FY17 projects & consortium leadership activities

Full website rebuild & redesign

Establishing access to Convio web marketing

Hiring half-time communications manager
Current Website In Brief (2017)

- **Visits from all 50 States**
- **Organic Search** (62%)
- **Unique Visitors** (8,672)
- **Desktop** (82%)
- **New Visitors**
  - 2
  - 9
- **Returning Visitors**
  - 7
  - 1
- **Pages/Session** (2)
- **Minutes/Session** (2)
- **Popular Pages**
  1. Home
  2. Staff
  3. About
  4. Bootcamp
  5. Projects we fund
  6. Climate Degree Programs
  7. Projects Funding
  8. Contact

Visits from all 50 States
A new look for National Climate Change & Wildlife Science Center

Learn More About Us
Learn more about what we do and where we work

Explore Our Projects
Search for projects by topic, region, or year

Watch a Webinar
Browse our webinars to learn more about our science

Stay Connected
Sign up for our newsletter and find out how to get involved

News & Announcements
- New Study Looks at Ecological "Tipping Points" for Coastal Species to Help Manage for Change
- Warmer Waters Threaten Montana's Prized Westslope Cutthroat Trout
- CSC Presentations at The Wildlife Society's 2017 Annual Meeting
Website Redesign

Motivated by the need to refresh, streamline & make tailored content easier to find. Locate on UW servers.

New Information Architecture

Our Center | Research | Training | News & Events | Contact
Goal: More clearly convey who we are & what we provide
Goal: Connect needed information with end-users
Goal: Align work with science agenda, strategy & stakeholder needs
Goal: Use metrics to define, implement, assess our impact & reach
Goal: Leverage the NCCWSC & University networks to amplify our work
Ongoing & Future Work

- Strategic Communications Planning
- Website build-out
- Establish evaluation targets & metrics
- Maintain social media presence
- Work closely with NCCWSC to amplify our efforts
- Collaborate with CIG to develop communications trainings
Discussion

**Website**
1. Do you use the website? For what?
2. What is missing from the website?
3. What features do you love?

**E-Communications**
1. What do you want out of our email communications?

**Social Media**
1. Do you engage with our social media?

**Other**
1. Wishlist - products, content, frequency?
2. Innovative ideas?
3. Tools and Resources you need?
4. Ways to work with consortium & partners?
NMFS’s West Coast Climate Vulnerability Analysis and Climate Science Planning

NW and SW Fisheries Science Centers
NOAA Fisheries
Outline

• Climate Vulnerability Analysis
  • Species-level
  • Salmonid-specific

• Climate Science Planning at NMFS and NWFSC
General Vulnerability Assessments

1. Highly Vulnerable
   - At greatest risk
   - Specific research needed
   - Interventions generally needed

2. Potential Adapters
   - May be at risk
   - Monitor and support adaptive responses

3. Potential Persisters
   - May not be at risk
   - Monitor population trends

4. High Latent Risk
   - Not currently at risk
   - Monitor environment

Foden et al. 2013
1. Complete
   Northeast
2. In progress
   Bering Sea
   California Current
     Fish
     Salmon
     Turtles and mammals
   South Atlantic
   Caribbean
   Gulf of Alaska

https://www.st.nmfs.noaa.gov/ecosystems/climate/index
Goal and Objectives

Goal:
Assess the vulnerability of FMP and ESA-listed fish species (and subunits) to a changing climate.

Objectives:
1. Provide relative vulnerability rankings across species
2. Identify key attributes/factors and life-stages driving vulnerability
3. Identify key data gaps or information needs
4. Provide input to management options at the regional and Council level
5. Contribute, where appropriate, to life-cycle modeling efforts
Overview

• Expert-opinion based

• Two scales
  • Species-level (divided into functional groups)
  • Salmonid-ESU level

• Steps
  • Compile base information
  • Expert scoring
  • Integration of expert scores
  • Present results
Methodology Framework

Stock Vulnerability

Exposure
- Sea surface temperature
- Sea surface salinity
- Air temperature
- Phenology of Upwelling
- Ocean acidification (pH)
- Precipitation
- Currents
- Sea level rise
- Subsurface Oxygen

Sensitivity
- Habitat Specificity
- Prey Specificity
- Sensitivity to Ocean Acidification
- Sensitivity to Temperature
- Stock Size/Status
- Other Stressors
- Adult Mobility
- Spawning Cycle
- Complexity in Reproductive Strategy
- Early Life History Survival and Settlement Requirements
- Population Growth Rate
- Dispersal of Early Life Stages
Habitat Specificity (Sensitivity)

**Scoring Bins:**

**Low:** The stock is a habitat generalist and/or utilizes very common abiotic habitats.

**Moderate:** The stock strongly prefers a particular habitat.

**High:** The stock is a specialist on an abundant biological habitat.

**Very High:** The stock is a specialist on a restricted biological habitat.
Vulnerability Scoring Rubric

Vulnerability Rank

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Very High</th>
</tr>
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<tbody>
<tr>
<td>Very High</td>
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<td>Low</td>
<td>Moderate</td>
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<table>
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<th>Exposure</th>
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<th>Moderate</th>
<th>High</th>
<th>Very High</th>
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<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | NOAA Fisheries | Page 10
Species-Level CVA Results

<table>
<thead>
<tr>
<th>Climate Exposure</th>
<th>Very High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>1 salmon</td>
<td>1 Elasmobranch</td>
</tr>
<tr>
<td></td>
<td>1 Other anadromous</td>
<td>1 Rockfish</td>
</tr>
<tr>
<td></td>
<td>1 Puget Sound rockfish</td>
<td>5 Flatfish</td>
</tr>
<tr>
<td>Moderate</td>
<td>2 Puget Sound rockfish</td>
<td>15 Rockfish</td>
</tr>
<tr>
<td></td>
<td>5 Rockfish</td>
<td>4 HMS</td>
</tr>
<tr>
<td></td>
<td>1 HMS</td>
<td>3 Other groundfish</td>
</tr>
<tr>
<td></td>
<td>4 salmon</td>
<td>1 Other anadromous</td>
</tr>
<tr>
<td></td>
<td>1 Elasmobranch</td>
<td>2 CPS</td>
</tr>
<tr>
<td></td>
<td>1 Flatfish</td>
<td>1 Rockfish</td>
</tr>
<tr>
<td>Low</td>
<td>2 Flatfish</td>
<td>5 HMS</td>
</tr>
<tr>
<td></td>
<td>1 Other Groundfish</td>
<td>4 flatfish</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 CPS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Other groundfish</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 Elasmobranch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 Rockfish</td>
</tr>
</tbody>
</table>

Biological Sensitivity

- Very High
- Moderate
- Low

Climate Exposure

- Low
- Moderate
- High
- Very High
Drivers of Vulnerability

- Air temperature
- Precipitation
- Sea Level Rise
- Subsurface $O_2$, Upwelling
- Population Growth Rate
- Reproductive Strategy
- Other Stressors

Vulnerability Levels:
- Low
- Medium
- High
- Very High

NOAA Fisheries
Species-level CVA Results: Directional Effect

- **Elasmobranchs**
  - Positive: 0
  - Neutral: 0
  - Negative: 0

- **Flatfish Species**
  - Positive: 0
  - Neutral: 0
  - Negative: 0

- **Other Groundfish**
  - Positive: 0
  - Neutral: 0
  - Negative: 0

- **Anadromous Species**
  - Positive: 0
  - Neutral: 0
  - Negative: 0

- **Rockfish**
  - Positive: 0
  - Neutral: 0
  - Negative: 0

- **HMS**
  - Positive: 0
  - Neutral: 0
  - Negative: 0

- **CPS**
  - Positive: 0
  - Neutral: 0
  - Negative: 0
General CVA Results: 
Distributional Shift

- Elasmobranchs
- Flatfish Species
- Other Groundfish
- HMS
- Anadromous Species
- CPS

Diagram showing the distributional shift for different species categories.
Salmon-specific climate vulnerability assessment

Salmon recovery domains
Freshwater exposure factors

- Stream Temperature
- Water Deficit

- Hydrological Regime
- Atmospheric River Events

- Flood Ratio - 100 year event frequency
- Change in Flood Magnitude
## Results I: Final Vulnerability Ranking

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Exposure</th>
<th>Species/Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td></td>
<td>Central Valley Chinook Southern coho Spring Chinook Interior sockeye</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td>Central Valley spring-run Chinook Central California Coast Coho Northern Coast Coho Columbia River Steelfish</td>
</tr>
</tbody>
</table>
Spread of vulnerability within each species

- Chinook: Very High
- Coho: Very High
- Sockeye: Very High
- Steelhead: Very High
- Chum: High
- Pink: Moderate

Number of ESUs:
- Chinook: 5
- Coho: 4
- Sockeye: 1
- Steelhead: 6
- Chum: 2
- Pink: 1

NOAA Fisheries
Hotspots:
High sensitivity and high exposure in the same life stage

<table>
<thead>
<tr>
<th>Exposure: Stream Temperature</th>
<th>Adult</th>
<th>Juvenile Regime Shift/Tstream (*both)</th>
<th>Egg Flooding</th>
<th>Estuary Sea Level Rise</th>
<th>Marine Upwelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snake River spring/summer-run Chinook</td>
<td>Snake River spring/summer-run Chinook*</td>
<td>Sacramentor River winter-run Chinook</td>
<td>Central Valley fall-run/late fall-run Chinook</td>
<td>Central Valley spring-run Chinook</td>
<td></td>
</tr>
<tr>
<td>Mid Columbia Spring Chinook</td>
<td>Mid Columbia Spring Chinook*</td>
<td>Upper Columbia River spring-run Chinook</td>
<td>Central Valley spring-run Chinook</td>
<td>Sacramento River winter-run Chinook</td>
<td></td>
</tr>
<tr>
<td>Snake River Sockeye</td>
<td>Upper Willamette River spring-run Chinook</td>
<td>Southern Oregon/Northern California Coast Coho</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key:
- Interior Columbia
- Central Valley
Wrap up

• **Products:**
  - 2 manuscripts in prep;
  - Species narratives and vulnerability scores

• **Management Uses**
  - Prioritizing actions (match to key life stages or exposures, etc.)
  - Informing decisions about precautionary approaches
  - Not a quantitative tool

• **Science Uses**
  - Identify stocks that should be highest priority for incorporating environmental parameters into assessments and life cycle models
  - Identify priority monitoring
  - Fishing or other human community vulnerability assessments
Outline

• Climate Vulnerability Analysis
  • Species-level
  • Salmonid-specific

• Climate Science Planning at NMFS and NWFSC
Objectives

Build and Maintain Adequate Science Infrastructure

Track Change and Provide Early Warnings

Understand Mechanisms of Change

Project Future Conditions

Adaptive Management Processes

Robust Management Strategies

Climate-Informed Reference Points

Interdependent
Action Plan

• Continue California Current Integrated Ecosystem Assessment
• Sustain scientific expertise
• Coordinate, optimize survey and observation efforts
• Conduct Management Strategy Evaluations
• Build Coordinated Climate Program
• Ensure information is well-disseminated
### General CVA Results: Logic Rule Ranks

<table>
<thead>
<tr>
<th>Biological Sensitivity</th>
<th>Climate Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Very High</td>
<td>Very High</td>
</tr>
</tbody>
</table>

#### Biological Sensitivity

- **Low**: Arrowtooth Flounder, Dover Sole, Pacific Grenadier
- **Moderate**: Longnose Skate, Pacific Cod
- **High**: Blackgill Rockfish, Bocaccio Rockfish, Calico Rockfish
- **Very High**: Green Sturgeon, Yelloweye Rockfish - Puget Sound

#### Climate Exposure

- **Low**: Chum salmon, Yelloweye Rockfish
- **Moderate**: Chinook salmon, Coho salmon, Sockeye salmon, Steelhead Salmon, Black Rockfish, Bluefin Tuna
- **High**: Bocaccio Rockfish - Puget Sound
- **Very High**: Canary Rockfish, Canary Rockfish - Puget Sound, Chum salmon, Yelloweye Rockfish, Pacific Ocean perch, Spiny dogfish, Yellowtail Rockfish
NW CSC syntheses projects in FY 2017

Gustavo Bisbal, Director

SAC F2F meeting – Seattle, WA – November 29, 2017
“There is a lot of good science out there, but where is it and what does it all mean?”

YOU, SAC Members

6 projects in FY17
- 3 weeks from budget allocation to procurement deadlines
- Under $100k cap
- Focus on tribal, federal, state stakeholder priorities
- Essential step: Where is science strong and not?
- Consistent with old Science Agenda; new ASAP mode
- Consistent with guiding principles on new Science Agenda
- Relatively short duration; products available soon

Brian Harvey (UW), Jessica Halofsky (UW), David Peterson (USFS)

Spoilt for Choice: a Review of Downscaled Climate Datasets for the Pacific Northwest

Dominique Bachelet (OSU)

Climate Change Impacts on Invasive Species in the Northwest: A Synthesis and Path Forward

Clint Muhlfeld (USGS NOROCK), Jennifer Gervais (Oregon Wildlife Institute)
Extremes to Ex-Streams: Ecological Drought Adaptation Synthesis Project
Rachel Gregg and Jessi Kershner (EcoAdapt)

Phenology and Climate Change in the Pacific Northwest: Status and Resources for Management and Decision Making
Jherime Kellermann (OIT)

Will Climate Warming Affect Locations or Timing of Availability of Food Sources from Native Northwestern Shrubs?
Constance Harrington (USFS) and Partners (U. of Idaho, Mt. Baker-Snoqualmie National Forest, Cedar River Watershed, Gifford Pinchot National Forest, CBI, Skokomish Indian Tribe, Quinault Indian Nation, Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation)
Phenology in the Northwest’s changing climate
A synthesis of the science, monitoring programs, and the USA National Phenology Network

Dr. Jherime Kellermann, Associate Professor, Oregon Tech
Jherime.Kellermann@oit.edu  (541) 851-5156

Oregon TECH
We know the headlines

GREAT STORM HITS
AFTR 4-INCII RAIN

SWITZERLAND
This 21st century’s first
decade was the hottest on
record, with temperatures
rising at an unprecedented
pace and weather extremes
claiming 370,000 lives, the
United Nations says.

In a new report on the
period from 2001-2010, the
World Meteorological
Organisation said land and
sea temperatures averaged
14.4°C.

This compares
with the long-term average of
14°C, as measured from weather
records dating back to 1880.

When measured globally,
every year of the decade
was among the ten warmest
years on record, the

Close Up:
Freezing out the bigger picture:
Arctic blasts tied to climate change

UN chief ‘alarmed’ at
Arctic glacier melt

UN Secretary General Ban Ki-moon said
the loss of the Larsen B glacier in Antarctica
was a wake-up call.

A lot of people are asking
these days: ‘Is this the
world is really warming?
Or is it just a freak
weather experience?’

Meanwhile, Ban
said he had asked
diplomats in Copenhagen
in December

archipelago, located 1,200 kilometres (745
miles) from the North Pole.

“Unless we take urgent action to stem this

Storm Brings Winds: 70, Dikes Fail;
Death, Delay
And Darkness
Motorists in Trees

UN Secretary General Ban Ki-moon
photographs in front of a collapsed
ac mike at the
atmospheric measurement station
in Ny-Alesund, a climate
change research station on the
Norwegian
Island of Svalbard.

Ban is on a two-day trip to the Arctic
Circle to see first-hand the
effects of climate change ahead of
key international climate talks in Copenhagen,

UN chief 'alarmed' at
Arctic glacier melt

UN Secretary General Ban Ki-moon said
the loss of the Larsen B glacier in Antarctica
was a wake-up call.

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miles) from the North Pole.

“Unless we take urgent action to stem this
Understanding relevant climate change science can be overwhelming.

What information is most meaningful for the resources in the Northwest?
It’s been hot, and expected to get hotter

Land & Ocean Temperature Percentiles Jan–Dec 2016
NOAA’s National Centers for Environmental Information
Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0

Much Cooler than Average
Cooler than Average
Near Average
Warmer than Average
Much Warmer than Average
Record Warmest

Hottest years in modern record
16 of the top 17 have occurred since 2000
Snowpack declining, snowmelt earlier

http://www.climatecentral.org/gallery/graphics/spring-snow-cover
Reduced snow water & streamflow

Reduced SWE from 1950-2000

(Mote 2003 GRL)

<50% runoff by 2040s

USGCRP 2014

What do these changes mean for our managed lands and resources?
Warmer, drier years associated with
below-average salmon survival
below-average forest growth
above-average forest fire risk

(Mote et al. 2003 CC)
Ecological impacts of climate change can be subtle...

...altered species phenology
What is “phenology”?

Phonology

Phrenology
Why do we care about phenology?

Phenology is:

- Fundamental to species biology & ecology
- Interaction of genetic & environmental control
- Evolutionarily adapted to local-regional conditions
Why do we care about phenology?

The capacity of species to adapt to climate change depends on:

• Their phenology
• How flexible their phenology is
• Interactions with other species’ phenology
Why do we care about phenology?
Not all species are responding to climate change the same!

Fig. 2. Changes in timing of spring events in days/decade$^{-1}$ for individual species grouped by taxonomy or functional type for the combined dataset. Each bar represents a separate, independent species. Negative values indicate advancement (earlier phenology through time) while positive values indicate delay (later phenology through time).

Parmesan 2007
So what does changing phenology mean for the NW?

Disrupted ecosystems, resources, and land use
Forest Health - Pests

- Earlier emergence
- Longer breeding seasons
- More susceptible hosts
- Range expansion

Life Cycle of Mountain Pine Beetle, *Dendroctonus ponderosae*

Beetles migrate to nearby healthy trees to begin cycle again.
Beetles mate and burrow through bark of the tree, depositing eggs in brood chambers in the tissues.
Adults and larvae create horizontal chambers, and introduce wood into the tree's soft tissues. This slowly kills the tree over the course of a year.

Spruce beetle: 
Mountain pine beetle: 
Pinyon pine beetle:

(Raffa et al. 2008. *Bioscience*)
**Forest Health - Fire**

- Earlier snowmelt → Longer growing seasons → Increased Fuel
- Bigger fires
- More frequent fires
- Longer fire seasons

(Altschuler & Swetnam 2000)

(Westerling 2016)
Fisheries
Changing Salmon migrations
• Extremely variable across populations
  • Local to Global conditions
• Genetic phenological diversity increases resiliency!

Kovach et al. 2015. Global Change Biology

Earlier

Later
From 1970 to 2006, as open temperatures were rising, catch composition in the subtropic and temperate areas slowly changed to include more warm-water species and fewer cool-water species.

Cheung et al. 2013.
Plant invasions and encroachment

- Western juniper expansion
- Whitebark pine loss
- Exotic species invasion
Wildlife populations

- Migratory birds out of sync with habitat
- Wildlife diseases expanding
- Predator-prey/herbivore dynamics disrupted
- Pollination disrupted

**BEES HAVING TO COOL HIVES**

RESTRICTS THEM FROM POLLINATING CROPS.

SYDNEY MORNING HERALD JUNE 23, 2015
Recreational use

- Hunting & Fishing
- Bird & wildlife watching
- Wildflower viewing
- Photography & Observation

$41 billion/yr trips and equipment
$14.9 billion/yr – local economy - food, lodging, transport
666,000 jobs created from birdwatching expenditures
$325 billion/yr – hunting, fishing, wildlife watching

$h!t to Remember so far

- Phenology is species’ “1st response” to climate change
  - Temperature
  - Snowpack & Snowmelt
- Species responses are extremely variable
  - Species & populations
  - Biogeography
  - Local conditions
Understanding phenology requires monitoring & research

CNW / Citizen Wildlife Monitoring Project
But developing new protocols can be expensive & time consuming

“Off-the-shelf” programs available

- Cut costs & Save time
- Easy for volunteers
- Integration with other users

Programs vary in:

- Geographic & ecological scope
- Complexity
- Tools & Resources
- Popularity

Citizen Wildlife Monitoring Project
How do you choose?

- Single or multi-species
- Information needed
- Money & Time
- Personnel
• >1,200 species
• >11,000 active observers
• >10,000 active sites
• ~12 million status records

Includes:
• Vetted monitoring protocols
• Web-based data portals
• Data entry & download interface
• Data visualization tools
• Data products
• Decisions support tools
• Training resources
• Educational materials
• Newsletters
What can you do with the USA-NPN and \( N/V \)?

- Map phenology
- E.g. Aspen greenup
What can you do with the USA-NPN and N\textsuperscript{N}? 

- Interacting species activity curves \textbf{-> detect phenological mismatch!}
What can you do with the USA-NPN and NPN?

Data products

Spring Leaf Index Anomaly, November 28, 2017

www.usanpn.org

Based on NOAA NCEP RTMA and NDFD Products, Provisional Data
What will my synthesis provide?

- Summary of relevant literature
- Guide to available monitoring programs
- Summary of USA-NPN database for NW
Northwest Climate Science Center
Fellowship Program

Meade Krosby, Amy Snover, Ronda Strauch
Climate Impacts Group, University of Washington
Northwest Climate Science Center
Goals

1. Support research aligned with the NW CSC science agenda
2. Build capacity for actionable science among early career scientists
2018 Fellows

8 graduate students (MS/PhD)
5 consortium universities

Partners from state, federal, and tribal governments
NW Climate Science Center Fellows

Lillian McGill

Project: Estimating climate risks to river flows using water isotopes

Partners:

Northwest Fisheries Science Center
NW Climate Science Center Fellows

Benjamin Dittbrenner

Project: Targeting beaver reintroductions to address climate impacts

Partners:
Tyler Tran

**Project:** Understanding how eelgrass can reduce ocean acidification impacts

**Partners:**
Kyra Freeman

Project: Modeling climate impacts on hydrology and stream temperatures

Partners:
NW Climate Science Center Fellows

Travis King

**Project:** Modeling climate impacts on the range and status of Canada lynx

**Partners:**

- Washington Department of Fish and Wildlife
- WWU
- UW
- WSU
- USGS
- UM
- BSU
Kimberly Cook

**Project:** Understanding climate impacts on the declining Cascades frog

**Partners:**

- Forest Service
- PNW
Hamid Dashti

**Project:** Modeling sagebrush steppe response to future climate change

**Partners:**

USGS
Drew Lyons

**Project:** Understanding climate impacts on conifer seedling survival

**Partners:**
Building capacity for actionable science

Skills building
- Theory and practice of linking science to action
- Science communication
- Social science and collaborative research methods
- Best practices for Tribal engagement

Cohort building
- Regular video conference calls

Northwest Climate Conference
- Support for fellows to attend; opportunities for interaction
Questions?

mkrosby@uw.edu
Modeling watershed-scale hydrologic benefits of beaver impoundments

Benjamin Dittbrenner

University of Washington
School of Environmental & Forest Sciences
NW CSC Research Fellow
Inter-annual changes to hydrology
Skykomish River near Gold Bar

- 2.0 to 8.5°F warming
- ↓ ~34% summer precipitation
- ↑ 14% annual average precipitation
  (dramatic winter increase)
North American Beaver
(*Castor canadensis*)

- Historic population: 50-100 million
- Current: 6–12 million
Beavers: Ecosystem Engineers

Drive Ecosystem Processes

- Physical
- Hydrology
- Habitat
- Resilience

Michael Pollock
Sky Beaver Project

Research Objectives

1. Characterize population levels in Snohomish
2. Relocate ‘nuisance’ beavers to vacant habitat
3. Better understand the benefits beavers provide
Obj. 1: Develop habitat model for the Snohomish watershed

**Beaver Intrinsic Potential Habitat (BIP) Model**

<table>
<thead>
<tr>
<th>Observed Conditions</th>
<th>% of Suitable habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable, Occupied</td>
<td>27%</td>
</tr>
<tr>
<td>Suitable, Unoccupied</td>
<td>73%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**BIP Model Scores**
- 3 High BIP
- 2 Moderate BIP
- 1 Low BIP
- 0 No BIP
Obj. 3: Quantify beaver benefits
Beaver Pond & Stream Temps
Overarching Question:
Can the combined hydrologic benefits of beaver complexes mitigate some impacts of climate change?
Obj. 1:
Construct a watershed model using Sky Beaver Project data to identify the cumulative effect on hydrology
Obj. 2:
Compare the modeled hydrologic benefits of beavers to anticipated impacts of climate change on local hydrology
Obj. 3.

Determine the minimum level of site occupancy required to mitigate climate impacts.
Conclusions

• Site level benefits promising

• Findings can be used to:
  – Identify effectiveness of relocation as climate adaptation tool
    – Prioritize relocation for greatest benefit
    – Make policy & management recommendations

• Schedule: Winter & Spring 2018
Thank You - Questions

Project Team & Collaborators

University of Washington
Benjamin Dittbrenner
Christian Torgersen
Josh Lawler
Susan Bolton
Aaron Wirsing
Julian Olden

King County
Josh Latterell
Laura Hartema
Jen Vanderhoof

Tulalip Tribes
Jason Schilling
Mike Sevigny
Molly Alves
David Bailey
Terry Williams
Josh Kubo

Beavers Northwest
Abby Hook
Jake Jacobson
Elyssa Kerr
Shawn Behling

CREOi
Michelle Wainstein

NOAA NWFSC
Michael Pollock
Jason Hall

US Forest Service
Kent Woodruff
Joe Neal
Andy Bryden
Sonny Paz

King County

WDFW
Bob Everitt
Jamie Bails

NW Climate Science Center
Amy Snover
Meade Crosby

 Snohomish County
Mike Rustay

USGS

Research Crew (AKA Beaver Believers): Chris Tran, Susan Priest, Zoe Hayes, Desirae Belcher, David Hagopian, Olivia McGrath
Extras:
Do Frogs Have a Future? 
Climate change, amphibians, and disease 
Kimberly Cook 
Washington State University
1. How does climate change impact montane amphibians?

2. How can we translate research into conservation strategies?
Climate threats to montane amphibians

• Short hydroperiod

Lee et al. 2015. PLoS One
McMenamin et al. 2008. PNAS
Climate threats to montane amphibians

- Short hydroperiod
- Low tadpole survival
Disease threats to montane amphibians

- Chytrid fungal pathogen (Bd)
Interactions between disease and climate

• High temperatures reduce Bd infection
Interactions between disease and climate

- High temperatures reduce Bd infection
- Thermal stress affects host immune development
1. How does climate change impact montane amphibians?

2. How can we translate research into conservation strategies?
Cascades frog

• Declines at southern end of range
  o First noticed in the 1980s

• WA populations persisting with disease
  o Latitudinal comparison
Conservation strategies

- Lengthen effective hydroperiod
Conservation strategies

• Develop effective treatments for Bd
  o Fungicide

Hardy et al. 2015 *Diseases of Aquatic Organisms*
Conclusions

1. Multiple interactive threats to montane amphibians
   • Climate and disease

2. Conserving Cascades frogs requires an understanding of these interactions
   • Cascades frogs as a case study
Acknowledgements

- Many field and lab technicians
- Karen Pope
- Jonah Piovia-Scott
- Dede Olson
Tribal Engagement at Three Scales

Chas Jones, Ph.D.
Tribal Liaison
cejones@usgs.gov
(541) 750-1023
Chas Jones
Tribal Liaison with the NW Climate Science Center

- Hired by ATNI via BIA grant
- Past research
  - Tribal lands: How does predicted hydrologic behavior (in the next century) fall outside of historic observations since 1900s? (i.e. precipitation, surface water, groundwater, streamflow)
  - How are rural and native Alaskans impacted by changes in driftwood availability associated with flooding?
  - How has travel on rivers in winter become more dangerous due to groundwater flow into rivers resulting from permafrost degradation?
  - Dam removals and habitat restoration
Chas Jones
Tribal Liaison with the NW Climate Science Center

Learn from NW tribes

• What resources are important?
• How are resources at risk?
• What projects would improve tribal resilience?
• How can NW CSC help tribal resilience projects succeed?
Tribal Engagement at Three Scales

- NW CSC Tribal Projects
- Regional efforts
- National efforts
NW CSC Tribal Projects

• Since 2011, funded 13 tribal research projects (~$700k) [NPLCC, NCCWSC, AK CSC]

• Assessing the capacity of Columbia River Basin tribes to address CC (Sampson 2015)

• Building tribal capacity to assess vulnerability to CC (Krosby 2016)[GBLCC]

• Tribal Climate Camp (2016 & 2017)[BIA, ATNI]

• Will climate affect availability of food sources from native shrubs? (Harrington 2017)
Engaging Tribes Regionally

• Funding
  – NW Climate Conference
  – ATNI Tribal Leaders Summit on CC

• Liaison
  – BIA: Rights Protection Initiative proposal review
  – Federal Caucus of Tribal Liaisons in CRB
  – NPLCC Tribal Climate Summit
  – ATNI Fall Annual Convention
  – PNW Tribal CC Network (K. Lynn)
Engaging Tribes Nationally

BIA / CSC National Tribal Liaison network
- Contribute to national tribal CC adaptation
- Developing webinar series
  - Introduction to Tribal Liaisons
  - VA’s & Adaptation plan training
  - Writing competitive proposals
- Collaborative opportunities across CSCs
Tribal Engagement at Three Scales

Chas Jones, Ph.D.
Tribal Liaison
cejones@usgs.gov
(541) 750-1023
Science Agenda for 2018-2023

Gustavo Bisbal, Director

SAC F2F meeting – Seattle, WA – November 29, 2017
## Comparing the old & new Science Agendas

<table>
<thead>
<tr>
<th>2012-2017</th>
<th>2018-2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Created by ESAC</td>
<td>Co-produced by SAC &amp; SAP</td>
</tr>
<tr>
<td>Based on “science needs”</td>
<td>Based on management priorities</td>
</tr>
<tr>
<td>Focus on research products</td>
<td>Focus on actionable science</td>
</tr>
<tr>
<td>Random, diffuse, open-ended</td>
<td>Focused, deliberate, goal-oriented</td>
</tr>
<tr>
<td>No social science</td>
<td>Social science recognized</td>
</tr>
<tr>
<td>No evaluation module</td>
<td>Evaluation module included</td>
</tr>
<tr>
<td>No assessment of current state of knowledge</td>
<td>Assessment of current state of knowledge</td>
</tr>
</tbody>
</table>
The 2018-2023 Science Agenda at a glance

- Introduction
- Acknowledgements
- Guiding Principles
1. Let resource management priorities drive science opportunities
2. Focus on climate adaptation science
3. Support co-produced actionable science
4. Emphasize synthesis and interpretation
5. Capitalize on partnerships and leveraging
6. Encourage innovation
7. Maintain flexibility
The 2018-2023 Science Agenda at a glance

- Introduction
- Acknowledgements
- Guiding Principles
- Climate Change in the NW
- Key Science Opportunities based on Management Priorities
1. Aquatic resources
2. At-risk species and habitats
3. Invasive species and diseases
4. Forest ecosystems
5. Shrubland ecosystems
6. Working lands and waters
7. Human dimensions of climate adaptation
A Regional Experiment...

SAC MANAGEMENT PRIORITIES

SAP SCIENCE OPPORTUNITIES
**Example:**
Management Priority (aquatic resources)

*Management Goal 1.2:* Protect and enhance habitat for native salmon and trout, with particular focus on maintaining suitable stream temperatures

<table>
<thead>
<tr>
<th>Key Science Opportunities</th>
<th>Knowledge Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2.1. Identify current and future freshwater refugia to protect migrating and resident native fish populations from high temperatures and exceptionally high or low streamflows</td>
<td>3</td>
</tr>
<tr>
<td>1.2.2. Project future stream temperatures for major Northwest rivers, including estuaries</td>
<td>3</td>
</tr>
<tr>
<td>1.2.3. Describe how aquatic plant and animal communities may change if environmental tolerances for water temperature, water chemistry, and streamflow are exceeded</td>
<td>4</td>
</tr>
<tr>
<td>1.2.4. Evaluate methods of controlling stream temperature and other water quality measures (e.g., How long does it take to realize the benefits of enhanced riparian habitat? How much can stream temperatures be influenced by riparian shade?)</td>
<td>2</td>
</tr>
</tbody>
</table>
Knowledge categories

1. Knowledge/tools already exist, need to be publicized

2. Relevant knowledge already exists, but requires synthesis, assessment, interpretation, translation and/or tool development

3. Relevant knowledge could be developed in context of a 5yr science agenda

4. Relevant knowledge could be developed in 2022-2027 if the stage is set

5. Developing relevant knowledge not feasible within scope of CSC
The 2018-2023 Science Agenda at a glance

- Introduction
- Acknowledgements
- Guiding Principles
- Climate Change in the NW
- Key Science Opportunities based on Management Priorities
- Data Management and Information Sharing
- Measuring Achievement
Measuring Achievement

Impact evaluation
Are NW CSC-sponsored products informing management decisions?

Process evaluation
Have we successfully implemented the Science Agenda?

Project evaluation
Are NW CSC projects administratively compliant?
The 2018-2023 Science Agenda at a glance

- Introduction
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- Key Science Opportunities based on Management Priorities
- Data Management and Information Sharing
- Measuring Achievement
- Implementation
Implementation
The 2018-2023 Science Agenda at a glance

- Introduction
- Acknowledgements
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- Climate Change in the NW
- Key Science Opportunities based on Management Priorities
- Data Management and Information Sharing
- Measuring Achievement
- Implementation
- Partners and Stakeholders
- References
- 3 Appendices
“It always seems impossible until it is done.”

– Nelson Mandela

WOOOHOOO WE DID IT
THANK YOU
EVERYONE!
Evaluation of the NW CSC Science Agenda: Accountability, Learning, and Impact

Alison M. Meadow

University of Arizona – Institute of the Environment
Why Evaluate the Science Agenda?

- The Agenda expresses and sets the goals and expectations for how the NW CSC will meet the science information needs of resource managers and stakeholders in the Northwest region.
- A strategic evaluation of activities outlined in the Agenda will help the NW CSC leadership identify successes, learn from challenges, and demonstrate impact.
Goals of the 2017 – 2022 Science Agenda

- The Agenda will be produced in collaboration with the SAC
- Scientists and Managers will work together throughout projects
- Science will be directly related to stakeholder priorities
- Projects will be policy and practice relevant, not prescriptive
- Products and tools will be accessible to stakeholders
Mapping Goal and Activities
To what extent was the Agenda developed collaboratively with the SAC?

- **Activity:** Survey SAC members to gather their perspectives on the process of developing the Agenda

- **Logistics:**
  - Will be administered electronically just after this meeting
  - Responses will be anonymous
  - Responses will go to NW CSC leadership
  - Frequency – one survey
Have resource managers been active participants in NW CSC-funded research projects; how has their participation influenced outcomes and impacts?

- Activity: Survey of all resource managers who were identified as participants (or potential participants) in NW CSC-funded projects

- Logistics:
  - Online survey or email
  - Responses can be anonymous
  - Responses go to NW CSC leadership
  - Frequency: surveys administered immediately post-project and yearly thereafter (up to a total of 3 times) to trace uses and impacts
Are projects designed to include stakeholders throughout and to focus on stakeholders’ science needs?

- **Activity:** Proposal review guidance for external proposal reviewers
- **Logistics:**
  - NW CSC leadership will supply all external proposal reviewers with a set of guidelines to consider how well a proposal has planned for the inclusion and collaboration of resource managers.
  - The guidelines are not prescriptive; they ask reviewers to consider an additional set of questions relating to the practices associated with collaborative research and development of actionable science.
Are products and tools accessible to (and used by) resource managers?

- **Activity:** Use (citation) of outputs from the projects can be traced through online search engines to see where they are used beyond the immediate project participants

- **Logistics**
  - Enter each project publication into Google Scholar and Altmetric search tools
  - Sort citations of each publication into: academic, agency documents, grey literature, and other categories
  - Altmetric tracks mentions of specific researchers or projects in traditional and social media
  - NW CSC staff regularly (yearly) search publications and update database
Is the research being funded by the NW CSC having an impact on resource management decisions in the region?

- Resource management participant survey
- Citation tracking
- Project annual and final reports
Next Steps

- Finalize the evaluation plan (SAC, NW CSC Leadership, Meadow)
- Finalize implementation plan (NW CSC Leadership)
- Determine information use strategy (SAC, Leadership)
- Collect the data (Leadership, Staff)
- Use data to inform program decisions; re-assess as needed (SAC, Leadership)
Alison M. Meadow
Institute of the Environment
University of Arizona
meadow@email.arizona.edu
520-626-0652
Goals of the CSC Network

- Respond to high priority natural and cultural resource management challenges and foster substantive, sustained engagement between scientists and managers
- Advance the understanding of the impacts of climate change and variability on fish, wildlife, land, and people to support sound resource management and adaptation
- Build a community of researchers and managers and foster their leadership in science-based resource management
- Understand and respond to information needs and support the integration of climate adaptation in resource management through usable, useful products and tools
Strategic Plan 2018-2023:
Our next endeavor

Gustavo Bisbal, Director

SAC F2F meeting – Seattle, WA – November 29, 2017
## The plan for the plan

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>Written plan (15-20 pages) with a 5 year horizon</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORE TEAM</td>
<td>Gus Bisbal, Amy Snover, Meade Krosby, Part-time detailee</td>
</tr>
<tr>
<td>STEERING TEAM</td>
<td>NW CSC Staff and host consortium</td>
</tr>
<tr>
<td>CONSULTATION/ADVICE</td>
<td>Stakeholder Advisory Committee</td>
</tr>
<tr>
<td>INPUT MODE</td>
<td>Calls, emails, webinars, F2F meetings</td>
</tr>
<tr>
<td>TIMELINE</td>
<td>January 2018 – June 2018</td>
</tr>
</tbody>
</table>
1. Strategic Elements
   Mission
   Vision
   Planning Process

2. Background
   a. History
   b. Structure
   c. Partners & Stakeholders
   d. Core Strengths
   e. Accomplishments

3. Pillars/Themes
   a. Science
   b. Capacity Building
   c. Partnerships
   d. Communications

4. Core Services and Products
   a. Research
   b. Synthesis/Assessment
   c. Technical Assistance

5. Evaluation

6. Appendices
   a. Network History
   b. CSC Timeline
   c. Strategic Plan Process
   d. Governance
Our Mission

Our mission is to deliver science to help fish, wildlife, water, land, and people adapt to a changing climate.
### Definitions: Goals, Objectives, Strategies

<table>
<thead>
<tr>
<th><strong>GOAL</strong></th>
<th>A statement of aim or purpose articulating what we need to achieve to advance our mission.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OBJECTIVES</strong></td>
<td>More detailed statements of the outcomes or management impact we are trying to achieve with each goal.</td>
</tr>
<tr>
<td><strong>STRATEGIES</strong></td>
<td>Approaches we will take to accomplish the objectives.</td>
</tr>
</tbody>
</table>
An Imaginary Example: Goal & Objectives

GOAL  Achieve the highest standards of integrity, transparency, and service in all regional operations.

OBJECTIVES

1. Communications/Customer Service: Be pro-active in our communications and provide responsive and efficient service to internal and external parties.

2. Fiscal Integrity: Implement processes and tools for accountability and the responsible management of public funds.

3. Internal Alignment: Create an integrated, organized, and coordinated regional office to support staff, maximize resources, and improve Center outcomes.

4. Staff: Invest in staff growth and development to create a resilient organization.
OBJECTIVE (1 of 4)  
**Communications/Customer Service:** Be pro-active in our communications and provide responsive and efficient service to internal and external parties.

**STRATEGIES**

1. Provide timely and thorough responses to information requests.
2. Maintain and improve online tools to meet customer needs.
3. Provide documented data sets, including geospatial data, for internal and external customers.
4. Maintain a user-friendly website with useful and accessible information to support stakeholder understanding and engagement.
5. Develop web stories, fact sheets, and other materials, use social media, and participate in outreach events to inform stakeholders about, accomplishments, and stewardship opportunities.