

DRAFT FOR DISCUSSION PURPOSES

~~Alternative Proposal for Consideration of the members of the Skagit County
Climate Impacts Advisory Committee~~Draft CIAC 2026 Work Plan

Prepared by Jenna Friebe, Drainage and Irrigation District Consortium

April 2, 2026

Revised for ~~XXXX~~May 6, 2026 CIAC Meeting

NOTES

~~This proposal builds on the work Betty presented to the CIAC during the last meeting. This revised draft proposal is presented for the purpose of discussion at our upcoming meeting. This proposal addresses Meetings & Study Sessions and Ad Hoc Committees, as discussed below. This document has been re-named the DRAFT CIAC 2026 Work Plan. I have made redlines based on the notes I took during the April 9, 2026 meeting, for additional review, discussion, and revision at our upcoming May 6, 2026 meeting.~~

I think it will be extremely important to create a final draft of this document to ensure we are all clear about tasks and expectations. I recommend that we finalize and adopt this work plan as our first deliverable to the BoCC.

Meetings & Study Sessions

To facilitate the questions posed by the Skagit County Commissioners' March 10, 2026 letter, the CIAC should schedule one full-committee meeting per month. A second monthly *study session* could be scheduled as needed to bring in experts and presenters on specific relevant topics. Study session attendance would be encouraged but optional. These sessions would be recorded and archived so that CIAC members or the public could view them at another time. Both regular CIAC meetings and study sessions would be public meetings as they would be expected to have a quorum of representatives of the CIAC and thus open to the public and recorded.

Ad Hoc Committees

The ordinance that created the CIAC envisions the creation of ad hoc committees to investigate specific topics on climate change impacts in Skagit County. Per the ordinance, ad hoc committees would require participation of at least two CIAC members, and would meet outside of the scheduled monthly full-committee meetings.

Ad hoc committees would focus on more detailed technical topics necessary to address the broader issues identified by the Commissioners. As needed, outside experts or consultants may be called on to provide services such as presentations, analyses, technical data, reports, reviews, and professional opinions. Ad hoc committee meetings will not include a quorum of

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the CIAC members and will not be public meetings. Proceedings will be documented with agenda, meeting minutes and other documents that will be posted in the CIAC's document center.

Background Understanding

~~As we CIAC members are committed to get going on this work, it is imperative that we develop~~ developing a shared understanding of ~~several key topics related to~~ coastal and river flooding hazards and risks in Skagit County. These are the ~~the~~ two primary topics identified presented by the Board of Commissioners (BoCC) with the request to focus on the areas below Sedro Woolley as the initial priority.

First, ~~the group CIAC members will become~~ needs to get familiar with the Skagit County Hazard Mitigation Plan (HMP). This plan uses FEMA methods to assess a variety of hazards including natural hazards, risks, and vulnerabilities and is regularly reviewed and updated.

FEMA defines natural hazards as natural events that threaten lives, property, and other assets. Natural hazards in Skagit County include coastal floods, river floods, tsunamis, volcanos, wildfire, drought and earthquakes and can be characterized in terms of probability of occurrence, geographic extent, severity / magnitude. Though the lens of the HMP, climate change is not a natural hazard, rather, it may lead to increased or decreased natural hazards.

Per the County Commissioners' March 10, 2026 letter, this group has been asked to initially focus on coastal and river flood hazards. The purpose of the CIAC is to characterize how these two natural hazards may change under different climate scenarios, and characterize how these changes may result in increased risks. (Potential Speaker: Julie DeLasoda, Skagit County DEM Chief).

Second, ~~the CIAC members needs will develop to obtain~~ a baseline understanding of the floodplain, human populations and industry, and critical infrastructure (transportation and utility corridors, schools, WWTP, fire stations etc) that are at risk from coastal and river flooding. It is also important for CIAC members to possess a clear understanding as to how existing flood risk reduction infrastructure such as dikes and levees are used in Skagit County to reduce risks associated with natural hazards and how that infrastructure interacts with natural systems and natural processes. (Potential Speakers Julie DeLasoda, Skagit County DEM Chief; Jenna Friebel, Drainage Consortium; Chad Kruger, WSU Director, Center for Sustaining Agriculture & Natural Resources.)

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~~This committee tasks~~The CIAC is tasked with characterizing risks under climate change scenarios and making recommendations on strategies to improve resiliency. As CIAC moves forward, ~~members will believe it will be~~ strive important to ensure ~~solutions recommendations~~ are integrated with an understanding of the natural environment and natural processes. ~~That~~The CIAC believes this is ~~feels~~ especially relevant ~~as we start thinking about~~in light of more extreme events and long-term resilience.

~~We~~CIAC members ~~already will be knowledgeable about~~ have a pretty good understanding of how different types of flood control ~~approaches recommendations could~~ affect habitat, sediment processes, and water quality. ~~It~~CIAC members ~~recognize that there is~~ seems like there's an opportunity to carry ~~that this~~ knowledge forward and use it to shape how new or upgraded infrastructure is designed under changing climate conditions. ~~How~~CIAC will acknowledge that ~~can we use~~ climate induced changes ~~in weather patterns~~ and our adaptations ~~of protective infrastructures should~~ to benefit the closely tied needs of human communities and the natural environment.

Third, ~~the~~CIAC ~~members will be knowledgeable about~~ requires an understanding of the existing (relevant) tools and studies that can help project how climate change may change the magnitude and frequency of coastal and river flooding natural hazards in Skagit County and climate change might affect the probability that infrastructure would fail or breach. ~~This will require in-depth technical work that may be best suited for Ad-Hoc Committees as discussed in the next section.~~

Last, ~~the group~~CIAC members will develop a ~~requires a~~ basic understanding of County policies and decision-making as it pertains to natural hazards and comprehensive planning. The CIAC understands that work of the BoCC has formed this committee to better understand risks and mitigation strategies that will help inform future decisions about resiliency such as policy and investments in public funds. ~~his group will inform County policy as well as capital funding investments for pre-disaster mitigation and community resilience~~ (Potential Speaker: Will Honea, Senior Deputy Prosecuting Attorney, natural resource & tribal matters).

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~~reviews, and professional opinions. Ad hoc committee meetings will not include a quorum of the CIAC members and will not be public meetings. Proceedings will be documented with agenda, meeting minutes and other documents that will be posted in the CIAC's document center.~~

There are *many* existing studies, tools, and guidance documents related to climate change. These range from broad international studies to downscaled studies and tools specific to Skagit County. As the CIAC proceeds, it's members will ~~be important to have~~develop a shared understanding of the literature and agree will establish to protocols to guide how ~~we the~~ committee will collectively identify and utilize existing studies and tools to evaluate potential changes to coastal flood and river flood hazards and risks under a variety of climate scenarios, and identify data gaps and/or needs for additional studies.

~~At a high level, key scientific areas around which to develop a shared understanding:~~

- ~~▪ Global emissions scenarios~~
- ~~▪ Coastal flood hazards — scenarios for changes in sea level~~
- ~~▪ River flood hazards — scenarios for changes in atmospheric rivers / hydrology~~

2026 CIAC Work Plan

The CIAC will focus on the following key topics:

- Global Emissions Scenarios
- Coastal Flood Hazards
- River Flood Hazards
- Climate Resiliency Case Studies
- Outreach and Education

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Global Emission Scenarios

Background

There are many different ways to characterize climate change [add detail here]

Action Items

~~The CIAC will review the IPCC and Washington State Climate Resilient Strategy and An ad hoc committee could~~ summarize global emissions scenarios and recommendations. CIAC members will and present them to the larger CIAC for discussion and agreement on a recommendation to the BoCC regarding the global emission scenarios most appropriate for the purposes of this ~~group~~committee. The CIAC recommendation will be documented in a memo to the BoCC. If the committee identifies other sources of information about emissions scenarios or needs additional guidance, the committee will work together to identify key technical expertise. - Based on my understanding, there are two main sources of information:

Intergovernmental Panel on Climate Change

IPCC has information about global emissions scenarios [Emissions Scenarios — IPCC](#). This source will be cross-referenced to identify major shifts in climate science.

Washington State Climate Resilient Strategy

Washington has developed a [Washington State Climate Resilience Strategy](#) that includes several appendices with detailed information about climate projections by region, resilient work, plans, and strategies and links to technical resources.

Coastal Flood Hazards

Background

Coastal flood hazards are characterized through an evaluation of extreme coastal flood events (storm surge). The frequency, duration, and magnitude of these extreme coastal flood events is predicted to change under a variety of global emission scenarios.

Risks from coastal flooding are characterized as the risk to people, roads, ~~and~~utilities and habitat under different hazard scenarios. The severity of risks can be best characterized by warning time duration, and magnitude of impact to the population, land, or damaged structures. Skagit County has already experienced impacts from coastal flooding events that include temporary inundation and damage to low-lying land, roads and dikes.

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~~There~~The CIAC preliminarily has identified ~~are many~~the following sources of information pertaining to coastal flood hazards, sea level rise predictions, and potential risks:~~I have included an initial list below.~~

~~A good task for an ad hoc committee to summarize these sources of information and analysis tools, and present them to the larger CIAC for discussion, identification of data gaps, and agreement on the best tools to characterize coastal flood hazards or identify a need for additional studies.~~

National Oceanic and Atmospheric Administration

NOAA provides a tool for coastal modeling ([Coastal Flood Exposure Mapper](#)) that includes an evaluate of coastal flood risks under different climate scenarios and includes estimates of risk based on critical facilities and populations. It does not appear to account for the existence of marine dikes. This information is also linked to the Washington Coastal Hazards Resilience Network [Washington Coastal Hazards Resilience Network |](#)

United States Geologic Survey

USGS has developed an on-line tool called Hazard Exposure Reporting and Analytics, which includes a module for coastal flooding risk tool ([HERA Flood Tool](#)). This tool has been launched for Whatcom, King, and Pierce County, but not yet active for Skagit County. This model includes assumptions about SLR based on several emissions scenarios. This tool has a much better user interface than the NOAA tool and also characterizes risks for different scenarios.

Department of Ecology

Department of ecology has developed maps of inundation due to sea level rise [Coastal Atlas - Map](#). This tool does not appear to account for the existence of the marine dikes.

UW Salish Sea Modeling Center

The Salish Sea Model center has a complex hydrodynamic model of the Salish Sea, which has been downscaled and applied to site specific analysis in the lower Skagit River, Skagit Bay, Swinomish Channel and Padilla Bay [Salish Sea Modeling Center](#). This model includes recommendations about RSLR based on several emissions scenarios. This model does not have a web-based user interface and may be expensive to run. It also does not have an integrated system to evaluate risks.

UW Climate Impact Group

~~Revised DRAFT~~ CIAC ~~Proposal~~2026 Workplan May 6, 2026

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UW CIG has published predictions for RSLR for several emissions scenarios, but no associated coastal models or risk assessment tools [Interactive Sea Level Rise Data Visualizations](#)

Recent Project Specific Studies

I am aware of several project specific analyses conducted in the Skagit by a variety of entities related to coastal flooding hazards under climate scenarios. Here is a high-level summary:

Swinomish Tribal Community Flood Study, Fisher Slough Estuary Restoration Project, Fir Island Farm Estuary Restoration Project, Wiley Slough Levee Repair Projects, Headquarters Unit / Deepwater Slough Phase 2 Estuary Restoration Project, McGlenn Jetty, Skagit Hydrodynamic Model Project, Samish Isthmus Restoration Project. All of these studies have methods and recommendations about how best to characterize coastal flooding hazards under different emission scenarios at a project / local level. These reports could be reviewed and methods/recommendations could be summarized.

Action Items

Initially, the CIAC will review the background information and work together to develop a series of questions as it pertains to coastal flooding, data sources and assumptions built into existing tools, data gaps (such as subsidence), and recommendations about the best tools to characterize coastal flood hazards. Once these questions have been developed, the CIAC will invite technical experts to present to the full committee.

As an initial matter, the committee identified the following technical experts:

[Eric Grossman, Research Geologist, USGS Pacific Coastal and Marine Science Center](#)

[Tarang Khangaonkar, Director Salish Sea Modeling Center](#)

Following these presentations, CIAC will consider the value of establishing an ad hoc committee to conduct additional work as identified by the CIAC and will identified additional action items as it pertains to coastal flood hazards.

River Flood Hazards

Background

River Flood Hazards are characterized through an evaluation of extreme weather events (atmospheric rivers). River floods are evaluated using hydrologic models that predict how much runoff (volume of water) would be generated by a specific storm event, based on a variety of parameters such as duration, rainfall intensity, temperature, and snow conditions, which are

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predicted to change under a variety of global emissions scenarios. Estimates of runoff are used as input parameters for hydraulic models, which predict inundation depth, velocity, geographic extent, and duration of flooding based on information about river/floodplain bathymetry. The output from hydraulic models can be used to evaluate risks to roads, populations, ~~and~~ key public infrastructure and habitat.

Hydrology – Hazard Characterization

Gaining a better understanding as to how ~~different~~ global emissions scenarios ~~will~~ will affect the frequency, peak runoff rate, and total volume of runoff associated with atmospheric rivers is ~~probably~~ one of the most challenging tasks ~~for the CIAC~~ presented by the Board's March 10, 2026 letter.

River flood hazards are generally characterized as a peak stage; which is measured by the U.S. Geological Survey (USGS) at both the Concrete and Mount Vernon gages. Statistical analysis of these peaks is then converted into a predicted return frequency or annual probability, and then extrapolated to predict larger floods like the 100-year and 500-year events. This type of analysis does not include ~~climate change predictions~~ global emissions forecasts and relies entirely on the historic record, although it is certain that the climate has changed during this period of record.

Hydrologic models can also be used to predict flood peaks and volumes by manipulating input parameters such as precipitation intensity, duration, and geographic extent, soil and vegetation conditions, snow conditions, and temperature. Output from hydrologic modeling can be used to predict future return frequencies. These predictions are based about assumptions and is also are often presented with ranges ~~of predictions~~ to represent the error, which can be large if there is little or no field data to support model parameters ~~and~~. ~~This is compounded by the non-stationarity of the data sets due to a changing climate.~~

~~Based on my understanding,~~ There are also several potential sources of information that pertain to hydrologic modeling in the Skagit watershed. The CIAC has identified the following key studies / sources of information that I am aware of and have attached copies of the studies referenced.

USGS

Data is available for the Mount Vernon daily data dates back to 1940, and continues (15-minute interval) is available starting in 1988. The USGS has performed statistical analysis of these data and has a variety of available results. This data could be used to predict return frequency of specific flood events.

Corps GI Study, 2014 Technical Appendix

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The Corps GI study includes a frequency analysis of historic floods at the Concrete and Mount Vernon USGS gages using both hypothetical (unregulated hydrographs) and historic observations and data. It appears that this study also used regression analysis to develop recommendations.

Salathe et al 2014. Estimates of Twenty-First-Century Flood Risk in the Pacific Northwest Based on Regional Climate Model Simulations

Warner et al 2015. Changes in Winter Atmospheric Rivers along the North American West Coast in CMIP5 Climate Models

Lee et al 2016. Impacts of Climate Change on Regulated Streamflow, Hydrologic Extremes, Hydropower Production, and Sediment Discharge in the Skagit River Basin

Bandaragoda, et al 2019. Hydrology, Stream Temperature, and Sediment Impacts of Climate Change in the Sauk River Basin

2024 Anchor QEA. Review of Recent Atmospheric River Research That is Relevant to Skagit Basin Flooding

~~A good task for an ad hoc committee would be to review available research and then reach out to USGS, Northwest River Forecast Center, Washington State Climate Office, and University of Washington Climate Impact Group to better understand potential studies or evaluations of current and future hydrology. I have summarized the key studies / sources of information that I am aware of and have attached copies of the studies referenced.~~

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Hydraulic Modeling – Risk Characterization

Over the years, several entities have developed, modified and improved hydraulic models of the Skagit River and its floodplain. Table 1 summarizes the models developed for the Skagit River below Sedro-Woolley, which is the area of focus defined by the Board’s March 10, [2026](#) letter.

Table 1. Summary of Skagit River Hydraulic Models below Sedro-Woolley

Study Name	Model Source / Year	Model Type
Skagit River General Investigation	Corps, 2014	1D HEC-RAS Flod-2D
Draft Skagit Flood Insurance Study	2008	Flo-2D
Skagit River Corps Water Management System	Corps 2022	Combined 1D / 2D HEC-RAS models
Skagit River Delta Flood Drainage Project	NHC, 2023b	2D HEC-RAS
Maddox Creek / Big Ditch Alternative Analysis	NHC, 2020	2D HEC-RAS
Old Hwy. 99 Thomas Creek Bridge	NHC, 2025	2D HEC-RAS
McGlenn Island Jetty Project	Corps 2022	
Skagit Hydrodynamic Model Project	PNNL	FV-COM model

Source: personal communication with Northwest Hydraulic Consultants.

Action Items

Initially, CIAC members will review the sources of information and studies below and work together to develop a series of questions as it pertains to current and future flood hydrology in Skagit County. Once these questions have been developed, the CIAC will invite technical experts to present to the full committee.

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As an initial matter, the committee identified the following technical expert:

Guillaume Mauger, State Climatologist

Reid Wolcott and Brent Bower, NOAA/National Weather Service

TBD, US Army Corps of Engineers

Following the meeting(s) with technical expert(s), the CIAC may opt to form an ad hoc committee to review available research and then conduct additional outreach out to USGS, Northwest River Forecast Center, Washington State Climate Office, and University of Washington Climate Impact Group to better understand potential studies of evaluations of current and future hydrology.

It is expected that the 2026 NHC model, which has been at least partially validated for the 2025 flood, will be the most up-to-date and comprehensive hydraulic model available to evaluate flood risks below Sedro-Woolley.

Once there is consensus around hydrologic scenarios and once the 2026 model has been made publicly available, which is expected in late summer 2026, the CIAC will revisit this element of the work plan and identify appropriate next steps.

Climate Resiliency Case Studies

Background

Communities around the world are responding to climate change in a variety of ways to ensure long-term health and resiliency of human and natural environments.

Action Items

The CIAC will assemble a draft portfolio of case studies from other areas of the state, country and world to better understand the types of actions other communities are taking to adapt to climate change. Specifically, the CIAC will focus on award or high-profile examples of actions implemented by other communities to address coastal and river flooding in both urban and rural areas.

Once this draft portfolio has been assembled, the CIAC will work together to identify a suite of final examples that are most relevant for Skagit County.

Community Outreach, Education, Awareness

Background

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Members of the CIAC have concerns about community awareness as it pertains to climate change and specifically river and coastal flooding hazards. The CIAC believes it is important to work with key entities in the County to ensure our community is knowledgeable about current coastal and flooding risks and how these may change in the future.

Action Items

CIAC members will conduct informal surveys to better understand how our community learns about natural hazards and how our community learns about how natural hazards may change as a result of climate change.

Following completion of informal surveys, CIAC members will compile an annotated list of the existing sources of information, entities with community outreach, education, and awareness programs as it pertains to natural hazards and climate change and identify gaps / deficiencies.

Once this preliminary investigative work has been completed, the CIAC will develop final recommendations on how to improve community education and awareness to be presented to the BoCC and other key entities and organizations throughout Skagit County.

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