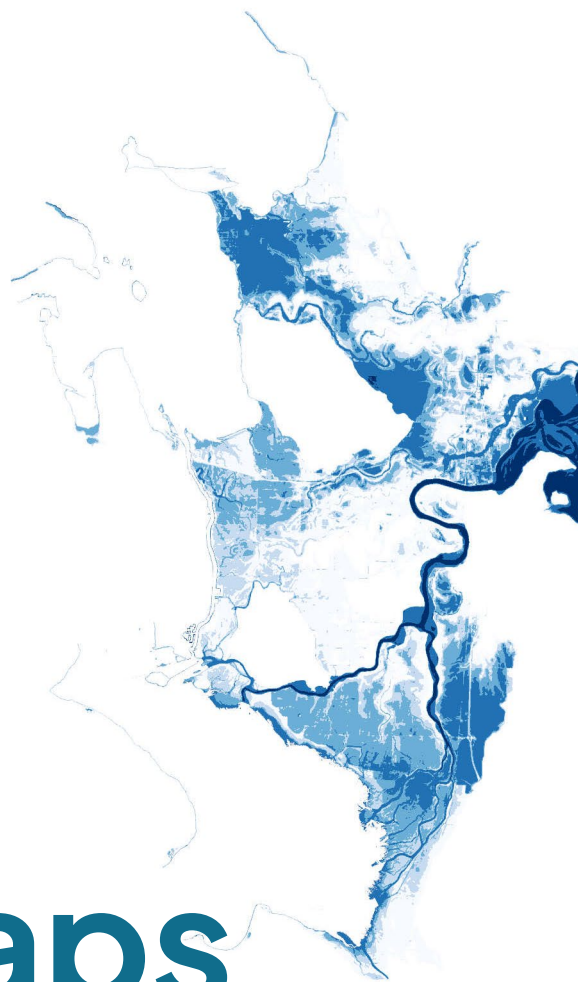




Lower River Flooding Maps

This map bundle shows Skagit River flood model results for areas downstream of Sedro-Woolley.

This set includes an overview map of the area and zoomed-in map areas for the cities of Burlington and Mount Vernon, the town of La Conner, the Swinomish Reservation and the unincorporated communities of Conway, Bow, and Edison. Full context for these maps can be found in the full *Understanding Current and Future Skagit Flood Risk Through New Modeling Capabilities* report and specific details on the hydraulic model that created these maps can be found in Appendix A. Flood animations for select locations can be found at the Skagit Climate Science Consortium website.

These maps are products of the hydraulic model detailed in Appendix A. They are provided without any warranty of performance or fitness for a particular purpose. They should not be depended upon as a sole source of information as they illustrate potential scales of flooding rather than exact locations and do not account for real-time changes like erosion, dike failures, larger than modeled events, or other factors. Maps should be used at your own risk.

What Is Included in This Appendix

This appendix contains map bundles for Upriver Flooding (Marblemount to Sedro-Woolley), Lower River Flooding (Sedro-Woolley to Skagit, Padilla and Samish bays), Coastal Flooding, and Dike Failure Scenarios.

Each of these map bundles has a map showing results for the entire map bundle area and then more zoomed in maps for key population centers. Maps include: flood depths, flood hazard (depth and velocity), and duration. For dike failure scenarios, a depth difference map is also included.

FLOOD FREQUENCIES

Floods are described in terms of “flood frequencies”; in this report we provide results for the 10-, 25-, 100- year events. As described in the report, this terminology can be confusing because it makes it sound like a flood event will only happen once in a given timeframe. In fact, the “10-year event” is a shorthand way to describe a flood event that has a 10% probability (or 1 in 10 chance) of occurring in any given year. Similarly, a 25-year event has a 4% chance of occurring in any given year, and a 100-year flood event has a 1% chance of occurring in any given year.

CLIMATE CHANGE

Climate change is projected to result in larger and more frequent floods. For example, models project that today’s 1% annual chance event will become about a 4–5% chance event by midcentury. To help the reader understand how flood risk is changing, this report uses the common terminology of 10-, 25-, and 100-year flood frequencies combined with different timeframes: historic, 2040s and 2080s.

FLOOD DEPTH MAPS

Flood depth maps show the depth and extent of flooding for specific locations and events.

DEPTH-VELOCITY HAZARD MAPS

Depth-velocity hazard maps show the danger posed by flood waters. Based on both water depth and velocity, the maps show the likely risk for children, adults, vehicles, and structures. These maps do not include secondary hazards such as erosion, avulsion, landslides or debris flows.

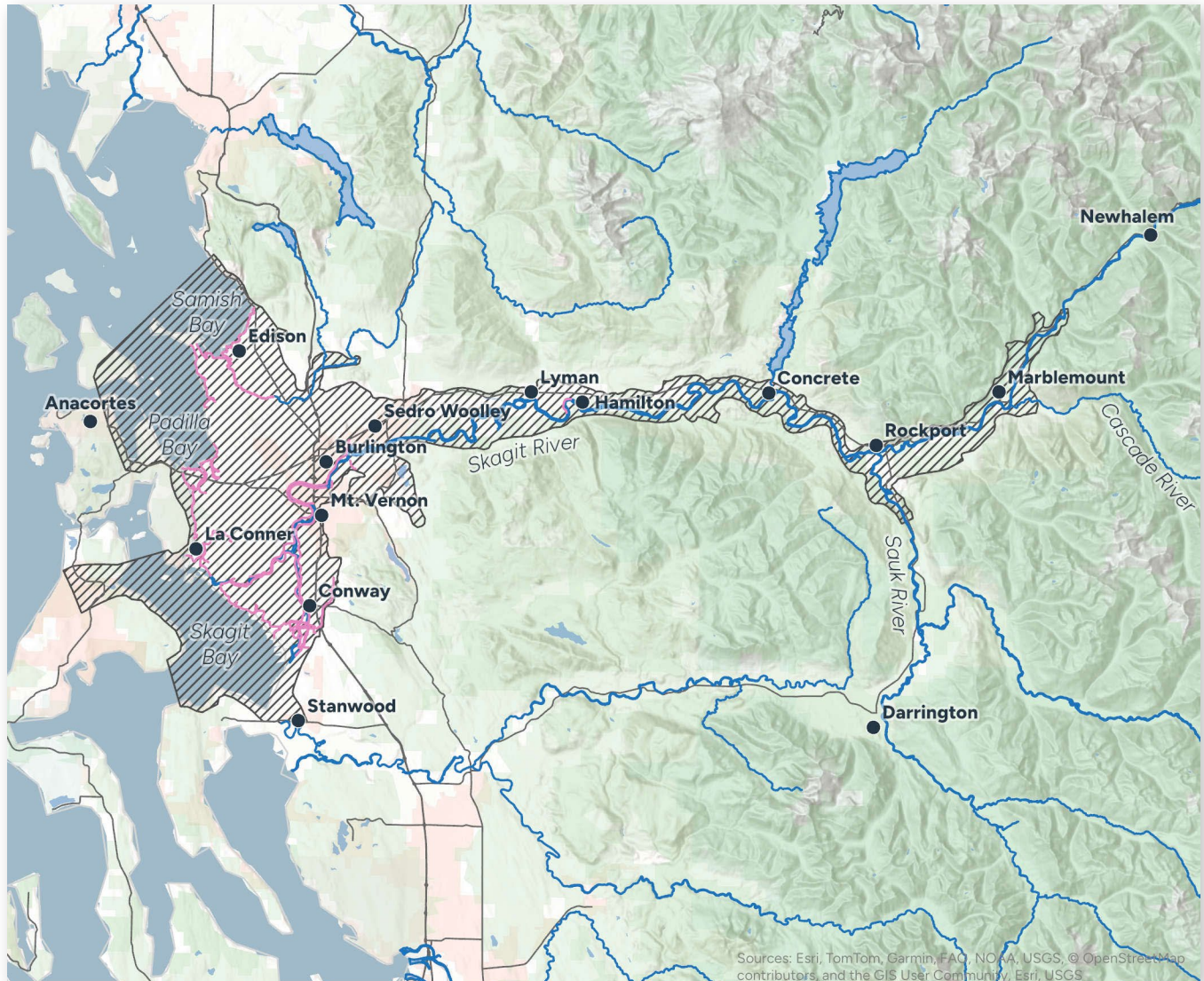
DURATION MAPS

Duration maps show the amount of time a location is flooded. This can be important for understanding the impacts on buildings, roads, dikes, emergency response, livestock, and many other important aspects of flood risk.

Disclaimer

These maps are products of the hydraulic model detailed in Appendix A. They are provided without any warranty of performance or fitness for a particular purpose. They should not be depended upon as a sole source of information as they illustrate potential scales of flooding rather than exact locations and do not account for real-time changes like erosion, dike failures, events that are larger than those modeled, or other factors. Maps should be used at your own risk. A reference section at the end contains data sources for map products.

Skagit River System Overview



Hydraulic Model Domain

Maps included in Appendix B are products of the 2-D hydraulic model described in Appendix A. This map shows the model domain. The hatching shows that the model extends into Skagit, Padilla and Samish Bays in order to simulate coastal flooding. Water flowing into the model domain during flood events – from the Baker River, Upper Skagit River, Sauk River, and many smaller tributaries – are all included, even though the hydraulic model simulations are confined to the Skagit River floodplains.

- Cities
- Major Roads
- Rivers
- Dike or Coastal Dike
- ▨ 2D Model Domain

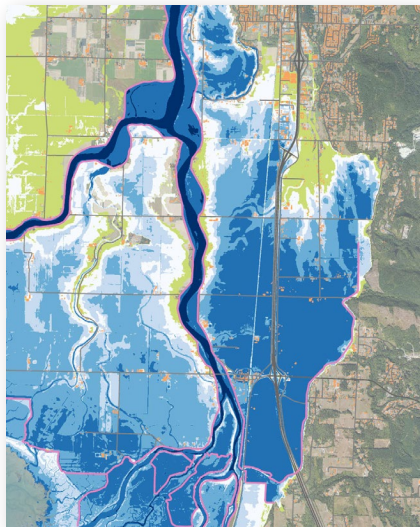
0 2.5 5 10 Miles

How to Read Lower River Flooding Maps

What These Maps Show

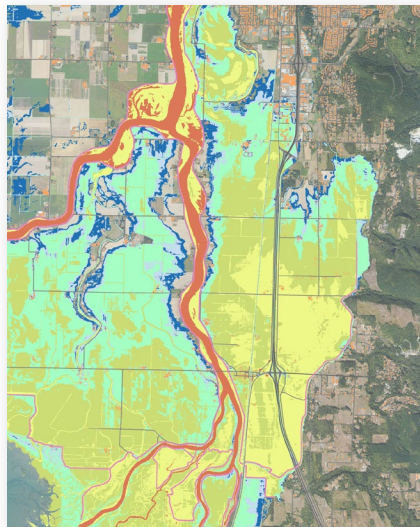
For all maps, the background is based on an aerial image (USDA 2023) and structures are shown as orange rectangles (Microsoft 2022). Pink lines, if present, show dike locations (Skagit County 2022), and dark gray lines show major transportation routes (WSDOT 2008, Skagit County 2019). The river channel itself may change colors depending on the map, but is the darkest shading in all maps.

FLOOD DEPTH MAPS



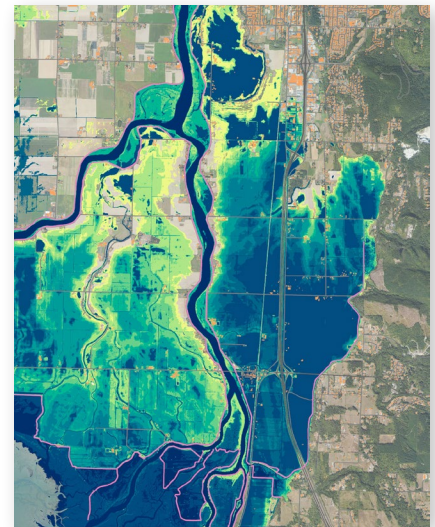
These maps are organized into sets of three, showing results for Historic (top), 2040s (middle), and 2080s (bottom) flood magnitudes. Each set of maps shows the model results for a specific flood frequency: 10-year, 25-year, and 100-year. Maps show the depth of flooding in shades of blue, where darker blue indicates deeper water and lighter blue indicates shallower water. In order to see how flooding is projected to change in the future, the Historic and 2040s maps also show the estimated extent of the 2080s flood in bright green. There is no bright green shading for the 2080s map because the map is already showing the depth and extent of the 2080s flood. All three maps are at the same scale.

DEPTH-VELOCITY HAZARD MAPS



These maps show depth-velocity hazards for a historic 100-year event. Only the historic results are shown; maps for the 2040s or 2080s are not included. The hazard classifications shown in the key were assigned based on a standard international practice (AIDR, 2017) and grouped into six hazard ratings. The hazard mapping is based on clearwater hazards and does not account for secondary hazards such as shoreline and fluvial geomorphic hazards (e.g., erosion, avulsion, debris flows, alluvial fan, etc.). Colors show when water poses a risk to children, adults, vehicles, and structures due to depth, velocity, or a combination of the two.

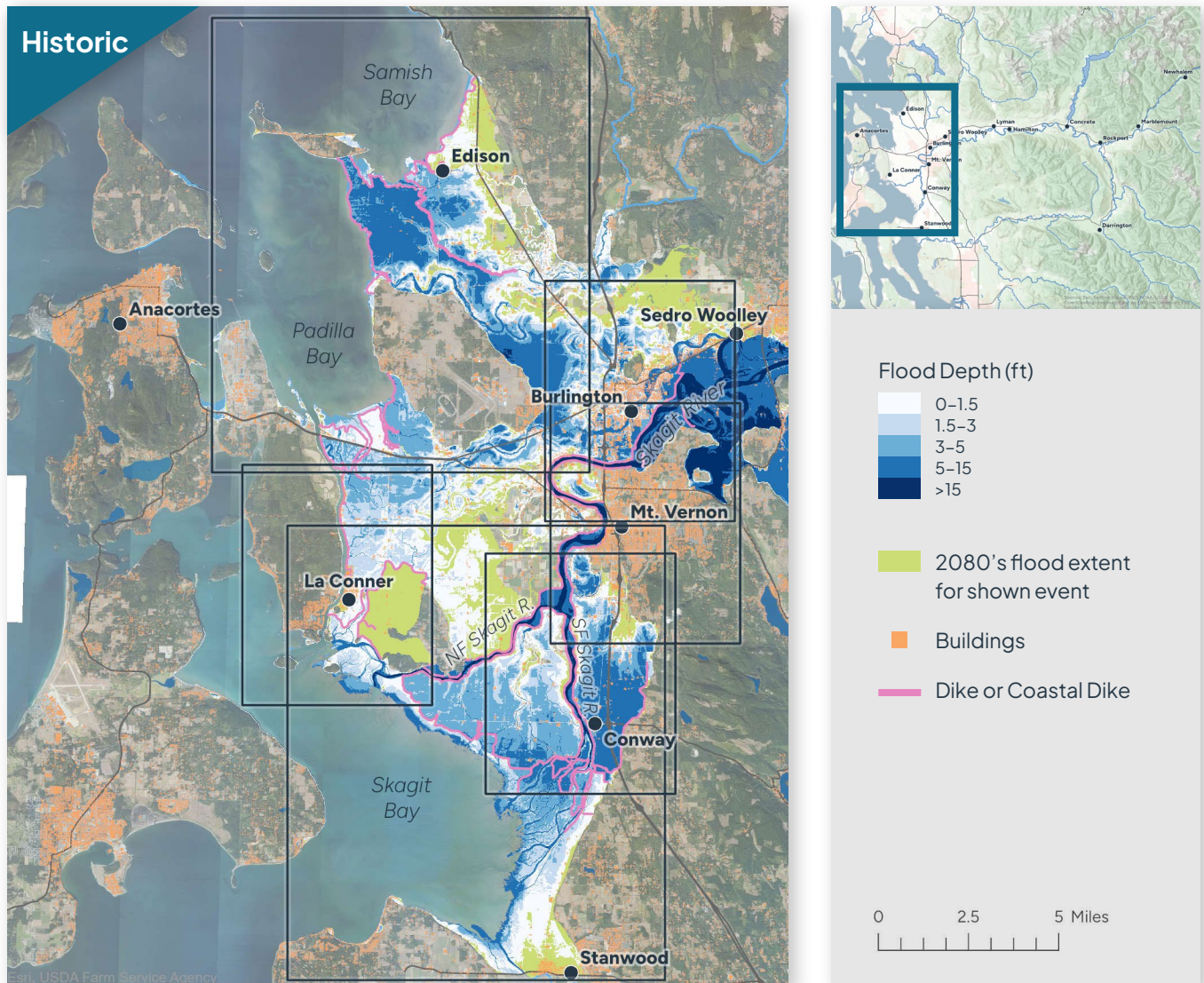
DURATION MAPS



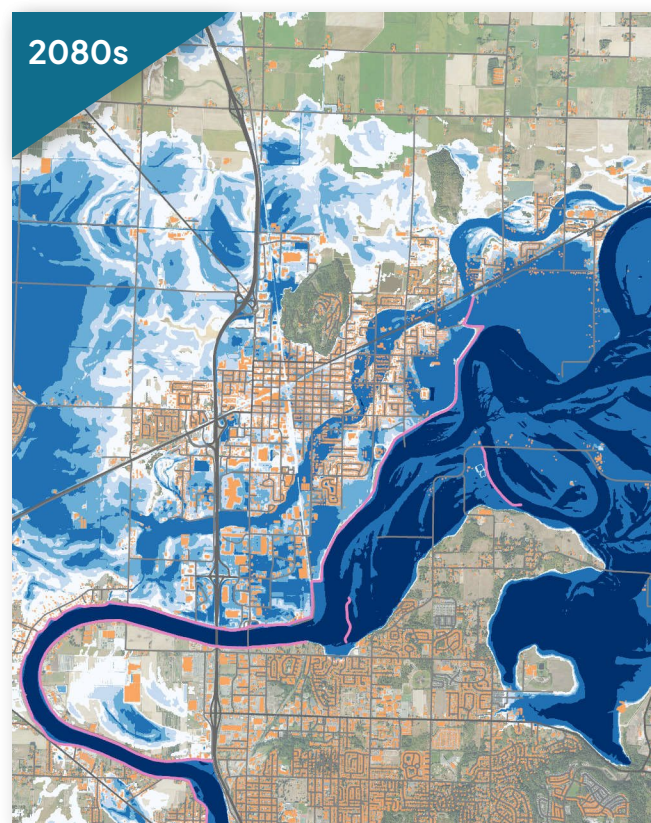
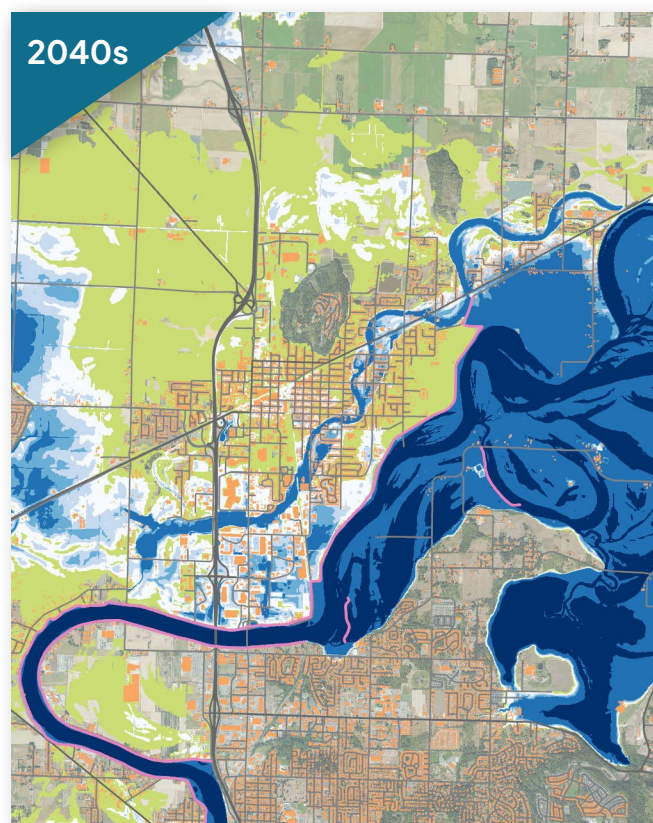
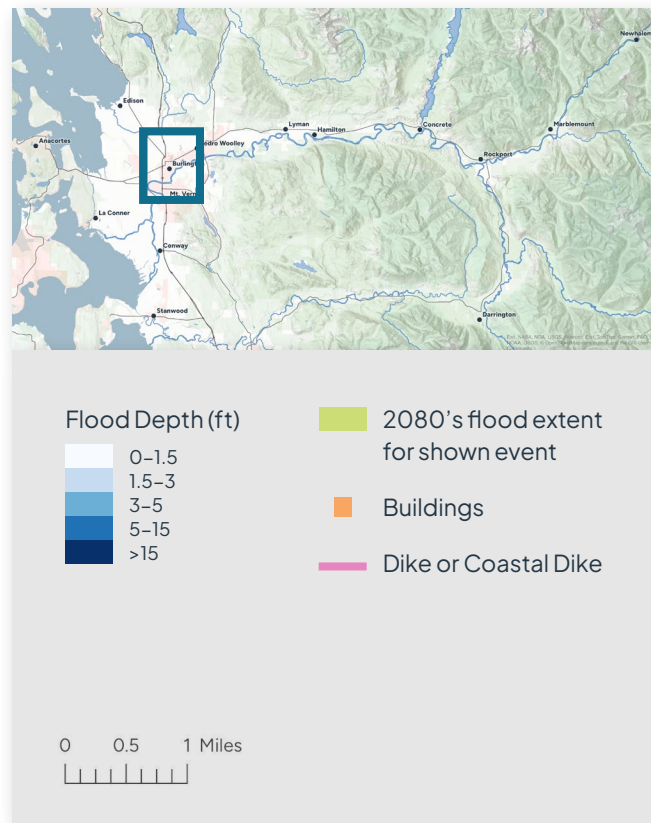
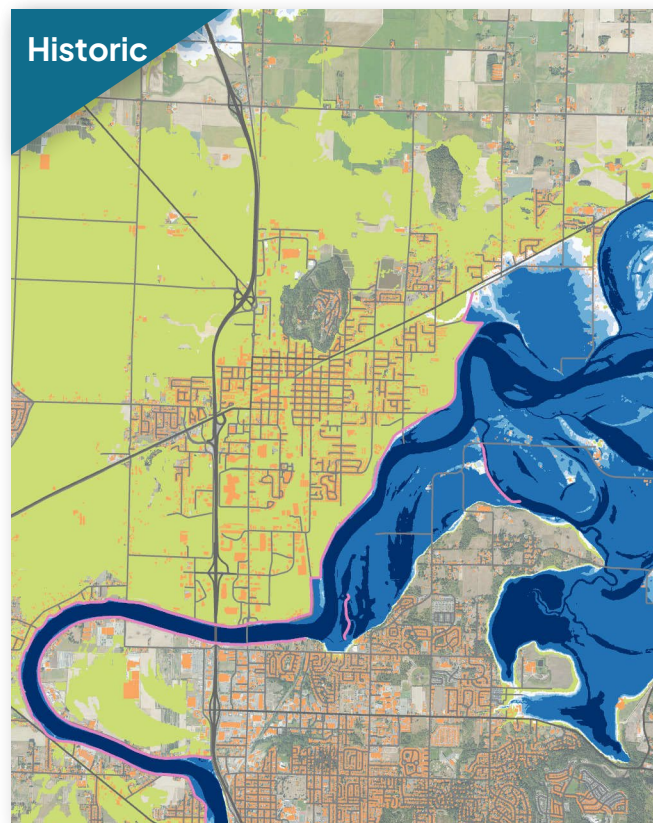
These maps show the amount of time, in days, that each location is inundated during a historic 100-year flood event and do not include flows estimated for the 2040s or 2080s. Duration is shown in shades ranging from dark blue to yellow, with darker shading indicating a longer duration, and lighter shading indicating a shorter duration of flooding.

LOWER RIVER FLOODING MAPS

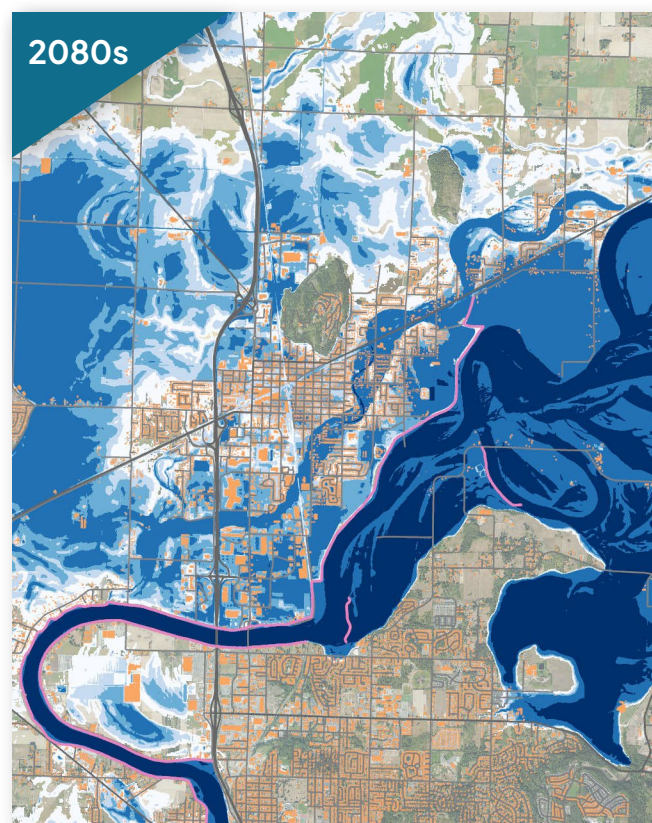
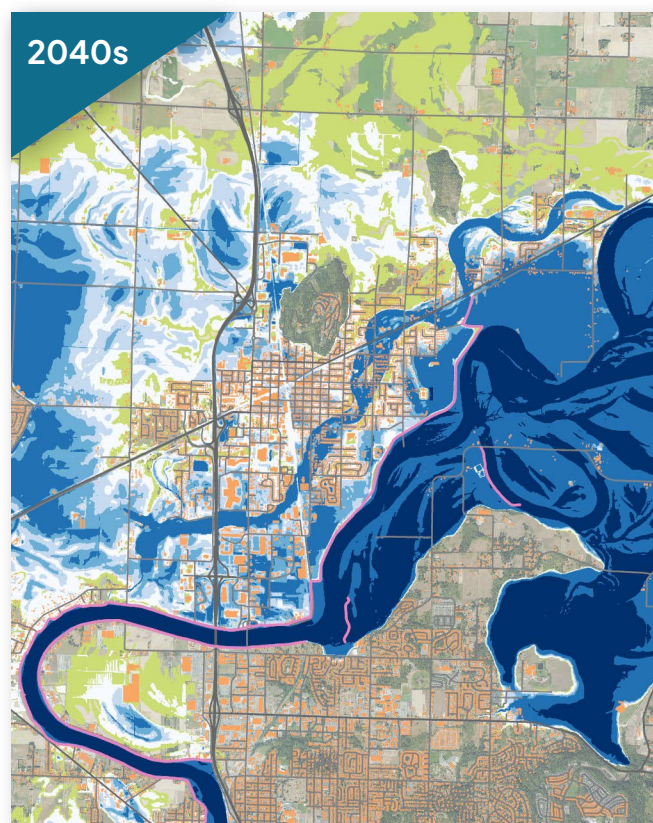
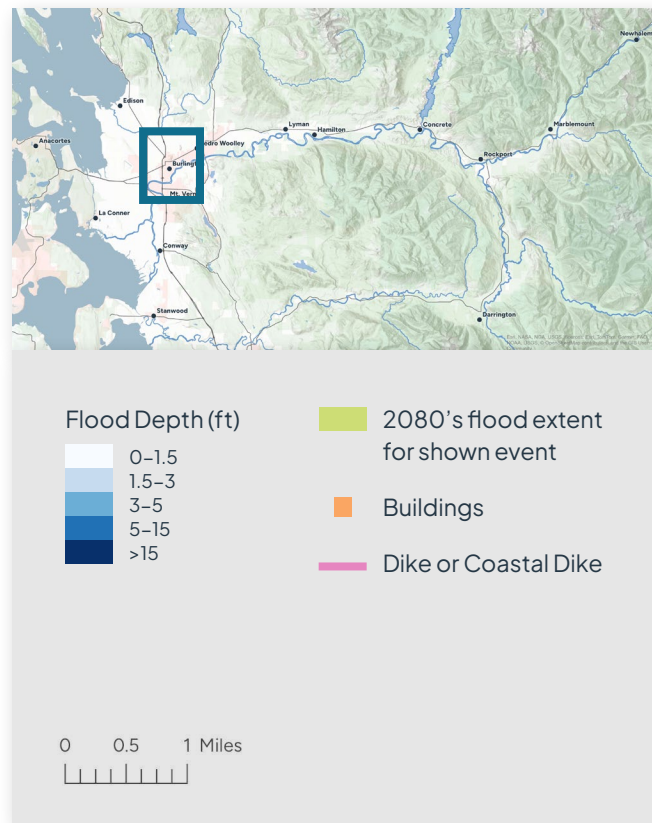
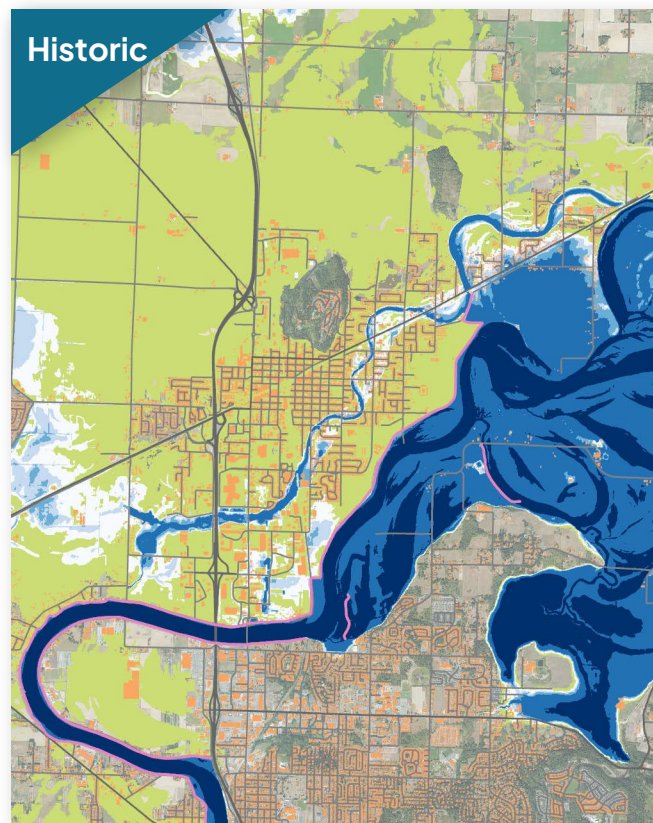
Overview Map



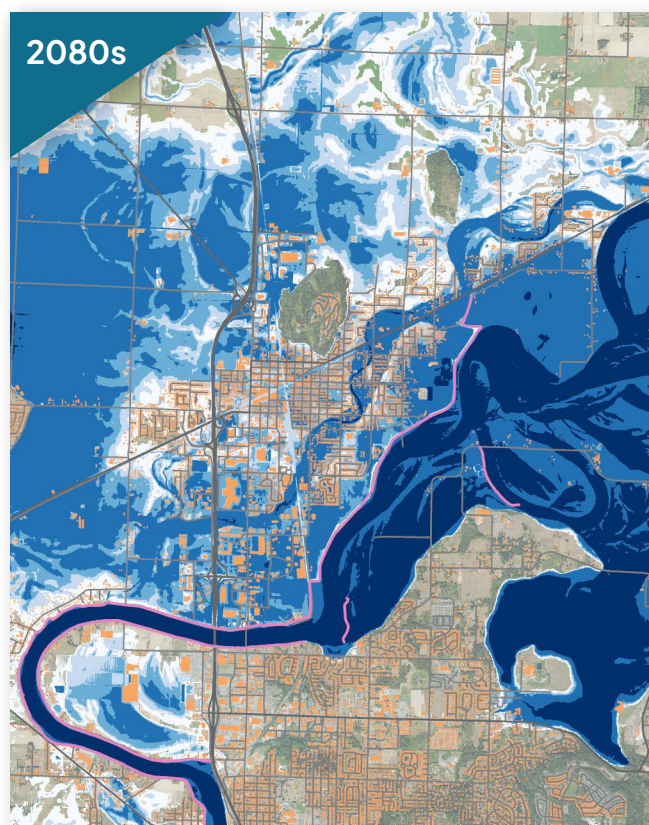
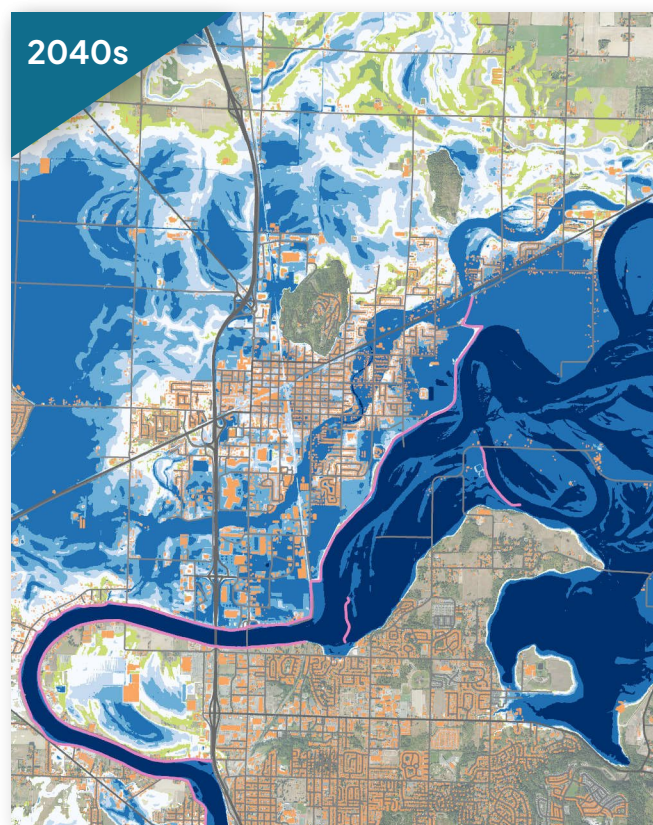
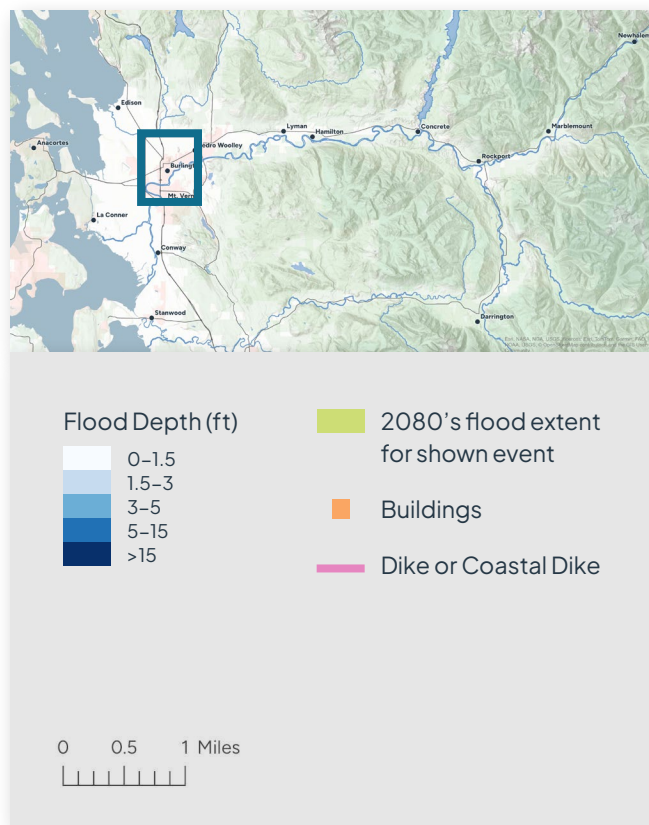
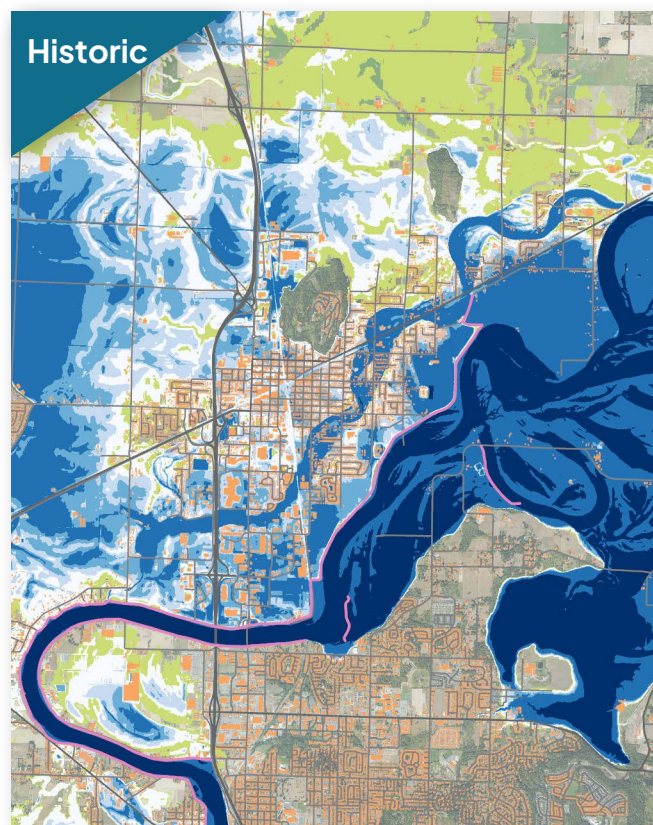
Burlington | 10 Year Flood



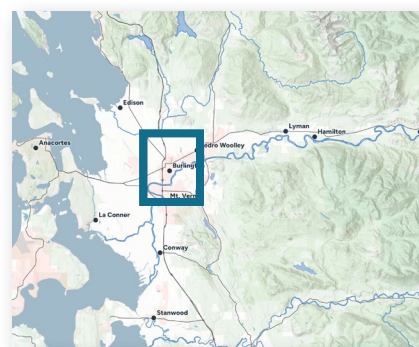
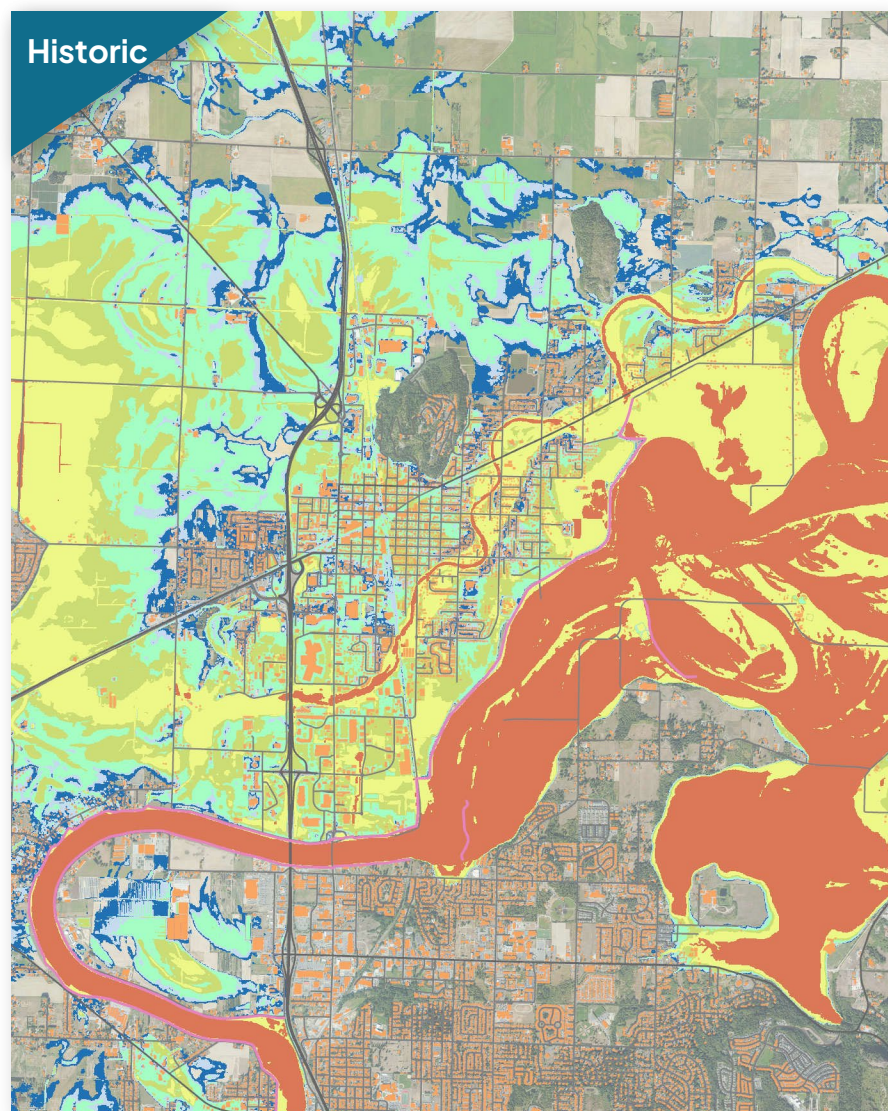
Burlington | 25 Year Flood



Burlington | 100 Year Flood



Burlington | Depth-Velocity Hazard



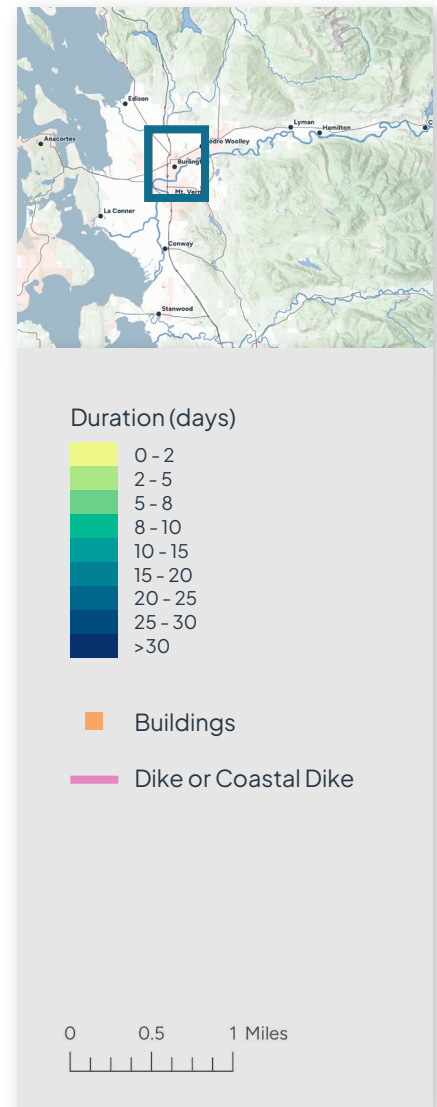
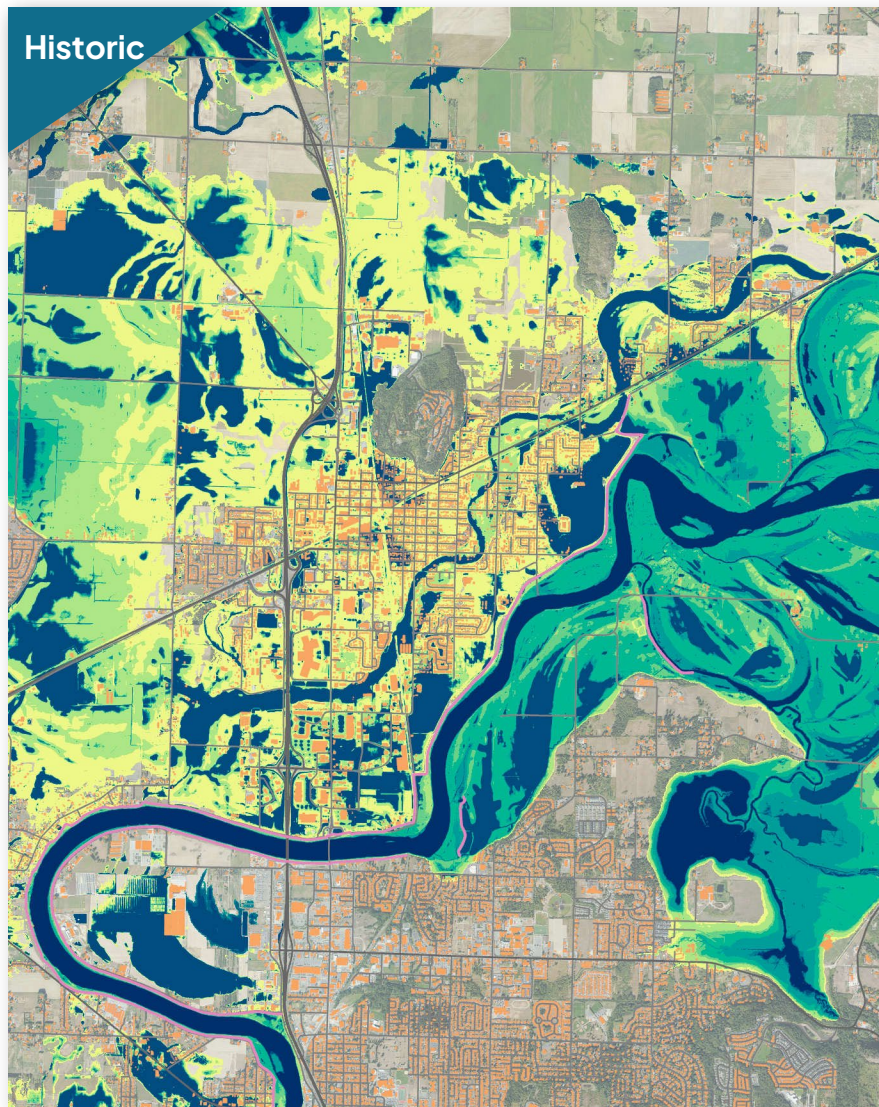
Descriptions for Flood Hazard Rating Mapping (AIDR, 2017)

- Generally safe for vehicles, people, and buildings
- Unsafe for small vehicles
- Unsafe for vehicles, children, and the elderly
- Unsafe for vehicles and people. All building types vulnerable to structural damage.
- Unsafe for vehicles and people. All building types considered vulnerable to failure.
- Buildings
- Dike or Coastal Dike

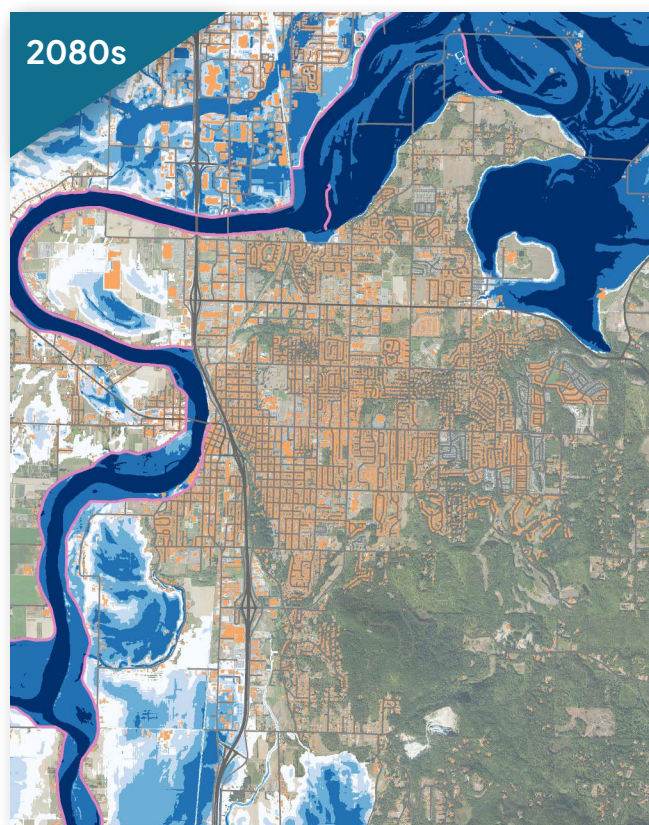
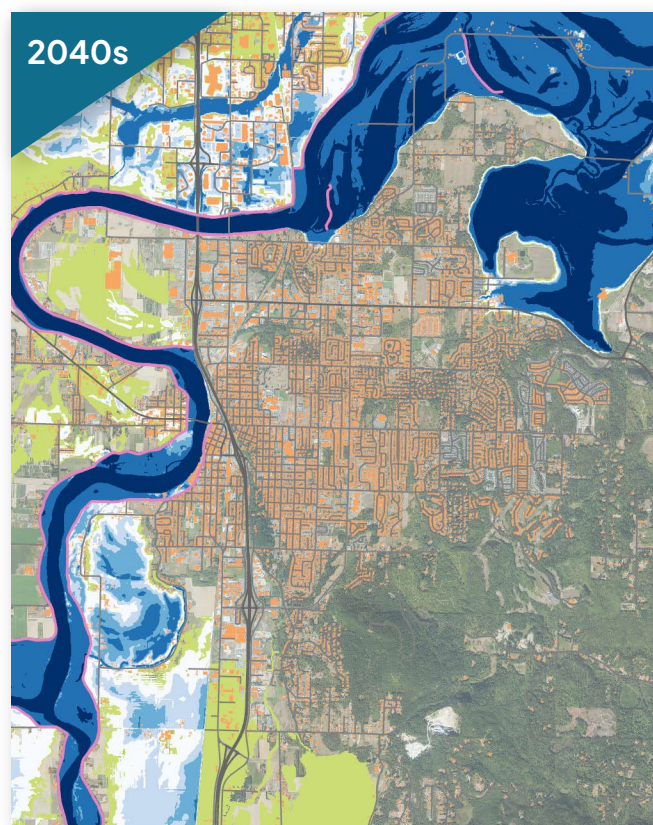
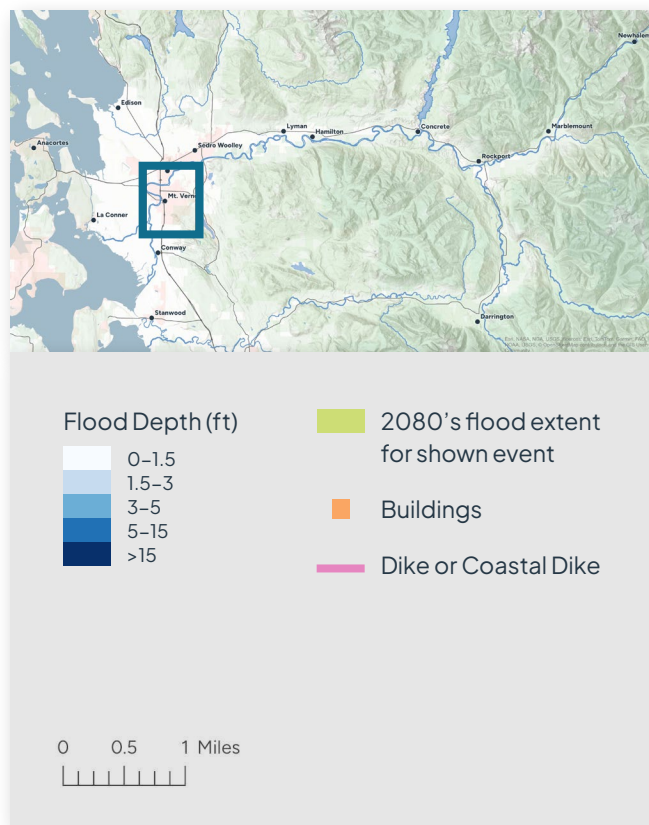
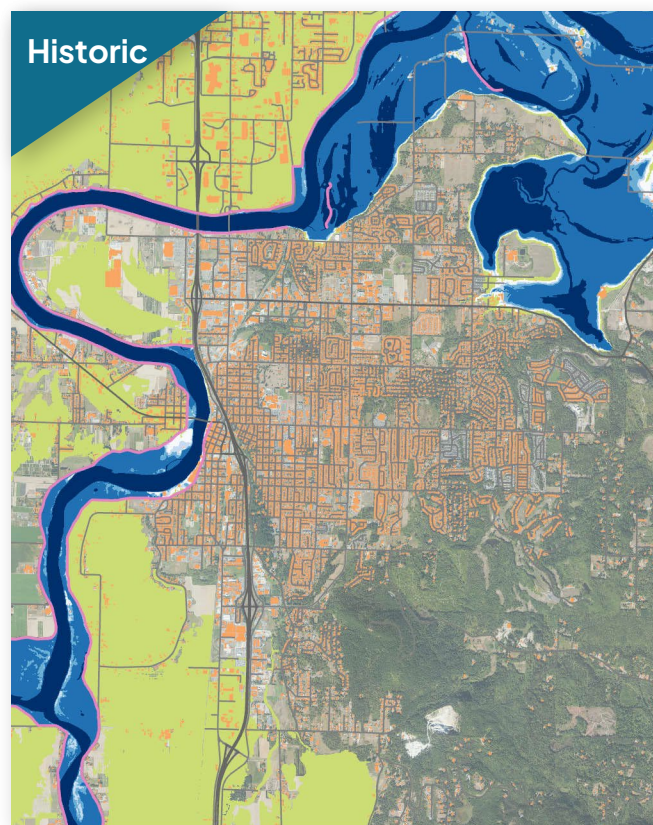
0 0.5 1 Miles

LOWER RIVER FLOODING MAPS

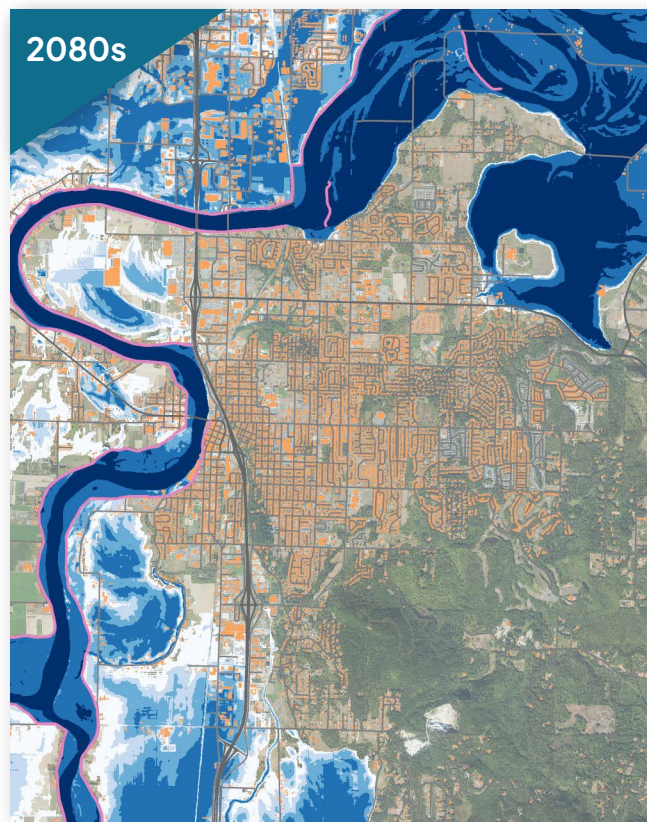
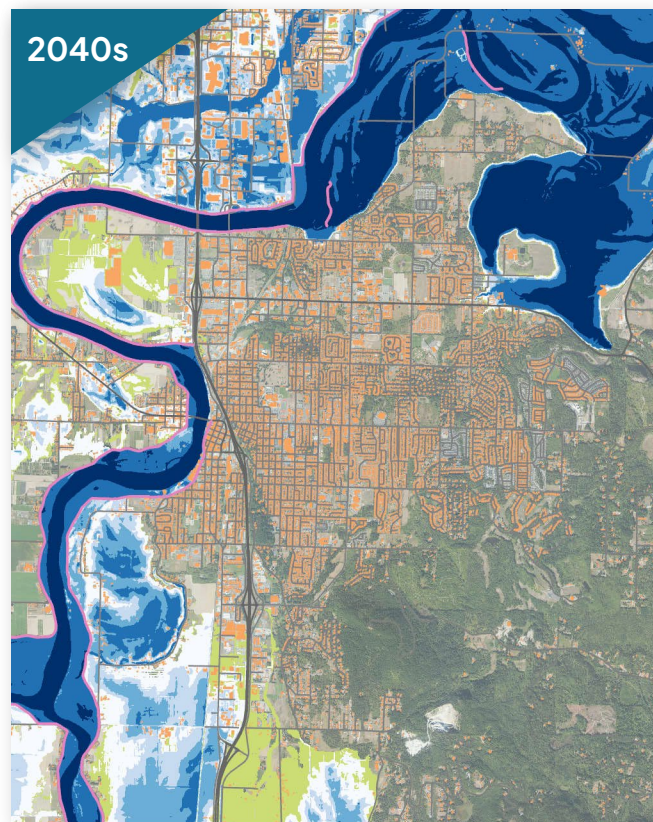
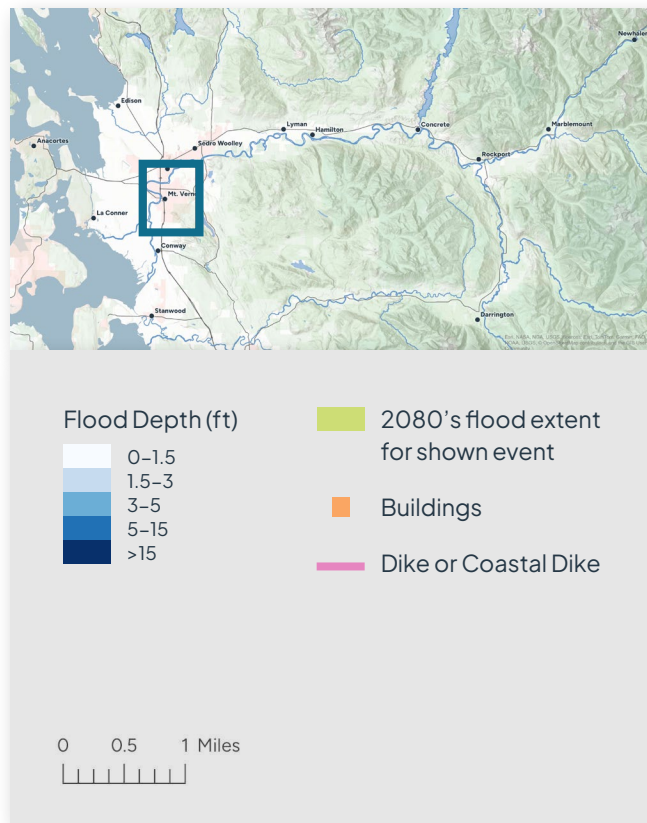
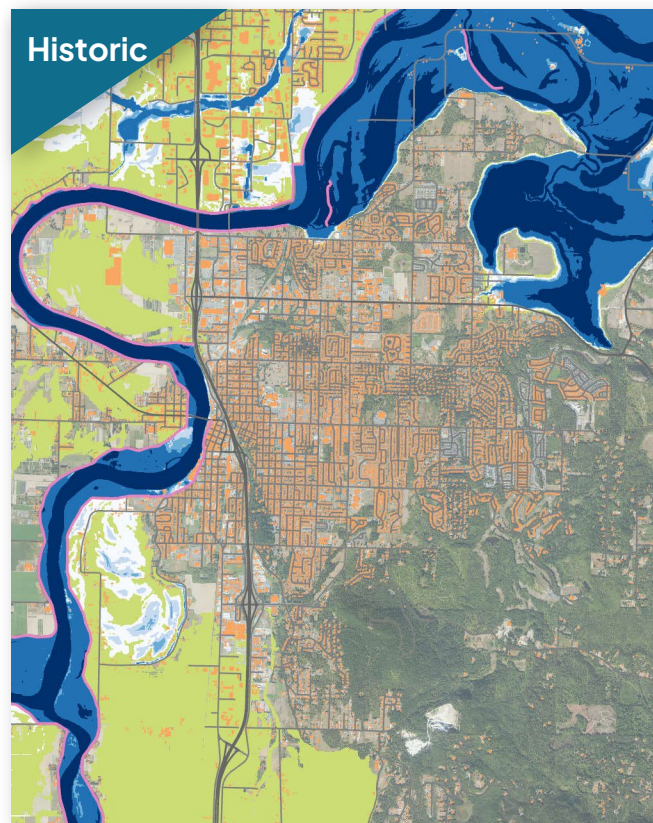
Burlington | Duration



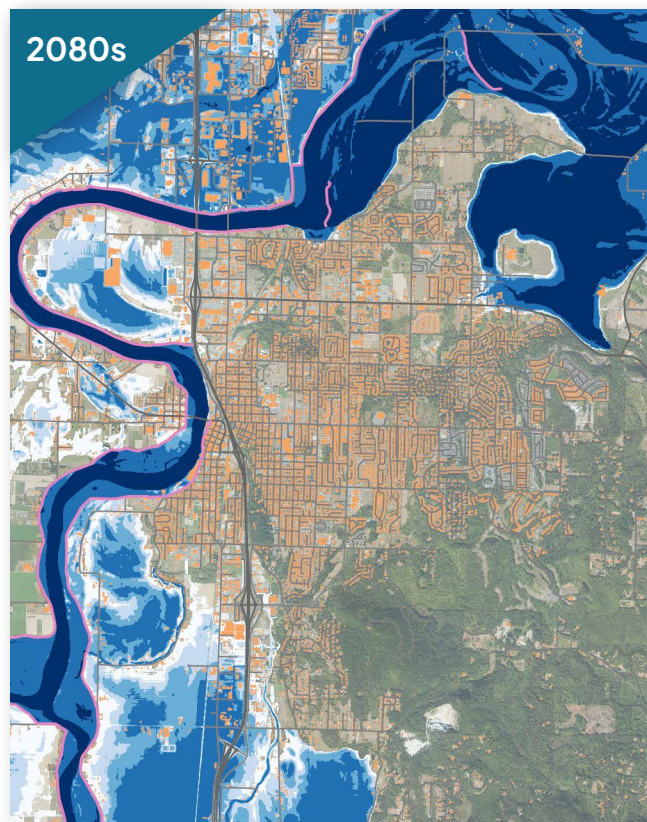
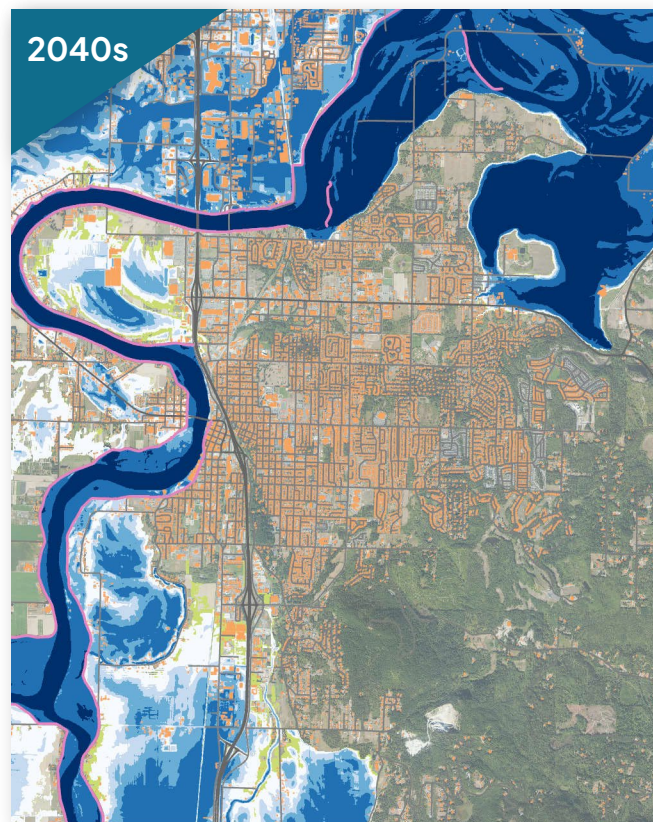
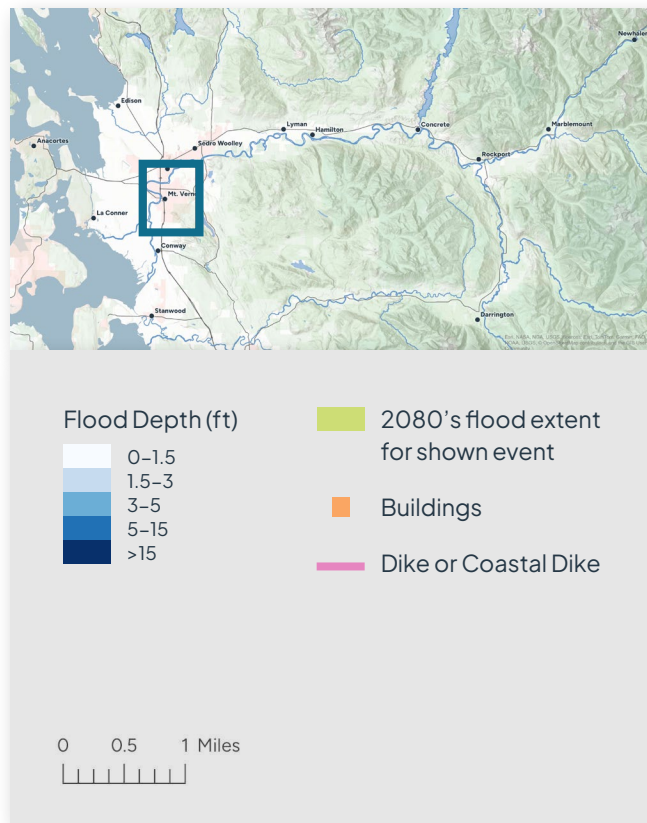
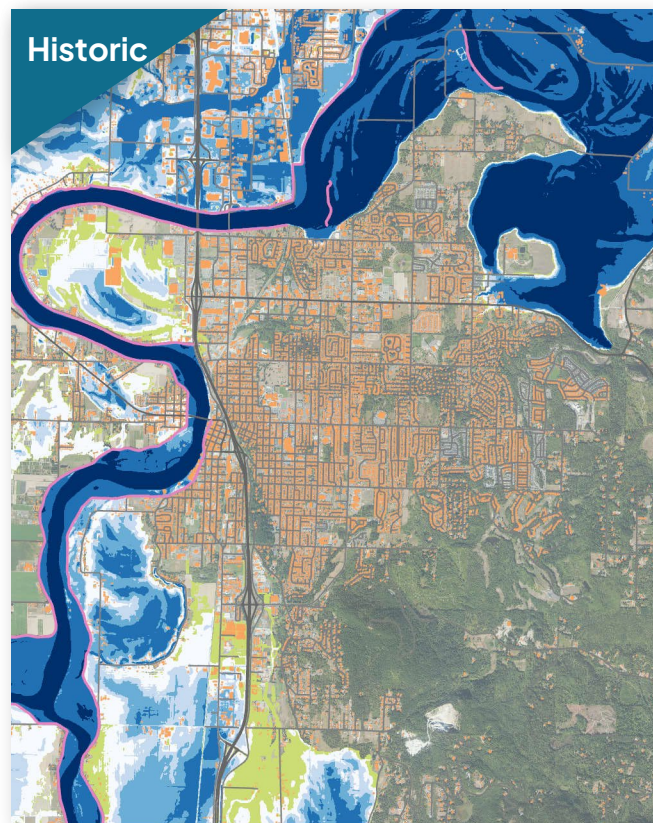
Mount Vernon | 10 Year Flood



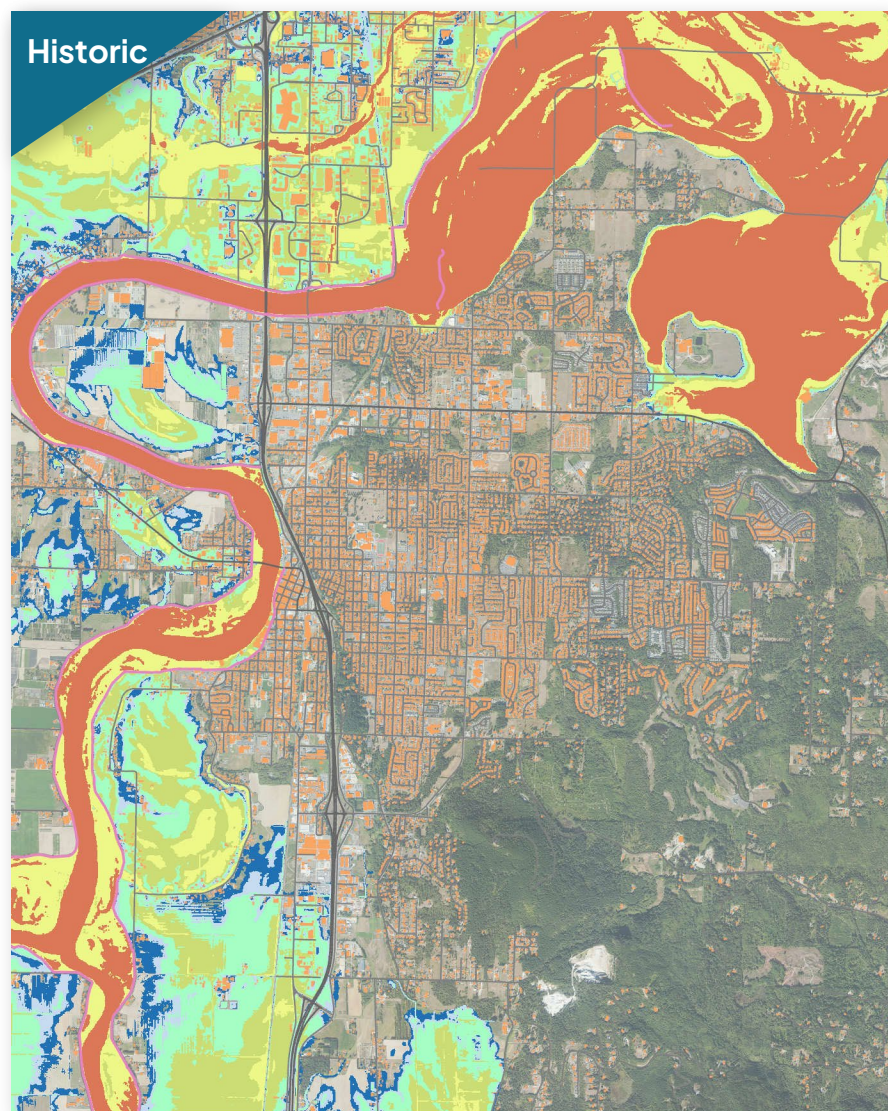
Mount Vernon | 25 Year Flood



Mount Vernon | 100 Year Flood



Mount Vernon | Depth-Velocity Hazard



Descriptions for Flood Hazard Rating Mapping (AIDR, 2017)

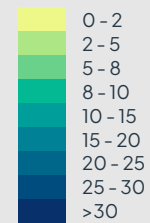
- Generally safe for vehicles, people, and buildings
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- Unsafe for vehicles and people
- Unsafe for vehicles and people. All building types vulnerable to structural damage.
- Unsafe for vehicles and people. All building types considered vulnerable to failure.
- Buildings
- Dike or Coastal Dike

0 0.5 1 Miles

Mount Vernon | Duration

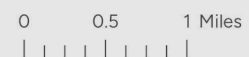


Duration (days)

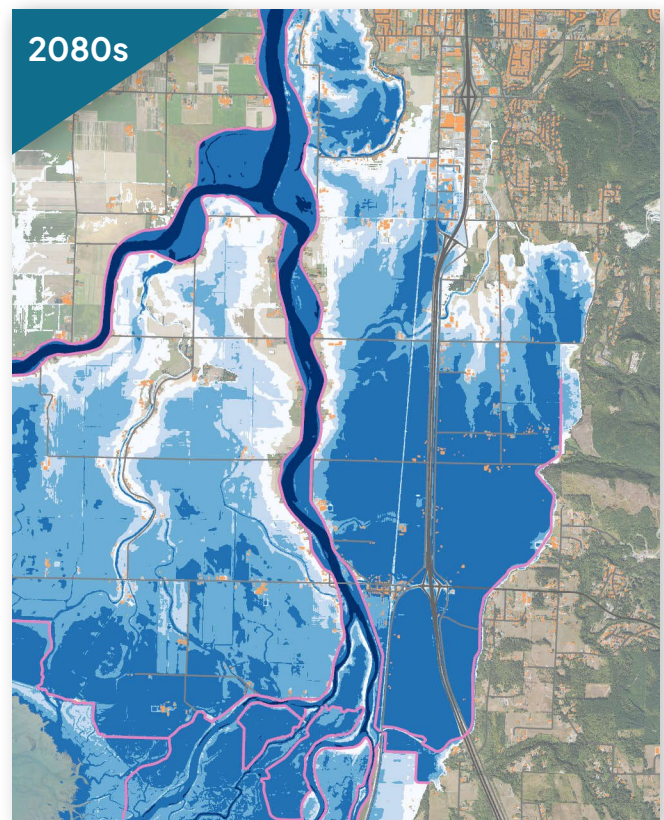
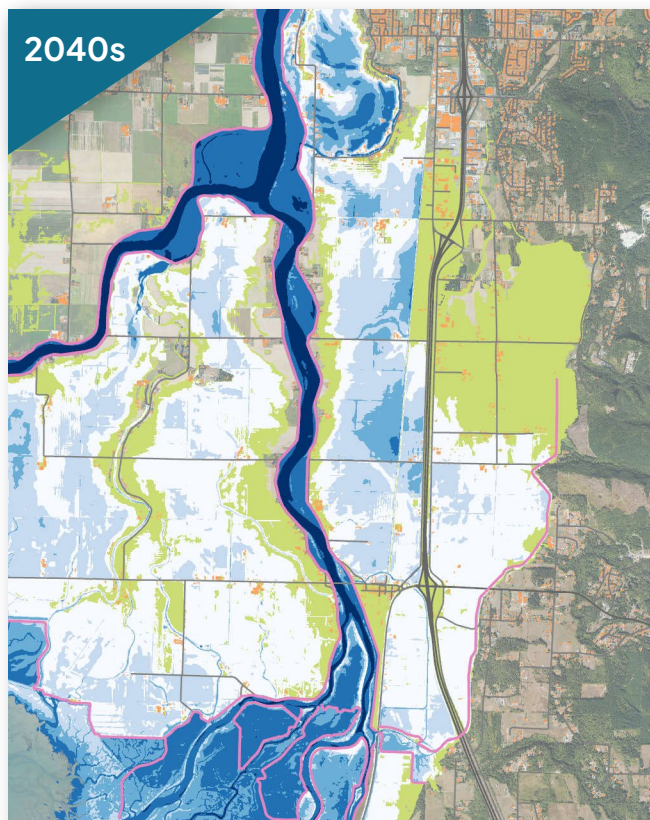
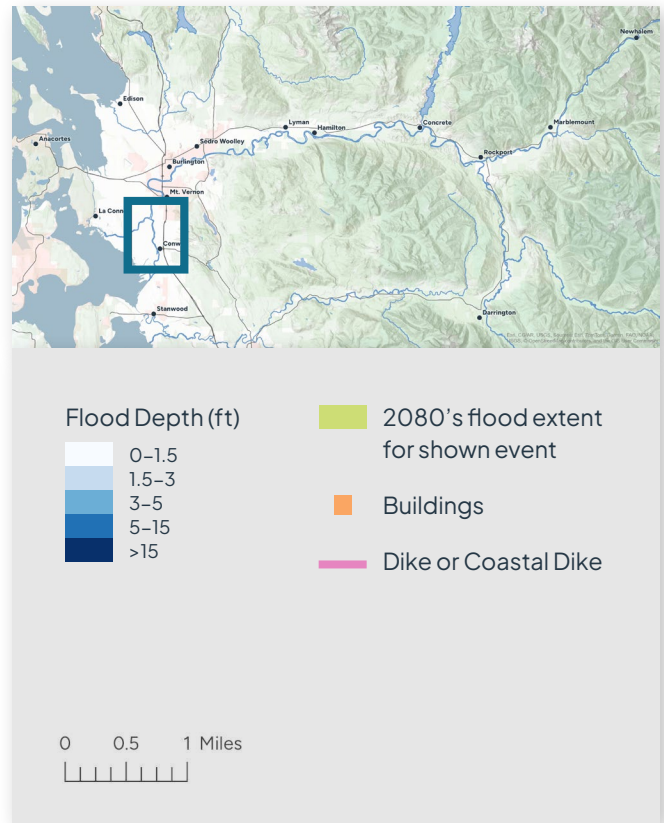
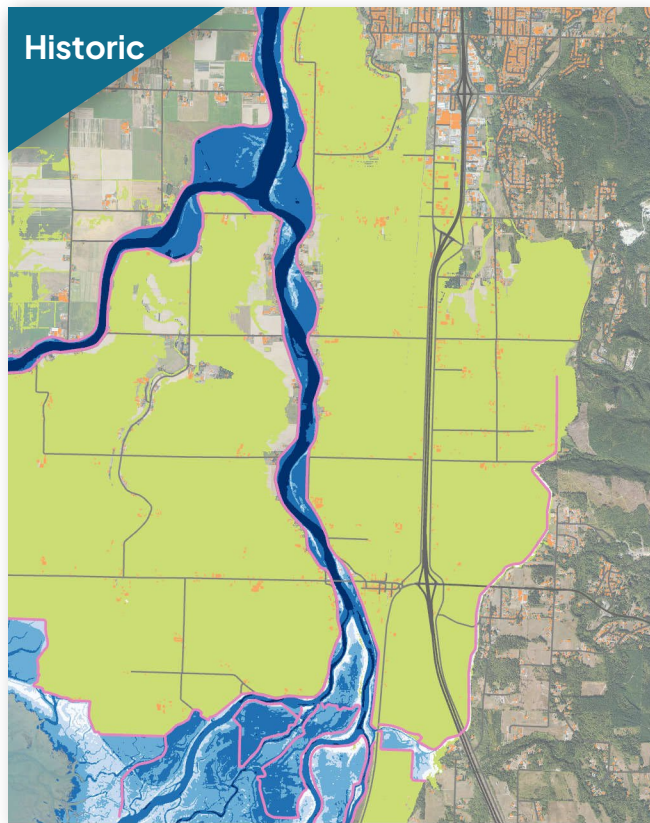


■ Buildings

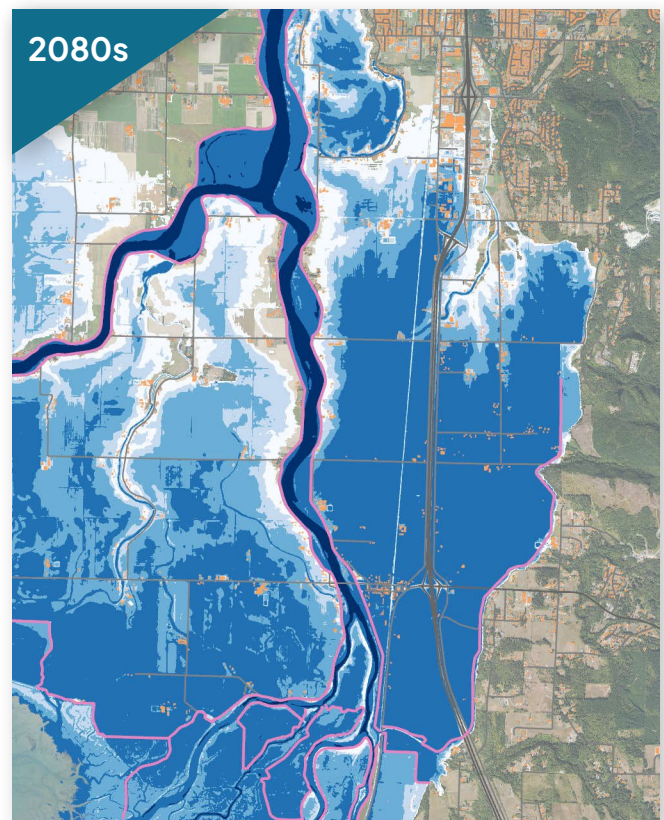
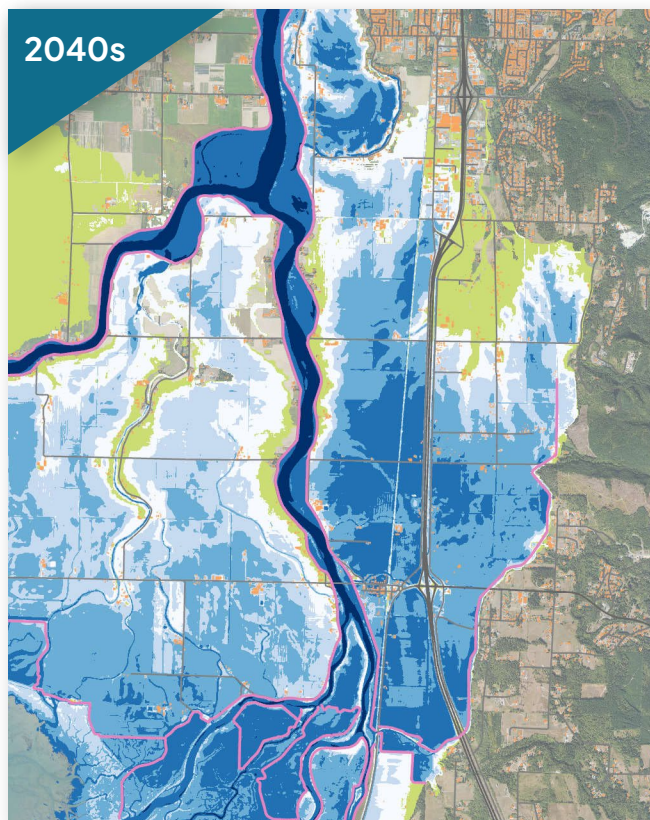
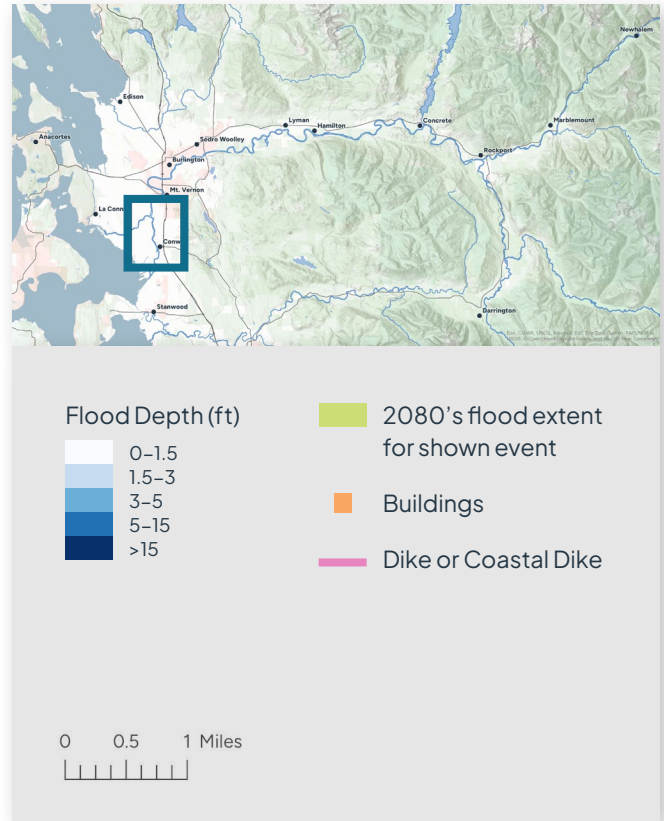
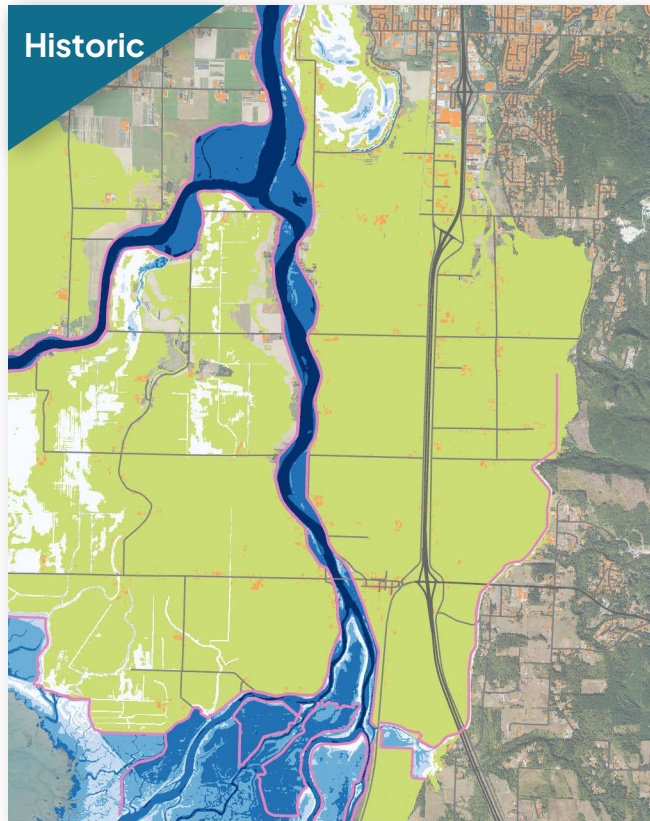
— Dike or Coastal Dike



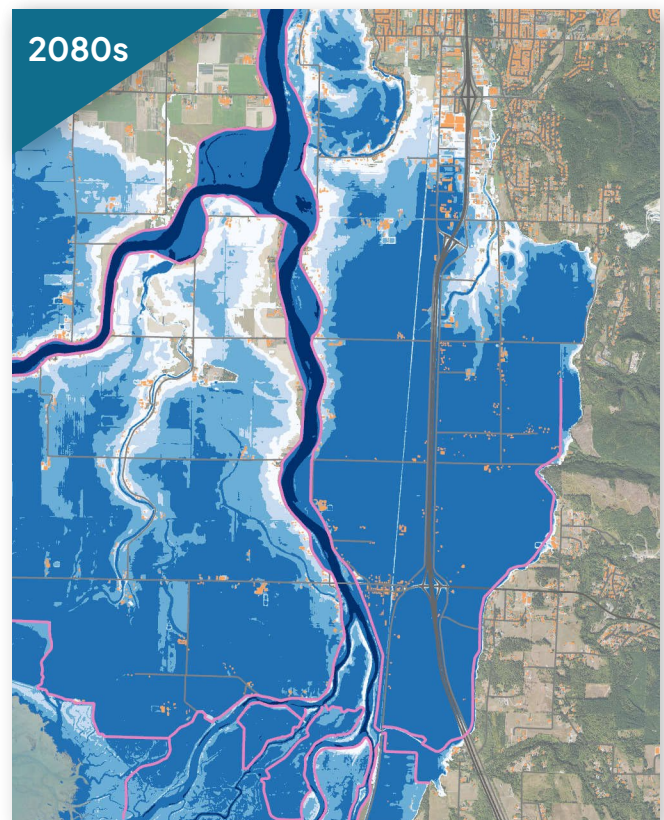
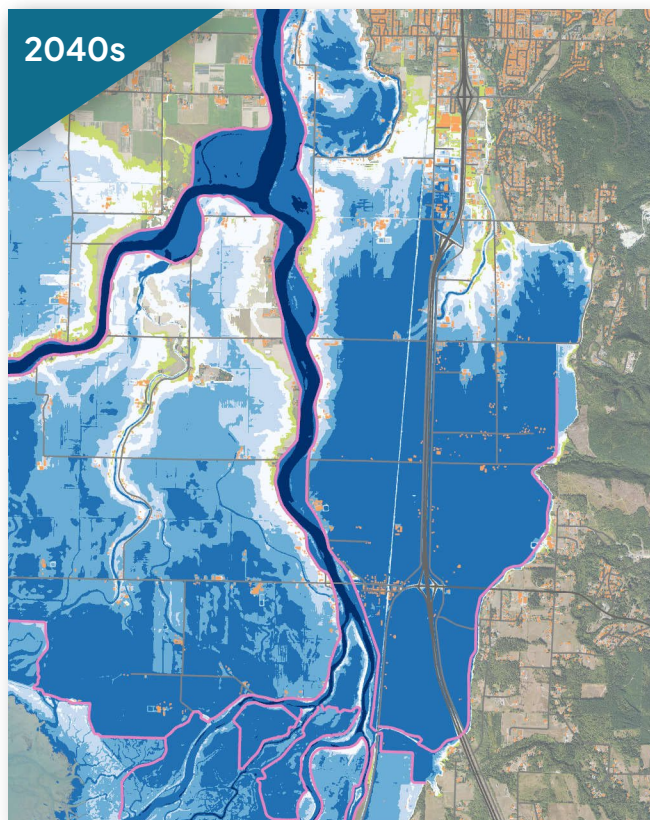
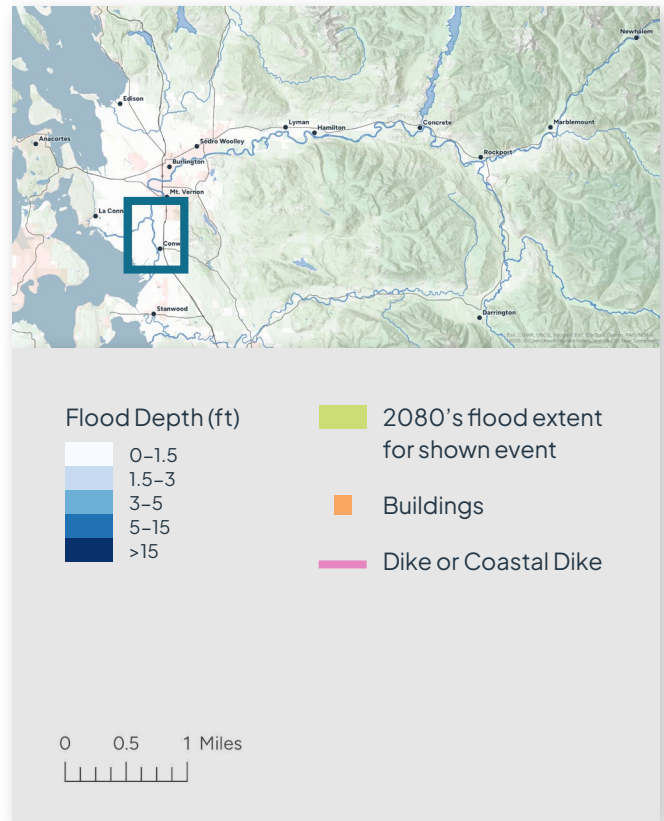
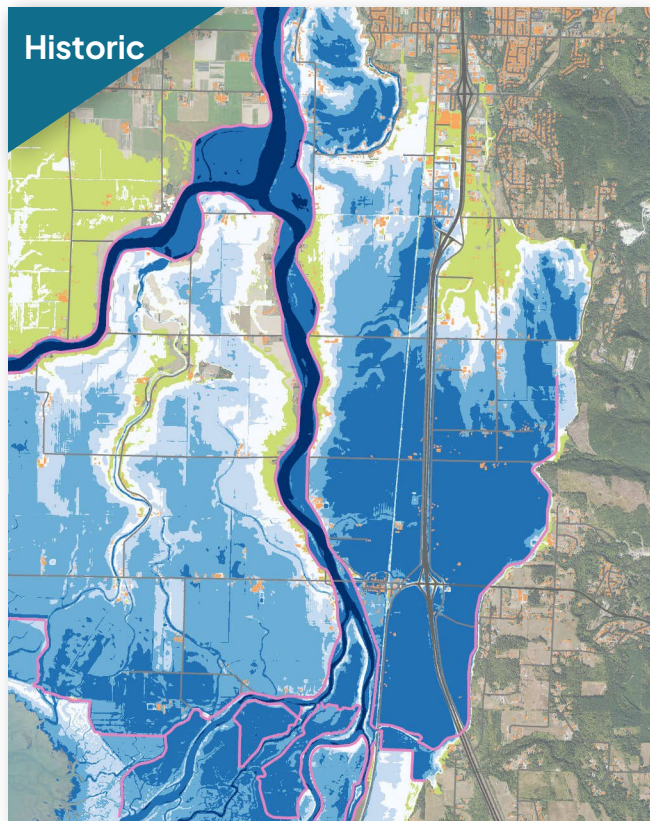
Conway | 10 Year Flood



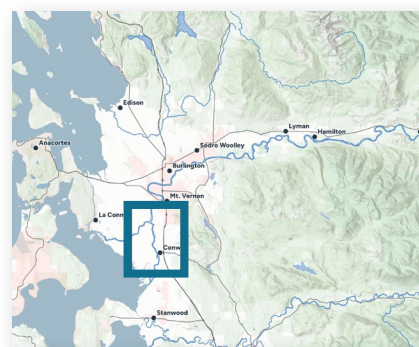
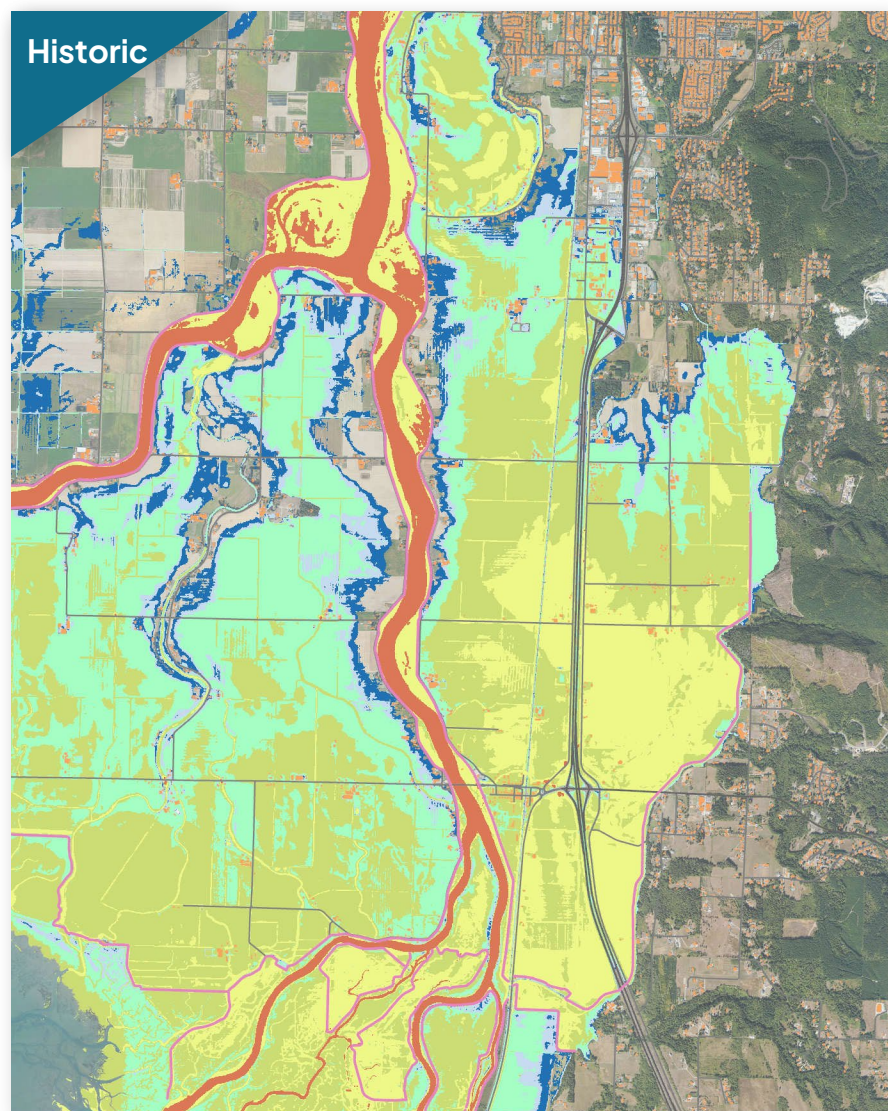
Conway | 25 Year Flood



Conway | 100 Year Flood



Conway | Depth-Velocity Hazard



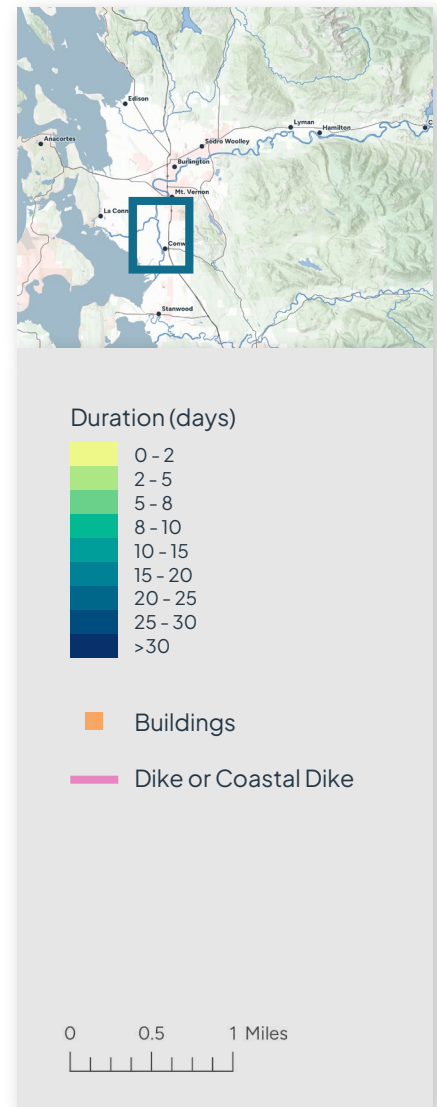
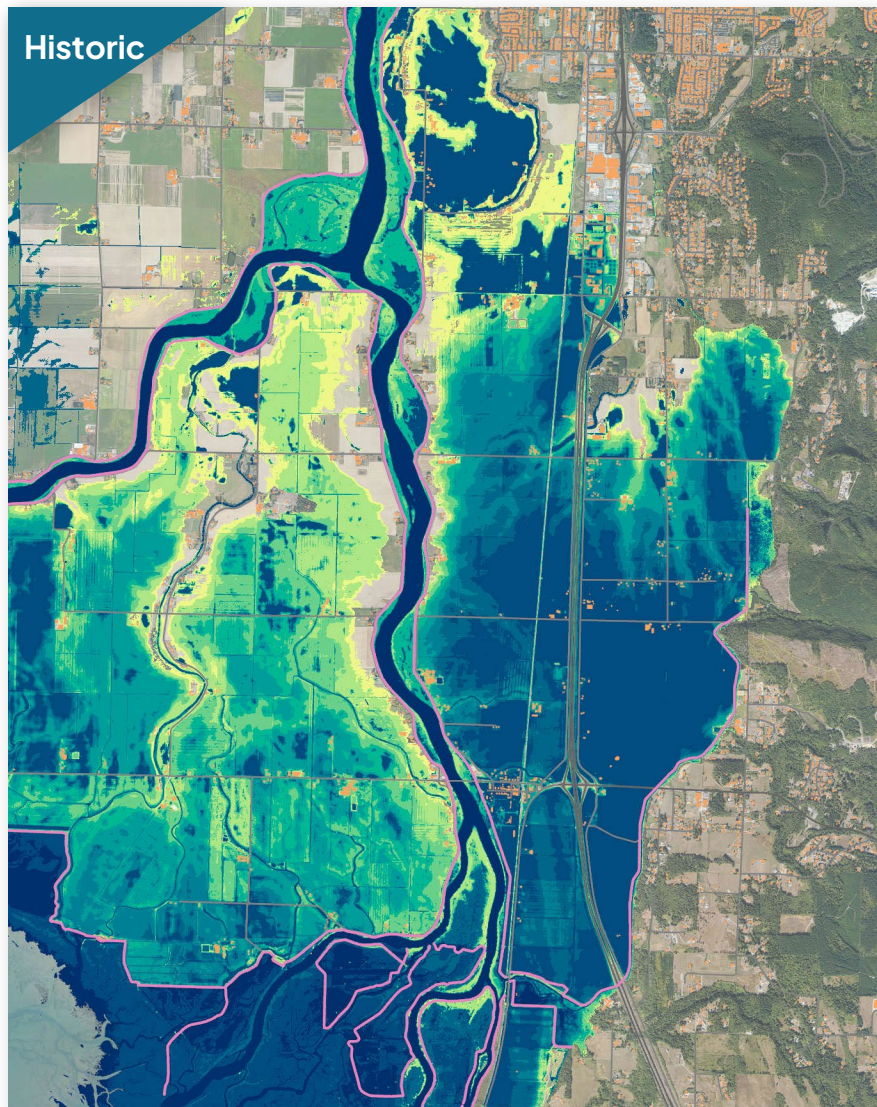
Descriptions for Flood Hazard Rating Mapping (AIDR, 2017)

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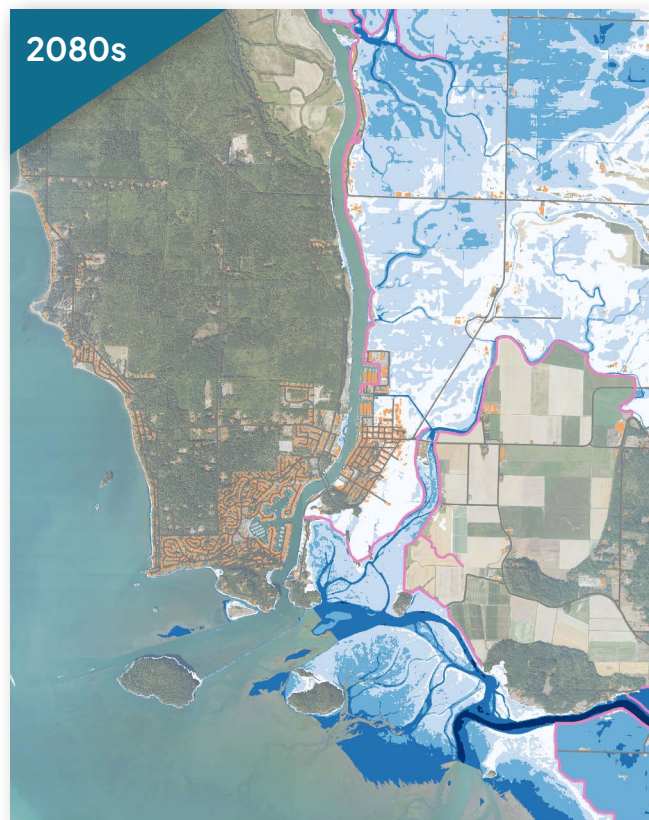
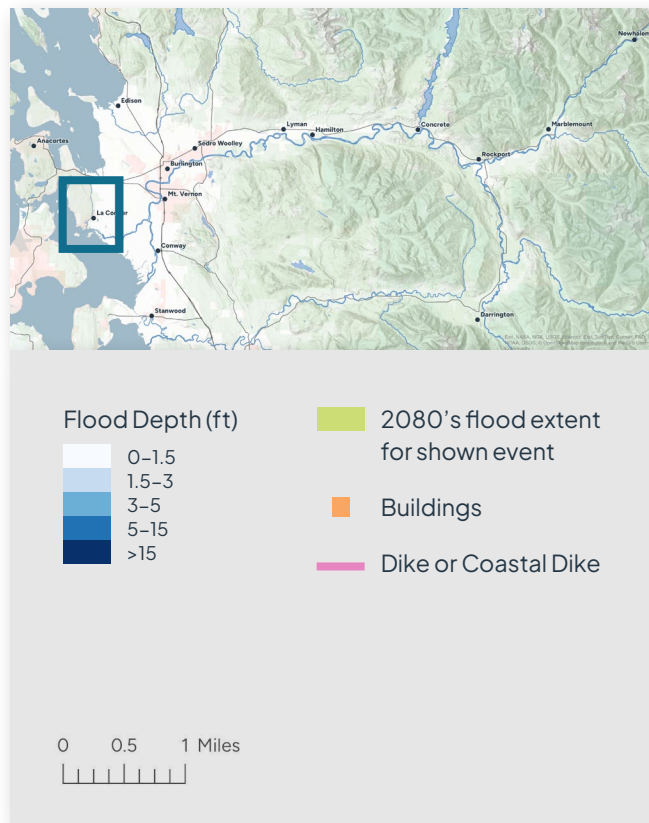
0 0.5 1 Miles

LOWER RIVER FLOODING MAPS

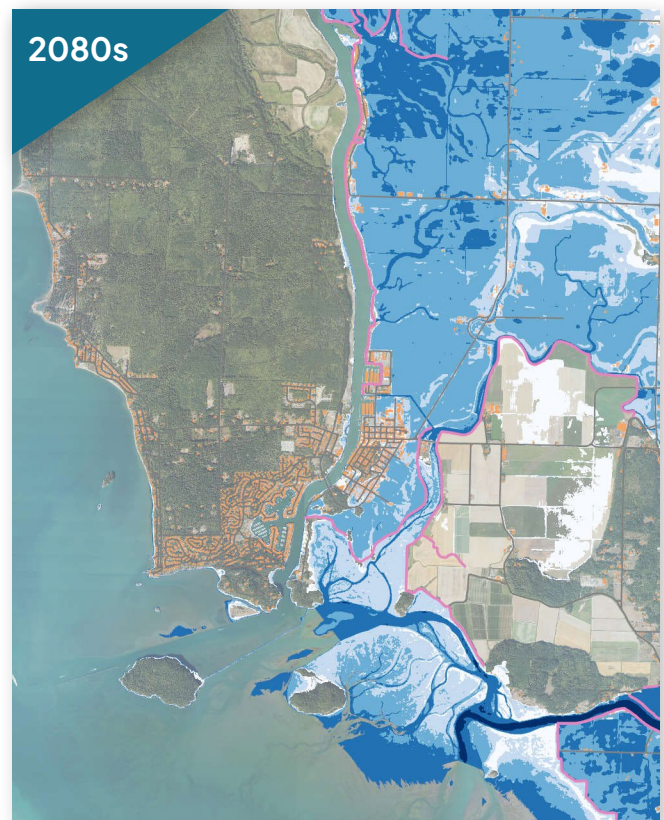
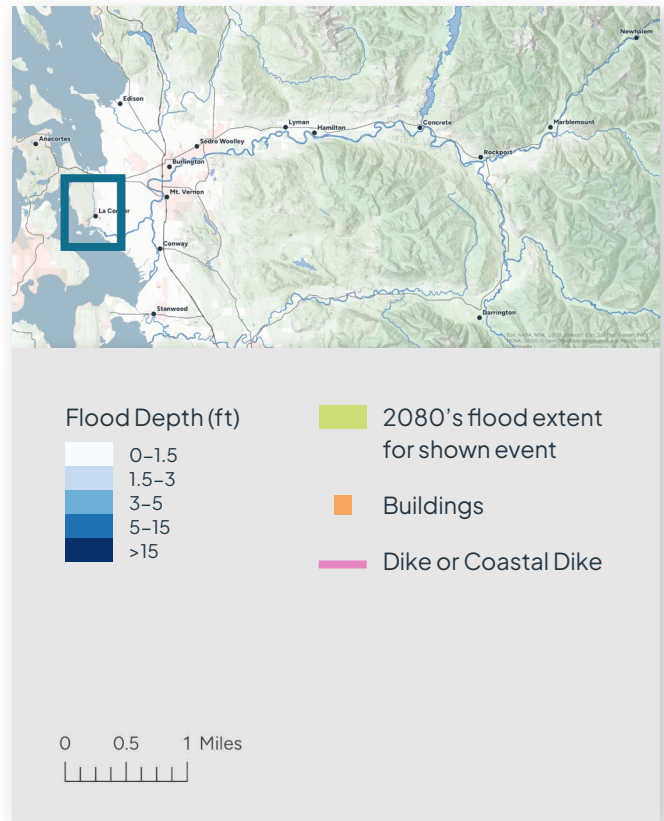
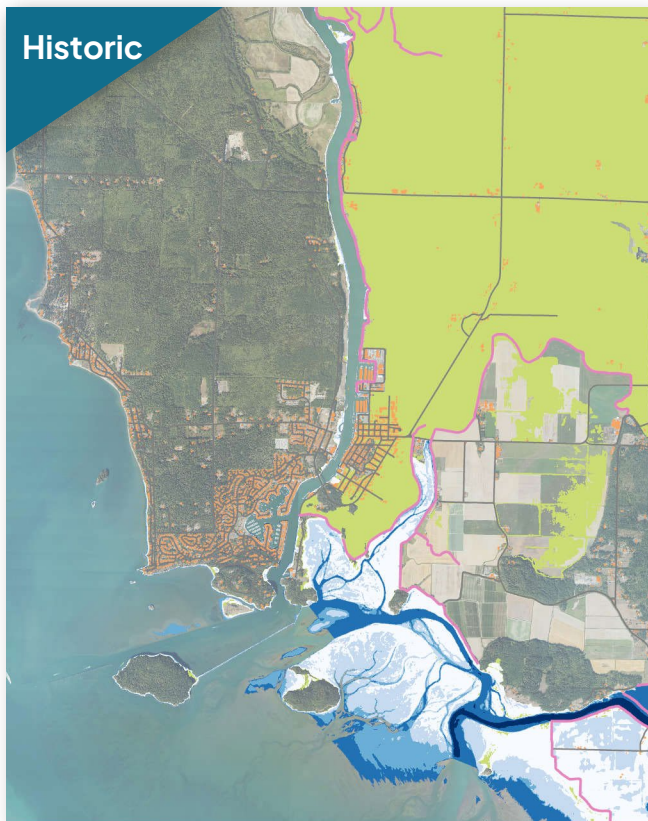
Conway | Duration



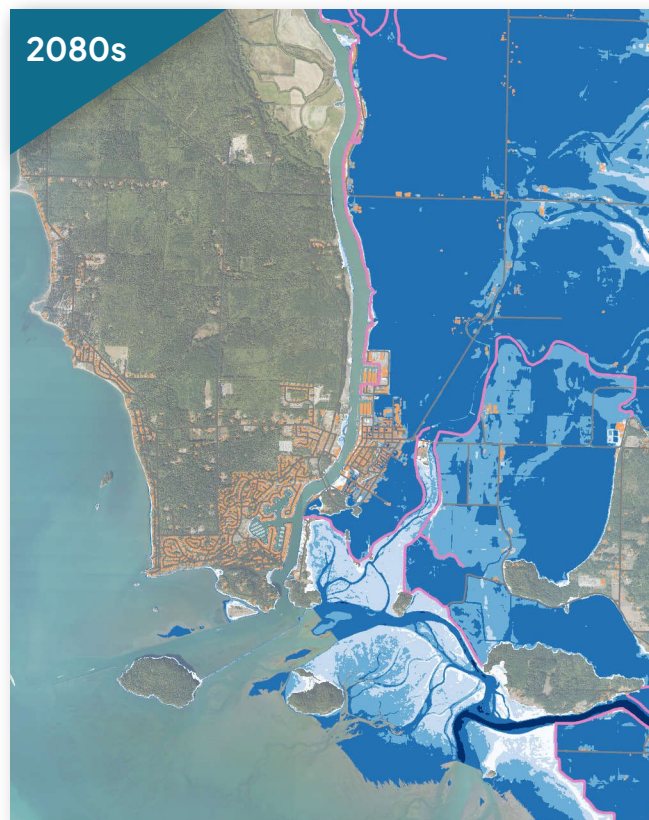
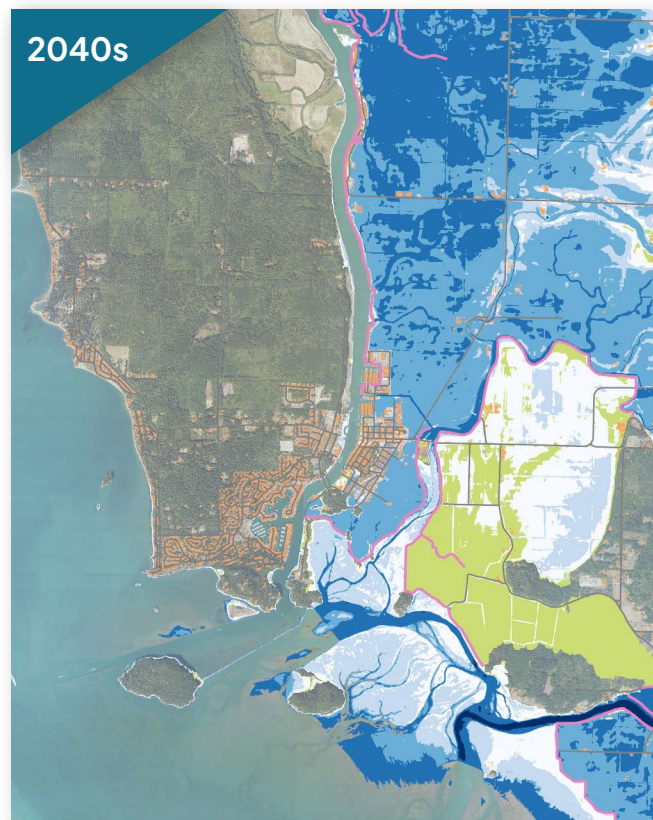
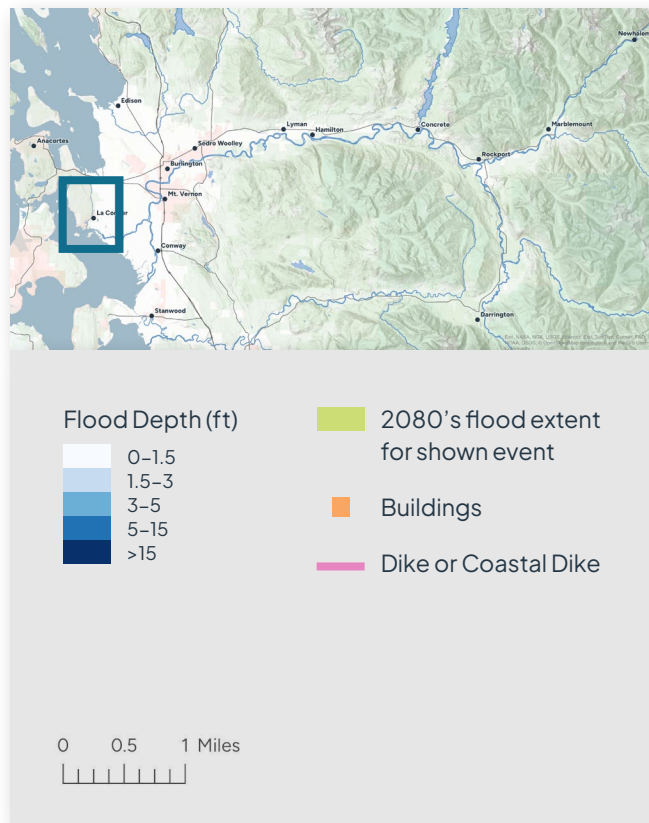
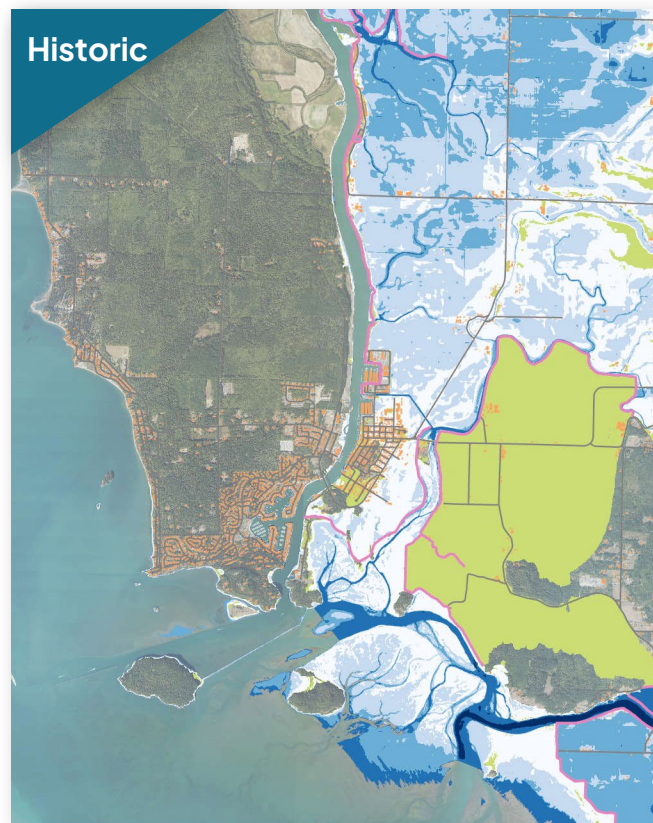
La Conner | 10 Year Flood



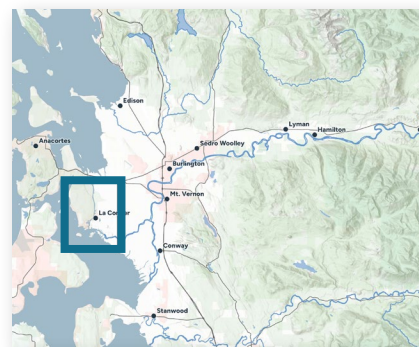
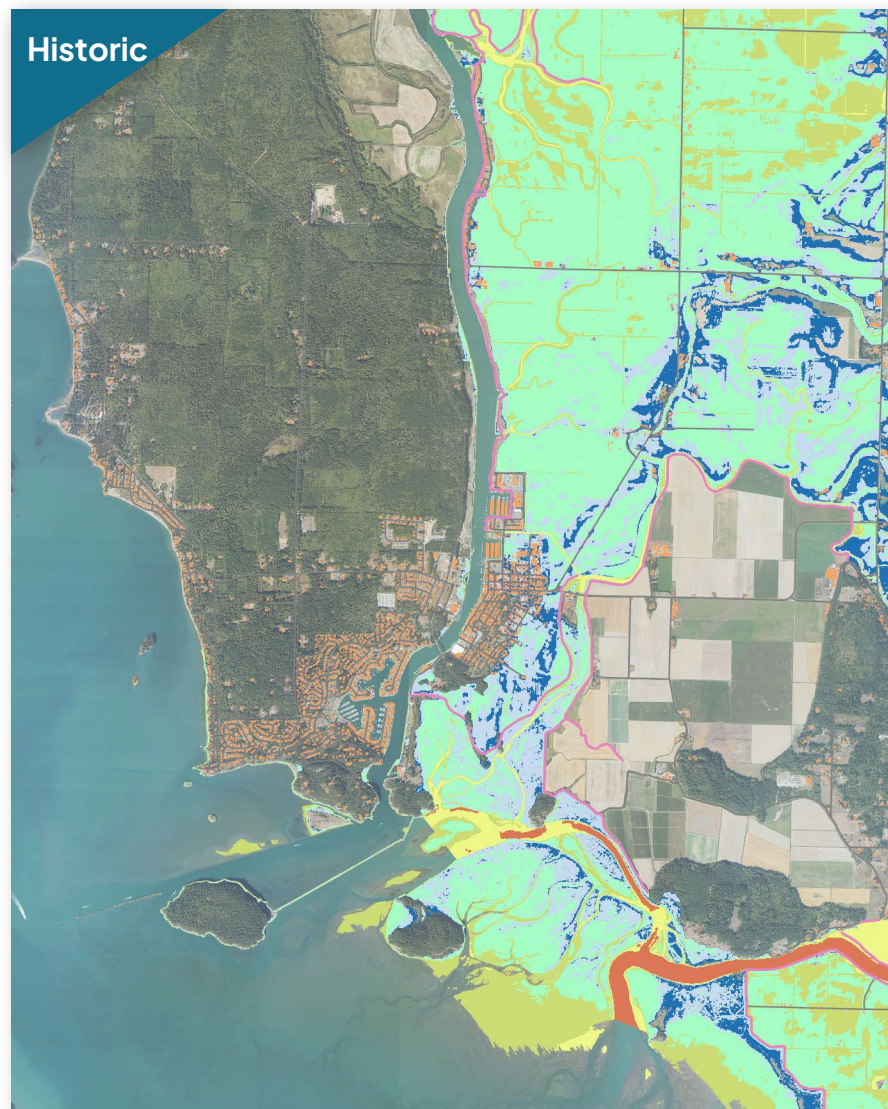
La Conner | 25 Year Flood



La Conner | 100 Year Flood



La Conner | Depth-Velocity Hazard



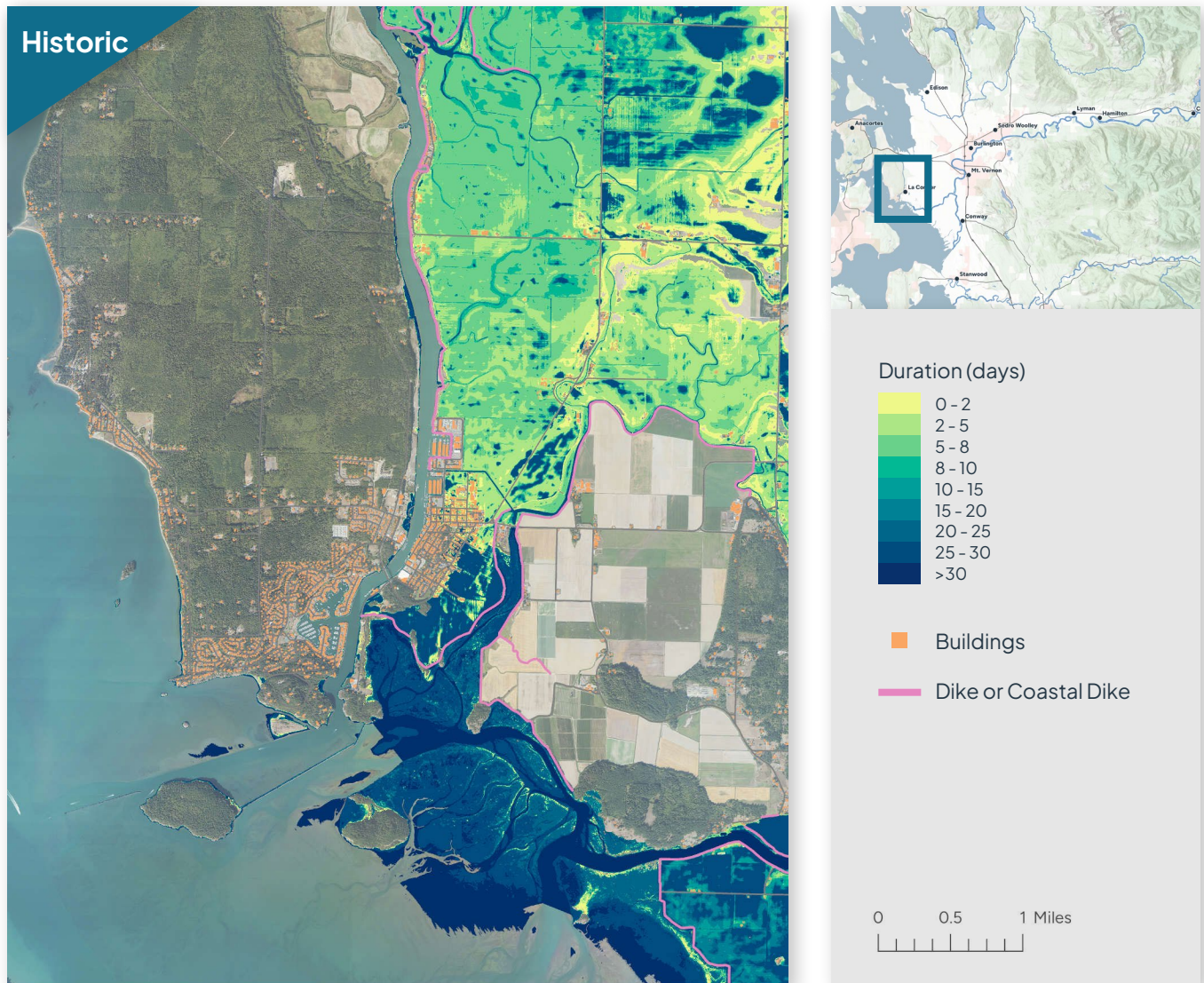
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- Buildings
- Dike or Coastal Dike

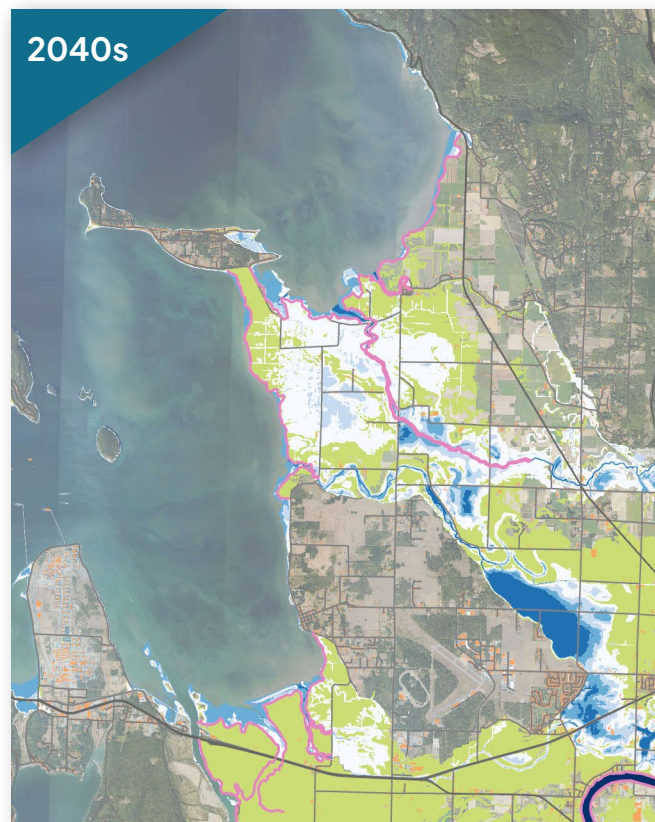
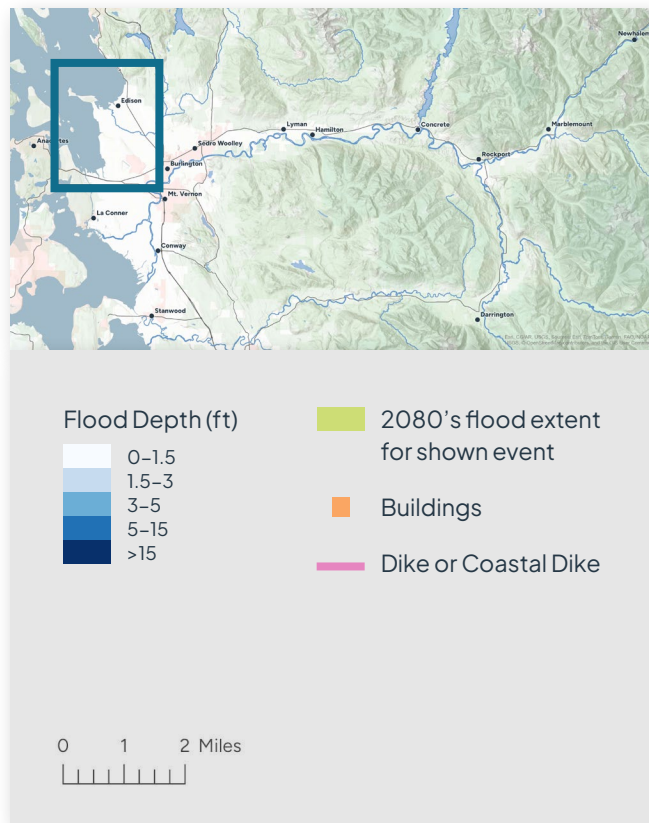
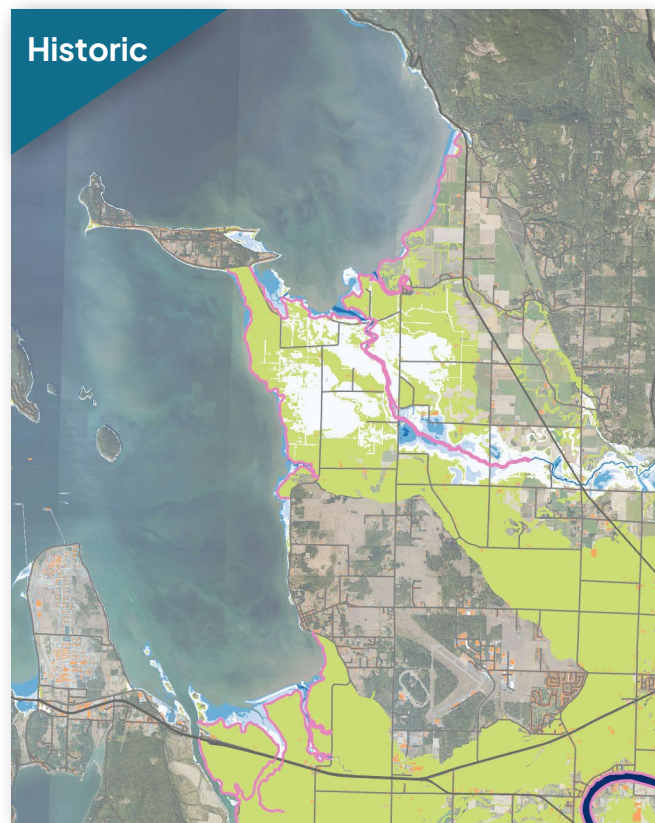
0 0.5 1 Miles

LOWER RIVER FLOODING MAPS

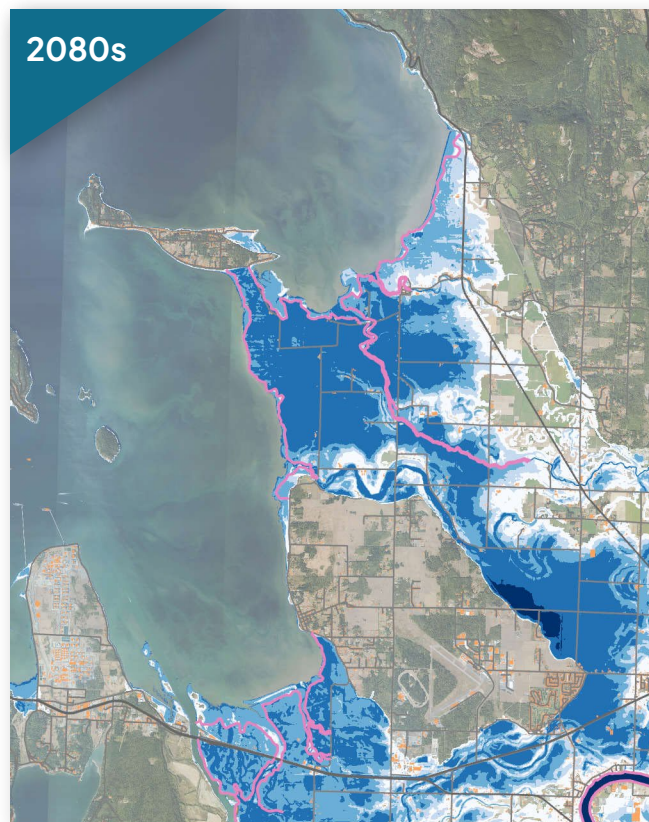
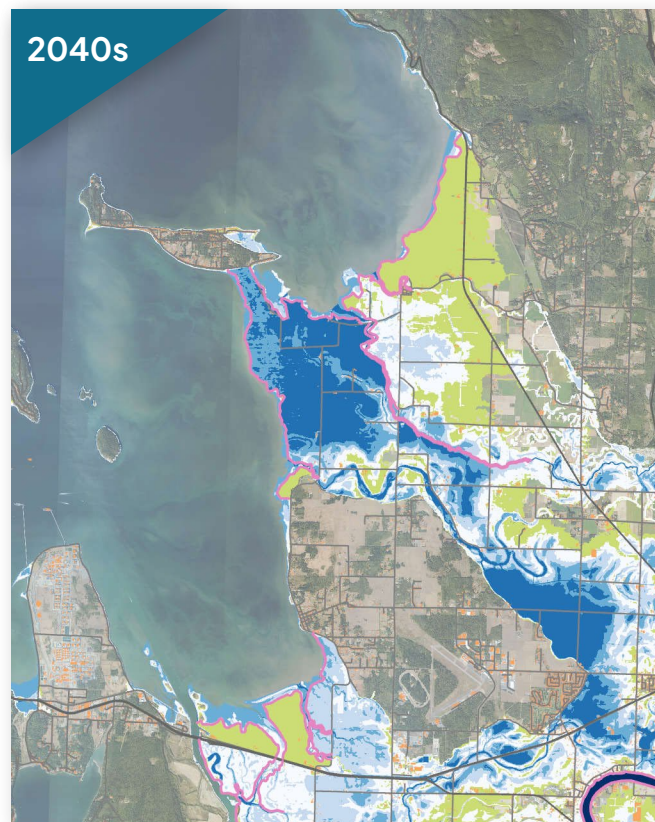
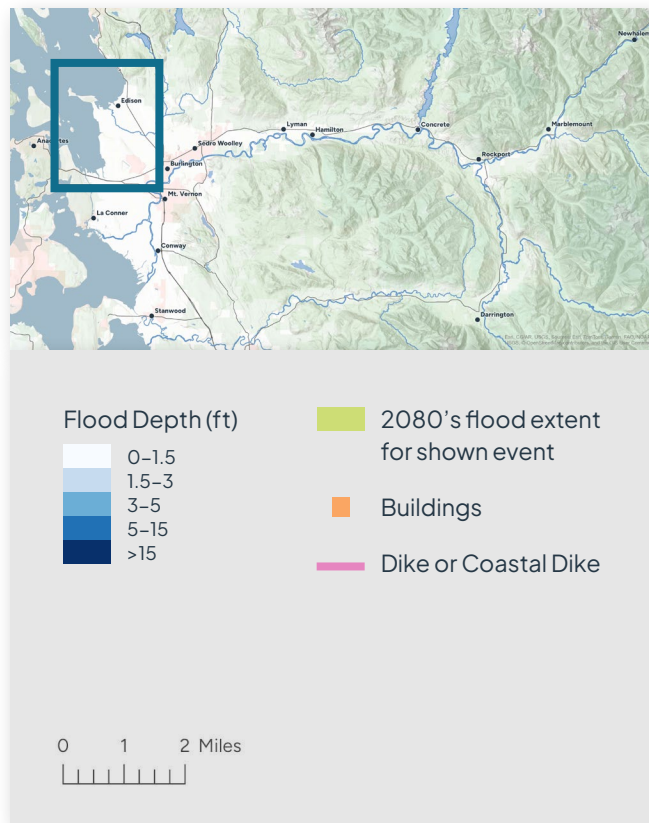
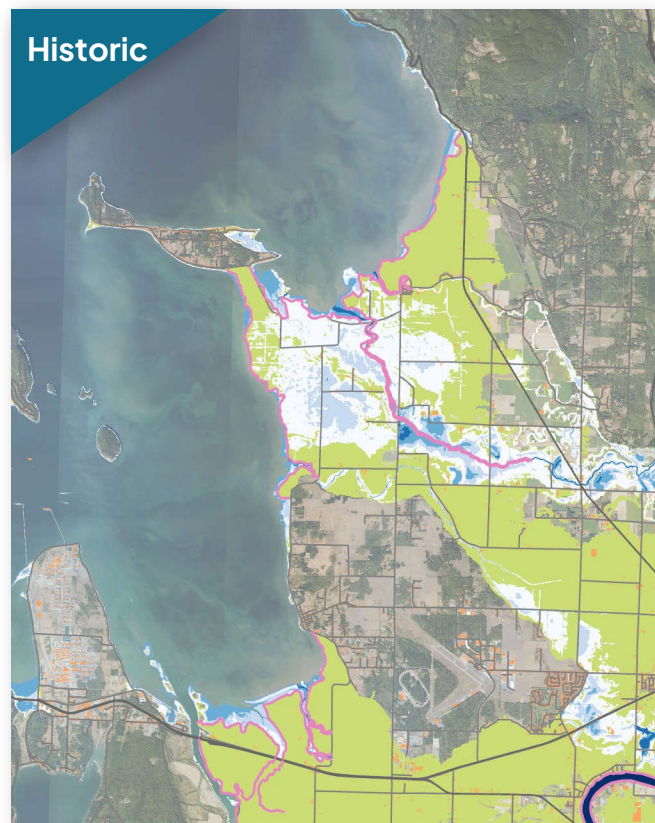
La Conner | Duration



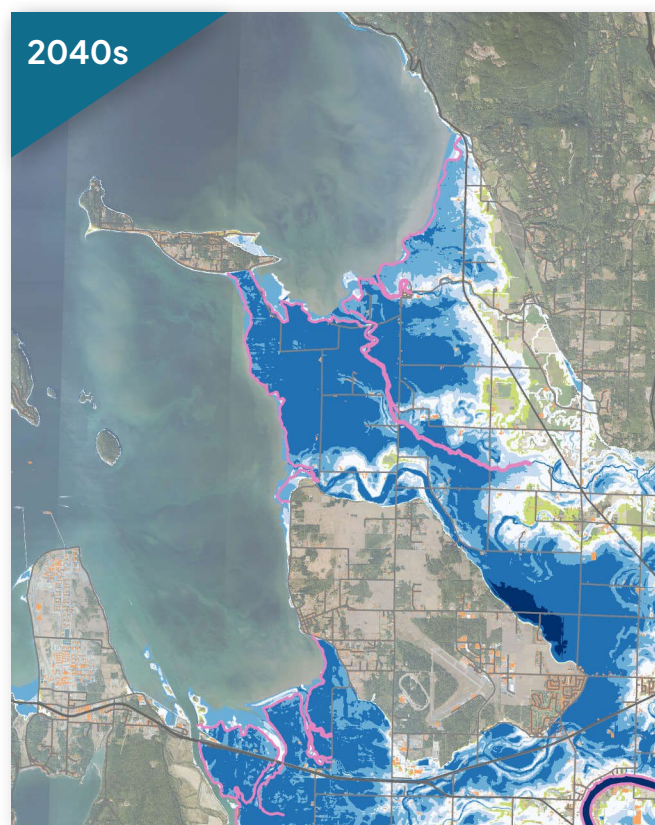
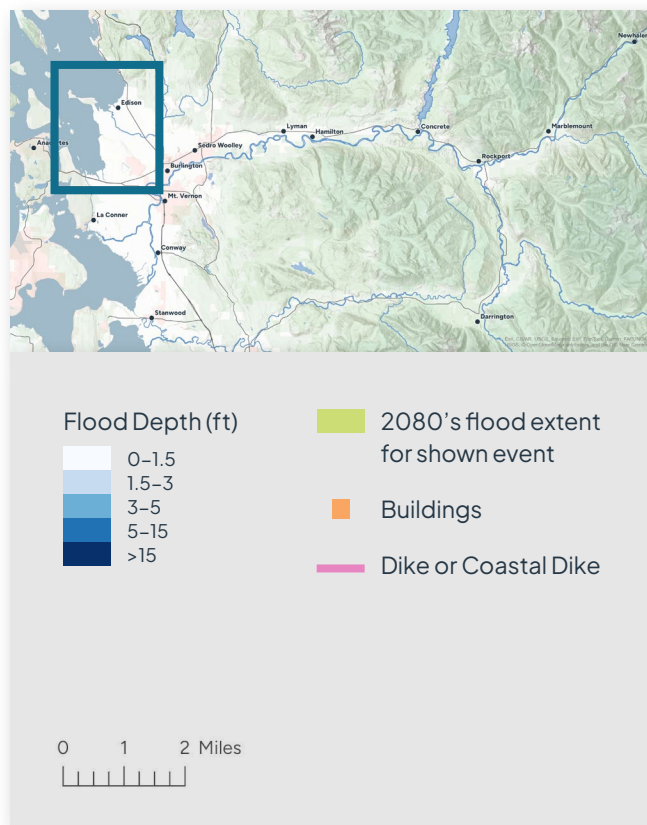
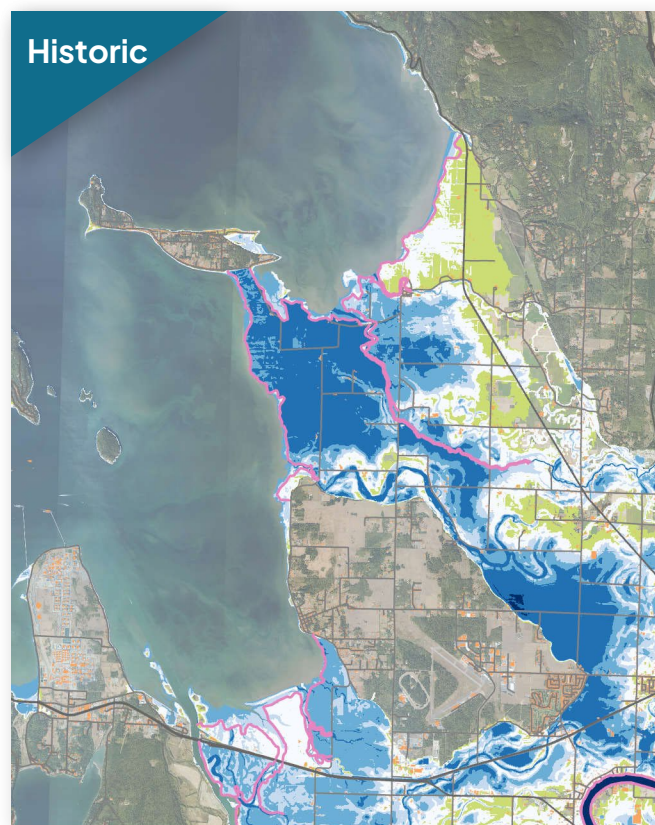
Padilla and Samish Bays | 10 Year



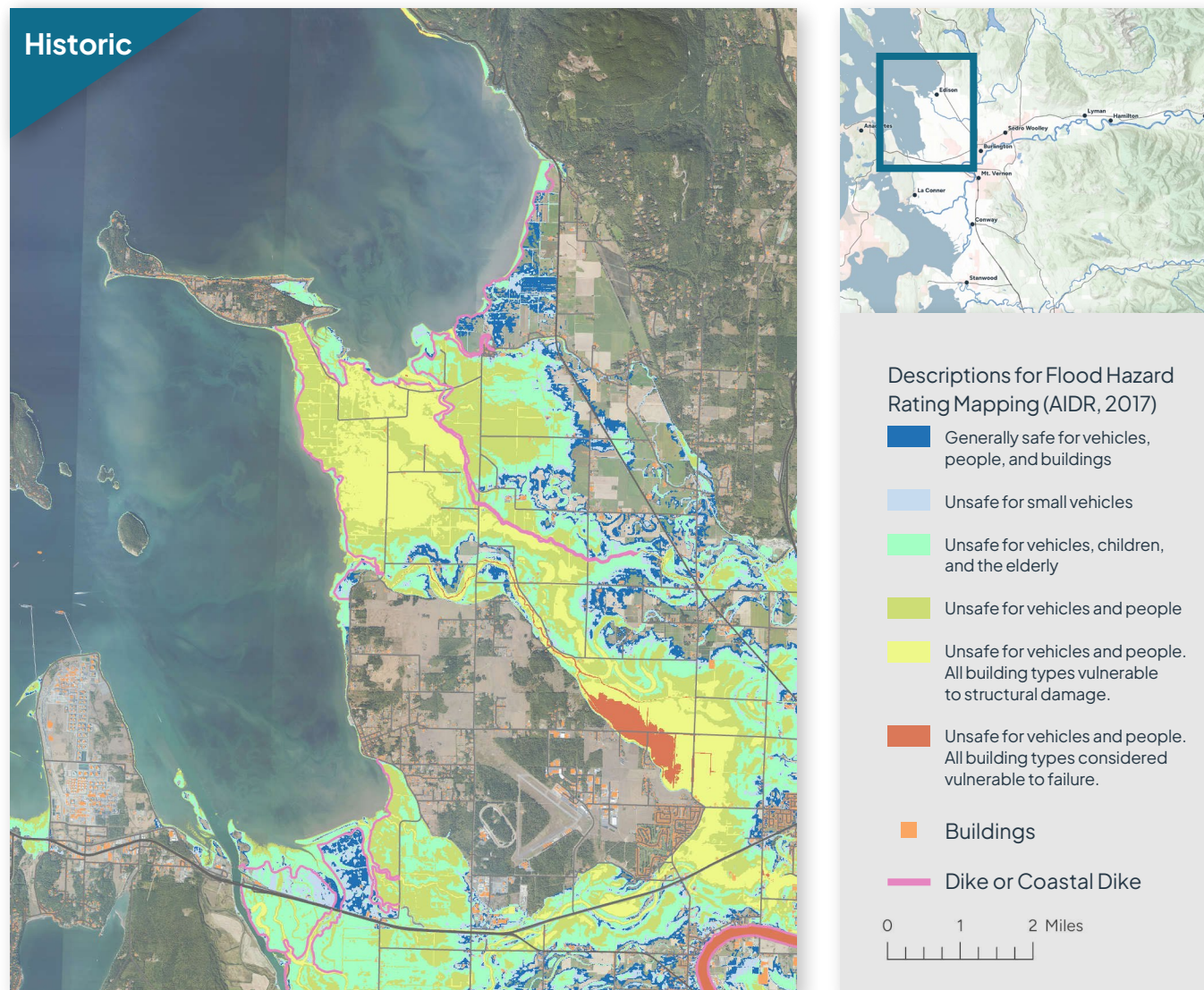
Padilla and Samish Bays | 25 Year



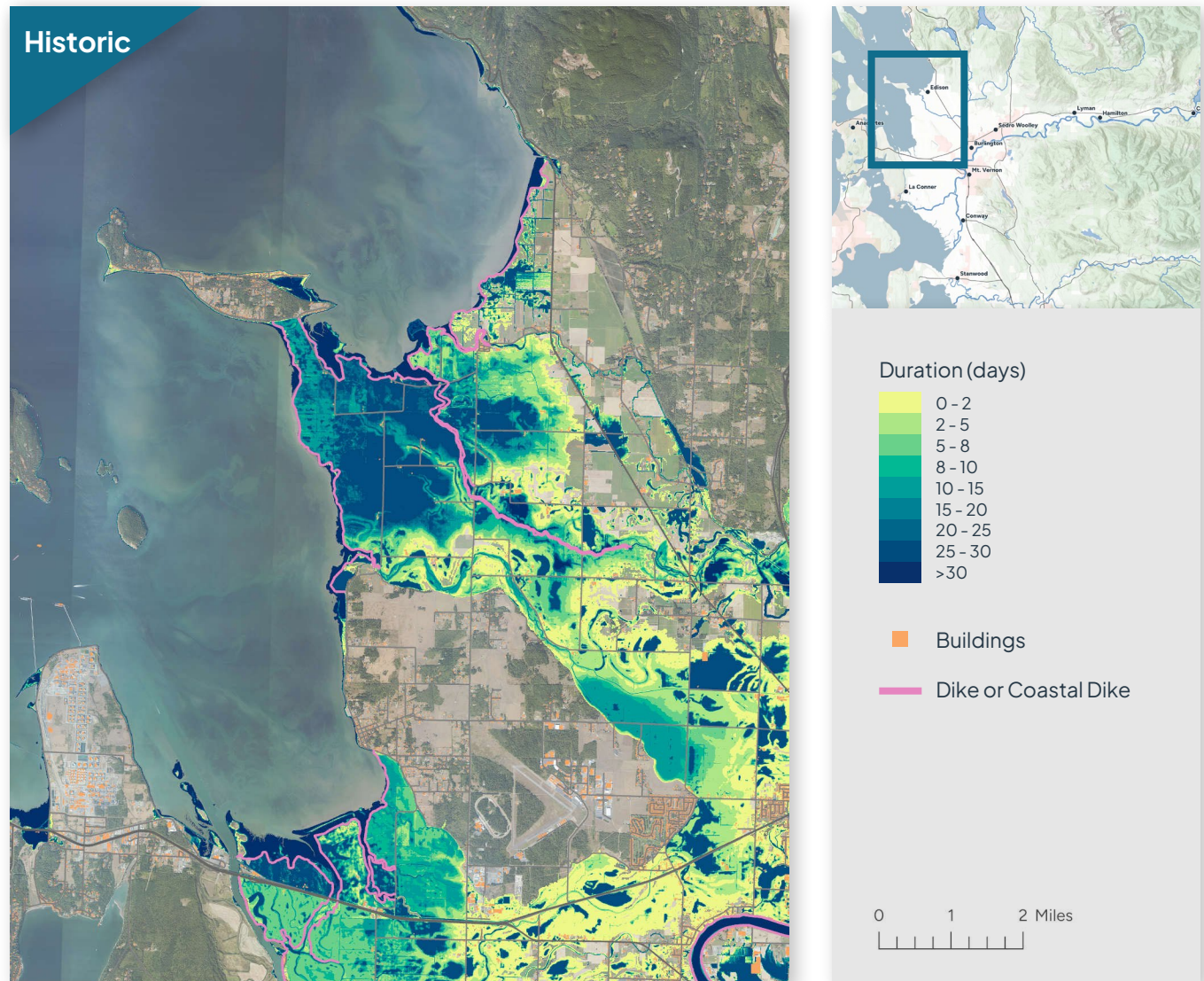
Padilla and Samish Bays | 100 Year



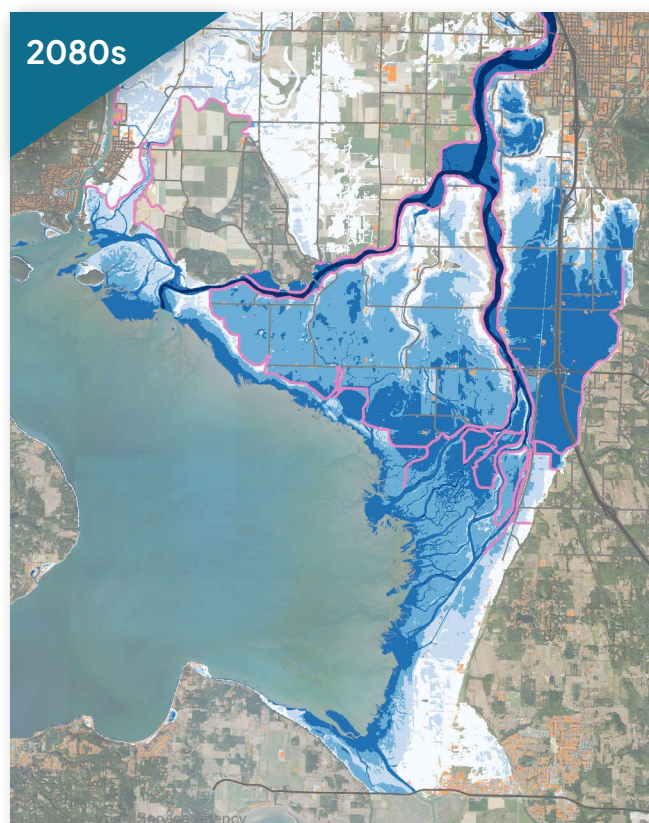
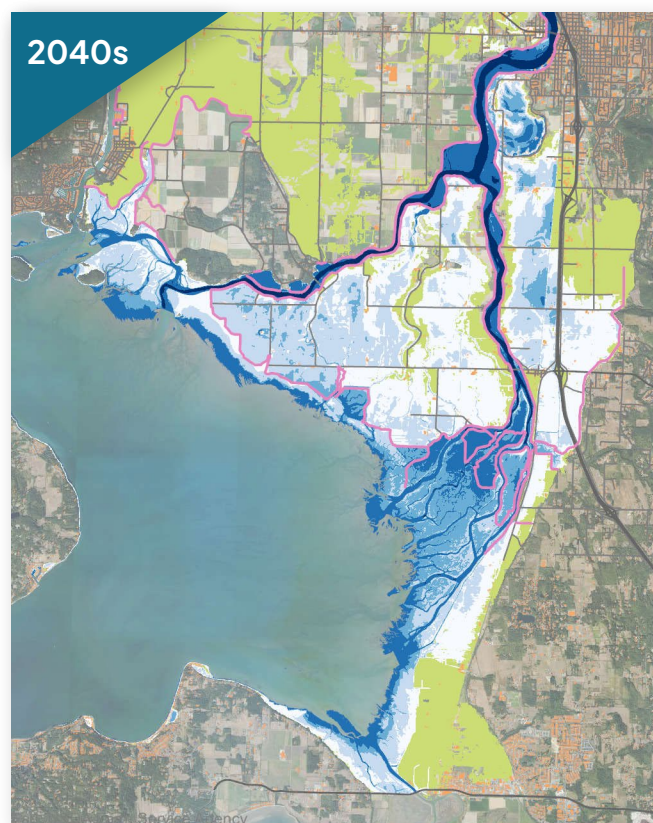
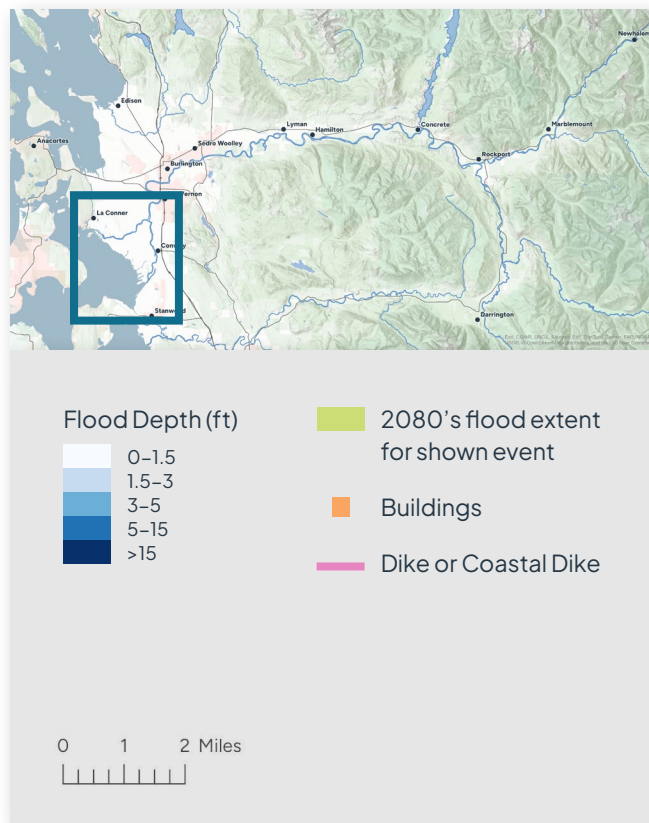
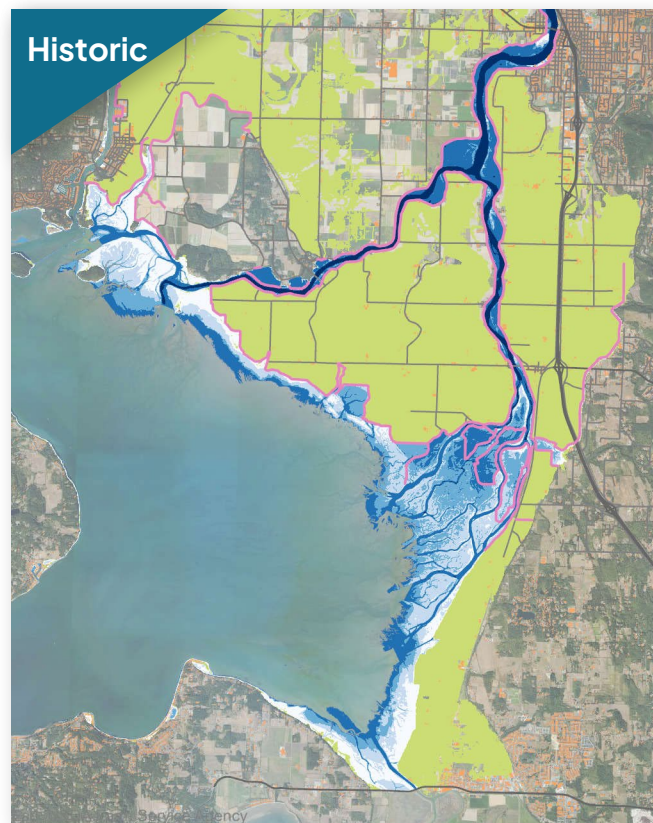
Padilla and Samish Bays | Depth-Velocity Hazard



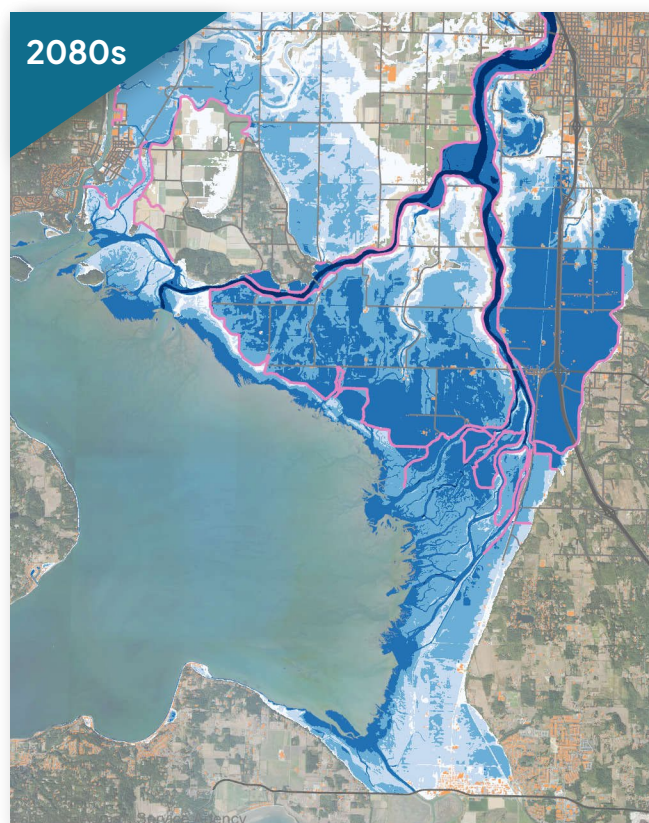
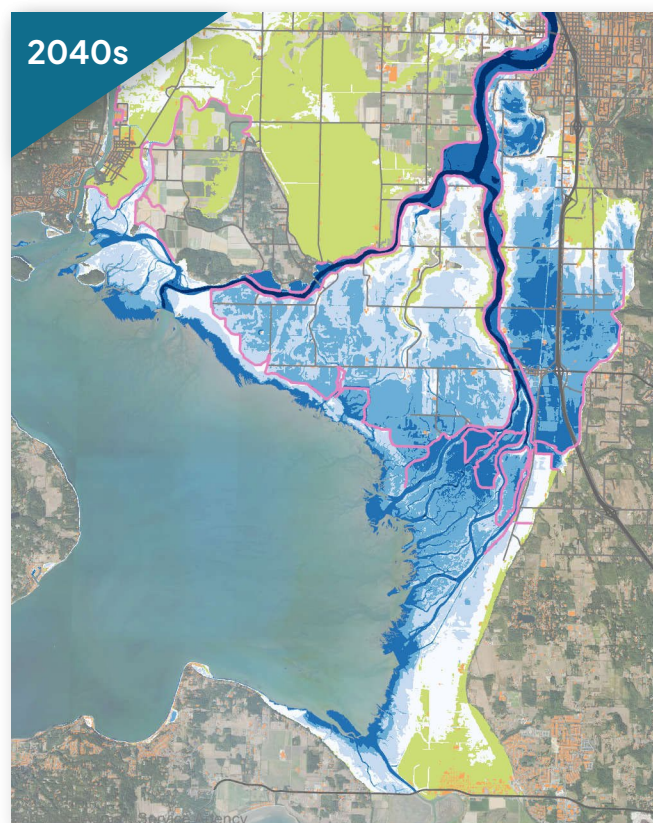
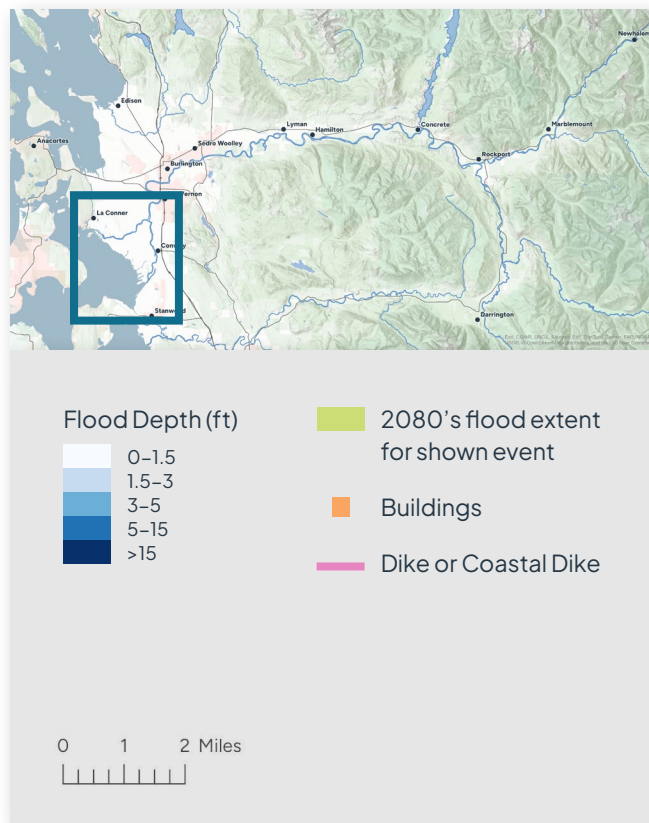
Padilla and Samish Bays | Duration



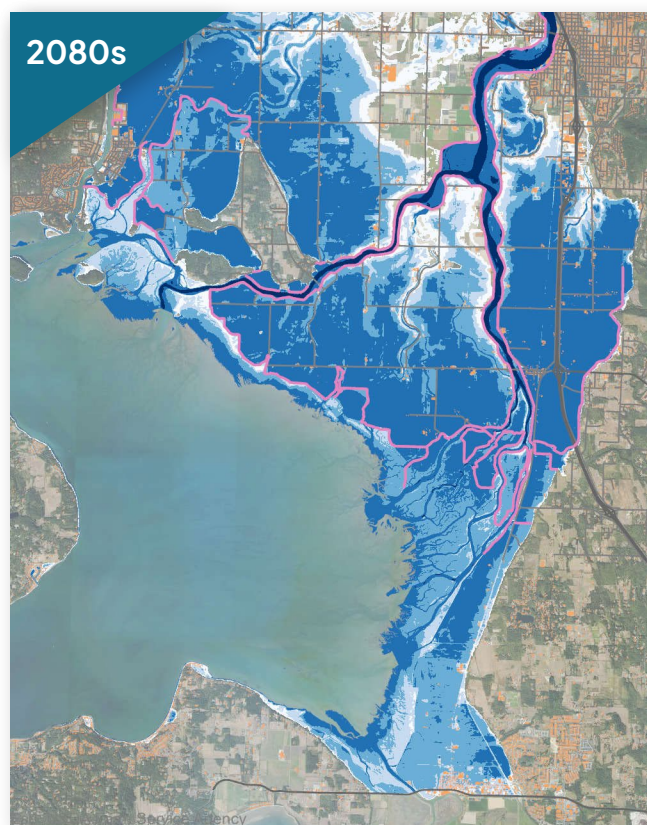
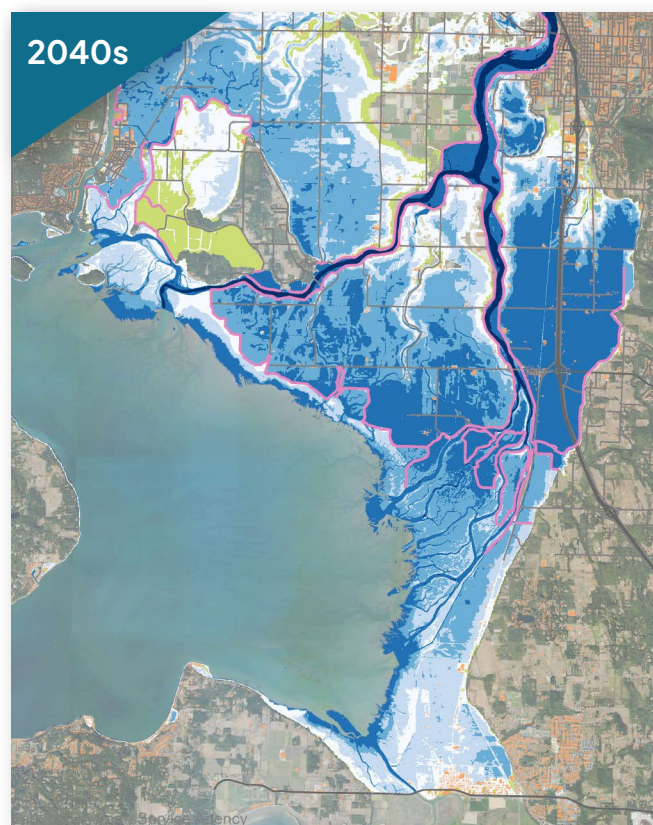
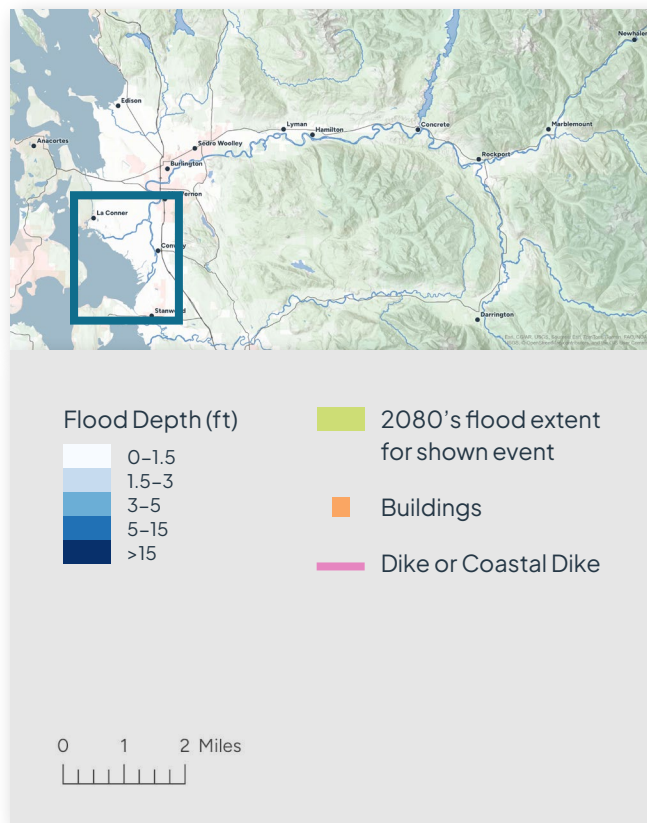
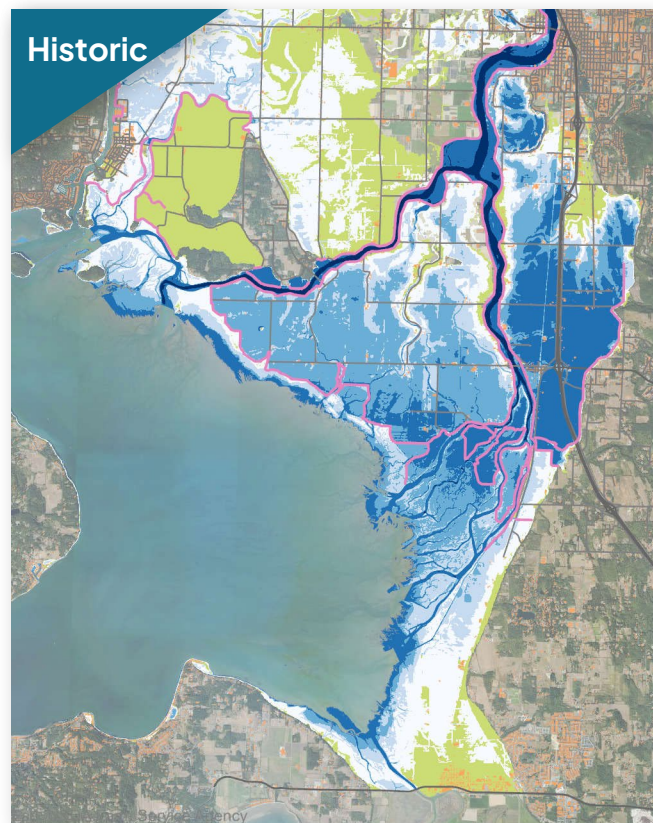
Skagit Bay | 10 Year Flood



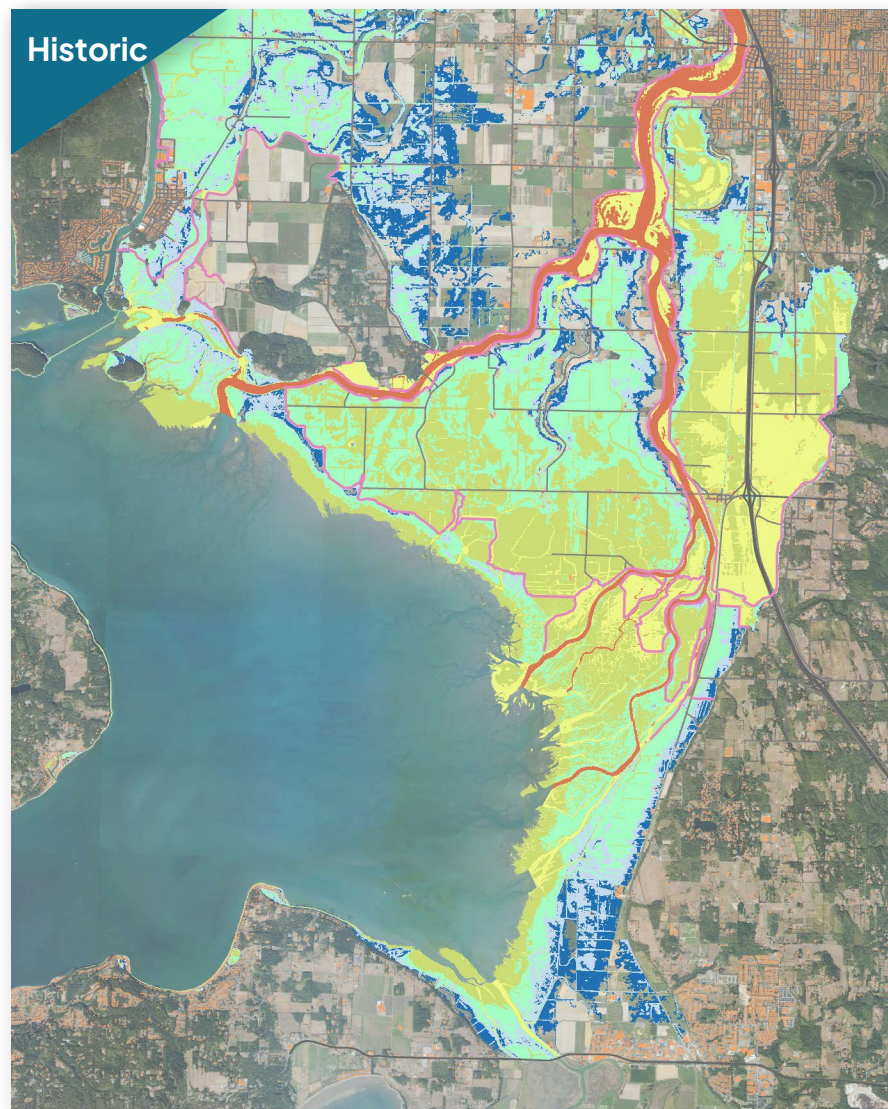
Skagit Bay | 25 Year Flood



Skagit Bay | 100 Year Flood



Skagit Bay | Depth-Velocity Hazard

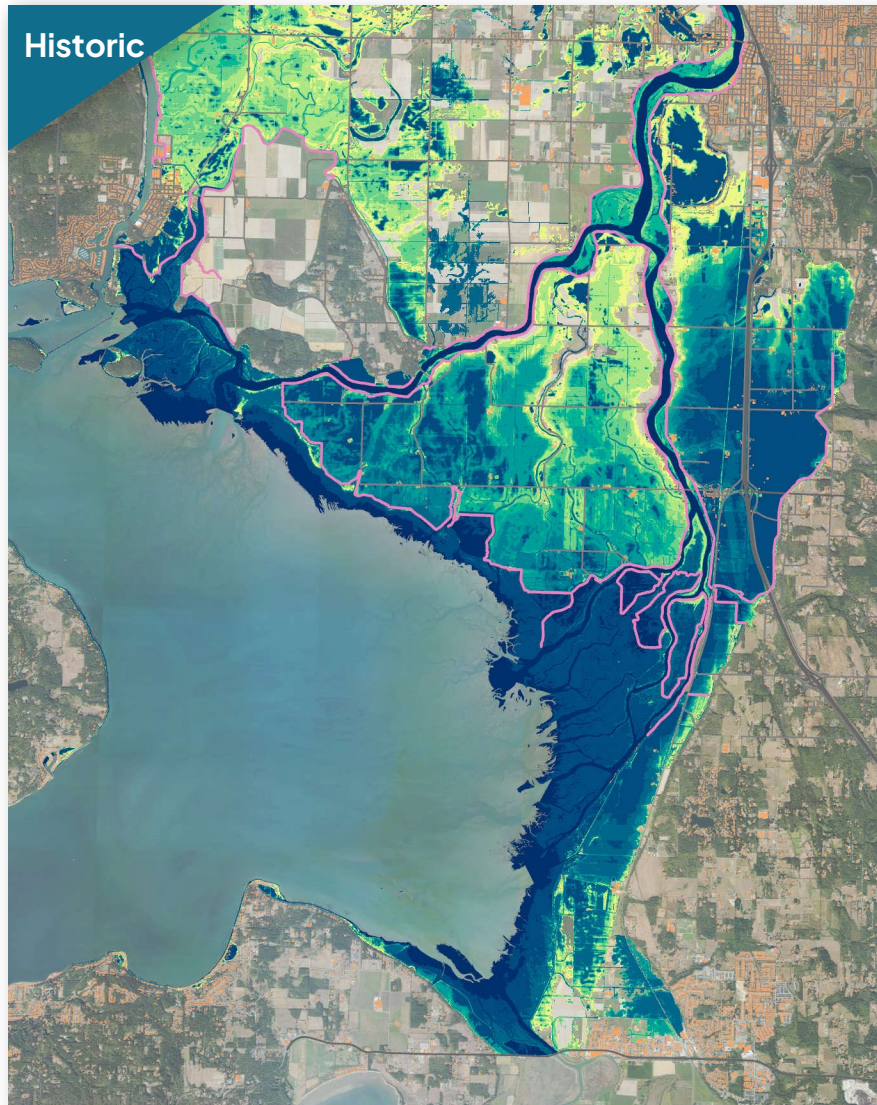


Descriptions for Flood Hazard Rating Mapping (AIDR, 2017)

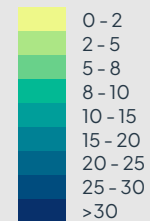
- Generally safe for vehicles, people, and buildings
- Unsafe for small vehicles
- Unsafe for vehicles, children, and the elderly
- Unsafe for vehicles and people
- Unsafe for vehicles and people. All building types vulnerable to structural damage.
- Unsafe for vehicles and people. All building types considered vulnerable to failure.
- Buildings
- Dike or Coastal Dike

0 1 2 Miles

Skagit Bay | Duration



Duration (days)



Orange square: Buildings

Pink line: Dike or Coastal Dike



References

Microsoft (2022). Building Footprints [shapefile]. File last modified 2022. <https://www.arcgis.com/home/item.html?id=bb69f10baf334d4c935a0fb23d758f38>

Skagit County (2022). Dikes and Levees [shapefile]. File last modified 2022.

Skagit County GIS. Road Centerline [shapefile]. File published 2019.

(USACE) U.S. Army Corps of Engineers. (2014). Skagit River Flood Risk Management General Investigation: Draft Feasibility Report and Environmental Impact Statement. Prepared for Skagit County, Washington, by the Seattle District of the U.S. Army Corps of Engineers. Available at: <https://www.skagitcounty.net/Departments/PublicWorksSalmonRestoration/main.htm>

(USDA) United States Department of Agriculture (2023). USDA Farm Service Agency, National Agriculture Imagery Program (NAIP) 2023 Imagery. <https://nracs.app.box.com/v/naip>

Washington State Department of Transportation Cartography/GIS Section. State Routes of Washington at 1:24,000 [shapefile]. File published 2008.