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AGENDA DATE: January 26, 2021

TO: Del Norte County Board of Supervisors

FROM: Kymmie Scott, Emergency Services Manager

SUBJECT: Adoption of the California Tsunami Hazard Area Maps

RECOMMENDATION FOR BOARD ACTION:

- Receive a presentation from representatives from the California Geological Survey, California Governor's Office of Emergency Services, and the Redwood Coast Tsunami Work Group regarding the history of tsunami hazard mapping in Del Norte County and the history of new *Tsunami Hazard Area Map* products; and
- Adopt Resolution No. 2021-XX Adopting the California *Tsunami Hazard Area Maps* for Del Norte County.

DISCUSSION/JUSTIFICATION:

The California Tsunami Program, led by the California Governor's Office of Emergency Services and the California Geological Survey, is responsible for updating the State's tsunami hazard maps that are used in evacuation planning and for public safety.

The State completed the previous statewide tsunami hazard maps in 2009. Based on increasingly better science, improved modeling, and information learned from tsunamis that have occurred since 2009, the State has determined that an update of the 2009 maps was warranted to improve protection of the public from tsunami hazards. The updated statewide *Tsunami Hazard Area Maps* will be completed in 2021.

The 2021 *Tsunami Hazard Area Maps* are an update to the 2009 maps produced by the State of California and their development was informed by mapping methods developed in coordination with the Redwood Coast Tsunami Work Group (RCTWG) over the last decade. The map making process included stakeholder meetings led by a subcommittee of the RCTWG that occurred in Del Norte and Humboldt Counties in 2018 and 2019.

ALTERNATIVE:

Do not adopt the maps and either (1) continue using the previous maps from 2009, or

(2) develop hazard maps as alternatives to the state maps (note that this alternative may require significant funding and result in a product inconsistent with other counties in the State and be of lesser quality and accuracy than the State maps).

FINANCING:

New Tsunami Hazard Area Map brochures informing the community of the updated hazard areas will be provided through RCTWG by funding from National Weather Service.

CHILDREN'S IMPACT STATEMENT:

This section meets 1 of the following outcome measures for children in Del Norte County:

- Children ready for and succeeding in school.
- Children and youth are healthy and preparing for adulthood.
- Families are economically self-sufficient.
- Families are safe, stable and nurturing.
- Communities are safe and provide a high quality of life.
- No impact to Children as a result of this action.

OTHER AGENCY INVOLVEMENT:

Multiple local stakeholders were engaged during development of the new method used to create the Tsunami Area Hazard Maps, including but not limited to the Del Norte Unified School District, Del Norte County Sheriff's Office, City of Crescent City, Crescent City Police Department, Crescent City Fire and Rescue, Crescent City Harbor District.

SIGNATURE REQUIRED: Chair signature on Resolution No. XXX

ADMINISTRATIVE SIGN-OFF:

- AUDITOR:
- COUNTY ADMINISTRATIVE OFFICER: Jay Sarina
- ASSISTANT COUNTY ADMINISTRATIVE OFFICER:
- COUNTY COUNSEL:
- PERSONNEL:
- OTHER DEPARTMENT:

**RESOLUTION AUTHORIZING THE ADOPTION OF THE CALIFORNIA TSUNAMI
HAZARD AREA MAPS FOR DEL NORTE COUNTY**

RESOLUTION NO. 2021-XX

WHEREAS, new tsunami hazard information and mapping tools developed over the past 10 years represent a need for updated tsunami hazard area maps and evacuation plans; and

WHEREAS, new information about tsunami sources around the Pacific Ocean and local earthquake and landslide sources off the coast of California has been discovered; and

WHEREAS, improvements have been made in the tsunami computer models used to simulate tsunami inundation; and

WHEREAS, there is geologic evidence of tsunamis over the past 3,500 years along the north coast where the Cascadia subduction zone is located; and

WHEREAS, evacuation planning should not rely on the historical or geologic record alone, but should be more conservative to allow for greater life-safety; and

WHEREAS, the 2009 tsunami hazard maps are over 10 years old; and

WHEREAS, guidelines set by the National Tsunami Hazard Mitigation Program indicate that tsunami hazard maps should be re-evaluated and possibly updated every 5 to 10 years; and

WHEREAS, the California Tsunami Program, led by the California Governor's office of Emergency Services and the California Geological Survey, is responsible for updating the state's tsunami inundation maps for evacuation planning and public safety; and

WHEREAS, the State has developed new California Tsunami Hazard Area Maps to be utilized in local evacuation and public safety planning;

NOW, THEREFORE, BE IT RESOLVED, that the Del Norte County Board of Supervisors:

1. Adopts the use of the new California Tsunami Hazard Area Maps for Del Norte County.
2. Will use the adopted updated maps to guide future evacuation and public safety planning.

PASSED AND ADOPTED BY THE BOARD OF SUPERVISORS OF DEL NORTE on this 26th day of January, 2021 by the following vote:

AYES:

NOES:

ABSTAIN:

ABSENT:

Chair
Board of Supervisors

ATTEST:

Kylie Goughnour
Clerk of the Board of Supervisors

Date: _____

By: _____



2020-21 California Tsunami Hazard Area Map Updates



The California Tsunami Program (State), led by the California Governor's Office of Emergency Services and the California Geological Survey, is responsible for updating the State's tsunami inundation maps that will define our tsunami hazard areas in support of evacuation planning and public safety. Communities use the State's tsunami hazard maps to develop and update their evacuation route maps and emergency response plans. The State is constantly evaluating tsunami events, sources, and analysis techniques to ensure that coastal communities are safe from tsunami hazards.

The State completed the previous set of statewide tsunami inundation maps in 2009. Lesson's learned from 2011 Japan tsunami, and new tsunami hazard data and mapping tools developed over the past 10 years indicate that some areas of the California coastline may have a higher tsunami hazard than is represented in the 2009 maps. Based on this more recent information, the State has determined that an update of the 2009 maps is warranted to protect the public from tsunami hazards. The following steps summarize the plan for updating the tsunami hazard maps, and provide guidance and a timeline for communities to update their emergency response plans, tsunami sign locations, etc.

Process for the State to update tsunami hazard maps:

- The updated tsunami hazard maps encompass the tsunami model flood areas (inundation areas) for maximum considered events and include a logical inland buffer which typically extends to the nearest streets and landmarks and/or to a set elevation.
- These maps could be used directly for evacuation purposes if a community so chooses.
- The State will meet with communities to discuss the new tsunami hazard maps and, if needed, help identify where community response plans may require updating.
- To allow time for communities to digest and accommodate changes in the State tsunami hazard maps, the maps will be made available to community planners at least one month prior to the State updating them in the "California Tsunami Preparedness Guide" on the www.tsunami.ca.gov website.
- The State will update the tsunami response decision-support tools/products (Playbooks) to include the new tsunami hazard area map (or an associated community tsunami evacuation map) as the updated maximum phase evacuation maps.

Guidance for communities in updating local plans and tsunami sign locations:

- Before the new tsunami hazard area maps are made available to the public, communities are encouraged to share the maps with key decision makers and response personnel to determine if their tsunami response plans should be updated, and if and where tsunami hazard signs should be placed or moved.
- The State tsunami program has resources available and is happy to assist communities throughout this process.



2020 California Tsunami Hazard Area Map Updates



FREQUENTLY ASKED QUESTIONS:

What are the three different parts of tsunami modeling and mapping process?

- SOURCE – The tsunami source is defined by the region, magnitude, and earthquake rupture area. We are only including large, realistic sources (earthquakes and landslides).
- PROPAGATION – The part of tsunami modeling which shows movement of the tsunami from the source across the deep ocean towards the nearshore area of coastline.
- INUNDATION – As the tsunami approaches the coast, a more precise model is used to simulate the tsunami moving within the shallow-water/nearshore region and onto land to show all areas of flooding. These products are reviewed in the office using GIS and in the field before the tsunami hazard area maps are created.

Why is the State updating the existing tsunami hazard area maps?

- The California Tsunami Program is constantly evaluating tsunami events and potential sources to ensure that coastal communities have plans in-place to reduce impacts from the tsunami hazard.
- The 2009 tsunami maps are 10-years old. New tsunami hazard information and mapping tools developed over the past 10 years indicate that some areas of coastline may have a higher tsunami hazard than represented in the existing maps.
- Guidelines established by the National Tsunami Hazard Mitigation Program recommend that tsunami hazard maps be re-evaluated and possibly updated every 5 to 10 years.

Are the existing 2009 tsunami inundation maps and related evacuation maps inaccurate or inadequate?

- The existing maps accurately capture the tsunami hazard for most major tsunamis from local and distant source threats.
- There are multiple reasons for the update: 1) to develop more precise tsunami hazard maps incorporating new information; 2) to follow national guidance on updating maps every 5 to 10 years; and 3) to provide more conservative, more consistent tsunami hazard maps statewide.
- Significant changes to the 2009 tsunami maps are not expected in most places.
- If significant changes occur to the defined tsunami hazard area, the State will assist local emergency managers and decision-makers who want to update their local tsunami response/evacuation plans.

What new tsunami hazard information is available, and why is it appropriate for updating the 2009 maps?

- Over the past 10 years, tsunami science has significantly improved, with a better understanding of tsunami sources and enhancements to computer modeling.

- New information is available about tsunami sources around the Pacific Ocean and local earthquake and landslide sources off the California coast. These sources are included in the tsunami hazard map updates in many areas.
- Improvements have also been made in the tsunami computer models used to simulate tsunami inundation. These improvements include verification against existing tsunami flood data and the availability of bathymetric and topographic information with higher map resolution, which improves accuracy. This enhances the ability of the tsunami model to capture subtle land surface changes and refine the extent of water flow onto land.
- Tsunami events such as 2010 Chile, 2011 Japan, and 2018 Indonesia taught scientists and planners a number of lessons about how to better plan for and respond to tsunamis.
 - In the 2011 Japan tsunami, hazard maps underestimated the tsunami threat in some locations in Japan because they were based on inundation from historical events over the past 100 to 500 years. However, there was geologic evidence of larger tsunami events that occurred on a 1000-year basis; the 2011 Japan tsunami was one of those 1000-year events.
 - California does not have historical tsunami records going back more than 200 years, though there is geologic evidence of a number of tsunamis over the past 3,500 years along the north coast where the Cascadia subduction zone is located.
 - Evacuation planning should not rely on the historical or geologic record alone; it should be more conservative. The State is using new scientific information to make tsunami planning more conservative and capture potential, lesser-known events.
- The new tsunami hazard maps incorporate most potential tsunami events with a 1000-year average return period; this return period translates to a 5 percent chance of flood exceedance over the next 50 years.
 - The tsunami hazard maps incorporate a statistical representation of the unknown, called “uncertainties.” The upper statistical limit of uncertainty is added to the modeled inundation area, making the results more conservative and safeguarding communities against unknown tsunami hazards. This information helps provide a conservative buffer against potential tsunami events that have not happened in historic time or in the geologic record.
- The tsunami hazard maps include an additional buffer that typically extends to the nearest streets and landmarks or a specific elevation, which will more directly help communities with their evacuation planning needs.
- Overall, the new State tsunami hazard area maps best characterize current tsunami science in California.

When are the tsunami hazard area maps expected to be completed statewide?

- The State plans to complete all maps by the end of 2021.
- The existing maps and Playbooks are still valid and should be used during a tsunami event.



Tsunami Hazard
Updates
Del Norte County
Electeds Review

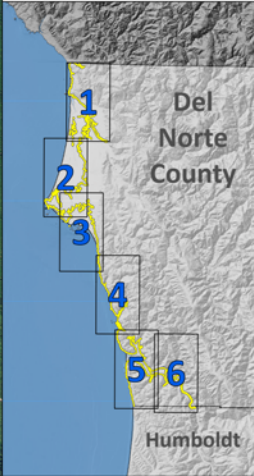
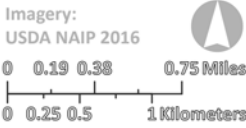
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Tsunami Hazard Area v 2.3
2009 Tsunami Inundation

Map Number: 1





Tsunami Hazard
Updates
Del Norte County
Electeds Review

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Tsunami Hazard Area v 2.3
2009 Tsunami Inundation

Map Number: 2

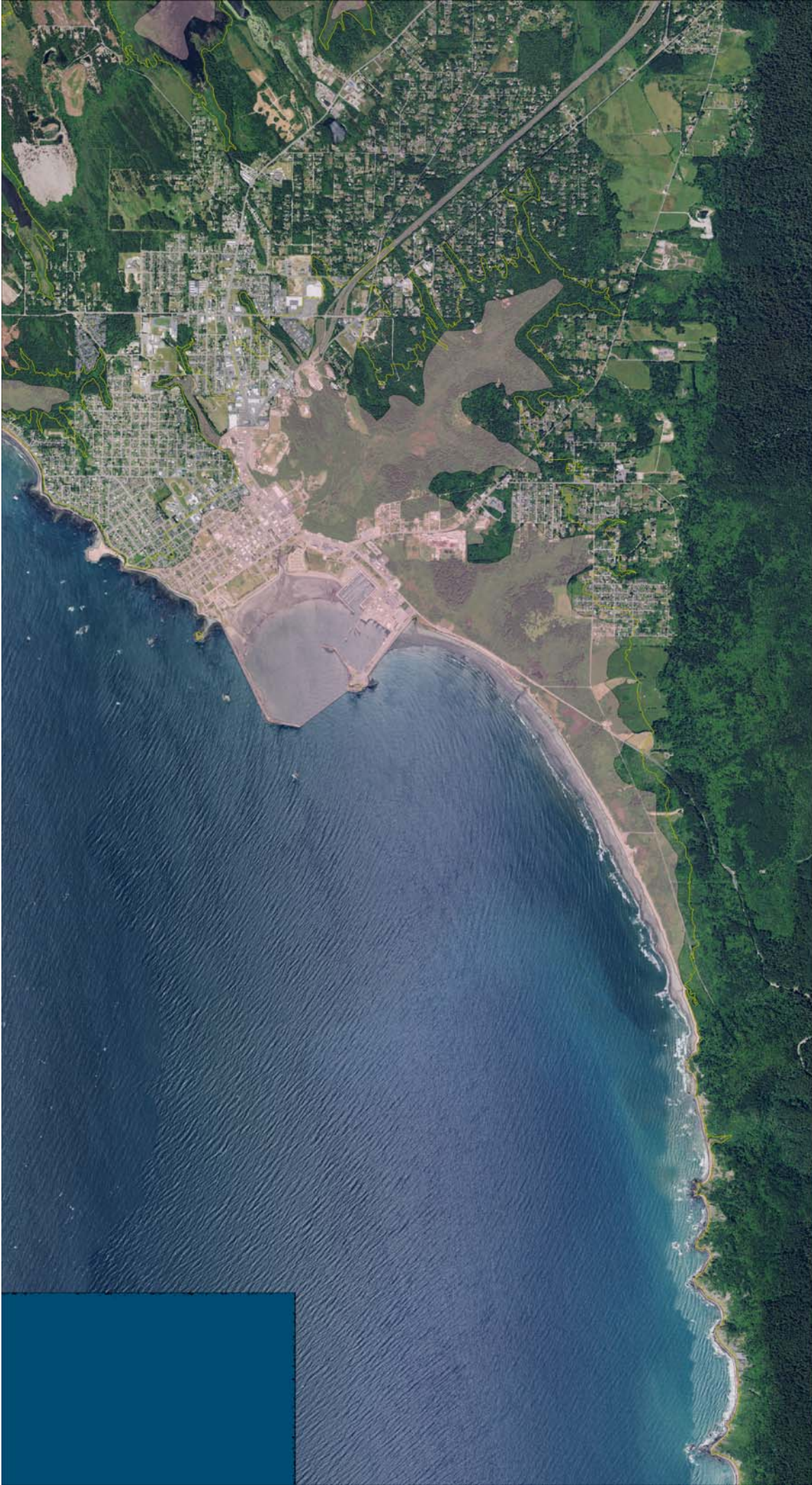
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USDA NAIP 2016



0 0.19 0.38 0.75 Miles

0 0.25 0.5 1 Kilometers





Tsunami Hazard
Updates
Del Norte County
Electeds Review

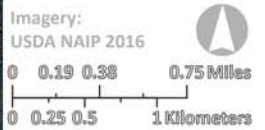
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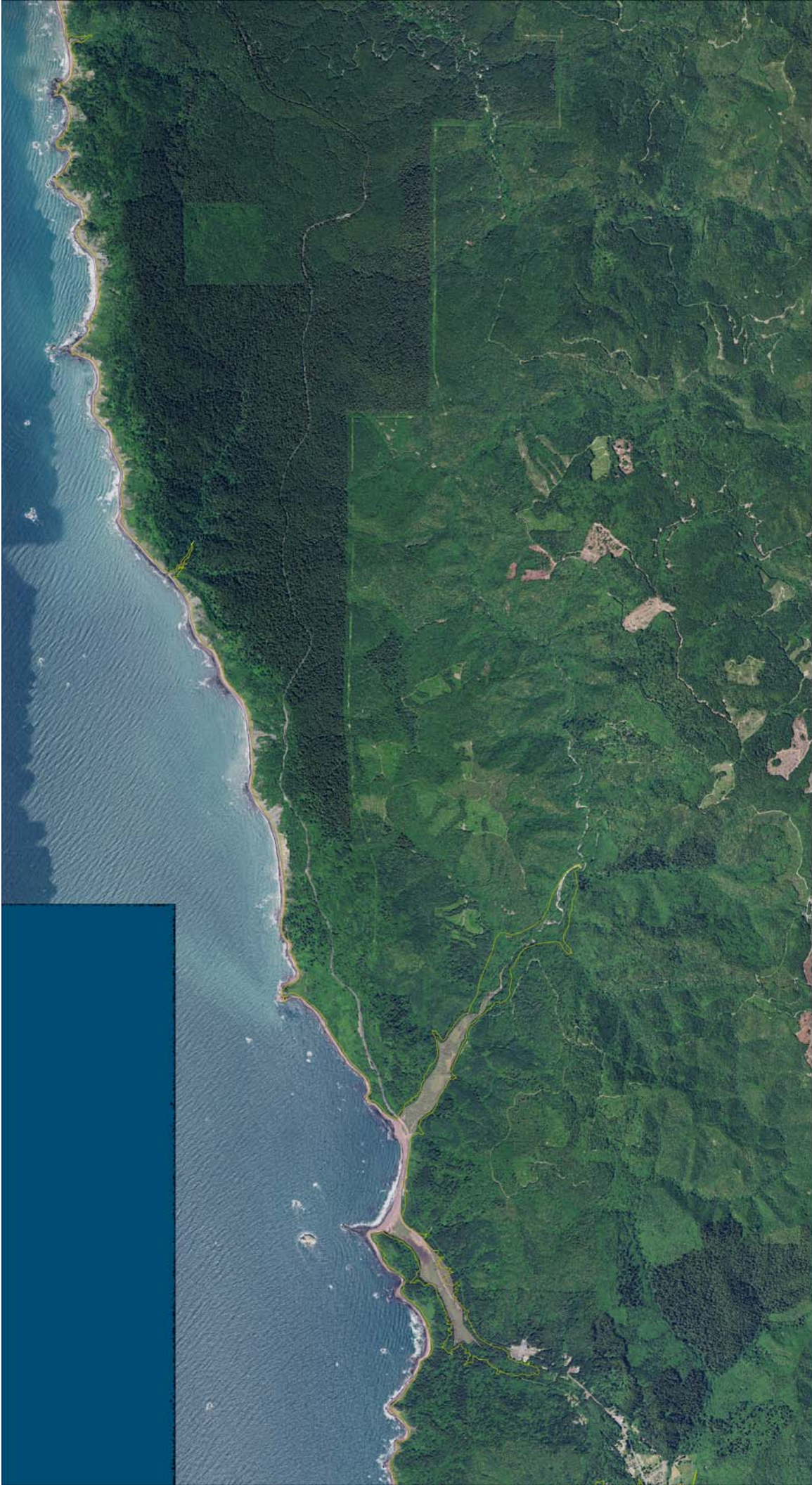
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- Tsunami Hazard Area v 2.3
- 2009 Tsunami Inundation

Map Number: 3





Tsunami Hazard
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Del Norte County
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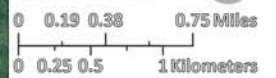
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Tsunami Hazard Area v 2.3
2009 Tsunami Inundation

Map Number: 4

Imagery:
USDA NAIP 2016





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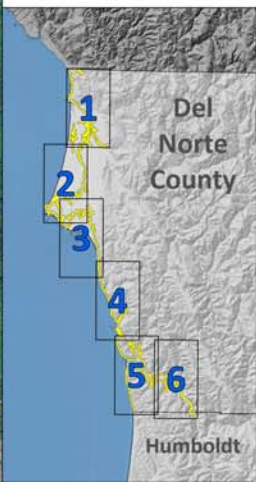
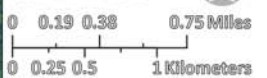
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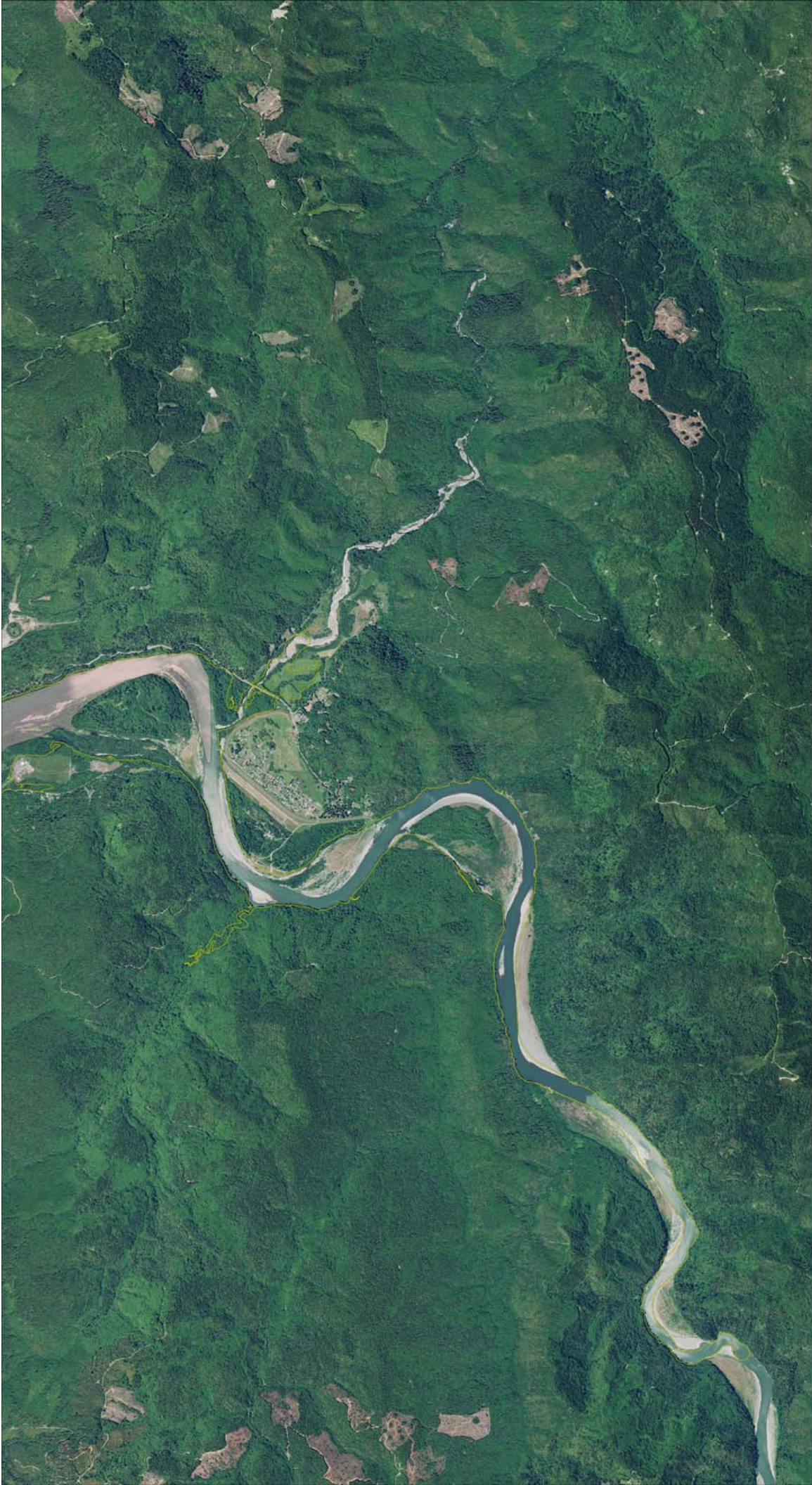


Tsunami Hazard Area v 2.3
2009 Tsunami Inundation

Map Number: 5

Imagery:
USDA NAIP 2016





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California
**Department of
Conservation**
California Geological Survey
Seismicity, Landslides & Watershed Data



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GOVERNOR'S OFFICE
OF EMERGENCY SERVICES

— Tsunami Hazard Area v 2.3
■ 2009 Tsunami Inundation

Map Number: 6

Imagery:
USDA NAIP 2016



0 0.19 0.38 0.75 Miles

0 0.25 0.5 1 Kilometers

