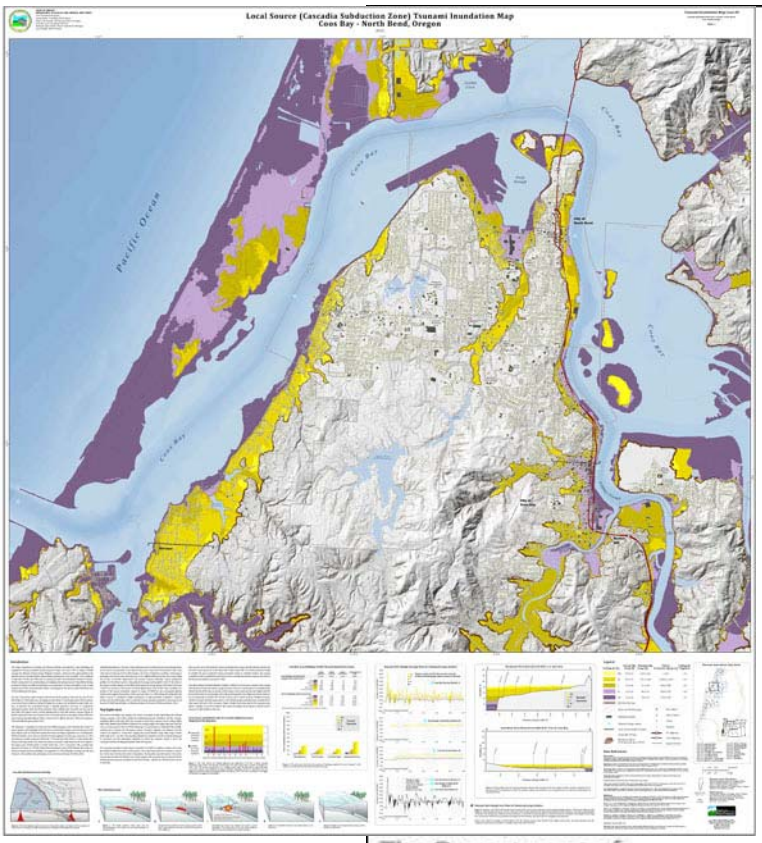
Proposal to the National Ocean Services (NOS)
For a Coastal Zone Management
Project of Special Merit Competition
Fiscal Year 2016
Submittal - December 18, 2015

Building Resilience to Tsunami along the Oregon Coast: Local Government Land Use Implementation



The Department of Land Conservation and Development

May 2015

Preparing for a Cascadia Subduction Zone Tsunami: A Land Use Guide for Oregon Coastal Communities

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1. PROJECT TITLE: Building Resilience to Tsunami along the Oregon Coast: Local Government Land Use Implementation

2. PROJECT OVERVIEW:

Applicant Contact Information:

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Geographic Area(s) Affected: Selected communities along the Oregon coast with high tsunami vulnerability

Total Cost: $250,000

Did you submit an additional PSM proposal for consideration? No

3. PROJECT OF SPECIAL MERIT ENHANCMENT AREAS

List all that apply: Coastal Hazards

4. ASSOCIATED PROGRAM CHANGE

The approved strategy that the proposed PSM will support is "Coastal Hazard Planning". The approved types of program changes that this strategy will result in, or implement include: 1) new or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding; and 2) include new or revised local coastal programs and implementing ordinances. The OCMP is a networked program that is comprised of a number of state agency authorities along with the comprehensive plans and implementing land use

regulations of every coastal local government. Portions of the local comprehensive land use plans and development codes are foundational enforceable policies of the OCMP. Therefore, most changes to those plans and codes accomplished through this project will represent program changes that establish important new enforceable policies at the community level. The principle project manager will coordinate with the OCMP Federal Consistency Coordinator and Office for Coastal Management (OCM) on potential enforceable policies as they are developed to assist in concurrence.

5. PROJECT DESCRIPTION

Summary: The project will serve to increase resilience to a Cascadia Subduction Zone tsunami by assisting four or more coastal local governments in the development of land use resilience measures and strategies focused on tsunami hazard, and the implementation of these measures through local comprehensive plans and development codes. To accomplish this work, the OCMP will develop and utilize a new suite of comprehensive tsunami maps and socioeconomic exposure data products.

Background: Oregon's coastal communities face multiple risks from chronic natural hazards that challenge community resilience. These risks include climate change effects, such as changes in the patterns and magnitude of severe storms, sea level rise and attendant shoreline erosion, and over time gradual coastal inundation coupled with increased risks of flooding. However, the greatest hazard facing coastal communities is the occurrence of a Cascadia Subduction Zone (CSZ) earthquake and tsunami. While communities must plan for and take actions to adapt to all hazards with varying levels of risk, actions associated with building resilience to a catastrophic CSZ event will achieve the greatest benefits to coastal communities and simultaneously address several other chronic hazard risks affecting coastal development.

Fortunately, considerable resources have been devoted to developing data, modeling and mapping capabilities in order to document the tsunami risk on the Oregon coast, and to assist in identifying needed adaptation actions. These efforts include a multi-year study undertaken by DOGAMI to re-map the Oregon coast for tsunami inundation using state of the art computer modeling and detailed topographic lidar data; the remapping was completed in 2013. The outcome of this effort was the creation of new and more accurate tsunami evacuation maps for the entire Oregon coast (http://nvs.nanoos.org/TsunamiEvac). Most recently, DLCD published a major tsunami land use guidance document, which is designed to be used in conjunction with the DOGAMI inundation mapping, and provides for a suite of approaches that local communities can use to help build resilience through land use planning implementation (OCMP, 2015).

Although resilience to a CSZ tsunami in Oregon's coastal communities is currently low, both in terms of short-term (life safety) and long-term (future planning), these existing data and policy products provide a foundation to significantly advance and increase resilience efforts. The current setting presents a strong opportunity to capitalize on existing data and policy products to establish on-the-ground measures to significantly increase community resilience on the Oregon coast.

The Problem: The significance of this project cannot be overstated. A CSZ earthquake and accompanying tsunami event along the PNW coast of northern California, Oregon and Washington will be the largest and most destructive natural disaster to strike the United States. A recent article in the New Yorker Magazine underscores this fact (http://www.newyorker.com/magazine/2015/07/20/the-really-big-one). Increasing resilience to a CSZ earthquake and accompanying tsunami through this local government effort is a major priority of the state of Oregon. The Oregon Governor's office has provided a letter supporting these efforts (see letter in Appendix 10b). Unfortunately, communities in Oregon and

across the PNW are increasingly challenged to anticipate, prepare for, and recover from natural hazard disasters, as budgets and capacity are eroded. Recent events such as the 2004 Indian Ocean and 2011 Tōhoku tsunamis are a sobering reminder of the magnitude of the problem PNW communities will face. The 2011 Tōhoku tsunami killed ~15,800 people (ITIC, 2015), and the economic impact is estimated to be ~$235 billion (Kim, 2011), making it the most expensive disaster in history. Local governments in the PNW will be severely challenged by both the costs of and the recovery time from a locally generated CSZ earthquake and accompanying tsunami. These issues set the stage for natural hazards mitigation planning and provide opportunities for improved community resilience that emphasizes the value of an informed and engaged community. Implementation of project components will provide initial community engagement and provide the basis for essential community education and outreach. OCMP staff will continue beyond the scope of this project to further enhance these initial efforts.

The built environment in Oregon's coastal communities represents more than a century of community development and investment, undertaken largely without knowledge of or regard for tsunami risk. Due to steep terrain and a narrow coastal strip, this development is mostly confined to low-lying areas, along coastal bluffs and dunes, or along the steep sides of coastal hills (Allan et al., 2009). While Oregon's statewide system of land use planning requires local government comprehensive plans to incorporate measures to reduce risk from natural hazards, the recent tsunami hazard information has not yet been adequately addressed by coastal communities, primarily as a result of budget constraints and low planning capacity. As a result, existing local government land use plans do not include detailed information, policies, and implementing measures to effectively address the hazard. Effecting changes in development patterns through land use policy often takes considerable time. As a result, there is an urgent need to implement effective land use measures now and thus begin to build long-term community resilience.

Relationship of the proposed project to the CMP's approved Assessment and Strategy: The proposed project addresses the OCMP's approved assessment and strategy by implementing key components of the "Coastal Hazards Planning" strategy including:

- Working with Oregon coast jurisdictions to develop comprehensive plan and development code provisions to address tsunami hazards;
- Providing technical and financial support to local governments for the management of a high priority hazard (tsunami);
- Focusing on implementation of improved land use measures related to coastal hazards at the local government level.

How the proposed project will further all or part of a program change that the CMP has identified in its Strategy: The proposed project is intended to further program changes identified in the approved strategy by creating revised local government authorities, regulations and policies; and by implementing new comprehensive plan provisions and code provisions. It does this, as indicated below, by utilizing the OCMP tsunami land use guidance and applicable hazard data to assist selected Oregon coast communities in developing and adopting land use resilience strategies and implementation measures. Adopted changes will be submitted as enforceable policies of the OCMP in the routine program change process.

Goals: The principal goal of this project is to increase community resilience to a tsunami that will strike the Pacific Northwest (PNW) coast of Oregon within minutes following a Cascadia Subduction Zone (CSZ) earthquake. This goal will be accomplished with participation from four (4) jurisdictions along the Oregon coast (see letters of collaboration in Appendix 10b) and will be achieved through the

completion of two specific project objectives outlined below.

Objectives: There are two central objectives we would like to achieve in this PSM. Together, Objective 1 and Objective 2 will result in effective, integrated resilience planning, enabling the following issues to be addressed:

- Establish and implement improved land use measures and strategies to address tsunami and other coastal hazards;
- Establish requirements for the evaluation of current development proposals in relation to tsunami evacuation risk;
- Assess the need for identifying and prioritizing evacuation infrastructure improvements;
- Assess the need for imposing additional land use limitations in highest risk areas;
- Assess and prioritize long-term relocation strategies and related infrastructure investments in high risk areas; and,
- Assess options for the siting and/or relocation of essential facilities.

Objective 1: *To increase both short and long-term community resilience we will assist and support key local government land use resilience work with Oregon coastal communities*, including:

a. Providing technical and financial support for selected local government partners for the development and implementation of improved land use measures and strategies to address tsunami and other coastal hazards. Assistance will include GIS and mapping support as needed, and interpretation and adaptation of map and evacuation modeling products for land use planning purposes. This work will be informed, in part, by time/distance/vulnerability analyses produced through modeling work conducted under Objective 2.

b. Assisting local governments in the development, drafting and adoption of comprehensive plan and development code provisions utilizing the OCMP tsunami land use planning guide (http://www.oregon.gov/LCD/OCMP/docs/Publications/TsunamiGuide20150407.pdf). This guidance document provides an important and comprehensive suite of approaches to assist local governments in establishing land use based resilience measures. We strongly suggest reviewing the guidance in order to fully comprehend the work proposed, and the potential outcomes. The guide includes chapters on comprehensive plan provisions, development code provisions and requirements, financing and incentive concepts, tsunami evacuation facilities improvement planning, long range community land use planning (relocation) that will be a foundation for the PSM work proposed here. During the course of the grant the OCMP will work with 4 or more high risk jurisdictions, on the north, central, and southern Oregon coast, in an effort to incorporate tsunami land use resilience measure into local comprehensive plans and codes. The end result will be locally implemented land use strategies, policies, and regulatory standards that will reduce vulnerability and increase community resilience.

Objective 2: *To increase short-term community resilience by developing a comprehensive suite of new tsunami maps and socioeconomic (exposure) data products*, based on the following tasks. This objective represents the development of essential information resources necessary not only to develop comprehensive land use resilience strategies but also to assist communities in their overall tsunami preparation.

a. Complete least-cost-distance (LCD) modeling that incorporates landscape characteristics such as elevation and land cover, to calculate the most efficient evacuation paths from every location in a maximum-considered CSZ tsunami inundation zone to points of safety outside the zone (Fraser et al., 2014; Wood et al., 2015; Wood and Schmidtlein, 2011).

b. With knowledge of the expected CSZ tsunami wave arrival time at every node in our tsunami

model grids, produce maps of wave front arrival times and time/distance maps of minimum pedestrian evacuation speeds to reach safety on the LCD paths (Priest et al., in press).
c. Complete updated socioeconomic analyses of community exposure to various tsunami inundation scenarios in order to assess the numbers of people (including vulnerable populations), businesses, and critical facilities (schools, hospitals, police and fire stations) in each of 4 potential CSZ zones as well as a maximum-considered distant tsunami inundation zone.

Outcomes: The outcomes from this planning work will be locally implemented land use strategies, policies and regulatory standards based on sound scientific information that will significantly reduce risk and enhance community resilience.

Likelihood for success of the project approach to achieve the identified goals, objectives, and outcomes: The basic planning and regulatory framework to accomplish local implementation of resilience measures is well established through Oregon's comprehensive statewide system of land use planning. All local governments have in place comprehensive plans and implementing land use regulations that conform to statewide requirements. For example, local plans must address explicit provisions contained in Statewide Planning Goal 7, which includes planning for and reducing risk from natural hazards. As a result, the planning concepts needed to advance resiliency are well understood among Oregon's local communities, and the systemic capacity is in place to ensure the success of this project.

The OCMP tsunami land use guidance document, addresses various land use planning and implementation measures for use by local government. The development of the concepts in the guidance document was strongly informed by local input and experience. The ideas for policy, planning and implementation in large part represent what experienced local practitioners and decision makers have indicated are both most needed and achievable at the community level. The proposed project will be specifically directed to provide technical support to develop the necessary data and tools for the application of these concepts.

The Oregon Resilience Plan (ORP), adopted in February 2013, reviews policy options, summarizes relevant reports and studies by state agencies, and makes recommendations on policy direction to protect lives and keep commerce flowing during and after a Cascadia earthquake and tsunami. Chapter 3 (tsunami) of the ORP addresses the unique risks faced by the Oregon coast, and has received widespread notice in the media and in Oregon's coastal communities. Recognition of the need to plan for the impacts of a Cascadia event tsunami has increased substantially in many at-risk coastal communities. The proposed project will thus coincide with this heightened interest in resilience planning among Oregon's coastal communities, providing a well-timed opportunity for success.

Finally, both DLCD/OCMP and DOGAMI enjoy strong working relationships with coastal local governments. The proposed project has been discussed with numerous coastal jurisdictions and those discussions have indicated strong local support for the project. The interest in resilience generated by the ORP, the existing planning framework in place at the local level, the readiness of existing planning concepts through the DLCD tsunami guidance document, and the strong partnership relationships that can be capitalized upon will combine to provide a high likelihood that the tsunami modeling and land use resilience implementation project will be successful if funded.

How will the project further the goals and objectives of the approved 309 strategy in an innovative way: The proposed project will utilize a comprehensive tsunami land use guide, created by the OCMP

and not found anywhere else, in developing local government land use resilience strategies and regulations. In addition, this land use effort will utilize tsunami and time and distance modeling not found elsewhere to provide detailed information needed in land use hazard policy and development code creation which can be tailored to the specific community.

Project Activities, Sub-awardees, Project Outcomes:

The proposed project activities, who they will be undertaken by, and potential stakeholders are addressed below:

- **Proposed activity 1:** Support and assist in development and adoption of land use resilience work with Oregon coastal communities
  - **Undertaken by:** The local land use implementation project elements will be performed by OCMP/DLCD staff and/or a designated land use consultant (under a sub award) designated by, and coordinated with DLCD.

- **Proposed Activity 2:** Development of a comprehensive suite of new tsunami maps and socioeconomic (exposure) data products to support land use hazard policy and code development and adoption.
  - **Undertaken by:** Oregon Department of Geology and Mineral Industries (DOGAMI)

- **Stakeholders:** Participating local governments including Cannon Beach, Tillamook County, Coos County, and Waldport, with Bandon, Port Orford, Lincoln City, or Florence as alternates. State agency stakeholders include the Oregon Department of Geology and Mineral Industries (DOGAMI) and Oregon Office of Emergency Management (OEM).

Description of a robust public engagement process for this effort is included below.

Project evaluation components and activities to communicate or disseminate project outcomes: Each of the two main components within the proposal will be coordinated and have significant public processes associated with them. They will consist of a project management team (PMT) and a project advisory committee (PAC). The PMT will be made up of a variety of jurisdiction staff including emergency management and service personal, planning department staff, public works staff, and others. The PAC will be made up of the PMT members and a number of citizens representing the broader community. The groups will meet numerous times throughout each of the component processes. In addition, each jurisdiction will hold public open houses to assist in the development of project outcomes and to engage the public and provide education and outreach. It is anticipated that the outcomes associated with tsunami land use resilience measures will be adopted by the local government and will include an extensive public process. A typical adoption process involves workshops and public hearings with the local planning commissions and governing body. Once adopted, the land use resilience measures will be in place and operational in increasing resilience within the jurisdiction.

6. BENEFITS TO COASTAL MANAGEMENT

Scope, value, and benefits of improved coastal management and resource protection: The OCMP has a number of technical support resources for hazard planning including model code provisions for (chronic) coastal hazards, tsunami land use guidance, tsunami evacuation facility planning guidance, and recent high-resolution coastal hazard mapping products that are suitable for application to land use planning. Further, an improved model for tsunami evacuation has recently been completed, though the application of this model is very limited. This project will seek to implement Oregon's 309 Coastal

Hazards strategy by integrating all of these available resources to establish on-the-ground implementation through local land use and hazard management programs. This work will improve hazard management at the local development review level, and will ultimately result in safer, more resilient coastal communities. One of the many benefits of this proposal is the opportunity to leverage significant resources from our project partners who are supportive and willing to participate. For example, the Oregon Office of Emergency Management will provide expertise and technical assistance in the identification of hazard mitigation measures such as the implementation of wayfinding schemes. The Department of Land Conservation and Development (DLCD) will provide significant resources beyond what will be compensated by the grant, utilizing regional representatives, GIS staff, and others in support of the project. Additionally, local government participants will provide significant effort in community education, outreach, and in facilitation of adoption processes for local land use resilience strategies and implementation measures. Other project stakeholders, such as Oregon Emergency Management (OEM), Oregon Sea Grant (OSG), Oregon Seismic Safety Policy Advisory Commission (OSSPAC), Oregon Parks and Recreation Department (OPRD), DLCD/FEMA Risk Map staff, and others will participate and provide valuable assistance and resources.

Timeframe: Project outcomes are expected to become implementable management improvements upon local government adoption which is anticipated to be within the 18 month timeframe of this funding opportunity.

Transferability: Opportunities for these efforts to be duplicated in other areas facing tsunami risk are significant. Successful efforts engaged in through this project will clearly provide a template for other coastal communities, including other coastal management programs (CMPs), to improve and strengthen their land use and hazard management programs.

Alignment with Existing Resilience Efforts: Effective community resilience includes a wide array of tools, options, and considerations, and must address both short and long term resilience strategies and measures. This project focuses on multiple aspects of resilience as defined by the National Research Council (2012) and the Oregon Resilience Plan (OSSPAC, 2013), including: 1) plan and prepare for; 2) reduce or absorb the impacts of; 3) recover from; and 4) more successfully adapt to a CSZ tsunami. The land use resilience work proposed here will support the development and prioritization of sustainable adaptation and land use implementation strategies, including local comprehensive plan land use policies and development code provisions that require and provide incentives for development that reduces risk and increases both short and long-term community resilience. The associated tsunami evacuation modeling will provide accurate "LCD" maps for at-risk communities, allowing the identification of needed capacity improvements to evacuation systems thereby increasing short-term community resilience, while also providing the foundation for the development of land use policy that addresses the tsunami risk.

The Oregon Resilience Plan (ORP), completed in 2013,[1] provides the State's focus to lead and coordinate preparation for a potentially catastrophic CSZ earthquake and tsunami (OSSPAC, 2013). The plan emphasizes various steps needed in order to protect lives and reduce impacts to Oregon economies both during and after the event. The land use resilience components, coupled with the "Least-Cost-Distance" (LCD) mapping and modeling/socioeconomic exposure analyses are entirely consistent with the goals of the ORP. Specifically, the products from this effort will allow local

[1] http://www.oregon.gov/OMD/OEM/osspac/docs/Oregon_Resilience_Plan_Final.pdf

governments to implement or otherwise directly address the following selected Oregon Resilience Plan recommendations:

- Create tsunami evacuation modeling for each coastal community as a base to estimate the likely fatality levels. Models may be used to test improvements in evacuation measures and determine whether the improvements would reduce fatality levels;
- Improve tsunami evacuation measures by further developing existing evacuation routes, creating new routes, better education and signage about evacuation routes, and creating vertical evacuation structures or buildings;
- Use tsunami resistant infrastructure for critical transportation, port facilities, and utilities;
- Encourage communities to develop a tsunami hazard overlay zone and other tsunami resilience provisions related to land use, which could be adopted and used within local land use codes. The code language could include options for incentives, requirements, and best practices for assisting communities to become more resilient to tsunamis; Support local government efforts to apply best practices and tools developed by DLCD, when revising coastal communities' comprehensive plans;
- Support local governments to identify key community facilities which may need to be relocated to address tsunami risk. Work with communities to develop local land use policies and strategies to address future relocation of these facilities.

Application to Chronic Coastal Hazards: Areas subject to tsunami inundation are also susceptible to impacts from chronic coastal hazards (e.g. coastal erosion, storm surge, sea level rise, and other effects of climate change). As a result, comprehensive strategies that increase resilience to a catastrophic tsunami will also serve to reduce risk to chronic hazards. The tsunami land use guidance document describes a number of land use based resilience strategies that are directly applicable to resilience to chronic hazards (DLCD, 2015), including:

- Prohibiting comprehensive plan or zone changes that would increase density or permit more intensive uses in high risk areas;
- Establishing transferable development credits to facilitate development outside high risk areas;
- Protecting and enhancing existing dunes and coastal vegetation to promote natural buffers and reduce erosion;
- Updating public facility plans to plan, fund, and locate key infrastructure outside the tsunami inundation zones;
- Limiting uses in high risk areas; and,
- Developing relocation strategies for vulnerable community facilities and uses.

Implementation of these and other similar land use strategies will not only allow local communities to directly address tsunami risk, it will at the same time help reduce risk from and build resilience to other chronic coastal hazards.

7. FISCAL AND TECHNICAL NEEDS AND PAST PERFORMANCE

- Fiscal Needs: A Cascadia Subduction Zone tsunami will be the greatest natural hazard we likely will ever face along our coast. Preparation and resilience to such an event is extremely low. In addition, resources to address such an event are simply not available. At the local government level the capacity in general to address these issues has been significantly reduced as local resources have diminished. As a result, significant progress to increase resilience within a community's comprehensive land use program is not likely to occur without this PSM funding award.
- Technical Needs: Local government partners need additional technical expertise to develop tsunami land use strategies and options. In addition, the OCMP and our local government partners currently

lack needed tsunami Least-Cost-Distance (LCD) modeling and mapping. This important tool is critical to vulnerable communities for two main reasons:

- To inform important policy and decision-making that will result in effective, integrated resilience planning. The modeling can provide information on areas with vulnerable populations which cannot adequately be evacuated to assist in determining land use decision making and policy. It can also help determine scientifically based evacuation routes to facilitate the identification of priorities and improvements needed to get them to be fully functional.
- To dramatically improve evacuation route/facilities mapping used by communities at risk and thus has the potential to substantially increase the number of lives saved.

b) Past Performance under the Section 309 Program: Provide a brief description of the CMP's past performance and success in achieving the expected results of Section 309 strategies that are similar in size, scope, and relevance to the proposed project.

The OCMP has an excellent record of completing its §309 work tasks and achieving expected results within our 309 strategies. These successes have enhanced our program and are reflected in semi-annual grant performance reports to NOAA. Brief relevant examples follow:

- Chronic coastal erosion: One of the priorities in the last 309 cycle was assistance to local governments to address chronic and increasing coastal erosion. The OCMP contracted with DOGAMI to develop hazard risk zone maps and analyses for areas of the Oregon coast experiencing significant coastal erosion. Using the DOGAMI analyses and maps, the OCMP developed model comprehensive plan and development code provisions. A number of local governments have utilized this information in their adoption of land use provisions including a coastal erosion overlay zone. The completed work is a template for other communities to address these issues and is a proven model for this current PSM proposal.
- Territorial Sea Plan: The OCMP completed a comprehensive effort to successfully implement statewide marine plan updates that involved many different stakeholder groups. The data and tools to support that effort were in large part funded through 309 funds and resulted in new enforceable policies and routine program change enhancements.
- Estuary Habitat Mapping: The 2012-2015 PSM, to develop new estuary habitat maps, has resulted in a significant improvement in mapping products available for Oregon's estuarine environment. These products have been useful for partner agencies and local governments as they move towards amending Oregon's estuary management framework. The products have been so well received that the project methods are now being applied in California and Washington, and have served as a backbone for the conduct of regional assessments of the nursery function of estuaries along the west coast.

8. PROJECT WORK PLAN

8.1 Capacity of the OCMP to carry out the project including collaboration with partners:

OCMP staff is well equipped to carry out this project, and has the experience and expertise to both manage and develop the necessary products associated with this effort. Specifically, OCMP staff has extensive local government experience and expertise in developing and adopting local land use planning components including comprehensive plan text, policies and natural hazard inventory maps, and associated development code provisions. OCMP staff developed the tsunami land use guidance which will be utilized in this effort. The guidance includes model text, plan policies and development code provisions. By nature of its networked program, the OCMP maintains excellent and productive relationships with applicable state and local government partners which will enable them to coordinate

well on this project. OCMP staff also assisted in development and completion of the Oregon Resilience Plan (ORP), which stresses the need to become more resilient to a Cascadia Subduction Zone earthquake and tsunami. This effort coincides with this heightened interest in resilience planning among Oregon's coastal communities, providing a well-timed opportunity for success. Recognition of the need to plan for the impacts of a Cascadia event tsunami has increased substantially over the last few years beginning with the Japan tsunami and further heightened by the completion of the ORP.

8.2 Work Plan:

Task 1 Title: Initiating and supporting key land use resilience work with Oregon coastal communities

Timeframe: 18 months

Description of Activities:

1.1. Establish partnerships with the four (4) participating communities and review project goals and work scope (DLCD, DOGAMI, OEM, and partner jurisdictions). OCMP staff will establish a connection with local staff and elected officials to formalize project components and responsibilities, and outline the overall project work plan. Partner communities will review the work scope and anticipated work schedule for the project.

1.2. Develop local project management teams (PMTs) and project advisory committees (PACs) for each identified participating jurisdiction.

1.3. Develop a schedule for tsunami land use resilience implementation within the local planning programs (DLCD and partner jurisdictions).

1.4. Develop draft implementing land use resilience components for participating jurisdictions designed to be integrated into local comprehensive plans and implementing ordinances.

- Utilize the OCMP tsunami land use guidance in developing these draft products.
- Utilize Task 2 Least-Cost-Distance (LCD) mapping products in land use policy and strategy development.

1.5 Participate in local PMTs, PACs, public open houses and other associated meeting and events throughout.

1.6 Assist participating local governments in moving through local land use adoption processes.

Task 2 Title: Developing a comprehensive suite of new tsunami maps and socioeconomic (exposure) data products which will be integrated into Task 1 final products.

Timeframe: 12 months +/-

Description of Activities:

2.1 Develop schedule for LCD mapping and modeling and socioeconomic exposure analyses for selected jurisdictions (DOGAMI, DLCD and partner jurisdictions). DOGAMI work will be integrated within the overall schedule, framework, and advisory groups established for Task 1.

2.2 Perform LCD mapping and modeling and socioeconomic exposure analyses (DOGAMI) for all participating jurisdictions.

2.3 Integrate Task 2 modeling and mapping into task 1 work, where applicable.

<u>Anticipated Final Products:</u>

- Adopted local tsunami resilience comprehensive plan (text and policies) and implementing code provisions based on the DLCD tsunami land use guidance, and DOGAMI LCD mapping/modeling for four (4) at-risk jurisdictions.
- Tsunami LCD time/distance mapping and modeling completed for four (4) or more communities

Date of Completion: Within 18 months of commencement of the project.

8.3 Milestones, Outcomes, Schedule: The text and table below show the major task schedule, milestones, and outcomes related to the project work plan above. Points of significant project progress are indicated in the table below as either an intermediate milestone, "IM," or a key project outcome, "O."

Within 6 Months:

- Develop project management teams (PMTs) and project advisory committees (PACs) for two (2) jurisdictions to facilitate a collaborative effort. Both groups will provide the necessary local input required to develop products that are best suited for each community;
- Undertake "LCD" mapping and modeling for 2 or more high risk communities; and,
- Develop *draft* implementing land use resilience components for local comprehensive plans and implementing ordinances for two (2) high risk coastal communities using the tsunami land use guidance document (DLCD, 2015).

Within 1 Year:

- Develop PMTs and PACs for remaining jurisdictions (two (2) additional proposed) to facilitate a collaborative effort. Both groups will provide the necessary local input required to develop products that are best suited for each community;
- Undertake "LCD" mapping and modeling for 2 or more additional high risk communities;
- Develop *draft* implementing land use resilience components for local comprehensive plans and implementing ordinances for the two remaining high risk coastal local communities using the OCMP tsunami land use guidance document as indicated above.

Within 18 Months:

- Complete local comprehensive plan and development code *adoption* of the following for all participating jurisdictions:
    - Comprehensive plan maps including related DOGAMI tsunami inundation maps (TIMs), "LCD" maps, and a tsunami hazard overlay (THO) zone map;
    - Comprehensive plan text and policies related to resilience to a local tsunami event; and,
    - Development code resilience implementation provisions and strategies which, in part, utilize a tsunami hazard overlay zone.

Table cells show when the Intermediate Milestones (IM), and Key Outcomes (O) are expected to be completed:

Task #	Major Tasks	6 Mo	12 Mo	18 Mo
1.1	Establish partnerships with the four (4) participating	IM		
1.2	Develop PMTs and PAC	IM	IM	
1.3	Develop schedule for tsunami land use resilience	IM		
1.4	Develop draft implementing land use resilience components	O	O	
1.5	Participate in local PMTs, PACs, public open houses, etc.	IM	IM	IM
1.6	Local governments adoption process			O
2.1	Develop schedule for LCD mapping and modeling	IM		
2.2	Perform LCD mapping and modeling	O	O	
2.3	Integrate Task 2 modeling and mapping where applicable	IM	IM	IM

9. PROJECT BUDGET (Total requested: $250,000)

9.1 Budget Narrative

NOAA funding will be used to address the two main components or project objectives which include 1) developing key land use resilience strategies and measures for selected Oregon coastal communities, and; 2) developing key time/distance modeling and mapping needed to assist in important policy and decision making choices. More specifically related to Objective 1, this work will include developing local comprehensive plan text and policies and land use code provisions related to tsunami land use resilience strategies and options, assisting local governments in adoption processes, assisting in other local government processes such as project management teams, project advisory committees, planning commissions, city councils and boards, and open houses. Additionally, related to objective 2, NOAA funds will be used to develop tsunami time/distance modeling for identified jurisdictions which is an integral part of informing land use policy and development code concept development. NOAA funds will also be used for project-related travel, management and administration. OCMP staff will manage the overall project and administer the grant award. Work on Objective 1 will be carried out primarily by OCMP staff. However, it is anticipated that capacity will be added by utilizing a land use consultant to assist in this work. Work on Objective 2 will be carried out by the Oregon Department of Geology and Mineral Industries (DOGAMI). As needed, other professional services (GIS, data processing, and web technologies) will be provided to the project through existing OCMP staff supported by other funds.

Travel cost estimates are based on historical data and projects of similar scope undertaken by the OCMP and will be paid based on the GSA per diem rate at the time that travel is made.

The project budget has been developed based on work with four (4) Oregon coastal jurisdictions. This number of jurisdictions is optimal in development of products which provide maximum potential for transferability to other communities that are vulnerable to this potential catastrophic hazard. However, in order to address flexibility in the funding opportunity, the number of communities that we work with depends on the actual funding received. A detailed budget plan is included in Appendix 10a and a summary is included below.

9.3 Summary Budget Table (see Full Budget in appendix 10a for details)

Salary & Benefits (Fringe)		**Total**
Project Manager: Coastal Shorelands Specialist		38,352
Senior Coastal Policy Analyst		41,054
OCMP South Coast Regional Representative		18,612
OCMP North Coast Regional Representative		19,147
	Subtotal	$117,165
Travel		6,900
Supplies		935
Contracts/Grants		
Land Use Consultant contract for work assistance with Objective 1 work		50,000
DOGAMI LCD modeling/mapping to complete Objective 2 work		75,000
Total		**$250,000**

10. APPENDICES

a. Mandatory detailed budget information for each sub-award and contract as described in the Budget Narrative, Section IV.B.9:

10a.1 Total requested: NOAA Grant Request of $250,000

10a.2 Budget Narrative

NOAA funding will be used to address the two main components or project objectives which include 1) developing key land use resilience strategies and measures for selected Oregon coastal communities, and 2) developing key time/distance modeling and mapping needed to assist in important policy and decision making choices. More specifically related to Objective 1, this work will include developing local comprehensive plan text and policies and land use code provisions related to tsunami land use resilience strategies and options, assisting local governments in adoption processes, assisting in other local government processes such as project management teams, project advisory committees, planning commissions, city councils and boards, and open houses.

Additionally, related to objective 2, NOAA funds will be used to develop tsunami time/distance modeling for identified jurisdictions which is an integral part of informing land use policy and development code concept development. NOAA funds will also be uses for project-related travel, management and administration. OCMP staff will manage the overall project and administer the grant award. Work on Objective 1 will be carried out primarily by OCMP staff. However, it is anticipated that capacity will be added by utilizing a land use consultant to assist in this work. Work on Objective 2 will be carried out by the Oregon Department of Geology and Mineral Industries (DOGAMI). As needed, other professional services (GIS, data processing, and web technologies) will be provided to the project through existing OCMP staff supported by other funds.

Travel cost estimates are based on historical data and projects of similar scope undertaken by the OCMP and will be paid based on the GSA per diem rate at the time that travel is made.

The project budget has been developed based on work with four (4) Oregon coastal jurisdictions. This number of jurisdictions is optimal in development of products which provide maximum potential for transferability to other communities that are vulnerable to this potential catastrophic hazard. However, in order to address flexibility in the funding opportunity, the number of communities that we work with depends on the actual funding received.

10a.3 Detailed Budget Table

Salary & Benefits (Fringe)		**Salary**	**Benefits**	**Total**
PI -Coastal Shores Specialist	.20 FTE 18 months	25,215	13,137	38,352
Senior Coastal Policy Analyst	.20 FTE 18 months	27,652	13,402	41,054
OCMP South Coast Regional Representative	.10 FTE 18 months	12,038	6,574	18,612
OCMP North Coast Regional Representative	.10 FTE 18 months	12,607	6,540	19,147

Subtotal $117,165

Travel 6,900

Estimate based on travel to 4 Communities X 10 trips to each community
Average mileage (RT) to community (208 miles) X GSA rate of .565
Also, two (2) overnight lodgings X 4 communities X
standard GSA rates for lodging and meals)

Supplies 935
(e.g., map plotter ink and paper, display boards, copy paper, toner, binders, workshop supplies)

Contracts/Grants
Land Use Consultant contract for work assistance with Objective 1 work 50,000
DOGAMI LCD modeling/mapping to complete Objective 2 work 75,000

Total **$250,000**

10a.4 Detailed Budget For Objective Work 2 by the Department of Geology and Mineral Industries (DOGAMI):

Budget for Project Elements:

The project work program consists of two main components, including: a) Project administration and management of the grant and subcontracts, and b) time/distance "beat the wave" (BTW) mapping and modeling and socioeconomic analyses for discrete communities/areas. A detailed breakdown in the requested funding is provided below.

Project Budget by Project Element	**Amount**
Project management, NRS-4 (0.25 month):	$1,711
LCD/travel time distance review, NRS-4 (0.5 month):	$3,421
Report writing, NRS-4 (0.75 months):	$5,132
LCD/travel time distance modeling, GEO-2 (4.75 months):	$24,420
Socioeconomic analyses, GEO-2 (0.25 months):	$1,285
Map design, development and publication, PAS-2 (0.5 month):	$2,827
Sub total	**$38,796**
Fringe benefits (calculated at 46.97% of salary costs)	**$19,786**
Travel (5 days, 1 person, $89/night, $51/day per diem, vehicle use at $75/day):	$1,075
PI Travel (5 days, 1 person, $89/night, $51/day per diem, vehicle use at $75/day):	$1,075
General office supplies (general supplies, telecommunication, photocopying, software upgrades)	$396
Total Direct Charges	**$61,128**
Indirect rate (22.7%, excludes contractual element)	**$13,872**
Total	**$75,000**

Personnel: DOGAMI is requesting funding support for PI Allan (0.25 months) to oversee the completion of the project objectives, work tasks, and with respect to the administration of the grant award. The "beat the wave" (BTW) mapping and modeling will be undertaken by DOGAMI staff. We request 5 months funding support for a GEO-2 staff member to undertake the modeling and 0.5 months of a cartographer (PAS-2 staff member) to assist with map and product development. Time and budget permitting, DOGAMI GEO-2 staff member may be able to work with the USGS to complete an updated socioeconomic analysis of four tsunami inundation zones, which encompass the proposed study communities (Coos Bay/Charleston, Cape Meares, Tierra Del Mar, Pacific City, Neskowin, and Waldport). DOGAMI is also requesting 0.5 months funding support for PI Allan to provide technical review of the "beat the wave" (BTW) mapping and modeling effort, and attendance at community meetings to discuss the project results. The total salary requested for personnel is ***$38,796***. Fringe benefits are calculated at 46.97% of the base salary, which amounts to ***$19,786***.

Travel: We are requesting in-state travel support for 2 people (GEO-2 and PI) for a total of 5 days each. The total travel budget request is ***$2,150***.

Office Supplies: DOGAMI is requesting funding support for office support, which includes general office supplies, telecommunications, and computer software support. The total funding requested for office support is ***$396***.

Indirect charges: A fixed carry forward rate is negotiated with the United States Department of the Interior annually. The current rate is 22.7% and is applied to all direct costs, excluding contracts. Indirect charges requested for this project amount is **$13,872**.

Total funding support requested by DOGAMI is $75,000.

10 b. Letters of Collaboration:
See attached letters from participating local governments including Cannon Beach, Tillamook County, Coos County, and Waldport. Additionally, see attached letter from the Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon Office of Emergency Management (OEM), and Oregon Governor's Office.

10 c. Resumes:

Laren Woolley, Newport Field Office, Oregon Department of Land Conservation and Development Ocean Coastal Management Program, 810 SW Alder Street, Suite B, Newport, Oregon 97365, Phone: 541-514-0091, Email: Laren.woolley@state.or.us

Education:
Masters of Science, Geography/Earth Sciences, University of California at Riverside (1987)
Bachelor of Science, Geography/Earth Sciences, University of California at Riverside (1984)

Employment:

2009 – Present	Coastal Shores Specialist, Department of Land Conservation and Development (DLCD)/Oregon Coastal Management Program (OCMP) - Policy and goal administration for Statewide Planning Goal 17 (Coastal Shorelands) and Goal 18 (Beaches and Dunes).
1998 – 2009	Regional Representative, Department of Land Conservation and Development (DLCD)/Oregon Coastal Management Program (OCMP) - All duties related to a DLCD/OCMP regional representative including acting as a liaison with local government partners and coastal goal administration
1988 – 1998	Local government land use planner and senior land use planner, Curry County, Oregon, and City of Gold Beach, Oregon - Diverse land use planning for local county and city jurisdiction

Related Professional Experience:

June '09 – Present	Coastal Shores Specialist, DLCD/OCMP. Addresses coastal shoreland issues Including geologic and ocean processes, hazards, sea level rise, bluff/beach erosion, beach access, shorefront protective structures, and related topics. Provides technical assistance and policy advice to coastal local governments and assists coastal field representatives on local coastal shoreland issues. Assists local government and state agencies in responding to development proposals or other actions in coastal shore areas where coastal resources are affected or where geologic processes may be hazardous to development. Provides agency liaison to scientific research community, serves on state task forces and advisory committees, reviews federal and state statutes, rules and regulations, keeps appropriate agency staff and local governments informed of changing requirements.
March '03 – June '09	Regional Representative, OCMP. Represented DLCD/OCMP as the Oregon North Coast Regional Representative. Worked with coastal local governments and applicable state agencies and a variety of coastal and land use develop issues.

Selected Related Work Examples:
Project Management Lead - DLCD Publication "Preparing for a Cascadia Subduction Zone Tsunami: A

Land Use Guide for Oregon Coastal Communities".

Contributing Author - The Oregon Resilience Plan, Chapter 3 - Coastal Communities, 2013 Project Management Lead - DLCD On-Line Training "Understanding Oregon's Land Use Planning Program: Training for Local Officials and the Public".

DLCD Lead and Grant Manager - Neskowin Coastal Erosion Adaptation Plan. Worked with Tillamook County And Neskowin citizens group to develop the above referenced plan which includes a set of adopted Tillamook County comprehensive plan and development code amendments to increase resilience to significant coastal erosion within the Neskowin Rural Community.

DLCD Lead and Grant Manager – Bayshore Dune management Plan (Lincoln County). Worked with Lincoln County, Bayshore residents, and a consultant engineering geologist to develop a plan, consistent with Statewide Planning Goal 18, that works to manage and stabilize the foredune area and provide a more robust dune form to address periodic erosion events.

Co-Chair of the Oregon Coastal Processes and Hazard Working Group OCPHWG). The OCPHWG is a working group made up of applicable state agencies, academic institution staff, coastal geologic practitioners, local land use planners, NGO staff, and more. The group meets periodically to address both specific and general coastal process and hazard issues affecting the Oregon coast.

DLCD Lead – Goal 18 beachfront protective structure eligibility policy and implementation. Works with Oregon Parks and Recreation Department and local governments to administer beachfront protective structure policy/limitations along the Oregon coast.

Selected Presentations:

"Reducing Coastal Erosion Vulnerability in Tillamook County", APA – OR Planning Conference, Portland Oregon, October 15, 2015

"Preparing for a Cascadia Subduction Zone Tsunami: A Land Use Guide for Oregon Coastal Communities" Oregon Resilience Plan Taskforce Working Group, Salem, Oregon, April 7, 2014.

"Pre-Disaster Recovery Planning: "Preparing for a Cascadia Subduction Zone Tsunami: A Land Use Guide for Oregon Coastal Communities"", APA-OR Planning Conference, Portland, Oregon, May 29, 2014.

"Oregon Natural hazard Planning Requirements for the Coast" Central Oregon Coast Board of Realtors, June 12, 2014.

Jonathan C. Allan, Coastal Geomorphologist, Coastal Field Office, Oregon Department of Geology and Mineral Industries, P.O. Box 1033, Newport, OR 97365; Ph: (541) 574-6658; jonathan.allan@state.or.us

Education:

Ph.D./Geography: University of Canterbury, Christchurch, New Zealand (1998)
M.Sc. (Honours)/ Geography: University of Canterbury, Christchurch, New Zealand (1992)
B.Sc./Geography: University of Canterbury, Christchurch, New Zealand (1990)

Employment:

Coastal Geomorphologist with the Oregon Department of Geology and Mineral Industries (2001-present); Courtesy Faculty Staff Member with the College of Oceanic & Atmospheric Sciences, Oregon State University (2001-present); Post-Doctoral Research Associate working with Professor Paul Komar in the College of Oceanic & Atmospheric Sciences, Oregon State University (1999-2001); Research Fellow in the Department of Geography, University of Canterbury, Christchurch, New Zealand (1998-1999); Coastal consultant for Land and Water Studies (International) Ltd. (1998-1999).

Memberships, professional associations and awards:

American Geophysical Union
Coastal Education & Research Foundation, Inc.
2015 GSA Environmental and Engineering Geology Division (EEGD) E.B. Burwell, Jr. Award

Selected Publications

Allan, J.C., Ruggiero, P., Garcia, G., O'Brien, F., Roberts, J.T., and Stimely, L., 2015, Coastal Flood Hazard Study, Tillamook County, Oregon: Oregon Department of Geology and Mineral Industries, *Special Paper 47*, 283 p.

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Komar, P.D., Allan, J.C. and Ruggiero, P., 2012. U.S. Pacific Northwest Coastal Hazards: Tectonic and Climate Controls. In: C.W. Finkl (Editor), *Coastal Hazards*. Springer.

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Barnard, P., Allan, J., Hansen, J, Kaminsky, G., Ruggiero, P. and Doria, A., 2011. The impact of the 2009-10 El Niño on U.S. West Coast beaches, *Geophysical Research Letters*, 38, L13604, doi:10.1029/2011GL047707.

Allan, J.C., P.D. Komar, P. Ruggiero, *2011*: Storm surge magnitudes and frequency on the central Oregon coast. *Proc. Solutions to Coastal Disasters Conf., Amer. Soc. Civil Engrs,* Anchorage, Alaska: 53-64.

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10 d. Data Sharing Plan:

This data sharing plan distinguishes between raw data and its use to produce derivative product information. This project proposal does not anticipate the need for any new data acquisition. Instead, it will utilize existing datasets available to DOGAMI and the USGS, to generate the new LCD/Time distance and socioeconomic information needed to guide the planning process. This data sharing plan primarily addresses the management of the information developed under this project.

Types of environmental data and information to be created during the course of the project: The project does not involve the acquisition of any new environmental data. The project is based entirely on the compilation and manipulation of existing datasets related to natural hazards (e.g., previous detailed numerical modeling of tsunami inundation undertaken by DOGAMI), community features, community development, environmental conditions, and community vulnerability to natural hazards. The project will use such datasets to 1) assist with the development of tsunami LCD/travel time distance modeling; 2) socioeconomic analyses based on utilizing existing USGS landcover and land use datasets, and 3) utilizing the DLCD tsunami land use guidance which will be incorporated into local government land use programs. The resulting information will consist of a tsunami LCD/travel time distance modeling for selected coastal jurisdictions, and local land use resilience provisions to be adopted into local comprehensive plans and codes. Both products will reference GIS layers as applicable.

Data collection methods: No new raw environmental data are being collected under this project. However summary metrics will be drawn from existing environmental data and made available in GIS format.

Tentative date by which data will be shared: All information created under this project will be made available as information products in at least one of the following locations within six months of project conclusion: the Oregon Coastal Atlas (data archive & catalog), the Oregon Hazards Explorer (data viewer), applicable DOGAMI websites, and at local jurisdictions. The Oregon Coastal Atlas provides a user interface for searching for data, as well as a Catalog Services for the Web (CSW) interface for machine searching (catalog to catalog). The Oregon Coastal Atlas CSW service is registered with the federal Data.gov portal, and as a result all products available via the Oregon Coastal Atlas are discoverable via Data.gov.

The standards to be used for data/metadata format and content: The State of Oregon OAR 125-600-0005 requires that the data file format be a file format compatible with the scalable suite of ESRI software applications. The state standard for metadata is the Federal Geospatial Data Committee CSDGM standard, therefore the CSDGM standard will be used to document the data. CSDGM compliant metadata will be distributed with all products in XML format.

Policies addressing data stewardship and preservation: The OCMP publishes data products via the Oregon Coastal Atlas (OCA) server which serves as a long-term data archive. Information products can be published, or un-published on the OCA as they are created, updated or otherwise rendered obsolete, while still remaining archived, and data in the archive are always available directly from the web, or upon request. DOGAMI maintains comprehensive geologic datasets (e.g. lidar and tsunami data) that are stored in both onsite and offsite storage areas for long-term data preservation.

Procedures for providing access, data, and security: Data products from this project are not anticipated to be encumbered by data access or security restrictions. As such, any products will be made available via a public website. Data access and security will fall entirely within the scope of normal practices of the Oregon Coastal Atlas and other applicable websites.

Prior experience with publishing such data: The Oregon Coastal Atlas (OCA) and DOGAMI websites have been providing data hosting, archiving and download capabilities for OCMP geospatial data products since 2002. The OCMP was an early developer of the "Coastal Atlas" platform in use by many organizations. The Oregon Coastal Atlas provides summary information and FGDC-compliant metadata about a broad range of data types related to managing coastal resources in Oregon. It also either provides direct access to download such data, or identifies where the data can be acquired. All data in the Oregon Coastal Atlas have FGDC-compliant metadata.

10 e. National Environmental Policy Act (NEPA) and Environmental Compliance

The OCMP does not believe that there are any negative environmental impacts to this proposed project. Products include tsunami land use resilience strategies and implementation measures that would be included within a local government land use planning programs.

10 f. Indirect Cost Rate

Not applicable. The DLCD is not charging indirect costs.

10 g. References

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