



Salish Sea Shoreline Forum Report

New and Emerging Scientific Research focused on Armor and the Nearshore: Implications for Implementers

May 20, 2014

*Georgetown Conference Center, South Seattle
Community College*

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Key Take-Aways from the Forum

The Salish Sea Shoreline Forum held on May 20, 2014, was the third in a series of forums to bring together researchers, policy makers, and outreach staff from municipalities, agencies, non-profit organizations, academic institutions, and the business community to discuss shoreline efforts throughout the Salish Sea (see Attachment 1 for detailed purpose statement). The first Salish Sea Shoreline Forum focused on incentives for soft shore techniques and the prevention of shoreline armor. The second Salish Sea Shoreline Forum turned the discussion to the permitting process associated with single-family shoreline armor or mitigation.

The forum on May 20, 2014, presented new and emerging scientific research on nearshore armor. Participants discussed how implementers can apply the findings of nearshore armor research, including the science-policy interface. Key takeaways from the forum include:

- There is a growing and diverse community of stakeholders involved in nearshore issues.
- Scientific research on armor is “messy” we need more targeted science. Will it take 20 years to have sufficient knowledge to support efforts at restoring shorelines?
- New research on the nearshore has provided large quantities of data needing to be analyzed and synthesized. Also, key research needs to be peer reviewed before it can be made available and used by policy makers.
- Restoration efforts underway throughout the Puget Sound can provide important lessons learned.
- Social science research is emerging that helps to identify what motivates homeowners and decision makers related to armor issues. This opens up a whole new area for important research.
- Relevant science is available to help policymakers address nearshore problems. In fact, the shoreline policies have preceded the science, which is now catching up.
- Scientific information needs to be translated into digestible formats for decision makers and legislators. Further work is needed to bridge the gap between science and its policy applications.
- Agencies have tools available to help local governments and other stakeholders with nearshore issues.

Summary of the Forum

The forum was structured into four parts:

Part 1: Introduction and Science Presentations

Part 2: Science Presentations Continued

Part 3: Cross Communication and Panel Discussion on Science from the Implementers' Perspective

Part 4: The Way Forward

See Attachment 2 for detailed program information.

Introduction

Introduction and Background on Salish Sea Shoreline Forums – *Tracy Collier, Science Director, Puget Sound Partnership*

The Puget Sound Partnership has a vital sign target of no net growth of shoreline armor by 2020. While the Partnership believes that they are still a ways from their goal, scientific research helps implementers respond to homeowners when they ask, “Why is armor bad?” Is it possible to prioritize the types of shorelines where armor should be reduced? What scientific information is needed to make these decisions? The forum will help implementers understand what science is available now and how that information can better educate the public and help the Puget Sound Partnership prioritize efforts.

Part 1: Background

2009 Puget Sound Shorelines and the Impacts of Armor: State of the Science – *Hugh Shipman, Coastal Geologist, Washington Department of Ecology*

The need for more science to understand the impacts of shoreline armor management is not a recent trend. Concerns about beach loss, protection of ecological resources, and public use of the shoreline have been around for decades. There are general reports but not rigorous science research about how beaches work. In the Puget Sound region, data from the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) show that 27% of shorelines are armored and that more armor is being installed than is removed. In 2009, a workshop was held with 40 national, regional, and local participants to discuss the state of the science surrounding shoreline armor. Participants at the workshop found that the impacts of shoreline armor were complex, with impacts related to the geomorphic setting and location of armor. There was also found to be a lack of information regarding the tradeoffs of ecosystem goods and services related to armor. The relationship between geology and biology is not well understood. Participants noted that impacts of shoreline armor would increase with rising sea levels. Since 2009, more research, technical studies and guidance, and management and restoration plans have been enacted to address shoreline armor.

Part 2: Science and Social Science Presentations

1. **Biophysical Impacts of Armor on Puget Sound Shorelines** – *Megan Dethier, Research Professor, University of Washington Friday Harbor Laboratories*

The impact of shoreline armor is relatively well known for open coast sandy beaches, but less is known about gravelly inland areas like the Puget Sound. The natural history of Puget Sound shorelines combined with human settlement has contributed to the use of armor, dikes, and other tools for protection. Her team has recently focused on research to examine conditions under which armor is more harmful. From a science perspective, it is difficult to isolate armor signals from beach to beach noise. Between 2010 and 2012,

studies were conducted on 29-paired beaches in the Puget Sound with additional 34-paired sites in the north sound. Armored beaches were paired with beaches maintained a natural shoreline within a mile of each other, having the same environments. The research included bird surveys, and assessment of width of log line, changes in elevation of beaches with or without armor, beach width and juvenile fish behavior.

Results from the study included:

- Unarmored beaches were wider and shadier. Armored beaches lost on average 13 to 29 feet in width and 20% to 60% cover shade.
- Unarmored beaches have greater accumulation of organic debris (wrack).
- Unarmored beaches have more log accumulation.
- Unarmored beaches have more amphipods.
- Unarmored beaches have fewer invertebrates overall.
- Armored beaches had fewer birds, with crows being the most common.
- Terrestrial birds spent more time foraging for food on unarmored beaches.
- Armor locally increases wave heights.
- Armor disrupts the food web by affecting seaweed, forage fish, and other natural processes.

The study showed that armor has clear effects on beach width and shading. It is hard to distinguish all of the effects on the beaches. The study did find that armored beaches have an affect on forage fish. The study produced an enormous data set and the challenge will be to filter out information from the data to answer questions. The team would like to know what questions should be asked to see if the data can provide answers. Megan invited audience member to contact her with specific policy and other questions. The research has not yet been peer reviewed. When that is complete there will be published reports available for some of the findings.

2. **How Science Can Inform Restoration Along Armored Shorelines** - *Jason Toft, University of Washington School of Aquatic and Fishery Sciences/Washington Sea Grant*

The role of science in restoration is to inform goals, incorporate data, and figure out what works and what does not. With shoreline restoration, the goal is to take an altered landscape and restore the site back to original conditions. An example restoration project is a beach along the Olympic Sculpture Park in Elliot Bay in Seattle. From that project, a set of metrics were identified to measure site performance:

- Nursery area for fish
- Foraging opportunities
- Riparian value
- Connectivity
- Physical resilience

Data shows that most of these metrics at the site have improved compared to armored shorelines. Monitoring data can be incorporated in other projects such as the Seattle seawall. With research from completed restoration projects, restoration goals should include:

- Improving beach slope. Gradual slopes are better than steep slopes.
- Maximizing unshaded areas.
- Improving aqua-terrestrial connections.
- Monitoring new ideas to measure their effectiveness.

A shoreline monitoring toolbox is available at: <https://sites.google.com/a/uw.edu/toolbox/home>.

3. **Documenting Habitat for Puget Sound Forage Fish** – *Phillip Dionne, Research Scientist, Washington Department of Fish and Wildlife*

Forage fish are an ecological group that is generally comprised of small schooling fish. These fish occupy the middle tier of the food web and are a vital conduit between groups such as plankton and higher level marine consumers. Common forage fish in Washington include the Northern Anchovy, Pacific Sardine, Longfin Smelt, and Eulachon. The surf smelt, Pacific sand lance, and Pacific herring are forage fish that spawn in nearshore areas. Armor can impact nearshore forage fish habitat in the following ways:

- Direct habitat loss
- Loss of riparian cover
- Changes in runoff patterns
- Changes in sediment transport
- Impoundment of beach sediment supply

WDFW and WDNR are developing new methods for testing impacts on habitats for these species.

4. **Geomorphic Responses of Beaches to Shoreline Armor in the Northern Salish Sea – Aundrea McBride, Research Ecologist, Skagit River System Cooperative**

Studies are being conducted to measure the change in beach ecology and geomorphology related to shoreline armoring. Thirty six beaches along the Puget Sound were measured over two summers of fieldwork. Aundrea McBride's study looked at the impact of beach erosion using elevation profiles and beach grain typology using grain size analysis. Data thus far shows that more work needs to be done to isolate other factors related to beach erosion and grain size. The comparison between an armored shoreline and an unarmored shoreline is not the only modifier to predict beach erosion.

5. **Natural Nourishment: Beach Observations from the Elwha River Delta – Ian Miller, Coastal Hazard Specialist, Washington Sea Grant**

The removal of the Elwha River dam allows scientists to study how dam removal affects physical marine shoreline restoration. To date, about 2-4 million cubic meters of fine sand to gravel has been released (of the total 7 million cubic meters of coarse sediment estimated to have been trapped behind the now demolished dam structures). Prior to dam removal, the annual sand and gravel load was estimated to be 10,000-40,000 m³/yr (prior to the dams, the load is estimated to have been about 175,000 m³/yr). Through this research, scientists hope to apply lessons learned to other coastal stability problems. Ian Miller's research team is conducting beach/nearshore transects twice a month. Initial observations from the nearshore near the Elwha River show that:

- The geomorphology of the coastal environment has been documented to be altered: in some areas there is significant accretion and some areas are being eroded due to the sediment input.
- Measurable changes are concentrated around the immediate river mouth area.
- The alongshore transport system is moving beach sediment east but below the mean lower low water (MLLW).
- There is no measureable change in morphology east of Dry Creek to Ediz Hook.

Sediment is not being transported along the beach, which surprised researchers. The rate of erosion is larger than expected

6. **New Research and Management Implications on the Impacts of Shoreline Armor and Sea Level Rise on Beach Spawning Forage Fish – Tina Whitman, Science Director, Friends of the San Juans**

The Healthy Beaches for People and Fish Project in San Juan County was completed this year. The study sought ways to improve the long-term protection of nearshore marine habitat from rising sea levels and the impacts of shoreline armor. The research included a review of the regulatory framework affecting nearshore habitat. Other results of the project included:

- There are 23 miles of armored shoreline in San Juan County. Among land adjacent to armor and forage fish habitat in the county, 65% was private land that was developed, 27% was private and undeveloped, 5% were under conservation, and 3% were for public or educational use.
- 15% of documented San Juan County spawn beaches are armored.
- 90% of armor covers spawning habitat.
- 88% of drift cells have 1.4 miles of armored feeder bluffs up-drift of spawning beaches.
- Overhanging vegetation is significantly reduced at armored spawn beaches.
- 20 miles of public and private roads are vulnerable to sea level inundation and 10 miles are vulnerable to erosion.
- More than 1,200 residential structures are vulnerable to sea level rise.
- Priority habitats and areas such as parks and coastal wetlands are also vulnerable.
- 10-20% of incubating surf smelt eggs sites could be inundated by 2050.
- 35% to 99% of egg sites likely to be inundated by 2100.

Management implications of the project’s findings include:

- Existing laws grant sufficient authority to protect public shoreline resources through regulation and incentive.
- Building setbacks are an effective tool to reduce future demand for armor.
- Natural beach substrates at elevations significantly higher than mean higher high water (MHHW) are an important spawning habitat.
- Beach spawning forage fish habitat is vulnerable to the impacts of rising sea levels, especially at armored sites.

The full study can be found at: www.sanjuans.org/NearshoreStudies.htm

7. **How Social Science Can Inform Shoreline Management** – *Melissa Poe, Environmental Social Scientist, Washington Sea Grant*

Social science is more than the study of changing behavior. There are multiple disciplines within social science research. It can be beneficial for ecosystem understanding. The application of social science to shorelines can increase buy-in from participants and potentially improve outcomes. Potential science questions for shorelines include:

- What are the social values and uses of shorelines?
- How do various social groups participate in decision-making?
- Are some people more vulnerable to shoreline changes than others?
- What is the relationship between ecosystems and human wellbeing?
- What are the institutional and economic conditions that have shaped shoreline development and access?
- What are the social and economic benefits of shoreline restoration?

These are questions that should and can be asked about shorelines to enhance understanding. There are a number of projects currently going on, including “Developing Social Indicators and Evaluating Community Wellbeing” funded in part by Washington Sea Grant.

8. **Indigenous Community Health and Climate Change: Integrating Social and Natural Science Indicators** – *Jamie Donatuto, Environmental Health Analyst, Swinomish Indian Tribal Community*

This project sought to develop a multi-dimensional and culturally meaningful definition of health that considered how social, environmental, and cultural aspects of life influence the overall well-being of individuals and the community. How can the entire realm of risks, not just conventional risks, be evaluated? The project developed the following indicators:

- Natural resources security
- Cultural use
- Education
- Community connections
- Self determination
- Quality of life

A pilot study of members of the Swinomish community asked participants about their concerns with project impacts of sea level rise. The project is still ongoing, and more information can be found at: www.swinomish-nsn.gov/ih/.

Part 3: Creative Example of Science and Policy Interplay

1. **Assessing Land Use and Regulation in Rural King County Through Ecological Studies** – *Gino Lucchetti, Senior Ecologist, King County Department of Natural Resources and Parks*

A study was conducted to assess the effectiveness of the King County Critical Areas Ordinance under the Growth Management Act at the local watershed scale. The goal was to determine if the new regulations are sufficient and if not, why and what should change. For six “treatment” (i.e., changed land cover) basins and three control sites, the team analyzed:

- Past, present and future land cover change.
- Environmental response using high pulse counts for hydrology, macro-invertebrates and BIBI, conductivity and temperature, and salt traces and substrate, thalweg, pools, large woody debris.
- Permitting and compliance

They found that the lowest amount of forest cover occurred in the 1940s-1960s (i.e., we have more forest cover now as trees have grown back after a significant amount of clearcutting). Hydrology, especially flashiness (high pulse county), is a key indicator for ecological health and in combination with land use cover was used to provide a hydrologic condition index (HCI) by creating a baseline to which future measurements can be compared. The HCI (using distance, land covers, and geology) can be applied to other lowland Puget Sound watersheds to estimate high pulse counts thus helping reduce the need for costly modeling. Based on this research, the authors did not recommend any changes to the Critical Areas Ordinance at this time. More information can be found at www.kingcounty.gov/environment/data-and-trends/monitoring-data/critical-areas.aspx.

Part 4: Cross Communications

Cross Communication – *All participants were given the opportunity to speak for up to three minutes about other projects or emerging issues throughout the Salish Sea.*

- **Ken Connell, Senior Project Coastal Oceanographer at Golder Associates**, discussed a study analyzing the proposed Passenger Only Fast Ferry service (POFF) between Bremerton in Kitsap County and Seattle. The results of the study can be found at www.pugetsoundpoff.com/home.htm.
- **Bruce Jones, Northwest Indian Fisheries Commission**, encouraged participants to visit the near shore data exchange produced by the commission. The exchange can be found at <http://maps.nwifc.org/nearshore/>.
- **Garrett Jackson, Geomorphologist/Hydrologist with the Washington Department of Transportation**, noted that WSDOT has begun a pilot study using landslide and flood deposits that land on the highway for beach nourishment and highway stabilization. The study area is on the lower end of the Hood Canal, near the community of Union. WSDOT has placed 2000 cubic yards of material so far and will be monitoring the movement of the sediment. The permitted study period is 5 years, ending in 2018.

- **Dr. Kelly Biedenweg, Lead Social Scientist at the Puget Sound Institute**, stated that the Institute is studying the integration of homeowner values in public policy. The Institute is working to develop a cognitive map of values and shorelines issues. This information can be used to understand the policy implications of agency decisions.
- **Jerry Joyce, Seattle Audubon Society**, discussed the use of citizen science especially with environmental monitoring. The Audubon Society promotes the use of volunteers to monitor bird nesting and habitat and had over 8,000 hours of volunteer hours in one year.
- **Theresa Mitchell, Washington Department of Fish and Wildlife**, described the recently released Marine Shoreline Design Guidelines. More information can be found at <http://wdfw.wa.gov/conservation/habitat/planning/ahg>.
- **Kelsey Gianou, NOAA Coastal Management Fellow**, worked with the Washington Department of Ecology to publish guidance for local governments for soft shoreline stabilization. The report and further background information can be found at www.ecy.wa.gov/programs/sea/shorelines/stabilization/index.html.
- **Jonnie Dunn, Student at UW School of Environmental and Forest Science**, described a high resolution land map that is being developed as part of the Bainbridge Island Shoreline Master Plan review. The map will visualize ecological function at a high resolution.
- **Jeff Rice, Managing Editor of the Puget Sound Institute**, encouraged participants to make restoration projects more discoverable by utilizing the resources available at the Encyclopedia of the Puget Sound. More information can be found at www.eopugetsound.org.
- **Hugh Shipman, Coastal Geologist with the Washington Department of Ecology**, describe a recently completed mapping project of feeder bluffs in the Puget Sound. The map and more information on the project can be found at www.ecy.wa.gov/programs/sea/shorelines/FeederBluffs/mapping/index.html.
- **Amy Leitman, Marine Surveys and Assessments** is interested in putting together a forum to discuss issues associated with tribal and non-tribal permit review processes.

Part 5: Science from the Implementers' Perspective

Moderated by Dr. Trina Wellman of Northern Economics

Panelists:

- Margaret Clancy, Environmental Science Associates
- Tim Hyatt, Skagit River System Cooperative
- Michael Paine, City of Bellevue
- Tim Gates, WA Department of Ecology
- Tim Quinn, WA Department of Fish and Wildlife

Question 1: How does scientific information apply to your work and do we have enough of it?

- Tim Hyatt –There is a disconnect between science and its implementation. Those who review permits do not review science. Whether it is the permitting review process or the use of best available science in a regulatory plan, the science does not make it to the necessary implementation level. Scientific arguments can be used, but permit reviewers will look at the code when analyzing a project. More scientific guidance is needed for bodies such as planning commissions or technical advisory committees.
- Tim Gates – The information that the science community provides should be useful to the people who need them. The approaches promoted by science should be feasible to accomplish and based on good scientific information. Make research is available and useful. We should promote green shoreline solutions and be sure it is the first choice solution if appropriate and based upon good scientific foundation.

- Tim Quinn – It is important to note that the Washington Department of Fish and Wildlife works within the authority given to them by the state Legislature with permitting.
- Michael Paine – It doesn't matter how much science you have, people do not want to rely on the science. We need more science, but it won't make the key difference.
- Panel members noted that there is a divide between science and the people science is trying to help. There is an analogue with the fresh water efforts on riparian buffers where there is quite a bit of science that has not been accepted. There is a "20 year rule" for moving an issue from scientific research to implementation of actions based upon that scientific understanding. There is a need to have a very clear "story" to tell to move the issue forward.
- Solutions: A three-part plan was suggested: actionable science should be used followed by social marketing and education efforts.

Question 2: What are the challenges and barriers in bringing science into policy decisions related to shoreline armor?

- Participants noted that science is complex and that decision makers need information synthesized and easily digestible. There are issues of time and scale that need to be addressed. Tools such as the Shoreline Master Program are intended to address those issues of scale at the management level. Participants shared concerns that best available science does not always make its way to regulators.
- Staff shortages are common at the regulatory level. The science community can be more involved with helping staff understand the science related to the regulations. Participants also noted the importance of involving all stakeholders including contractors.
- Scientists sometimes disagree. When dealing with legal situations in court, try to stick to the relevant science and let the court make the final decision about what science to follow.
- Elected officials also are balancing the needs of their constituents with the information being produced by the science community. We need to discuss how to communicate with our elected officials.

Question 3: How do values and perspectives of property owners drive policy decisions as compared to scientific information?

- Shoreline Master Programs are intended to look at both the needs of the property owners and the best available science. Science, however, can often incite emotional responses from people especially if it contradicts a deeply held behavior. The public can influence regulators, and it does not take many people to delay the political process. There are gaps in the available science and how it is presented to the public is also important.
- Put the science and evidence to work to help demonstrate the value and importance of "green shorelines" that will help us implement SMPs and "get to yes" with shoreline property owners.
- What is the science necessary to answer questions about how to implement SMP no net loss and also achieve Puget Sound Partnership goal to restore Puget Sound by 2020?
- Kelly Biedenweg provided information about a recent social science research project. Seventeen decision makers were surveyed to determine what they were thinking about when they made their final decision about their SMPs. After being asked what most influenced their decisions, they were then shown maps of landowner values. Then they were asked if it influenced their decision. When asked what affected decisions, 80% said it was budget, personal legacy, politics and relationship with peer relationships. When decision makers were shown data showing what their constituents cared about, that did not change the decision outcome. The results of this study will be out in the fall of 2014. For more information contact Kelly at kellybiedenweg@gmail.com.

Question 4: How did scientific research affect SMP development and how does science such as the UW research affect policy development?

- The SMP guidelines created 10 years ago established policy regarding shoreline armoring. Critical research science, however, is now catching up to support that 10 year old policy guidance.
- Issue: How are SMPs being applied? There is quite a bit of good science, but how applied depends upon decision makers. There are gaps in science but those gaps need to be identified and then funded.
- Critical issue: What motivates people? How can facts change their minds?

Part 6: Now What? Where Do We Go From Here?

Moderated by Todd Hass of the Puget Sound Partnership

Panelists:

- Hugh Shipman, WA Department of Ecology
- Megan Dethier, UW Friday Harbor Labs
- Tim Quinn, WA Department of Fish and Wildlife

What key science lessons or themes did you hear today and why did you find them key?

- Panel members were encouraged by the growing community of stakeholders involved in marine nearshore issues.
- The importance and influence of social science is also a highlight. We are set up to target populations who will make a difference.
- Panel members also noted the implications of lessons to be learned from restoration projects such as the Elwha River, including the importance of scale and context for identifying solutions to problems.
- Science may be messy, but we want certainty. Need to figure out how to bridge that gap. Need targeted science. In areas already going forward, we need to further pursue research. How can we look for opportunities to advance the science and knowledge (and it takes a long time...maybe 20 years or more)?
- Need to try to understand what is happening on a smaller scale rather than try to solve system wide problems.

What can we do to improve the relationship between science and policy makers regarding nearshore armor?

- Information should be easily comprehensible by policy makers. Three hundred page reports are not going to be read by most decision makers. We need shorter pieces of information.
- People who are involved in both the science and policy communities can help bridge the gap between the two parties.
- We need directed research to get to the “yes” issues for shoreline homeowners. We need good information about how well the green shore solutions actually work.
- From a policy perspective, it is challenging to enact legislation when there is limited information on the cumulative impact of armor. Formulating an argument and gaining the political will to advance a limited change is challenging.

Gaps in Science

- There are opportunities for targeted areas of science to do more.
- We need to do more on geology.
- We need to expand upon the work of Dr. Megan Dethier.
- Research science related to marine riparian areas is one remaining big gap.

Attachment 1: Forum Purpose Statement

What is the Salish Sea Shoreline Forum?

This proposal is to establish a forum to create an opportunity for a diverse group of interests to come together to discuss issues associated with shoreline efforts throughout the Salish Sea. This includes both marine and fresh water efforts in the nearshore and the 200-foot landward shorezone area.

Information gathered from each of the topical sessions will be summarized and provided to key agencies, the Puget Sound Partnership, or those entities known to have primary responsibility associated with the funding and research of that topic.

Why Is There A Need For A Salish Sea Shoreline Forum?

There are multiple efforts going on throughout the Salish Sea region related to shorelines. However, there is no forum through which professionals can share information about projects, programs, challenges and information sources region-wide. For example, the Puget Sound Partnership identified removal of armor as a major target effort. Associated with this target is funding from the US Environmental Protection Agency for implementation of priority projects and programs by the Marine and Nearshore Lead Organization administered by Washington Department of Natural Resources and Washington Department of Fish and Wildlife, the two Lead Organizations (LO). Other examples include the WRIA 8 Green Shorelines model program for soft shore alternatives to bulkheads along Lake Washington and Puget Sound. For each of these there are numerous ongoing efforts including scientific research, education, outreach, incentives and regulatory reform.

The Salish Sea Shoreline Forum will provide a way to share information across organizations, entities, and geography for all of these efforts. Creating a regular forum for communications would address this communication gap, create more efficiency to minimize duplication of efforts, provide opportunities for collaboration and identify shared needs of all kinds.

Topics for Forum:

Suggested topics for presentations would rotate between information about project implementation and funding or regulation, policy and science updates. Sample topics include:

- **Incentives for alternative green shoreline techniques (September 30, 2013)**
 - Incentives overview, Social Marketing Approach (WDFW/WDNR/PSP); Green Shores for Homes (Seattle/San Juan/Sea Grant) project; Monetary incentives: Public Benefit Ratings System, loans, etc.; Non-monetary incentives: Recent examples.
- **Outreach, Financing and technical assistance on shoreline erosion control**
 - Outreach materials and efforts; Examples from volunteer groups of education and outreach work, providing technical assistance to shoreline landowners, and sources of funding for shoreline projects – softshore design, bulkhead removals and restoration
- **Directions and trends in alternative shoreline treatments**
 - Recent research on the impacts of armor on PS; Follow up on 2009 Shoreline Armor Workshop coordinated by Hugh Shipman; Presentations of current work (UW, FOSJ, USGS, WDFW); Presentation on Marine Shoreline Design Guidelines; Feeder Bluff Study
- **Green Shorelines initiatives**
 - Scope “green” shorelines – all aspects of shoreline development (stormwater, vegetation, etc.) or just shoreline erosion control treatments; Updates on Green Shores for Homes, WRIA 8 Green Shorelines Steering Committee, other efforts
- **Updates on physical and geological studies of shorelines**
 - Geology, erosion, and landside mapping; Feeder bluffs project; Littoral drift, wave modeling, etc.
- **Buffers and setbacks on Puget Sound marine shorelines and Lake Shorelines**
 - Recent work that sheds light on these topics; Management challenges in addressing these issues; Examples of how different jurisdictions have handled this; Information and examples on Lake Washington

- **Permitting and mitigation with focus on permits associated with shoreline erosion control structures and alternatives on Salish Sea marine shorelines and lakes (February 3, 2014)**
 - Mitigation; Local, state, federal. Tribal concerns (Treaty Rights at Risk); Challenges in tracking and monitoring armor and shoreline condition; Discussion of possible efficiencies; Monitoring and enforcement
- **Tracking and assessing patterns and trends in shoreline armor and alternatives on Salish Sea and lakes**
 - Do we know what we have and how much is occurring?; PSP Targets and Indicators; Monitoring and evaluating No Net Loss requirements; Role of NGOs (Salmon Enhancement Groups, Local Env't'l Groups, etc.)
- **Beach restoration on the Salish Sea**
 - PSNERP, ESRP; Local case studies

When Will the Salish Sea Shoreline Forum Meet?

The forums will meet on a quarterly basis or 3 times a year depending on available resources (e.g. September, January, June). This proposal is to initiate these forums for three (3) years, for a total of 9 – 12 meetings. If at some point it is determined the forum should continue beyond the original number of meetings it can be expanded. However, this proposal would limit the timeframe of the meetings.

Where Will the Salish Sea Shoreline Forum Meet?

The proposed forums will meet in a central place such as Edmonds, Seattle or Tacoma to accommodate people traveling from North, South and West Puget Sound areas. We will also explore opportunities for use of webinars, webcasts or other internet service in order to increase participation for those who cannot travel to meetings.

What is the Structure and Leadership for the Salish Sea Shoreline Forum?

The Salish Sea Shoreline Forum will be convened and facilitated by Washington Sea Grant, Washington Department of Ecology and Futurewise. An advisory committee may be convened to assist with recommendations for topics and structure for the second part of each forum. There will be no formal chair or decision-making process included in the forum structure. Sub-committees may form around specific geographic or topical issues if there is sufficient interest for those (perhaps a working group model).

Who Would Participate in the Salish Sea Shoreline Forum?

The forums will be open to anyone interested in Salish Sea shoreline issues. Target audiences will be professionals engaged in shoreline restoration, shoreline enhancement, and shoreline protection efforts. These groups typically include (though this list is not necessarily complete):

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|---|---|
| <ul style="list-style-type: none"> ○ Local Governments: ○ Local Shoreline Planners and Regulators ○ WRIAs on Puget Sound and Lake Washington/Lake Sammamish, ○ State Government: ○ Washington Department of Natural Resources, ○ Washington Department of Fish and Wildlife, ○ Washington Department of Health Washington ○ Department of Ecology and Washington Recreation and Conservation Office ○ Federal Government: ○ EPA ○ NOAA/NMFS ○ Corps of Engineers ○ USGS ○ USFWS | <ul style="list-style-type: none"> ○ Ports ○ Puget Sound Partnership ○ Tribes ○ Puget Sound Conservation Districts ○ Non-Profits with focus on shoreline issues ○ Marine Resource Committees and Northwest Straits Commission ○ Universities: University scientists engaged in research regarding the nearshore environment (this includes UW, WWU, WSU and any private universities engaged in science research) ○ PSNERP/ESRP ○ Private Property Owners ○ Consultants in related fields ○ Businesses |
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Attachment 2: Forum Program

Agenda

3rd Salish Sea Shoreline Forum

May 20, 2014
8:30 AM – 4:00 PM

Location: South Seattle Community College, Georgetown Campus
6737 Corson Ave S, Seattle, WA 98108

Title: New and Emerging Scientific Research focused on Armor and the Nearshore: Implications for Implementers

***Learn about New and Emerging Science related to Armor (marine and freshwater).
What does that mean for Implementers?***

PURPOSE OF THE FORUMS: The Salish Sea Shoreline Forum brings diverse groups of interests together to discuss issues associated with shoreline efforts throughout Salish Sea.

8:30 AM **Check-in, coffee, networking**

9:00 AM **Welcome, introductions and information about Salish Sea Shoreline Forum**
- Tracy Collier, Puget Sound Partnership

9:10 AM **Background – Armor Symposium 2009**
- Hugh Shipman – Washington Department of Ecology

9:30 AM **Science Presentations**

Biophysical impacts of armor on Puget Sound shorelines
- Megan Dethier, UW Friday Harbor Labs

How science can inform restoration along armored shorelines
- Jason Toft, UW School of Aquatic and Fishery Sciences/WA Sea Grant

Documenting Habitat for Puget Sound Forage Fish
- Phill Dionne, WA Department of Fish and Wildlife

10:30 AM **Break**

10:45 AM **Science Presentations (Continued)**

Geomorphic responses of beaches to shoreline armor in the northern Salish Sea
- Aundrea McBride, Skagit River System Cooperative

Natural Nourishment: Beach observations from the Elwha River delta
- Ian Miller, WA Sea Grant

New research and management implications on the impacts of shoreline armor and sea level rise on beach spawning forage fish

- Tina Whitman, Friends of San Juans

How social science can inform shoreline management

- Melissa Poe, WA SeaGrant and NOAA Northwest Fisheries Science Center

Indigenous community health and climate change: Integrating social and natural science indicators

- Jamie Donatuto, Swinomish Tribe

Facilitated discussion (15 minutes)

This conversation will be used to solicit ideas and insights for the afternoon discussion about how new science can be used by implementers

11:30 AM

Creative Example of Science and Policy Interplay

Assessing land use and regulations in rural King County through ecological studies

- Gino Lucchetti, King County

12:00 PM

Lunch

1:00 PM

Cross communication

This is an opportunity to inform participants about projects or emerging issues throughout the Salish Sea. Each person can speak for up to 3 minutes.

1:15 PM

Panel: Science from the Implementers Perspective

Moderator: Trina Wellman, Puget Sound Partnership Science Panel

- Margaret Clancy, Environmental Science Associates
- Tim Quinn, WA Department of Fish and Wildlife
- Tim Gates, WA Department of Ecology
- Tim Hyatt, Skagit River System Cooperative
- Michael Paine, City of Bellevue

Facilitated discussion

2:30 PM

Break

2:45 PM

Now What? Where Do We Go From Here?

Introduction to Issue

- Todd Hass, Puget Sound Partnership

What are some of the gaps in the science?

- Hugh Shipman, WA Department of Ecology
- Megan Dethier, UW Friday Harbor Labs

What are the implications for policy?

- Tim Quinn, WA Department of Fish and Wildlife

3:45

Wrap and Adjourn

This third Salish Sea Shoreline Forum is supported by the Puget Sound Partnership, WA SeaGrant, and Futurewise and is partially funded by the U.S. Environmental Protection Agency, through agreements with the Puget Sound Marine and Nearshore Grant Program, a partnership between Washington Departments of Fish and Wildlife and Natural Resources.

Speaker Bios: Salish Sea Shoreline Forum

Margaret Clancy

Margaret is the Director of the Biological Resources Program for Environmental Science Associates' Northwest Region. She is a Professional Wetland Scientist with 23 years of consulting experience specializing in projects involving shoreline master planning, Growth Management Act compliance, and Puget Sound restoration and recovery. Margaret enjoys multidisciplinary projects that blend science, planning, policy development, and public outreach. She has helped numerous jurisdictions update and implement critical area ordinances and shoreline master programs and is working on several initiatives related to mitigation effectiveness, watershed characterization, and the integration of resource management and land use planning.

Tracy Collier

Tracy Collier is the Science Director for the Puget Sound Partnership, a Washington State agency charged with protecting and recovering Puget Sound and with using science to inform management and policy. He also is the chair of the Delta Independent Science Board in California, and serves as a technical advisor to NOAA and other natural resource trustees assessing injuries to marine mammals and sea turtles after the Deepwater Horizon oil spill. Before having these positions he worked for over 30 years for NOAA's Northwest Fisheries Science Center, ending up as the Director of the Environmental Conservation Division, where the research portfolio included environmental toxicology and chemistry, harmful algal blooms, and watershed processes. He 'retired' from that position in 2010, and plans to retire again someday. Dr. Collier received his PhD from the University of Washington in 1988, and has over 150 scientific publications.

Megan Dethier

Megan Dethier grew up on the east coast, was sucked into marine biology by spending summers on the coast of Maine. She received her BA at Carleton College in Minnesota even though there isn't an ocean there, and then came further west to do her PhD at University of Washington. She got 'stuck' at Friday Harbor and never managed to leave!

Phil Dionne

Phillip Dionne has been with the Washington Department of Fish & Wildlife, Habitat Science Division, since 2012. His current research interests are monitoring effects of shoreline modification on nearshore habitat, identifying and assessing the distribution and characteristics of forage fish spawning habitat, and assessing new methods of detecting forage fish spawn. Prior to joining the habitat program Phil's research included work with the WDFW Fish Program using mark-recapture and acoustic telemetry to assess abundance and

distribution of ESA listed Green Sturgeon in Washington and Oregon estuaries, and using estimates of larvae density to estimate spawning stock biomass of ESA listed Eulachon smelt returning to the Columbia River.

Jamie Donatuto

Jamie Donatuto has been an employee of the Swinomish Indian Tribal Community in La Conner for 14 years. In addition to her research on community-based indicators of indigenous health, Dr. Donatuto works with Coast Salish Tribes and First Nations on projects such as toxics trends monitoring, Superfund cleanup challenges, and climate change impacts and adaptation measures.

Tim Gates

Tim Gates is Shoreline Management Policy Lead for Ecology's Shorelands and Environmental Assistance Program. He has 24 years of experience in land use planning in Washington State, most recently with the Department of Commerce's Growth Management program.

Todd Hass

Todd Hass is the Program Manager for Marine and Nearshore Special Projects at the Puget Sound Partnership. His work has concentrated on implementation of agency-owned near term actions for shoreline armor reduction, vessel traffic and oil spill prevention, marine spatial planning and nearshore habitat protection. Todd holds a BS in Zoology from the UW and a PhD in Biology from the University of North Carolina at Chapel Hill. Todd is also an active Affiliate Assistant Professor in the School of Marine and Environmental Affairs at the UW and Affiliate Curator of Ornithology at the Burke Museum.

Tim Hyatt

Tim Hyatt is an ecologist with the Skagit River Systems Cooperative in LaConner, where he helps represent the off-reservation natural resource interests of the Swinomish and Sauk-Suiattle Indian tribes. Tim holds a master's degree in riparian ecology and has spent most of the past 22 years on freshwater research, habitat assessment, and instream restoration. He currently works on habitat protection issues, both at the site level and through participation in multiple shoreline, critical area, and other regulatory updates.

Gino Lucchetti

Gino Lucchetti earned a M. Sc. in Fisheries and Wildlife Science from Virginia Polytechnic Institute and State University in 1983 and a B. Sc. in Fisheries Science from the University of Washington in 1980. He has worked in fishery research and management for the Tulalip Tribes, USFWS, USFS, USNPS, and the Washington and Virginia Cooperative Fishery Research Units. For the past 24 years he has served as project manager, lead or senior

scientist for many of King County's contemporary actions to assess, protect and restore salmon and aquatic resources. Major achievements include a recently completed EPA-grant-funded research program on land use regulation effectiveness; a federally-approved Programmatic Habitat Assessment of the County's floodplain land use for ESA compliance; the development of a classification system to guide agricultural waterways maintenance activities; the County's Best Available Science for aquatic critical areas; the Tri-County Salmon Recovery Plan; Senior team member on the County's federally-approved ESA Biological Review Team; "Return of the Kings", a comprehensive ESA-based review of County projects, programs and regulations; Shoreline Master Plan update; the Lower Cedar River and Hylebos-Lower Puget Sound Basin Plans and numerous scientific presentations and publications. He was a member of the USFWS Bull Trout Recovery Unit Team for Puget Sound and is currently a member of the NMFS Steelhead Technical Recovery Team.

Aundrea McBride

Aundrea McBride has worked as a coastal geomorphologist and ecologist since 1996. The focus of her work with the Skagit River System Cooperative has been to conduct applied research that both support the protection and restoration of salmon stocks in the Skagit River, and provides a scientific foundation for policy development by the Swinomish and Sauk-Suiattle Indian Tribes.

Ian Miller

Ian Miller is Washington Sea Grant's coastal hazards specialist, working out of Peninsula College in Port Angeles as well as the Olympic Natural Resources Center in Forks. Dr. Miller works with coastal communities on the Olympic Peninsula to increase their ability to plan for and manage coastal hazards, including tsunami, chronic erosion, coastal flooding and hazards associated with climate change. To accomplish this, he uses a suite of tools including outreach, applied research, synthesis of existing science, and coordination to help coastal communities access funding and expertise to achieve their goals and implement their plans.

Melissa Poe

Melissa is the joint social science liaison with Washington Sea Grant and the Northwest Fisheries Science Center. She holds a bachelor's in sociology and master's and PhD in environmental anthropology. Melissa's work centers on efforts to define, identify, and assess social and cultural interactions with coastal and marine ecosystems. She's committed to applying social science results to improve coastal conservation and human well-being.

Michael Paine

Michael Paine has worked as an environmental and urban planner for 27 years, 21 of them at the City of Bellevue. Born in Manhattan, he developed his love of nature as a boy growing up in rural Vermont where the lower "forty" was his classroom, newts, tadpoles and garter snakes his friends, and where winter snow,

no matter how deep, did not mean a day home from school. Drawn by a vision of a landscape less domesticated than the peaceful valleys and rolling foothills of his youth, Paine set out for the West after college where he spent the better part of a decade climbing, guiding, hiking, skiing, and paddling in wild places on three continents before settling down to the mundane task of earning a living. Not without contradictions, he has an abiding love for good food and wine, Danish design, fast German automobiles, Swedish detective novels, ocean sailing, and fly-fishing. Along with his Danish wife, UW law student son, and an impossibly stubborn Shiba Inu, Paine lives in Wallingford.

Tim Quinn

Timothy Quinn is Chief Scientist of the Habitat Program at the Washington Department of Fish and Wildlife. Tim received his MS degree in Physiological Ecology in 1987 and his doctorate in wildlife ecology from the University of Washington in 1992. Since 2000, Tim has been an adjunct faculty at The Evergreen State College where he teaches Conservation Biology in the Masters of Environmental Studies Program. Quinn served on the Science Working Group that came up with scientific underpinnings and a technical framework for the development of the Puget Sound Partnership.

Hugh Shipman

Hugh Shipman is a coastal geologist with the Washington Department of Ecology. He has worked on shorelines throughout Puget Sound for more than 20 years. His interests include beach processes, natural hazards, and coastal environmental issues. Hugh has degrees in engineering and geology and grew up on the coast of Maine. He blogs about beaches at his Gravel Beach website.

Jason Toft

Jason Toft is a research ecologist with the Wetland Ecosystem Team in the School of Aquatic and Fishery Sciences at the University of Washington. Jason is co-employed at Washington Sea Grant. His work focuses primarily on aquatic systems in nearshore habitats, including the effects of shoreline modifications and monitoring of restoration. He is a coordinator of the PSEMP Nearshore work group, works on shoreline management and monitoring, ecology of marine, estuarine, and riverine habitats, juvenile salmonid life history, non-indigenous species and statistical analysis. He holds a B.S. in biology from Brown University and a M.S. in Fisheries from the University of Washington.

Tina Whitman

Tina Whitman is staff scientist for Friends of the San Juans where she has managed shoreline research, restoration and protection programs for 12 years. Tina received an interdisciplinary Master of Science from the University of Oregon in 1999. She has over twenty years of experience in habitat conservation in the northeast and the northwest working with wildlife refuges, watershed councils and a natural history museum.

Participant List

Peter Adolphson, *WA Dept. of Ecology*
Lalena Amiotte, *WA State Dept. of Natural Resources*
Laura Arber, *WA Dept. of Fish and Wildlife*
Justine Asohmbom, *WA Dept. of Ecology*
Elizabeth Babcock, *NOAA Fisheries*
Bob Barnard, *WA Dept. of Fish and Wildlife*
Kelly Biedenweg, *UW Tacoma*
Misty Blair, *City of Tacoma*
Cedar Bouta, *WA Dept. of Ecology*
Marta Branch, *San Juan LIO*
Shannon Bray, *Futurewise*
Jeff Brennan
Joe Burcar, *WA Dept. of Ecology*
Bob Burkle, *WA Dept. of Fish and Wildlife*
Ann Bylin, *Snohomish County*
Carrie Byron, *US EPA*
John Cambalik, *Strait ERN LIO*
Randy Carman, *WA Dept. of Fish and Wildlife*
Alan Chapman, *Lummi Natural Resources*
Margaret Clancy, *Environmental Science Associates*
Lori Clark, *Island County LIO*
Tracy Collier, *Puget Sound Partnership*
Ken Connell, *Golder Associates*
Jessica Cote, *Golder Associates*
Paul Crane, *City of Everett*
Janet Curran, *NOAA Fisheries*
Matthew Curtis, *WA Dept. of Fish and Wildlife*
Shannon Davis, *Friends of the San Juans*
Megan Dethier, *UW Friday Harbor Labs*
Phill Dionne, *WA Dept. of Fish and Wildlife*
Jamie Donatuto, *Swinomish Tribe*
Keith Dublanica, *Governor's Salmon Recovery Office*
Jonnie Dunne, *University of Washington*
Nicole Faghin, *WA Sea Grant*
Annika Fain, *Golder Associates*
Annika Fain, *Golder Associates*
Diane Fitzpatrick, *Poulsbo Parks Commission*
Lola Flores, *Earth Economics*
Anthony Gabriel, *Central Washington University*
Ted Gage, *Eldred & Associates*
Rob Garwood, *City of Sammamish*
Tim Gates, *Department of Commerce*
Tim Gates, *WA Dept. of Ecology*
Wendy Gerstel, *Qwg Applied Geology*
Kelsey Gianou, *WA Dept. of Ecology*
Heather Gibbs, *WA State Dept. of Natural Resources*
Maggie Glowacki, *City of Seattle - DPD*
Matthew Goehring, *WA State Dept. of Natural Resources*
Jayme Gordon, *Pierce Conservation District*
Michael Grady, *NOAA*
Jeremy Graham, *Mason County*
Nathalie Hamel, *Puget Sound Partnership*
Todd Hass, *Puget Sound Partnership*
Diane Hennessey, *Hart Crowser*
Doug Hennick, *WA Dept. of Fish and Wildlife*
Kathleen Herrmann, *Snohomish County MRC*
Kollin Higgins, *King County DNRP*
Sheila Hosner, *ORIA*
Maria Hunter, *WA Dept. of Fish and Wildlife*
Tim Hyatt, *Skagit River System Cooperative*
Garrett Jackson, *WA Dept of Transportation*
Andy James, *UW*
Laura James, *Videographer and Tox-Ick*
Patricia Jatzczak, *WA Dept. of Fish and Wildlife*
Brad Johnson, *Island County*
Jason Johnson, *Island County*
Bruce Jones, *Northwest Indian Fisheries Commission*
Jerry Joyce, *Moon Joyce Resources*
Susie Kalthorn, *Sound Action*
Susan Key, *San Juan County*
Jay Krienitz, *WA Dept. of Fish and Wildlife*
Kirk Lakey, *WA Dept. of Fish and Wildlife*
Sandra Lange, *WA Dept. of Ecology*
Amy Leitman, *Marine Surveys & Assessments*
Kyle Loring, *Friends of the San Juans*
Cheryl Lowe, *Jefferson Co MRC*
Gino Lucchetti, *King County*
Michael MacDonald, *WSDOT/NMFS liaison*
Matthew Mateo, *WA Sea Grant*
Bill Matthews, *MSA*
Aundrea McBride, *Skagit River System Cooperative*
Paul McCollum, *Port Gamble S'Klallam Tribe*
Michelle McConnell, *WA Dept. of Ecology*
Jeanette McKague, *Washington REALTORS*
Franzi McKay, *Futurewise*
Jamie Michel
Ian Miller, *WA Sea Grant*
Kathy Minsch, *Seattle Public Utilities*
Theresa Mitchell, *WA Dept. of Fish and Wildlife*
Jamie Mooney, *WA Sea Grant*
Theresa Nation, *WA Dept. of Fish and Wildlife*
Janet O'Connell, *CATS Team member*
Osa Odum, *Northwest Indian Fisheries Commission*
Allison Osterberg, *Thurston County*

Heather Page, *Anchor QEA*
Michael Paine, *City of Bellevue*
Douglas Palenshus, *WA Dept. of Ecology*
Leo Ted Parker, *Snohomish County-PW-RM*
David Pater, *WA Dept. of Ecology*
Kit Paulsen, *City of Bellevue*
Ben Perkowski, *City of Seattle*
Kathy Peters, *Kitsap County*
Kathy Peters, *Kitsap County*
Ginger Phalen, *USFWS*
Gina Piazza, *WA Dept. of Fish and Wildlife*
Melissa Poe, *WA Sea Grant*
Dawn Pucci, *Island County DNR*
Tim Quinn, *WA Dept. of Fish and Wildlife*
Greg Rabbourn, *King County*
Alyson Rae, *Snohomish County MRC*
Cindy Rathbone, *WA State Dept. of Natural Resources*
Wendel Raymond, *University of Washington*
Brandy Reed, *King Conservation District*
Betty Renkor, *WA Dept. of Ecology*
Jeff Rice, *Puget Sound Institute*
George Ritchotte, *WA Dept of Transportation*
Barbara Rosenkotter, *San Juan County Lead Entity*
Adrian Rowland, *Kapmarconsult*
Mindy Rowse, *NOAA*
David Sale, *ECO Resource Group*
David Sherrard, *Environmental Planning*
Hugh Shipman, *WA Dept. of Ecology*
John Small, *Anchor QEA*
Cindy Spiry, *Snoqualmie Tribe*
Cathy Stanley, *Tulalip Shellfish*
Karen Stewart, *Snohomish County DPW*
Erik Stockdale, *WA Dept. of Ecology*
Linda Storm, *U.S. EPA*
Karin Streliaoff, *Mason Conservation District*
Jason Toft, *UW*
Heather Trim, *Futurewise*
Lisa Verner, *King County*
Skadi von Reis, *WA Sea Grant*
Micah Wait, *Wild Fish Conservancy*
Diane Walsh, *Seattle Dept. of Transportation*
Katharine Wellman, *PSP Science Panel*
Gordon White, *WA Dept. of Ecology*
Tina Whitman, *Friends of the San Juans*
Michelle Wilcox, *WA Dept. of Ecology*
Chad Yunge, *WA Dept. of Ecology*
Steve Zuvela, *Waterfront Construction, Inc.*

Attachment 3: Post-event evaluation summary

Survey Monkey sent to all participants after event. Number of responses = 50

Summary of evaluation:

1. **Logistics of the day** based upon a scale of 1 (poor) to 7 (excellent)

1. Pre-registration process: **90%** rated as 6 or 7
2. Day of the week (Tuesday): **72%** rated as 6 or 7
3. Facility Location: **58%** rated as 6 or 7
4. Facility (room accommodation): **72%** rated as 6 or 7
5. Food: **56%** rated as 6 or 7 (**27%** responded N/A)
6. Length of time (total) for the program: **74%** rated as 6 or 7
7. Timing/pacing of the event: **66%** rated as 6 or 7

In general, the participants were happy with the logistics of the event. Feedback suggested many people thought there was too much content in a tight timeframe, and that either spreading the conference out to two days or having fewer presentations would allow for deeper Q&A time and discussion. People also gave feedback suggesting the setup of the tables was not ideal (round table seating made it hard to see screens, and many attendees had to turn away from table to face front of room). Some participants felt the location was difficult to get to, and there were several complaints about “skimpy” food or lack of options for those with allergies/dietary constraints.

Specific comments were:

- My comments are as follows: 1) It would be better if these events were scheduled on a Monday or a Friday so that those of us who have to travel for the event only need to miss a single day of work and can combine the event with other weekend/travel plans. 2) In general the location (in a major city) was excellent; however the specific location was a bit far from accommodations etc.
- Core-15 locations with 8:30 start time are more challenging for north- south-Sound and Peninsula attendees; Great breadth of information, but very tight agenda limited time for Q&A/discussion - especially for panels
- Everything was clear and well planned. Great job. Ran out of coffee in the afternoon, but I was probably the only one that wanted some.
- Hosting the event in South Seattle makes it very hard for those of us from the San Juans to attend. We either have to leave the day before the work shop and spend the night or miss 2 or more hours of the workshop to travel on the day of the workshop. The lunch was a little skimpy but the snack was plentiful and yummy. :-)
- I liked the range of technical to social science subjects. The sharing turned out better than I expected.

- I think you are trying to move the location of the Forum around each time but for me, the Edmonds location is much easier to get to.
- I thought that the training site and other logistics worked very well. Good Job.
- I was not able to spare the time to travel to the facility.
- I watched this via live stream on utube. I certainly enjoyed and learned alot from the program
- I wonder if we tried to pack too much into the time period. I have often thought questions and discussion is almost as important as the presentations themselves
- In general, I think you are trying to cram too much in to each meeting. Allow for more thorough presentation and discussion. I frequently did not ask questions because I knew there was not the time to do so.
- Length of Time: suggest making this a two-day forum, so discussion can have time to evolve.
- Maybe a little too long.
- My only feedback is that for the pre-paid food (\$10) I was surprised there wasn't a vegan option - most of the food had cheese in it (the veg roll-ups, the salad dressing, etc.). Unfortunately, I have food allergies to a number of things... Conference overall was really excellent!
- Room and facility were fine. My only suggestion would be to set up tables/chairs so that people don't have to turn their chairs around from the table to watch the speakers and presentations. I've been to two of the three forums and both times found the table and chair set ups to be awkward.
- Round tables made it hard to see screens.
- Seemed to be a lot of e-mails related to the pre-registration process...would be nice to consolidate.
- Some of the sessions didn't seem based around a theme, but just a hodgepodge of people's findings. Overall, very good content.
- The effort to include a lot of new information was excellent, but some of the question periods after morning presentations fell a bit short.
- The last hour is stretching it a bit, even though there is always lots to talk about. I suggest ending at 3 rather than 4, since half of the room is gone anyway.
- The organizers/ facilitators did a nice job trying to keep people on track.
- The 'scrunch' due to the tight scheduling created a bit of discomfort and undoubtedly limited the quality discussion that may have ensued with less need to move on
- Very good and nice. I personally do not like "wraps" because the tortillas always taste doughish.
- Was exceptionally pleased that I got to see several of the presentations that I was not able to attend at the Salish Sea Conference!

2. Feedback on content in answer to “This session (structure and content) was valuable for me” based upon a scale of 1 (not valuable to 7 (valuable)

Morning:

- | | |
|--|----------------------------|
| 1. Background – Armor Symposium: | 72% rated as 6 or 7 |
| 2. Science Presentation: Biophysical Impacts of Armor: | 86% rated as 6 or 7 |
| 3. Science Presentation: How Science Can Inform Restoration: | 74% rated as 6 or 7 |

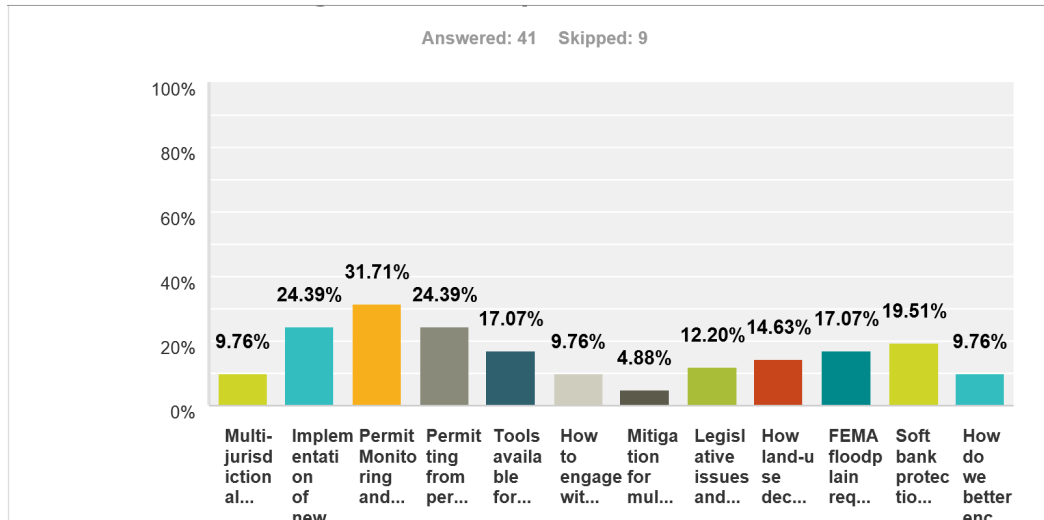
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|--|----------------------|
| 4. Science Presentation: Documenting Habitat: | 65% rated as 6 or 7 |
| 5. Science Presentation: Geomorphic Responses: | 57% rated as 6 or 7 |
| 6. Science Presentation: Natural Nourishment: | 69% rated as 6 or 7 |
| 7. Science Presentation: New Research and Management Implications: | 72% rated as 6 or 7) |
| 8. Science Presentation: How Social Science Can Inform Shoreline Management: | 60% rated as 6 or 7 |
| 9. Science Presentation: Indigenous Community Health: | 63% rated as 6 or 7 |
| 10. Science Presentation: Creative Example of Science and Policy Interplay: | 67% rated as 6 or 7 |
| Afternoon: | |
| 11. Afternoon panel: Science from Implementers' Perspective: | 74% rated as 6 or 7 |
| 12. Afternoon panel: Where to go from here: | 46% rated as 6 or 7, |
| 14.9% marked "N/A" as they likely did not attend the panel. | |

Comments: Many respondents noted a lack of true solutions-oriented discussion about the link between policy and science. Respondents tended to favor the morning sessions (with some comments that one specific presentation was too basic for this audience) that were focused more on science—the afternoon panels that were about the link between science and policy were highlighted as being circular and indicative of wider problems in the field related to a disconnect between implementing policy changes and the science those policies should be based on. In general, many respondents were pleased overall, although some comments about the choice of presentations indicated concern over the lack of policymaker representation, as well as dearth of female presenters.

3. **We created a list of topics you suggested at previous forums. Please vote for your 5 favorite topics. There are 5 different categories listed below. Please allocate a total of 5 votes overall (not 5 for each category).**

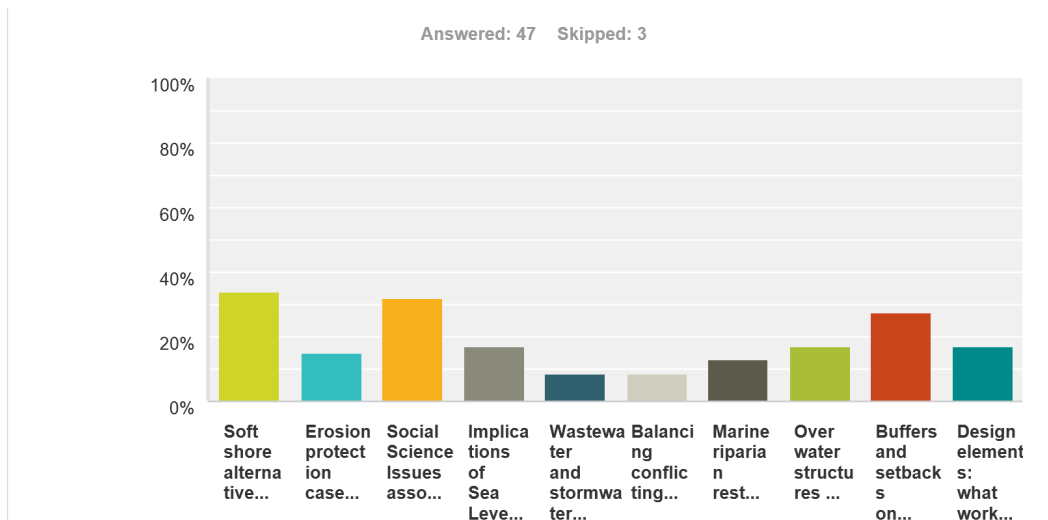
Highest ranked topics are highlighted in orange below

A. CATEGORY: Permitting, Mitigation and Regulatory Nearshore mitigation and impacts assessments:



| | Responses – |
|---|-------------|
| – | 9.76% |
| – | 4 |
| – | 24.39% |
| – | 10 |
| – | 31.71% |
| – | 13 |
| – | 24.39% |
| – | 10 |
| – | 17.07% |
| – | 7 |
| – | 9.76% |
| – | 4 |
| – | 4.88% |
| – | 2 |
| – | 12.20% |
| – | 5 |
| – | 14.63% |
| – | 6 |
| – | 17.07% |
| – | 7 |
| – | 19.51% |
| – | 8 |
| – | 9.76% |
| – | 4 |

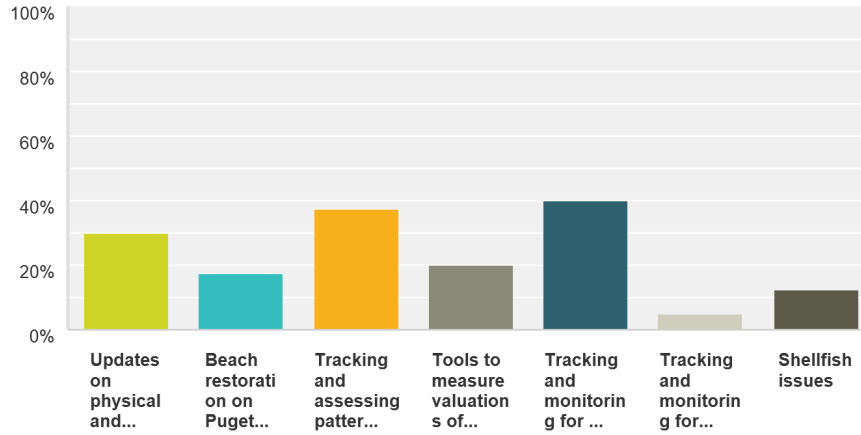
B. CATEGORY: Soft shore techniques and science and other shoreline design or use issues



| | |
|--|---------------------|
| Soft shore alternatives to hard armor for marine and fresh water including lessons learned. | 34.04% 16 |
| - Erosion protection case studies of erosion protection and environmental benefit/impact of soft protection | 14.89% 7 |
| - Social Science Issues associated with alternatives to armor (i.e. shoreline owners and publics attitudes, behaviors, motivations, etc. about shoreline health and how they manage their shoreline | 31.91% 15 |
| - Implications of Sea Level Rise on shorelines and armor | 17.02% 8 |
| - Wastewater and stormwater management issues for old and new lots especially with small lots. | 8.51% 4 |
| - Balancing conflicting objectives to maintain sediment sources ("feeder bluffs") and provide "erosion control | 8.51% 4 |
| - Marine riparian restoration and bluff reforestation in combination with slope stability issues; project implementation logistics | 12.77% 6 |
| - Over water structures - Impacts, design alternatives, permitting, studies | 17.02% 8 |
| - Buffers and setbacks on Puget Sound marine shorelines and Lake Shorelines | 27.66% 13 |
| - Design elements: what works in different situations | 17.02% 8 |

C. CATEGORY: Shoreline science, monitoring, and valuation of ecological functions present in nearshore ecosystems.

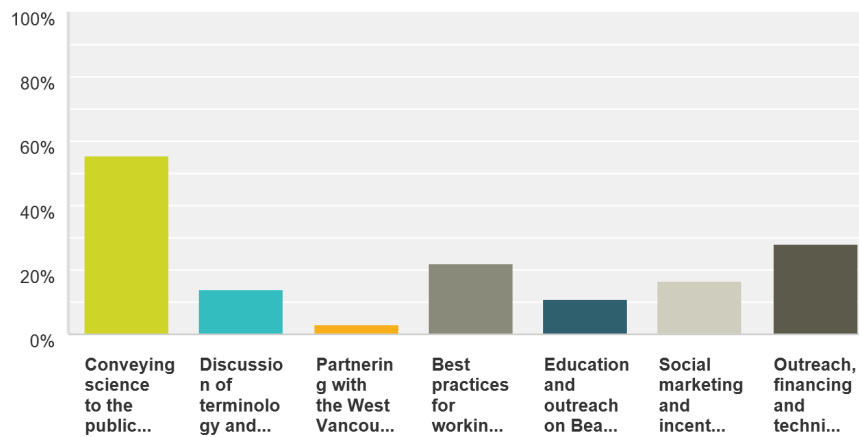
Answered: 40 Skipped: 10



| | |
|---|----------------------------|
| Updates on physical and geological studies of PS shorelines | 30.00% 12 |
| – Beach restoration on Puget Sound | 17.50% 7 |
| – Tracking and assessing patterns and trends in shoreline conditions (including armor) on Puget Sound and Lake Washington | 37.50% 15 |
| – Tools to measure valuations of ecosystem | 20.00% 8 |
| – Tracking and monitoring for SMP No Net Loss | 40.00% 16 |
| – Tracking and monitoring for voluntary restoration | 5.00% 2 |
| – Shellfish issues | 12.50% 5 |

D. CATEGORY: Education, outreach, social marketing, and technical assistance

Answered: 36 Skipped: 14



| | |
|--|---------------|
| Conveying science to the public, dealing with misinformation, and making studies relevant to local shorelines | 55.56% |
| — | 20 |
| Discussion of terminology and how it should be used to educate the public about shorelines. | 13.89% |
| — | 5 |
| Partnering with the West Vancouver Shoreline Preservation on an interactive educational community engagement event | 2.78% |
| — | 1 |
| Best practices for working with property owners. | 22.22% |
| — | 8 |
| — | 11.11% |
| Education and outreach on Beach Monitoring | 4 |
| — | 16.67% |
| Social marketing and incentives | 6 |
| — | 27.78% |
| Outreach, financing and technical assistance of shoreline erosion control on Puget Sound | 10 |

The highest ranked topic was “Conveying science to the public, dealing with misinformation, and making studies relevant to local shorelines,” and the next highest ranked topics were “Soft shore alternatives to hard armor for marine and freshwater including lessons learned” and “Tracking and Monitoring for SMP No Net Loss.”

Additionally, the following suggestions were made for additional topics or changes to topics:

- Protection challenges- can we use existing regulatory and voluntary frameworks to leave intact areas alone?
- For tools, focus on decision making processes, not the guidance documents. Missing - more information about the percent of armored shoreline by drift cells and thresholds that could be used to modify/limit permits.
- Market research/focus group feedback on barriers to soft or no armor.

- For tools, focus on decision making processes, not the guidance documents. Missing - more information about the % armored by drift cells and thresholds that could be used to modify/limit permits.
- Evaluation of criteria for implementation of CAO/SMPs Effectiveness monitoring of SMPs

4. How valuable is this forum to you? Please describe briefly your feelings towards this forum series.

In response to the question “Please describe briefly your feelings towards this forum series,” participants generally responded very favorably, with the overwhelming number expressing the sentiment that the forum is of great value to them. Several commenters expressed the value to them in the context of being new to the field, while several other commenters expressed the significance for them despite an implied longer career in the field. Some commenters expressed in this section their frustration at the lack of solutions, as also noted earlier.

Specific comments:

- These forums have been extremely valuable. Overall they are an excellent opportunity to meet other shoreline planners and share information.
- As a new-ish employee, it was a great introduction to the progress and challenges occurring in the region.
- Find these forums valuable. I like the agency updates.
- Good education.
- Good mix of people in the audience.
- Great combination of scientists and policy/management
- Great venue for new and overview information and discussion and synthesis of regional efforts.
- Great way to learn what is going on and to network on this issue. Very valuable
- Having a science background, this forum was valuable to me. I enjoyed hearing about what we know, what we're learning, and what more we need to study and understand.
- I appreciate the no expense. I would not be able to attend otherwise.
- I appreciate these forums as an opportunity to learn about current studies and share ideas. Since there is no money in my agency for attending conferences, these forums do a great job of filling that gap.
- I attended first and third. Great sharing of ideas and networking opportunities. Came away with better view of larger picture.
- I enjoy going, interacting with people working on similar topics and learning about the other projects people are working on. That way we can all strengthen our work by integrating it with others.
- I find the very valuable and I make attending these forums a priority.
- I found this forum valuable and useful. I would like to see continuing updates on the research on shoreline armor impacts.
- I think it is great. Very valuable.
- I very much enjoyed the science presentations and found them very valuable.
- It is valuable, especially to stay current on shoreline research and mgmt issues

- Moderately valuable, generally a reinforcement of materials previously heard of but perhaps not fully absorbed
- Pretty valuable. Broadened my understanding of data and all related issues.
- Quite valuable to understand key scientific hurdles and current state of understanding, ... with uncertainty.
- The morning was very valuable. The afternoon was a bit too much complaining and not enough real solutions. Private ownership of the commons has always led to tragedy let's move towards real protection of the shorelines and stop worrying about whether science or policy is to blame for allowing this public resource to decline.
- This forum series is valuable, but after the third one I got to thinking how is it making a difference? I'm personally starting to experience a little burn out. Perhaps if there were specific outcomes and recommendations associated with each one, that would be good. Honestly I'm not sure how to address this problem...
- This forum series is very valuable to me. It offers an opportunity to meet with and learn from a wide variety of stakeholders involved in the state's shorelines.
- This is a good forum for information.
- This is a great opportunity to people to come together from different aspects of restoration. I think it would be great to include realtors and contractors in some of these discussions re shoreline armor.
- This is a very valuable forum, it is very informative and there is great discussion on how to resolve some of the more difficult issues. This series needs to be continued.
- This is very valuable
- very helpful
- very helpful
- very interesting, Hugh, Megan, and Jamie's presentations were the most valuable; sorry to have missed prior events
- Very valuable - great!
- Very valuable, it gives us a chance to dig into the subject!
- Very valuable. It was useful to have repeats of some of the Salish Sea presentations because I missed a couple of important ones, and some (M. Dethier and T. Whitman) bear repeating.
- Very. I'm a beginner and this helped me gain some understanding of issues.
- While skeptical at first, I believe this series has been the most informative and most useful effort I have participated in on the shoreline management and protection issue.

5. Did any collaborations/ partnerships emerge based on one of the previous forums? If yes, please explain briefly.

In response to the question, "Did any collaborations/partnerships emerge based on one of the previous forums? If yes, please explain briefly," 31% responded "Yes." The comments showed that many participants made connections at *this* forum with the expectation that collaborations are in the works; additionally, several commenters detailed partnerships that have been evolving since previous events.

Specific comments:

- Kelsey Gianou and Theresa Mitchell have partnered up to do presentations to local jurisdictions on the ECY soft shoreline stabilization document and the WDFW MSDG. There are currently 3 joint presentations scheduled at 3 counties and 1-2 more in the works.
- Connections with WDFW on recent Marine Shoreline Design Guidelines (and potential training)
- Conversations with permitting people, scientists, and engineers have become more common.
- Expect collaborations to occur based on current forum.
- First one attended
- I had several side conversations to follow-up on, including on agricultural practices, floodplains and rational approaches to balancing competing interests.
- I wasn't able to attend either of the previous forums, but I anticipate that yesterday's forum will lead to some collaboration going forward.
- N/A
- Not yet, but in progress. A possibility to have one of the researchers participate in a regional workshop on how to implement their results.
- Policy and contractors how are "in the trenches" with this stuff
- Streamed forums. However, it did spark conversations with colleagues.
- Was able to connect with a potential partner to collaborate on a grant application.
- Working closer with NOAA and FEMA on state SMA shoreline and NFIP floodplain policies to implement existing regulations that will avoid adverse impacts to identified Puget Sound ESA-listed species of salmonids, orca and critical (floodplain) habitat (NFIP), and avoid a net loss of ecological functions identified in the local SMP Shoreline Inventory, Characterization and Analysis (SICA).
- Working on developing some ideas and collaborations.
- Yes, I made contacts with at least three new people/entities

6. Please provide any additional comments or suggestions you have about the Salish Sea Shoreline Forum. Also, if you have thoughts about the topic (science/policy) that you would like to add here, that would be great. All of the feedback and comments submitted in this survey monkey will be included in the Forum Report. And thank you again for your feedback!

Overall, participants seemed to be very pleased with the forum and left overwhelmingly positive remarks at the end of the survey. They liked the opportunity provided to get together and talk about their work among a diverse group of participants and possibility to exchange ideas and information.

Specific comments:

- There are so many topics that need more in depth exploration, I don't know how you possibly do it all and do it justice! Would be good to get the right people in the room to develop a long term funding strategy for getting some of this work done. Operating on a biennial based grant cycle is not conducive to long-term guarantee of staff to work on these topics.
- Impressed with the attendance, facility, program and catering. Video and report will be helpful; would like access to presenters slideshows as well (PDF)
- It became clear during the most recent forum that more information on marine riparian vegetation is a significant gap.
- As mentioned earlier, we must initiate and/or fully support the controversial work of implementing existing standards and regulations for activities and development in watersheds of the Salish Sea.

Whether those standards and regulations are in local SMPs, CAOs, Comprehensive Plans, Stormwater Manuals, Flood Ordinances, etc. they were carefully drafted, assessed and established to achieve protection of Salish Sea (and elsewhere) critters and functions. It is right that we carry them out so they can work. Some of the hardest for land owners to accept may be restrictions on shoreline armor, prohibitions on building in Protected Areas of NFIP floodplains, requirements for vegetation conservation in riparian buffer areas and steep slopes, using best management practices for storm water, minimizing impervious surfaces everywhere, limiting development of raw land, etc. The environment of Washington State has reached its carrying capacity, and boosters should not encourage thousands more residents as they are hoping for in the next few years. Urban areas are only one place in the environmental health chain, and can't be written off because their air was targeted for the most vehicle and industrial use, their soil was targeted for the most removal of trees and vegetation, the most hard pavement, and the most buildings with the most people making the most sewage going into the Salish Sea via combined sanitary and storm sewers with inadequate plans for separation, capture and treatment. Cities that decide "enough is enough" with densification end up better life quality and better economies.

- Interesting forum. Because it was low-cost and only one-day I think you got some participation from regulators at state and local agencies that couldn't afford (the time or money) to attend the Salish Sea conference. That in itself is a good reason to continue.
- I appreciated the emphasis on science and policy yesterday, and encourage the forum to address issues like the following in the future: (1) underlying assumptions about the meaning of state laws that apply to marine shorelines. Comments from agency officials at yesterday's forum indicated a potential belief that those laws require them to prioritize private shoreline development over protection of public natural resources (e.g., the agencies can seek the avoidance and minimization of impacts where possible, but must allow the development to move forward in some form). It would be invaluable to involve agency lawyers in a discussion about the actual language from the Shoreline Management Act and Hydraulic Code to better understand perceived limitations to their capacity to protect public shoreline resources; (2) underlying assumptions about how Salish Sea shorelines should function -- for example, as mentioned earlier, a significant portion of the language used at yesterday's forum suggested that erosion is a harmful force that needs to be controlled in favor of establishing a permanently located demarcation between upland and shoreline. Yet I think an objective interpretation of much of the literature on shoreline physical and biological processes would suggest that erosion is a natural process to which littoral and marine species have adapted over the years. Thus, to have a productive conversation about whether and to what extent Washingtonians should continue to develop shorelines with bulkheads and other modifications, it would be useful to first understand from the stakeholders whether shoreline erosion is deemed a threat, a benefit, or other; (3) identifying impediments (e.g., the lack of political will, or at least the perception of lack of will) to the implementation of existing shoreline regulations to protect public resources; and (4) perhaps most importantly, an exploration of the values that lead some shoreline property owners, including those who are genuinely concerned about their shoreline's ecological health, to replace native shoreline vegetation with lawns and bulkheads.
- Please keep me on your list for future forums :-)
- Could we draw from some of the success from freshwater, it seems that more people understand the importance freshwater habitat/environment in sustainability. I like what Phill Dionne said to paraphrase fish left in the ocean are more economically important than the ones that are caught or removed (something like that). If outreach could deliver a message similar about shorelines, for example a "natural looking beach is more economically beneficial than a beach isolated by concrete or large rock armor"???? Also, the fact that beaches isolated and shortened by hydromods tend to shrink as a result of armor. Although not exactly the same property owners who live along

shorelines of rivers and streams seem to be open to the fact that armor banks with conventional methods leads to future failure in the future. That isn't always true, but seems to be the case at least part of the time.

- We need more science that answers the questions needed to create effective and fair regulation-- regulation that works with minimum economic cost and intrusion and that will be accepted on the broadest possible scale. No less important is the need for policy that puts the recovery of the marine and freshwater ecosystems that support salmon recovery as the primary land use policy for the state and the residents of Puget Sound. People need concrete symbols and goals and talking about no net loss of ecological functions is not a sufficiently motivating message to do the heavy lifting required. Science and policy, no matter how well understood and articulated, will not mean much absent a collective commitment toward a common goal. The role of those involved in the Forum is help build the commitment.
- Thanks for having it. Although frustration was palpable re: progress in protecting and restoring PS, the forum provided an outlet (i.e., group therapy session) for expressing those frustrations and possible solutions. All-in-all, I learned a lot and felt it was very worthwhile day.
- More focus on north sound/Salish sea environments with higher energy. It would be nice to have a venue further north than Edmonds on occasion