SHORELINE EDUCATION SERIES
JULY 8, 2010

DISCUSSION ITEMS

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1. WELCOME, INTRODUCTIONS, AND OVERVIEW 6:35:48 PM

Libby Hudson, Long Range Planning Manager, welcomed the attendees and thanked them for coming on such a lovely evening. She told attendees that the speaker series is part of the city's shoreline update process and what came out of the community workshop on how citizens wished to participate in the update process.

Libby welcomed Jim Johannessen from Coastal Geological Services, who would be presenting a report that he did for the City of Bainbridge Island that addresses feeder bluffs and coastal geomorphic features on Bainbridge Island. A question and answer session was scheduled to follow that presentation.

Libby also told attendees that the presentation and the questions with their responses will be posted on the city's web site and noted that the next education event has been scheduled for July 27th, when Ron Thom will speak about understanding the nearshore assessment that was done by Battelle.

2. FEEDER BLUFF MAPPING – JIM JOHANNESSEN

Jim Johannessen told the audience that it was great to see the entire island by boat, which is how all of the work for the report was started. He noted that the report looks at the beach and bluff conditions on the island as a whole system.

The outline for the presentation showed objectives for the study, a brief look at previous work that was some of the data that went into this project, the methods for new data collection, a quick overview of the geomorphic processes, current conditions, historic conditions, analysis and results, and recommendations.

Jim said that the objective of the study was to definitively map coastal drift sediment sources (meaning feeder bluffs – the bluffs that are providing the bulk of sediment for the Island's beaches and beach systems), neutral areas (sediment transport zones), accretion shoreforms, modified segments (typically bulkheaded areas) and recent landslides and bluff toe erosion.

After that, Jim said, they went and used the current conditions and other information to determine historic feeder bluff mapping, historic accretion shore form mapping. Thirdly, provide the geomorphic process base recommendations for restoration of some of these sediment transport processes and conservation – taking all this data and weighing against each other, essentially.

Jim said that the presentation will be organized by what is called a drift cell. He then used a pointer to illustrate a drift cell from Rolling Bay to Point Monroe as an example and a couple other of the longer drift cells.

Some of the original mapping was done in the 1970's by the Coastal Zone Atlas of Washington. This particular portion of that mapping is not correct – the drift cells they mapped were done from behind the desk, without getting in the field. We have corrected those through all of these other sources.

USGS is a compilation of many different counties' mapping, completed for the Dept. of Ecology – some of which (about 500 miles) Jim did. That work has been updated. Because it was digitized, there were some errors in digitizing. We corrected that for Kitsap County in 2007 and later in 2007 went back and corrected historic net shore drift – pre-development for the Army Corps of Engineers and for the Puget Sound Nearshore Estuarine Restoration Project (PSNER).

There are 21 drift cells around the island – about 40 miles of drift cells and 13.7 miles of no appreciable drift areas. The map is focused on the drift cells on the active area.

Coastal Geological Services has applied these same methods for current conditions for about 800 miles of shore around the Sound. Jim noted that they are approaching half-way and thinks they're getting momentum so that they can finish it in the foreseeable future. There are about 300 miles with both current conditions and historic feeder bluff mapping.
We can do Sound-wide planning with this type of data.

Some of the other studies that have recently been done by PSNER include *Beaches and Bluffs of Puget Sound, Management Measures* (ways to do restoration – ways to remove bulkheads, ways to open up old estuaries, ways to take out fill, etc.), and *Strategic Needs.*

Jim said that the beauty of this kind of work is that it relies heavily on field work. They didn't fly in an airplane, they didn't just use somebody else's photos and somebody else's GIS maps and somebody else's geology maps and so on. It's really based on a field-mapping protocol. It's new data, not recycled, and he thinks it's accurately done because they've visited every bit of shoreline. Jim said they used a very small map and got close to shore, mapping at very high tides and using handheld GPS's that were later post-processed and corrected to be very accurate.

Everything then was brought into the office – all the GPS points were brought into the computer system, moved slightly landward to be on the high water shoreline to be in the same mapping that nearly everything else is in. We digitized everything and error-checked as we went, using the best available air photos where needed. We got it all into the GIS, got it all error-checked, and then went through differently delineated the landslides and toe erosion from the field points. We also had field points from the areas that showed restoration potential – something falling down into the water that could be removed – some obvious, opportunistic point – separate from the mapping that has already been briefly discussed.

Jim then showed examples of what they have termed "feeder bluffs exceptional" and said that feeder bluffs are the primary sediment sources for the beaches, for the drift cells, for the spits.

The Island doesn't have any major rivers and doesn't have a lot of streams. Even the few streams are delivering very little sediment so bluff erosion is the primary source of sediment. That's been verified over the years by different geologists and scientists around the Sound. The feeder bluff exceptional with greater input, the feeder bluff (ordinary) is commonly mapped. They used common indicators that are explained in the text if someone wants to see it in more detail, but a whole suite of six or eight indicators each but also the absence of several different processes. For example, feeder bluffs would have some evidence of landslides, some evidence of sediment delivery to the beach directly, immature vegetation – perhaps no vegetation, perhaps trees on the beach, boulders on the beach showing past slides, steep bluff angles, perhaps evidence of old bluff scarps still visible (besides the more recent ones) - those are the primary indicators. These are all based on a whole series of other published papers that have been referenced in the report.

Another common shore form, a geomorphic type, is the transport zone – these areas that are not eroding or accreting. "Modified" is a bit of a catch-all phrase – residential bulkhead, industrial fill, harbor facilities, boat ramps, large stairways, etc. would all be in the modified category as they cross the high water line.

Accretional beaches are in front of a bluff or other land form. Pocket beaches are fairly rare – there are a few down near the mouth of Blakely Harbor and further south on the island where there is a beach between several headlands, not part of a littoral cell or a drift cell. No appreciable drift areas where there is almost no wave energy in the inner bays and areas where there is bedrock and basically no active beach. These are outside of drift cells.

Jim showed a few examples of current condition mapping. The maps are USGS maps with a lidar overlay to show a little of the hills and colored mapping along shore. Red was used to indicate modified areas, with green for the transport zones, and blue and purple were used for the feeder bluffs. Landslides were indicated with a sort of peachy color and accretion areas were indicated by yellow.

Showing a list of all the drift cells around the island, Jim pointed out that some of the longer ones are four or five miles in length and pointed out specific drift cells and talked about how much of those areas are modified. (The average is 62% modified, well above the Puget Sound average.)

Coastal Geological Services coined the term "historic sediment source index" in 200 for a King County/Snohomish County study which is very similar to this one. This is an example of basically a score sheet used to score each small segment of bulkhead, looking at all the historic resources. So these are not scoring a whole drift cell at once, but scoring a segment which might be a few hundred feet long, might be 500 feet long, and might be a little less or more than those.

So what they looked at was to go through a bunch of existing data sets and then measuring some new things, also looking at their data. Where were they with a certain bulkheaded area in relationship to the mapped feeder bluffs? Was there feeder bluff on both sides? You're more likely to get feeder bluff on one side. The wave fetch – the amount of exposure from an open water distance where waves can form. More exposure, larger waves, more likely to have erosion of the bluff – one of many of these individual score units.

Topography, namely bluff height – higher bluffs can provide more sediment, more likely to be a feeder bluff. Geology – what were the geologic units? It's mapped at the surface. That's all we have, so it's not perfect. Do those units have high sand and gravel contents so they'd be good for beach building? Those would get some points.

Historic mapping – so what did it look like in the 1880's in some of these old topographic maps? Do they map it as eroding bank or eroding bluff, for example – that would get more points than some of these other things I'm talking about. 1940's and 1960's vertical aerial photos – we zoomed way in on those to see if there was evidence of erosion at that time. Mapped recent landslides from Coastal Zone Atlas – there was a decent layer in that. Did we have mapped landslides by our group? Were they close or not to these divergence zone areas where the drift cells start?

All those things were weighted – some more than others, as the score sheet shows. Each segment got scored, totaled up on the computer, and if the score was over 30, it fell into the historic modified feed bluff category. If it scored lower than 30, it was either labeled potential and we did not consider it a feeder bluff or it was definitely not a feeder bluff in our opinion. There is more information in the report.

Jim used maps to point out some of the historic feeder bluffs and how impacted they now are.

Jim then talked about the conservation prioritization that was conducted to identify bluffs that are of high conservation value for sediment supply. Not only were the historic feeder bluffs mapped, but the feeder bluffs that are not modified were identified so that all of the units could be compared, using the same scoring criteria to see which ones appear to provide the highest sediment yields. If there's a big high sandy bluff that's eroding away and feeding the drift cell significantly, it's got a higher conservation value. That is, let it erode and feed the beaches as compared to going to great lengths to keep a bluff that's eroding and providing very little sediment.(Of course, some of you are thinking as homeowners, "That's not conservation – that's giving your bluff away." I'm well aware that there are two sides to the story.)

Jim told the audience that erosion rates in this area are typically slow around here. We do not have rapidly eroding bluffs anywhere around this island. It's not like many other parts of the world. Looking at a few of these units, some of these scored very high for sediment source in the current conditions and were listed in this table.

Coastal Geological Services stayed at the unit scale for restoration potential. The Army Corps of Engineers, PSNER, and other groups are interested in restoring processes, not interested in bringing dump trucks to the shore for a year to try to create natural processes. Sometimes that's done when there is absolutely no alternative, but it's not a cost-effective, long-term solution. Restoring the sediment supply processes from the bluffs will restore and maintain the down-drift beach habitats – the spits, the salt marshes, the salmon streams, the embayments (which are of very high value for salmon and other wildlife).

Some of our forage fish spawn on these fine-grained upper intertidal beaches, right in the area where bulkheads often go in. If all the bulkheads go in for the feeder bluffs, the down drift beaches wash away, the habitats wash away.

Stepping back then, within each drift cell then, it was easy to sort what were the three highest units for sediment source, bluffs, and preservation or conservation (or bulkhead removal, as it might be in some examples)?

Jim discussed how the study might be used in making permit decisions, identifying restoration and/or conservation projects, and education.

3. DISCUSSION

Libby thanked Jim for his presentation. She told the audience that the Nearshore Assessment identified the feeder bluffs in a more specific way than we had prior to that and this study builds on that. This is the most specific and new information specific to Bainbridge Island, so it's what we use currently since it's recently been completed. Like with wetlands, we have new scientific information, a more specific understanding of our natural resource areas, and now with feeder bluffs, we have newer information more specific to the area.

Libby introduced Josh Machen, senior planner in current planning and Ryan Ericson, the city's shoreline planner. The question and answer session started with written comments.

If beach nourishment was used, how would you select the amount or type of material that might be used?

Jim said that beach nourishment is adding sediment to a beach by artificial means – barge, boat, whatever means. He said that he has worked on a lot of those projects, including some for Bainbridge Island parks. Each site is different. The question was how much and what materials – each site would have a historic research (not the same as mentioned earlier) but actually looking at short change to add a little more data to what we've done. How much has it eroded? What are the erosion rates? How much has it been filled – percent perhaps? What are the causes of erosion? Is it just the loss of sediments by wakes, by particular structures? There would be some analysis of the problem first. The mapping of sediment sources that exist in that particular site and in neighboring reference sites, similar, more natural conditions – all of those things would be weighed to figure out what material would go in.

If it's a highly eroding site, lots of times we have to go to gravel – larger sizes are more stable. Seattle Parks, for example, have been nourished with gravel in the past. Many of them had very little beaches thirty years ago, twenty years ago, before nourishment occurred. So it might be beaches there that weren't even there a generation back because it's been so heavily modified. Where the energy is lower, where the erosion is lower, we can get finer gravel and sometimes sand sizes – that has to do with the erosion rate and the wave energy. All of those have to be considered.

How much material? That would be how long do we want to keep materials from eroding back to a certain point. Again, that goes back to those same data sources – what are the rates of erosion, transport? What are the margins of safety we have to keep? Do we certain structures we

have to protect on this particular site we're talking about? So all that has to be weighed in. Is the city, the feds, or whoever is going to do this, are they ready to renourish this, to sign up for a schedule, because then you can add less. All that has to be weighed.

Do you have specific examples of shoreline erosion or accretion documented by changes between historic maps, photos, and current maps? Did you find any shrinkage of accretion shore forms? If so, where?
The latter one is easier to answer – did we see accretion shore forms shrinking, so to speak. We didn't look at those in that kind of detail I showed with the feeder bluff mapping. The protocol was more heavily designed to map the feeder bluffs, current and historic. We didn't do a detailed analysis of all the accretion beaches. We did do a little bit of additional work where we looked at two particular drift cells and we did see that the upper beaches had lost a significant amount of area between the earliest data of about 1961 and the present conditions. So a lot of the beaches, as you know, upper intertidal and mid-tidal, steeper, sometimes gravelly beach, there's a flatter sand flat down around the low tide line. Sometimes it's coarse; sometimes it's mud; sometimes it's sand – there's usually a break in slope. That break in slope usually shows up in air photos that were taken at low tide pretty well. So when we looked at a couple of drift cells in good detail with additional historic work, we saw the upper beaches were losing area in all reaches along the drift cell, except the very end portion where it had actually grown in both places. The losses far outweighed the gains, however. We saw the accretion shore forms shift around – in one case, shrink a bit; in one case grow a little bit – but certainly adjusting.

In an effort to reach mutually beneficial solutions to the problems of shoreline process loss versus shoreline owners' interests in keeping their yards from falling into the Sound, please discuss island-wide beach nourishment to overcome the perceived loss of sediment due to property protection bulkheads.
Jim replied that, on the practical side of that is money. That's the most important factor for that question as far as he can see. He has designed a lot of nourishment projects and done budgets, talked to contractors, overseen construction – all of that. The project range for beach nourishment has been $100 - $500 a foot just to do the beach nourishment project. Those are not island-wide. Also, for a larger project the material for the nourishment would need to come from someplace like DuPont/Steilacoom. The supply of those materials is dwindling and subsequently the cost is rising. Transportation costs are also rising. In previous years, the costs have really been going up measurably and you need a maintenance schedule of some sort, so it can get pretty expensive in large areas.

Ryan added that, from an update standpoint, to meet the condition of no net loss, mitigation of new development's impacts on the nearshore – one of the tools that can be used for modifying a shoreline would be a beach nourishment regime. That's to be decided through this process – how we do that.

Can you compare the costs of beach nourishment against the costs of home loss?
Jim replied that the cost of beach nourishment is certainly less the cost of home loss. With that said, the erosion rates we're talking about – through other work where we've carefully measured on Bainbridge and close in to Bainbridge – are typically a couple of inches per year on the long-term average. The higher rates we'd expect to see on Bainbridge would be 4-6 inches per year,

averaged over a three decade period. So you might lose 5 feet or 8 feet in one particular day and then it doesn't change at all for 20 or 30 years and then maybe another landslide happens in that same spot. So they're very episodic and a lot of the residential work done in the past has been by folks that are fairly new to their property and all of a sudden they see some major landsliding. They're rightly concerned, but it might be that a more detailed investigation says there wasn't a landslide on your property in 30 years. Home loss – the greatest danger is at the bottom of highly unstable bluffs. The top of the bank – it's usually 1-foot, 2-foot, or 5 foot at a time and, generally speaking, unless your house is closer than 5 or 10 feet, you're not likely to see home loss or loss of foundation – those things. Sometimes the perception is greater than the risk.

The County has a handout on their web site that says, "Bulkheads don't stop slides. Bulkheads do little to prevent sliding of the upper bank. They simply can't withstand the sheer force of saturated, sliding soils. Is that statement correct?
Jim replied that he thought the statement was correct. They're typically not engineered to stand above an unstable bluff. Unless it's tied down very, very deeply into something structurally sound, it's really often more of a landscaping feature. It's much easier to tie in a shoreline bulkhead down on the beach into deep, stable soils beneath it than it is to do one that's up here. Sometimes we see whole walls or whole pieces of walls coming down from the top of the bank whereas the shoreline bulkhead – if it's there – might be fine. Other times we see bulkheads being pushed down from mid-slope or from lower-slope landslides and many times we see bulkheads performing just as they were designed, but not so much at the top of the bank. When you engineer a slope, again – it's a matter of money. To work on a 50-foot unstable bluff, you could spend as much as you spent on the house to get what you're after.

The shoreline bulkhead is designed to stop the wave attack at the toe of the bluff. Until you get a stable angle of repose projected from that bulkhead up, then you will continue to see sliding at a decreasing rate.

What will happen as the island continues to be modified with armoring? How would beach nourishment help or hurt the island?
There is no one exact point where everything changes, but as the feeder bluff sources become more limited, each one becomes more valuable. Or the loss of each one would be felt in that particular drift cell to some extent. Whether we can measure or not; it's very difficult. As you've seen, more than half of the feeder bluffs are already bulkheaded, which is well above the Puget Sound average. The remaining sources are thought to be more important than if they were all still there. We have seen upper beach erosion in the few drift cells we have looked at in great detail and those were the ones that were modified (bulkheaded) more than 70% of the sediment sources. Those were the ones that were more modified than average and we did see impacts when looking very closely. You look at some of the drift cells in Rich Passage where there's not that much sediment supply - both the Port Orchard side and the Bainbridge side – where there's a lot of bulkheading and you can see with your naked eye that there's really not that much upper beach in front of those bulkheads. It doesn't take a lot of high-tech mapping to see that in many areas – not all areas.

Is the feeder bluff study available online?
Yes, the feeder bluff study is available online – available in two parts because it's a very large document. The text portion is available and the maps you have to click on separately and download each one.

When the language of no net loss is used in the Shoreline Management Program update process to what is that referring? To the feeder bluffs or to what?
The full term is "no net loss of ecological function." So that would be all the functions and processes in the nearshore; that would include feeder bluffs and habitat.

A long time ago there was a fellow named Wolfe Bauer that put out groins that were perpendicular to the wave front to prevent further loss. With present thinking, can you support that idea – permitting Wolfe Bauer-like groins that project out against the erosion?
Wolfe Bauer was a coastal engineer (I think he's only 99 right now, so he's given his "last talk again. He's had a lot of "last" talks.) Wolfe Bauer designed a lot of beach nourishment projects. He coined the term "feeder bluff." If he was here today, he'd be far less soft-spoken and mild-mannered than we are up here. He'd be saying, "These damned bulkheads are ruining your beaches!" He'd be pounding on the table – I've seen him do it many times. In highly developed and impacted areas, like Seattle's parks, he designed a lot of beach nourishment projects. In some of those he used groins, mostly just one groin. A groin is a rock structure that goes across the shore and it goes down – usually his were fairly short and wouldn't go all the way across the beach; they'd kind of peter out about halfway down. The idea was to build up the beach and hold it in place from moving along. He called that a drift sill, so it would stop the drift. It's just a groin associated with a nourishment project. In only a couple of the projects he did, he had more than one groin. In many of them he had no groins, so he used them as a last resort. A groin will cause accretion on one side and erosion on the other side. People put them on their down-drift property line and their neighbor feels the pain; they feel the benefit. For that basic reason, back in the 1970's the Shoreline Management Act more or less outlawed them unless absolutely required for something like a marina entrance, in which case they're really a jetty. Regulatorily speaking, they're basically not allowed in anything but a straight industrial use where they're required – because of those down-drift impacts, because of damaging the intertidal.

The current Shoreline Master Plan that the city has prohibits groins or drift sills.

I'm particularly interested in assessment methodology. I find the geologic assessment methodology is particularly interesting and I know you couldn't elaborate or get into detail about them, so I'm curious as to where they came from initially. And then the whole historical assessment methodology I find particularly fascinating too. So, if you could explain a little bit about them and I would certainly go to your report for more details.
Historic methods are explained in much more detail in this report. We looked for defensible measures to use. Pretty simple – greater open water causes greater waves causes greater erosion. We wanted to find a good, solid reference for that and identify it. We wanted to find somebody who has determined another connection between interpreting these maps from the 1880's - what do these interpretations mean? So we've cited that to those folks who've done that work. We cited back to mostly peer-reviewed – not all peer-reviewed – mostly peer-reviewed articles,

reports, USGS reports – things like that. Those are all listed in the report. There's at least several pages of references – three pages of references in small print in the back of the report – and there's a good methods section, so I really can't explain all that, but it's similar to the net shore drift mapping that was done in the 1980's and 1990's. With net shore drift mapping, we had nine indicators of the littoral drift direction. Each of those nine, such as a stream mouth getting offset when it crosses the beach, such as identifiable sediment coming down the bluff and going one direction predominantly – each of those is backed up by detailed studies and references. We tried to do the same approach here. The geomorphic approach was done in the drift cell mapping. It replaced – and is found to be far, far more accurate than – the engineering approach from the previous generation. Since our shores are so complex – they vary every 5 feet, every 500 feet – we felt that the geomorphic approach and all this map analysis I talked about was needed to identify these feeder bluffs, as opposed to the more one-size-fits-all mapping.

We've owned our waterfront parcel since 1958. I noticed that nothing was said about "vessel" or "ship". Why do we need additional sediment to replace the sediment that's been washed away? The thing you need to know is that there are 2800 to 3000 large container ships passing by in front of the east coast of Bainbridge Island to the port of Seattle and Tacoma and they're doing 20 to 23 knots on the average. They send these tsunamis ashore. One that breached our bulkhead was at least 16 feet high and it did $25,000 damage to our neighbors' bulkhead. If you want to check this out for your own information, go to the website www.marinetraffic.com/ais/. You'll see that they're going very slowly through the straits of Juan de Fuca, but as soon as they round the corner at Port Townsend, they pick it up to 20-23 knots – and that includes the cruise ships. You have 8 arrivals a day and we have to assume as many departures. Why haven't you studied the effects of the container passing on Bainbridge Island's east coast?

Jim replied that they were looking at the geomorphic features. We were not looking at an analysis of existing waves. That would be an engineering analysis, so it really didn't fit into what we were looking at. We were looking at sediment sources and weren't trying to parse out exactly how much erosion was due to wakes and how much was due to natural storms and how much might be due to upland development or any other factor. It really wasn't in our scope of work is the simple answer. I don't deny that those vessel wakes are having an effect. I have studied vessel wakes a small amount – I worked on the Rich Passage ferry case years ago. I know it's a valid issue to be talking about, but it really wasn't within the course of our study to look at how many waves are formed today and how many might have been formed in 1900 or 1950 because we don't have that data. That's not to say some work couldn't be done on that, but it just didn't fall into what we were doing.

Ryan asked if Jim knows of anyone studying the effect of vessel wakes on Puget Sound. Jim replied that there was ongoing work, particularly for the Rich Passage fast ferry issue, and state DOT paid a lot of money for a lot of studies that I'm sure are still available through Dept. of Transportation. I think some of them have been going on until recent years - some of the monitoring. So DOT would be the source there. As far as central Sound, the main basin – I'm not sure who might be looking at that but I'm sure that somebody is.

Libby asked Josh if that issue has come up in any of the nourishment permits. Josh responded that the one that's been mentioned here is Kitsap Transit for the past 4 or 5 years was working on a potential beach nourishment and study area at Point White and Pleasant Beach for studying fast

ferry wave up in Rich Passage. Just in this past year they've cancelled that permit due to funding issues.

In the reach KS17-14 there is a feeder bluff on Rockaway Beach Road. You didn't have a score up there for that but that one gets 46 ferries a day going by it, so it has a faster erosion than normal rate. If it has a fairly high score for either restoration or conservation, will the ferry wake action (which is not going to go away) be taken into account in cases like that?
Josh asked if the question was for potential for enhancement or restoration work or bulkheading…?
The question is if the value of a bluff is going to be negated somewhat by the constant wave action caused by the ferries?
Ryan said that it's a good idea to take that into account. At this time, he doesn't' believe that the city doesn't have any restoration in that particular area. Just north of that area we have a restoration project ongoing at this time.
Josh added that the city, in conjunction with the property owner, just north of that area - along Rockaway Beach, right there at Creosote – has recently removed a significant portion of bulkhead and exposed a significant portion of valuable feeder bluff. As that bulkhead was removed on what was part of the old creosote packing plant, that bluff has now started to react as we would expect and started to again erode at a more natural pace. Certainly the ferry traffic and stuff is probably going to have an increased effect on that erosion just because it's additional wave energy that's hitting that slope.

Do you have insights into the predictability of hazardous slopes, faults, and slides? Is that work that was done as part of this or is that work that is coming forward? It seems to me that there are some places where you haven't got a clue and are surprised when it slides, but there are other places where it's predictable. I'm kind of curious about how that works out here on Bainbridge and in the Sound.
There was mapping in the 1907's that attempted to map unstable slopes, intermediate slopes, and stable slopes around all of our Puget Sound shorelines – that was the Coastal Zone Atlas mentioned earlier. It was reasonably well done. It also mapped deep-seated slides that have occurred in the past – large earth movements, not just landslides from the surface, but whole blocks of sediment that have moved at a larger scale. From working around the Island over the years there are certainly some areas that are more erosion-prone and landslide-prone than others – such as Rolling Bay. North and south of there are some of the more obvious stability problems. There have been a number of individual assessments for private properties all around that aren't really compiled together. I'm not sure if I'm missing another, wider mapping that's been done.

Josh added that, from a regulatory standpoint, as individual property owners come in with a request for armoring or stabilization of sorts, then at that point, staff does a site-by-site analysis with folks like Jim – geotechnical engineers – to assess what is actually occurring on that site, what hazard is to the slope, what the potential hazard is to the home or other structures on the lot, and formulating decisions based on the current Shoreline Master Program.

Given the gentleman's comments about the wakes of the shipping traffic, some time ago we experienced damage from the wakes and established that the vessel traffic service didn't

monitor. When the tide is over 11 feet, they're supposed to slow to minimum wake speed. If they didn't and damage was done, we collected over a thousand dollars from the shipping company that caused the damage. Vessel Traffic Service monitors that speed and you can report who caused the damage. So, if people experience it, they should get hold of Vessel Traffic Service and file a claim against them.
Libby asked if you make the report by calling in at the time the wake's hitting.
If you experience the wake damage, where we lived at the time on Point Monroe, we figured out it was 20-25 minutes before the wake would come across. From that you could call Vessel Traffic Service and determine what the ship was and make the claim against that ship.
Libby said that it sounds like you need to report the time the wake is doing the damage to Vessel Control and they can determine…

Can you explain why that historical component is important in moving forward into the future or in understanding or scoring or ranking or establishing those conservation areas? I didn't quite get how that piece fit in with the rest of everything.
It's really getting back to part of the overview of the process-based restoration planning that the statewide analysis is looking for and that counties and jurisdictions like this are looking for. It doesn't turn out to be that fruitful to look at one particular property at a time in isolation. We know we've got a lot of modified areas on this island and if we didn't have any indication of the historic nature of where the feeder bluffs were, we wouldn't know how to assess the potential impact of any one project. For example, if we know you're in a drift cell on the updrift end, there's a long beach that goes downdrift from you, and most of the feeder bluffs are all gone, it's likely that the ones remaining are likely more important with that situation opposed to a similar drift cell somewhere else, which all the historic feeder bluffs are still there. So, there are a couple of different levels – it's how they compare within this jurisdiction, it's how they compare within this jurisdiction for restoration ideas. When the city or other jurisdictions go in for some money to do a certain project, their applications are compared to everybody else's and the ones that have actually done their homework and can say "This is what it was like in the past, this is what it looks like today, these are the problems, these are the implications of those problems, and this is what we want to do" is viewed much more favorably than somebody that comes and says, "Well, we know what it's like today, we don't know what it was like yesterday – we just want to do this." There are multiple levels I'm trying to highlight here. It's a short-range planning, it's a long-range planning, it's a restoration planning, and it's making all of this data available for the Sound-wide monies. This makes it easier to plan and prioritize projects that are funded outside of the Island. They might be funded through Washington D.C. – there's a lot that's going to be coming to Puget Sound, which is the next Everglades, the next Chesapeake Bay, an estuary of national significance. It's going to get a lot of money and these are the kind of science studies they want to see before they start pumping that money into certain projects.

4. WRAP-UP/NEXT STEPS
Libby thanked Jim Johannessen and staff for helping. She reminded attendees that Ron Thom will speak about the nearshore assessment on July 27th and science forum on September 16th. The meeting adjourned at 7:58 p.m.