Marie Hitchman

From: "Marie Hitchman" <mhitch5@comcast.net>
To: "Marie Hitchman" <mhitch5@comcast.net>
Sent: Wednesday, November 28, 2012 2:28 PM
Subject: Effects of Increased Marine traffic

Effects of Increased Marine Traffic

On 12/22/88 a barge went aground off Grays Harbor spilling 231,000 gallons of bunker fuel. I washed oiled birds at Neah Bay for 3 days. I shall never forget holding a small rhinocerous auklet in one hand while trying to get the oil out of its nostrils with a water pic. The spill resulted in 12,600 dead birds with only 125 live birds saved. It is estimated that the average life of a common murre after the BP Gulf spill was 9 days. On 2/26/91 I helped pick up dead birds after a 210,000 gallon spill at the Anacortes Texaco Refinery.. Nothing is Fail Safe!

I include a photo from 4/29/09 of a dead gray whale that was hit by a ship and washed ashore at Pt. Whitehorn Park.

Our family has sailed the San Juan and Gulf Islands in a 26 ft. sloop since 1968. I know how big these ships are and I know how tight the passages can be.

I enclose 2 articles on this issue by Matt Krogh and Fred Felleman and agree with their comment.s. Please study the implications of this marine traffic increase on the Salish Sea as it relates to GPT.Also consider the following isssues;
I. The holding area off Vendovi Island often has 2-3 oil tankers with sometimes an overflow tanker anchored on Bellingham Bay. Where would the holding area anchorage be for these huge Cape size vessels?
2. what about the problem of invasive species coming in the ballast water?
3. what about the effect of noise on marine organisms?

See figure 8 and figure 13 of the Vessel Traffic Risk Assesment in the ;
Annals of Operation Research. Dec. 12. DOI:10.1007/SID479-009-009-0678-1

Mrs. Marie Hitchman
601 16th St
Bellingham WA 98225-6316

4/27/09 - dead 2yr old grey whale
just N. of BP pier - Pt. Whitehorn
County PK.
-2.5 Tide @ 1:35
about 3 P.M

Whatcom Watch 2/22/12

A Sinister Left Turn

TANKERS AND BULKERS THREATEN SALISH SEA

WITH THE current levels of marine vessel traffic in the Salish Sea, it's just a matter of time before we—along with salmon, orcas, fisheries and the tourist industry—face a catastrophic oil spill. Vancouver is Canada's busiest container port and greater Seattle America's third busiest; combined with other bulk and tanker traffic, they make the Strait of Juan de Fuca one of the busiest waterways in North America.

Now there are two proposals on the books that will increase the chance of that oil spill happening sooner. These proposals will invite more oil tankers and the world's largest bulk carriers to come up the Strait of Juan de Fuca and turn left up the narrow passages that bracket the San Juans, Haro Strait on the west and Rosario Strait on the east. (A marine chart is helpful. Note the shallow rocks in Rosario and the tight turn at Turn Point in Haro.)

The first proposal is to more than double the capacity of the Kinder-Morgan pipeline that currently pipes Alberta tar sands crude to Vancouver. In 2010, about 100 tankers called on Vancouver to load tar sands crude; that number is expected to nearly triple if British Columbia permits a twin to the existing pipeline. Each of those tankers transits Haro Strait, a key local residence of the endangered Southern Resident orcas (J, K, and L pods). According to the federal marine research agency NOAA, "Of all the threats posed to orca whales in the [Puget Sound] region, the threat of a major oil spill is the single greatest risk to the species. Such a spill could easily eliminate our resident orca populations."

The second proposal you already know about: shipping 48 million tons of coal (and maybe someday 6 million tons of "other") out of a pro-

posed new dock in the Cherry Point Aquatic Reserve, the Gateway Pacific Terminal (GPT). Would GPT's 487 bulk carriers a year share Rosario Strait with more than 700 tankers currently transiting to Cherry Point? Or would they pop over and play international "Frogger" with Canadian traffic in Haro? No one knows.

Even scarier, bulkers have the worst safety record of any commercial vessels on the high seas. They are prone to catastrophic failure—some call it "sinking"—and are often undermanned.

> The cost to us for one oil spill, in the state of Washington, would be $10.8 billion and 165,000 jobs impacted

Unlike tankers, bulkers are single hulled, aren't required to have an escort tug, and are double the size of tankers allowed past Port Angeles. Worse? The big bulkers carry, right up against the hull, as much as 2 million gallons of bunker fuel (aka toxic sludge) for propulsion, more than some small tankers carry as cargo. A recent study has shown that herring, the base of the food chain in the Salish Sea, are acutely sensitive to contaminants in bunker fuel, even many years after a spill.

But that's not all. Bulkers, unlike oil tankers, arrive empty, meaning they needed to take on ballast water in the port they came from (China?). Not just a little ballast, either. The big bulkers have as much as 17 million gallons on board. While in theory they are required to exchange that ballast water offshore, the reality is they get a pass for bad weather and have very little inspection.

Why does ballast water matter? Because it's infested with invasive species and viruses with the potential to wipe out our Salish Sea fisheries, shellfish and finfish alike.

We have a real problem on our hands already, even without more bulkers hauling coal and expansion of tar sands tanker traffic. According to the Department of Ecology, "more than 15 billion gallons of oil are shipped annually through Washington state waters.... Unlike the Gulf spill, a major spill in Washington waters would likely reach its shores in hours or minutes instead of days."

Ecology goes further and estimates that "such a spill could cost our economy $10.8 billion and impact 165,000 jobs." That's right: the cost to us for one oil spill, in the state of Washington, would be $10.8 billion and 165,000 jobs impacted.

$10.8 billion, 165,000 jobs, J, K, and L pods, all from one oil spill. Those aren't risks I'm willing to take for profits for SSA Marine, Peabody Coal, Burlington Northern, and Goldman Sachs. Are you?

Matt Krogh is the North Sound Baykeeper at RE Sources for Sustainable Communities

VIEWS EXPRESSED ARE NOT NECESSARILY THOSE OF *CASCADIA WEEKLY*

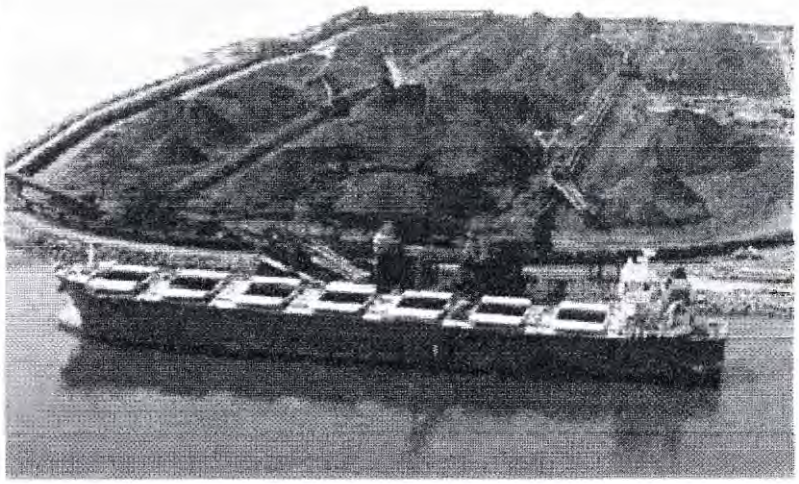
If you care about the Salish Sea, you should oppose the Gateway Pacific Coal Terminal (GPT).

Seattle-based SSA Marine proposes to build North America's largest coal export terminal in the Cherry Point Aquatic Reserve near Bellingham, WA. Exporting 48 million tons of coal as proposed requires **974 transits of giant bulk carriers** every year. These ships, twice the size of the oil tankers currently allowed to call on Washington ports, have the worst safety records of any commercial vessels. They would significantly add to oil spill risks in the region since they carry up to two million gallons of bunker fuel, suffer from poor maneuverability, are not required to have tug escorts, and would join the increasingly congested waterways of Rosario and Haro straits.

The problems start with construction

During construction of GPT, the marine life that call Cherry Point home would experience sea-floor disturbance and increased turbidity, noise from pile driving and seismic surveys, and lighting – an attractive nuisance. But during operations after construction, shading from the pier and wharf, toxics from the terminal's outfall pipes, night lighting, and noise from vessel operations would impact species at Cherry Point year after year. Of particular concern: coal dust in the marine environment.

"Dust is the enemy"



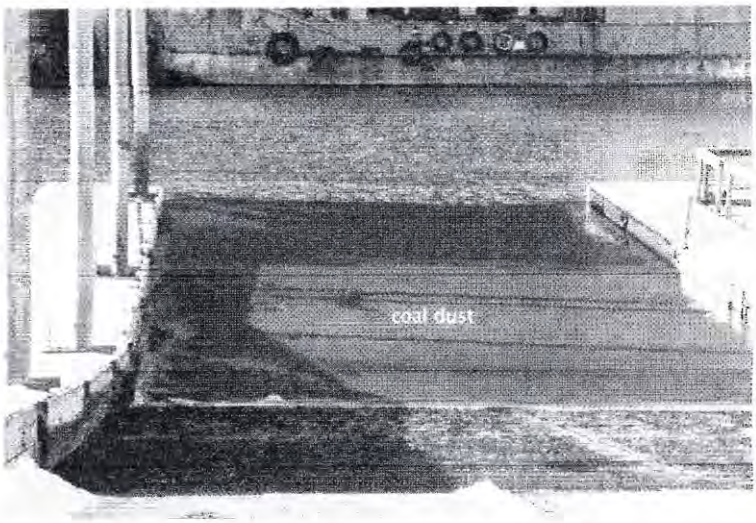
The Westshore coal export terminal in Delta, BC loses **over 1.5 million pounds of coal dust a year** into the surrounding marine environment while shipping 24 million tons of coal. According to the facility manager, "Dust is the enemy." The proposed terminal for Cherry Point would ship twice as much coal from the same footprint, just a few hundred yards from sensitive marine habitat in a high-wind area.

Coal dust and the high PAHs (polycyclic aromatic hydrocarbons) it includes would be the nail in the coffin for the Cherry Point Pacific herring. Since 1970, Cherry Point herring have declined from 17,000 tons of spawning biomass to less than 1,000 tons. These small fish play a big role in the health of the Puget Sound ecosystem - *they are a linchpin in the food chain that includes* ***endangered Chinook salmon, migratory seabirds, and Southern Resident orcas***. Herring eggs and larvae are acutely sensitive to the impacts of PAHs.

A slow speed oil spill

At Cherry Point itself, toxics entering the water from the states' two largest oil refineries are already like a slow oil spill. How much will that accelerate with a massive increase in deep-draft vessels (974 transits a year), each of which carries up to two million gallons of bunker fuel for their own power, and receives coal and fuel transferred over water? The sheer number of bulk carriers creates multiple risks:

Rosario Strait already sees in excess of **700 tankers**, with Haro Strait exposed to over **100 loaded tar sands crude tankers** and hundreds more **bulk carrier and container ships**. Tankers in Haro Strait may nearly triple if the Kinder-Morgan tar sands pipeline to Vancouver, BC expands as planned.



Increasing conflicts between docking vessels and fishing boats during terminal operations, given both increased ship traffic and an exclusion zone for the dock.

Ferries crossing Rosario and Haro straits will experience **increased delays**.

An **oil spill or collision** becomes much more likely as congestion increases.

Whale and dolphin communications will be increasingly disrupted by the high-intensity low-frequency noise from the carriers.

Trading coal for pollution

In return for our coal, we get back two kinds of problems: **invasive species** and **air pollution**. The largest ships bring up to 17,000,000 gallons of ballast water infested with non-native, invasive aquatic species from the western Pacific, including toxic dinoflagellates that increase the risk of harmful algal blooms that lead to paralytic shellfish poisoning. These ships can also bring Chinese mitten crabs, Asian tunicates, Japanese eelgrass, and other invasive species that have the ability to severely disrupt the Salish Sea's ecosystem. With minimal inspection for ballast exchange and exemptions for bad weather it is guaranteed that millions of gallons of foreign ballast water will be discharged into the Salish Sea every year.

And it's not just invasive species—we also get **back mercury pollution** and the **climate impacts** that burning 48 million tons of coal every year, year after year, would create. Carbon dioxide also dramatically contributes to **ocean acidification**, a problem already jeopardizing the fabric of the marine food web.

We have a choice.

Go to PowerPastCoal.org to find out what **you** can do to protect Puget Sound from this imminent threat.

POWER PAST COAL

communities against coal export

Marie Hitchman

From: "Marie Hitchman" <mhitch5@comcast.net>
To: "Marie Hitchman" <mhitch5@comcast.net>
Sent: Thursday, November 29, 2012 10:05 AM
Subject: Scoping Comments on EIS for GPT

Greetings-

Two minutes as speaker #100 At the Squalicum scoping meeting on 10/27/12 was hardly enough to get started . I hope these written comments will be useful in preparing the EIS,

.

I am an 81 yr. old Botanist and Naturalist. I grew up in Puget Sound and have lived in Bellingham since 1966., except for 79-80 when I lived in India, and 92-94 when I served with Peace Corps in the Eastern Caribbean. I have been fortunate to travel on 5 continents and know how blessed and beautiful our Salish Sea area truly is.

In 1974 I served on the citizens committee to write the first Bellingham Master plan for the Shoreline Management Act of 1971. In 2007-08 I served on the Cherry Pt. Work group to help DNR write the Master Program for the Cherry Pt. Aquatic Reserve. I currently serve on the DNR Cherry Point Implementation Committee and the Cherry Pt. Citizens Stewardship committee.

I have tried to focus my concerns on what I know and what I have seen.I include :
I. a fact sheet of personal observations on the Cherry Pt. Reach
2. macro algae species list
3. vascular plant list-Cherry Pt.
4. vascular plant list- Pt. Whitehorn Reserve
5. Cherry Pt. Legacy article

I apologize for not having mastered microsoft word but hope you can forgive my somewhat neo-luddite E mail format. I also feel somewhat guilty for having all the fun in the field for two decades while you sit at your computers. Perhaps the enclosed photos will help.

I am including the following issues for study:
I. Climate Change and Ocean Acidification
2.Increased Marine Traffic
3.Shoreland management Act-Public Trust Doctrine-Wetlands
4. Lummi Nation-Archeological-Fishing-Treaty Rights

I'll not go into the jobs issue except to say that I hope an accurate analysis would not double count all the existing jobs in rail, shipping, etc. and certainly lost jobs in fishing, shellfish and tourism need to be subtracted from the inflated job numbers.

Whatcom Docs have done a good job covering human health issues. What about the health implications for birds and marine organisms?

Coal Train Facts.org is an excellent source for studying the many issues surrounding the transport of coal from the Powder River basin , through all the affected N.W. communities and the cost implications for taxpayers.

I hope this material will help you in studying this very complex issue.
Thank you for your time.
Sincerely,

Marie Hitchman

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Marie Hitchman

From: "Marie Hitchman" <mhitch5@comcast.net>
To: "Marie Hitchman" <mhitch5@comcast.net>
Sent: Tuesday, November 15, 2011 11:05 AM
Subject: Cherry Point Diversity

EVERYTHING IS CONNECTED TO EVERYTHING ELSE - 1ST law OF Ecology

Personal observations along the Cherry Point Reach from Pt. Whitehorn to the Intalco Pier from l996 to the present. as a Beachwatcher and member of the Cherry Point Work group.

Cherry Pt. has a distinctive bathymetry with water depths of more than 70 ft. relatively close to shore...and a steep gradient along the intertidal habitat important to marine diversity(Wha.Co. 2006). Constant erosion of feeder bluffs have created a habitat conducive to supporting submerged vegetation and forage fish(Center for Biological Diversity 2004)

The steep gradient drop-off at Gulf Road which would allow for a new pier without dredging also produces a very rich environment for zooplankton, late spawning herring,bottom fish, crab and on up the food chain to salmon and Orca. June 15, l996 a f riend took a photo of hundreds of young molting Dungeness crab carapaces(shells) at the very location of the proposed Gateway Pacific pier. An estimated 80% of Puget Sound Dungeness crab catch occurs between Hales Passage and Birch Bay including Cherry Pt. (Wha. Co. l996)

The Cherry Point region is noted by USFWS for its high density of submerged vegetation compared to the rest of Puget Sound(USFWS 2004) The greater the diversity the more stable the ecosystem! Marine algae functions include providing food, habitat and shelter for a variety of organisms including salmonids, forage fish, phytoplankton, zooplankton and macroinvertebrates. Two studies along the Cherry Pt. Reach are the DNR Nearshore survey l995 and Fairbanks Environmental
Services 2005.
I have identified over 40 species of marine algae,25 of which are listed by Fish and Wildlife (Pentilla 1972-2000) used by late spawning herring along the Cherry Point Reach. I have photos of spawn on Ulva,Desmerestia, Gigartina,Prionitis, and Mazzaella in addition to Zostera(eel grass).

In addition to late spawning herring, the Cherry Point Reach is important habitat for two other Forage fish, surf smelt (Hypomesus pretiosus) and sand lance(Ammodytes hexapterus). Identified surf smelt spawning sites have been given "no net loss" protection (WDFW 2007), Wha.Co. MRC 2007).
The area from Gulf Road to Neptune Beach is the largest contiguous stretch of spawning because this area contains mixed sand and gravel beaches where the surf smelt spawn near the high tide line. I found surf smelt eggs in May 2006 on a known site just south of the derelict conveyor belt at Gulf Road.

The only salt water marsh along the Reach is located at Gulf Road. It is an emergent salt water marsh where I have identified several Obligate Wetland Species. These species include Carex lyngbyei, Cicuta douglasia, Oenanthe sarmentosa,Potentilla pacifica, Salicornia virginica, Triglochin maritimum, and Typha latifolia.

The MESA study during the late 70's and 80's showed that Cherry Point registerd the highest bird counts per square kilometer in Puget Sound. A later study comparing the MESA study to a WWU study (Bower 2009) showed that of the 37 common overwintering birds in the Strait of Georgia 10 have declined over 50%. A compilation of bird species along the Cherry Point Reach is 138. That is 4o% of the total number of species in Whatcom County which use this area at various times of the year. The WDFW has identified seven eagle nest locations along the Cherry Pt.Reach. I have seen the nest at the Wa Co Marine Reserve at Pt. Whitehorn, and every time I am at Gulf Road I usuallysee at least one pair of eagles.

In over 40 years of Sailing in the Salish sea I find the Cherry Pt. Reach to have rich biodiversity which needs to be preserved not only for those of us who live here but also for all the diverse species that co-exist with us in this beautiful ecosystem.
Thanks- Marie Hitchman
601-16th
Bellingham, Wa.
phone 360-671-3243

REFERENCES – 12/5/2011

Marie Hitchman

From: "Marie Hitchman" <mhitch5@comcast.net>
To: "Marie Hitchman" <mhitch5@comcast.net>
Sent: Tuesday, November 15, 2011 12:06 PM
Subject: Cherry Pt. References

REFERENCES

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Wha.Co. Shoreline Master Program Update. Shoreline Characterization and Inventory June,2006

Wha.Co. I996. Gateway Pacific Draft Environmental Impact Statement

5/15/06 Pt. Whitehorn -2.5
herring spawn on seaweed
L. to R.
Prionitis
Sarcodiotheca gaudichaudii
Gigartina
Odonthalia Fx.

POINT WHITEHORN MARINE RESERVE ALGAE

by Marie Hitchman 2009

field tripsin 09: 4/27 & 5/10, 5/25

ALGAE		
	Chlorophyta	green algae
	Cladophora flexuosa	sea moss
	Ulva lactuca	sea lettuce
	Enteromorpha sp.	sea hair
	Phaeophyta	brown algae
	Agarum fimbriatum	
	Alaria marginata	winged kelp
	Costaria costata	seersucker
	Desmerestia ligulata	flat acid kelp
	Desmerestia viridis	acid kelp
	Analipus japonicus	
	Fucus distich us	rockweed
	Hedophyllum sessile	sea cabbage
	Laminaria saccharina	sugar kelp
	Nereocystis luetkeana	bull kelp
	Sargassum muticum	
	Scytosiphon lomentaria	
	Soranthera ulvoides	
	Rhodophyta	red algae
	Callophyllis sp.	
	Bossiella californica	branching coraline algae
	Cryptopleura ruprechtiana	
CONSTANTINEA SUBULIFERA	Gelidium robustum	
	Gigartina latissima	turkish washcloth
	Gloiosiphonia verticillaris	
	Delesseria decipiens	
	Gracilariopsis sjoestedtii	
	Hymena flabelligera	
(MAZZAELLA)	Iridaea cordata	irideacent seaweed
	Lithothamnium pacificum	pink, encrusting
	Odonthalia floccosa	
	Plocamium pacificum	
	Palmaria palmata	dulse
	Porphyra perforata	laver
	Prionitis lanceolata	
	Prionitis lyallii	broad iodine seaweed
	Phodymania pertusa	red silk
	Smithora naiadum	red fringe
(NED)	Rhodomelia larix	black pine
FLOWERING PLANTS	Sarcodiotheca gaudichaudii	succulent seaweed
	Zostera marina	eelgrass
	Zostera japonica (NANA)	
LICHENS		
	Caloplaca coralloides – yellow	
	Xanthora candelaria – yellow	
	Verrucaria maura – black	

Vascular Plant List
Cherry Point

Cherry Point, Whatcom County, WA. List covers pants found on the Cherry Point bluff and wetland, from Henry Road to Gulf Road end, about six miles west of Ferndale. List by Vikki Jackson and Al Hanners, June 1996, with additions by Wayne Weber, October 2007. 122 spp.

These lists represent the work of different WNPS members over the years. Their accuracy has not been verified by the Washington Native Plant Society. We offer these lists to individuals as a tool to enhance the enjoyment and study of native plants.

* - Introduced

Scientific Name	*Common Name*	*Family Name*
Abies grandis	Grand fir	Pinaceae
Acer circinatum	Vine maple	Aceraceae
Acer glabrum	Douglas maple	Aceraceae
Acer macrophyllum	Big-leaf maple	Aceraceae
Achillea millefolium	Yarrow	Asteraceae
Alnus rubra	Red alder	Betulaceae
Ambrosia chamissonis	Silver bursage	Asteraceae
Amelanchier alnifolia	Serviceberry	Rosaceae
Anaphalis margaritacea	Pearly everlasting	Asteraceae
Angelica lucida	Sea-watch	Apiaceae
Artemisia absinthium*	Absinthe	Asteraceae
Artemisia suksdorfii	Suksdorf's sagewort	Asteraceae
Aster subspicatus	Douglas' aster	Asteraceae
Athyrium filix-femina	Lady fern	Polypodiaceae
Atriplex patula	Spear saltbush	Chenopodiaceae
Betula papyrifera	Paper birch	Betulaceae
Cakile edentula	Searocket	Brassicaceae
Cakile maritima*	European searocket	Brassicaceae
Cardamine sp.	Bittercress	Brassicaceae
Carex lyngbyei	Lingby's sedge	Cyperaceae
Centaurea maculosa*	Spotted knapweed	Asteraceae
Chrysanthemum leucanthemum*	Ox-eye daisy	Asteraceae
Cichorium intybus*	Chicory	Asteraceae
Cirsium arvense*	Canada thistle	Asteraceae
Cirsium vulgare*	Bull thistle	Asteraceae
Convolvulus sepium*	Lady's nightcap	Convolvulaceae
Cornus stolonifera	Red-osier dogwood	Cornaceae
Corylus cornuta	California hazelnut	Betulaceae
Cotula coronopifolia*	Brass buttons	Asteraceae
Crataegus douglasii	Black hawthorn	Rosaceae
Crepis capillaris*	Smooth hawksbeard	Asteraceae
Cytisus scoparius*	Scot's broom	Fabaceae
Dactylis glomerata*	Orchard grass	Poaceae
Daucus carota*	Queen Anne's lace	Apiaceae
Dianthus armeria*	Grass pink	Caryophyllaceae
Digitaria sanguinalis*	Hairy crabgrass	Poaceae
Distichlis spicata	Seashore salt grass	Poaceae
Dryopteris expansa	Spreading wood-fern	Polypodiaceae

Eleocharis palustris	Common spike-rush	Cyperaceae
Elymus mollis	American dunegrass	Poaceae
Epilobium angustifolium	Fireweed	Onagraceae
Epilobium watsonii	Watson's willow-herb	Onagraceae
Equisetum arvense	Common horsetail	Equisetaceae
Equisetum telmateia	Giant horsetail	Equisetaceae
Erodium cicutarium*	Filaree	Geraniaceae
Euphrasia officinalis*	Hairy eye-bright	Scrophulariaceae
Galium aparine	Cleavers	Rubiaceae
Geranium molle*	Dovefoot geranium	Geraniaceae
Geum macrophyllum	Large-leaved avens	Rosaceae
Gnaphalium uliginosum*	Marsh cudweed	Asteraceae
Grindelia integrifolia	Coastal gumweed	Asteraceae
Hedera helix*	English ivy	Araliaceae
Heracleum lanatum	Cow parsnip	Apiaceae
Holodiscus discolor	Ocean spray	Rosaceae
Honkenya peploides	Sea purslane	Caryophyllaceae
Hordeum brachyantherum	Meadow barley	Poaceae
Hypericum perforatum*	Klamath weed	Hypericaceae
Hypochaeris radicata*	Hairy cat's-ear	Asteraceae
Ilex aquifolium*	English holly	Aquifoliaceae
Juncus balticus	Baltic rush	Juncaceae
Juncus effusus	Soft rush	Juncaceae
Lactuca muralis*	Wall lettuce	Asteraceae
Lactuca serriola*	Prickly lettuce	Asteraceae
Lathyrus japonicus	Maritime peavine	Fabaceae
Lepidium densiflorum	Common pepperweed	Brassicaceae
Lonicera ciliosa	Orange honeysuckle	Caprifoliaceae
Lonicera involucrata	Black twinberry	Caprifoliaceae
Maianthemum dilatatum	False lily-of-the-valley	Liliaceae
Matricaria matricarioides*	Pineapple weed	Asteraceae
Oemleria cerasiformus	Indian plum	Rosaceae
Oenanthe sarmentosa	Water parsley	Apiaceae
Orobanche californica	California broomrape	Orobanchaceae
Phalaris arundinacea*	Reed canarygrass	Poaceae
Picea sitchensis	Sitka spruce	Pinaceae
Plantago lanceolata*	English plantain	Plantaginaceae
Polygonum aviculare*	Doorweed	Polygonaceae
Polygonum convolvulus*	Black bindweed	Polygonaceae
Polypodium glycyrrhiza	Licorice fern	Polypodiaceae
Polystichum munitum	Western sword fern	Polypodiaceae
Populus trichocarpa	Black cottonwood	Salicaceae
Potentilla pacifica	Pacific silverweed	Rosaceae
Prunus avium*	Sweet cherry	Rosaceae
Prunus emarginata	Bitter cherry	Rosaceae
Pseudotsuga menziesii	Douglas fir	Pinaceae
Pteridium aquilinum	Bracken	Polypodiaceae
Pyrus fusca	Pacific crabapple	Rosaceae
Ranunculus acris*	Meadow buttercup	Ranunculaceae
Ranunculus repens*	Creeping buttercup	Ranunculaceae

Rosa nutkana	Nootka rose	Rosaceae
Rubus discolor*	Himalayan blackberry	Rosaceae
Rubus parviflorus	Thimbleberry	Rosaceae
Rubus spectabilis	Salmonberry	Rosaceae
Rubus ursinus	Wild blackberry	Rosaceae
Rumex crispus*	Sour dock	Polygonaceae
Salicornia virginica	Pickleweed	Chenopodiaceae
Salix hookeriana	Hooker's willow	Salicaceae
Salix lasiandra	Pacific willow	Salicaceae
Salix scouleriana	Scouler willow	Salicaceae
Salix sitchensis	Sitka willow	Salicaceae
Sambucus racemosa	Red elderberry	Caprifoliaceae
Scirpus maritimus	Cosmopolitan bulrush	Cyperaceae
Senecio vulgaris*	Common groundsel	Asteraceae
Sisymbrium officinale*	Hedge mustard	Brassicaceae
Solanum dulcamara*	Bittersweet nightshade	Solanaceae
Solidago canadensis	Meadow goldenrod	Asteraceae
Sonchus arvensis*	Field sowthistle	Asteraceae
Sonchus asper*	Prickly sowthistle	Asteraceae
Sonchus oleraceus*	Common sowthistle	Asteraceae
Spiraea douglasii	Hardhack	Rosaceae
Symphoricarpos albus	Common snowberry	Caprifoliaceae
Tanacetum vulgare*	Common tansy	Asteraceae
Taraxacum officinale*	Common dandelion	Asteraceae
Tellima grandiflora	Fringecup	Saxifragaceae
Thuja plicata	Western red cedar	Cupressaceae
Trifolium pratense*	Red clover	Fabaceae
Triglochin maritimum	Seaside arrowgrass	Juncaginaceae
Tsuga heterophylla	Western hemlock	Pinaceae
Typha latifolia	Common cattail	Typhaceae
Urtica dioica	Stinging nettle	Urticaceae
Verbascum thapsus*	Common mullein	Scrophulariaceae
Vicia gigantea	Giant vetch	Fabaceae
Zostera marina	Wide-blade eelgrass	Zosteraceae

Vascular Plant List
Pt. Whitehorn Marine Reserve

Pt. Whitehorn, Whatcom Co. WA. List covers plants found in 54 acre county park on wooded wetland and bluff. Exit I-5 #266, 8.5 miles west on Grandview Rd. then left ½ Mile on Koehn Rd. List by Marie Hirchman and Lyle Anderson. April, 2010.

These lists represent the work of different WNPS members over the years. Their accuracy has not been verified by the Washington Native Plant Society. We offer these lists to individuals as a tool to enhance the enjoyment and study of native plants.

* = Introduced

Scientific Name	*Common Name*	*Family Name*
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Acer glabrum	Douglas maple	Aceraceae
Acer macrophyllum	Big-leaf maple	Aceraceae
Achillea millefolium	Yarrow	Asteraceae
Alnus rubra	Red alder	Betulaceae
Artemisia suksdorfii	Suksdorf's sagewort	Asteraceae
Aster (Symphyotrichum) subspicatus	Douglas' aster	Asteraceae
Athyrium filix-femina	Lady fern	Polypodiaceae
Betula papyrifera	Paper birch	Betulaceae
Cardamine oligosperma	Bittercress	Brassicaceae
Carex spp.	Lingby's sedge	Cyperaceae
Cerastium fontanum	Mouse-ear chickweed	Caryophyllaceae
Chamerion angustifolium	Fireweed	Onagraceae
Circaea alpina	Enchanter's nightshade	Onagraceae
Cirsium arvense*	Canada thistle	Asteraceae
Cirsium spp.	Bull thistle	Asteraceae
Claytonia siberica	Siberian miner's lettuce	Portulacaceae
Cornus stolonifera	Red-osier dogwood	Cornaceae
Corylus cornuta	California hazelnut	Betulaceae
Dicentra formosa	Bleeding heart	Fumariaceae
Dryopteris expansa	Spreading wood-fern	Polypodiaceae
Epilobium ciliatum	Watson's willow-herb	Onagraceae
Equisetum spp.	Common horsetail	Equisetaceae
Euphrasia officinalis*	Hairy eye-bright	Scrophulariaceae
Galium aparine	Cleavers	Rubiaceae
Geranium robertianum*	Stinky bob	Geraniaceae
Geum macrophyllum	Large-leaved avens	Rosaceae
Grindelia integrifolia	Coastal gumweed	Asteraceae
Heracleum lanatum	Cow parsnip	Apiaceae
Holodiscus discolor	Ocean spray	Rosaceae
Ilex aquifolium*	English holly	Aquifoliaceae
Juncus effusus	Soft rush	Juncaceae
Lactuca spp.	Wall lettuce	Asteraceae
Lonicera ciliosa	Orange honeysuckle	Caprifoliaceae
Lysichiton americanum	Skunk cabbage	Araceae

Maianthemum dilatatum	False lily-of-the-valley	Liliaceae
Maianthemum racemosa	False Solomon's seal	Liliaceae
Maianthemum stellata	Star-flowered Solomon's seal	Liliaceae
Malus (Pyrus) fusca	Pacific crabapple	Rosaceae
Montia sibirica	Siberian miner's lettuce	Portulacaceae
Oemleria cerasiformus	Indian plum	Rosaceae
Oenanthe sarmentosa	Water parsley	Apiaceae
Phalaris arundinacea*	Reed canarygrass	Poaceae
Physocarpus capitatus	Ninebark	Rosaceae
Picea sitchensis	Sitka spruce	Pinaceae
Polypodium glycyrrhiza	Licorice fern	Polypodiaceae
Polystichum munitum	Western sword fern	Polypodiaceae
Populus trichocarpa	Black cottonwood	Salicaceae
Prunus emarginata	Bitter cherry	Rosaceae
Pseudotsuga menziesii	Douglas fir	Pinaceae
Pteridium aquilinum	Bracken	Polypodiaceae
Ranunculus acris*	Meadow buttercup	Ranunculaceae
Ranunculus repens*	Creeping buttercup	Ranunculaceae
Ribes divaricatum	Coast black gooseberry	Grossulariaceae
Ribes lacustre	Prickly currant	Grossulariaceae
Ribes sanguineum	Red-flowering currant	Grossulariaceae
Rosa gymnocarpa	Baldhip rose	Rosaceae
Rosa nutkana	Nootka rose	Rosaceae
Rubus leucodermis	Blackcap	Rosaceae
Rubus discolor*	Himalayan blackberry	Rosaceae
Rubus parviflorus	Thimbleberry	Rosaceae
Rubus spectabilis	Salmonberry	Rosaceae
Rubus ursinus	Wild blackberry	Rosaceae
Rumex obtusifolius	Bitter dock	Polygonaceae
Salix hookeriana	Hooker's willow	Salicaceae
Sambucus racemosa	Red elderberry	Caprifoliaceae
Solidago canadensis	Meadow goldenrod	Asteraceae
Sonchus spp.*	Sowthistle	Asteraceae
Symphoricarpos albus	Common snowberry	Caprifoliaceae
Taraxacum officinale*	Common dandelion	Asteraceae
Tellima grandiflora	Fringecup	Saxifragaceae
Thuja plicata	Western red cedar	Cupressaceae
Tolmiea menziesii	Youth-on-age	Saxifragaceae
Trientalis latifolia	Broadleaved starflower	Myrsinaceae
Trifolium pratense*	Red clover	Fabaceae
Tsuga heterophylla	Western hemlock	Pinaceae
Urtica dioica	Stinging nettle	Urticaceae
Veronica americana	American brooklime	Scrophulariaceae
Zostera japonica	Narrow-bladed eelgrass	Zosteraceae
Zostera marina	Wide-blade eelgrass	Zosteraceae

WHATCOM WATCH - AUGUST 2011

Our Cherry Point Legacy

by *Marie Hitchman* 8/2011

On June 15, 1996, I participated in a field trip to the Cherry Point beach at Gulf Road. That day a member of our group took a photo of hundreds of young molting Dungeness crab carapaces (shells) at the very location of the proposed Gateway Pacific pier. The only salt water marsh along that entire Reach was alive with birds, including a bald eagle. Since that day I have spent many pleasant hours at low tide studying the marine organisms and have identified over 40 species of algae (seaweed) 25 of which are listed by Fish and Wildlife as substrate for the late spawning herring along Cherry Point. This is one of the most relatively intact and diverse areas in Puget Sound/Salish Sea. In 2002, a group of us enjoyed a two day low tide beach walk from Point Whitehorn to Neptune Beach. The first day we spotted Orcas swimming parallel to the shore.

Marie Hitchman was a member of the Cherry Point Work Group in 2007-2008.

In July 2007, I was privileged to participate on the Department of Natural Resources (DNR) Cherry Point Work Group composed of representatives from government, industry, environment, education, and local tribes. Our task was to assist DNR in formulating a management plan for the Cherry Point Aquatic Reserve established by the DNR Commissioner in 2000. The group met almost weekly for one and a half years with presentations on various topics, including jobs, ship traffic, and the marine environment.

Jobs: March 18, 2008, Skip Sahlin of SSA gave a brief presentation on the Gateway proposal. His answer to the question of the number of permanent jobs was 90. Why is this number now 280 and still rising? There was nothing in the presentation on storm water run-off from upland storage of coal, potash, sulphur, etc., or studies on the increased projection of rail and ship traffic through Whatcom County. The proposed pier could accomodate up to three bulk cargo ships at one time.

Ship Traffic: Another presentation showed that there is already a tight traffic situation along the Cherry Point Reach. The newer cape sized cargo ships are bigger than oil tankers. The International Maritime Organization and the Coast Guard show that dry cargo vessels have the highest accident rate among commercial vessels worldwide. Another pier at Cherry Point would increase the odds of a major collision and/or oil spill.

Marine Environment: The steep water

Continued on page 16

In this issue

Editorial on Sales Tax for New Jail 2
Beaks and Bills 3
Questions for Candidates 4-6
- Whatcom County Executive
- Whatcom County Sheriff
- Mayor of Bellingham

Caspian Terns in Bellingham 8-9
Watch on Government 10-15
- Bellingham City Council
- Port of Bellingham
- Whatcom County Council

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Our Cherry Point Legacy

Continued from page 1

gradient drop-off at Cherry Point which would allow for a new pier without dredging also produces a very rich environment for zooplankton, late spawning herring, bottom fish, crab and on up the food chain to salmon and Orcas.

If you build it they will come. Not necessarily!

- The most direct distance to sea from Powder River coal in Montana and Wyoming is along the Columbia River.
- The permit for a coal export facility near Longview was withdawn by the applicant when internal douments revealed it planned to ship up to 10 times more coal than was listed on the application.
- Port of Tacoma said *no* to coal shipments.
- Port of Seattle is not at capacity.
- The Deltaport at Roberts Bank, where there is already a sizeable marine dead zone, is under major expansion.

So, among other things, what do the people of Whatcom County want for the future?

- Gateway/SSA/Carrix/Goldman Sachs/ BNSF want a profit for their private investors.
- Politicians want tax revenues.
- Labor wants jobs.
- Fishermen want a viable fishery.
- Puget Sound Partnership wants to clean up Puget Sound.
- Environmentalists want to maintain a healthy, diverse ecosystem for future sustainable development.

Some Questions to Consider:

Dirty coal is a major contributor to global warming. According to James Fallows in the Dec. 2010 issue of *The Atlantic* magazine, the first experimental "clean coal" plant is scheduled to open in 2013 in China. In the U.S. a second "clean coal" plant is still in the experimental stage. Is it *ethical* to ship to the Far East a commodity that the U.S. is trying to phase out?

For those who prefer *pragmatism*, how pragmatic is it to ship dirty coal overseas only to have its pollutants such as mercury come back to us in the air we breathe?

Do we want to choose short term jobs and taxes from extractive industries like coal and potash, rather than protect the ecosystem for sustainable industries?

Is it wishful thinking to believe that this type of industrial development can happily co-exist with nature? I believe that the precautionary principle should apply.

This Christmas my oldest son and his two teen-age daughters joined me in a walk along the Cherry Point beach. The outgoing tide was flowing back to sea from the outlet to the marsh. A pair of bald eagles kept a beady-eyed watch on us from a tall cottonwood. It was quiet and peaceful with a beautiful view of the San Juans. What kind of legacy will we leave for our children and grandchildren?

important article →*

For More Information

- "Cherry Point Pier Settlement Attains Additional Marine Resources Protection" in the August/September 1999 issue.
- "Deliberations Continue on Proposed Fifth Deep Water Pier at Cherry Point" in the December 1998 issue.

Both articles are on the *Whatcom Watch* website: www.whatcomwatch.org.

Marie Hitchman

From: "Marie Hitchman" <mhitch5@comcast.net>
To: "Marie Hitchman" <mhitch5@comcast.net>
Sent: Thursday, November 29, 2012 11:51 AM
Subject: Lummi Nation-Archeological- Fishing-Treaty Rights

LUMMI NATION-ARCHEOLOGICAL-FISHING-TREATY RIGHTS

On 7/31/12 I was invited to join Michael Kyte, long time marine consultant with BP, Intalco, and Phillips66 on a beach walk. About half way between Intalco and Phillips he showed me an ancient stone structure, which looks like a fish trap or weir. It was a minus 2 tide. Michael has an extensive personal bibliography on the Cherry Pt. Reach. he says the first written account of this structure was around 1953 but he thinks it goes back much further that that. I had seen this artifact once before on a beach walk on 6/24/02. There is considerable evidence that the entire Cherry Pt. Reach was the historical homeland for the Lummi people.

5/16/12 on a Wa. Native Plant Society field trip from Gulf Rd. toward BP a retired anthropology prof in our group pointed out that the low bank at the end of Henry Rd. near the GPT proposed pier looked like a midden. The bank was full of shells.

On 10/8/12 Lummi Nation coordinated a protest with Bellingham and Lummi fishermen . It was a beautiful day as we sat on logs overlooking the San Juan Is. as the fishing boats converged off Gulf Rd. I was sitting near the N.Y. Times reporter Kirk Johnson and have included his article and 2 photos from that day.

The 1/22/1855 Pt. Elliott Treaty included the right to fish in common with citizens of the territory at Lummi tribes accustomed fishing grounds and stations. The Boldt Decision reinforced those rights.

Please study the legal and environmnetal implications of GPT as it relates to Lummi Nation.

The New York Times

HITCHCOCK

October 11, 2012

Tribes Add Potent Voice Against Plan for Northwest Coal Terminals

By KIRK JOHNSON

FERNDALE, Wash. — At age 94, Mary Helen Cagey, an elder of the Lummi Indian tribe, has seen a lot of yesterdays. Some are ripe for fond reminiscence, like the herring that used to run rich in the waters here in the nation's upper-left margin, near the border with Canada. Others are best left in the past, she said, like coal.

"I used to travel into Bellingham and buy my sack of coal," she said, standing in sensible shoes on a pebbled beach at a recent tribal news conference, talking about her girlhood of rural subsistence and occasional trips to the nearby market town. The idea that coal producers would make a comeback bid, with a huge export shipping terminal proposed at a site where she once fished, called Cherry Point, is simply wrong, she said. "It's something that should not come about," Ms. Cagey said.

Many environmental groups and green-minded politicians in the Pacific Northwest are already on record as opposing a wave of export terminals proposed from here to the south-central coast of Oregon, aiming to ship coal to Asia. But in recent weeks, Indian tribes have been linking arms as well, citing possible injury to fishing rights and religious and sacred sites if the coal should spill or the dust from its trains and barges should waft too thick.

And as history has demonstrated over and over, especially in this part of the nation, from protecting fish habitats to removing dams, a tribal-environmental alliance goes far beyond good public relations. The cultural claims and treaty rights that tribes can wield — older and materially different, Indian law experts say, than any argument that the Sierra Club or its allies might muster about federal air quality rules or environmental review — add a complicated plank of discussion that courts and regulators have found hard to ignore.

Lummi tribal leaders recently burned a mock million-dollar check in a ceremonial statement that money could never buy their cooperation. Last month, the Affiliated Tribes of Northwest Indians, a regional congress of more than 50 tribes in seven states, passed a resolution demanding a collective environmental impact statement for the proposed ports, rather than project-by-project statements, which federal regulators have suggested.

Leaders of the Columbia River Inter-Tribal Fish Commission, which focuses on fishing rights, said in a statement in support of the resolution that moving millions of tons of coal through the region could affect a range of issues, like road traffic and economic life on the reservations, not to mention the environment.

"It brings another set of issues to the table," said Gov. John Kitzhaber of Oregon, a Democrat who earlier this year asked for a broad federal environmental review that would examine implications of the coal plan from transit through the region by train or barge to the burning of the coal in China. The tribes, Mr. Kitzhaber said, have now added a voice that even a governor cannot match. "It definitely increases the pressure," he said.

Coal producers across the nation have been wounded by a sharp drop in demand in the United States — down 16.3 percent in the period from April through June, compared with the same period in 2011, to the lowest quarterly level since 2005, according to the most recent federal figures. With prices falling and abundant supplies of natural gas flowing because of new fields and drilling technologies, especially hydraulic fracturing, or fracking, many electricity producers that can switch are doing so.

That has made coal exports, which have increased this year in every region of the country except the West, according to federal figures, even more crucial to the industry than they were when the six terminals on the Pacific Coast were first proposed. Jason Hayes, a spokesman for the American Coal Council, said that with coal-producing nations like Australia and Indonesia competing for Asian markets, a roadblock on the West Coast is an issue for the entire American economy.

The first public hearings for the terminal projects, conducted by the Army Corps of Engineers, are set to begin this month in Bellingham, near the Lummi reservation.

"The people that can produce efficiently and can ship quickly and reliably — those are the big things — they are going to be the ones that are chosen for being reliable business partners," Mr. Hayes said. "If we can build the ports on the West Coast, then it just becomes that much more reliable."

But by coincidence of history, geography, culture and law, the West Coast, especially Washington and Oregon, is also a center for Indian tribe muscle, legal scholars said.

Although many tribes around the nation received rights to hunt and fish in the treaty language of the 1800s that consigned them to reservations, few places had a focus on a single resource — fish, especially from the Columbia River and its tributaries — that tribes here did. They also, crucially, persisted in using the resources that the treaties had granted

them; fishing did not become a hobby or a cultural artifact.

Then, in the 1970s, when the Indian rights and environmental movements were both surging, tribal timing was fortuitous in pushing court cases that reinforced their claims.

"They made really good use of those rights, and have become major players," said Sarah Krakoff, a law professor at the University of Colorado who teaches Indian law and natural resources law. Tribal rights have been a cornerstone in the long battle over restoring salmon stocks in the Columbia River. This year, one of the biggest dam removal projects in the nation's history reached a milestone when a section of the Elwha River near Olympic National Park in Washington was restored to wild flow, with fishing rights an important driver in the process.

Coal has also become an element in the presidential race, as energy executives have poured tens of millions of dollars into campaigns backing Mitt Romney, the Republican candidate, and accusing the Obama administration of harboring hostility to coal through tightened air pollution rules.

An executive order dating from the administration of Bill Clinton could give further ammunition to Northwest tribes in their coal fight, Professor Krakoff and other experts said. The order directs federal agencies to allow tribal access to sacred sites and to take into account religious practices in federal decision making.

Lummi leaders, in the protest this week where Ms. Cagey spoke, said the Cherry Point site in particular — though partly developed years ago by industry, with a major oil refinery nearby — is full of sacred sites and burial grounds. The tribe's hereditary chairman, Bill James, said in an interview, however, that the tribe would not reveal the locations of the graves for fear of looting.

7/31/12 - Looking N. to Intelco - 2 @ 10:30 a.m.
close-up of ancient stones forming
a fish trap or weir

10/8/12 - the fishermen come ashore bringing their days catch of Dungeness Crab.
N.Y. Times reporter Kirk Johnson sitting on log next to me ~~the~~ making notes.

27

10/8/12 - Mary Helen Cagey - 92 in pink
speaks with strong passion
"a coal terminal @ Cherry Pt. is
simply wrong" ~~coal~~ should be
left in the ground"

79

Marie Hitchman

From: "Marie Hitchman" <mhitch5@comcast.net>
To: "Marie Hitchman" <mhitch5@comcast.net>
Sent: Wednesday, November 28, 2012 9:26 PM
Subject: Shoreline Management Act-Public Trust Doctrine- Wetlands

SHORELINE MANAGEMENT ACT-PUBLIC TRUST DOCTRINE-WETLANDS

Two of the major goals of the 1971 state shoreline management act are:
I. protect the marine environment
2. increase public access to the shoreline.

In 1987 the Wa. Supreme Court affirmed the Public Trust Doctrine as the law of the state. see "The Public Trust Doctrine and Coastal Zone Management in Wa. State"Wa. Law Review pp521-97 , by Ralph Johnson,Goeppele,Jansen, and Paschael, July 1992.

In the Cherry Pt. Settlement agreement of 1999 one of the key conditions, #7,states: "Gateway gifted to Whatcom Co. areas of both beachfront and uplands, including a sensitive saltwater marsh, for the purposes of a PUBLIC PARK. .....This agreement also acknowledges the state's rights to public access under the Public Trust Doctrine."

Please read " Cherry Pt. Pier Settlement Obtains Additional Marine Resources Protection" by David Schmalz. Whatcom Watch. Sep?Aug. 1999. Vol.8. Issue 8/9.

The only salt water marsh along the Cherry Pt. Reach between Pt. Whitehorn and Neptune Beach is located at Gulf Rd.(sometimes referred to as Powder Plant or Power Plant road) This road is the only public car access to the shoreline along the Reach. GPT plans to vacate Henry road which would also close Gulf Rd. Whenever I have been at Gulf Rd. since 1996 there have always been others there enjoying the great view of the San Juans and participating in shoreline activities. The GPT plan to locate the conveyer belt close to the salt water marsh would , by it's very nature preclude any use by the public for a park,and greatly decrease public access to the shoreline.
In walking along Cherry Pt. Reach I have noticed many fresh water seeps . The salt water marsh is fed by two streams from the uplands area which will be affected by upland clearing for coal storage areas., cause unavoidable damage to the marsh and seepage areas. and alter the salinity of the nearshore nursery waters.

Mitigation is an over-used word by Developers and Planners. It doesn't mean "to solve" it means to "make less painful" I enclose a 2012 wetland restoration article., and a nice picture of the marsh. This year I observed river otter scat in the marsh, which is nice.

Mrs. Marie Hitchman
601 16th St
Bellingham WA 98225-6316

SALT H_2O Marsh at ~~South~~ end of
Gulf Rd, whatcom Co. looking
6/25/02 NORTH

Note zonation.
- Just right of Center
  Scirpus ~~maritimus~~ maritimus
- Center: Eleocharis palustris
- Just left of center on higher ground
  Carex obnupta with grasses

Roll 210 IQ
7A

WHATCOM WATCH – MAY 2012

Wetland Restoration Usually Doesn't Succeed A lesson for Whatcom County

Wetland restoration is a billion-dollar-a-year industry in the United States that aims to create ecosystems similar to those that disappeared over the past century. But a new analysis of restoration projects shows that restored wetlands seldom reach the quality of a natural wetland.

"Once you degrade a wetland, it doesn't recover its normal assemblage of plants or its rich stores of organic soil carbon, which both affect natural cycles of water and nutrients, for many years," said David Moreno-Mateos, a University of California, Berkeley, postdoctoral fellow. "Even after 100 years, the restored wetland is still different from what was there before, and it may never recover."

Moreno-Mateos's analysis calls into question a common mitigation strategy exploited by land developers: create a new wetland to replace a wetland that will be destroyed and the land put to other uses. At a time of accelerated climate change caused by increased carbon entering the atmosphere, carbon storage in wetlands is increasingly important, he said. "Wetlands accumulate a lot of carbon, so when you dry up a wetland for agricultural use or to build houses, you are just pouring this carbon into the atmosphere," he said. "If we keep degrading or destroying wetlands, for example through the use of mitigation banks, it is going to take centuries to recover the carbon we are losing."

The study showed that wetlands tend to recover most slowly if they are in cold regions, if they are small – less than 100 contiguous hectares, or 250 acres, in area – or if they are disconnected from the ebb and flood of tides or river flows. "These context dependencies aren't necessarily surprising, but this paper quantifies them in ways that could guide decisions about restoration, or about whether to damage wetlands in the first place," said coauthor Mary Power, UC Berkeley professor of integrative biology.

Wetlands provide many societal benefits, Moreno-Mateos noted, such as biodiversity conservation, fish production, water purification, erosion control and carbon storage. He found, however, that restored wetlands contained

Continued on page 8

Continued from page 6

about 23 percent less carbon than untouched wetlands, while the variety of native plants was 26 percent lower, on average, after 50 to 100 years of restoration. While restored wetlands may look superficially similar – and the animal and insect populations may be similar, too – the plants take much longer to return to normal and establish the carbon resources in the soil that make for a healthy ecosystem.

Moreno-Mateos noted that numerous studies have shown that specific wetlands recover slowly, but his meta-analysis "might be a proof that this is happening in most wetlands." "To prevent this, preserve the wetland, don't degrade the wetland," he said.

Moreno-Mateos conducted a meta-analysis of 124 wetland studies monitoring work at 621 wetlands around the world and comparing them with natural wetlands. Nearly 80 percent were in the United States and some were restored more than 100 years ago, reflecting of a long-standing American interest in restoration and a common belief that it's possible to essentially recreate destroyed wetlands. Half of all wetlands in North America, Europe, China and Australia were lost during the 20th century, he said.

Though Moreno-Mateos found that, on average, restored wetlands are 25 percent less productive than natural wetlands, there was much variation. For example, wetlands in boreal and cold temperate forests tend to recover more slowly than do warm wetlands. One review of wetland restoration projects in New York state, for example, found that "after 55 years, barely 50 percent of the organic matter had accumulated on average in all these wetlands" compared to what was there before, he said. "Current thinking holds that *many* ecosystems just reach an alternative state that is different, and you never will recover the original," he said.

http://newscenter.berkeley.edu/2012/01/24/study-shows-restored-wetlands-rarely-equal-condition-of-original-wetlands.

Moreno-Mateos D, Power ME, Comín FA, Yockteng R (2012) Structural and Functional Loss in Restored Wetland Ecosystems. PLoS Biol 10(1): e1001247.

http://www.plosbiology.org/article/%3Adoi%2F10.1371%2Fjournal.pbio.1001247

2.

Marie Hitchman

From: "Marie Hitchman" <mhitch5@comcast.net>
To: "Marie Hitchman" <mhitch5@comcast.net>
Sent: Wednesday, November 28, 2012 1:56 PM
Subject: Climate Change and Ocean Acidification

Climate Change

My oldst son, Matthew, is a professor of Atmospheric Sciences at U. of Wisconsin, Madison so I know that coal has one of the largest CO2 effects on climate change. Please study The effects of this proposed terminal and others in Wa. and Oregon.on Climate Change and OCean Acidification. See RCW 43.21C.030, Section(f)
"recognize the worldwide and long-range character of environmental problems, and where consistent with state policy, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline of the world environment"

OCEAN ACIDIFICATION

I first became aware of ocean acidification when I read Elizabeth Kolbert"s excellent "The Darkening Sea " in the 11/20/06 New Yorker. In a recent Bellingham symposium on "Climate Change and the Future of Food"Bill Dewey of Taylor Shellfish reported that there has been no natural oyster larvae set in Willapa Bay since 2005. They have to ship the spawn to a nursery in Hawaii for early development. It was also reported that acidification has recently increased 30% in Puget Sound.

I am including an article from 11/25/12 Seattle Times on what is happening to pteropods, which are crucial to the food chain. Also an article from the June '12 Whatcom Watch on acidification effects on our oyster industry.

Also some Acidification links for further study if you don't have them already.

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The Seattle Times
Winner of a 2012 Pulitzer Prize

Local News

Originally published November 25, 2012 at 8:17 PM | Page modified November 26, 2012 at 10:52 AM

Sea changes harming ocean now could someday undermine marine food chain

New research by Seattle scientists shows that pteropods — tiny snail-like sea creatures crucial to marine food webs — are being damaged decades earlier than expected by ocean acidification, the souring of seas from human-caused carbon-dioxide emissions.

By Craig Welch

Seattle Times environment reporter

Scientists years ago figured out that a group of tiny snail-like sea creatures crucial to marine food webs may one day be an early victim of changing ocean chemistry.

Researchers predicted that pteropods, shelled animals known as sea butterflies, could begin dissolving by 2038 as human-caused carbon-dioxide emissions begin souring the seas in a process known as ocean acidification.

But new research by Seattle scientists concludes that corrosive seas are damaging pteropods right now — decades earlier than expected. And that damage was recorded in the south Atlantic Ocean, where surface pH doesn't dip as low as it has off the Washington coast or in Puget Sound.

The finding suggests that changing sea chemistry already could be harming pteropods in the Northwest, with potentially vast implications for the marine food chain.

And it comes as a panel of experts organized by Gov. Chris Gregoire this week plans to unveil recommendations for ways Washington can attempt to combat changes to ocean chemistry.

"This is really an important discovery because here in the Northwest, our pink salmon, for example, are dependent on pteropods for survival in the open ocean in their first year of life," said Richard Feely, a scientist with the National Oceanic and Atmospheric Administration in Seattle, and an acidification expert. Feely participated in the research. "More than 50 percent of their diets are these pteropods."

Scientists have long known that greenhouse-gas emissions from the burning of fossil fuels were being taken up by the seas and slowly changing ocean chemistry, but research in recent years shows those changes are coming far faster than initially expected. As a result, scientists in

laboratories around the world have been scrambling to figure out how those changes will affect marine life.

This lab work has shown that increasing carbon dioxide in the oceans eventually could kill, endanger or alter the behavior of many marine organisms, from crab and squid to clownfish and clams. The most sensitive species are those that rely on calcium carbonate to form shells or other body parts, such as the inner parts of many fish ears. Significant changes to important species are expected to ripple though the food chain.

This research, published Sunday in the journal Nature Geoscience, is different. It places pteropods, which are eaten by many fish, among a mere handful of marine species worldwide being impacted right now. The others are Pacific oysters along the Northwest coast and tropical corals in the South Pacific.

"It was a surprise to me to see that level of damage in a wild field population," said Dave Mackas, a scientist with Canada's Department of Fisheries and Oceans who has studied pteropods in the Northwest. "I think we should take it as another warning signal."

Like corals, pteropods are central to many ocean ecosystems. They're not much bigger than pepper grains, but they eat plankton and occur in great clusters that are easily scooped up by fish.

"They're a great example of some tiny not-charismatic creature that is incredibly important," said Gretchen Hofmann, a University of California at Santa Barbara biologist and ocean-acidification expert. "They're small, but carry an enormous amount of nutrition and are eaten even by very big fish. If you're in the Antarctic and see a beautiful emperor penguin, it exists by eating fish under the sea ice. And those fish eat pteropods."

The new discovery was made by an international team of researchers led by Nina Bednarsek, who was affiliated with the British Antarctic Survey. She since has been hired by NOAA in Seattle.

During a 2008 research cruise south and east of the Falkland Islands off the tip of South America, Bednarsek gathered samples of Limacina helicina antarctica, a southern Atlantic species of pteropod. Some of the samples came from an area where cold deep water wells up from below much as it does off the Washington coast.

"We brought the samples back home and saw these really tiny changes on the shell," Bednarsek said.

Pteropods create extremely thin shells that are highly susceptible to chemical changes in seawater. Using a complex set of tests, Bednarsek discovered the shells were dissolving.

While the damage wasn't enough to kill the animals, it weakened them, making them more vulnerable to predators and infection. And, as scientists before her had predicted through lab work, the degree of dissolution worsened in creatures taken from waters containing more carbon dioxide.

The discovery prompted a big question: "When we established that we had dissolution, we wondered, 'What's driving this?' " Bednarsek asked.

As it turns out the answer, in part, is: humans.

Because deep frigid water normally holds more carbon dioxide, its pH is naturally lower than that of surface waters. South Atlantic waters, naturally, would dissolve pteropods if they lived at depths below 1,000 meters.

But these creatures were being dissolved in some cases just 200 meters below the sea surface — up where pteropods actually live.

That deep water has always welled up from below, but the addition of carbon dioxide from fossil fuels had pushed it past the threshold that pteropods can withstand.

"The deep water coming up just keeps getting more and more acidic," said Hofmann.

The researchers only saw particularly serious damage in one spot, which left other questions unanswered.

"Was that a worse-case event that happened to hit that site?" asked Mackas, the Canadian scientist. "Or is it common or persistent there? I'm sure someone is looking at that right now." It's too soon to fully grasp the implications of Bednarsek's work, especially in the Pacific Northwest.

Mackas has found that one population of pteropods off Vancouver Island appears already to have begun declining; it just isn't clear why. But another, similar species nearby actually seemed to be growing in number.

"We definitely need to check this out more," Mackas said.

In fact, that, said Feely, is why Bednarsek came to work in Seattle. She will be studying pteropods in and around Washington.

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Acidification Affecting Northwest's Oyster Industry

April 11, 2012 Marine researchers have definitively linked the collapse of oyster seed production at a commercial oyster hatchery in Oregon to an increase in ocean acidification. Larval growth at the hatchery declined to a level considered by the owners to be "non-economically viable."

A study by the scientists found that increased seawater carbon dioxide (CO_2) levels, resulting in more corrosive ocean water, inhibited the larval oysters from developing their shells and growing at a pace that would make commercial production cost-effective.

As atmospheric CO_2 levels continue to rise, this may serve as the proverbial canary in the coal mine for other ocean acidification impacts on shellfish. "The predicted rise of atmospheric CO_2 in the next two to three decades

Continued on page 6

June W. Walsh

Northwest Oyster Industry

Continued from page 4

may push oyster larval growth past the break-even point in terms of production."

The owners of Whiskey Creek Shellfish Hatchery at Oregon's Netarts Bay experienced a decline in oyster seed production several years ago and looked at potential causes, including low oxygen and pathogenic bacteria. The results clearly linked the production failures to the CO_2 levels in the water in which the larval oysters were spawned and spent the first 24 hours of their lives. That first day is a critical time when the oysters develop from fertilized eggs to swimming larvae and build their initial shells.

"The early growth stage for oysters is particularly sensitive to the carbonate chemistry of the water," said George Waldbusser, a benthic ecologist at Oregon State University. "As the water becomes more acidified, it affects the formation of calcium carbonate, the mineral in shells. As the CO_2 goes up, the mineral stability goes down, ultimately leading to reduced growth or to mortality."

Commercial oyster production on the West Coast of North America is a 273-million-dollar industry each year. It has depended since the 1970s on oyster hatcheries for a steady supply of the seed used by growers.

In recent years, the hatcheries that provide most of the seed for West Coast growers have suffered persistent production problems. At the same time, non-hatchery wild stocks of these oysters also have shown low recruitment, putting additional strain on a limited seed supply.

Hales said that Netarts Bay, where the Whiskey Creek hatchery is located, experiences a wide range of chemistry fluctuations. The researchers believe that hatchery operators may be able to adapt to take advantage of periods when water quality is at its highest. "In addition to the impact of seasonal upwelling, the water chemistry changes with the tidal cycle and with the time of day," Hales said. "Afternoon sunlight, for example, promotes photosynthesis in the bay. That production can absorb some of the carbon dioxide and lower the corrosiveness of the water."

The researchers also found that larval oysters showed a delayed response to the water chemistry, which may cast new light on other experiments looking at the

Continued on page 13

Continued from page

impacts of ocean acidification on shellfish.

In the study, they found that larval oysters raised in water that was acidic, but non-lethal, had significantly less growth in later stages of their life. "The takeaway message here is that the response to poor water quality isn't always immediate," said Waldbusser. "In some cases, it took until three weeks after fertilization for effects from the acidic water to become apparent. Short-term experiments of just a few days may not detect the damage."

The research was also supported by NOAA and the Pacific Coast Shellfish Growers Association.

Other authors of the journal article include Chris Langdon of OSU's Hatfield Marine Science Center and Richard Feely of NOAA's Pacific Marine Environmental Laboratory.

http://nsf.gov/news/news_summ.jsp?cntn_

Do you want more information on ocean acidificaton? Here are some helpful links below:

http://c-can.msi.ucsb.edu/ great page for current research on OA and has some resource links too

http://www.nanoos.org/nvs when you get to this site, click on ORCA Dabob Bay and it will take you to a map of all the monitoring.

http://www.sightline.org/research/energy/ocean-acidification/northwest-ocean-acidification

http://articles.latimes.com/2012/oct/06/local/la-me-acidic-oceans-20121007