SMA 550: Climate Impacts

Coastal Zone Management

22 February 2002

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Assigned readings: Coastal chapter of the MIT Press book; Heinz Center sea level rise report

In prior technical session, discussed feed back loops of the climate forcing processes vis a vis coastal processes, including human interventions. Began to touch on management issues, jurisdictional gaps and overlaps, institutional structures, adaptability, and response time.

Principal public policy and institutional framework issues are ones of authority, appropriate level of government, and land use management vis a vis resources management interactions with respect to compatibility of goals and authorities, turf issues, and competing issues.

Fundamentally, climate variability and climate change response in the coastal zone is a coastal management issue. That's not the simple truism it sounds like. Coastal zone management is Washington State is not a well-oiled "institutional machine."

"Capital Letter" Coastal Zone Management.

Authorized by the federal Coastal Zone Management Act of 1972. Washington was the first state to achieve a federally approved plan in 1976. (Washington was also the first state to have their proposed CZMP rejected.)

Do I need to describe the federal CZMA?

CZMA policy goals: …development and implementation of management plans to achieve wise use of the land and water resources of the coastal zone giving full consideration to ecological, cultural, historic, and aesthetic values as well as to needs for compatible economic development…

The 1990 CZMA reauthorization added an inducement to the states to make "improvements" to their CZMPs in nine specific areas:

1. Attaining increased opportunities for public access, taking into account current and future public access needs, to coastal areas of recreational, historical, aesthetic, ecological, or cultural value.

2. Preventing or significantly reducing threats to life and destruction of property be eliminating development and redevelopment in **coastal high hazard areas**, managing development in other hazard areas, **and anticipating and managing the effects of potential sea level rise**.

3. Planning for the use of ocean resources.

4. Protection, restoration, or enhancement of the existing coastal wetlands base, or creation of new coastal wetlands.

5. Development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on

various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources.

6. Reducing marine debris entering the Nation's coastal and ocean environment by managing uses and activities that contribute to the entry of such debris.

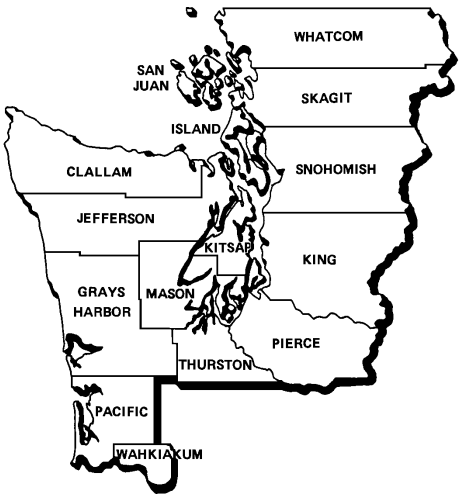
7. Preparing and implementing special area management plans for important coastal areas.

8. Adoption of procedures and enforceable policies to help facilitate the siting of energy and government facilities which may be of greater than local significance.

9. Enhance existing procedures and planning processes for siting marine aquaculture facilities while maintaining current levels of coastal resource protection. (Added, 1995.)

Washington CZMP

Washington's coastal zone management program applies to the fifteen coastal counties as shown in the adjacent map.



All the formally incorporated state laws are implemented by Dep't of Ecology.

Shoreline Management Act or 1971: adopted the year before the CZMA, it's the heart and soul of the states CZMP

State Environmental Policy Act: Washington's little NEPA

Ocean Resources Management Act, aka the Prohibition of Off-shore Oil Drilling Act

Transportation of Petroleum Products Financial Responsibility Act

Clean Water Act (required by federal CZMA) applied only in review of Dep't of the Army Permits and for determination of federal consistency

Clean Air Act (required by federal CZMA) applied only for determination of federal consistency

Energy Facilities Site Evaluation Council Act

Advisory programs are:

Puget Sound Water Quality Management Plan: implemented by the Puget Sound Action Team

Stormwater Management Manual for the Puget Sound Basin: implemented by the Dep't of Ecology

"small letter" coastal zone management

What is usually referred to as small letter czm, or informal czm components, is a very real but unenforceable aspect of coastal zone management.

> Seashore Conservation Act: implemented by Parks and Recreation Commission for Pacific Coast beaches
>
> Hydraulic Projects Approval Code: implemented by Dep't of Fish and Wildlife on waters of the state, state-wide
>
> Growth Management Act: implemented by the Office of Community Development; especially pertinent is the Critical Areas Ordinance requirement, and within that, the requirement to base CAOs on beast available science
>
> Aquatic Lands Management Act: implemented by Dep't of Natural Resources for state-owned aquatic lands
>
> Puget Sound Water Quality Authority Act
>
> Watershed Planning Act: nominally implemented by Dep't of Ecology
>
> Salmon Recovery Planning Act: implemented by Governor's Salmon Recovery Office; has spawned a number of small letter czm efforts such as the Aquatic Habitat Guidelines project

Shoreline Management Act

The Shoreline Management Act is the fundamental shoreline regulatory program in the State of Washington. Adopted by the 1971 legislature as an alternative to the Shoreline Protection Act initiative sponsored by the environmentalist community.

In adopting the Shoreline Management Act the legislature declared the following findings and basic state policy:

> RCW 90.58.020—Legislative findings—State policy enunciated—Use preference.
>
> The legislature finds that the shorelines of the state are among the most valuable and fragile of its natural resources and that there is great concern throughout the state relating to their utilization, protection, restoration, and preservation. In addition it finds that ever increasing pressures of additional uses are being placed on the shorelines necessitating increased coordination in the management and development of the shorelines of the state. The legislature further finds that much of the shorelines of the state and the uplands adjacent thereto are in private ownership; that unrestricted construction on the privately owned or publicly owned shorelines of the state is not in the best public interest; and therefore, coordinated planning is necessary in order to protect the public interest associated with the shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest. There is, therefore, a clear and urgent demand for a planned, rational, and concerted effort, jointly performed by federal, state, and local governments, to prevent

the inherent harm in an uncoordinated and piecemeal development of the state's shorelines.

It is the policy of the state to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses. This policy is designed to insure the development of these shorelines in a manner which, while allowing for limited reduction of rights of the public in the navigable waters, will promote and enhance the public interest. This policy contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life, while protecting generally public rights of navigation and corollary rights incidental thereto.

The SMA is a state law implemented by local government under the oversight of the Dep't of Ecology. The law applies to all marine shorelines, all lakes with a surface area of 20 acres or greater, and all streams with an average annual flow of 20 cfs or greater. Concerned here only with the marine shorelines.

Washington State has three distinct "coasts" — the shores of the inland marine waters of Puget Sound and the Strait of Juan de Fuca (2,246 mi); the Pacific Ocean coast itself (171 mi); and the shores of the estuaries fronting the Pacific Ocean (313 mi).

Inland Marine Waters

The coast of Puget Sound includes the most intensively developed marine shorelines in the region, in particular the rapidly growing Tacoma – Seattle – Everett metropolitan complex, where high density urban and port facility development is centered on major river deltas and their bays. Outlying suburban shorelines have long been popular for second homes and residences; a growing phenomenon is the expensive bluff-top or beach-front trophy home. Remnants of agricultural lands and timber-growing tracts can still be found in rural areas.

Puget Sound shorelines are predominately narrow beaches, fully or mostly inundated at high tides, and backed by steep banks or bluffs. Most coastal bluffs are unstable or marginally stable; landsliding is common during wet winters when heavy rainfall saturates the soil and upper geologic layers (Gerstel, et al., 1997; Baum et al., 1998). Sand spits are few and mostly small. Rocky shores are common only in the San Juan Islands or north Puget Sound. Substantial portions of the central and south Puget Sound shoreline have been armored in urban areas, at shoreline railroad fills, and for shoreline residential development.

Storm and wave energy regimes are tempered by Puget Sound's inland location, with most storms coming out of the south. When, rarely, a northerly storm occurs at high tide the damage to structures built close to the shore can be substantial.

Ocean Coast

The Pacific Ocean coast, by contrast, has relatively lower intensity development. There is no major urban center. Significant portions of the coast are public parks or other reservations, or within the bounds of Indian reservations. Development (mostly low density residential) occurs only in limited areas along this coast.

Washington's north Pacific coast is characterized by steep, rocky bluffs and headlands, punctuated by a few small pocket beaches, with land ownership predominately within the Olympic National Park and five Indian reservations.

Washington's south Pacific coast is characterized by broad, sandy beaches and sandspits acting, in effect, as "barrier islands" at the mouths of Willapa Bay and Grays Harbor. Land ownership is mostly in small residential parcels and lots. For most of the 20th century the southwest coast beaches have been accretional (Phipps & Smith, 1978) but be-ginning in the 1980s the rate of accretion began to slow (Phipps, 1990).

The ocean coast is open to the full force of storm-driven waves. During El Niño winters the sea level can temporarily be a foot or more above normal, accompanied by an in-creased frequency of storm waves, potentially causing temporary but unusually severe erosion (Kaminsky, Ruggiero & Gelfenbaum, 1998).

Ocean Estuaries

The shallow coastal estuaries (Grays Harbor, Willapa Bay, and the Columbia River Estuary) and their shorelines are characterized by relatively small cities and towns, mostly at the river mouths, still-extensive farm-lands and dairy-lands, and shellfish aquaculture. Most shorelines are in private ownership with the exception of Willapa Bay where portions lie within the Willapa National Wildlife Refuge.

For the most part these bays lie within a broad coastal plain, therefore the shorelines are backed by tidal wetlands, freshwater wetlands, and other low-lying lands. Bluff-backed shorelines are rare. Coastal flooding is an occasional problem for some of the cities and towns, especially those situated on the mouth of a major river.

Storm and wave energy regimes are tempered by the relatively short fetches across the bays. Shoreline accretion and erosion patterns are poorly studied; shoreline erosion is know to occur on the North Bay of Grays Harbor, and near the mouth of

Implementation

The SMA is implemented by each local government (counties and incorporated cities) which abuts waters which come under the Act. Each of these local governments must develop and adopt a local Shorelines Master Program which must be approved by the Dep't of Ecology. Ecology adopted a regulation, Shoreline Master Program Guidelines, for development of local SMPs. The original rule was adopted in 1972.

Permits for shoreline projects are reviewed and approved by the local government and submitted to Ecology for review and approval for consistency with the local SMP and the intents of the Act.

Three types of permits

- Shoreline Substantial Development Permit

  To challenge a local action, Ecology must appeal the permit to the Shoreline Hearings Board

- Conditional Use Permit

  Ecology can reject the local permit, and the local government and/or the application must appeal Ecology's decision to the Shoreline Hearings Board

- Variance

  Ecology can reject the local permit, and the local government and/or the application must appeal Ecology's decision to the Shoreline Hearings Board

Shoreline Development Activity

The level of development activity is an indicator of "sensitive" areas — areas sensitive to coastal hazards.

A review of the shoreline permit activity state-wide since 1990 indicates that 64% of the permitted shoreline development projects occurs in 25 of the 249 local jurisdictions which implement the SMA (see Table 1). Another way of looking at this is to summarize the permitted projects not by individual jurisdiction but by geographic areas (counties) (Table 6.2): approximately 70% of the permitted shoreline development projects occur in 1/3 of the counties (italicized in Table 2).

It is important to remember that much shoreline development is exempted from a requirement to acquire a shoreline permit, most notably single-family residential development. These data do not, therefore, include residential development. It is also important to remember that the data in the tables do not distinguish between the magnitude of the permitted projects. Still, the broad patterns identified above are likely to be representative of on-the-ground conditions

While these date cover marine, lake, and stream shorelines, they do indicate that the bulk of the shoreline development occurs in the coastal counties.

Sea Level Rise Response

Ecology conducted a sea level rise response research and policy analysis program in the early 1990s, but lacking any clear mandate from the state legislature, has made no effort to establish a sea level rise response policy and incorporate it into the most recent attempted amendment of the Shoreline Master Program Guidelines. (Indeed, the proposed new rule which was adopted in November 2001, was quite controversial. A consortium of local governments, agricultural associations, construction industry associations, and business interests successfully appealed the new rule to the SHB. Because the new rule repealed the old rule, at present there is no rule governing the preparation of local SMPs.)

Run through PAS overheads, or at least the first overview.

Table 1: Permitted Shoreline Projects by Individual Jurisdiction, 1990 – 2000.

Jurisdiction	Projects	Percent
Seattle	445	6.7
Pierce County	335	5.0
San Juan County	298	4.5
Mason County	255	3.8
Skagit County	250	3.8
King County	225	3.4
Whatcom County	213	3.2
Grays Harbor	176	2.6
Snohomish County	175	2.6
Pacific County	173	2.6
Island County	169	2.5
Tacoma	163	2.5
Lewis County	149	2.2
Cowlitz County	147	2.2
Chelan County	129	1.9
Clark County	126	1.9
Clallam County	122	1.8
Kitsap County	114	1.7
Mercer Island	99	1.5
Everett	98	1.5
Thurston County	84	1.5
Bellingham	82	1.2
Renton	81	1.2
Jefferson County	78	1.2
Pend Oreille County	77	1.2
Subtotal	4263	64.0
All Others	2214	36.0
Total	6677	100.0

Table Notes:

1. Data derived from queries on the Shorelands Programs' Permit Tracking Database for the period January 1990 through May 2000.

2. No assurance is implied that this information is complete. The database from which it was derived is maintained for the purpose of tracking permit applications, not for assessing development trends.

Table 2: Permitted Shoreline Projects by County area, 1990 – 2000.

County	Projects	Percent
King	*1367*	*20.5*
Pierce	*586*	*8.8*
Skagit	*353*	*5.3*
Snohomish	*340*	*5.3*
Whatcom	*333*	*5.1*
San Juan	*322*	*5.0*
Grays Harbor	*270*	*4.0*
Mason	*265*	*4.0*
Pacific	*240*	*3.6*
Clark	*230*	*3.4*
Kitsap	*226*	*3.4*
Clallam	*204*	*3.1*
Cowlitz	*189*	*2.8*
Island	188	2.8
Chelan	183	2.7
Lewis	176	2.6
Thurston	144	2.2
Spokane	123	1.8
Jefferson	97	1.5
Yakima	84	1.3
Grant	82	1.2
Wahkiakum	81	1.2
Okanogan	80	1.2
Pend Oreille	80	1.2
Stevens	71	1.1
Kittitas	62	0.9
Whitman	52	0.8
Douglas	43	0.6
Benton	40	0.6
Walla Walla	29	0.4
Klickitat	27	0.4
Skamania	27	0.4
Asotin	26	0.4
Ferry	14	0.2
Columbia	7	0.1
Franklin	4	0.1
Adams	1	0.0
Garfield	0	0.0
Lincoln	0	0.0
Total	6677	100.0

Sea Level Rise Effects Summary

Sea level rise effects in Washington related to existing coastal hazards:

Three hazard classes:

- Flooding, including tsunamis
- Erosion and landsliding
- Low level sea level rise in south Puget Sound and temporary El Niño sea level rise on southwest coast

Three hazard regions:

- North Pacific Coast: stable cliffs: little/no development
- South Pacific Coast: sandy, accretional but erosion-prone beaches; low-to-moderate development intensity; tsunamis a threat
- Puget Sound: unstable bluffs; increasing population and development intensity; chronic shoreline erosion a low rate

Accelerated Sea Level Rise Effects Summary

- Coastal erosion, shoreline retreat, and bluff landsliding (winter rains an equal or greater causative effect)
- Coastal wetlands inundation, migration (where possible), and salinization
- Storm surges and coastal flooding
- Coastal inundation
- Sea water intrusion (ground water withdrawal likely a greater causative effect than sea level rise in most areas)
- Coastal water table rise
    - Agricultural soils saturation
    - Longer duration flooding
    - On-site sewage disposal impeded
    - Corrosion of underground pipes and tanks
    - Solid & hazardous waste site leaching
    - Storm drainage systems impeded

Three Previews of Coming Attractions

City of Olympia sea level rise study on central business district.

Ocean Shores beach erosion during the last El Niño

Seattle landsliding during 1996-97 winter rains

Policy Alternatives

Policy Alternatives Study Overview

Wetlands Protection and Preservation
    Loss due to inundation or erosion

Shallow Water and Estuarine Habitat
    Provide for migration & suitable habitat

Sea Water Intrusion
    Exacerbation of existing problem

Ground/Surface Water Contamination
    Leachate from disposal/waste sites

Beach, Shoreline, and Bluff Erosion
    Accelerated rates of erosion

Public Access and Recreation
    Loss of public assets

Public and Private Facilities
    Damage exposure

Coastal Floodplain Hazards
    Increased frequency and intensity

Wetlands and Shallow Water Estuarine Habitat

Permit & Regulatory Approaches
    Setbacks
    Conditional Use Permits
    Zoning
    Environmental Review
    Mitigation
    Critical Area Designation
    Estuary Management Plan

Economic and Market Strategies
    Subsidies & Incentives
    Fees & Disincentives
    Public Development Program
    Easements
    Transferable Development Rights

Government Programs
    Education & Information
    Environmental Engineering

Research & Monitoring
Land Acquisition

Sea Water Intrusion

Permit & Regulatory Approaches
- Modify Exemptions
- Conditional Use Permits
- Environmental Review
- Adaptive Management Strategies
- Regional Planning

Economic and Market Strategies
- Subsidies & Incentives
- Fees & Disincentives
- Public Development Program
- Water Development Rights Market

Government Programs
- Education & Information
- Environmental Engineering
- Hydrological Engineering
- Research & Monitoring
- Public Acquisition

Ground and Surface Water Contamination

Permit & Regulatory Approaches
- Zoning & Land Use Ordinances
- Conditional Use Permits
- Environmental Review

Economic and Market Strategies
- None

Government Programs
- Education & Information
- Research & Monitoring
    - Disposal Sites

Beach and. Shoreline Erosion Bluff Erosion

Permit & Regulatory Approaches
- Setbacks
- Conditional Use Permits
- Zoning
- Engineering Standards
- Environmental Review
- Critical Area Designation

Special Areas Management

Economic and Market Strategies
- Subsidies & Incentives
- Fees & Disincentives
- Public Development Program
- Easements

Government Programs
- Education & Information
- Environmental Engineering
- Research & Monitoring
- Land Acquisition

Public Access and Recreation

Permit & Regulatory Approaches
- Engineering Standards
- Environmental Review

Economic and Market Strategies
- Subsidies & Incentives
- Public Development Program

Government Programs
- Environmental Engineering
- Research & Monitoring
- Land Acquisition

Planning, Permitting, and Remediation of Public and Private Facilities

Permit & Regulatory Approaches
- Engineering Standards
- Environmental Review

Economic and Market Strategies
- Public Sector: None
- Private Sector: Subsidies, Incentives, etc.

Government Programs
- Education & Information
- Environmental Engineering
- Research & Monitoring
- Land Acquisition

Coastal Floodplain Hazards

Permit & Regulatory Approaches
- Setback Requirements
- Conditional Use Permits

Zoning & Subdivision Ordinances
Engineering Standards
Environmental Review

Economic and Market Strategies
Subsidies
Tax Incentives
Fees
Public Development Programs
Easements

Government Programs
Education & Information
Environmental Engineering
Research & Monitoring
Land Acquisition

Shoreline Processes

The processes of accretion, erosion, landsliding, and netshore-drift are intimately related. Puget Sound shorelines have been in a dynamic state of equilibration with sea level rise and glacial rebound since the retreat of the glaciers beginning ~12,000 years ago.

Net shore drift processes and littoral cells

Downing's bluff land form change graphic.

Rates can be affected by land use practices.

Shoreline Project Permitting

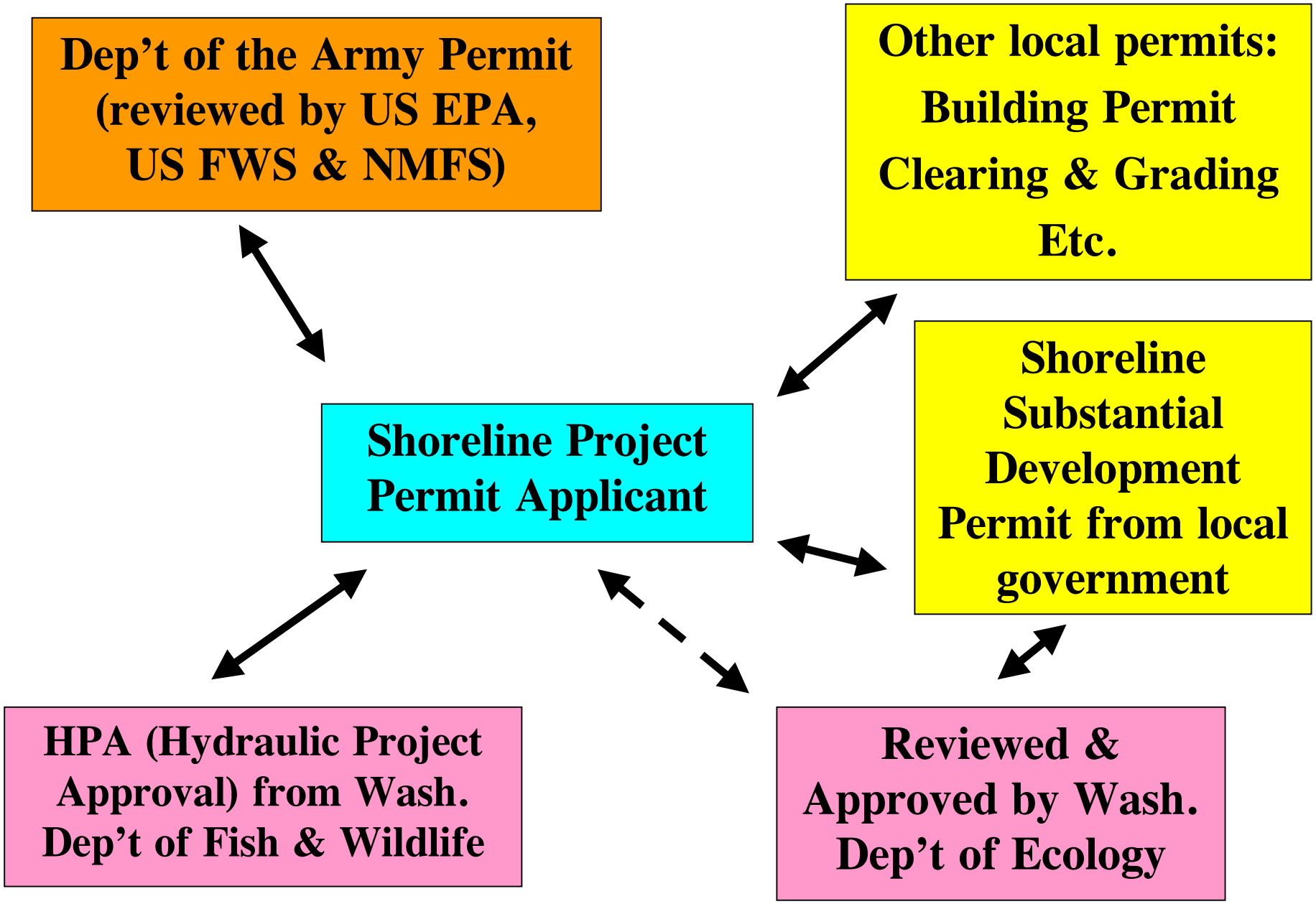
Shoreline Substantial Development Permit

Required by the Shoreline Management Act of any "substantial development" within 200 feet landward of Ordinary High Water (some exceptions making for a greater corridor) and waterward to the limits of the jurisdictional boundary.

Categorical exemptions for single family residence and some other small structures.

Hydraulic Project Approval

Required under the Hydraulics Code of any project waterward of Ordinary High Water. Issued directly by the Washington Department of Fish and Wildlife. Authority only to protect fish and shellfish life; authority over habitat contested.


Dep't of the Army Permit (reviewed by US EPA, US FWS & NMFS)
Other local permits: Building Permit Clearing & Grading Etc.
Shoreline Project Permit Applicant
Shoreline Substantial Development Permit from local government
HPA (Hydraulic Project Approval) from Wash. Dep't of Fish & Wildlife
Reviewed & Approved by Wash. Dep't of Ecology

Department of the Army Permit

AKA Section 404 Permit (under federal Clean Water Act) or Section 10 Permit (under Rivers and Harbors Act of 1899). Issued by the US Army Corps of Engineers as a joint Department of the Army Permit.[1] Subject to review by various agencies, but especially by US Environmental Protection Agency, US Fish and Wildlife Service, and National Marine Fisheries Service. This is the permit which invokes a federal nexus with respect to the Endangered Species Act. Applies waterward of Mean High Water. The Corps has adopted a number of "Nationwide Permits" for expedited processing of common types of projects such as residential shoreline armoring.

Other Local Permits

Other local government permits and certifications would likely be required, depending on the nature of the project, such as a Building Permit (universal), a Clearing and Grading Permit uncommon), zoning variance (circumstantial), etc.

[1] http://www.mvk.usace.army.mil/offices/od/odf/main.htm