

ALASKA LEGISLATURE SPECIAL COMMITTEE/SUBJECT FILE 8672
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Habitat stuff to
support model

RANKINGS OF PRODUCTIVITY, DIVERSITY, AND OIL SENSITIVITY
FOR MARINE AND ESTUARINE HABITAT TYPES IN WASHINGTON

"The first consideration in the analysis of the sensitivity of biological systems to oil spills is to establish and identify the analytical units to be ranked. To be useful in oil spill response planning, these units should be ecologically sound, geographically delineable, and capable of being classified as to the relative importance of the damage to them caused by oiling. The "habitat" was selected as the best available unit for this purpose. The term "habitat" refers to the place occupied by an entire community of organisms; it has geographic boundaries that can be measured and mapped" (p. 2, Adams et al. 1984).

The habitats ranked below are described in Appendix 1; this is a shortened and simplified list derived from the habitat classification system of Dethier (1990). Rankings for productivity, diversity, and oil sensitivity are based on the best or most pristine examples of each habitat type, and range from 0 (lowest, e.g. where there is no primary productivity) to 5 (highest). Two rankings are given for productivity: 1) Primary productivity, i.e. from benthic algae, seagrass, or marsh plants living in a habitat type, and 2) Secondary productivity of invertebrates living in a habitat type, either 'fed' by local primary production or by plankton and detritus brought to that habitat by waves or currents.

Primary productivity rankings have the following definitions:

5. Algae or vascular plants abundant and fast growing year round.
4. Plants less abundant but still productive, or with only small seasonal reduction.
3. Productivity somewhat reduced due to lower abundance, somewhat seasonal environment, or some physiological stress.
2. Plants rather sparse, quite seasonal, or quite stressed by physical conditions such that productivity is reduced.
1. Plants rare or with a very short growing/productive season.
0. No living plants of any kind.

Secondary productivity rankings vary from 0 (no consumers supported in the habitat) to 5 (high biomass and growth rates of consumers present).

Diversity rankings are based on an approximation of the number of species commonly found in a pristine example of the habitat type. They are as follows:

5. >80 species
4. 60 - 80 species
3. 40 - 60 species

2. 20 - 40 species
1. 1 - 20 species
0. No living organisms

Oil Sensitivity rankings assume that mixed-cargo oil is spilled and gets into each habitat type (via waves, sinking, etc.) in measurable amounts. That is, the rankings assume that every habitat is vulnerable (has some likelihood of contact by oil), but habitats vary in their sensitivity (response of the biotic resource to oil). Each rating is based on a worst-case scenario, i.e. oil hitting a pristine example of each habitat type. Four rankings are given: a) Mechanical damage, i.e. from smothering, weighting, or tearing off of organisms, smothering of substrate, or asphaltting of substrate; b) Toxicity, i.e. susceptibility to short-term acute mortality or sublethal damage due to chemical constituents in oil; c) Persistence, i.e. the retention of oil in different habitat types, and d) Recovery, i.e. the time taken for organisms to return to their pre-spill abundances and sizes, or for the community as a whole to recover its functional attributes (productivity and diversity).

For both potential Mechanical and Toxicity sensitivity, the rankings are as follows:

5. Destruction of most or all of organisms in a habitat possible
4. Death or significant population decline of a large proportion of the organisms
3. Death or loss of a moderate proportion of organisms, or broad sublethal effects
2. Moderate, mostly sublethal effects
1. Little damage

For Oil Persistence the rankings are as follows:

5. Oil present for >10 years
4. Oil present for 5-10 years
3. Oil present for 1-5 years
2. Oil gone in < 1 year
1. Oil gone in days to weeks

For Recovery from Oil the rankings are as follows:

5. Community requires > 10 years to recover
4. Community requires 5-10 years to recover
3. Community requires 1-5 years to recover
2. Community recovers in < 1 year

	<u>PRIM. PROD.</u>	<u>SECOND. PROD.</u>	<u>DIVERSITY</u>
MARINE INTERTIDAL			
Exposed and semi-exposed rocky shores	4	5	5
Sand-scoured rocky shores	3	4	4
Protected rocky shores	3	3	3
Semi-exposed cobble and mixed coarse beaches	2	4	4
Semi-exposed gravel beaches	1	2	1
Exposed sandy beaches	1	3	1
Semi-protected mixed-fine beaches	3	4	3
Protected mud flats	4	4	2
MARINE SUBTIDAL			
Shallow subtidal rock and boulders	5	4	5
Deep subtidal rock and boulders	2	4	5
Deep subtidal cobble and mixed-coarse areas (mod-high energy)	1	3	2
Shallow subtidal mixed-coarse to mixed-fine areas (mod-low energy)	5	4	4
Shallow subtidal gravel or mixed- fine areas (mod-high energy)	2	3	3
Deep subtidal sand (high energy)	0	2	1
Deep subtidal mixed-fine areas (mod-low energy)	1	3	2
Deep subtidal muddy areas	0	2	2

SENSITIVITY TO OIL

	<u>MECHANICAL</u>	<u>TOXICITY</u>	<u>PERSISTENCE</u>	<u>RECOVERY</u>
MARINE INTERTIDAL				
Exposed and semi-exposed rocky shores	4 (M,O,S,V,Y) *	3 (B,I,S,T)	2 (L,P)	4 (T,X,AB)
Sand-scoured rocky shores	4	3	2	3
Protected rocky shores	4 (D,H,O,U,AA)	3 (T)	3 (L,P,X)	3 (H,AA)
Semi-exposed cobble and mixed-coarse beaches	3	3 (B,J)	3 (B)	4 (Q)
Semi-exposed gravel beaches	1	5 (H)	2 (L,AD)	2 (H)
Exposed sandy beaches	1	5 (B,J,L,R)	1	3
			(E,L,P,AD)	(J,L,R,X,AB)
Semi-protected mixed-fine beaches	2 (N)	3 (H,J,L,Z)	4 (AD)	4 (H,X)
Protected mud flats	2 (N)	4 (B,H,Z)	5 (B,Q,V)	5 (H)
MARINE SUBTIDAL				
Shallow subtidal rock and boulders	3 (H,T)	3 (H,T)	2	4 (H,T,X)
Deep subtidal rock and boulders	2	2	3	3
Deep subtidal cobble and mixed-coarse areas (mod-high energy)	2	1	2	3
Shallow subtidal mixed-coarse to mixed-fine areas (mod-low energy)	3 (N)	3 (J)	3	3 (J)
Shallow subtidal gravel or mixed-fine areas (mod-high energy)	1	3	2	3 (X)
Deep subtidal sand (high energy)	3	2	2	3
Deep subtidal mixed-fine areas (mod-low energy)	3	1	4	4
Deep subtidal muddy areas	2	2	5	5

*Letters refer to literature cited in Bibliography

	<u>PRIM. PROD.</u>	<u>SECOND. PROD.</u>	<u>DIVERSITY</u>
ESTUARINE INTERTIDAL			
Open rocky shores	3	3	3
Open mixed-coarse beaches and low marsh	3	3	4
Open gravel beaches	1	2	1
Open sandy beaches	3	4	2
Sandy low marshes	4	3	2
Mixed-fine beaches and low marshes	5	5	4
Saline lagoons	4	3	3
Low-salinity lagoons	3	2	2
Mud flats	3	3	2
High salt marshes	3	3	2
Transition zone wetlands	3	3	2
ESTUARINE SUBTIDAL			
Shallow subtidal rock and boulders	4	3	3
Deep subtidal rock and boulders	2	4	4
Shallow subtidal cobble and mixed-coarse areas	3	3	3
Deep subtidal cobble and mixed-coarse areas	1	3	2
Shallow subtidal sandy or mixed-fine areas	3	4	3
Deep subtidal sandy or mixed-fine areas	1	3	2
Shallow subtidal muddy bays	3	3	2
Deep subtidal muddy bays	0	3	2

SENSITIVITY TO OIL

	<u>MECHANICAL</u>	<u>TOXICITY</u>	<u>PERSISTENCE</u>	<u>RECOVERY</u>
ESTUARINE INTERTIDAL				
Open rocky shores	4(AA)	3(AA)	3	3(AA)
Open mixed-coarse beaches and low marsh	3	3	3	3
Open gravel beaches	1	5	2	2
Open sandy beaches	3(N)	4	2	3
Sandy low marshes	3(Y)	4(S)	3(L)	3
Mixed-fine beaches and low marshes	4(F,H,AA)	4(F,L,S,W)	4(P)	4(F,H,W,AA)
Saline lagoons	4(AA)	4(S,AA)	5	5(AA)
Low-salinity lagoons	4	3	5	4
Mud flats	2	4(W,Z)	5(Q)	5(H,W)
High salt marshes	4(F)	2(F,S)	5	4(F)
Transition zone wetlands	4	2	5	4
ESTUARINE SUBTIDAL				
Shallow subtidal rock and boulders	3	3	2	3
Deep subtidal rock and boulders	2	2	3	3
Shallow subtidal cobble and mixed-coarse areas	3	2	3	3
Deep subtidal cobble and mixed-coarse areas	2	1	3	3
Shallow subtidal sandy or mixed-fine areas	3	3(W)	3	3(W)
Deep subtidal sandy or mixed-fine areas	3	2	4	4
Shallow subtidal muddy bays	2(N)	3(W)	5	5(W)
Deep subtidal muddy bays	2	2	5	5

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APPENDIX I. CONDENSED AND SIMPLIFIED MARINE AND ESTUARINE
HABITAT DESCRIPTIONS FOR OIL SPILL COMPENSATION DETERMINATIONS

MARINE: Intertidal

Exposed and semi-exposed rocky shores

Bedrock and boulder habitats exposed to the full range of wave energies of the Pacific (i.e., on the outer coast), or to extensive wave fetch along the Strait of Juan de Fuca. Rocky areas on the coast partly protected behind sea stacks or islands also fall into this category.

Sand-scoured rocky shores

Rocky headlands or sea stacks directly adjacent to high energy sandy beaches such that there is much suspended sand in the water, which scours the rock. Unique plants and animals are found here.

Protected rocky shores

Bedrock and boulder habitats lacking oceanic swell and extensive wave fetch; e.g., inside waters of the San Juan Islands, headlands in bays off the Strait of Juan de Fuca or well protected behind islands on the outer coast.

Semi-exposed cobble and mixed-coarse beaches

Beaches exposed to moderate wave action composed of cobble overlying sand, or to somewhat less wave action, with a mix of cobble, gravel, and sand where no one component occupies more than 70% of the surface. Algae may grow on larger cobbles, and animals live both on the surface and in the sediment. Species vary dramatically with degree of wave exposure and composition of the sediment. Found inside the San Juan Islands, outside of Whidbey Island, at semi-protected sites along the Strait, and behind island and sea stacks on the coast.

Semi-exposed gravel beaches

Unstable beaches, containing some sand in more protected areas. Many sites along the Strait of Juan de Fuca.

Exposed sandy beaches

Pure marine sands found in moderate to high-energy areas, e.g. on the outer coast and along the Strait of Juan de Fuca. Mouths of bays with some wave action also fall into this category.

Semi-protected mixed-fine beaches

Mixed sand and silt habitats, found in bays and inlets with some wave action so they are not dominated by the finer sediments (muds). Patches of gravel may be present high on the shore.

Protected mud flats

Areas of little to no wave energy, where fine sediments settle and accumulate organic matter. Found in calm bays and inlets with little freshwater influx (i.e. not estuaries).

MARINE: Subtidal

Shallow subtidal rock and boulders

Areas less than 15 m depth with some currents so that sediments do not totally cover bedrock. Kelp beds are found in these habitats, which are widespread in the state.

Deep subtidal rock and boulders

Areas deeper than 15 m and thus lacking in significant algal cover, but still with enough currents to keep the substrate exposed. Common in the San Juans and the Strait.

Deep subtidal cobble and mixed-coarse areas

"Scoured" areas in channels or passes with high currents, composed entirely of cobbles or with gravel and sand mixed in.

Shallow subtidal mixed-coarse to mixed-fine areas (Low energy)

Areas ranging from cobbles lying over a matrix of sand and gravel to mixed sand and silt, in waters less than 15 m. Bays and inlets commonly have this range of substrate types. Plants and animals exist both on the cobbles and in the sediment.

Shallow subtidal gravel or mixed-fine areas (High energy)

Areas just offshore of sand or gravel beaches, where swells or wave action keep fine sediments from accumulating. Substrates range from pure gravel to gravel mixed with sand and shells. Common in the Strait.

Deep subtidal sand

Areas deeper than 15 m in the Strait or on the coast where swells keep the substratum fairly coarse.

Deep subtidal mixed-fine areas

Areas of sand, shells, and pebbles with some currents removing finer particles.

Deep subtidal muddy areas

Areas with no swell and few currents, where fine silts settle out and accumulate organic matter.

ESTUARINE: Intertidal

Open rocky shores

Rocky intertidal areas (including hardpan and riprap) in areas exposed to moderate waves or currents, e.g. on headlands in Puget Sound.

Open mixed-coarse beaches

One of the most common beach types in Puget Sound, composed of a mix of cobble, gravel, and sand in areas with some wave action that keeps finer silts suspended. Sparse salt marsh vegetation may occur at the tops of these beaches, especially in quieter areas.

Open gravel beaches

Areas of gravel or pebbles, often overlying sand, in areas of moderate wave action.

Open sandy beaches

Common habitats of gently sloping beaches but moderate wave action. May have gravel on the upper shore. Found in Puget Sound and in some areas of other estuaries, including Grays Harbor.

Sandy low marshes

Found on spits, berms, and deltas where sand collects. Areas of different salinities are dominated by different marsh plant communities. Widespread (although disturbed) throughout the Puget Trough.

Mixed-fine beaches and low marshes

Found in backwaters or deltas away from large channels, where the substrate is mixed sand and mud, sometimes with patches of gravel or peat. Substrate is stable and organic-rich. Marsh communities vary with salinity.

Saline lagoons

Areas where water-borne sediments are deposited into a spit closing off an embayment, which is flushed regularly or irregularly. Salinities vary with evaporation and runoff but are generally high.

Low-salinity lagoons

Lagoons that are nearly separated from tidal/salt influence by a berm, and where there is a source of freshwater. Substrate is usually soft silt. This habitat is rare in the state.

Mud flats

Areas lacking in gravel or significant amounts of sand due to limited wave action, usually found in the heads of bays and inlets. Includes undisturbed channels and sloughs which drain slowly through a tidal cycle, and which may contain some sand.

High salt marshes

Areas above normal high water but salt influenced, with organic/peat substrata. Salinities vary, and plant communities with them.

Transition zone wetland

Areas transitional between salt marshes and uplands, where salt water only rarely inundates. Substrata are peat or fine silts.

ESTUARINE: Subtidal

Shallow subtidal rock and boulders

Areas less than 15 m deep with moderate currents or wave action that remove silt. Kelp beds develop here.

Deep subtidal rock and boulders

Areas in narrow channels or around headlands where currents remove sediment that otherwise would settle in these deeper areas. These habitats are essentially marine, since freshwater tends to stay layered in shallow water.

Shallow subtidal cobble and mixed-coarse areas

Mixed cobble, gravel, and sand remain in shallow areas fairly open to wave action or currents.

Deep subtidal cobble and mixed-coarse areas

Tidal currents running through deep channels in Puget Sound keep fine silts from settling and create areas of mixed cobbles, sand, and gravel.

Shallow subtidal sandy or mixed-fine areas

High-current areas with little debris and some gravel, or less current-swept with more debris. Both are common outside of enclosed bays in Puget Sound.

Deep subtidal sandy or mixed-fine areas

Current-swept areas below 15 m. Organic debris and gravel tend to accumulate deeper (below 30 m), leading to different assemblages there.

Shallow subtidal muddy bays

Common habitats in open to partly enclosed bays in Puget Sound, where limited water movement allows fine sediments to accumulate. Organic enrichment is high, especially in more enclosed bays.

Deep subtidal muddy bays

Habitats in the heads and centers of inlets in Puget Sound where there is little motion and the substrate is soft mud and sand. Assemblages vary with depth and amount of organic debris accumulated.

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SHELLFISH VULNERABILITY TO OIL SPILLS
A RANKING SYSTEM FOR THE
OIL SPILL COMPENSATION SCHEDULE

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prepared by

Laura Geselbracht

2/21/91

*example
model detail
of shellfish stuff*

Key 1 to zone

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Definition

For purposes of the oil spill compensation schedule, shellfish are defined as all marine invertebrates with important commercial or recreational value occurring within marine waters of Washington State including species without obvious shells or exoskeletons such as octopuses and squid.

Method for Ranking Shellfish Vulnerability to Oil Spills

The Shellfish Oil Index (SOI)

The Shellfish Oil Index (SOI) provides a methodology to relatively rank both shellfish species and Washington State marine environments for their vulnerability to oil spills. Shellfish depend on the marine environment for their survival. Species biology determines the relative vulnerability of shellfish species to spills, and includes factors such as depth of occurrence for the various life stages, range, concentration, population size, and reproductive characteristics. Nine factors were selected to rank species vulnerability to oil spills. Each factor was scored for each species. A description of the ranking factors and their scoring parameters are listed below.

Adult/Juvenile Habitat (AJH)

- 5 - primarily occurs intertidally or on the surface
- 3 - primarily occurs in shallow waters (at depths of less than 20 meters)
- 1 - occurs both shallow and deep (at depths greater than 20 meters)
- 0 - primarily occurs only in deep waters (at depths greater than 20 meters)

Larval Habitat (LH)

same scoring scheme as for Adult/Juvenile Habitat

Location of Eggs (LE)

same scoring scheme as for Adult/Juvenile Habitat

Relative Significance of Washington Population (i.e. distribution). (SD)

- 5 - species found only in Washington waters
- 3 - Washington waters account for a moderate proportion of species range (i.e., species found in Pacific NW only, or from B.C. to OR)
- 1 - wide population distribution (i.e., found from AK to So. CA and further south, or with temperate water distribution)
- 0 - introduced species

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Concentration of Washington Population (PC)

- 5 - species WA population concentrated in very few locations
- 3 - known to occur in moderate number of areas statewide
- 1 - ubiquitous in WA marine waters, not known to concentrate

Size of Washington Population (PS)

- 5 - rare or uncommon; small population, limited numbers
- 3 - common; population of moderate size
- 1 - abundant; large population

Length of Spawning Period (SP)

- 5 - annual spawning period limited to a few days
- 3 - spawning takes place primarily during one season
- 1 - spawning occurs during more than one season with a peak in one season, or has bimodal spawning
- 0 - spawns throughout the year

Reproductive Potential (number of eggs spawned per female annually), (RP)

- 5 - relatively low, less than 100,000 eggs per female
- 3 - moderate, 100,00 to 1 million eggs per female
- 1 - relatively high, more than 1 million eggs per female

Age at Sexual Maturity (SM)

- 5 - more than 3 years
- 3 - one to three years
- 1 - less than one year

To account for the seasonality of vulnerability, each of the factors is scored in each season. For example, for species with larvae present during only one season of each year, only the season in which larvae are present receives a score. Appendix A lists factor scores in each season for each species. Factor scores for each species were then combined using the following formula to derive a composite for each species in each season:

$$SOI = [AJH + SP(LH + LE + RP)](PC + SD + PS + SM)$$

Composite scores for each species are also listed in Appendix A.

To determine area vulnerability to oil spills (for shellfish only), the

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SOI of each shellfish species present in a subregion were summed for each season. SOIs for each compensation schedule subregion are listed in Tables 1 - 9. Subregional SOIs are graphically represented in Figures 1 - 9.

Table 1

SHELLFISH AND OTHER INVERTEBRATES OF COMMERCIAL OR RECREATIONAL IMPORTANCE
SOI FOR REGION 2

file: invert2.ws

date: 2/15/91

P/A - presence/absence in a zone

1 - present

0 - absent

SPRING

Group	Species Common Name	SOI SP	201 P/A	203 SOI P/A	204 P/A	205 SOI P/A	206 P/A	207 SOI P/A	208 P/A	209 SOI P/A	210 P/A	211 SOI P/A	212 P/A	213 SOI P/A	214 P/A	215 SOI P/A	216 P/A	217 SOI P/A	218 P/A	219 SOI P/A	220 P/A

Bivalves	Pacific Oyster	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Olympia Oyster	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0																			
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Geoduck	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Butter Clam	18	0	0	0	0	1	18	1	18	1	18	1	18	1	18	0	0	0	0	0
	Native Little Neck	144	0	0	0	0	1	144	1	144	1	144	1	144	1	144	0	0	0	0	0
	Manila Clam	15	0	0	0	0	1	15	1	15	1	15	1	15	1	15	0	0	0	0	0
	Horse Clam	18	0	0	0	0	1	18	1	18	1	18	1	18	1	18	0	0	0	0	0
	Horse Clam	18	0	0	0	0	1	18	1	18	1	18	1	18	1	18	0	0	0	0	0
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cockles	24	0	0	0	0	1	24	1	24	1	24	1	24	1	24	0	0	0	0	0
		0																			
	Pink Scallop	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rock Scallop	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Weathervane Scallop	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0																			
Bay Mussel	30	0	0	1	30	1	30	1	30	1	30	1	30	1	30	0	0	0	0	0	0
California Mussel	30	0	0	1	30	1	30	1	30	1	30	1	30	1	30	0	0	0	0	0	0
	0																				
Cephalopods	Squid	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Octopus	24	0	0	1	24	1	24	1	24	1	24	1	24	1	24	1	24	1	24	1
	0																				
Sea Snails	Northern Abalone	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0																				
Echinoderms	Sea Cucumber	80	0	0	0	0	1	80	1	80	1	80	1	80	1	80	1	80	1	80	1
	Red Sea Urchin	168	0	0	1	168	0	0	1	168	1	168	1	168	1	168	1	168	1	168	1
	Green Sea Urchin	60	0	0	0	0	1	60	1	60	1	60	1	60	1	60	1	60	1	60	1
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustaceans		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dungeness Crab	42	1	42	0	0	1	42	0	0	1	42	1	42	1	42	1	42	1	42	1
	Red (Rock) Crab	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Spot Shrimp	220	0	0	0	0	1	220	1	220	1	220	1	220	1	220	1	220	1	220	1
	Coon Stripe Shrimp	220	0	0	0	0	1	220	1	220	1	220	1	220	1	220	1	220	1	220	1
	Side Shrimp	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pink Shrimp	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	42	4	252	10	363	14	1069	13	1051	13	1051	7	814	7	814	7	814	7

SUMMER

DAL

Group	Species	Summer	201		203		204		205		206		207		208		209	
			P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI
Mollusks	Pacific Oyster	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Olympia Oyster	456		0		0		0		0		0		0		0		0
		0																
	Pacific Razor Clam	420	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Geoduck	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Butter Clam	144	0	0	0	0	1	144	1	144	1	144	1	144	0	0	0	0
	Native Little Neck	144	0	0	0	0	1	144	1	144	1	144	1	144	0	0	0	0
	Manila Clam	120	0	0	0	0	1	120	1	120	1	120	1	120	0	0	0	0
	Horse Clam	60	0	0	0	0	1	60	1	60	1	60	1	60	0	0	0	0
	Horse Clam	18	0	0	0	0	1	18	1	18	1	18	1	18	0	0	0	0
Mollusks	Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cockles	192	0	0	0	0	1	192	1	192	1	192	1	192	0	0	0	0
		0																
	Pink Scallop	0		0		0		0		0		0		0		0		0
	Rock Scallop	48		0		0		0		0		0		0		0		0
	Weathervane Scallop	24		0		0		0		0		0		0		0		0
		0																
	Bay Mussel	30	0	0	1	30	1	30	1	30		0	0	0		0	0	0
	California Mussel	30	0	0	1	30	1	30	1	30		0	0	0	0	0	0	0
		0																
Cephalopods	Squid	6		0		0		0		0		0		0		0		0
	Octopus	8	0	0	1	8	1	8	1	8	1	8	1	8	1	8	1	8
Sea Snails	Northern Abalone	384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0																
Echinoderms	Sea Cucumber	96	0	0	0	0	0	0	1	96	1	96	1	96	1	96	1	96
	Red Sea Urchin	6	0	0	1	6	0	0	1	6	1	6	1	6	1	6	1	6
	Green Sea Urchin	6	0		0	0	0	0	1	6	1	6	1	6	1	6	1	6
Crustaceans		0		0		0		0		0		0		0		0		0
	Dungeness Crab	6	1	6	0	0	1	6	0	0	1	6	1	6	1	6	1	6
	Red (Rock) Crab	66		0		0		0		0		0		0		0		0
		0		0		0		0		0		0		0		0		0
	Spot Shrimp	220	0	0		0		0	1	220	1	220	1	220	1	220	1	220
	Coon Stripe Shrimp	220	0	0		0		0	1	220	1	220	1	220	1	220	1	220
	Side Shrimp	308	0	0		0		0		0		0		0		0		0
	Pink Shrimp	126		0		0		0		0		0		0		0		0
			1	6	4	74	10	752	14	1294	13	1240	13	1240	7	562	7	562

FALL

	Species	SOI	201	203	204	205	206	207	208	209
Group	Common Name	Fall	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Bivalves										
	Pacific Oyster	15	0	0	0	0	0	0	0	0
	Olympia Oyster	60	0	0	0	0	0	0	0	0
		0								
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0
	Geoduck	6	0	0	0	0	0	0	0	0
	Butter Clam	18	0	0	0	18	18	18	18	0
	Native Little Neck	18	0	0	0	18	18	18	18	0
	Manila Clam	15	0	0	0	15	15	15	15	0
	Horse Clam	18	0	0	0	18	18	18	18	0
	Horse Clam	18	0	0	0	18	18	18	18	0
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0
	Cockles	24	0	0	0	24	1	24	1	24
		0								
	Pink Scallop	12	0	0	0	0	0	0	0	0
	Rock Scallop	48	0	0	0	0	0	0	0	0
	Weathervane Scallop	0	0	0	0	0	0	0	0	0
		0								
	Bay Mussel	156	0	0	156	1	156	0	0	0
	California Mussel	30	0	0	30	1	30	0	0	0
		0								
Cephalopods/Squid		0	0	0	0	0	0	0	0	0
	Octopus	8	0	0	1	8	1	8	1	8
		0								
Sea Snails	Northern Abalone	48	0	0	0	0	0	0	0	0
		0								
Echinoderms	Sea Cucumber	8	0	0	0	0	1	8	1	8
	Red Sea Urchin	6	0	0	1	6	0	6	1	6
	Green Sea Urchin	6	0	0	0	0	1	6	1	6
		0	0	0	0	0	0	0	0	0
Crustaceans		0	0	0	0	0	0	0	0	0
	Rock Crab	6	1	6	0	0	1	6	1	6
	Red (Rock) Crab	66	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0
	Spot Shrimp	10	0	0	0	1	10	1	10	1
	Coon Stripe Shrimp	10	0	0	0	1	10	1	10	1
	Side Shrimp	14	0	0	0	0	0	0	0	0
	Pink Shrimp	0	0	0	0	0	0	0	0	0
			1	6	4	200	10	311	14	345
									13	165
									13	165
									7	54
									7	54

Group	Species Common Name	SOI	201		203		204		205		206		207		208		209 *	
			P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Bivalves																		
	Pacific Oyster	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Olympia Oyster	60	0		0		0		0		0		0		0		0	
		0																
	Pacific Razor Clam	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Geoduck	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Butter Clam	18	0	0	0	0	1	18	1	18	1	18	1	18	0	0	0	0
	Native Little Neck	18	0	0	0	0	1	18	1	18	1	18	1	18	0	0	0	0
	Manila Clam	15	0	0	0	0	1	15	1	15	1	15	1	15	0	0	0	0
	Horse Clam	18	0	0	0	0	1	18	1	18	1	18	1	18	0	0	0	0
	Horse Clam	60	0	0	0	0	1	60	1	60	1	60		60	0	0	0	0
	Eastern Soft Shell	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cockles	24	0	0	0	0	1	24	1	24	1	24	1	24	0	0	0	0
		0																
	Pink Scallop	0	0		0		0		0		0		0		0		0	
	Rock Scallop	48	0		0		0		0		0		0		0		0	
	Weathervane Scallop	12	0		0		0		0		0		0		0		0	
		0																
	Bay Mussel	156	0	0	1	156	1	156	1	156		0	0	0		0	0	0
	California Mussel	30	0	0	1	30	1	30	1	30		0	0	0	0	0	0	0
		0																
Cephalopods	Squid	114	0		0		0		0		0		0		0		0	
	Octopus	8	0	0	1	8	1	8	1	8	1	8	1	8	1	8	1	8
		0																
Sea Snails	Northern Abalone	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0																
Echinoderms	Sea Cucumber	8	0	0	0	0	0	0	1	8	1	8	1	8	1	8	1	8
	Red Sea Urchin	6	0	0	1	6	0	0	1	6	1	6	1	6	1	6	1	6
	Green Sea Urchin	60	0		0	0	0	1	60	1	60	1	60	1	60	1	60	1
		0	0		0		0		0		0		0		0		0	
Crustaceans		0	0		0		0		0		0		0		0		0	
	Dungeness Crab	48	1	48	0	0	1	48	0	0	1	48	1	48	1	48	1	48
	Red (Rock) Crab	18	0		0		0		0		0		0		0		0	
		0	0		0		0		0		0		0		0		0	
	Spot Shrimp	10	0	0		0		0	1	10	1</							

Table 2

SPRING

[illegible]

SUNN EA

[illegible]

FALL

10	131	0	0	2	16	14	163	9	67	9	140	15	233	12	158	12	161	7	117	8	123	3	20	11	139	7	159	0	0	8	103	7	88
----	-----	---	---	---	----	----	-----	---	----	---	-----	----	-----	----	-----	----	-----	---	-----	---	-----	---	----	----	-----	---	-----	---	---	---	-----	---	----

VINTER

[illegible]

Table 3

SHELLFISH AND OTHER INVERTEBRATES OF COMMERCIAL OR RECREATIONAL IMPORTANCE
SOI FOR REGIONS 4 and 5

file: inver4 5.ws

date: 2/15/91

SPRING

	Species	SOI	401		501		502		503		504		505		506		507	
Group	Common Name	SP	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Bivalves	Pacific Oyster	15	0	0	0	0	0	0	1	15	1	15	1	15	1	15	1	15
	Olympia Oyster	60		0		0		0		0		0		0		0		0
		0																
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Geoduck	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Butter Clam	18	1	18	1	18	0	0	1	18	1	18	1	18	1	18	1	18
	Native Little Neck	144	1	144	1	144	0	0	1	144	1	144	1	144	1	144	1	144
	Manila Clam	15	1	15	1	15	0	0	1	15	1	15	1	15	1	15	1	15
	Horse Clam	18	1	18	1	18	0	0	1	18	1	18	1	18	1	18	1	18
	Horse Clam	18	1	18	1	18	0	0	1	18	1	18	1	18	1	18	1	18
Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cockles	24	1	24	1	24	0	0	1	24	1	24	1	24	1	24	1	24	
		0																
	Pink Scallop	12	1	12	1	12		0		0		0		0		0		0
	Rock Scallop	48	1	48	1	48		0		0		0	0	0	1	48		0
	Weathervane Scallop	12	1	12	1	12		0		0		0	0	0	1	12		0
		0																
	Bay Mussel	30	0	0	0	0	0	0	0	0		0		0	0	0		0
	California Mussel	30	0	0	0	0	0	0	0	0		0		0	0	0	0	0
		0																
Cephalopods	Squid	132	1	132		0		0		0		0		0		0	1	132
	Octopus	24	1	24	0	0	0	0	0	0	0	0	0	0	1	24	1	24
		0																
Sea Snails	Northern Abalone	48	0	0	1	48	0	0	0	0	0	0		0	0	0	0	0
		0																
Echinoderms	Sea Cucumber	80	1	80	1	80	0	0	0	0	0	0	1	80	0	0	1	80
	Red Sea Urchin	168	1	168	1	168	0	0	0	0	0	0		0	0	0	0	0
	Green Sea Urchin	60	1	60	1	60	1	60	1	60	1	60		0	0	0	1	60
		0		0		0		0		0		0			0		0	0
Crustaceans		0		0		0		0		0		0		0		0		0
	Dungeness Crab	42	1	42	1	42	1	42	1	42	1	42	1	42	1	42	1	42
	Red (Rock) Crab	18		0		0		0		0		0		0		0		0
		0		0		0		0		0		0			0		0	0
	Spot Shrimp	220	1	220	1	220	0	0	0	0	0	0		0	0	0	0	0
	Coon Stripe Shrimp	220	1	220	1	220	1	220	1	220	1	220	1	220	0	0	0	0
	Side Shrimp	308	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
	Pink Shrimp	126		0	1	126		0	0	0	0	0		0	0	0	0	0
			17	1255	17	1273	3	322	10	574	10	574	10	594	11	378	12	590

SUMMER

	Species	SOI	401	501	502	503	504	505	506	507 *
Group	Common Name	Summer	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Bivalves										
	Pacific Oyster	96	0	0	0	0	0	1	96	1
	Olympia Oyster	456		0		0		0		0
		0								
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0
	Geoduck	6	0	0	0	0	0	0	0	0
	Butter Clam	144	1	144	1	144	0	0	1	144
	Native Little Neck	144	1	144	1	144	0	0	1	144
	Manila Clam	120	1	120	1	120	0	0	1	120
	Horse Clam	60	1	60	1	60	0	0	1	60
	Horse Clam	18	1	18	1	18	0	0	1	18
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0
	Cockles	192	1	192	1	192	0	0	1	192
		0								
	Pink Scallop	0	1	0	1	0		0		0
	Rock Scallop	48	1	48	1	48		0		0
	Weathervane Scallop	24	1	24	1	24		0		0
		0								
	Bay Mussel	30	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0
		0								
Cephalopods	Squid	6	1	6		0		0		0
	Octopus	8	1	8	0	0	0	0	0	0
		0								
Sea Snails	Northern Abalone	384	0	0	1	384	0	0	0	0
		0								
Echinoderms	Sea Cucumber	96	1	96	1	96	0	0	0	0
	Red Sea Urchin	6	1	6	1	6	0	0	0	0
	Green Sea Urchin	6	1	6	1	6	1	6	1	6
		0		0		0		0		0
Crustaceans		0		0		0		0		0
	Dungeness Crab	6	1	6	1	6	1	6	1	6
	Red (Rock) Crab	66		0		0		0		0
		0		0		0		0		0
	Spot Shrimp	220	1	220	1	220	0	0	0	0
	Coon Stripe Shrimp	220	1	220	1	220	1	220	1	220
	Side Shrimp	308	0	0	0	0		0	0	0
	Pink Shrimp	126		0	1	126		0	0	0

17 1318 17 1814 3 232 10 1006 10 1006 10 1096 11 860 12 896

FALL

	Species	SOI	401		501		502		503		504		505		506		507		
Group	Common Name	Fall	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	

Bivalves	Pacific Oyster	15	0	0	0	0	0	0	1	15	1	15	1	15	1	15	1	15	
	Olympia Oyster	60		0		0		0		0		0		0		0		0	
		0	-----																
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Geoduck	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Butter Clam	18	1	18	1	18	0	0	1	18	1	18	1	18	1	18	1	18	
	Native Little Neck	18	1	18	1	18	0	0	1	18	1	18	1	18	1	18	1	18	
	Manila Clam	15	1	15	1	15	0	0	1	15	1	15	1	15	1	15	1	15	
	Horse Clam	18	1	18	1	18	0	0	1	18	1	18	1	18	1	18	1	18	
	Horse Clam	18	1	18	1	18	0	0	1	18	1	18	1	18	1	18	1	18	
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Cockles	24	1	24	1	24	0	0	1	24	1	24	1	24	1	24	1	24	
		0	-----																
		Pink Scallop	12	1	12	1	12		0		0		0		0		0		0
		Rock Scallop	48	1	48	1	48		0		0		0	0	0	1	48		0
		Weathervane Scallop	0	1	0	1	0		0		0		0	0	0	1	0		0
		0	-----																
	Bay Mussel	156	0	0	0	0	0	0	0	0		0		0	0	0		0	
	California Mussel	30	0	0	0	0	0	0	0	0		0		0	0	0	0	0	
	0	-----																	
Cephalopods	Squid	6	1	6		0		0		0		0		0		0	1	6	
	Octopus	8	1	8	0	0	0	0	0	0	0	0	0	0	1	8	1	8	
		0	-----																
Sea Snails	Northern Abalone	48	0	0	1	48	0	0	0	0	0	0		0	0	0	0	0	
	0	-----																	
Echinoderms	Sea Cucumber	8	1	8	1	8	0	0	0	0	0	0	1	8	0	0	1	8	
	Red Sea Urchin	6	1	6	1	6	0	0	0	0	0	0		0	0	0	0	0	
	Green Sea Urchin	6	1	6	1	6	1	6	1	6	1	6	5	0	0	0	1	6	
		0	-----																
Crustaceans		0	-----																
	Dungeness Crab	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	
	Red (Rock) Crab	66		0		0		0		0		0		0		0		0	
		0	-----																
	Spot Shrimp	10	1	10	1	10	0	0	0	0	0	0		0	0	0	0	0	
	Coon Stripe Shrimp	10	1	10	1	10	1	10	1	10	1	10	1	10	0	0	0	0	
	Side Shrimp	14	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
	Pink Shrimp	0		0	1	0		0	0	0	0	0		0	0	0	0	0	

17 231 17 265 3 22 10 148 10 148 10 150 11 188 12 160

WINTER

Group	Species Common Name	SOI Wint	401 P/A	SOI	501 P/A	SOI	502 P/A	SOI	503 P/A	SOI	504 P/A	SOI	505 P/A	SOI	506 P/A	SOI	507 P/A	SOI
Bivalves																		
	Pacific Oyster	15	0	0	0	0	0	0	1	15	1	15	1	15	1	15	1	15
	Olympia Oyster	60		0		0		0		0		0		0		0		0
		0																
	Pacific Razor Clam	30	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
	Geoduck	132	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
	Butter Clam	18	1	18	1	18	0	0	1	18	1	18	1	18	1	18	1	18
	Native Little Neck	18	1	18	1	18	0	0	1	18	1	18	1	18	1	18	1	18
	Manila Clam	15	1	15	1	15	0	0	1	15	1	15	1	15	1	15	1	15
	Horse Clam	18	1	18	1	18	0	0	1	18	1	18	1	18	1	18	1	18
	Horse Clam	60	1	60	1	60	0	0	1	60	1	60	1	60	1	60	1	60
	Eastern Soft Shell	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cockles	24	1	24	1	24	0	0	1	24	1	24	1	24	1	24	1	24
		0																
	Pink Scallop	0	1	0	1	0		0		0		0		0		0		0
	Rock Scallop	48	1	48	1	48		0		0		0	0	0	1	48		0
	Weathervane Scallop	12	1	12	1	12		0		0		0	0	0	1	12		0
		0																
	Bay Mussel	156	0	0	0	0	0	0	0	0		0		0	0	0		0
	California Mussel	30	0	0	0	0	0	0	0	0		0		0	0	0		0
		0																
Cephalopods	Squid	114	1	114		0		0		0		0		0		0	1	114
	Octopus	8	1	8	0	0	0	0	0	0	0	0	0	0	1	8	1	8
		0																
Sea Snails	Northern Abalone	48	0	0	1	48	0	0	0	0	0	0		0	0	0	0	0
		0																
Echinoderms	Sea Cucumber	8	1	8	1	8	0	0	0	0	0	0	1	8	0	0	1	8
	Red Sea Urchin	6	1	6	1	6	0	0	0	0	0	0		0	0	0	0	0
	Green Sea Urchin	60	1	60	1	60	1	60	1	60	1	60		0	0	0	1	60
		0		0		0		0		0		0			0		0	0
Crustaceans		0		0		0		0		0		0		0		0		0
	Dungeness Crab	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48
	Red (Rock) Crab	18		0		0		0		0		0		0		0		0
		0		0		0		0		0		0			0		0	0
	Spot Shrimp	10	1	10	1	10	0	0	0	0	0	0		0	0	0	0	0
	Coon Stripe Shrimp	10	1	10	1	10	1	10	1	10	1	10	1	10	0	0	0	0
	Side Shrimp	14	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
	Pink Shrimp	0		0	1	0		0	0	0	0	0		0	0	0	0	0

17 477 17 403 3 118 10 286 10 286 10 234 11 284 12 406

Table 4

SHELLFISH AND OTHER INVERTEBRATES OF COMMERCIAL OR RECREATIONAL IMPORTANCE
SOI FOR REGION 6

file: invert6.ws

date: 2/13/91

SPRING

Group	Species Common Name	SOI SP	601 P/A	602 SOI	603 P/A	604 SOI	605 P/A	606 SOI	607 P/A	608 SOI
Bivalves										
	Pacific Oyster	15	1	15	0	0	0	0	1	15
	Olympia Oyster	60		0		0		0		0
		0								
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0
	Geoduck	132	0	0	0	0	0	0	0	0
	Butter Clam	18	1	18	1	18	1	18	1	18
	Native Little Neck	144	1	144	1	144	1	144	1	144
	Manila Clam	15	1	15	1	15	1	15	1	15
	Horse Clam	18	1	18	1	18	1	18	1	18
	Horse Clam	18	1	18	1	18	1	18	1	18
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0
	Cockles	24	1	24	1	24	1	24	1	24
		0								
	Pink Scallop	12	0	0	0	0	0	0	0	0
	Rock Scallop	48	0	0	0	0	0	0	1	48
	Weathervane Scallop	12	0	0	0	0	0	0	1	12
		0								
	Bay Mussel	30	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0
		0								
Cephalopods	Squid	132	0	0	0	0	0	0	1	132
	Octopus	24	1	24	1	24	1	24	1	24
		0								
Sea Snails	Northern Abalone	48	0	0	0	0	0	0	0	0
		0								
Echinoderms	Sea Cucumber	80	1	80	1	80	1	80	1	80
	Red Sea Urchin	168		0		0		0		0
	Green Sea Urchin	60	1	60	1	60	1	60	1	60
		0		0		0		0		0
Crustaceans		0		0		0		0		0
	Dungeness Crab	42	1	42	1	42	1	42	1	42
	Red (Rock) Crab	18		0		0		0		0
		0		0		0		0		0
	Spot Shrimp	220	0	0	0	0	0	0	0	0
	Coon Stripe Shrimp	220	0	0	0	0	0	0	0	0
	Side Shrimp	308	0	0	0	0	0	0	0	0
	Pink Shrimp	128	0	0	0	0	0	0	0	0

11 458 10 443 10 443 10 443 11 458 13 635 7 402 5 338

SUMNER

Subregions

Group	Species Common Name	SOI Summer	Subregions															
			601		602		603		604		605		606		607		608	
			P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Bivalves																		
	Pacific Oyster	96	1	96	0	0	0	0	0	0	1	96	0	0	0	0	0	0
	Olympia Oyster	456		0		0		0		0		0		0		0		0
		0																
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Geoduck	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Butter Clam	144	1	144	1	144	1	144	1	144	1	144	1	144	0	0	0	0
	Native Little Neck	144	1	144	1	144	1	144	1	144	1	144	1	144	0	0	0	0
	Manila Clam	120	1	120	1	120	1	120	1	120	1	120	1	120	0	0	0	0
	Horse Clam	60	1	60	1	60	1	60	1	60	1	60	1	60	0	0	0	0
	Horse Clam	18	1	18	1	18	1	18	1	18	1	18	1	18	0	0	0	0
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cockles	192	1	192	1	192	1	192	1	192	1	192	1	192	0	0	0	0
		0																
	Pink Scallop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rock Scallop	48	0	0	0	0	0	0	0	0	0	0	1	48	1	48	0	0
	Veathervane Scallop	24	0	0	0	0	0	0	0	0	0	0	1	24	1	24	0	0
		0																
	Bay Mussel	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0																
Cephalopods	Squid	6	0	0	0	0	0	0	0	0	0	0	1	6	0	0	1	6
	Octopus	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8
		0																
Sea Snails	Northern Abalone	384	0	0	0	0	0	0	0	0	0	0	0	0	1	384	0	0
		0																
Echinoderms	Sea Cucumber	96	1	96	1	96	1	96	1	96	1	96	1	96	0	0	1	96
	Red Sea Urchin	6		0	0	0	0	0	0	0	0	0	0	0	1	6	0	0
	Green Sea Urchin	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6
		0		0		0		0		0		0		0		0		0
Crustaceans		0		0		0		0		0		0		0		0		0
	Dungeness Crab	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6
	Red (Rock) Crab	66		0		0		0		0		0		0		0		0
		0		0		0		0		0		0		0		0		0
	Spot Shrimp	220	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coon Stripe Shrimp	220	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Side Shrimp	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pink Shrimp	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subregional Totals:			11	890	10	794	10	794	10	794	11	890	13	872	7	482	5	122

FALL

	Species	SOI	601	602	603	604	605	606	607	608
Group	Common Name	Fall	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Bivalves										
	Pacific Oyster	15	1	15	0	0	0	0	1	15
	Olympia Oyster	60		0		0		0		0
		0								
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0
	Geoduck	6	0	0	0	0	0	0	0	0
	Butter Clam	18	1	18	1	18	1	18	1	18
	Native Little Neck	18	1	18	1	18	1	18	1	18
	Manila Clam	15	1	15	1	15	1	15	1	15
	Horse Clam	18	1	18	1	18	1	18	1	18
	Horse Clam	18	1	18	1	18	1	18	1	18
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0
	Cockles	24	1	24	1	24	1	24	1	24
		0								
	Pink Scallop	12	0	0	0	0	0	0	0	0
	Rock Scallop	48	0	0	0	0	0	0	48	1
	Weather-vane Scallop	0	0	0	0	0	0	0	0	1
		0								
	Bay Mussel	156	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0
		0								
Cephalopods	Squid	6	0	0	0	0	0	0	0	6
	Octopus	8	1	8	1	8	1	8	1	8
		0								
Sea Snails	Northern Abalone	48	0	0	0	0	0	0	0	0
		0								
Echinoderms	Sea Cucumber	8	1	8	1	8	1	8	1	8
	Red Sea Urchin	6		0	0	0	0	0	0	1
	Green Sea Urchin	6	1	6	1	6	1	6	1	6
		0		0		0		0		0
Crustaceans		0		0		0		0		0
	Dungeness Crab	6	1	6	1	6	1	6	1	6
	Red (Rock) Crab	66		0		0		0		0
		0		0		0		0		0
	Spot Shrimp	10	0	0	0	0	0	0	0	0
	Coon Stripe Shrimp	10	0	0	0	0	0	0	0	0
	Side Shrimp	14	0	0	0	0	0	0	0	0
	Pink Shrimp	0	0	0	0	0	0	0	0	0
			11	154	10	139	10	139	10	139
			11	154	13	193	7	122	5	34

11 154 10 139 10 139 10 139 11 154 13 193 7 122 5 34

WINTER

	Species	SOI	601		602		603		604		605		606		607		608	
Group	Common Name	Wint	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Bivalves																		
	Pacific Oyster	15	1	15	0	0	0	0	0	0	1	15	0	0	0	0	0	0
	Olympia Oyster	60		0		0		0		0		0		0		0		0
		0																
	Pacific Razor Clam	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Geoduck	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Butter Clam	18	1	18	1	18	1	18	1	18	1	18	1	18	0	0	0	0
	Native Little Neck	18	1	18	1	18	1	18	1	18	1	18	1	18	0	0	0	0
	Manila Clam	15	1	15	1	15	1	15	1	15	1	15	1	15	0	0	0	0
	Horse Clam	18	1	18	1	18	1	18	1	18	1	18	1	18	0	0	0	0
	Horse Clam	60	1	60	1	60	1	60	1	60	1	60	1	60	0	0	0	0
	Eastern Soft Shell	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cockles	24	1	24	1	24	1	24	1	24	1	24	1	24	0	0	0	0
		0																
	Pink Scallop	0	0	0	0	0		0		0		0		0		0		0
	Rock Scallop	48	0	0	0	0		0		0		0	1	48	1	48		0
	Weathervane Scallop	12	0	0	0	0		0		0		0	1	12	1	12		0
		0																
	Bay Mussel	156	0	0	0	0	0	0	0	0		0		0	0	0		0
	California Mussel	30	0	0	0	0	0	0	0	0		0		0	0	0	0	0
		0																
Cephalopods	Squid	114	0	0		0		0		0		0	1	114		0	1	114
	Octopus	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8
		0																
Sea Snails	Northern Abalone	48	0	0	0	0	0	0	0	0	0	0		0	1	48	0	0
		0																
Echinoderms	Sea Cucumber	8	1	8	1	8	1	8	1	8	1	8	1	8	0	0	1	8
	Red Sea Urchin	6		0	0	0	0	0	0	0	0	0		0	1	6	0	0
	Green Sea Urchin	60	1	60	1	60	1	60	1	60	1	60	1	60	1	60	1	60
		0		0		0		0		0		0				0		0
Crustaceans		0		0		0		0		0		0		0		0		0
	Dungeness Crab	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48
	Red (Rock) Crab	18		0		0		0		0		0		0		0		0
		0		0		0		0		0		0				0		0
	Spot Shrimp	10	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
	Coon Stripe Shrimp	10	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
	Side Shrimp	14	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
	Pink Shrimp	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0

11 292 10 277 10 277 10 277 11 292 13 451 7 230 5 238

Table 5

SHELLFISH AND OTHER INVERTEBRATES OF COMMERCIAL OR RECREATIONAL IMPORTANCE
SOI FOR REGIONS 7, 8, 9 and 10

file: inv7-10.ws

date: 2/20/91

SPRING

Group	Species Common Name	SOI SP	701 P/A SOI	703 P/A SOI	801 P/A SOI	802 P/A SOI	901 P/A SOI	902 P/A SOI	903 P/A SOI	100 P/A SOI	1002 P/A SOI
Bivalves											
	Pacific Oyster	15	0	0	0	0	15	0	0	0	0
	Olympia Oyster	60	0	0	0	0	0	0	0	0	0
		0									
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0
	Geoduck	132	0	0	0	0	0	0	0	0	0
	Butter Clam	18	1	18	0	0	0	0	0	18	0
	Native Little Neck	144	1	144	0	0	0	0	0	144	0
	Manila Clam	15	1	15	0	0	0	0	0	15	0
	Horse Clam	18	1	18	0	0	0	0	0	18	0
	Horse Clam	18	1	18	0	0	0	0	0	18	0
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0
	Cockles	24	1	24	0	0	0	0	0	24	0
		0									
	Pink Scallop	12	0	0	0	0	12	12	12	0	0
	Rock Scallop	48	0	0	0	48	48	48	48	48	48
	Weather vane Scallop	12	0	0	0	12	12	12	12	12	132
		0									
	Bay Mussel	30	0	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0	0
		0									
Cephalopods	Squid	132	0	0	132	0	0	0	0	0	0
	Octopus	24	1	24	1	24	1	24	1	24	1
		0									
Sea Snails	Northern Abalone	48	0	0	0	48	48	48	48	48	48
		0									
Echinoderms	Sea Cucumber	80	1	80	1	80	1	80	1	80	1
	Red Sea Urchin	168	1	0	0	168	1	168	1	168	1
	Green Sea Urchin	60	1	60	1	60	1	60	0	0	60
		0									
Crustaceans		0	0	0	0	0	0	0	0	0	0
	Dungeness Crab	42	1	42	1	42	0	0	1	42	1
	Red (Rock) Crab	18	0	0	0	0	0	0	0	0	0
		0									
	Spot Shrimp	220	0	0	0	0	0	220	0	0	0
	Coon Stripe Shrimp	220	0	0	0	0	0	220	0	0	0
	Side Shrimp	308	0	0	0	0	0	0	0	0	0
	Pink Shrimp	126	0	0	0	0	0	126	0	0	0
Total:			10	443	5	338	8	482	10	509	11
			1018	8	434	12	617	8	482	18	602

SUMMER

Group	Species Common Name	SOI Summer	701 P/A SOI	703 P/A SOI	801 P/A SOI	802 P/A SOI	901 P/A SOI	902 P/A SOI	903 P/A SOI	100 P/A SOI	1002 P/A SOI

Bivalves											
	Pacific Oyster	96	0	0	0	0	0	0	0	0	0
	Olympia Oyster	456	0	0	0	0	0	0	0	0	0
		0									
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0
	Geoduck	6	0	0	0	0	0	0	0	0	0
	Butter Clam	144	1	144	0	0	0	0	0	1	144
	Native Little Neck	144	1	144	0	0	0	0	0	1	144
	Manila Clam	120	1	120	0	0	0	0	0	1	120
	Horse Clam	60	1	60	0	0	0	0	0	1	60
	Horse Clam	18	1	18	0	0	0	0	0	1	18
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0
	Cockles	192	1	192	0	0	0	0	0	1	192
		0									
	Pink Scallop	0	0	0	0	0	1	0	1	0	0
	Rock Scallop	48	0	0	0	0	1	48	1	48	1
	Weathervane Scallop	24	0	0	0	0	1	24	1	24	1
		0									
	Bay Mussel	30	0	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0	0
		0									
Cephalopods	Squid	6	0	0	1	6	0	0	0	0	0
	Octopus	8	1	8	1	8	1	8	1	8	1
		0									
Sea Snails	Northern Abalone	384	0	0	0	0	1	384	1	384	1
		0									
Echinoderms	Sea Cucumber	96	1	96	1	96	1	96	1	96	1
	Red Sea Urchin	6	0	0	0	1	6	1	6	1	6
	Green Sea Urchin	6	1	6	1	6	1	6	0	0	0
		0									
Crustaceans		0	0	0	0	0	0	0	0	0	0
	Dungeness Crab	6	1	6	1	6	1	6	0	0	1
	Red (Rock) Crab	66	0	0	0	0	0	0	0	0	0
		0									
	Spot Shrimp	220	0	0	0	0	0	0	1	220	0
	Coon Stripe Shrimp	220	0	0	0	0	0	0	1	220	0
	Side Shrimp	308	0	0	0	0	0	0	0	0	0
	Pink Shrimp	126	0	0	0	0	0	0	1	126	0
Total:			10	794	5	122	8	578	10	674	11
			8	572	12	1244	8	578	18	818	

FALL

Total:	10	139	5	34	8	130	10	157	11	156	8	136	12	229	8	130	18	130
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WINTER

Group	Species Common Name	SOI Winte	701 P/A SOI	703 P/A SOI	801 P/A SOI	802 P/A SOI	901 P/A SOI	902 P/A SOI	903 P/A SOI	100 P/A SOI	1002 P/A SOI
Bivalves											
	Pacific Oyster	15	0	0	0	0	0	1	15	0	0
	Olympia Oyster	60	0	0	0	0	0	0	0	0	0
		0									
	Pacific Razor Clam	30	0	0	0	0	0	0	0	0	0
	Geoduck	132	0	0	0	0	0	0	0	0	0
	Butter Clam	18	1	18	0	0	0	0	0	0	18
	Native Little Neck	18	1	18	0	0	0	0	0	0	18
	Manila Clam	15	1	15	0	0	0	0	0	0	15
	Horse Clam	18	1	18	0	0	0	0	0	0	18
	Horse Clam	60	1	60	0	0	0	0	0	0	60
	Eastern Soft Shell	65	0	0	0	0	0	0	0	0	0
	Cockles	24	1	24	0	0	0	0	0	0	24
		0									
	Pink Scallop	0	0	0	0	0	0	0	0	0	0
	Rock Scallop	48	0	0	0	0	48	1	48	1	48
	Weather-vane Scallop	12	0	0	0	0	12	1	12	1	12
		0									
	Bay Mussel	156	0	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0	0
		0									
Cephalopods	Squid	114	0	0	1	114	0	0	0	0	0
	Octopus	8	1	8	1	8	1	8	1	8	1
		0									
Sea Snails	Northern Abalone	48	0	0	0	0	48	1	48	1	48
		0									
Echinoderms	Sea Cucumber	8	1	8	1	8	1	8	1	8	1
	Red Sea Urchin	6	0	0	0	0	6	1	6	1	6
	Green Sea Urchin	60	1	60	1	60	1	60	0	0	0
		0									
Crustaceans		0	0	0	0	0	0	0	0	0	0
	Dungeness Crab	48	1	48	1	48	1	48	0	0	1
	Red (Rock) Crab	18	0	0	0	0	0	0	0	0	0
		0									
	Spot Shrimp	10	0	0	0	0	0	0	10	0	0
	Coon Stripe Shrimp	10	0	0	0	0	0	0	10	0	0
	Side Shrimp	14	0	0	0	0	0	0	0	0	0
	Pink Shrimp	0	0	0	0	0	0	0	0	0	0
Total:			10	277	5	238	8	238	10	253	11
			210	8	178	12	283	8	238	18	358

Table 6

SHELLFISH AND OTHER INVERTEBRATES OF COMMERCIAL OR RECREATIONAL IMPORTANCE
SOI FOR REGION II

file: inverll.ws

date: 2/20/91

SPRING

Group	Species Common Name	SOI SP	1101 P/A	SOI	1102 P/A	SOI	1103 P/A	SOI	1104 P/A	SOI	1105 P/A	SOI	1106 P/A	SOI	1107 P/A	SOI	1108 P/A	SOI

Bivalves																		
	Pacific Oyster	15	0	0	0	0	0	0	0	0	1	15	0	0	0	0	0	0
	Olympia Oyster	60		0		0		0		0		0		0		0		0
		0																
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Geoduck	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Butter Clam	18	0	0	0	0	0	0	1	18	0	0	0	0	0	0	0	0
	Native Little Neck	144	0	0	0	0	0	0	1	144	0	0	0	0	0	0	0	0
	Manila Clam	15	0	0	0	0	0	0	1	15	0	0	0	0	0	0	0	0
	Horse Clam	18	0	0	0	0	0	0	1	18	0	0	0	0	0	0	0	0
	Horse Clam	18	0	0	0	0	0	0	1	18	0	0	0	0	0	0	0	0
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cockles	24	0	0	0	0	0	0	1	24	0	0	0	0	0	0	0	0
		0																
	Pink Scallop	12	1	12	1	12	1	12	1	12	1	12	1	12	1	12	1	12
	Rock Scallop	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48
	Weather-vane Scallop	12	1	12	1	12	1	12	1	12	1	12	1	12	1	12	1	12
		0																
	Bay Mussel	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0																
Cephalopods:	Squid	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Octopus	24	1	24	1	24	1	24	1	24	1	24	1	24	1	24	1	24
		0																
Sea Snails	Northern Abalone	48	1	48	1	48	1	48	1	48	1	48	0	0	0	0	0	0
		0																
Echinoderms:	Sea Cucumber	80	1	80	0	0	1	80	1	80	0	0	1	80	1	80	0	0
	Red Sea Urchin	168	1	168	0	0	1	168	1	168	1	168	0	0	1	168	1	168
	Green Sea Urchin	60	1	60	0	0	1	60	0	0	0	0	0	0	0	0	1	60
		0																
Crustaceans:		0																0
	Dungeness Crab	42	0	0	0	0	0	1	42	0	0	1	42	0	0	1	42	0
	Red (Rock) Crab	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0																
	Spot Shrimp	220	0	0	0	0	0	0	1	220	0	1	220	1	220	1	220	0
	Coon Stripe Shrimp	220	0	0	0	0	0	0	1	220	0	1	220	1	220	1	220	0
	Side Shrimp	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pink Shrimp	126	0	0	0	0	0	0	1	126	0	1	126	1	126	1	126	0
			8	452	5	144	8	452	17	1237	7	327	9	784	9	910	10	932

SUMMER

Group	Species Common Name	SOI	1101 P/A	SOI	1102 P/A	SOI	1103 P/A	SOI	1104 P/A	SOI	1105 P/A	SOI	1106 P/A	SOI	1107 P/A	SOI	1108 P/A	SOI

Bivalves																		
	Pacific Oyster	96	0	0	0	0	0	0	0	0	1	96	0	0	0	0	0	0
	Olympia Oyster	456	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0																
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Geoduck	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Butter Clam	144	0	0	0	0	0	0	1	144	0	0	0	0	0	0	0	0
	Native Little Neck	144	0	0	0	0	0	0	1	144	0	0	0	0	0	0	0	0
	Manila Clam	120	0	0	0	0	0	0	1	120	0	0	0	0	0	0	0	0
	Horse Clam	60	0	0	0	0	0	0	1	60	0	0	0	0	0	0	0	0
	Horse Clam	18	0	0	0	0	0	0	1	18	0	0	0	0	0	0	0	0
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cockles	192	0	0	0	0	0	0	1	192	0	0	0	0	0	0	0	0
		0																
	Pink Scallop	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
	Rock Scallop	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48
	Weathervane Scallop	24	1	24	1	24	1	24	1	24	1	24	1	24	1	24	1	24
		0																
	Bay Mussel	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0																
Cephalopods	Squid	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Octopus	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8
		0																
Sea Snails	Northern Abalone	384	1	384	1	384	1	384	1	384	1	384	1	384	1	384	1	384
		0																
Echinoderms	Sea Cucumber	96	1	96	0	1	96	1	96	0	0	1	96	1	96	0	0	0
	Red Sea Urchin	6	1	6	0	1	6	1	6	1	6	0	1	6	1	6	1	6
	Green Sea Urchin	6	1	6	0	1	6	0	0	0	0	0	0	0	0	1	6	6
		0																
Crustaceans		0																0
	Dungeness Crab	6	0	0	0	0	0	1	6	0	0	1	6	0	0	1	6	6
	Red (Rock) Crab	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0																
	Spot Shrimp	220	0	0	0	0	0	1	220	0	1	220	1	220	1	220	1	220
	Coon Stripe Shrimp	220	0	0	0	0	0	1	220	0	1	220	1	220	1	220	1	220
	Side Shrimp	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pink Shrimp	126	0	0	0	0	0	1	126	0	1	126	1	126	1	126	1	126
			8	572	5	464	8	572	17	1816	7	566	9	748	9	748	10	664

FALL

	Species	SOI	1101	1102	1103	1104	1105	1106	1107	1108	
Group	Common Name	Fall	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A

Bivalves											
	Pacific Oyster	15	0	0	0	0	0	0	1	15	0
	Olympia Oyster	60		0		0		0		0	
		0									
	Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0
	Geoduck	6	0	0	0	0	0	0	0	0	0
	Butter Clam	18	0	0	0	0	0	1	18	0	0
	Native Little Neck	18	0	0	0	0	0	1	18	0	0
	Manila Clam	15	0	0	0	0	0	1	15	0	0
	Horse Clam	18	0	0	0	0	0	1	18	0	0
	Horse Clam	18	0	0	0	0	0	1	18	0	0
	Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0
	Cockles	24	0	0	0	0	0	1	24	0	0
		0									
	Pink Scallop	12	1	12	1	12	1	12	1	12	1
	Rock Scallop	48	1	48	1	48	1	48	1	48	1
	Weathervane Scallop	0	1	0	1	0	1	0	1	0	1
		0									
	Bay Mussel	156	0	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0	0
		0									
Cephalopods	Squid	6	0	0		0		0		0	
	Octopus	8	1	8	1	8	1	8	1	8	1
		0									
Sea Snails	Northern Abalone	48	1	48	1	48	1	48	1	48	1
		0									
Echinoderms	Sea Cucumber	8	1	8		0	1	8	1	8	1
	Red Sea Urchin	6	1	6		0	1	6	1	6	1
	Green Sea Urchin	6	1	6		0	1	6	0	0	1
		0									
Crustaceans		0									0
	Dungeness Crab	6	0	0		0		0	1	6	0
	Red (Rock) Crab	66		0		0		0		0	
		0									
	Spot Shrimp	10	0	0	0	0	0	1	10	0	1
	Coon Stripe Shrimp	10	0	0	0	0	0	1	10	0	1
	Side Shrimp	14	0	0	0	0	0	0	0	0	0
	Pink Shrimp	0	0	0	0	0	0	1	0	1	0

8 136 5 116 8 136 17 267 7 137 9 102 9 102 10 106

WINTER

	Species	SOI	1101	1102	1103	1104	1105	1106	1107	1108
Group	Common Name	Wint	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Bivalves										
	Pacific Oyster	15	0	0	0	0	0	0	1	15
	Olympia Oyster	60		0		0		0		0
		0								
	Pacific Razor Clam	30	0	0	0	0	0	0	0	0
	Geoduck	132	0	0	0	0	0	0	0	0
	Butter Clam	18	0	0	0	0	0	1	18	0
	Native Little Neck	18	0	0	0	0	0	1	18	0
	Manila Clam	15	0	0	0	0	0	1	15	0
	Horse Clam	18	0	0	0	0	0	1	18	0
	Horse Clam	60	0	0	0	0	0	1	60	0
	Eastern Soft Shell	65	0	0	0	0	0	0	0	0
	Cockles	24	0	0	0	0	0	1	24	0
		0								
	Pink Scallop	0	1	0	1	0	1	0	1	0
	Rock Scallop	48	1	48	1	48	1	48	1	48
	Weathervane Scallop	12	1	12	1	12	1	12	1	12
		0								
	Bay Mussel	156	0	0	0	0	0	0	0	0
	California Mussel	30	0	0	0	0	0	0	0	0
		0								
Cephalopods	Squid	14	0	0	0	0	0	0	0	0
	Octopus	8	1	8	1	8	1	8	1	8
		0								
Sea Snails	Northern Abalone	48	1	48	1	48	1	48	1	48
		0								
Echinoderms	Sea Cucumber	8	1	8	0	1	8	1	8	0
	Red Sea Urchin	6	1	6	0	1	6	1	6	0
	Green Sea Urchin	60	1	60	0	1	60	0	0	0
		0								
Crustaceans		0								0
	Dungeness Crab	48	0	0	0	0	1	48	0	0
	Red (Rock) Crab	18		0		0		0		0
		0								
	Spot Shrimp	10	0	0	0	0	0	1	10	0
	Coon Stripe Shrimp	10	0	0	0	0	0	1	10	0
	Side Shrimp	14	0	0	0	0	0	0	0	0
	Pink Shrimp	0	0	0	0	0	0	1	0	1

8 190 5 116 8 190 17 351 7 137 9 144 9 102 10 202

Table 7

SHELLFISH AND OTHER INVERTEBRATES OF COMMERCIAL OR RECREATIONAL IMPORTANCE
SOI FOR REGION 12

file: inver12.ws

date: 2/20/91

SPRING

Species	SOI	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210
Common Name	SP	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI
Pacific Oyster	15	1	15	0	0	0	0	0	0	0	0
Olympia Oyster	60		0		0		0		0		0
Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0
Geoduck	132	0	0	0	0	0	0	0	0	0	0
Butter Clam	18	0	0	0	0	0	0	0	0	0	0
Native Little Neck	144	0	0	0	0	0	0	0	0	0	0
Manila Clam	15	0	0	0	0	0	0	0	0	0	0
Horse Clam	18	0	0	0	0	0	0	0	0	0	0
Horse Clam	18	0	0	0	0	0	0	0	0	0	0
Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0
Cockles	24	0	0	0	0	0	0	0	0	0	0
Pink Scallop	12	1	12	1	12	1	12	1	12	1	12
Rock Scallop	48	1	48	1	48	1	48	1	48	1	48
Weathervane Scallop	12	1	12	1	12	1	12	1	12	1	12
Bay Mussel	30	0	0	0	0	0	0	0	0	0	0
California Mussel	30	0	0	0	0	0	0	0	0	0	0
Squid	132	0	0	0	0	0	0	0	0	0	0
Octopus	24	1	24	1	24	1	24	1	24	1	24
Northern Abalone	48	0	0	1	48	1	48	0	0	0	0
Sea Cucumber	80	1	80	0	0	0	0	0	0	0	0
Red Sea Urchin	168	1	168	0	0	0	0	0	0	0	0
Green Sea Urchin	60	0	0	0	0	0	0	0	0	0	0
Dungeness Crab	42	1	42	0	0	0	0	0	0	0	0
Red (Rock) Crab	18		0		0		0		0		0
Spot Shrimp	220	0	0	0	0	0	0	0	0	0	0
Coon Stripe Shrimp	220	0	0	0	0	0	0	0	0	0	0
Side Shrimp	308	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	126	0	0	0	0	0	0	0	0	0	0
		8	401	5	144	5	144	5	111	15	1021
		8	401	13	899	15	1021	15	1109		

SUMMER

Species	SOI	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	
Common Name	Summer	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	
Pacific Oyster	96	1	96	0	0	0	0	0	0	1	96	0
Olympia Oyster	456		0		0		0		0		0	
Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0	0
Geoduck	3	0	0	0	0	0	0	0	0	0	0	0
Butter Clam	144	0	0	0	0	0	0	0	0	1	144	0
Native Little Neck	144	0	0	0	0	0	0	0	0	1	144	0
Manila Clam	120	0	0	0	0	0	0	0	0	1	120	0
Horse Clam	60	0	0	0	0	0	0	0	0	1	60	0
Horse Clam	18	0	0	0	0	0	0	0	0	1	18	0
Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	0
Cockles	192	0	0	0	0	0	0	0	0	1	192	0
Pink Scallop	0	1	0	1	0	1	0	1	0	1	0	1
Rock Scallop	48	1	48	1	48	1	48	1	48	1	48	1
Weathered Scallop	24	1	24	1	24	1	24	1	24	1	24	1
Bay Mussel	30	0	0	0	0	0	0	0	0	0	0	0
California Mussel	30	0	0	0	0	0	0	0	0	0	0	0
Squid	6	0	0	0	0	0	0	0	0	0	0	0
Octopus	8	1	8	1	8	1	8	1	8	1	8	1
Northern Abalone	384	0	0	1	384	1	384	1	384	0	0	0
Sea Cucumber	96	1	96	0	0	0	0	0	0	1	96	0
Red Sea Urchin	6	1	6	0	0	0	0	0	0	0	0	0
Green Sea Urchin	6	0	0	0	0	0	0	0	0	0	0	0
Dungeness Crab	6	1	6	0	0	0	0	0	0	1	6	1
Red (Rock) Crab	66	0	0	0	0	0	0	0	0	0	0	0
Spot Shrimp	220	0	0	0	0	0	0	0	0	1	220	0
Coc. Stripe Shrimp	220	0	0	0	0	0	0	0	0	1	220	0
Side Shrimp	308	0	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	126	0	0	0	0	0	0	0	0	1	126	0
		8	284	5	464	5	464	5	464	5	176	15
		8	284	13	1324	15	1426	15	1426	15	1336	

FALL

Species	SOI	1201		1202		1203		1204		1205		1206		1207		1208		1209		1210	
Common Name	Fall	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Pacific Oyster	15	1	15	0	0	0	0	0	0	1	15	0	0	1	15	0	0		0		0
Olympia Oyster	60		0		0		0		0		0		0		0		0		0		0
-----		0																			
Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0		0		0
Geoduck	6	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0		0		0
Butter Clam	18	0	0	0	0	0	0	0	0	0	0	1	18	0	0	1	18	1	18	1	18
Native Little Neck	18	0	0	0	0	0	0	0	0	0	0	1	18	0	0	1	18	1	18	1	18
Manila Clam	15	0	0	0	0	0	0	0	0	0	0	1	15	0	0	1	15	1	15	1	15
Horse Clam	18	0	0	0	0	0	0	0	0	0	0	1	18	0	0	1	18	1	18	1	18
Horse Clam	18	0	0	0	0	0	0	0	0	0	0	1	18	0	0	1	18	1	18	1	18
Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0		0
Cockles	24	0	0	0	0	0	0	0	0	0	0	1	24	0	0	1	24	1	24	1	24
-----		0																			
Pink Scallop	12	1	12	1	12	1	12	1	12	1	12	1	12	1	12	1	12	1	12	1	12
Rock Scallop	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48
Weathered Scallop	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
-----		0																			
Bay Mussel	156	0	0	0	0	0	0	0	0		0		0	0	0		0		0		0
California Mussel	30	0	0	0	0	0	0	0	0		0		0	0	0	0	0		0		0
-----		0																			
Squid	6	0	0	0	0		0		0		0		0		0		0		0		0
Octopus	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8
-----		0																			
Northern Abalone	48	0	0	1	48	1	48	1	48	0	0	0	0	0	0	0	0	0	0	0	0
-----		0																			
Sea Cucumber	8	1	8	0	0	0	0	0	0	0	0	1	8	1	8	0	0	1	8	0	0
Red Sea Urchin	6	1	6	0	0	0	0	0	0	0	0	0	0	1	6	0	0	0	1	6	0
Green Sea Urchin	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-----		0																			
Dungeness Crab	6	1	6	0	0	0	0	0	0	0	0	1	6	1	6	0	0	1	6	1	6
Red (Rock) Crab	66		0		0		0		0		0		0		0		0		0		0
-----		0																			
Spot Shrimp	10	0	0	0	0	0	0	0	0	0	0	1	10	0	0	1	10	1	10	1	10
Coon Stripe Shrimp	10	0	0	0	0	0	0	0	0	0	0	1	10	0	0	1	10	1	10	1	10
Side Shrimp	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	0
		8	103	5	116	5	116	5	116	5	83	15	213	8	103	13	199	15	213	15	211

WINTER

Species	SOI	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	
Common Name	Wint	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	
Pacific Oyster	15	1	15	0	0	0	0	0	0	1	15	0
Olympia Oyster	60		0		0		0		0		0	
Pacific Razor Clam	30	0	0	0	0	0	0	0	0	0	0	0
Geoduck	132	0	0	0	0	0	0	0	0	0	0	0
Butter Clam	18	0	0	0	0	0	0	0	0	1	18	0
Native Little Neck	18	0	0	0	0	0	0	0	0	1	18	0
Manila Clam	15	0	0	0	0	0	0	0	0	1	15	0
Horse Clam	18	0	0	0	0	0	0	0	0	1	18	0
Horse Clam	60	0	0	0	0	0	0	0	0	1	60	0
Eastern Soft Shell	65	0	0	0	0	0	0	0	0	0	0	0
Cockles	24	0	0	0	0	0	0	0	0	1	24	0
Pink Scallop	0	1	0	1	0	1	0	1	0	1	0	1
Rock Scallop	48	1	48	1	48	1	48	1	48	1	48	1
Weathered Scallop	12	1	12	1	12	1	12	1	12	1	12	1
Bay Mussel	156	0	0	0	0	0	0	0	0	0	0	0
California Mussel	30	0	0	0	0	0	0	0	0	0	0	0
Squid	114	0	0	0	0	0	0	0	0	0	0	0
Octopus	8	1	8	1	8	1	8	1	8	1	8	1
Northern Abalone	48	0	1	48	1	48	1	48	0	0	0	0
Sea Cucumber	8	1	8	0	0	0	0	0	0	1	8	1
Red Sea Urchin	6	1	6	0	0	0	0	0	0	0	0	1
Green Sea Urchin	60	0	0	0	0	0	0	0	0	0	0	0
Dungeness Crab	48	1	48	0	0	0	0	0	0	1	48	1
Red (Rock) Crab	18	0	0	0	0	0	0	0	0	0	0	0
Spot Shrimp	10	0	0	0	0	0	0	0	0	1	10	0
Coon Stripe Shrimp	10	0	0	0	0	0	0	0	0	1	10	0
Side Shrimp	14	0	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	0	0	0	0	0	0	0	0	0	1	0	0
		8	145	5	116	5	116	5	116	5	83	15
		297	8	145	13	241	15	297	15	295		

Table 8

SHELLFISH AND OTHER INVERTEBRATES OF COMMERCIAL OR RECREATIONAL IMPORTANCE
SOI FOR REGION 14

file: invert14.ws P/A = Presence/Absence
 date: 2/20/91 Presence = 1
 Absence = 0

SPRING

Species Common Name	SOI SP	Subregions																	
		1401 P/A	1402 SOI P/A	1403 SOI P/A	1404 SOI P/A	1405 SOI P/A	1406 SOI P/A	1407 SOI P/A	1408 SOI P/A	1409 SOI P/A	1410 SOI P/A	1411 SOI P/A	1412 SOI P/A	1413 SOI P/A	1414 SOI P/A	1415 SOI P/A	1416 SOI P/A	1417 SOI P/A	1418 SOI P/A
Pacific Oyster	15	0	0	0	0	0	0	0	0	0	0	0	0	1	15	0	0	1	15
Olympia Oyster	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pacific Razor Clam	480	1	480	1	480	1	480	1	480	1	480	0	0	1	480	0	0	1	480
Geoduck	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Butter Clam	18	0	0	1	18	0	0	0	0	0	0	0	0	1	18	0	0	1	18
Native Little Neck	144	0	0	1	144	0	0	0	0	0	0	0	0	1	144	0	0	1	144
Manila Clam	15	0	0	1	15	0	0	0	0	0	0	0	0	1	15	0	0	1	15
Horse Clam	18	0	0	1	18	0	0	0	0	0	0	0	0	1	18	0	0	1	18
Horse Clam	18	0	0	1	18	0	0	0	0	0	0	0	0	1	18	0	0	1	18
Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	0	0	1	156	0	0	0	0
Cockles	24	0	0	1	24	0	0	0	0	0	0	0	0	1	24	0	0	1	24
Pink Scallop	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock Scallop	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weathered Scallop	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bay Mussel	30	0	0	0	0	0	0	0	0	0	0	0	0	1	30	0	0	0	0
California Mussel	30	0	0	1	30	1	30	1	30	1	30	0	0	0	0	0	0	0	0
Squid	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Octopus	24	0	0	1	24	1	24	1	24	1	24	0	0	1	24	0	0	1	24
Northern Abalone	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sea Cucumber	80	0	0	1	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Sea Urchin	168	0	0	1	168	1	168	0	0	0	0	0	0	0	0	0	0	0	0
Green Sea Urchin	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dungeness Crab	42	1	42	1	42	1	42	1	42	1	42	1	42	1	42	1	42	1	42
Red (Rock) Crab	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spot Shrimp	220	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coon Stripe Shrimp	220	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Side Shrimp	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		2	522	12	1061	5	744	4	576	4	576	10	480	3	546	8	294	4	576

SUMMER

Species Common Name	SOI Summer	1401 P/A	1402 SOI P/A	1403 SOI P/A	1404 SOI P/A	1405 SOI P/A	1406 SOI P/A	1407 SOI P/A	1408 SOI P/A	1409 SOI P/A	SOI
Pacific Oyster	96	0	0	0	0	0	0	0	0	0	0
Olympia Oyster	456	0	0	0	0	0	0	0	0	0	0
Pacific Razor Clam	480	1	480	1	480	1	480	1	480	0	0
Geoduck	6	0	0	0	0	0	0	0	0	0	0
Butter Clam	144	0	0	1	144	0	0	0	0	1	144
Native Little Neck	144	0	0	1	144	0	0	0	0	1	144
Manila Clam	120	0	0	1	120	0	0	0	0	1	120
Horse Clam	60	0	0	1	60	0	0	0	0	1	60
Horse Clam	18	0	0	1	18	0	0	0	0	1	18
Eastern Soft Shell	156	0	0	0	0	0	0	0	0	1	156
Cockles	192	0	0	1	192	0	0	0	0	1	192
Pink Scallop	0	0	0	0	0	0	0	0	0	0	0
Rock Scallop	48	0	0	0	0	0	0	0	0	0	0
Weathervane Scallop	24	0	0	0	0	0	0	0	0	0	0
Bay Mussel	30	0	0	0	0	0	0	0	0	1	30
California Mussel	30	0	0	1	30	1	30	1	30	0	0
Squid	6	0	0	0	0	0	0	0	0	0	0
Octopus	8	0	0	1	8	1	8	1	8	0	0
Northern Abalone	384	0	0	0	0	0	0	0	0	0	0
Sea Cucumber	96	0	0	1	96	0	0	0	0	0	0
Red Sea Urchin	6	0	0	1	6	1	6	0	0	0	0
Green Sea Urchin	6	0	0	0	0	0	0	0	0	0	0
Dungeness Crab	6	1	6	1	6	1	6	1	6	1	6
Red (Rock) Crab	66	0	0	0	0	0	0	0	0	0	0
Spot Shrimp	220	0	0	0	0	0	0	0	0	0	0
Coon Stripe Shrimp	220	0	0	0	0	0	0	0	0	0	0
Side Shrimp	308	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	126	0	0	0	0	0	0	0	0	0	0

2 486 12 1304 5 530 4 524 4 524 10 966 3 494 8 780 4 524

FALL

Species	SOI	1401	1402	1403	1404	1405	1406	1407	1408	1409									
Common Name	Fall	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI
Pacific Oyster	15	0	0	0	0	0	0	0	0	0	0	1	15	0	0	1	15	0	0
Olympia Oyster	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pacific Razor Clam	480	1	480	1	480	1	480	1	480	1	480	0	0	1	480	0	0	1	480
Geoduck	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Butter Clam	18	0	0	1	18	0	0	0	0	0	0	1	18	0	0	1	18	0	0
Native Little Neck	18	0	0	1	18	0	0	0	0	0	0	1	18	0	0	1	18	0	0
Manila Clam	15	0	0	1	15	0	0	0	0	0	0	1	15	0	0	1	15	0	0
Horse Clam	18	0	0	1	18	0	0	0	0	0	0	1	18	0	0	1	18	0	0
Horse Clam	18	0	0	1	18	0	0	0	0	0	0	1	18	0	0	1	18	0	0
Eastern Soft Shell	156	0	0	0	0	0	0	0	0	0	0	1	156	0	0	0	0	0	0
Cockles	24	0	0	1	24	0	0	0	0	0	0	1	24	0	0	1	24	0	0
Pink Scallop	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock Scallop	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weathervane Scallop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bay Mussel	156	0	0	0	0	0	0	0	0	0	0	1	156	0	0	0	0	1	156
California Mussel	30	0	0	1	30	1	30	1	30	1	30	0	0	0	0	0	0	0	0
Squid	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Octopus	8	0	0	1	8	1	8	1	8	1	8	0	0	1	8	0	0	1	8
Northern Abalone	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sea Cucumber	8	0	0	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Sea Urchin	6	0	0	1	6	1	6	0	0	0	0	0	0	0	0	0	0	0	0
Green Sea Urchin	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dungeness Crab	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6
Red (Rock) Crab	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spot Shrimp	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coon Stripe Shrimp	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Side Shrimp	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		2	486	12	649	5	530	4	524	4	524	10	444	3	494	8	132	4	650

WINTER

Species	SOI	1401		1402		1403		1404		1405		1406		1407		1408		1409	
Common Name	Wint	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Pacific Oyster	15	0	0	0	0	0	0	0	0	0	0	1	15	0	0	1	15	0	0
Olympia Oyster	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pacific Razor Clam	30	1	30	1	30	1	30	1	30	1	30	0	0	1	30	0	0	1	30
Geoduck	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Butter Clam	18	0	0	1	18	0	0	0	0	0	0	1	18	0	0	1	18	0	0
Native Little Neck	18	0	0	1	18	0	0	0	0	0	0	1	18	0	0	1	18	0	0
Manila Clam	15	0	0	1	15	0	0	0	0	0	0	1	15	0	0	1	15	0	0
Horse Clam	18	0	0	1	18	0	0	0	0	0	0	1	18	0	0	1	18	0	0
Horse Clam	60	0	0	1	60	0	0	0	0	0	0	1	60	0	0	1	60	0	0
Eastern Soft Shell	65	0	0	0	0	0	0	0	0	0	0	1	65	0	0	0	0	0	0
Cockles	24	0	0	1	24	0	0	0	0	0	0	1	24	0	0	1	24	0	0

Pink Scallop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock Scallop	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weathered Scallop	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bay Mussel	156	0	0	0	0	0	0	0	0	0	0	1	156	0	0	0	0	1	156
California Mussel	30	0	0	1	30	1	30	1	30	1	30	0	0	0	0	0	0	0	0

Squid	114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Octopus	8	0	0	1	8	1	8	1	8	1	8	0	0	1	8	0	0	1	8

Northern Abalone	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Sea Cucumber	8	0	0	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Sea Urchin	6	0	0	1	6	1	6	0	0	0	0	0	0	0	0	0	0	0	0
Green Sea Urchin	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Dungeness Crab	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48	1	48
Red (Rock) Crab	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Spot Shrimp	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coon Stripe Shrimp	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Side Shrimp	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2 78 12 283 5 122 4 116 4 116 10 437 3 86 8 216 4 242

Table 9

SHELLFISH AND OTHER INVERTEBRATES OF COMMERCIAL OR RECREATIONAL IMPORTANCE
SOI FOR REGION 15

file: inver15.ws

date: 2/20/91

SPRING

Species	SOI	1501		1502		1503		1504		1505		1506	
Common Name	SP	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Pacific Oyster	15	1	15	0	0	1	15	0	0	1	15	1	15
Olympia Oyster	60	0	0		0		0		0		0	1	60
	0												
Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0	0	0
Geoduck	132	1	132	1	132	1	132	1	132	1	132	1	132
Butter Clam	18	1	18	1	18	1	18	1	18	1	18	1	18
Native Little Neck	144	1	144	1	144	1	144	1	144		144	1	144
Manila Clam	15	1	15	1	15	1	15	1	15	1	15	1	15
Horse Clam	18	1	18	1	18	1	18	1	18	1	18	1	18
Horse Clam	18	1	18	1	18	1	18	1	18	1	18	1	18
Eastern Soft Shell	156	1	156	1	156	0	0	0	0	0	0	0	0
Cockles	24	1	24	1	24	1	24	1	24	1	24	1	24
	0												
Pink Scallop	12	0	0	1	12	1	12	0	0	0	0	0	0
Rock Scallop	48	0	0	1	48	1	48	0	0	0	0	0	0
Weathervane Scallop	12	0	0	1	12	1	12	0	0	0	0	0	0
	0												
Bay Mussel	30	1	30	0	0	1	30	0	0		0	1	30
California Mussel	30	0	0	0	0	0	0	0	0		0	0	0
	0												
Squid	132	0	0	0	0		0		0		0		0
Octopus	24	1	24	1	24	1	24	1	24	1	24	1	24
	0												
Northern Abalone	48	0	0	0	0	0	0	0	0	0	0	0	0
	0												
Sea Cucumber	80	1	80	1	80	1	80	1	80	0	0	1	80
Red Sea Urchin	168	0	0	1	168	1	168	0	0	0	0	0	0
Green Sea Urchin	60	0	0	1	60	1	60	1	60	0	0	1	60
	0												
	0												0
Dungeness Crab	42	1	42	1	42	1	42	0	0	1	42	1	42
Red (Rock) Crab	18	0	0		0		0		0		0	1	18
	0												
Spot Shrimp	220	1	220	1	220	1	220	0	0	1	220	1	220
Coon Stripe Shrimp	220	1	220	1	220	0	0	0	0	1	220	0	0
Side Shrimp	308	1	308	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	126	1	126	0	0	0	0	0	0	1	126	0	0

17 1590 18 1411 18 1080 10 533 13 1016 16 918

SUMMER

Species	SOI	1501		1502		1503		1504		1505		1506	
Common Name	Summer	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Pacific Oyster	96	1	96	0	0	1	96	0	0	1	96	1	96
Olympia Oyster	456	0	0		0		0		0		0	1	456
	0												
Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0	0	0
Geoduck	6	1	6	1	6	1	6	1	6	1	6	1	6
Butter Clam	144	1	144	1	144	1	144	1	144	1	144	1	144
Native Little Neck	144	1	144	1	144	1	144	1	144	1	144	1	144
Manila Clam	120	1	120	1	120	1	120	1	120	1	120	1	120
Horse Clam	60	1	60	1	60	1	60	1	60	1	60	1	60
Horse Clam	18	1	18	1	18	1	18	1	18	1	18	1	18
Eastern Soft Shell	156	1	156	1	156	0	0	0	0	0	0	0	0
Cockles	192	1	192	1	192	1	192	1	192	1	192	1	192
	0												
Pink Scallop	0	0	0	1	0	1	0	0	0	0	0	0	0
Rock Scallop	48	0	0	1	48	1	48	0	0	0	0	0	0
Weathervane Scallop	24	0	0	1	24	1	24	0	0	0	0	0	0
	0												
Bay Mussel	30	1	30	0	0	1	30	0	0		0	1	30
California Mussel	30	0	0	0	0	0	0	0	0		0	0	0
	0												
Squid	6	0	0	0	0		0		0		0		0
Octopus	8	1	8	1	8	1	8	1	8	1	8	1	8
	0												
Northern Abalone	384	0	0	0	0	0	0	0	0	0	0	0	0
	0												
Sea Cucumber	96	1	96	1	96	1	96	1	96	0	0	1	96
Red Sea Urchin	6	0	0	1	6	1	6	0	0	0	0	0	0
Green Sea Urchin	6	0	0	1	6	1	6	1	6	0	0	1	6
	0												
	0												0
Dungeness Crab	6	1	6	1	6	1	6	0	0	1	6	1	6
Red (Rock) Crab	66	0	0		0		0		0		0	1	66
	0												
Spot Shrimp	220	1	220	1	220	1	220	0	0	1	220	1	220
Coon Stripe Shrimp	220	1	220	1	220	0	0	0	0	1	220	0	0
Side Shrimp	308	1	308	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	126	1	126	0	0	0	0	0	0	1	126	0	0

17 1950 18 1474 18 1224 10 794 13 1360 16 1668

FALL

Species	SOI	1501		1502		1503		1504		1505		1506	
Common Name	Fall	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI
Pacific Oyster	15	1	15	0	0	1	15	0	0	1	15	1	15
Olympia Oyster	60	0	0		0		0		0		0	1	60
Pacific Razor Clam	480	0	0	0	0	0	0	0	0	0	0	0	0
Geoduck	6	1	6	1	6	1	6	1	6	1	6	1	6
Butter Clam	18	1	18	1	18	1	18	1	18	1	18	1	18
Native Little Neck	18	1	18	1	18	1	18	1	18	1	18	1	18
Manila Clam	15	1	15	1	15	1	15	1	15	1	15	1	15
Horse Clam	18	1	18	1	18	1	18	1	18	1	18	1	18
Horse Clam	18	1	18	1	18	1	18	1	18	1	18	1	18
Eastern Soft Shell	156	1	156	1	156	0	0	0	0	0	0	0	0
Cockles	24	1	24	1	24	1	24	1	24	1	24	1	24
Pink Scallop	12	0	0	1	12	1	12	0	0	0	0	0	0
Rock Scallop	48	0	0	1	48	1	48	0	0	0	0	0	0
Weathervane Scallop	0	0	0	1	0	1	0	0	0	0	0	0	0
Bay Mussel	156	1	156	0	0	1	156	0	0		0	1	156
California Mussel	30	0	0	0	0	0	0	0	0		0	0	0
Squid	6	0	0	0	0		0		0		0		0
Octopus	8	1	8	1	8	1	8	1	8	1	8	1	8
Northern Abalone	0	0	0	0	0	0	0	0	0	0	0	0	0
Sea Cucumber	8	1	8	1	8	1	8	1	8	0	0	1	8
Red Sea Urchin	6	0	0	1	6	1	6	0	0	0	0	0	0
Green Sea Urchin	6	0	0	1	6	1	6	1	6	0	0	1	6
Dungeness Crab	6	1	6	1	6	1	6	0	0	1	6	1	6
Red (Rock) Crab	66	0	0		0		0		0		0	1	66
Spot Shrimp	10	1	10	1	10	1	10	0	0	1	10	1	10
Coon Stripe Shrimp	10	1	10	1	10	0	0	0	0	1	10	0	0
Side Shrimp	14	1	14	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	0	1	0	0	0	0	0	0	0	1	0	0	0

17 500 18 387 18 392 10 139 13 166 16 452

WINTER

Species	SOI	1501		1502		1503		1504		1505		1506	
Common Name	Wint	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI	P/A	SOI

Pacific Oyster	15	1	15	0	0	1	15	0	0	1	15	1	15
Olympia Oyster	60	0	0		0		0		0		0	1	60
	0												
Pacific Razor Clam	30	0	0	0	0	0	0	0	0	0	0	0	0
Geoduck	132	1	132	1	132	1	132	1	132	1	132	1	132
Butter Clam	18	1	18	1	18	1	18	1	18	1	18	1	18
Native Little Neck	18	1	18	1	18	1	18	1	18	1	18	1	18
Manila Clam	15	1	15	1	15	1	15	1	15	1	15	1	15
Horse Clam	18	1	18	1	18	1	18	1	18	1	18	1	18
Horse Clam	60	1	60	1	60	1	60	1	60	1	60	1	60
Eastern Soft Shell	65	1	65	1	65	0	0	0	0	0	0	0	0
Cockles	24	1	24	1	24	1	24	1	24	1	24	1	24
	0												
Pink Scallop	0	0	0	1	0	1	0	0	0	0	0	0	0
Rock Scallop	48	0	0	1	48	1	48	0	0	0	0	0	0
Weathered Scallop	12	0	0	1	12	1	12	0	0	0	0	0	0
	0												
Bay Mussel	156	1	156	0	0	1	156	0	0		0	1	156
California Mussel	30	0	0	0	0	0	0	0	0		0	0	0
	0												
Squid	114	0	0	0	0		0		0		0		0
Octopus	8	1	8	1	8	1	8	1	8	1	8	1	8
	0												
Northern Abalone	48	0	0	0	0	0	0	0	0	0	0	0	0
	0												
Sea Cucumber	8	1	8	1	8	1	8	1	8	0	0	1	8
Red Sea Urchin	6	0	0	1	6	1	6	0	0	0	0	0	0
Green Sea Urchin	60	0	0	1	60	1	60	1	60	0	0	1	60
	0												
	0												0
Dungeness Crab	48	1	48	1	48	1	48	0	0	1	48	1	48
Red (Rock) Crab	18	0	0		0		0		0		0	1	18
	0												
Spot Shrimp	10	1	10	1	10	1	10	0	0	1	10	1	10
Coon Stripe Shrimp	10	1	10	1	10	0	0	0	0	1	10	0	0
Side Shrimp	14	1	14	0	0	0	0	0	0	0	0	0	0
Pink Shrimp	0	1	0	0	0	0	0	0	0	1	0	0	0

17 619 18 560 18 656 10 361 13 376 16 668

Figure 1

SHELLFISH VULNERABILITY TO OIL SPILLS REGION 2

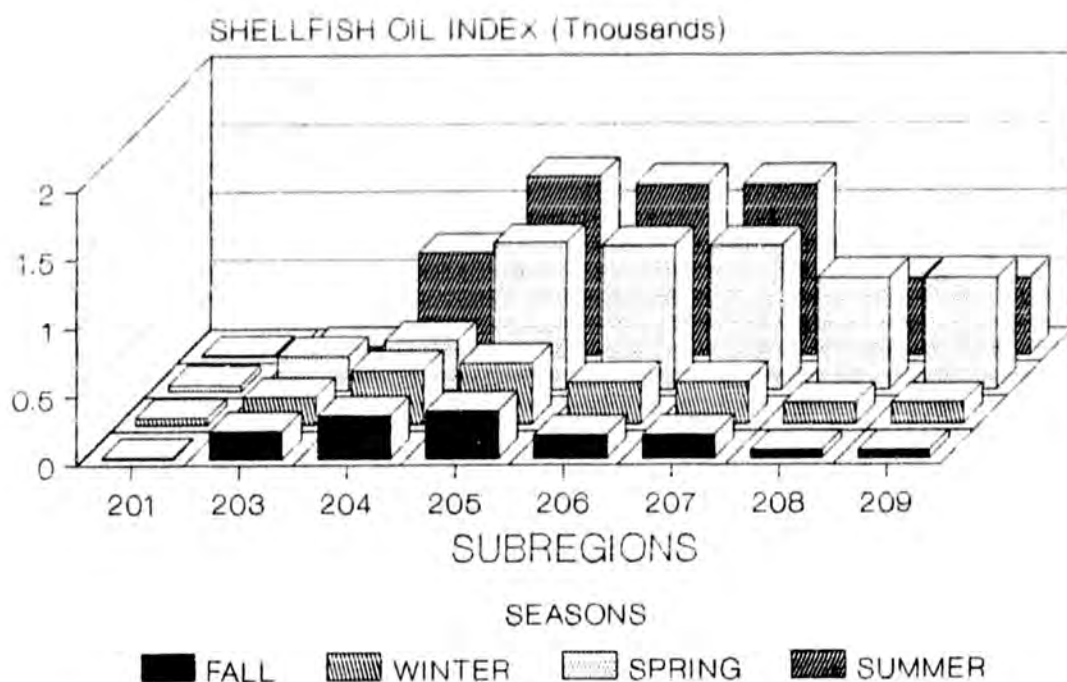


Figure 2

SHELLFISH VULNERABILITY TO OIL SPILLS REGION 3

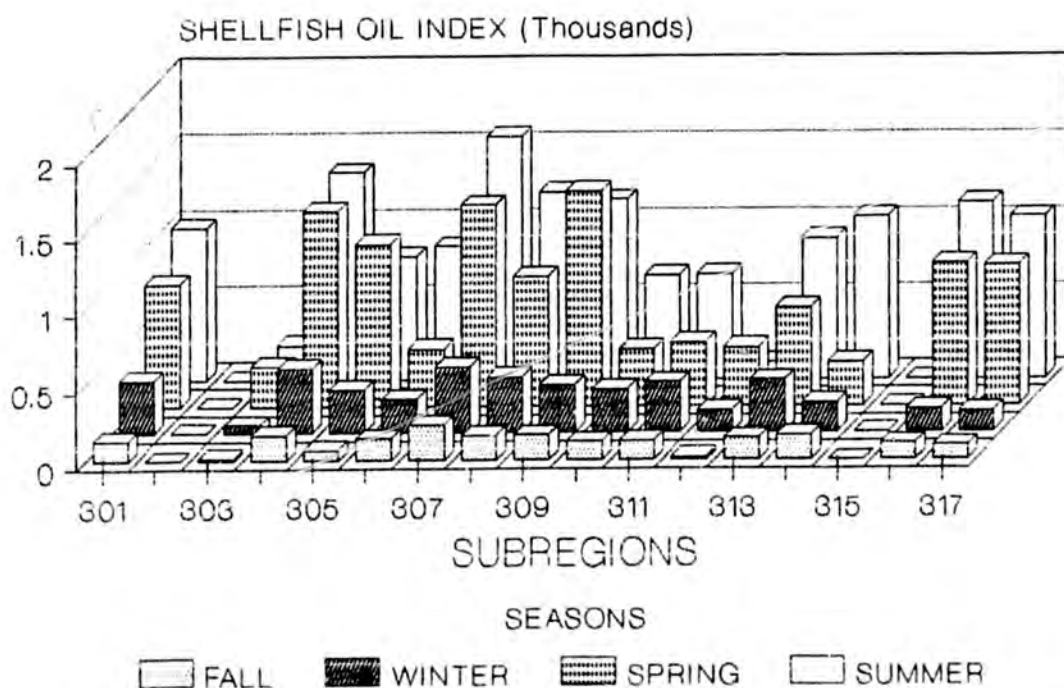


Figure 3

SHELLFISH VULNERABILITY TO OIL SPILLS REGIONS 4 AND 5

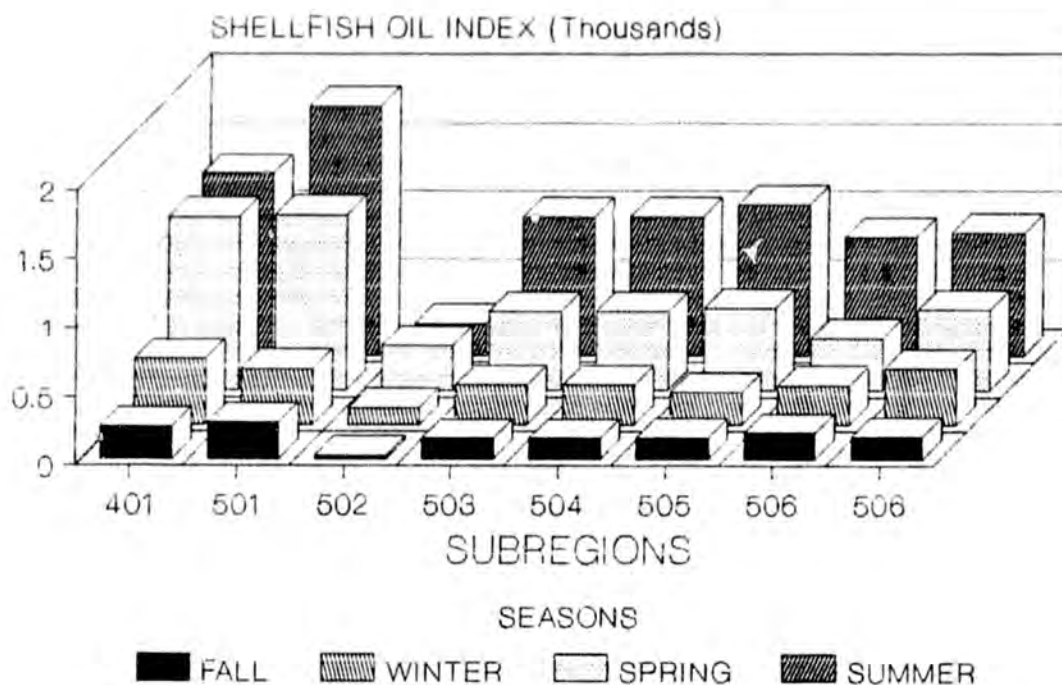


Figure 4

SHELLFISH VULNERABILITY TO OIL SPILLS REGION 6

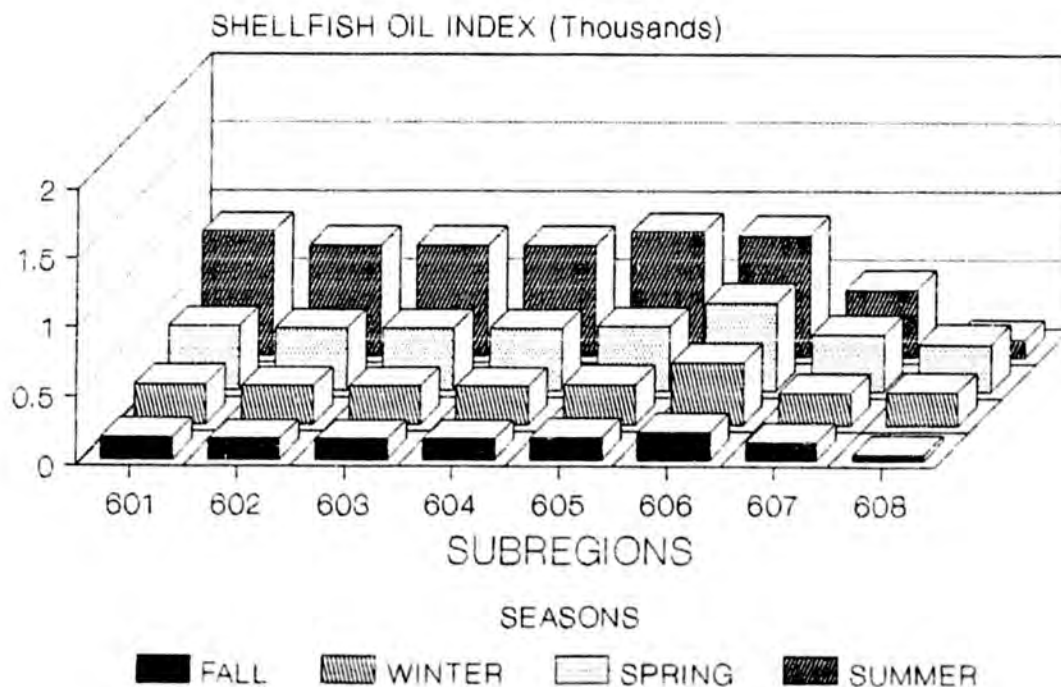


Figure 5

SHELLFISH VULNERABILITY TO OIL SPILLS REGIONS 7 THROUGH 10

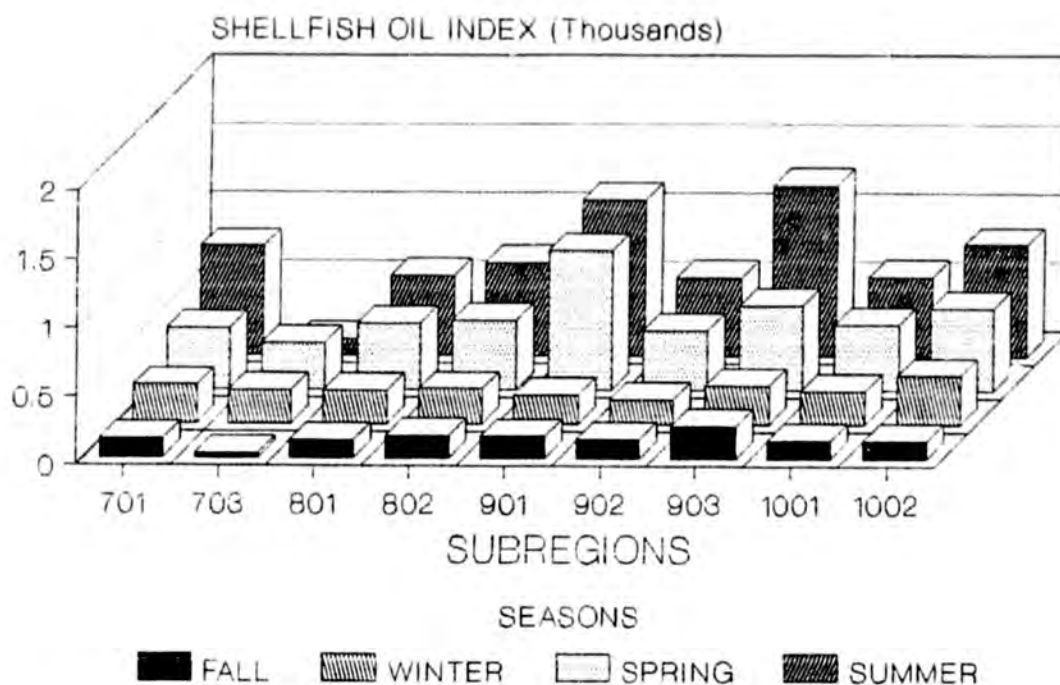


Figure 6

SHELLFISH VULNERABILITY TO OIL SPILLS REGION 11

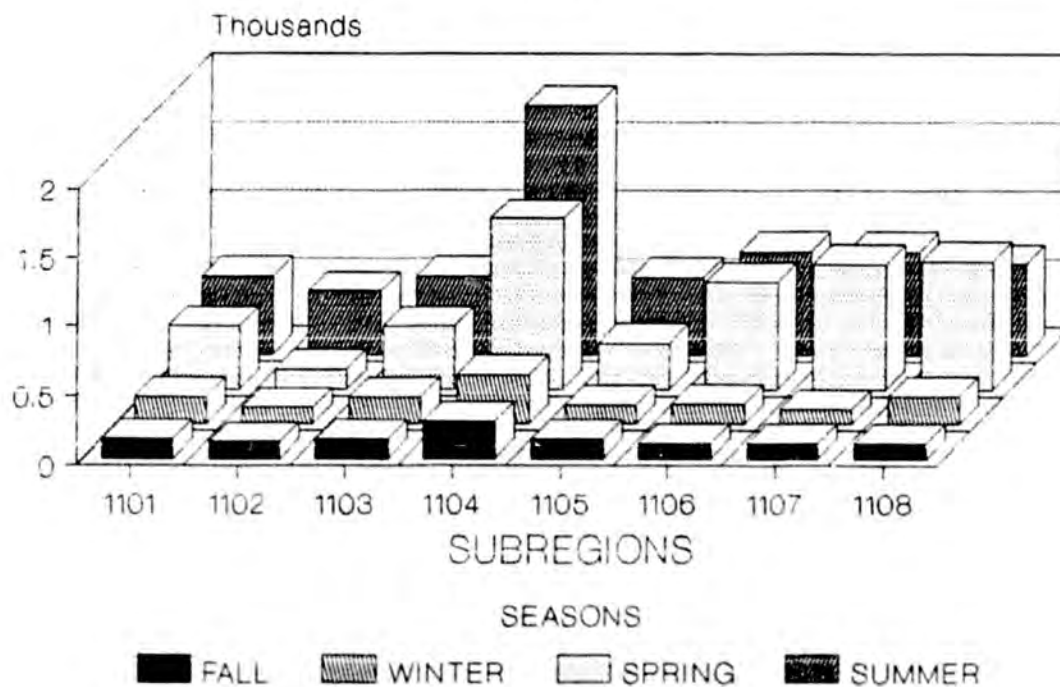


Figure 7

SHELLFISH VULNERABILITY TO OIL SPILLS REGION 12

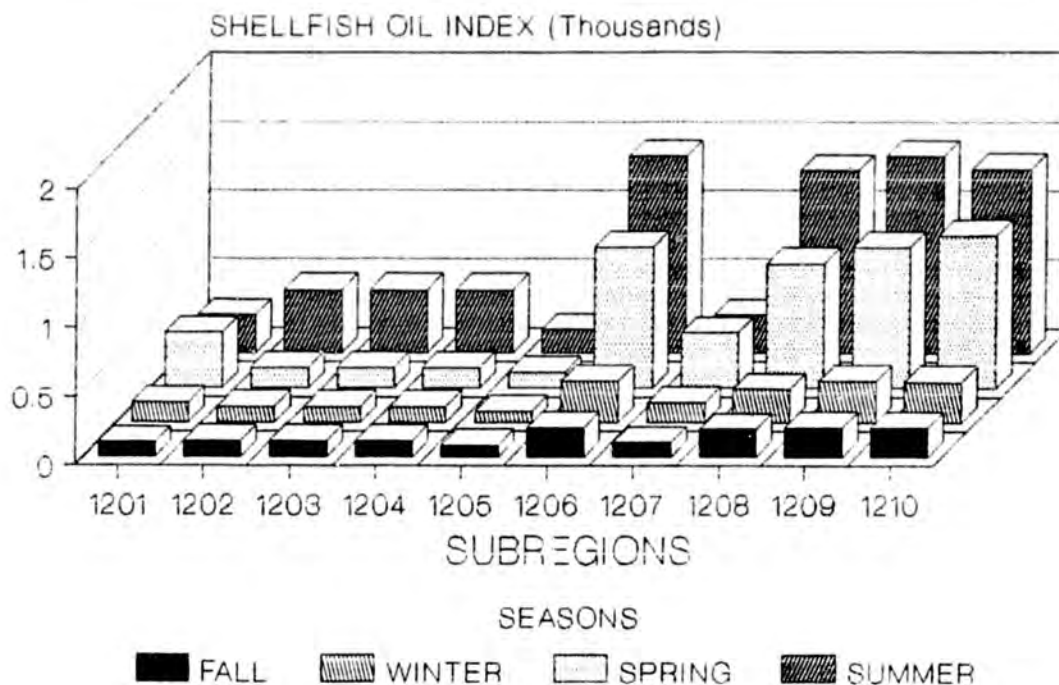


Figure 8

SHELLFISH VULNERABILITY TO OIL SPILLS REGION 14

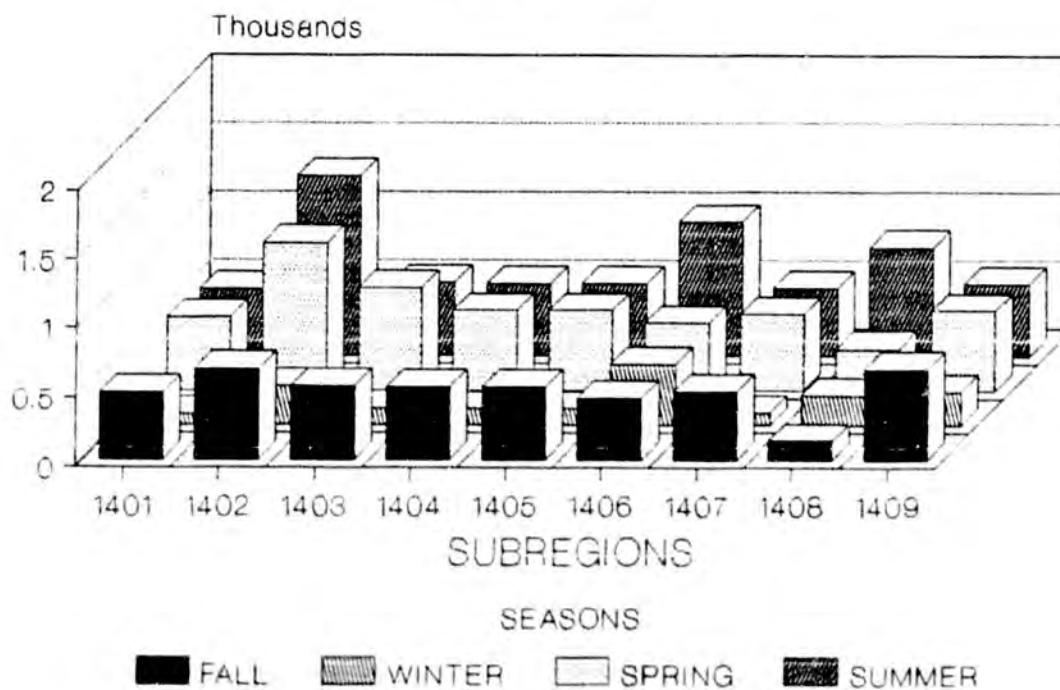
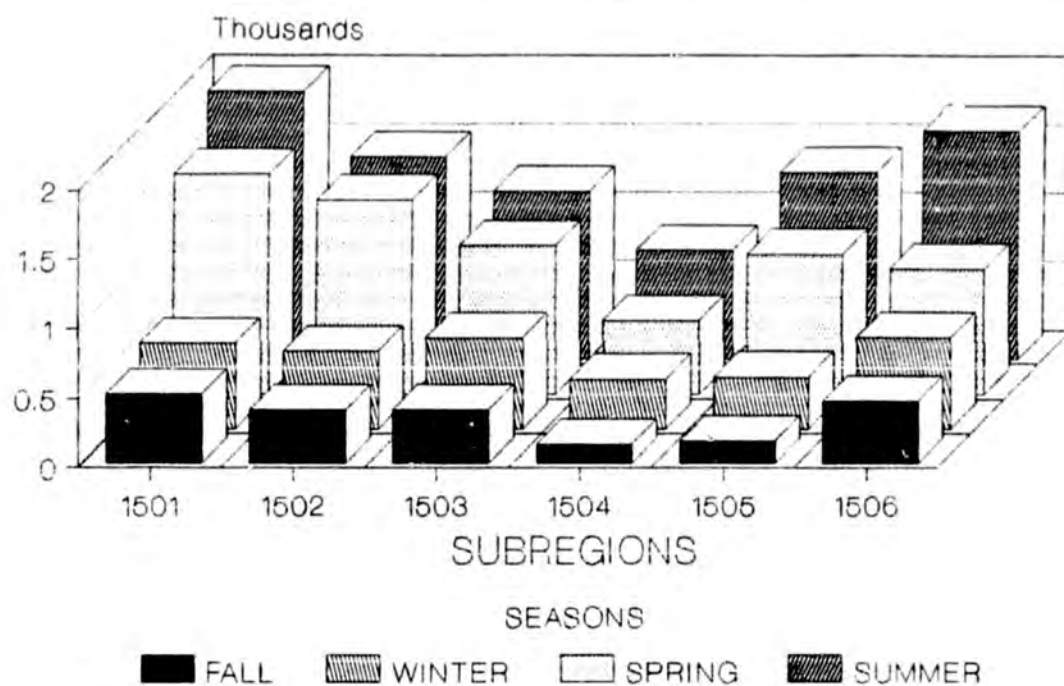


Figure 9

SHELLFISH VULNERABILITY TO OIL SPILLS REGION 15



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APPENDIX A

FACTOR AND COMPOSITE SCORING FOR EACH SPECIES

Common Name: Pacific Oyster
Scientific Name: *Crassostrea gigas*

Adult/Juvenile Habitat:

Reference:
Score SP: 5
SU: 5
FA: 5
WI: 5

Location of Larvae: pelagic larvae for 3-4 weeks

Reference: Cumbow, 1978
Score SP: 0
SU: 3
F: 3
W: 0

Location of Eggs: eggs float until fert.(after 10-15hrs)

Reference: Quayle, 1988
Score SP: 0
SU: 5
F: 0
W: 0

WA Population Conc.: found throughout WA marine waters

Reference: WDOF, 1989
Score: 1

Length of Spawning: July and August

Reference: Ricketts et al., 1985
Score SP: 0
SU: 3
FA: 0
WI: 0

Relative Signif.WA Pop.: Native to Japan

Reference: Rickets et al., 1985
Score: 0

Population Size in WA: several million lbs. harvested annually

Reference: WDOF, 1989
Score: 1

Reproductive Potential: up to 2 mill. per season

Reference: Cumbow, 1978
Score: 1

Age at Sexual Maturity: probably similar to native oyster

Reference:
Score: 1

COMPOSITE RANKING

Spring: 15
Summer: 96
Fall: 15
Winter: 15

Common Name: Olympia Oyster
Scientific Name: *Ostrea lurida*

Adult/Juvenile Habitat:

Reference:

Score SP: 5
SU: 5
FA: 5
WI: 5

Location of Larvae: see Pacific Oyster

Reference:

Score SP: 0
SU: 3
F: 3
W: 0

Location of Eggs: females retain eggs for about 2 wks

Reference: Cumbow, 1978

Score SP: 0
SU: 5
F: 0
W: 0

WA Population Conc.: a few areas in S. Puget Sound only

Reference: WDOF, 1989

Score: 5

Length of Spawning: June and July

Reference: Brittell et al., 1976

Score SP: 0
SU: 3
FA: 0
WI: 0

Relative Signif. WA Pop.: Alaska to California

Reference: Kozloff, 1973

Score: 1

Population Size in WA: threatened population

Reference: Brittell et al., 1976

Score: 5

Reproductive Potential: approx. 250,000 per season

Reference: Cumbow, 1978

Score: 3

Age at Sexual Maturity: six months

Reference: Ricketts et al., 1985

Score: 1

COMPOSITE RANKING

Spring: 60
Summer: 456
Fall: 60
Winter: 60

Common Name: Pacific Razor Clam
Scientific Name: *Siliqua patula*

Adult/Juvenile Habitat: intertidally to -30 feet

Reference: Cumbow, 1978

Score SP: 3

SU: 3

FA: 3

WI: 3

Location of Larvae: pelagic larvae for about 4 wks

Reference: Cumbow, 1978

Score SP: 3

SU: 3

F: 3

W: 0

Location of Eggs: egg becomes larvae in 1.5 - 10 days

Reference: Cumbow, 1978

Score SP: 5

SU: 5

F: 5

W: 0

WA Population Conc.: found on only a few beaches in WA

Reference:

Score: 5

Length of Spawning: Spring thru Fall, primarily Spring

Reference: Cumbow, 1978

Score SP: 5

SU: 5

FA: 5

WI: 0

Relative Signif. WA Pop.: Aluetins to N. California

Reference: Cumbow, 1978

Score: 1

Population Size in WA: abundant (approx. 15 million)

Reference: Ayers & Simons, 1989

Score: 1

Reproductive Potential: six to ten million

Reference: Cumbow, 1978

Score: 1

Age at Sexual Maturity: two years

Reference:

Score: 3

COMPOSITE RANKING

Spring: 480

Summer: 480

Fall: 480

Winter: 30

Common Name: Geoduck
Scientific Name: *Panope generosa*

Adult/Juvenile Habitat: intertidally to -360 feet

Reference: Goodwin and Pease, 1987

Score SP: 1
SU: 1
FA: 1
WI: 1

Location of Larvae: pelagic larvae for about 4 wks

Reference: Cumbow, 1978

Score SP: 3
SU: 3
F: 0
W: 3

Location of Eggs: egg becomes larvae in 1.5 - 10 days

Reference: Cumbow, 1978

Score SP: 3
SU: 3
F: 0
W: 3

WA Population Conc.: found in many locations

Reference:

Score: 1

Length of Spawning: Late Winter to early Summer

Reference: Goodwin and Pease, 1987

Score SP: 3
SU: 0
FA: 0
WI: 3

Relative Signif. WA Pop.: AK to Scammons Lagoon

Reference: Ricketts et al., 1985

Score: 1

Population Size in WA: two to three million lbs. harvested

Reference: Goodwin, 1973

Score: 1

Reproductive Potential:

Reference:

Score: 1

Age at Sexual Maturity:

Reference:

Score: 3

COMPOSITE RANKING

Spring: 132
Summer: 6
Fall: 6
Winter: 132

Common Name: Butter Clam
Scientific Name: *Saxidomus giganteus*

Adult/Juvenile Habitat: intertidally to -60 feet

Reference: Cumbow, 1978

Score SP: 3

SU: 3

FA: 3

WI: 3

Location of Larvae: pelagic larvae for about 4 wks

Reference: WDOF, 1978; Cumbow, 1978

Score SP: 0

SU: 3

F: 3

W: 0

Location of Eggs: egg becomes larvae in 1.5 - 10 days

Reference: Cumbow, 1978

Score SP: 0

SU: 3

F: 0

W: 0

WA Population Conc.: found in many locations

Reference:

Score: 1

Length of Spawning: Summer

Reference: Cumbow, 1978

Score SP: 0

SU: 3

FA: 0

WI: 0

Relative Signif. WA Pop.: AK to Monterey

Reference: Ricketts et al., 1985

Score: 1

Population Size in WA:

Reference: Goodwin & Shaul, 1978

Score: 1

Reproductive Potential:

Reference:

Score: 1

Age at Sexual Maturity:

Reference: see other species

Score: 3

COMPOSITE RANKING

Spring: 18

Summer: 144

Fall: 18

Winter: 18

Common Name: Native Little Neck
Scientific Name: *Protothaca staminea*

Adult/Juvenile Habitat: intertidally to -60 feet

Reference: Cumbow, 1978

Score SP: 3

SU: 3

FA: 3

WI: 3

Location of Larvae: pelagic larvae for about 4 wks

Reference: WDOF, 1978; Cumbow, 1978

Score SP: 3

SU: 3

F: 0

W: 0

Location of Eggs: egg becomes larvae in 1.5 - 10 days

Reference: Cumbow, 1978

Score SP: 3

SU: 3

F: 0

W: 0

WA Population Conc.: found in many locations

Reference:

Score: 1

Length of Spawning: Spring and early Summer

Reference: Ricketts et al., 1985; Cumbow, 1978

Score SP: 3

SU: 3

FA: 0

WI: 0

Relative Signif. WA Pop.: Aluetins to Baja

Reference: Ricketts et al., 1985

Score: 1

Population Size in WA: super abundant

Reference: Ricketts et al., 1985

Score: 1

Reproductive Potential:

Reference:

Score: 1

Age at Sexual Maturity: two years

Reference: Ricketts et al., 1985

Score: 3

COMPOSITE RANKING

Spring: 144

Summer: 144

Fall: 18

Winter: 18

Common Name: Manila Clam
Scientific Name: *Venerupis japonica*

Adult/Juvenile Habitat:

Reference:

Score SP: 3
SU: 3
FA: 3
WI: 3

Location of Larvae: pelagic larvae for about 4 wks

Reference: WDOF, 1978; Cumbow, 1978

Score SP: 0
SU: 3
F: 3
W: 0

Location of Eggs: egg becomes larvae in 1.5 - 10 days

Reference: Cumbow, 1978

Score SP: 0
SU: 3
F: 0
W: 0

WA Population Conc.: found in many locations

Reference:

Score: 1

Length of Spawning: Summer

Reference:

Score SP: 0
SU: 3
FA: 0
WI: 0

Relative Signif. WA Pop.: B.C. to So. California

Reference: Ricketts et al., 1985

Score: 0

Population Size in WA: abundant

Reference: Ricketts et al., 1985

Score: 1

Reproductive Potential:

Reference:

Score: 1

Age at Sexual Maturity:

Reference: see other species

Score: 3

COMPOSITE RANKING

Spring: 15
Summer: 120
Fall: 15
Winter: 15

Common Name: Horse Clam
Scientific Name: *Tresus nuttalli*

Adult/Juvenile Habitat: intertidally to -60 feet

Reference: Cumbow, 1978

Score SP: 3

SU: 3

FA: 3

WI: 3

Location of Larvae: pelagic larvae for about 4 wks

Reference: WDOF, 1978; Cumbow, 1978

Score SP: 0

SU: 3

F: 3

W: 0

Location of Eggs: egg becomes larvae in 1.5 - 10 days

Reference: Cumbow, 1978

Score SP: 0

SU: 3

F: 0

W: 0

WA Population Conc.: found in many locations

Reference:

Score: 1

Length of Spawning: Summer

Reference: Cumbow, 1978

Score SP: 0

SU: 1

FA: 0

WI: 0

Relative Signif. WA Pop.: B.C. to Scammons Lagoon

Reference: Ricketts et al., 1985

Score: 1

Population Size in WA:

Reference: Goodwin & Shaul, 1978

Score: 1

Reproductive Potential:

Reference:

Score: 1

Age at Sexual Maturity: two years

Reference: Ricketts et al., 1985

Score: 3

COMPOSITE RANKING

Spring: 18

Summer: 60

Fall: 18

Winter: 18

Common Name: Horse Clam
Scientific Name: Tresus capax

Adult/Juvenile Habitat: intertidally to -60 feet

Reference: Cumbow, 1978

Score SP: 3

SU: 3

FA: 3

WI: 3

Location of Larvae: pelagic larvae for about 4 wks

Reference: WDOF, 1978; Cumbow, 1978

Score SP: 3

SU: 0

F: 0

W: 3

Location of Eggs: egg becomes larvae in 1.5 - 10 days

Reference: Cumbow, 1978

Score SP: 0

SU: 0

F: 0

W: 3

WA Population Conc.: found in many locations

Reference:

Score: 1

Length of Spawning: Winter

Reference: Cumbow, 1978

Score SP: 0

SU: 0

FA: 0

WI: 1

Relative Signif. WA Pop.: AK to Central Calif.

Reference: Ricketts et al., 1985

Score: 1

Population Size in WA:

Reference: Goodwin & Shaul, 1978

Score: 1

Reproductive Potential:

Reference:

Score: 1

Age at Sexual Maturity: two years

Reference: Ricketts et al., 1985

Score: 3

COMPOSITE RANKING

Spring: 18

Summer: 18

Fall: 18

Winter: 60

Common Name: Eastern Soft Shell
Scientific Name: *Mya arenaria*

Adult/Juvenile Habitat: primarily intertidal as adults
Reference: Brousseau, 1987; Scapti, 1984
Score SP: 5
SU: 5
FA: 5
WI: 5

Location of Larvae: pelagic larvae for about 4 wks
Reference: WDOF, 1978; Cumbow, 1978
Score SP: 3
SU: 3
F: 3
W: 3

Location of Eggs: egg becomes larvae in 1.5 - 10 days
Reference: Cumbow, 1978
Score SP: 3
SU: 3
F: 3
W: 0

WA Population Conc.: a few N. Puget Sound bays only
Reference: Mills & Solomon, 1983; WDOF, 1989
Score: 5

Length of Spawning: Bimodal in Sp/Su and early Fa
Reference: Brousseau, 1987
Score SP: 1
SU: 1
FA: 1
WI: 0

Relative Signif. WA Pop.: AK to Elkhorn Slough
Reference: Ricketts et al., 1985
Score: 0

Population Size in WA: Port Susan area only
Reference: Mills & Solomon, 1983
Score: 5

Reproductive Potential:
Reference:
Score: 1

Age at Sexual Maturity:
Reference: see other species
Score: 3

COMPOSITE RANKING

Spring: 156
Summer: 156
Fall: 156
Winter: 65

Common Name: Cockles
Scientific Name: Clinocardium nuttalli

Adult/Juvenile Habitat: subtidally to -60 feet

Reference: Cumbow, 1978

Score SP: 3

SU: 3

FA: 3

WI: 3

Location of Larvae: pelagic larvae for about 4 wks

Reference: WDOF, 1978; Cumbow, 1978

Score SP: 0

SU: 3

F: 3

W: 0

Location of Eggs: egg becomes larvae in 1.5 - 10 days

Reference: Cumbow, 1978

Score SP: 0

SU: 3

F: 0

W: 0

WA Population Conc.: found in many locations

Reference:

Score: 1

Length of Spawning: Summer

Reference: Cumbow, 1978

Score SP: 0

SU: 3

FA: 0

WI: 0

Relative Signif. WA Pop.: Bering Sea to Baja

Reference: Ricketts et al., 1985

Score: 1

Population Size in WA: common

Reference: Cumbow, 1978

Score: 3

Reproductive Potential:

Reference:

Score: 1

Age at Sexual Maturity: two years

Reference: Ricketts et al., 1985

Score: 3

COMPOSITE RANKING

Spring: 24

Summer: 192

Fall: 24

Winter: 24

Common Name: Pink Scallop
Scientific Name: *Chlamys hericus* (or *rubida*?)

Adult/Juvenile Habitat: primarily found at 40 - 60 meters

Reference: Mottet, 1979

Score SP: 0

SU: 0

FA: 0

WI: 0

Location of Larvae: larvae are pelagic

Reference: Mottet, 1979; Zahradnik, 1985

Score SP: 1

SU: 0

F: 1

W: 0

Location of Eggs: eggs settle to bottom/adhere to fem

Reference: Mottet, 1979

Score SP: 0

SU: 0

F: 0

W: 0

WA Population Conc.:

Reference:

Score: 1

Length of Spawning: March and Sept.

Reference: Zahradnik, 1985

Score SP: 1

SU: 0

FA: 1

WI: 0

Relative Signif. WA Pop.: West Coast Canada & U.S.

Reference: Mottet, 1979

Score: 1

Population Size in WA: very abundant

Reference:

Score: 1

Reproductive Potential: extremely high

Reference: Mottet, 1979

Score: 1

Age at Sexual Maturity: one - two years

Reference: Mottet, 1979

Score: 3

COMPOSITE RANKING

Spring: 12

Summer: 0

Fall: 12

Winter: 0

Common Name: Rock Scallop
Scientific Name: Hinnites multirugous

Adult/Juvenile Habitat: found at 0 - 50 meters

Reference: Mottet, 1979

Score SP: 1
SU: 1
FA: 1
WI: 1

Location of Larvae: larvae are pelagic, approx. 1 mo.

Reference: Mottet, 1979; Malachowski, 1988

Score SP: 1
SU: 1
F: 1
W: 1

Location of Eggs: eggs settle to bottom/adhere to fem

Reference: Mottet, 1979

Score SP: 1
SU: 1
F: 1
W: 1

WA Population Conc.:

Reference:

Score: 3

Length of Spawning: May/June & Sept. - Dec.

Reference: Malachowski, 1988

Score SP: 1
SU: 1
FA: 1
WI: 1

Relative Signif. WA Pop.: Aluetins to So. CA

Reference: Mottet, 199

Score: 1

Population Size in WA: not abundant enough for commercial

Reference: Mottet, 1979; Bourne, 1988

Score: 5

Reproductive Potential: extremely high

Reference: Mottet, 1979

Score: 1

Age at Sexual Maturity: one - two years

Reference: Mottet, 1979

Score: 3

COMPOSITE RANKING

Spring: 48
Summer: 48
Fall: 48
Winter: 48

Common Name: Weathervane Scallop
Scientific Name: Pecten caurinus

Adult/Juvenile Habitat: found at depths >10 fathoms

Reference: Cumbow, 1978

Score SP: 0

SU: 0

FA: 0

WI: 0

Location of Larvae: larvae are pelagic

Reference: Mottet, 1979

Score SP: 0

SU: 1

F: 0

W: 0

Location of Eggs: eggs settle to bottom/adhere to fem

Reference: Mottet, 1979

Score SP: 0

SU: 0

F: 0

W: 0

WA Population Conc.:

Reference:

Score: 3

Length of Spawning: mid-Jan thru June

Reference: Robinson, 1984

Score SP: 1

SU: 1

FA: 0

WI: 1

Relative Signif. WA Pop.: So. AK to San Francisco

Reference: Mottet, 1979

Score: 1

Population Size in WA: not abundant enough for commercial

Reference:

Score: 5

Reproductive Potential: extremely high

Reference: Mottet, 1979

Score: 1

Age at Sexual Maturity: one - two years

Reference: Mottet, 1979

Score: 3

COMPOSITE RANKING

Spring: 12

Summer: 24

Fall: 0

Winter: 12

Common Name: Bay Mussel
Scientific Name: *Mytilus edulis*

Adult/Juvenile Habitat:

Reference: Ricketts et al., 1985

Score SP: 5

SU: 5

FA: 5

WI: 5

Location of Larvae: pelagic larvae for about 3 wks

Reference: Bayne, 1976

Score SP: 3

SU: 0

F: 3

W: 3

Location of Eggs: pelagic eggs

Reference: Seed, 1976

Score SP: 0

SU: 0

F: 3

W: 3

WA Population Conc.: found in marine bays of WA

Reference: WDOF, 1989

Score: 1

Length of Spawning: late Fall or Winter

Reference: Ricketts et al., 1985

Score SP: 0

SU: 0

FA: 3

WI: 3

Relative Signif. WA Pop.: northern temperate regions

Reference: Ricketts et al., 1985

Score: 1

Population Size in WA: tremendous abundance

Reference: Ricketts et al., 1985

Score: 1

Reproductive Potential: high

Reference: Bayne, 1976

Score: 1

Age at Sexual Maturity: one or more years

Reference: Seed, 1976

Score: 3

COMPOSITE RANKING

Spring: 30

Summer: 30

Fall: 156

Winter: 156

Common Name: California Mussel
Scientific Name: *Mytilus californianus*

Adult/Juvenile Habitat:

Reference: Ricketts et al., 1985

Score SP: 5

SU: 5

FA: 5

WI: 5

Location of Larvae: pelagic larvae for about 3 wks

Reference: Bayne, 1976

Score SP: 3

SU: 3

F: 3

W: 3

Location of Eggs: pelagic eggs

Reference: Seed, 1976

Score SP: 3

SU: 3

F: 3

W: 3

WA Population Conc.: found outer coast and straits

Reference: WDOF, 1989

Score: 1

Length of Spawning: throughout year

Reference: Ricketts et al., 1985

Score SP: 0

SU: 0

FA: 0

WI: 0

Relative Signif. WA Pop.: AK to So. Baja

Reference: Ricketts et al., 1985

Score: 1

Population Size in WA: abundant

Reference:

Score: 1

Reproductive Potential: high

Reference: Bayne, 1976

Score: 1

Age at Sexual Maturity: one or more years

Reference: Seed, 1976

Score: 3

COMPOSITE RANKING

Spring: 30

Summer: 30

Fall: 30

Winter: 30

Common Name: Squid
Scientific Name: *Loligo opalescens*

Adult/Juvenile Habitat:

Reference: Recksiek & Frey, 1978

Score SP: 1
SU: 1
FA: 1
WI: 1

Location of Larvae: surface to bottom in WA waters

Reference: Recksiek & Frey, 1978

Score SP: 1
SU: 1
F: 0
W: 0

Location of Eggs: eggs laid in nearshore; sink to bot

Reference: Recksiek & Frey, 1978

Score SP: 1
SU: 0
F: 0
W: 1

WA Population Conc.:

Reference: Recksiek & Frey, 1978

Score: 1

Length of Spawning: winter/spring

Reference: Recksiek & Frey, 1978

Score SP: 3
SU: 0
FA: 0
WI: 3

Relative Signif. WA Pop.:

Reference: Recksiek & Frey, 1978

Score: 1

Population Size in WA:

Reference:

Score: 1

Reproductive Potential: 6,500

Reference: Recksiek & Frey, 1978

Score: 5

Age at Sexual Maturity: 14 lunar months

Reference: Spratt, 1978

Score: 3

COMPOSITE RANKING

Spring: 132

Summer: 6

Fall: 6

Winter: 114

Common Name: Octopus
Scientific Name: Octopus dofleini

Adult/Juvenile Habitat: 0 to >100ft; <50ft. in SP to mate

Reference: Mottet, 1975; Cumbow, 1978

Score SP: 3

SU: 1

FA: 1

WI: 1

Location of Larvae: larvae in water column

Reference: Mottet, 1975

Score SP: 1

SU: 1

F: 1

W: 1

Location of Eggs: eggs laid in dens mostly at depths

Reference: Mottet, 1975

Score SP: 1

SU: 1

F: 1

W: 1

WA Population Conc.: known to occur in many locations

Reference: Mottet, 1975

Score: 1

Length of Spawning: hatching occurs throughout year

Reference: Mottet, 1975

Score SP: 0

SU: 0

FA: 0

WI: 0

Relative Signif. WA Pop.:

Reference: Mottet, 1975

Score: 1

Population Size in WA:

Reference:

Score: 3

Reproductive Potential: 30,000 to 100,000

Reference: Mottet, 1975

Score: 3

Age at Sexual Maturity: 1.5 to 2 yers

Reference: Mottet, 1975

Score: 3

COMPOSITE RANKING

Spring: 24

Summer: 8

Fall: 8

Winter: 8

Common Name: Northern Abalone
Scientific Name: *Haliotis kamschatkana*

Adult/Juvenile Habitat: intertidally to 15 meters

Reference: Mottet, 1978

Score SP: 3

SU: 3

FA: 3

WI: 3

Location of Larvae: pelagic larvae, short period

Reference: Mottet, 1975

Score SP: 0

SU: 3

F: 3

W: 0

Location of Eggs: eggs in water column for short period

Reference: Mottet, 1975

Score SP: 0

SU: 3

F: 0

W: 0

WA Population Conc.: occurs in aggregations

Reference: Ricketts et al., 1985

Score: 3

Length of Spawning: June through August

Reference: Mottet, 1978

Score SP: 0

SU: 3

FA: 0

WI: 0

Relative Signif. WA Pop.: B.C., WA and OR

Reference: Mottet, 1978

Score: 3

Population Size in WA: rare; no commercial harvest

Reference: Mottet, 1978

Score: 5

Reproductive Potential: 1,000 to several million

Reference: Mottet, 1978

Score: 1

Age at Sexual Maturity: four years

Reference: Ricketts et al., 1985

Score: 5

COMPOSITE RANKING

Spring: 48

Summer: 384

Fall: 48

Winter: 48