

**APPENDIX A**

**FIGURES**

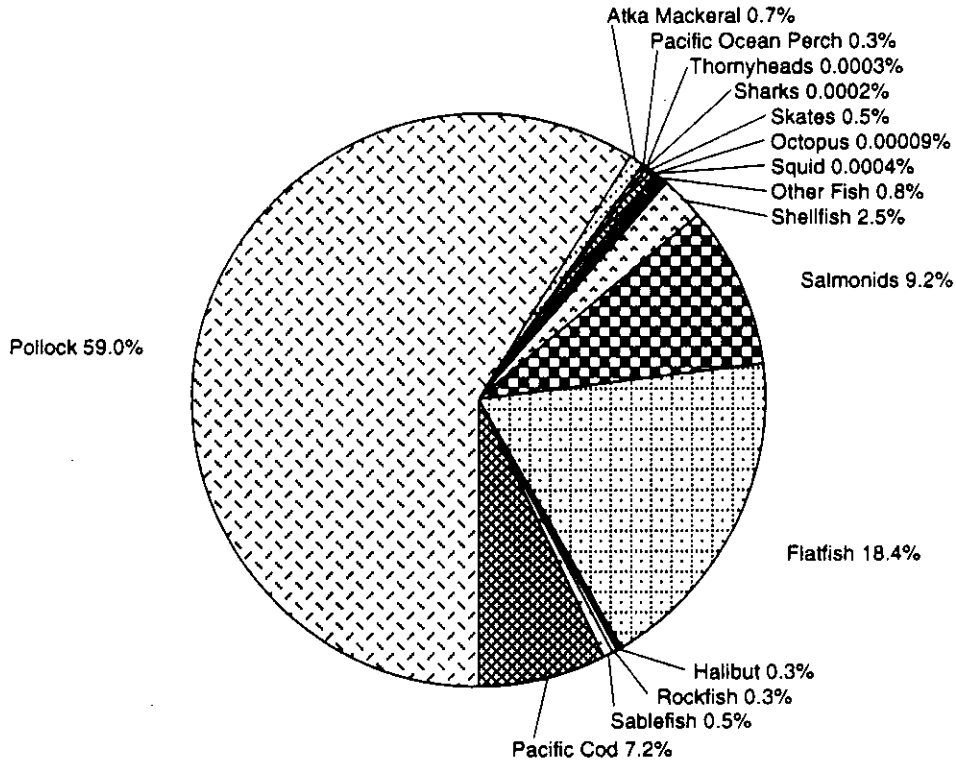
## APPENDIX A

### FIGURES

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	(thousands of pounds)	(metric tons)		(thousands of pounds)	(metric tons)
<sup>3</sup> Salmonids:	346,860	156,950.1	<sup>2</sup> Thornyheads:	1,158	523.8
<sup>2</sup> Flatfish:	695,584	314,743.9	<sup>2</sup> Sharks:	707	319.8
<sup>3</sup> Halibut:	9,451	4,276.5	<sup>2</sup> Skates:	20,221	9,149.7
<sup>2</sup> Rockfish:	13,171	5,959.7	<sup>2</sup> Octopus:	330	149.3
<sup>2</sup> Sablefish:	20,702	9,367.3	<sup>2</sup> Squid:	1,370	620.0
<sup>2</sup> Pacific Cod:	271,825	122,997.7	<sup>4</sup> Other Fish:	32,057	14,505.4
<sup>2</sup> Pollock:	2,226,660	1,007,538.6	<sup>3</sup> Shellfish:	93,601	42,353.4
<sup>2</sup> Atka Mackerel:	27,708	12,537.7			
<sup>2</sup> Pacific Ocean Perch:	10,290	4,656.1	<b>TOTAL:</b>	<b>3,771,695</b>	<b>1,706,649</b>



- <sup>1</sup> Estimates based on reported amount of processed products and product recovery rates
- <sup>2</sup> 1991 processed product statistics used to estimate amount of waste
- <sup>3</sup> 1990 processed product statistics used to estimate amount of waste
- <sup>4</sup> Processed product statistics used are for 1990 or 1991, depending on species and availability

Source: Tetra Tech 1992, Figure 7

Figure 2-1. Estimates of Solid Waste Generated From Seafood Processing Activities in Alaska <sup>1</sup>

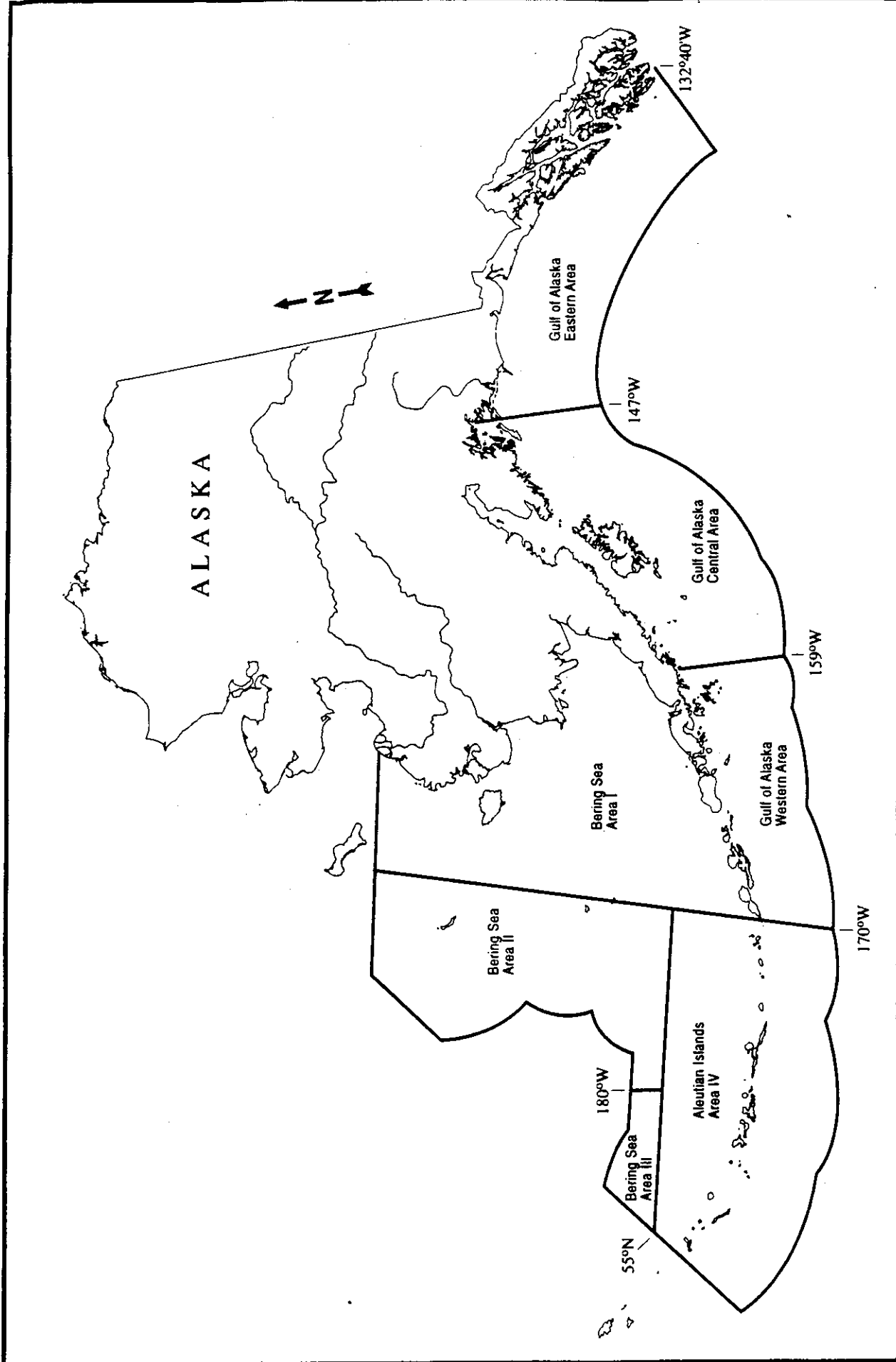


Figure 2-2. Groundfish Fishery Management Areas of the U.S. Fisheries Conservation Zone.

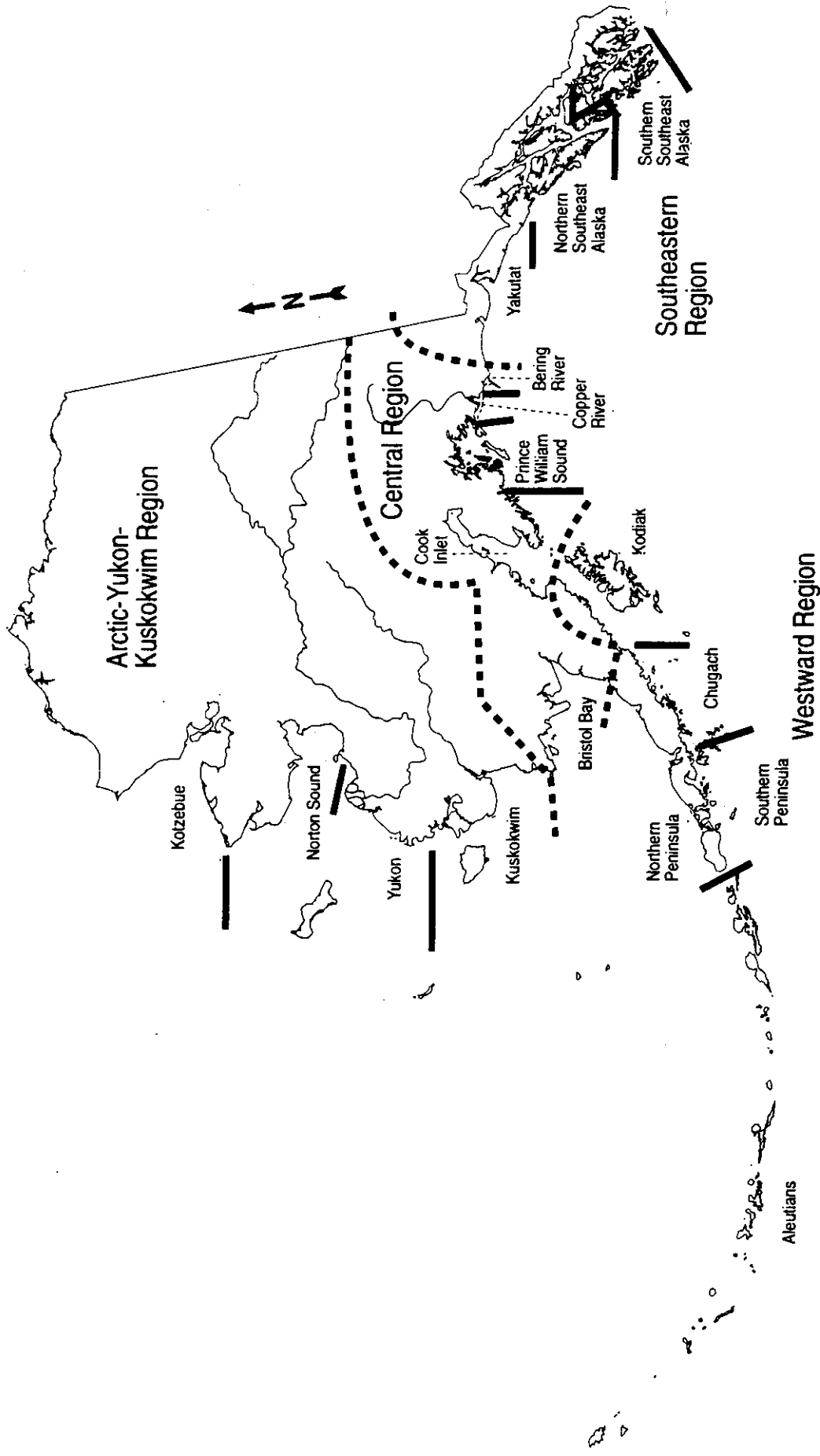


Figure 2-3. Salmon Management Regions, Areas, and Subareas.

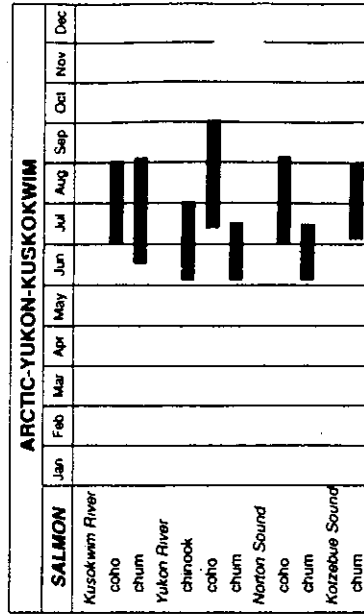
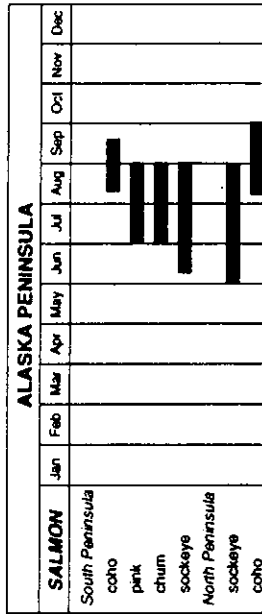
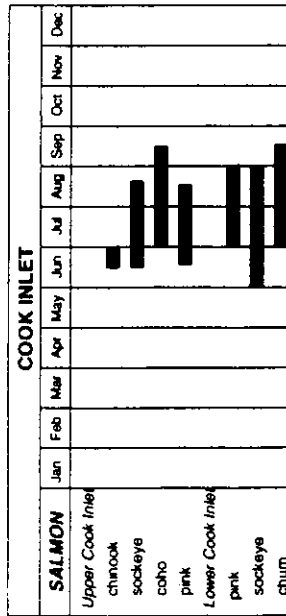
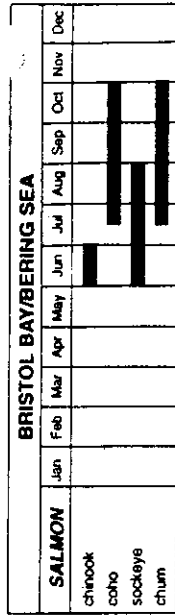
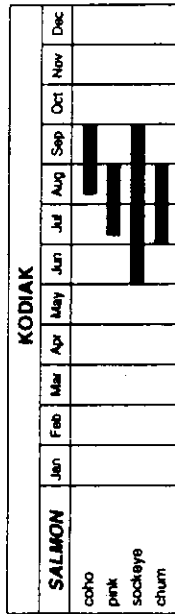
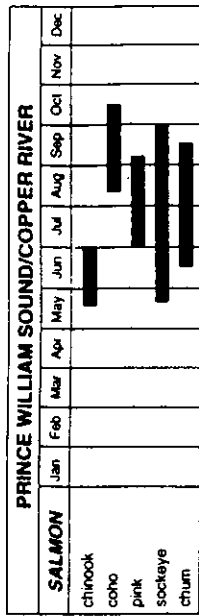
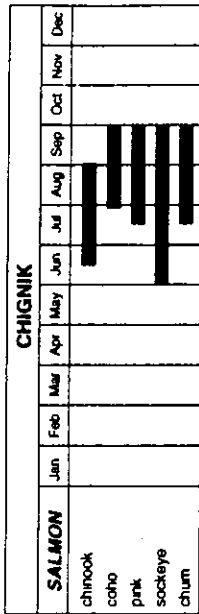
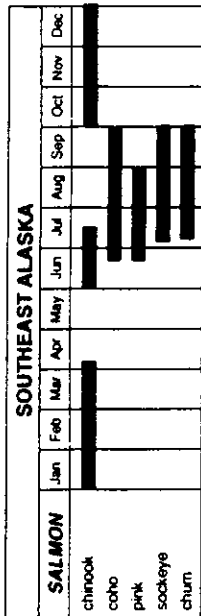


Figure 2-4. General Summary of Alaskan Salmon Fishing Seasons by Management Area.

SOUTHEAST ALASKA												
HERRING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
food/bait												
sac roe												
kelp/ro.												

KODIAK												
HERRING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
food or bait												
sac roe												

PRINCE WILLIAM SOUND/COPPER RIVER												
HERRING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
food and bait												
sac roe/line												
sac roe/gilnet												
roe on kelp												

COOK INLET												
HERRING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Upper Cook Inlet												
sac roe												
food and bait												
Lower Cook Inlet												
sac roe												

CHIGNIK												
HERRING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
sac roe												

BRISTOL BAY/BERING SEA												
HERRING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
sac roe												
roe on kelp												

ARCTIC-YUKON-KUSKOKWIM												
HERRING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kuskokwim Bay												
sac roe												
Yukon Delta												
sac roe												
Norton Sound												
sac roe												

ALASKA PENINSULA												
HERRING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
North Peninsula												
sac roe												
South Peninsula												
sac roe												
Dutch Harbor												
food and bait												

Figure 2-5. General Summary of Alaskan Herring Fishing Seasons by Management Area.



SOUTHEAST ALASKA												
SHELLFISH	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
king crab												
Dungeness crab												
Tanner crab												
shrimp/trawl												
shrimp/pot												
abalone/clam												
sea cucumber												

KODIAK												
SHELLFISH	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dungeness crab												
Tanner crab												
shrimp/trawl												
shrimp/pot												
scallops												
sea urchins												

PRINCE WILLIAM SOUND/COPPER RIVER												
SHELLFISH	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dungeness crab												
Tanner crab												
shrimp/trawl												
shrimp/pot												

YAKUTAT												
SHELLFISH	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dungeness crab												
Tanner crab												
scallop												

ALASKA PENINSULA												
SHELLFISH	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dungeness												
Tanner												
shrimp/trawl												
shrimp/pot												
sallops												

BRISTOL BAY/BERING SEA												
SHELLFISH	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
red king crab												
bairdi Tanner												
opiko Tanner												
blue king crab												
brown king crab												

COOK INLET												
SHELLFISH	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dungeness crab												
Tanner crab												
shrimp/trawl												
shrimp/pot												
clam												

Figure 2-6. General Summary of Alaskan Shellfish Fishing Seasons by Management Area.

**LEGEND**

- Number of permittees at each location for which 1993 data have been obtained
- Number of permittees at each location for which data were not available

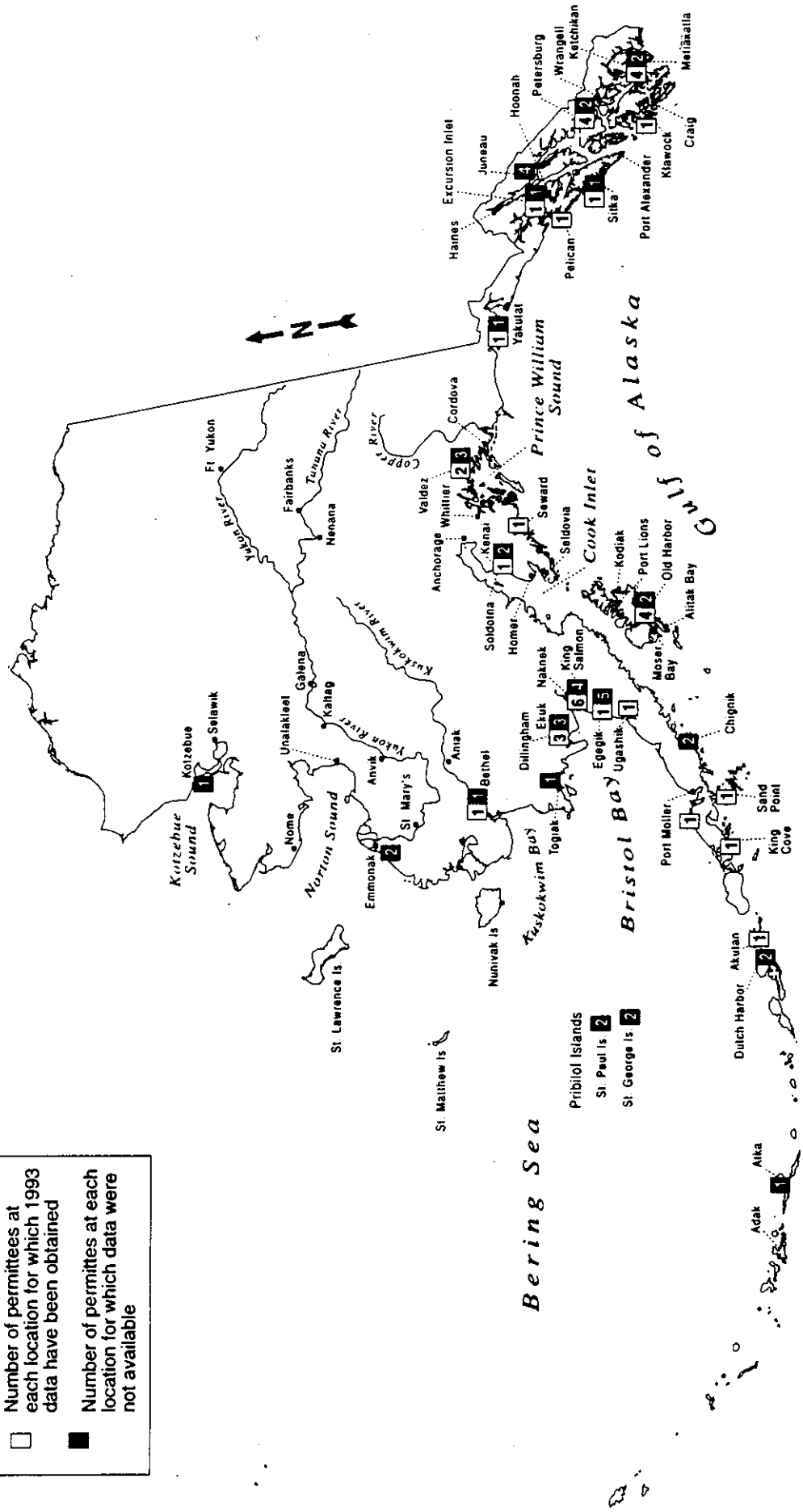


Figure 2-7. General Locations of Alaskan Shore-based Seafood Processing Facilities Operating Under the NPDES General Permit in 1993.

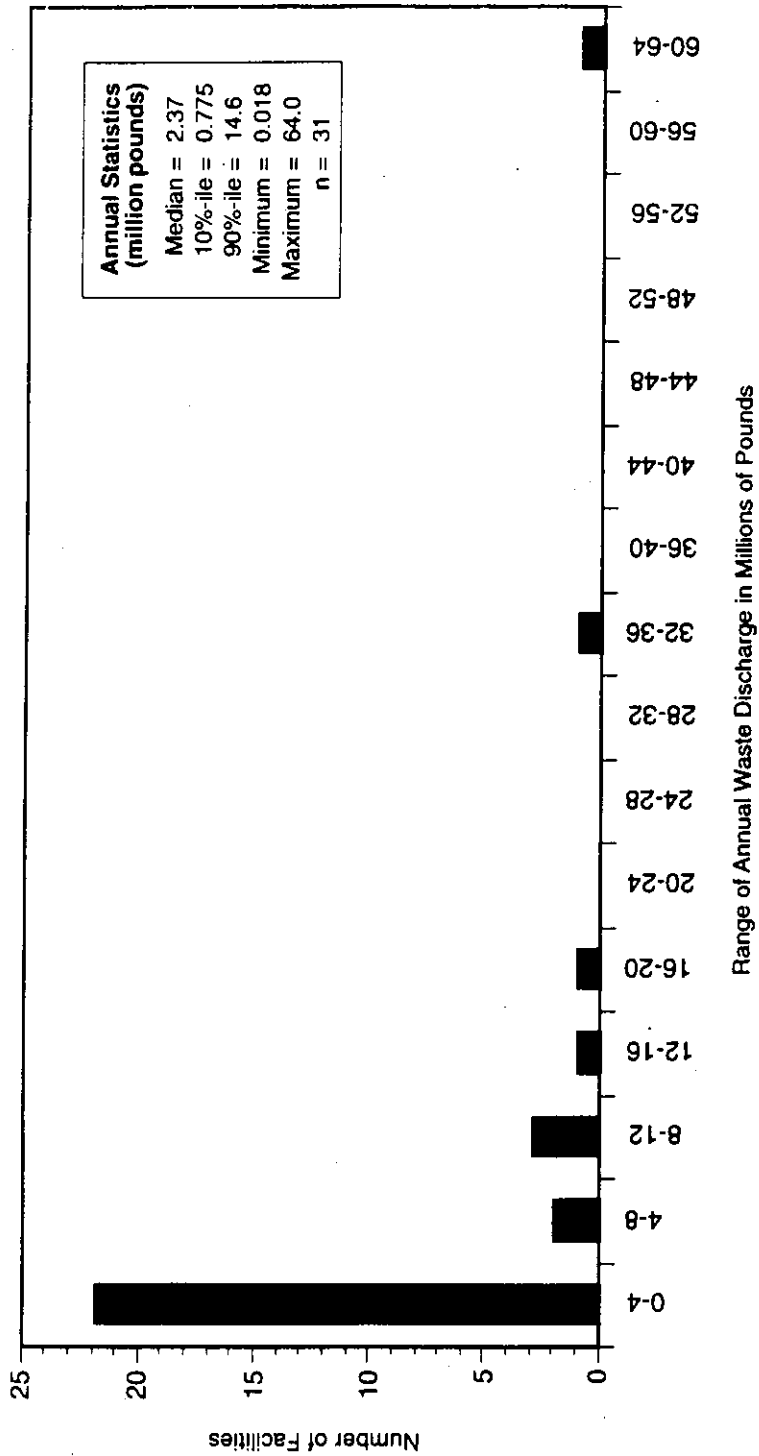


Figure 2-8. Frequency Distribution of Annual Solid Waste Discharge from Shore-based Seafood Processing Facilities in 1993 (n = 31).

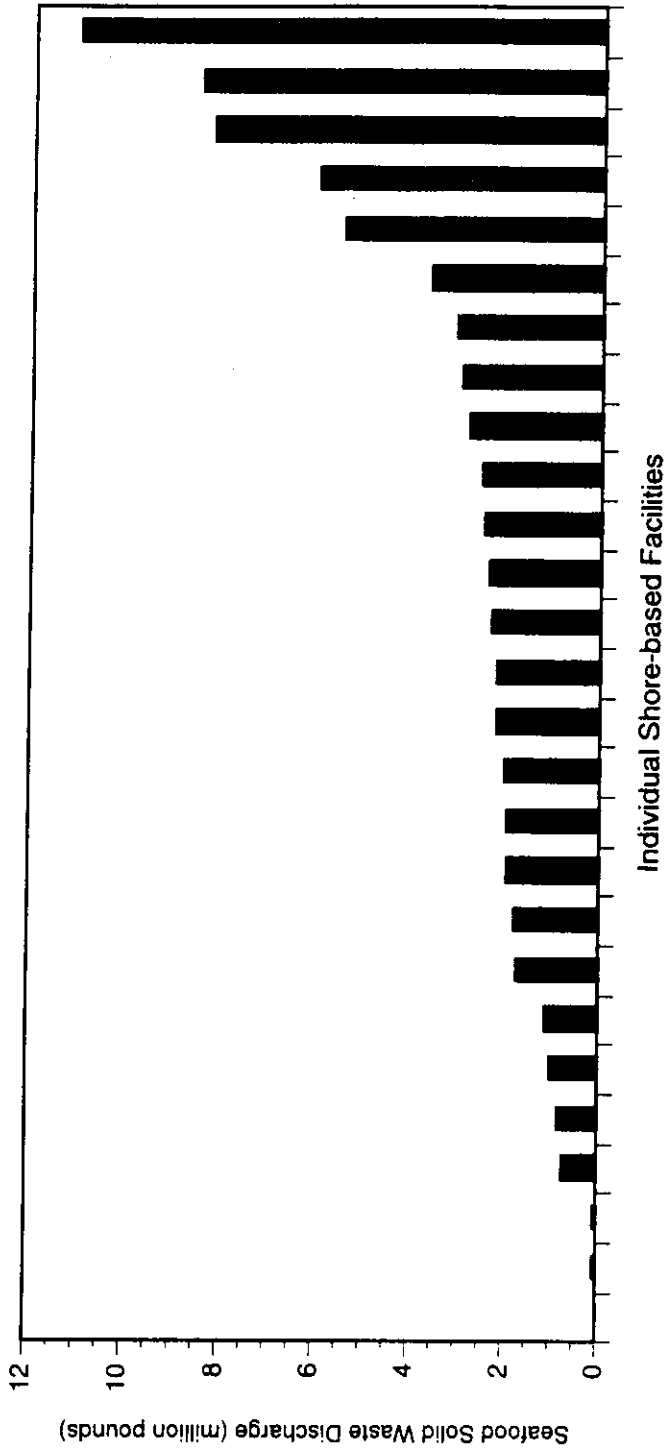


Figure 2-9. Distribution of Annual Seafood Solid Waste Discharge from Shore-based Seafood Processing Facilities Discharging Less Than 12 Million Pounds of Waste in 1993 (n = 27).

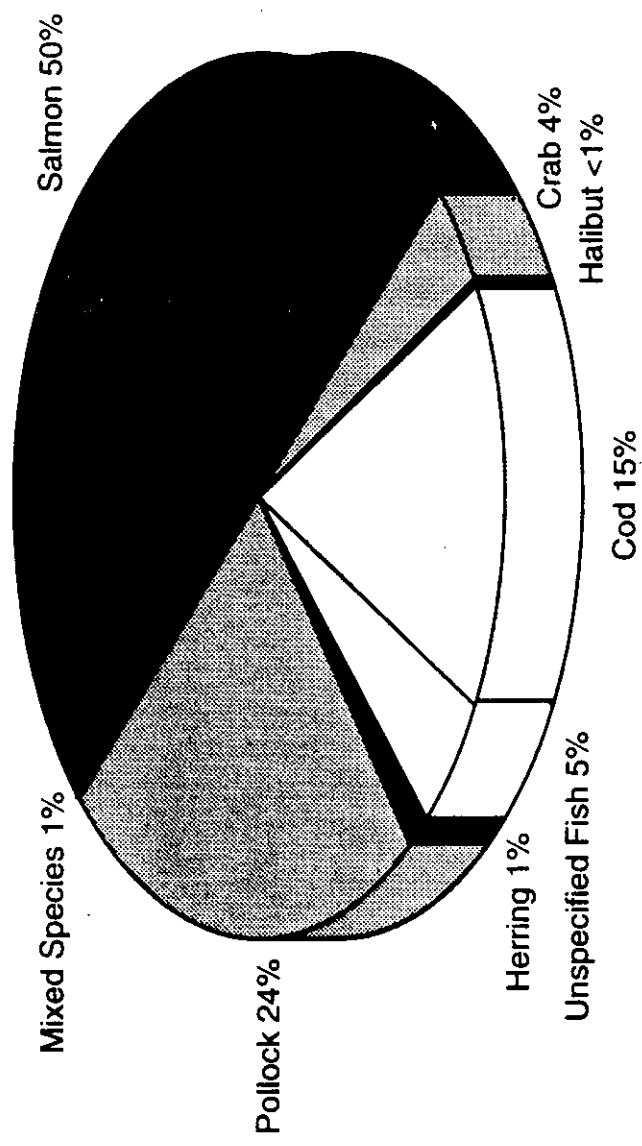


Figure 2-10. Distribution of Annual Seafood Solid Waste Discharged From Shore-based Facilities in 1993 by General Species Categories (n = 31).

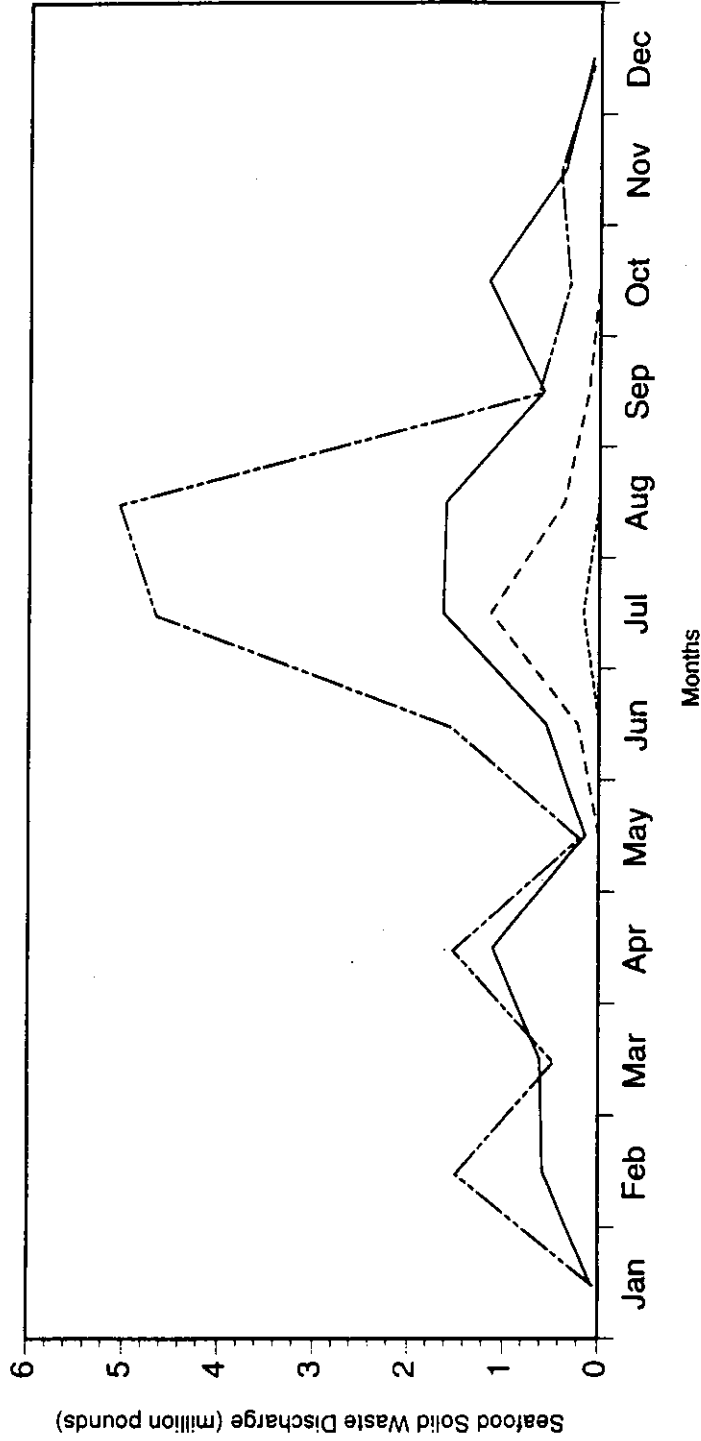
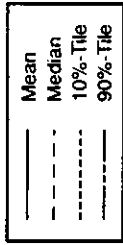


Figure 2-11. Monthly Seafood Solid Waste Discharge Statistics for Shore-based Facilities in 1993 (n = 24).

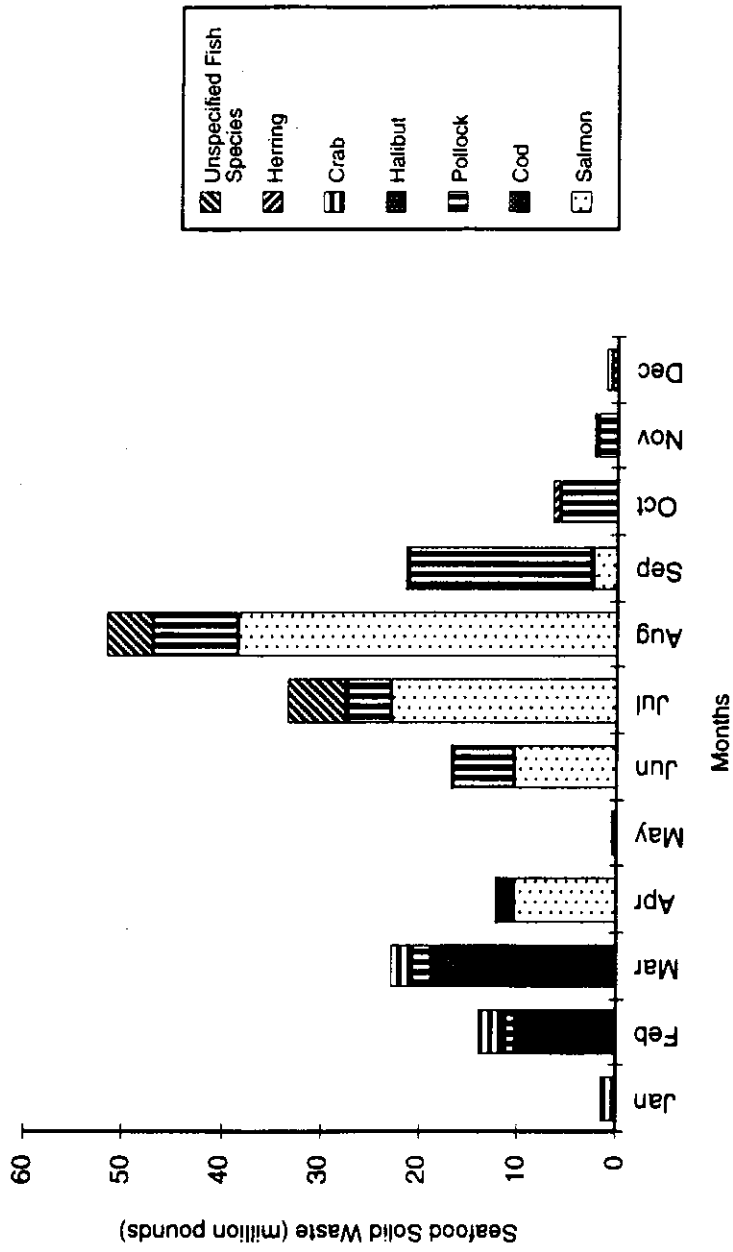


Figure 2-12. Monthly Distribution by General Species Category of Total Seafood Solid Waste Discharged by Shore-based Facilities in 1993 (n = 24).

**LEGEND**

□ Number of permittees at each location for which 1993 data have been obtained

■ Number of permittees at each location for which data were not available

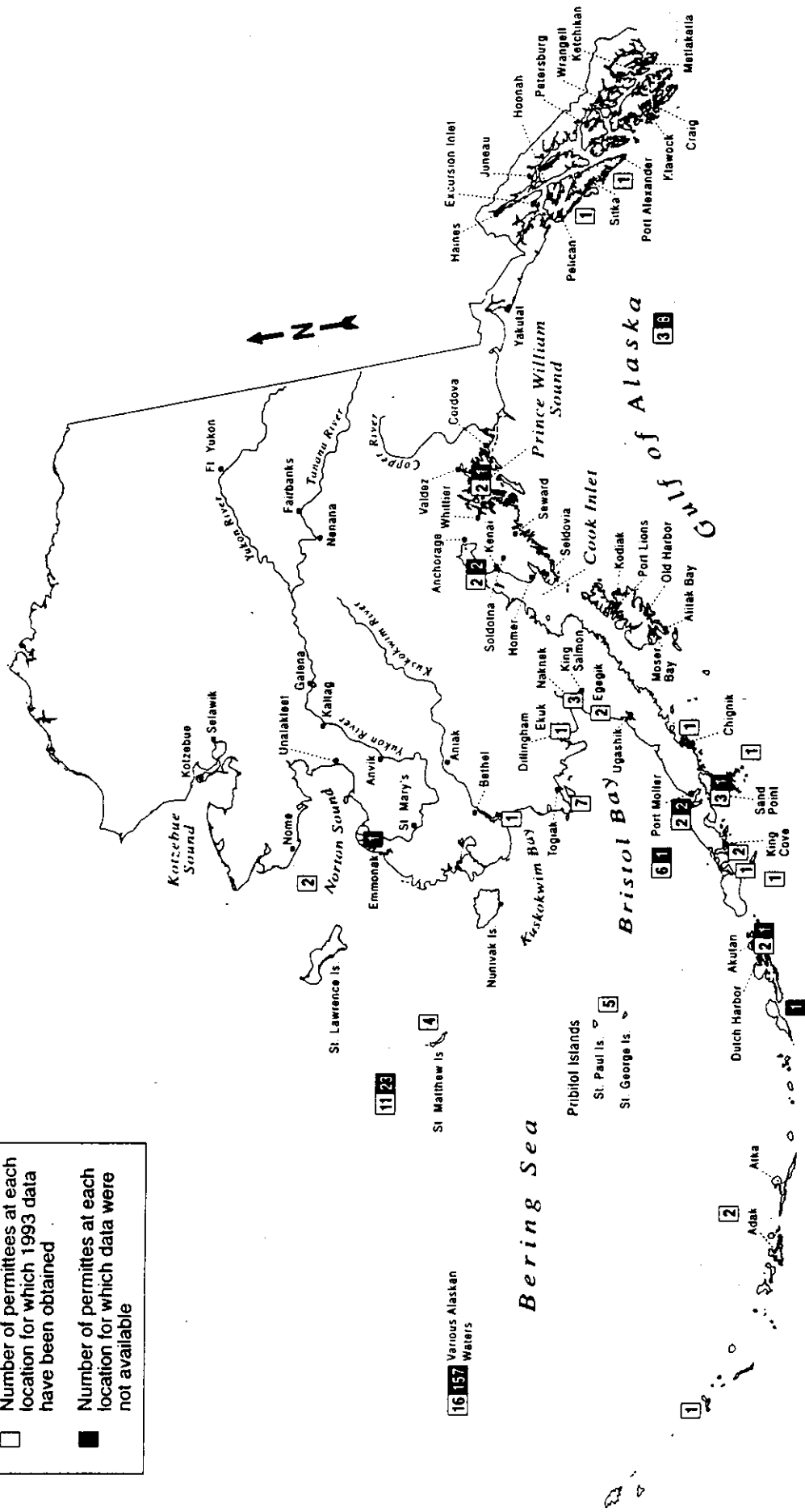


Figure 2-13. General Locations Occupied by the 237 Alaskan Floating Seafood Processing Facilities Operating Under the NPDES General Permit During 1993. Several facilities occupied more than one location during the year. One hundred and seventy three facilities could only be located as "various Alaskan waters."



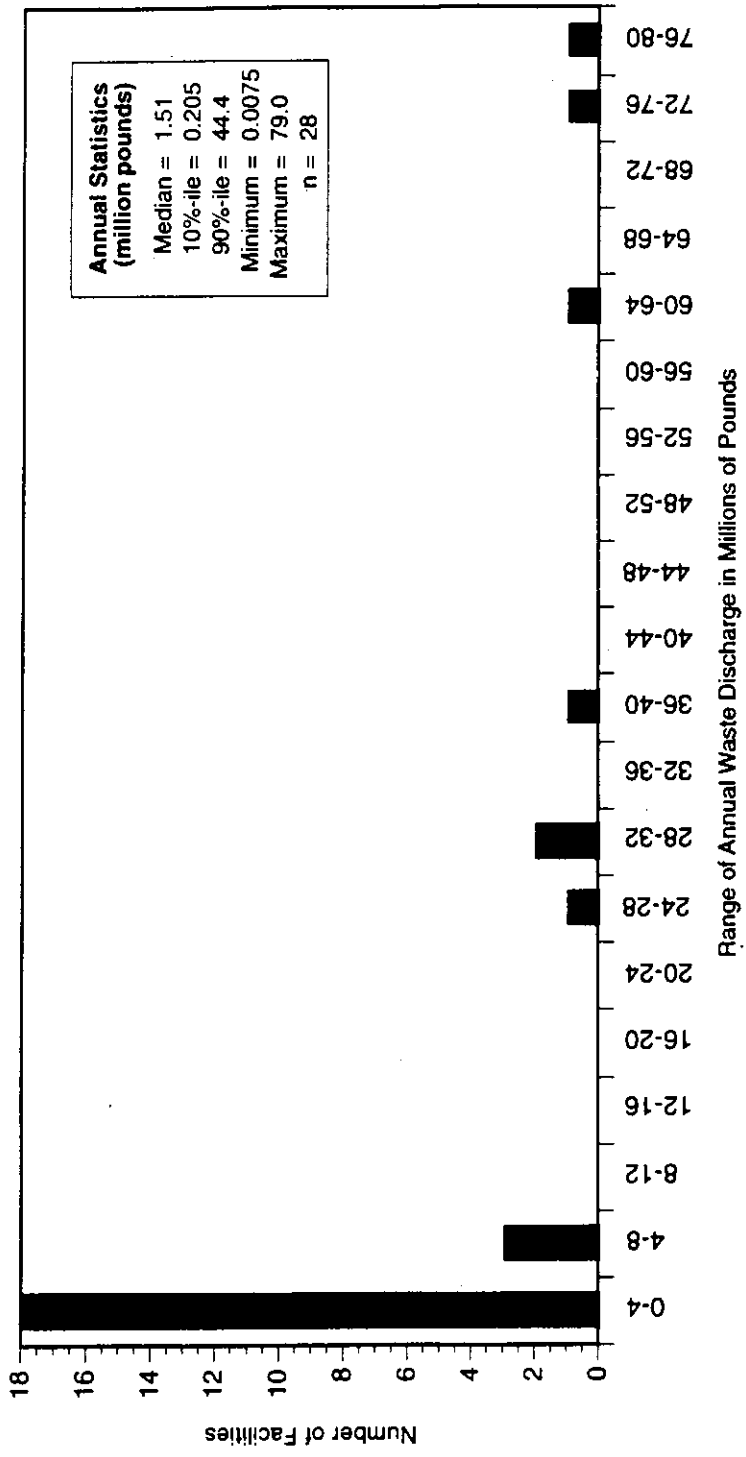


Figure 2-14. Frequency Distribution of Annual Solid Waste Discharge From Floating Seafood Processing Facilities in 1993 (n = 28).

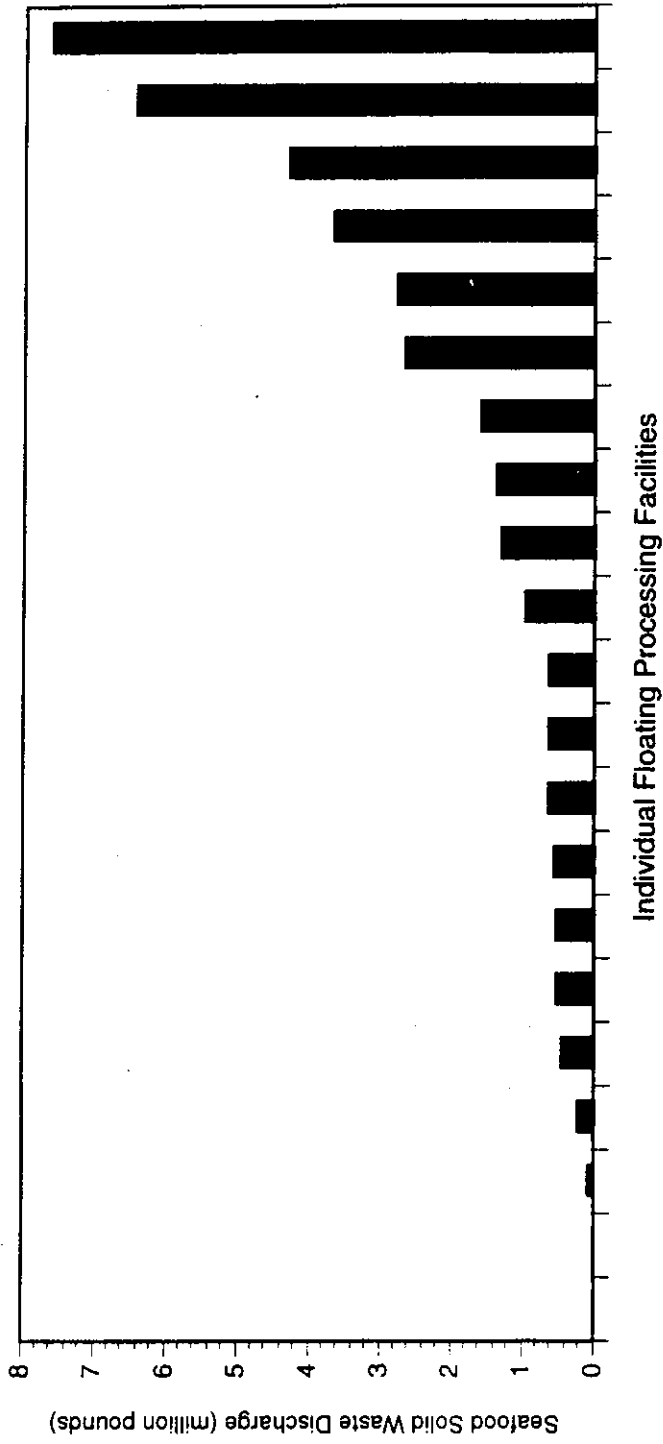


Figure 2-15. Distribution of Annual Solid Waste Discharge From Floating Seafood Processing Facilities Discharging Less Than 12 Million Pounds of Solid Seafood Waste in 1993 (n = 21).

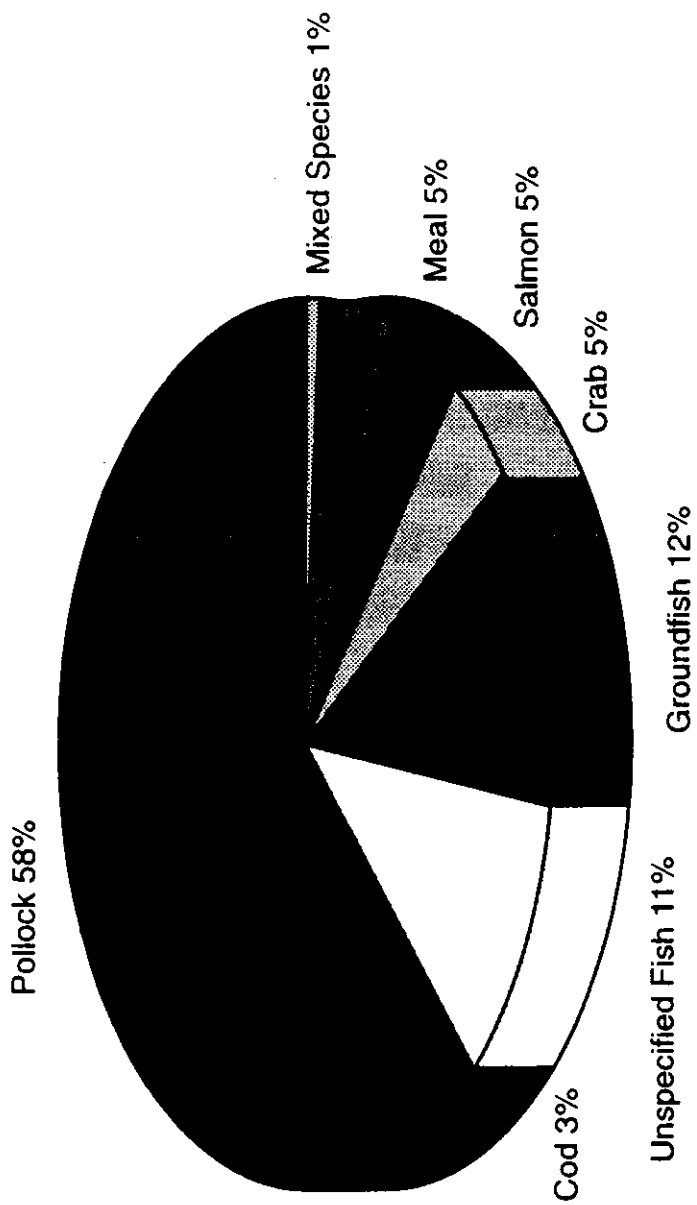


Figure 2-16. Distribution of Annual Seafood Solid Waste Discharged From Floating Facilities in 1993 by General Species Categories (n = 28).

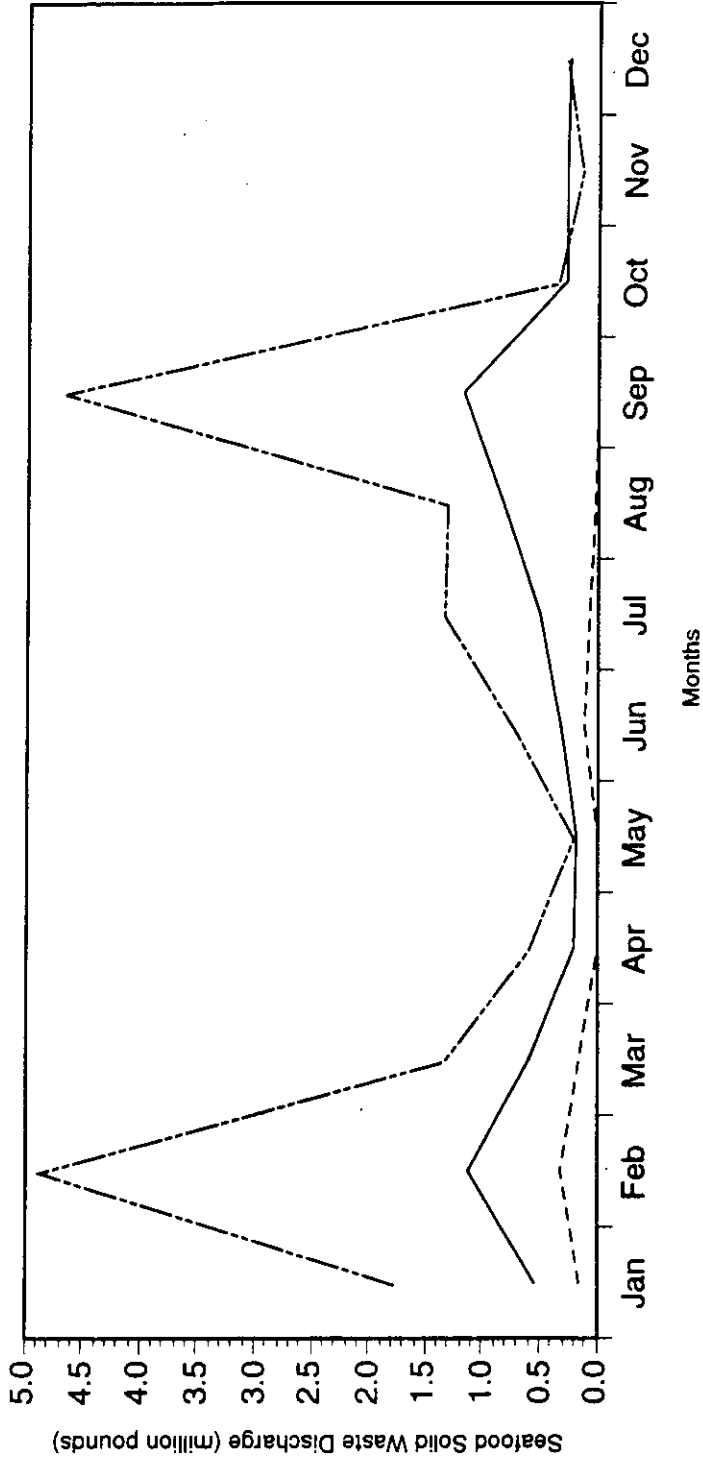
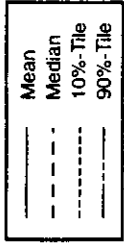


Figure 2-17. Monthly Seafood Solid Waste Discharge Statistics for Floating Facilities in 1993 (n = 22).

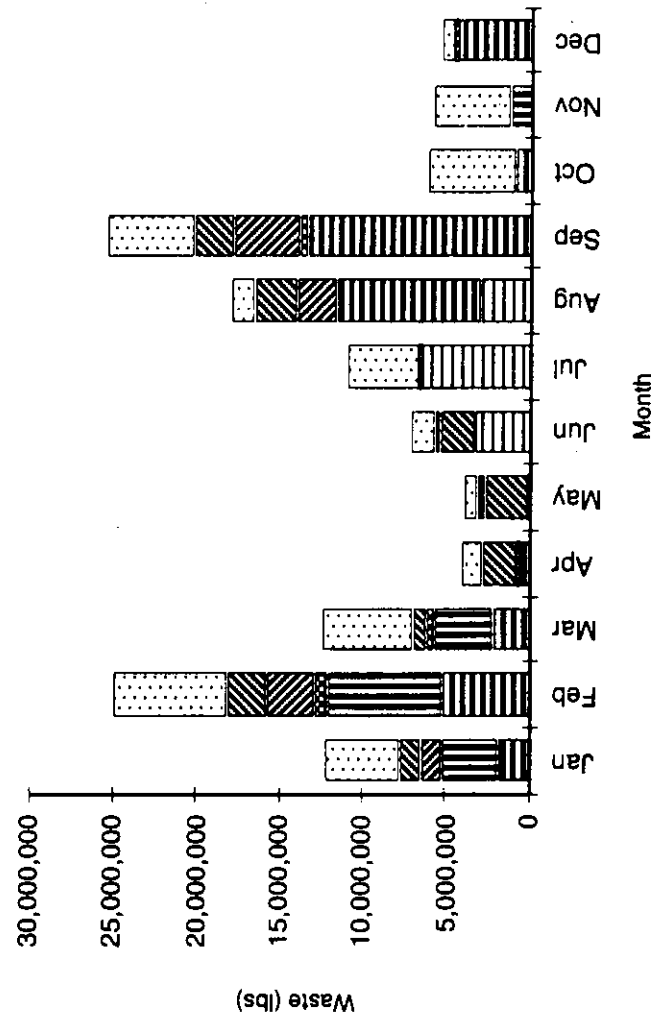
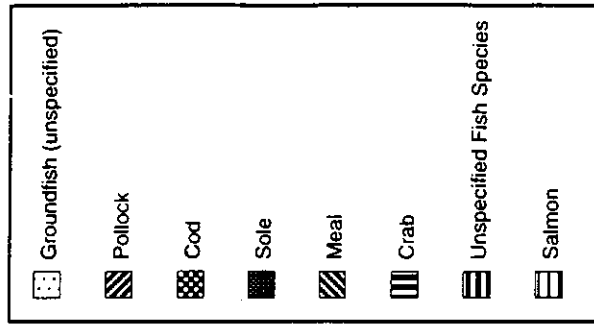


Figure 2-18. Monthly Distribution by General Species Category of Total Seafood Solid Waste Discharged by Floating Facilities in 1993 (n = 22).

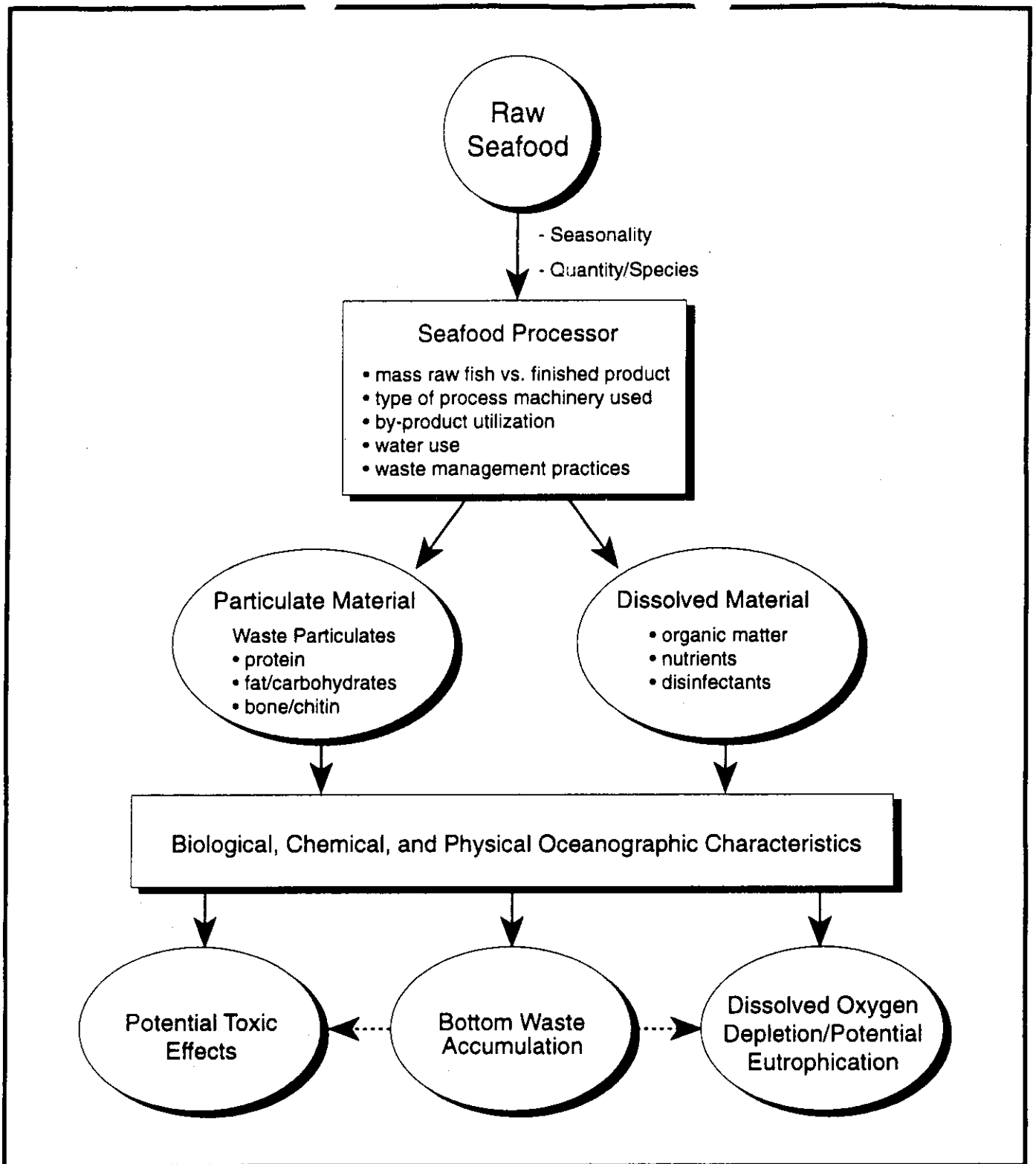


Figure 3-1. Conceptual Model of the Fate, Transport, Persistence, and Potential Adverse Impacts from Alaskan Seafood Processing Waste Discharges.

Seafood Waste Model (18 m smallest cell size)

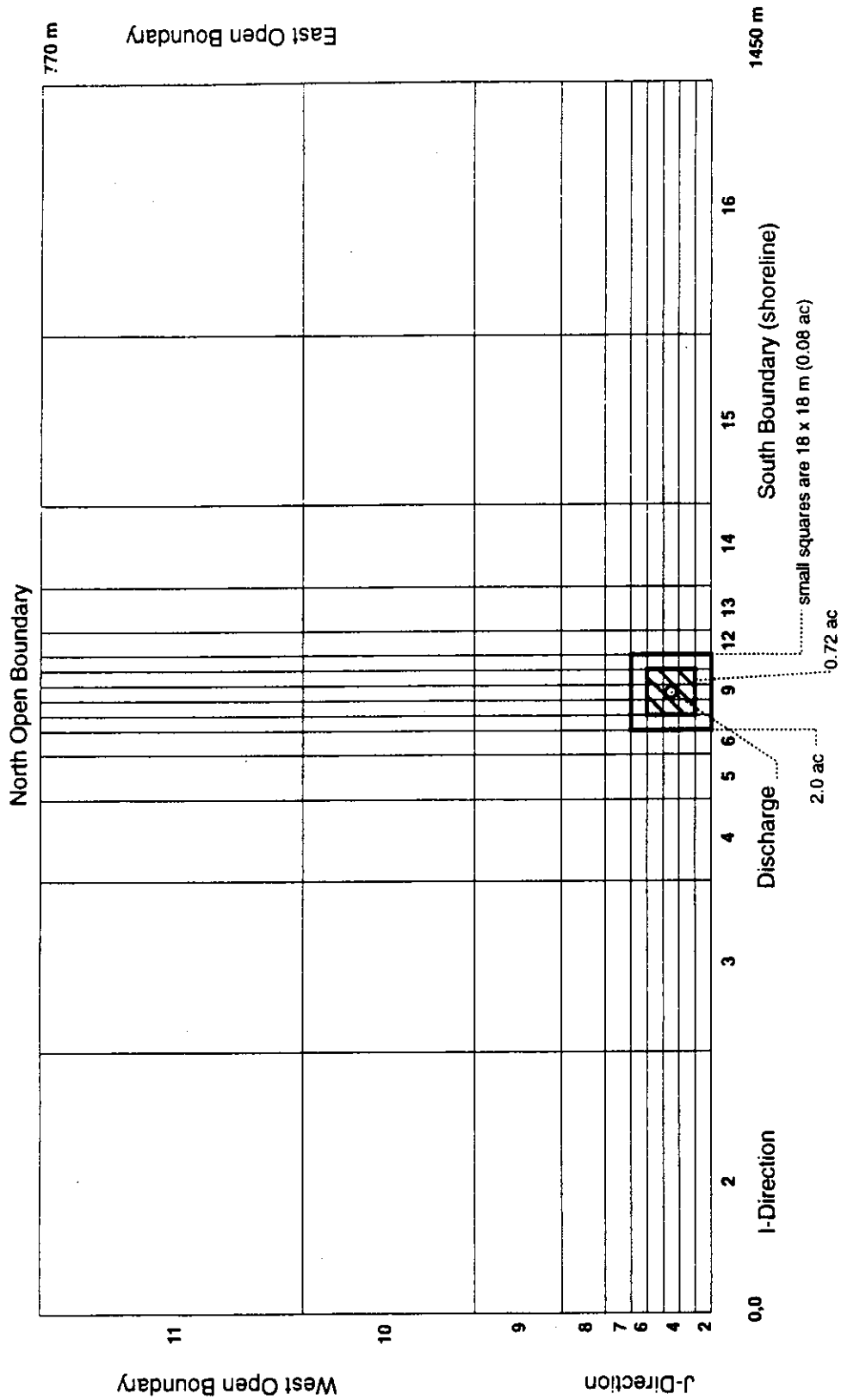


Figure 3-2 Variable-Spaced Model Grid for Shore-Based Seafood Waste Model.

## Seafood Waste Model

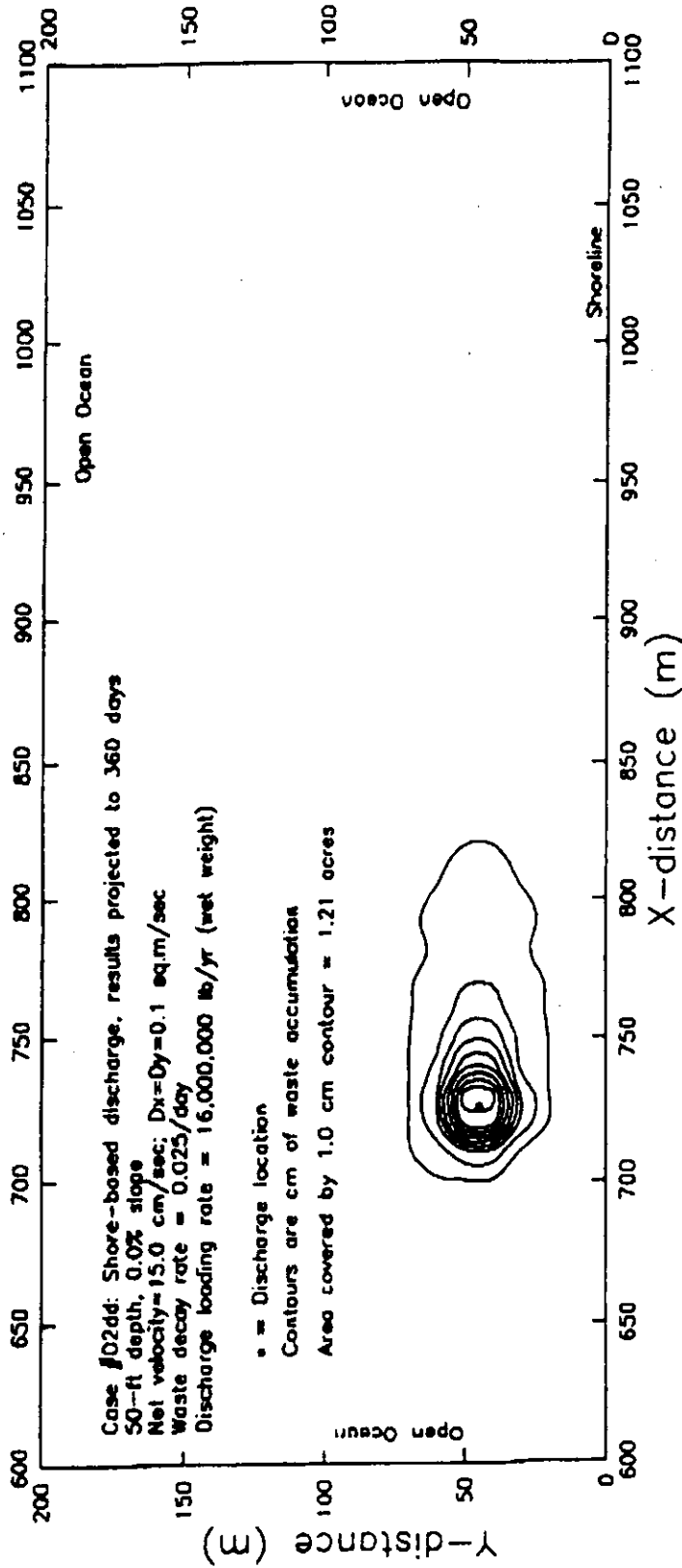
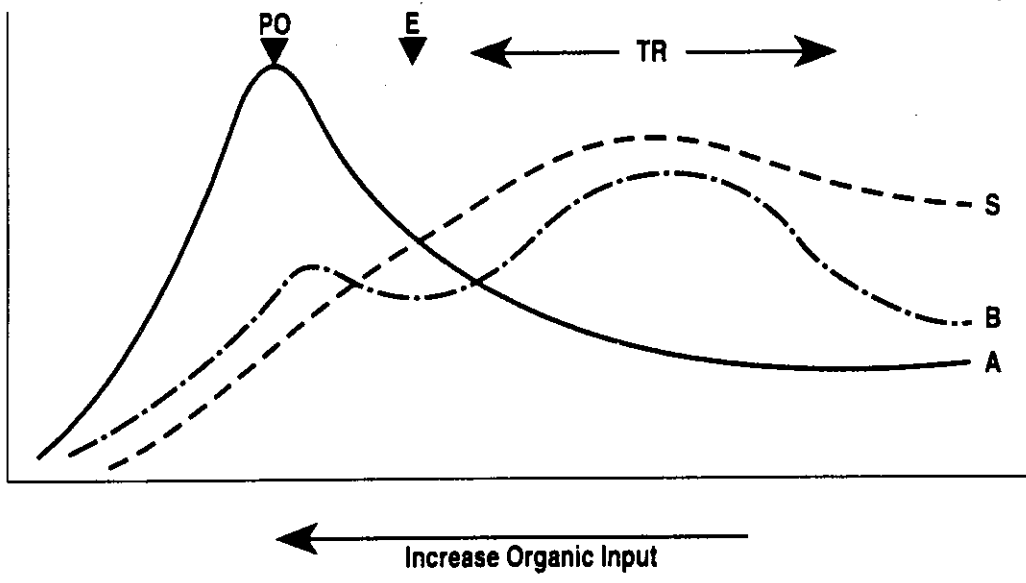


Figure 3-3. Example SURFER™ Contour Plot of Seafood Waste Deposit Depths for a Shore-Based Discharge With a Net-Drift Current Speed of 15 cm/sec, a Decay Rate of 0.025/day, and a Steady Waste Solids Discharge Rate of 16 Million Pounds (wet weight) Per Year.



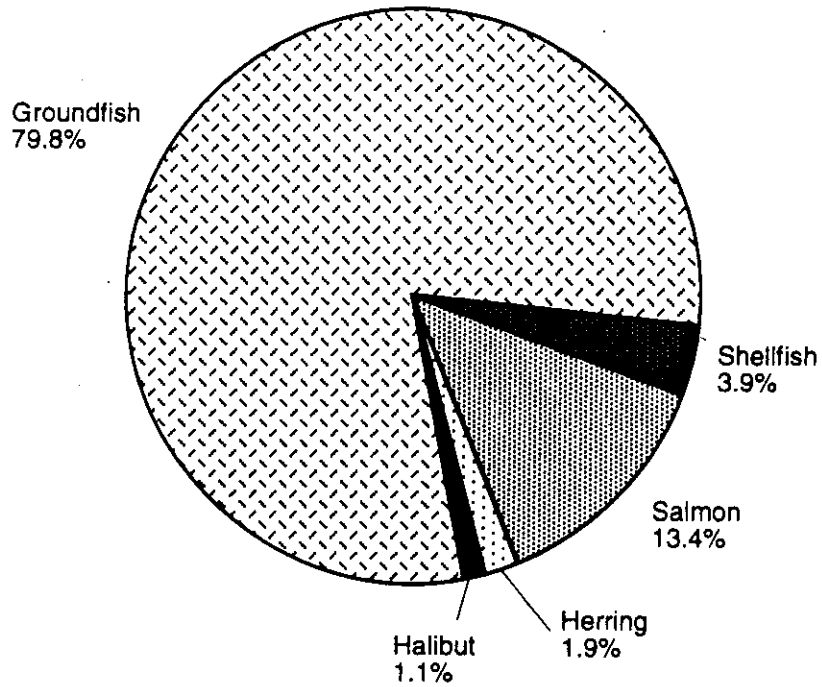


- S = Species Numbers
- A = Total Abundance
- B = Total Biomass
- PO = Peak of Opportunists
- E = Ecotone Point
- TR = Transition Zone

Reference: Figure 2 of Pearson and Roseberg (1978).

Figure 5-1. Generalized Changes in the Number of Species, Total Abundance, and Total Biomass Along Gradient of Organic Enrichment in Benthic Habitats.

	(million pounds)	(metric tons)
Salmon:	699.2	317,152
Herring:	97.9	44,407
Halibut:	55.5	25,174
<sup>2</sup> Groundfish:	4,160.0	1,886,944
<sup>3</sup> Shellfish	201.0	91,172
<b>TOTAL LANDINGS</b>	<b>5,213.6</b>	<b>2,364,849</b>



<sup>1</sup> Landings data obtained from Alaska Department of Fish & Game

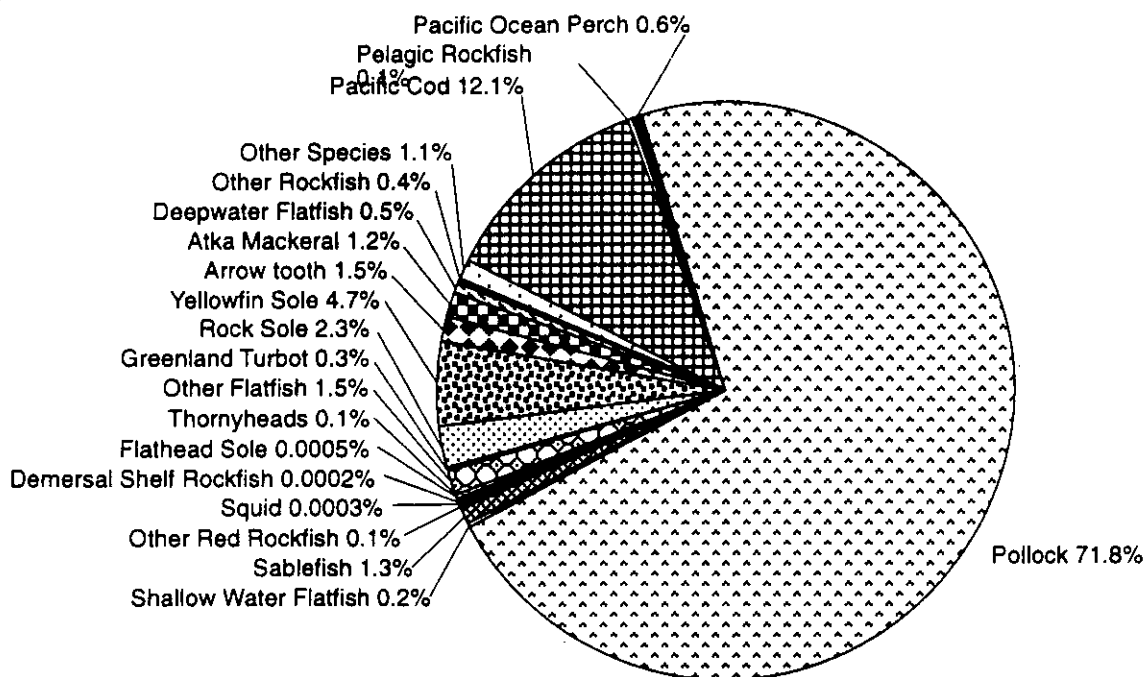
<sup>2</sup> Major species include Atka Mackerel, Walleye Pollock, Pacific Cod, Rockfishes, Flatfishes, Sablefish, and Pacific Ocean Perch

<sup>3</sup> Major species include King Crab, Tanner Crab, Dungeness Crab, Shrimp, Octopus, Clams, Sea Urchins, and Korean Hair Crab

Source: Tetra Tech 1992.

Figure 7-1. Alaska Total Commercial Fisheries Landings, 1989 <sup>1</sup>

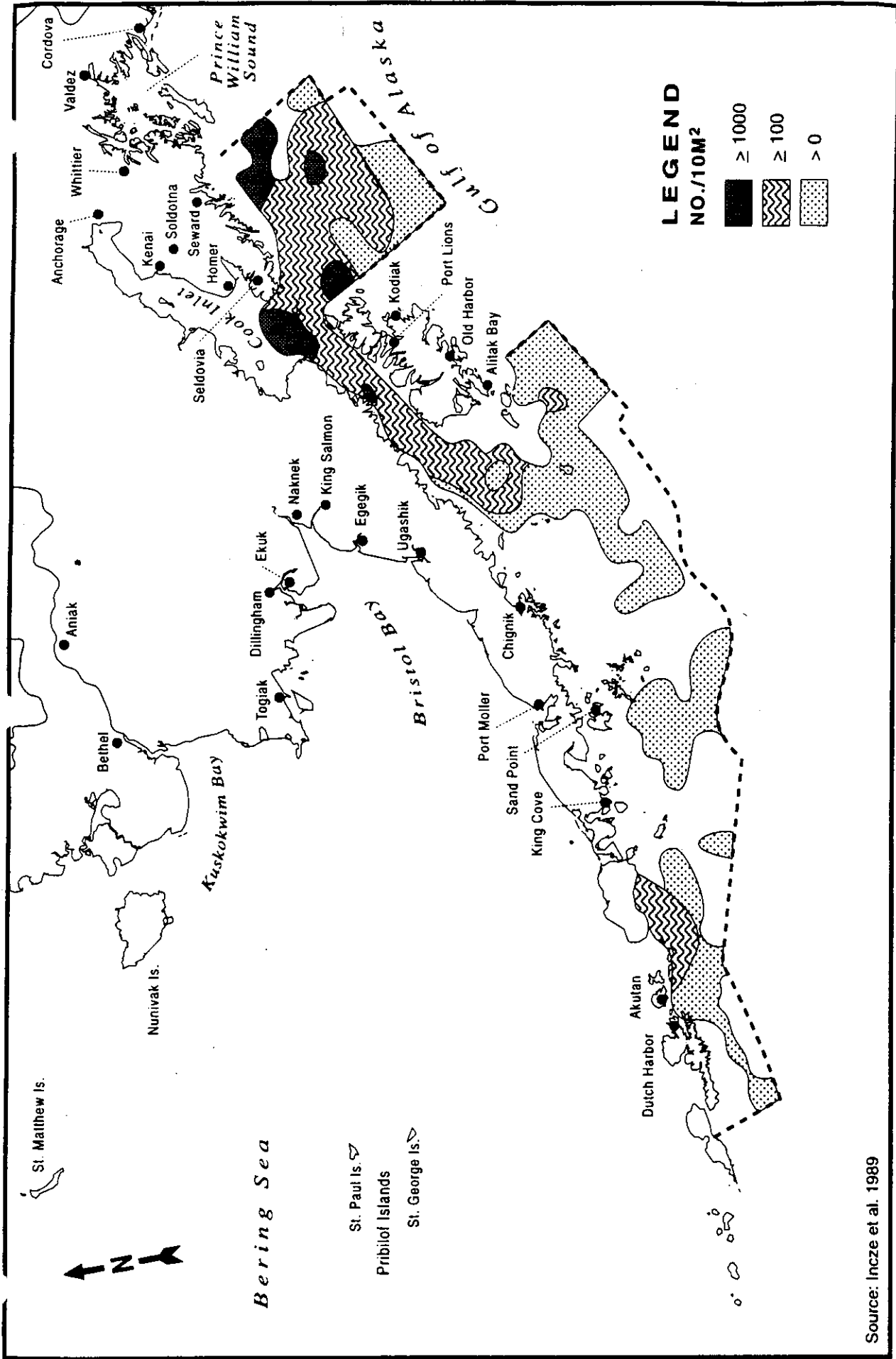
	(metric tons)		(metric tons)
Arrow tooth :	30,140	Walleye Pollock	1,440,521
Atka Mackeral	24,523	Sablefish	25,476
Deepwater Flatfish	10,226	Shallow Water Flatfish	4,335
Demersal Shelf Rockfish	395	Other Red Rockfish	2,195
Flathead Sole	993	Thornyheads	1,085
Other Rockfish	7,452	Greenland Turbot	6,878
Other Species	22,031	Other Flatfish	30,573
Pacific Cod	242,960	Rock Sole	46,772
Pacific Ocean Perch	12,582	Squid	632
Pelagic Rockfish	2,342	Yellowfin Sole	94,785
		<b>TOTAL LANDINGS</b>	<b>2,006,896</b>



<sup>1</sup> Landings data obtained from National Marine Fisheries Service, Fish Management Section, Juneau, AK.

Source: Tetra Tech 1992.

Figure 7-2. Alaska Total Groundfish Landings by Species and Species Group, 1991 <sup>1</sup>



Source: Incze et al. 1989

Figure 7-3. Distribution of Walleye Pollock Larvae From 16 May to 8 June 1985.  
 (dotted line indicates areas sampled)

