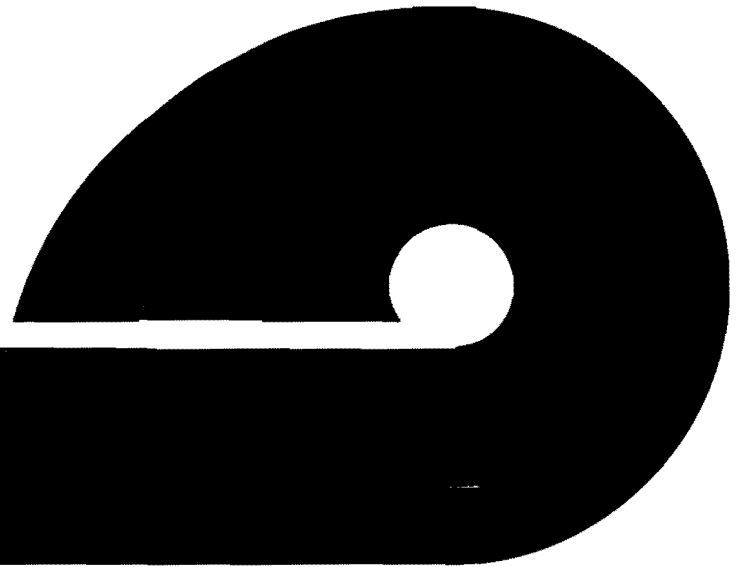


FISH COMMISSION OF OREGON

SILETZ RIVER ESTUARY

A STUDY IN RESOURCE USE
DIVISION OF MANAGEMENT AND RESEARCH



1971 SILETZ RIVER ESTUARY RESOURCE USE STUDY

by
**Tom Gaumer
Darrell Demory
Laimons Osis**

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Division of Management and Research**

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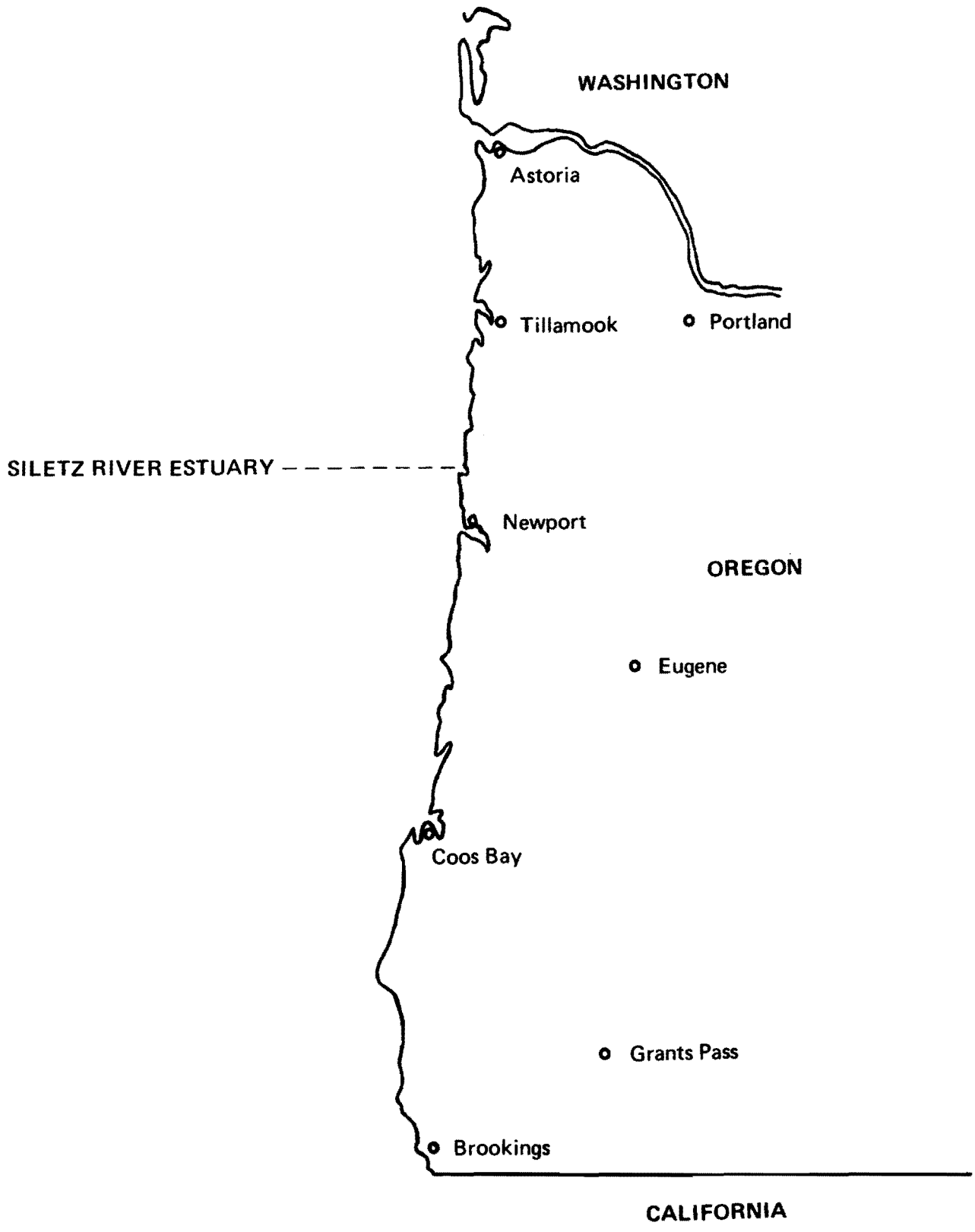


Figure 1. Location of Siletz River Estuary.

1971 SILETZ RIVER ESTUARY RESOURCE USE STUDY

INTRODUCTION

In 1971 the Fish Commission of Oregon conducted a comprehensive study of the recreational use of marine food fish, shellfish, and other miscellaneous invertebrates in 16 Oregon estuaries. The anadromous sport fisheries in the upper portions of most estuaries were not included in the study due to the lack of manpower to adequately sample those areas. The study was supported by state general funds and by the National Marine Fisheries Service under the Commercial Fisheries Research and Development Act. The U.S. Army Corps of Engineers funded portions of the data processing, preparation of a series of marine resource maps, and a special report for each estuary. This report summarizes the results of the Siletz River Estuary study.

PROCEDURE

The Siletz River Estuary is located 128 miles south of the Columbia River (Figure 1). The 1,187-acre bay contains 775 acres of tidelands.

From March 1 through October 31, 1971, boat and shore anglers, tideflat users, and scuba divers were interviewed for catch, effort, and origin data in a program designed for statistical analysis. Resource users were categorized as (1) county: people that reside west of the coast range summit within the county where the sampled estuary is found, (2) state: residents of Oregon not classified as county, and (3) nonstate: nonresidents of Oregon.

The study area extended from the mouth of the estuary upstream 2.5 miles to the Highway 101 bridge. Survey areas and their station numbers are outlined in Table 1 and are shown in Figure 2.

The 1971 Siletz River Estuary commercial landings of shellfish and their value, taken from Fish Commission catch statistic reports, are included in the results as supplemental information.

The following maps were prepared using information collected in previous Fish Commission studies and the 1971 resource use survey.

1. Principal boat fishing areas.
2. Clam beds.
3. Eel grass beds.
4. Food production areas, fish feeding areas, and fish migration routes.

RESULTS

During the study 2,740 boat, shore, tideflat, and scuba resource user interviews were obtained to estimate catch and effort values and angler origin. The values presented in the tables are estimates and have been rounded off when used in the text.

Boat Fishery

Figure 3 shows the principal boat fishing areas of the Siletz River Estuary. Only sport boat fishing areas are shown on the map since no commercial boat fishery occurs on the estuary. Principal species of fish and shellfish caught and peak periods of fishing activity are outlined.

An estimated 8,800 boat angler trips were expended on the Siletz River Estuary below the Highway 101 bridge (Table 2). Boat anglers spent 33,500 hours fishing (Table 3). Peak months of activity were August and September.

Seventeen species of fish and one species of crab were identified in the boat anglers' catch (Table 4). Dungeness crab and starry flounder were the principal species taken and accounted for 83% of the total number of animals caught. The major catches occurred from May through August (Table 5). Fishing success (catch per hour) was highest during May when large numbers of starry flounder moved into the bay.

Shore Fishery

Interview data revealed that 15,900 shore angler trips were expended on the Siletz River Estuary (Table 6). The Taft Pier and adjacent area was the principal fishing area; 97% of the anglers fished there. Shore anglers spent 32,900 hours fishing (Table 7). The peak month of activity was August.

Twenty species of fish and one species of crab were identified in the shore anglers' catch (Table 8). Pacific staghorn sculpin, shiner perch, and Dungeness crab were the principal species taken, accounting for 85% of the total number of animals caught. Catch and fishing success were highest during August (Table 9).

Tideflat Fishery

Figure 4 shows the one known bay clam area in the Siletz River Estuary. This flat, near the mouth of Drift Creek, contains a small population of soft shell clams although no clams were observed taken during the study.

Table 10 shows that 2,200 tideflat user trips were expended to harvest marine animals from the estuary. The tideflat users spent 2,000 hours collecting five species of miscellaneous invertebrates with the principal species being ghost and mud shrimp (Tables 11 and 12). June was the peak month of activity and catch.

Scuba Fishery

The small number of scuba divers interviewed on the Siletz River Estuary precluded making an estimate of catch and effort for this fishery.

Angler Origin

Nearly 75% of the anglers interviewed were residents of Oregon living outside of Lincoln County, 17% were Lincoln County residents, and 8% were out-of-state residents.

	Angler Origin		
	County	State	Non-State
Boat	1,280	6,994	574
Shore	2,528	11,883	1,516
Tideflat	771	1,261	193
Total	4,579	20,138	2,283
Percentage	17.0	74.6	8.4

Combined Recreational Fisheries

A total of 27,000 resource user trips (8,900 boat, 15,900 shore, and 2,200 tideflat) were expended on the Siletz River Estuary during the study (Table 14). Approximately 75% of the users were residents of Oregon living outside of Lincoln County. The 27,000 user trips represented 68,400 hours of effort (33,500 boat, 32,900 shore, and 2,000 tideflat). The peak months of activity were September, August, and June for the boat, shore, and tideflat fisheries, respectively. Combining all fisheries, Table 15 shows that August was the peak month of activity.

Anglers of the three fisheries harvested 115,800 marine animals (81,000 shrimp, 23,400 fish, 11,300 crabs, and 50 miscellaneous invertebrates). Nearly equal numbers of fish and crabs were caught by boat anglers. Starry flounder and Dungeness crab were the principal species harvested. Fish were the principal animals harvested by shore anglers and represented 89% of their total take. Pacific staghorn sculpin and shiner perch were the principal species caught. Ghost and mud shrimp comprised 97% of the tideflat users' total take. No clams were observed collected. Comparing the catch for all three fisheries revealed that tideflat users harvested 83,600 or 72% of the total animals taken. Peak month of catch was June for the tideflat fishery and August for the boat and shore fisheries. Combining all fisheries, June was the principal month of catch.

Commercial Fishery

Commercial landings of shellfish caught in the Siletz River Estuary in 1971 totaled 176 pounds of ghost and mud shrimp valued at \$178 (fisherman's level) according to Fish Commission landing statistics.

Eel Grass Beds

Eel grass beds are found scattered in the Taft-Schooner Creek area of the lower bay (Figure 5). These beds are usually found in areas of shallow water and high salinities. Clams and other important marine fauna are usually an integral part of the eel grass beds.

Food Production Areas, Fish Feeding Areas, and Fish Migration Routes

Figure 6 shows the food production areas, fish feeding areas, and fish migration routes in the Siletz River Estuary.

Estuaries are some of the most productive lands on earth. The productivity of estuarial areas is directly related to length of shore line, depth of water, and geographical location. Within each estuary tidelands are generally more productive than deep water channel areas.

In the Siletz River Estuary, the production of food organisms occurs throughout the entire estuary. These food organisms include the microscopic phytoplankton and other algae, zooplankton, small crustaceans, mollusks, annelids, and fish which are all important in the estuarine food chain.

The fish feeding areas of the Siletz River Estuary (for finfish and shellfish) include all areas of the estuary under tidal influence. Tidelands as well as deep water channels and rocky areas provide a variety of rearing habitat. Species of fish, numbers, and distribution within each area are generally related to type of food organisms, bottom type, water depth, and water quality.

Fish and shellfish typically found associated with tidelands include flounder, sole, perch, salmon, trout, crabs, shrimp, and clams. In addition to those species found on tidelands, herring, anchovy, and smelt reside in the estuary channels; period of residency is dependent on species, season, and location. A taxonomic list of the species of marine animals observed in this study is contained in Table 16.

Rocky areas in the lower Siletz River Estuary are the preferred feeding and rearing areas of perch, greenling, and cabezon. These fish reside near the Taft Pier and Schooner Creek.

Fish migration routes are those areas traveled by fish to and from spawning, feeding, or rearing areas. Fish migration routes through the Siletz River Estuary are as varied as the fish that use them. Species and age class of fish, season, water depth, and water quality all play an important role in fish migration patterns.

The use of channel areas throughout the estuary by salmon, trout, shad, sturgeon, perch, flounder, and baitfish is well known. In addition during high tide these same fish frequently swim across tidelands to reach their destination.

**Table 1. LOCATION OF SAMPLING STATIONS
Siletz River Estuary, 1971**

Fishing Activity	Station Number	Location
Boat	B-1	Highway 101 bridge downstream to mouth of estuary
Shore	S-1	Taft Pier including adjacent beach areas
	S-2	Kernville moorages – Highway 101 bridge at Millport Slough
Tideflat	T-1	All tideflats in estuary

**Table 2. NUMBER OF BOAT ANGLER TRIPS
By Month and Area, Siletz River Estuary
March 1 through October 31, 1971**

Month	Boat Fishing Area and Station Number		Percentage
	Below 101 Bridge B-1	Total	
March	345	345	3.9
April	336	336	3.8
May	415	415	4.7
June	1,425	1,425	16.1
July	1,132	1,132	12.8
August	1,986	1,986	22.5
September	2,113	2,113	23.9
October	1,096	1,096	12.4
Total	8,848	8,848	100.1
Percentage	100.0	100.0	

**Table 3. HOURS OF BOAT ANGLER USE
By Month and Area, Siletz River Estuary
March 1 through October 31, 1971**

Month	Boat Fishing Area and Station Number		Percentage
	Below 101 Bridge B-1	Total	
March	929	929	2.8
April	1,159	1,159	3.5
May	1,913	1,913	5.7
June	3,325	3,325	9.9
July	3,843	3,843	11.5
August	8,031	8,031	24.0
September	9,483	9,483	28.3
October	4,822	4,822	14.4
Total	33,505	33,505	100.1
Percentage	100.0	100.0	

**Table 4. MARINE ANIMALS CAUGHT BY BOAT ANGLERS
Siletz River Estuary, by Species and Area
March 1 through October 31, 1971**

Species	Boat Fishing Area and Station Number		Percentage
	Below 101 Bridge B-1	Total	
Dungeness crab	6,688	6,688	46.6
Starry flounder	5,233	5,233	36.5
Redtail surfperch	665	665	4.6
Pacific staghorn sculpin	659	659	4.6
Chinook salmon (adult)	250	250	1.7
Striped seaperch	189	189	1.3
Coho salmon (adult)	140	140	1.0
Pile perch	84	84	0.6
Cutthroat trout	70	70	0.5
Shiner perch	69	69	0.5
Buffalo sculpin	48	48	0.3
Pacific tomcod	46	46	0.3
Red Irish lord	23	23	0.2
Silver surfperch	23	23	0.2
White seaperch	23	23	0.2
Rainbow trout	16	16	0.1
Sand sole	11	11	0.1
Walleye surfperch	11	11	0.1
Unidentified fish	89	89	0.6
Total	14,337	14,337	100.0
Percentage	100.0	100.0	

Table 5. SPORT BOAT FISHING DATA
Siletz River Estuary, All Areas
1971

	March	April	May	June	July	Aug.	Sept.	Oct.	Total	Percentage
Angler trips (number)	345	336	415	1,425	1,132	1,986	2,113	1,096	8,848	—
Fishing effort (hours)	929	1,159	1,913	3,325	3,843	8,031	9,483	4,822	33,505	—
Fishing success (catch/hr.)	0.59	0.55	1.57	0.61	0.64	0.62	0.04	0.05	0.43	—
Catch (number)										
Dungeness crab	5	0	113	69	1,786	4,571	0	144	6,688	46.6
Starry flounder	487	642	2,470	1,248	218	87	71	10	5,233	36.5
Redtail surfperch	0	0	146	393	126	0	0	0	665	4.6
Pacific staghorn sculpin	21	0	0	115	230	293	0	0	659	4.6
Chinook salmon (adult)	0	0	0	0	0	0	189	61	250	1.7
Striped seaperch	0	0	178	0	11	0	0	0	189	1.3
Coho salmon (adult)	0	0	0	0	0	0	94	46	140	1.0
Pile perch	0	0	32	0	23	29	0	0	84	0.6
Cutthroat trout	0	0	0	23	0	0	47	0	70	0.5
Shiner perch	0	0	0	46	23	0	0	0	69	0.5
Buffalo sculpin	0	0	48	0	0	0	0	0	48	0.3
Pacific tomcod	0	0	0	46	0	0	0	0	46	0.3
Red Irish lord	0	0	0	0	0	0	23	0	23	0.2
Silver surfperch	0	0	0	23	0	0	0	0	23	0.2
White seaperch	0	0	0	23	0	0	0	0	23	0.2
Rainbow trout	0	0	16	0	0	0	0	0	16	0.1
Sand sole	0	0	0	0	11	0	0	0	11	0.1
Walleye surfperch	0	0	0	0	11	0	0	0	11	0.1
Unidentified fish	32	0	0	46	11	0	0	0	89	0.6
Total	545	642	3,003	2,032	2,450	4,980	424	261	14,337	100.0
Percentage	3.8	4.5	20.9	14.2	17.1	34.7	3.0	1.8	100.0	

**Table 6. NUMBER OF SHORE ANGLER TRIPS
By Month and Area, Siletz River Estuary
March 1 through October 31, 1971**

Month	Shore Fishing Area and Station Number		Total	Percentage
	Taft S-1	Kernville S-2		
March	514	0	514	3.2
April	776	4	780	4.9
May	1,390	35	1,425	8.9
June	1,816	27	1,843	11.6
July	3,253	334	3,587	22.5
August	4,484	2	4,486	28.2
September	2,076	0	2,076	13.0
October	1,200	16	1,216	7.6
Total	15,509	418	15,927	99.9
Percentage	97.4	2.6	100.0	

**Table 7. HOURS OF SHORE ANGLER USE
By Month and Area, Siletz River Estuary
March 1 through October 31, 1971**

Month	Shore Fishing Area and Station Number		Total	Percentage
	Taft S-1	Kernville S-2		
March	1,061	0	1,061	3.2
April	1,603	9	1,612	4.9
May	2,868	72	2,940	8.9
June	3,757	56	3,813	11.6
July	6,728	692	7,420	22.5
August	9,279	5	9,284	28.2
September	4,289	0	4,289	13.0
October	2,483	33	2,516	7.6
Total	32,068	867	32,935	99.9
Percentage	97.4	2.6	100.0	

**Table 8. MARINE ANIMALS CAUGHT BY SHORE ANGLERS
Siletz River Estuary, By Species and Area
March 1 through October 31, 1971**

Species	Shore Fishing Area and Station Number		Total	Percentage
	Taft S-1	Kernville S-2		
Dungeness crab	2,043	0	2,043	11.5
Pacific staghorn sculpin	6,586	190	6,776	38.1
Shiner perch	6,265	0	6,265	35.2
Starry flounder	1,116	24	1,140	6.4
Northern anchovy	321	0	321	1.8
Striped seaperch	33	196	229	1.3
Redtail surfperch	161	0	161	0.9
Pacific herring	121	0	121	0.7
Walleye surfperch	0	106	106	0.6
Pacific tomcod	81	0	81	0.4
Pile perch	44	36	80	0.4
Surf smelt	47	0	47	0.3
Coho salmon (adult)	29	0	29	0.2
Pacific sand lance	24	0	24	0.1
Cabezon	23	0	23	0.1
Buffalo sculpin	15	0	15	0.1
Kelp greenling	12	0	12	0.1
Chinook salmon (adult)	11	0	11	0.1
Sand sole	11	0	11	0.1
Rock greenling	10	0	10	0.1
Cutthroat trout	0	7	7	<0.1
Unidentified fish	294	0	294	1.7
Total	17,247	559	17,806	100.2
Percentage	96.9	3.1	100.0	

**Table 9. SHORE FISHING DATA
Siletz River Estuary, All Areas
1971**

	March	April	May	June	July	Aug.	Sept.	Oct.	Total	Percentage
Angler trips (number)	514	780	1,425	1,843	3,587	4,486	2,076	1,216	15,927	—
Fishing effort (hours)	1,061	1,612	2,940	3,813	7,420	9,284	4,289	2,516	32,935	—
Fishing success (catch/hr.)	0.09	0.27	0.21	0.73	0.56	0.83	0.26	0.36	0.54	—
Catch (number)										
Dungeness crab	5	62	86	426	479	428	110	447	2,043	11.5
Pacific staghorn sculpin	0	0	0	545	1,463	4,189	451	128	6,776	38.1
Shiner perch	0	0	86	1,388	1,599	2,499	527	166	6,265	35.2
Starry flounder	69	217	405	207	85	95	25	37	1,140	6.4
Northern anchovy	0	0	0	0	12	309	0	0	321	1.8
Striped seaperch	0	0	0	21	208	0	0	0	229	1.3
Redtail surfperch	11	139	0	0	0	11	0	0	161	0.9
Pacific herring	0	0	0	0	110	11	0	0	121	0.7
Walleye surfperch	0	0	0	0	0	0	0	106	106	0.6
Pacific tomcod	0	0	0	10	12	59	0	0	81	0.4
Pile perch	0	0	0	21	36	23	0	0	80	0.4
Surf smelt	0	0	0	0	36	11	0	0	47	0.3
Coho salmon (adult)	0	0	0	0	12	0	17	0	29	0.2
Pacific sand lance	0	0	0	0	24	0	0	0	24	0.1
Cabezon	0	0	0	0	12	11	0	0	23	0.1
Buffalo sculpin	0	15	0	0	0	0	0	0	15	0.1
Kelp greenling	0	0	0	0	12	0	0	0	12	0.1
Chinook salmon (adult)	0	0	0	0	0	11	0	0	11	0.1
Sand sole	0	0	0	0	0	11	0	0	11	0.1
Rock greenling	0	0	0	10	0	0	0	0	10	0.1
Cutthroat trout	0	0	0	0	0	0	0	7	7	<0.1
Unidentified fish	11	0	42	153	73	0	0	15	294	1.7
Total	96	433	619	2,781	4,173	7,668	1,130	906	17,806	100.2
Percentage	0.5	2.4	3.5	15.6	23.4	43.1	6.3	5.1	99.9	

**Table 10. NUMBER OF TIDEFLAT USER TRIPS
By Month and Area, Siletz River Estuary
March 1 through October 31, 1971**

Month	<u>Tideflat and Station Number</u>		Percentage
	All Tideflats in Estuary	Total	
	T-1		
March	96	96	4.3
April	86	86	3.9
May	208	208	9.3
June	1,124	1,124	50.5
July	389	389	17.5
August	63	63	2.8
September	0	0	0.0
October	259	259	11.6
Total	2,225	2,225	99.9
Percentage	100.0	100.0	

**Table 11. HOURS OF TIDEFLAT USE
By Month and Area, Siletz River Estuary
March 1 through October 31, 1971**

Month	<u>Tideflat and Station Number</u>		Percentage
	All Tideflats in Estuary	Total	
	T-1		
March	85	85	4.3
April	36	36	1.8
May	250	250	12.8
June	437	437	22.3
July	303	303	15.5
August	589	589	30.1
September	0	0	0.0
October	259	259	13.2
Total	1,959	1,959	100.0
Percentage	100.0	100.0	

Table 12. MARINE ANIMALS CAUGHT BY TIDEFLAT USERS
Siletz River Estuary, by Species and Area
March 1 through October 31, 1971

Species	Tideflat and Station Number		Percentage
	All tideflats in estuary T-1	Total	
Ghost shrimp	68,911	68,911	82.3
Mud shrimp	10,265	10,265	12.3
Shore crab	2,607	2,607	3.1
Bay mussel	41	41	0.1
Kelp worm	13	13	<0.1
Unidentified shrimp	1,786	1,786	2.1
Total	83,623	83,623	99.9
Percentage	100.0	100.0	

Table 13. TIDEFLAT FISHING DATA
Siletz River Estuary, All Areas
1971

	March	April	May	June	July	Aug.	Sept.	Oct.	Total	Percentage
Angler trips (number)	96	86	208	1,124	389	63	0	259	2,225	—
Fishing effort (hours)	85	36	250	437	303	589	0	259	1,959	—
Fishing success (catch/hr.)	15.8	41.1	30.1	77.0	29.1	33.4	0.0	43.0	42.7	—
Catch (number)										
Ghost shrimp	0	1,003	0	29,042	8,065	19,670	0	11,131	68,911	82.3
Mud shrimp	0	0	7,524	2,264	477	0	0	0	10,265	12.3
Shore crab	0	0	0	2,342	265	0	0	0	2,607	3.1
Bay mussel	0	41	0	0	0	0	0	0	41	0.1
Kelp worm	0	0	0	0	13	0	0	0	13	<0.1
Unidentified shrimp	1,347	439	0	0	0	0	0	0	1,786	2.1
Total	1,347	1,483	7,524	33,648	8,820	19,670	0	11,131	83,623	99.9
Percentage	1.6	1.8	9.0	40.2	10.5	23.5	0.0	13.3	99.9	

Table 14. SUMMARY
Number of Angler Trips, Hours of Effort, and Animals Caught
Siletz River Estuary, by Station
March 1 through October 31, 1971

Station Number	No. Angler Trips	Angler Hours	Catch				Total
			Fish	Crabs	Shrimp	Misc. Invert.	
B-1	8,848	33,505	7,649	6,688	0	0	14,337
Total	8,848	33,505	7,649	6,688	0	0	14,337
S-1	15,509	32,068	15,204	2,043	0	0	17,247
S-2	418	867	559	0	0	0	559
Total	15,927	32,935	15,763	2,043	0	0	17,806
T-1	2,225	1,959	0	2,607	80,962	54	83,623
Total	2,225	1,959	0	2,607	80,962	54	83,623
Grand Total	27,000	68,399	23,412	11,338	80,962	54	115,766

Table 15. SUMMARY
Number of Angler Trips, Hours of Effort, and Animals Caught
Siletz River Estuary, by Month
March 1 through October 31, 1971

Fishery	Month	No. Angler Trips	Angler Hours	Catch				Total
				Fish	Crabs	Shrimp	Misc. Invert	
Boat	March	345	929	540	5	0	0	545
	April	336	1,159	642	0	0	0	642
	May	415	1,913	2,890	113	0	0	3,003
	June	1,425	3,325	1,963	69	0	0	2,032
	July	1,132	3,843	664	1,786	0	0	2,450
	August	1,986	8,031	409	4,571	0	0	4,980
	September	2,113	9,483	424	0	0	0	424
	October	1,096	4,822	117	144	0	0	261
	Total	8,848	33,505	7,649	6,688	0	0	14,337
Shore	March	514	1,061	91	5	0	0	96
	April	780	1,612	371	62	0	0	433
	May	1,425	2,940	533	86	0	0	619
	June	1,843	3,813	2,355	426	0	0	2,781
	July	3,587	7,420	3,694	479	0	0	4,173
	August	4,486	9,284	7,240	428	0	0	7,668
	September	2,076	4,289	1,020	110	0	0	1,130
	October	1,216	2,516	459	447	0	0	906
	Total	15,927	32,935	15,763	2,043	0	0	17,806
Tideflat	March	96	85	0	0	1,347	0	1,347
	April	86	36	0	0	1,442	41	1,483
	May	208	250	0	0	7,524	0	7,524
	June	1,124	437	0	2,342	31,306	0	33,648
	July	389	303	0	265	8,542	13	8,820
	August	63	589	0	0	19,670	0	19,670
	September	0	0	0	0	0	0	0
	October	259	259	0	0	11,131	0	11,131
	Total	2,225	1,959	0	2,607	80,962	54	83,623
Combined	March	955	2,075	631	10	1,347	0	1,988
	April	1,202	2,807	1,013	62	1,442	41	2,558
	May	2,048	5,103	3,423	199	7,524	0	11,146
	June	4,392	7,575	4,318	2,837	31,306	0	38,461
	July	5,108	11,566	4,358	2,530	8,542	13	15,443
	August	6,535	17,904	7,649	4,999	19,670	0	32,318
	September	4,189	13,772	1,444	110	0	0	1,554
	October	2,571	7,597	576	591	11,131	0	12,298
Grand Total		27,000	68,399	23,412	11,338	80,962	54	115,766

**Table 16. TAXONOMIC LIST OF SPECIES HARVESTED
By Estuarine Resource Users, Siletz River Estuary
March 1 through October 31, 1971**

Common Name	Local Names	Scientific Name
Fish		
Buffalo sculpin	Bullhead	<i>Enophrys bison</i>
Cabezon	Bullhead, rock cod	<i>Scorpaenichthys marmoratus</i>
Chinook salmon	King salmon, salmon	<i>Oncorhynchus tshawytscha</i>
Coho salmon	Silver salmon	<i>Oncorhynchus kisutch</i>
Cutthroat trout	Blueback, harvest trout, sea run	<i>Salmo clarki</i>
Kelp greenling	Seatrout	<i>Hexagrammos decagrammus</i>
Northern anchovy		<i>Engraulis mordax</i>
Pacific herring		<i>Clupea harengus pallasii</i>
Pacific sand lance		<i>Ammodytes hexapterus</i>
Pacific staghorn sculpin	Bullhead	<i>Leptocottus armatus</i>
Pacific tomcod		<i>Microgadus proximus</i>
Pile perch		<i>Rhacochilus vacca</i>
Rainbow trout		<i>Salmo gairdneri</i>
Red Irish lord	Bullhead	<i>Hemilepidotus hemilepidotus</i>
Redtail surfperch		<i>Amphistichus rhodoterus</i>
Rock greenling	Seatrout	<i>Hexagrammos lagocephalus</i>
Sand sole		<i>Psettichthys melanostictus</i>
Shiner perch	Shiner	<i>Cymatogaster aggregata</i>
Silver surfperch		<i>Hyperprosopon ellipticum</i>
Starry flounder		<i>Platichthys stellatus</i>
Striped seaperch	Rainbow perch	<i>Embiotoca lateralis</i>
Surf smelt		<i>Hypomesus pretiosus</i>
Walleye surfperch		<i>Hyperprosopon argenteum</i>
White seaperch		<i>Phanerodon furcatus</i>
Crabs		
Dungeness crab	Market crab	<i>Cancer magister</i>
Shore crab	Mud crab	<i>Hemigrapsus oregonensis and Hemigrapsus nudus</i>
Miscellaneous Invertebrates		
Bay mussel		<i>Mytilus edulis</i>
Ghost shrimp	Sand shrimp	<i>Callinassa californiensis</i>
Kelp worm	Clam worm, mussel worm	<i>Nereis</i> sp.
Mud shrimp	Sand shrimp	<i>Upogebia pugettensis</i>

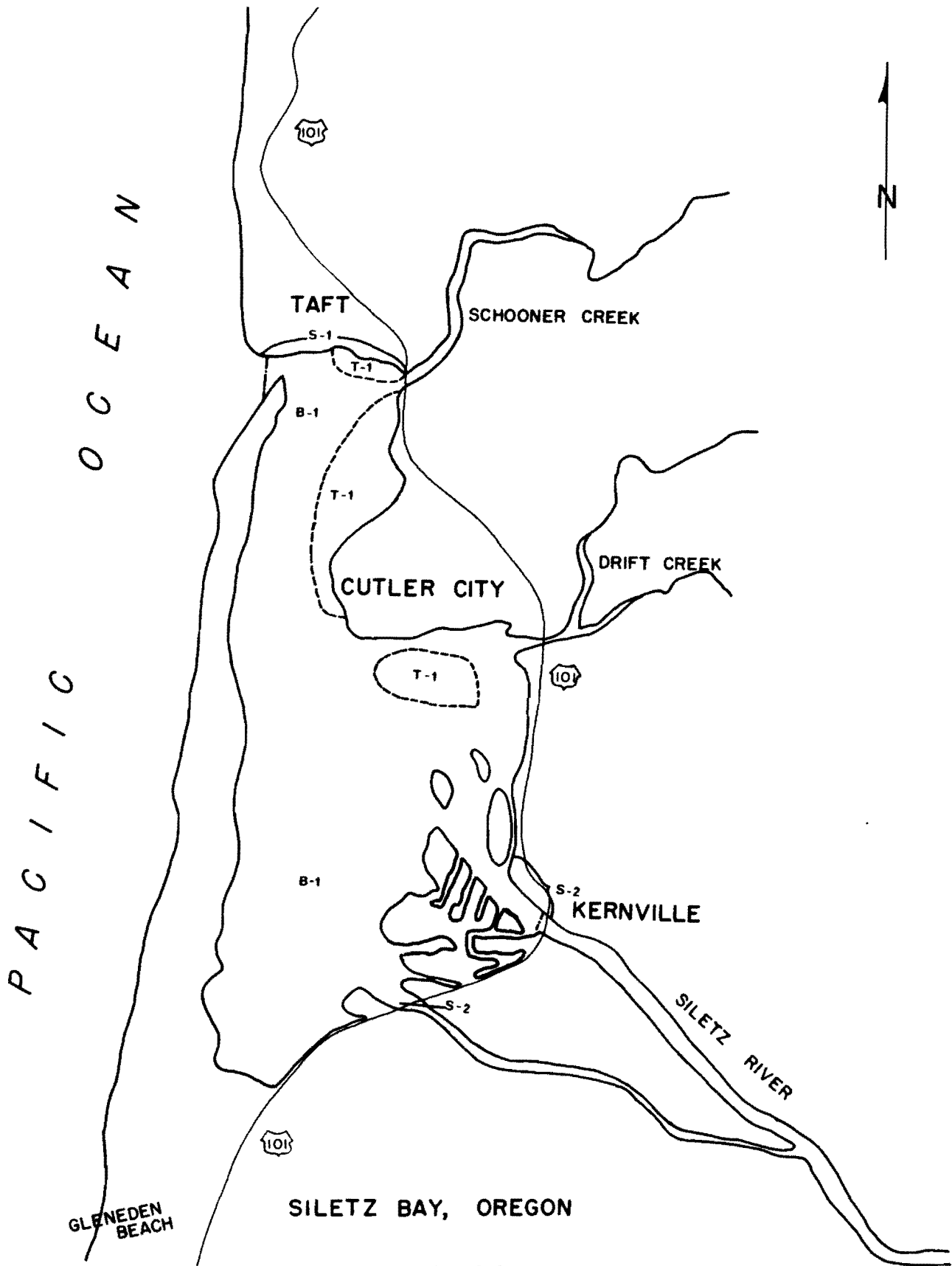


FIGURE 2. 1971 FCO RESOURCE SURVEY SAMPLING AREAS

- S - Shore Fishing Area
- B - Boat Fisheries Area
- T - Tideflat Use Area

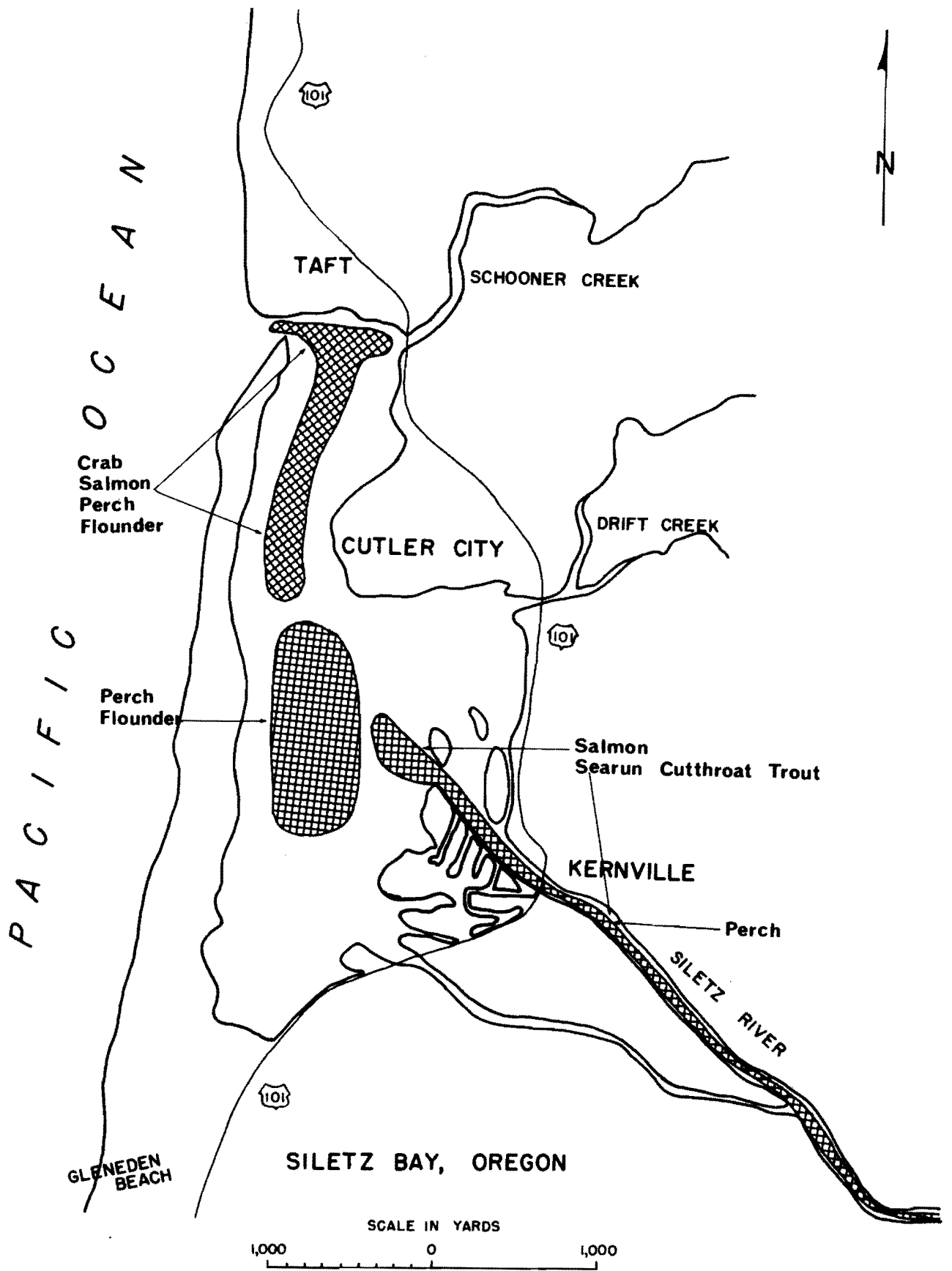
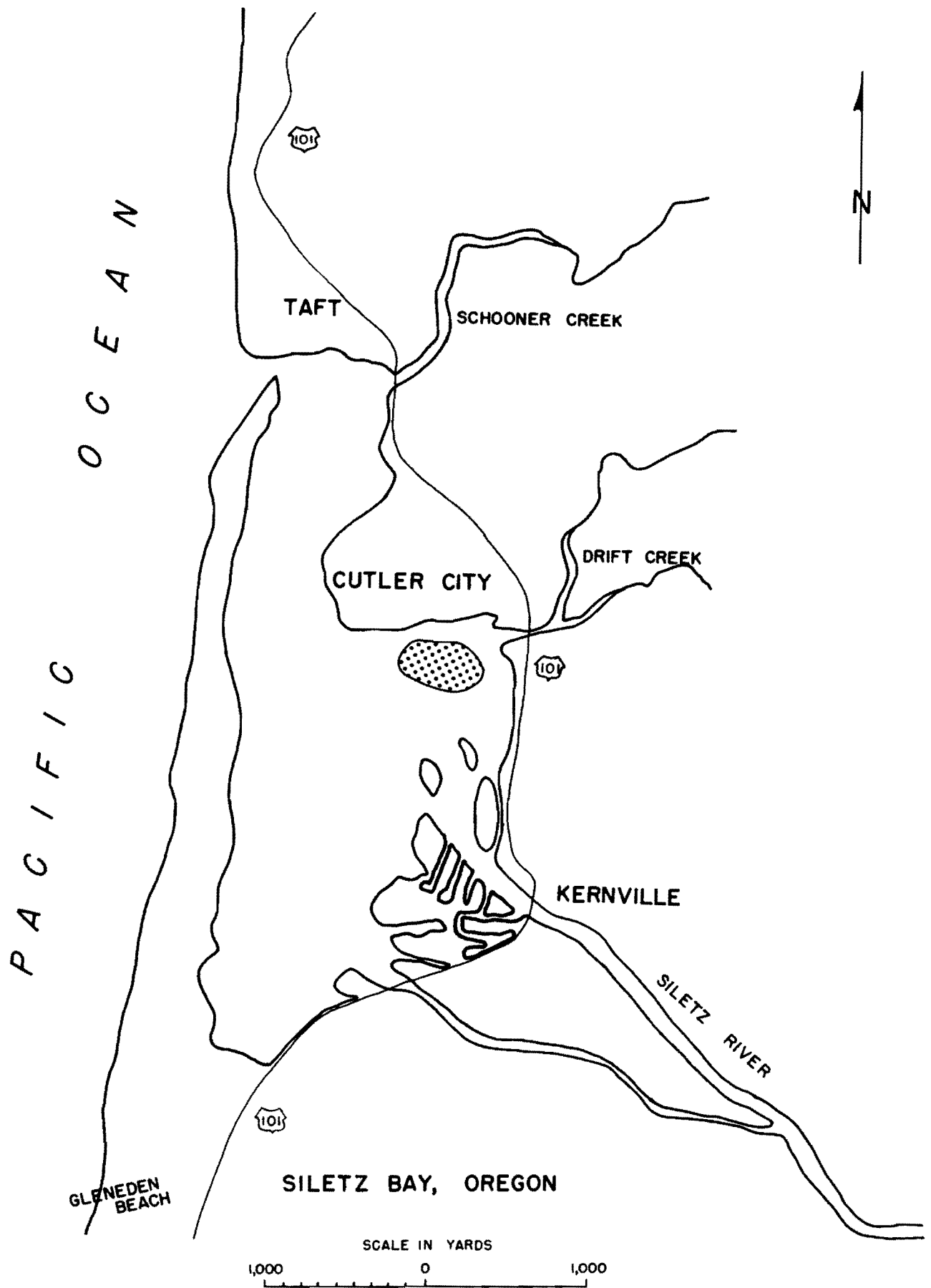


FIGURE 3. PRINCIPAL BOAT FISHING AREAS, 1971

Crab (March - October)	Flounder (March - August)
Salmon (August - October)	Searun Cutthroat Trout
Perch (March - August)	(August - September)



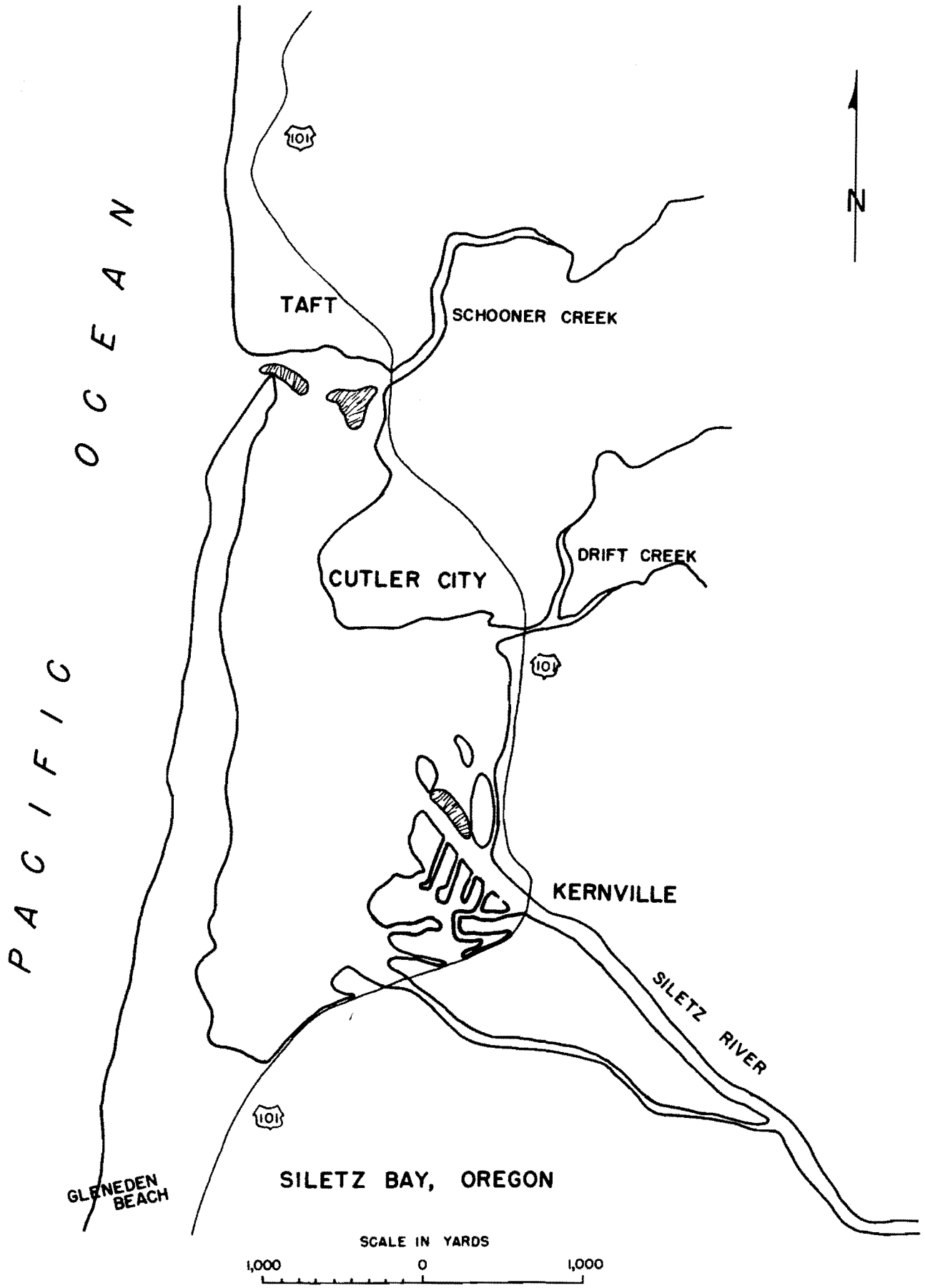


FIGURE 5.  EEL GRASS BEDS, 1971

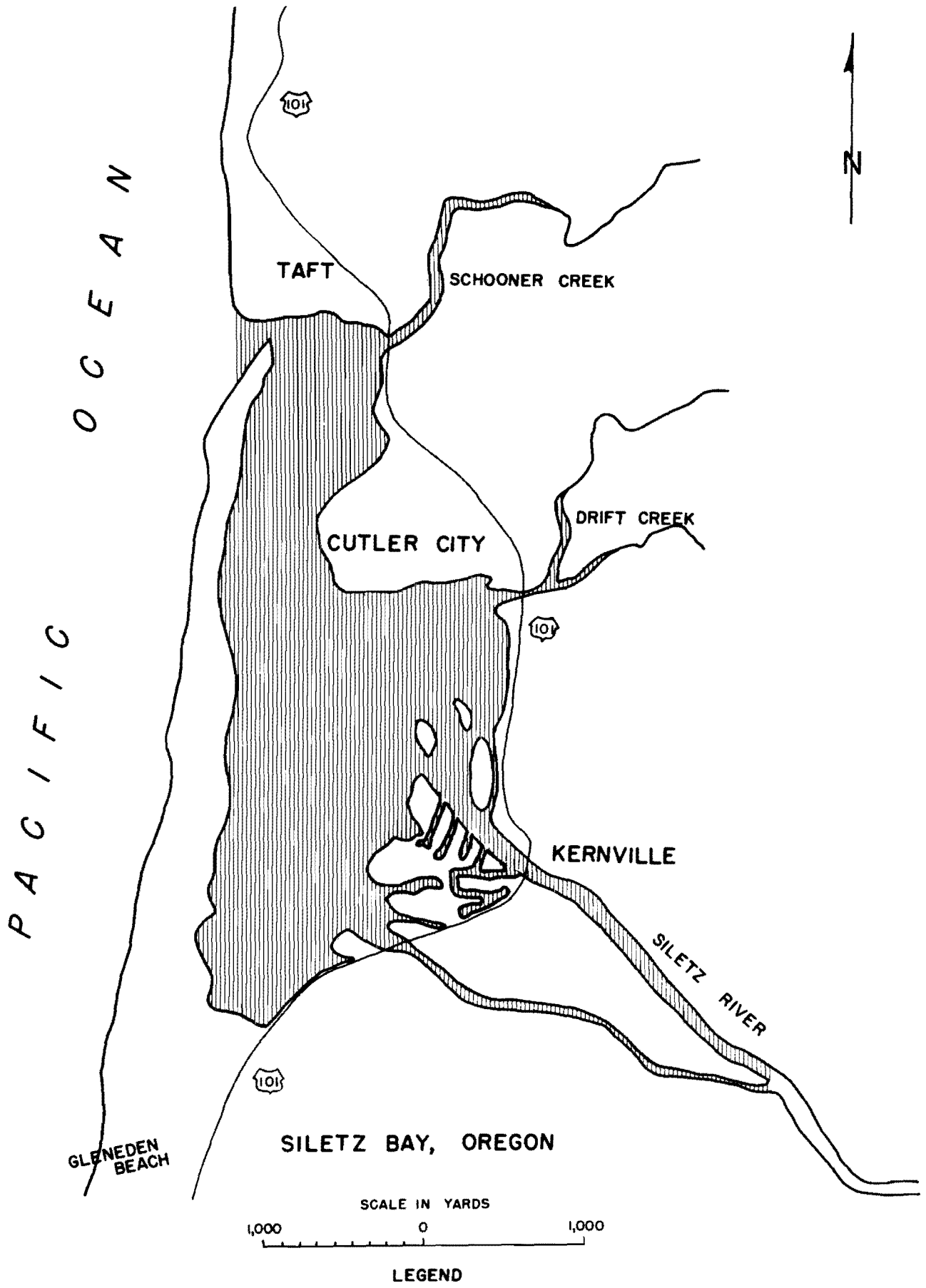


FIGURE 6.  FOOD PRODUCTION AREAS, FISH FEEDING AREAS AND FISH MIGRATION ROUTES, 1971

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