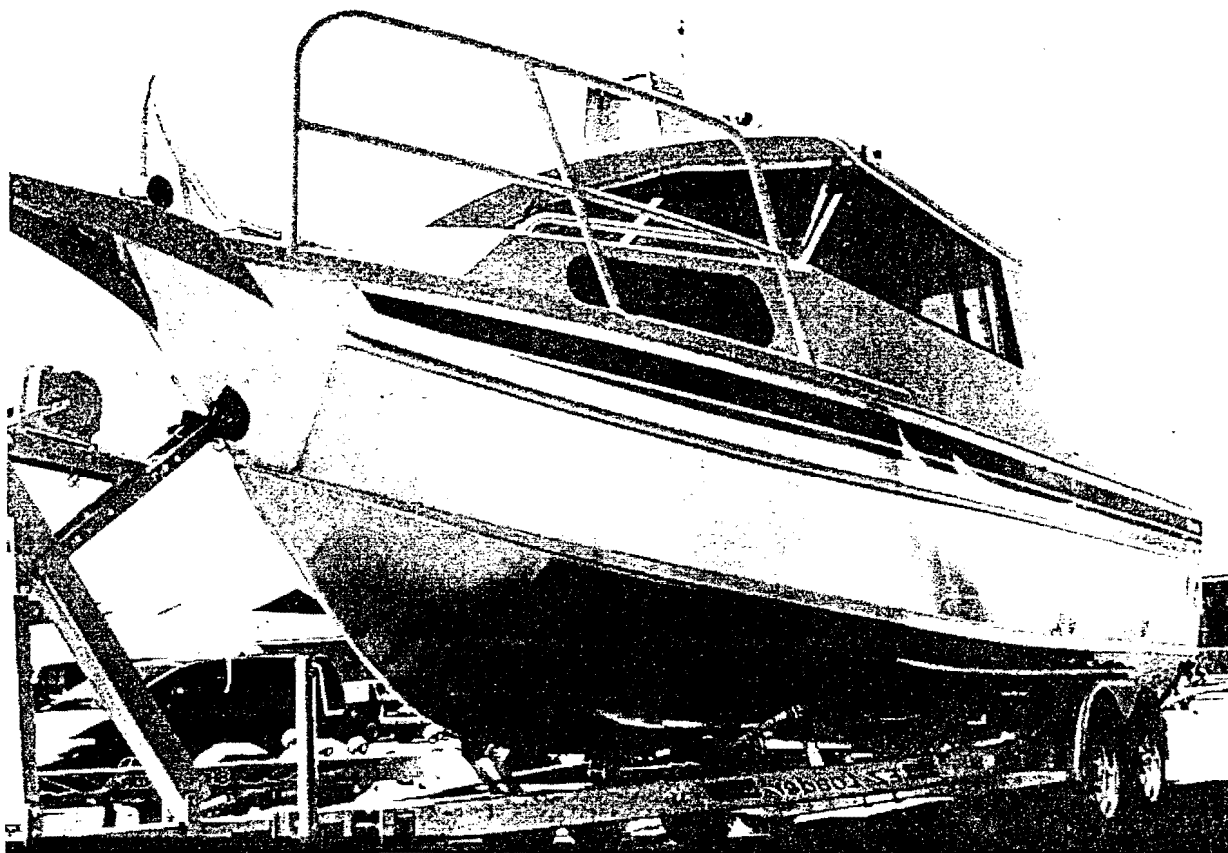


OREGON DEPARTMENT OF FISH AND WILDLIFE

SHELLFISH AND MARINE HABITAT PROGRAM
ANNUAL REPORT

1994



Marine Region
Newport, Oregon

SHELLFISH AND MARINE HABITAT PROGRAM

ANNUAL REPORT

1994

Oregon Department of Fish and Wildlife

Marine Region

April 1996

CONTENTS

INTRODUCTION	1
PERSONNEL CHANGES	1
SHELLFISH AND MARINE HABITAT PROGRAM ORGANIZATIONAL CHART.....	2
BAY CLAM INVESTIGATIONS.....	3
Recreational Fishery.....	3
Commercial Fishery.....	3
RAZOR CLAM INVESTIGATIONS.....	7
Recreational and Commercial Fishery.....	7
BAIT SHRIMP INVESTIGATIONS.....	7
MUSSELS.....	7
OYSTERS.....	7
MONITORING ACTIVITIES.....	8
DUNGENESS CRAB.....	8
Harvest and Effort.....	8
Regulations and Management.....	8
Research	9
PINK SHRIMP INVESTIGATIONS.....	9
1994 Season Summary	9
Regulation Changes.....	10
Research	10
SPOT PRAWN INVESTIGATIONS	11
SQUID INVESTIGATIONS	11
SCALLOP INVESTIGATIONS	11
SEA URCHIN INVESTIGATIONS	11
Harvest and Effort	11
Market Samples and Research	12
Regulations and Management.....	13
ABALONE INVESTIGATIONS.....	13
SUBTIDAL HABITAT SURVEY OF COOS BAY.....	14
INTERTIDAL INVERTEBRATES	15
Educational Harvest	15
Commercial Harvest	15
MISCELLANEOUS	15
DEVELOPMENTAL FISHERIES.....	15
Board Activities.....	16
Staff Activities.....	16
1994 Publications.....	16
MARINE HABITAT	16
Rocky Shores Habitat Survey	16
Ocean Policy Advisory Council	16
CORE Study	17
Miscellaneous	17
1994 Publications.....	17

INTRODUCTION

The Shellfish and Marine Habitat Program completed its second year as a merged program. A program work plan was established integrating efforts of staff from the former Shellfish Program and Marine Habitat Program. This report summarizes Program activities including field work, reports and rule changes, and extends the Shellfish Annual Report series which began in 1986.

PERSONNEL CHANGES

A listing of Shellfish and Marine Habitat Program personnel during 1994 appears in Table 1. Permanent staff and organization appear in Figure 1. Jean McCrae was reassigned as acting project leader for the newly created Developmental Fisheries Project. Claire Wood joined the program as an assistant project leader taking on some of Jean's former responsibilities. Claire supports several project's data processing and data analysis needs, and takes care of the Program's shellfish permit system.

Table 1. Shellfish and Marine Habitat Program personnel, 1994.

Name	Location	Position
Jim Golden	Newport	Program Leader
David Fox	Newport	M. Habitat Project Leader
Bob Hannah	Newport	SSS Project Leader
John Johnson	Newport	Clam Project Leader
Jean McCrae	Newport	Devo Fish Project Leader
Neil Richmond	Charleston	Crab/Urchin Project Leader
Steve Jones	Newport	Assistant Project Leader
Terry Link	Astoria	Assistant Project Leader
Arlene Merems	Newport	Assistant Project Leader
Claire Wood	Newport	Assistant Project Leader
Michele Long	Newport	Technical Assistant
June Mohler	Newport	EBA
John Schaefer	Charleston	EBA

SHELLFISH AND MARINE HABITAT PROGRAM ORGANIZATIONAL CHART

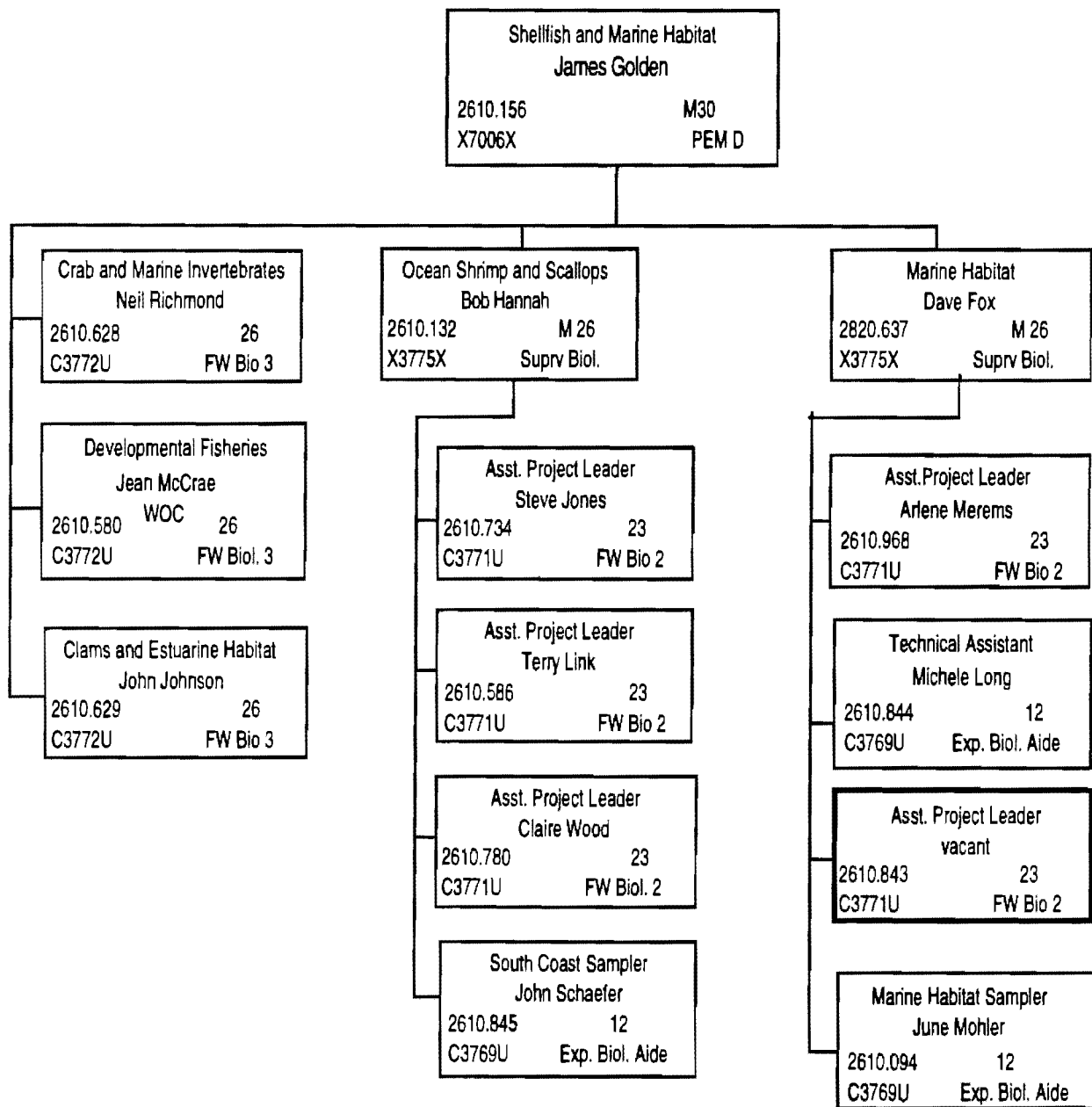


Figure 1. Shellfish and Marine Habitat Program permanent personnel and organization, 1994.

BAY CLAM INVESTIGATIONS

Recreational Fishery

The recreational bay clam survey began in 1976 but was dropped in 1992 due to budgetary restraints. Some of that survey data was gathered in 1993 and again in 1994 using volunteers. Approximately 60 volunteers interviewed diggers from Tillamook, Netarts, Yaquina, Umpqua, and Coos Bays. Data collected included species composition, catch per unit effort, and digger origin. During the year, volunteers interviewed 4,023 diggers who had expended 3,525 hours to harvest 79,975 clams. These diggers averaged 19.7 clams per trip which is somewhat better than the 18.5 clams per trip averaged in 1993. In 1994, 30.3% of the diggers were local county residents, 64.2% were from Oregon but living outside the county of harvest, and 5.5% were out-of-state residents. The cockle clam was the principal species observed comprising 55.4% of the total harvest.

Commercial Fishery

We issued 113 permits to commercial fishermen to harvest bay clams in 1994 which compares to 111 for 1993 (Table 2). Thirty-two fishermen reported landings of 180,934 lbs of clams. In 1993, 38 fishermen landed 127,730 lbs of clams. Cockle clams represented the bulk of the commercial catch in 1994 at 163,295 (90.3%) (Table 3). Tillamook Bay was the major producer of bay clams in Oregon with 149,494 lbs (82.6%). The Coos, Umpqua, and Nehalem estuaries followed in order with 12,042, 7,403, and 5,533 lbs of clams in 1994 respectively (Table 4).

Commercial harvest of cockle clams in Tillamook Bay increased from 65,569 lbs of clams in 1993 to 147,243 lbs in 1994. Commercial harvest of native littleneck clams took a dramatic decrease in 1994 with 6,084 lbs being taken compared to 36,632 in 1993.

Table 2. Oregon commercial clam harvest in pounds, 1970-94.

Year	Harvest (lb)	# Diggers	# Landings	Ave. lb/landing	# Permits Issued
1970	25,884	40	258	100.3	0
1971	28,526	50	230	124.0	0
1972	61,523	37	354	174.8	0
1973	17,156	19	187	91.7	0
1974	16,315	23	182	39.6	0
1975	25,908	19	116	227.3	0
1976	88,054	7	97	946.8	0
1977	85,733	29	155	304.0	0
1978	216,926	15	218	943.2	0
1979	94,912	19	128	741.5	0
1980	80,467	36	176	442.1	0
1981	81,138	30	336	222.5	0
1982	134,105	46	538	245.3	0
1983	136,185	41	811	168.0	0
1984	120,574	30	704	171.3	0
1985	99,254	44	614	161.7	65
1986	82,829	36	664	124.7	65
1987	46,283	34	385	120.2	121
1988	44,696	28	258	173.2	136
1989	60,482	24	221	273.7	111
1990	72,756	38	384	189.5	92
1991	87,842	40	473	185.7	126
1992	62,044	29	410	151.3	115
1993	127,730	38	733	174.3	111
1994	180,934	32	422	428.8	113

Table 3. Summary of pounds of bay clams reported commercially harvested in Oregon by species, 1970-94.

Year	Butter	Cockle	Gaper	Littleneck	Softshell	Macoma	Total
1970	885	12,257	1,218	863	10,661	0	25,884
1971	217	9,391	10,345	639	7,714	220	28,526
1972	52	7,269	34,006	1,406	18,772	0	61,505
1973	95	5,756	185	9,771	1,349	0	17,156
1974	412	6,073	0	8,987	843	0	16,315
1975	0	6,855	15,024	4,311	360	0	26,550
1976	816	322	85,831	455	630	0	88,054
1977	607	859	81,775	232	1,366	894	85,733
1978	1,452	6,717	207,685	1,056	52	0	216,962
1979	606	2,299	91,028	0	979	0	94,912
1980	40	2,244	74,459	4,268	456	0	81,467
1981	2,409	4,580	68,508	4,892	749	0	81,138
1982	3,654	10,517	106,440	13,231	248	0	134,090
1983	4,035	2,579	95,091	34,444	36	0	136,185
1984	4,842	17,912	50,573	46,874	366	0	120,567
1985	1,646	29,412	20,121	46,266	1,809	0	99,254
1986	2,862	31,681	17,021	27,487	3,558	0	82,609
1987	3,046	20,202	6,368	14,140	2,527	0	46,283
1988	2,492	30,068	3,816	6,884	1,436	0	44,696
1989	3,806	44,344	5,164	6,032	1,136	0	60,482
1990	4,604	45,607	10,391	7,521	4,633	0	72,756
1991	3,690	58,282	8,660	8,708	9,215	0	87,842
1992	475	35,800	8,609	10,980	6,180	0	62,044
1993	6,382	72,340	4,169	35,913	7,312	0	127,730
1994	1,961	163,295	2,146	6,084	7,448	0	180,934

Table 4. Summary of pounds of bay clams reported commercially harvested in major Oregon estuaries, 1970-94.

Year	Nehalem	Tillamook	Netarts	Yaquina	Alea	Siuslaw	Umpqua	Coos	Coquille	Total
1970	258	7,819	2,210	444	0	0	10,631	4,522	0	25,884
1971	589	6,168	1,598	1,819	0	0	7,459	10,893	0	28,526
1972	80	9,637	914	57	70	0	6,105	44,642	0	61,505
1973	329	11,997	1,191	0	0	0	786	2,853	0	17,156
1974	882	9,309	2,049	398	0	0	445	3,232	0	16,315
1975	0	4,637	0	0	13	0	309	21,553	38	26,550
1976	0	998	0	0	480	0	0	86,576	0	88,054
1977	0	2,619	0	71,013	0	0	35	12,066	0	85,733
1978	0	3,111	0	172,047	0	0	0	41,804	0	216,962
1979	174	433	0	74,565	0	3,432	0	16,308	0	94,912
1980	373	5,320	486	244	0	9,109	0	65,935	0	81,467
1981	65	4,259	0	128	0	684	0	76,002	0	81,138
1982	10,862	11,501	37	15	0	223	25	111,427	0	134,090
1983	31,856	3,144	200	5,253	0	15	0	95,717	0	136,185
1984	23,069	42,663	0	22	0	50	0	54,763	0	120,567
1985	40,349	34,148	240	0	0	895	268	23,030	324	99,254
1986	30,545	28,737	480	6	0	1,206	0	19,557	2,078	82,609
1987	10,723	22,936	0	1,114	250	654	0	10,214	392	46,283
1988	0	34,450	0	1,153	230	1,200	28	7,086	549	44,696
1989	80	49,650	0	2,790	993	600	150	6,183	36	60,482
1990	5,810	47,198	0	1,543	410	0	3,432	14,363	0	72,756
1991	6,331	50,860	7,451	1,013	530	120	8,322	12,501	60	87,842
1992	4,597	35,935	879	7,067	1,398	0	6,095	5,986	87	62,044
1993	31,966	76,103	54	2,843	1,495	93	7,105	5,698	0	127,730
1994	5,533	149,494	422	2,413	3,441	0	7,403	12,042	25	180,934

RAZOR CLAM INVESTIGATIONS

The razor clam fishery north of Cape Lookout opened November 1, after being closed for three years because of contamination by biological toxins. Clams from Tillamook Head to Columbia River were sampled regularly in November and December. Beaches south of Tillamook Head were sampled as time permitted. Sport and commercial diggers were interviewed to obtain effort and harvest data. Random wastage and age-length samples were collected.

Recreational Fishery

The harvest north of Tillamook Head was 885,000 clams dug on 58,555 digger trips. Wastage of clams was not a problem. The fall harvest was a record high. Random samples indicated a very late 1994 set entering the fishery.

Digging effort was minimal on the south coast because of lack of clams. Best digging was in the Newport area.

Many Oregon diggers want a shellfish license because of the increase in effort. Every other day digging, to spread out catch is being requested by many diggers.

Commercial Fishery

Harvesters landed 78,000 clams (18,854 pounds) and received \$1.00 to \$1.85/lb. A calculated 28.7% of the pounds landed were bought as crab bait. ODFW issued 170 harvest permits but only 129 sold clams. OR Department of Agriculture sold 62 permits to harvest for human consumption.

Monitoring

Department of Fish and Wildlife staff collected samples of clams each tide series from Clatsop beach for PSP and Domoic acid testing. Procedures for sampling the population were developed and implemented in October to determine the percentage of clams containing PSP. Four and five year old clams made up 7.9% of the population. They contained slightly over 80 units of toxin/100 gr. OR Department of Agriculture felt this was little risk for consumers of shellfish.

Adverse weather and night digging did not deter diggers, as 16,600 digger trips were made the first tide series. The first week of the fishery the state police spent 212 hours on the beach and two ODFW EBA's helped collect nearly 500 digger interviews.

BAIT SHRIMP INVESTIGATIONS

We issued 71 permits in 1994 for the commercial harvest of bait shrimp, 46 less than in 1993. Thirty five harvesters reported landings of 88,984 lbs of bait shrimp for 1994, a decrease of 31,553 lbs from 1993. Ghost shrimp harvest was 63,704 lbs (72%) and the mud shrimp catch was 25,280 lbs (29%). Alsea Bay produced the bulk of the ghost shrimp catch with 57,364 lbs (90%). Netarts Bay produced the majority of the mud shrimp landings with 24,956 lbs representing 99% of the total take.

MUSSELS

The 1994 commercial mussel harvest was 20,009 lbs compared to 22,934 for 1993. Ten harvesters collected 97% of the total harvest between Newport and Florence.

COMMERCIAL OYSTERS

Staff reviewed and field inspected several oyster lease application sites for 1994 in Netarts, Tillamook, and Coos Bays. Most lease applications are being denied because of concern about negative impacts on eelgrass and clam beds. ODFW and Department of Agriculture both see the need for studies that will answer the question of how ground cultured

oysters impact eelgrass.

OYSTER ENHANCEMENT

The native oyster enhancement effort continued for 1994. Natives were planted in Netarts in 1993 and continue to do well in 1994. Staff dispersed the oysters to several key areas in the bay in hopes they will start producing naturally. We also transplanted several bags of seed to Alsea Bay where they were located in five locations throughout the estuary. The oysters did not do well with the exception of Lints Slough where growth and survival was excellent.

MONITORING ACTIVITIES

We continue to issue and monitor DEQ fish waste discharge permits in selected estuaries throughout the coast. A change from the past is that any new permits require pre and post start-up surveys to assure that fish enhancement and not pollution is occurring.

High levels of TBT were detected in Coos Bay at three locations on the north shore. We closed the three sites to recreational harvest of clams pending further testing. This is the first estuary in the nation to close clam harvest as a result of high TBT levels.

Staff initiated a program to assess the impact of humans on the intertidal resources of the Seal Rock area using volunteers to gather the information. Four volunteers interviewed 1,633 users on key low tides during the summer months. Much valuable information was collected and we hope to continue this survey in 1995.

Staff reviewed approximately 230 fill and removal and 95 DEQ waste discharge permits.

DUNGENESS CRAB

Harvest and Effort

Commercial ocean landings during the 1993-94 season were 10.3 million pounds, slightly below the previous season but above the 30 year average of 9.1 million pounds. Crab quality testing was conducted and the whole coast opened on December 1 (1993), with very poor weather during the first two weeks. A "tie-up" over price in California resulted in a group of about 18 California boats fishing and delivering in the Coos Bay area for a few weeks in December. The California fleet finally went fishing in late December. Leading ports were Astoria and Newport, at 4.6 million and 2.6 million pounds, respectively. Landings at southern Oregon ports from Port Orford through Brookings were noticeably poor, totalling only 738,000 pounds. Statewide, 385 boats made 7824 deliveries, with 78 percent of the pounds landed by the end of January. Ocean crab price averaged \$1.14 for the month of December, and early season crab quality ranged from good on the central coast to only fair in Brookings and Astoria. Landings in the summer fishery (June 1-August 14) were slightly under the 10 percent limit, at 9.3% of the season's total through May.

The commercial bay crab fishery reached a modern record at 99,860 pounds in 1994. Waldport led with about 39 thousand pounds, followed by Coos Bay and Winchester Bay at 30 thousand and 26 thousand pounds, respectively. The three highest years since 1971 (the last year pots were legal) have been 1994, 1992, and 1991, respectively. Sport crabbing was good-to-excellent in most bays. The 1991 crab year class, which was prominent in 1991 and 1992 in several south coast shrimp beds, produced commercial and sport-legal sized males by the fall of 1994.

Regulations and Management

The PSMFC sponsored Tri-State Crab Committee was very active, as each state proceeded with limited entry plans. The states of Washington and California passed legislation limiting vessel access to the Dungeness fishery, effective in 1995 on January 1 and April 1, respectively. Included in both bills are complete prohibitions on longline Dungeness crab gear. Oregon crabbers met four times to plan a limited entry program, with staff acting as meeting facilitator, secretary and key contact. Numerous requests were handled during this process, including boat lists and boat landings history requests. The simple goal of capping fleet effort at

recent levels has turned into a complex social issue. Industry strongly called for a commission moratorium on new boats but the request was not heard by the Commission. A crab bill will be drafted in early 1995 for the legislative session. Several meetings were held in Brookings in response to California limited entry and quality testing plans.

Several crab issues were discussed at the October 19 Commission meeting in Newport. The Commissioners took action to define crab longline gear and to prohibit its use inside 40 fathoms at all times and anywhere in the month of November. They adopted a sunset date for all Dungeness longline gear to be prohibited on August 15, 1997. In a separate action, the rule for biodegradable escape panels and lid hook ties was liberalized to include other 120 thread fibers that the Department might specify. We subsequently authorized the use of blended polyester/cotton not to exceed 50% polyester content. A type of blended twine was being sold by a Newport vendor and used by local fishermen prior to this rule change, which caused concerns among crabbers and twine dealers alike. Staff pledged to test different twine materials to evaluate the rule change.

One scallop vessel began working on December 1, 1993 and fished regularly throughout the winter. The boat fished the most off the Coos Bay bed and caused concerns and some gear loss in the crab fleet. At least one crabber was compensated by the scalloper (for 20 lost pots). Shallowest tows were in 32 fathoms. Exacerbating the situation was a noteworthy increase, coastwide (OR/WA/CA), in deepwater crabbing effort this season. Some individuals were single-pot fishing in 80 fathoms or more and doing quite well, as were the few Oregon longline crabbers.

Research

Preseason samples of crabs for domoic acid were collected by industry volunteers and staff and submitted to the Department of Agriculture. Domoic acid levels were low. Staff conducted two at-sea, pre-season sampling trips, with volunteer vessels and crew, off Clatsop Spit on November 11 and December 4. Another was made by volunteers out of Brookings and trucked to Charleston for processing. We made a recommendation to delay the next season's north coast opener until December 16, 1994, north of Cape Falcon, to allow the crab quality to improve. The tri-state testing procedures and the delay rules were followed as closely as possible and both states' directors passed emergency rules.

PINK SHRIMP (*Pandalus Jordanii*)

1994 Season Summary

Approximately 16.4 million pounds of pink shrimp were landed into Oregon ports during the 1994 season, 10.5 million pounds less than in 1993 and 31.6 million pounds less than in 1992 (Table 5). It was the lowest annual landing total in Oregon since 1985. The 15 year average annual landing is about 28.5 million pounds. The decline over the last two years is due primarily to poor shrimp recruitment, resulting from unfavorable ocean conditions following larval release.

Table 5. Preliminary catch (lbX1000), effort (trips) and/catch (C/E) statistics for the Oregon pink shrimp fishery for 1993 and 1994.

Statistic		Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Catch,	1994	2,056	2,912	3,756	2,362	2,636	1,858	798	16,379
	1993	5,374	9,748	6,553	1,321	2,043	1,157	732	26,928
Effort,	1994	213	249	268	177	230	217	127	1,481
	1993	281	445	327	110	215	140	99	1,617
C/E,	1994	9.7	11.7	14.0	13.3	11.5	8.6	6.3	11.1
	1993	19.1	21.9	20.0	12.0	9.5	8.3	7.4	16.7

Monthly catches peaked in June, with most of the volume coming from the south coast and waters off California. Volume in other months and areas was sharply lower, with scattered bright spots below the Columbia River from mid to late season. By contrast, in 1993, most of the shrimp volume was harvested early in the season off Washington.

Fishermen spent more time catching fewer shrimp in 1994 than they did in 1993, however the average price paid for shrimp was sharply higher in 1994. Average price was in the high \$.30's in 1993 but increased to the high \$.50's in 1994. Total fishing effort in 1994 was about 78,400 single-rig-equivalent hours (SRE), a slight increase over the 1993 season total. Overall catch per unit effort (CPUE) was about 210 LB/hour (SRE), well below last year's, and below the 15 year average of about 273 LB/hour. Monthly CPUE was highest on the south coast throughout the season; sharply lower further north.

The 1994 catch was dominated by age one shrimp. Age-2 shrimp contributed poorly, with the percentage of age-2 shrimp in the catch reaching a record low. The low abundance of 2 year olds in 1994 and higher abundance of one year olds, in conjunction with the low landing total, supports the contention that recruitment was poor for the last two years. Further shrimp yield from these age classes is expected to be modest.

Coastwide, count-per-pound averaged about 123 shrimp/lb, slightly more than the 15 year average of 115 shrimp/lb. Growth of age-1 and age-2 shrimp was above average this year, which helped to keep the count-per-pound down, despite the dominance of age-1 shrimp in the catch.

Regulation Changes

The Washington Department of Fisheries officially rescinded its codend mesh size regulation this year. We have asked the Oregon Fish and Wildlife Commission to consider rescinding our reciprocal landing law which requires that Washington shrimp landed in Oregon be caught with Washington-legal nets. However, California continues to enforce its codend mesh size requirement of 1 3/8" between the knots. Oregon's reciprocal landing regulation still stands, requiring that California shrimp landed in Oregon be caught with California-legal nets.

Research

-gear survey

Over the last four years we have surveyed Oregon shrimp trawlers, asking questions about the types of gear being used. The study was initially intended just to establish a baseline "snapshot" of the average gear being fished for the purpose of evaluating changes in gear at a later date. This objective was accomplished in 1993. However, the study was extended to gather data on some recent gear innovations. One of these innovations was the soft mesh finfish excluder (or WeJo), a panel of 3" to 8" trawl web, installed at an angle in the codend. This panel guides finfish out a hole in the top of the trawl, while allowing shrimp to pass through into the codend. Use of the device was apparently increasing since its introduction by a north coast fisherman in 1992. Our survey showed that use of the "WeJo" increased sharply from 1992 to 1994, with over 30% of the vessels having used some version of the device. It also showed that most vessels having the device actually fished with it enabled less than 25% of the time.

-finfish excluder study

Our Saltonstal-Kennedy research project evaluating finfish excluders began in October 1994. The purpose of the study is to evaluate the efficiency of three excluder designs under actual fishing conditions. The first phase of the study was conducted under charter on the F/V Prospector during October, 1994. Using underwater video equipment borrowed from the National Marine Fisheries Service (and assistance from NMFS personnel), we obtained footage of the Nordemore grate and the "WeJo" excluders (in 5 and 8 inch designs) in action. The footage enabled us to adjust the angle of the devices so that they fished properly. The camera showed clearly that shrimp loss increased when the devices were installed at too shallow an angle. Short VHS tapes, showing highlights of the video work were made available to borrow from our Astoria, Newport and Charleston offices and response was fair.

SPOT PRAWNS (*Pandalus platyceros*)

The prawn fishery was designated a developmental fishery this year by the Developmental Fisheries Board. Permits were issued to six trawl vessels and six pot vessels. Directed harvest during 1994 was restricted to these vessels. Eleven vessels landed 65,019 pounds of Spot Prawns in Oregon this year. The catch was primarily trawl caught, but some was taken with pots. Some incidental landings were made. The ex-vessel price ranged from \$1.83 to \$6.00/lb round.

SQUID (*Loligo opalescens*)

Approximately 234,000 pounds of market squid were landed in Oregon during 1994. About half of these pounds were taken on trips where squid were targeted, with an ex-vessel price of \$0.15 to \$0.25/lb. Most of the remainder were taken incidentally in the whiting (*Merluccius productus*) fishery and did not receive a price.

SCALLOPS (*Patinopecten caurinus*)

Landings of Ocean Scallops totalled approximately 115,000 pounds round during 1994, down from almost 300,000 pounds round in 1993. Four vessels landed 12,605 pounds of shucked meats which sold for \$5.00 to \$6.00/lb. Only 74 pounds of whole scallops were landed, which sold for \$.50/lb.

SEA URCHIN INVESTIGATIONS

In 1994, fishery performance data was collected from market samples, diver logbooks, and fish tickets. A fishery-independent, SCUBA survey was conducted in the Depoe Bay area. More complete sea urchin fishery and research results will be provided in a separate report. The seasonal No Fishing marker buoys were deployed and retrieved at Pyramid Rock (Rogue Reef). New anchors were fabricated and the tethering systems were modified.

Harvest and Effort

A total of 43 permits were issued during the renewal period. The lottery for unused permits below the 46 permit ceiling was suspended (see Regulations below). Forty-five individuals made 2031 red urchin landings in 1994, including medical transfer divers. Twenty divers also made 134 purple urchin landings.

Statewide red urchin harvest and effort declined for the fourth consecutive year (Table 6). CPUE declined slightly in 1994, after 4 years of more rapid decline. Urchin buyers now reward divers for quality, resulting in a more selective harvest of the available legal size animals. Orford Reef was closed to harvest from May 1 through September 21. This was again achieved solely through industry compliance. The ports of Coos Bay, Depoe/Newport, and Brookings all showed large drops in harvest and effort. Port Orford harvest and effort were level, with decreases at Orford Reef offset by increases in many scattered areas, including Rogue Reef. Gold Beach increased sharply, primarily due to good market acceptance of Rogue Reef urchins. The strong year class of 88-89 had only seen modest pressure at Rogue Reef prior to this year due to market problems.

Average diver price dropped to \$.77 per pound, down from the 1993 peak of \$.87. Market conditions for export uni were depressed. Gonad quality was reportedly in a poor cycle, possibly due to low availability of suitable algae.

A short-lived but aggressive purple urchin harvest occurred in the late summer. The statewide total was the highest in the three year history of the fishery. Eighty-seven percent of the total was harvested at Cape Arago. The special permit process was cumbersome but effective. Cape Arago areas A and B were closed as the landings reached the total removal limits. Total fishery removals from these two areas combined was an estimated 146,289 pounds, well in excess of the combined 100,000 pound limit. The Arago areas A and B will be surveyed by staff before additional openings are announced.

Table 6. Annual number of permits, harvesters, deliveries, and pounds (in thousands) of red sea urchins harvested by port in Oregon, 1986-1994.

	1986	1987	1988	1989	1990	1991	1992	1993	1994
Permits Issued	19	162	92	92	72	60	49	46	43
Harvesters	5	21	47	61	66	58	46	46	45
Deliveries	31	137	869	3,102	4,417	3,389	2,528	2,298	2,031
Garibaldi					20				
Pacific City					20	10			
Depoe Bay		1	10	9	1,152	485	493	162	113
Newport		tr	1	89	221		56	386	20
Coos Bay		1	178	64	291	322	86	148	36
Port Orford	56	153	1,502	6,032	4,915	2,380	1,696	1,099	1,051
Gold Beach			226	1,586	2,589	1,201	383	260	505
Brookings		48	54	63	114	339	143	128	65
Total	56	203	1,971	7,843	9,321	4,737	2,857	2,183	1,790

Market Samples and Research

Red urchin harvest areas covered by market sampling included Depoe Bay, Orford Reef and Rogue Reef. Other areas were sampled sporadically. Purple urchins were measured from the Cape Arago harvest areas. Average size of red urchins harvested at Orford Reef did not change from the 1993 figure of 110 mm, while the average increased 6mm at Depoe Bay to 111mm. Average size at Rogue Reef was 120 mm. Presence of sublegals (<89mm) was low at all ports sampled.

Red urchin research surveys at Depoe Bay produced an overall density estimate of 1.34 red urchins per square meter. Twenty-four transects were completed, covering an area from Gull Rock at Cape Foulweather northward to Government Point. A remarkable size frequency mode was centered at 25mm (range 15-40mm). Sixty-one percent of all animals measured were in the "juvenile" recruit stage (<51mm). A relatively low 29 percent were legal size, and less than four percent were in the "large" category (greater than 5 inches). By comparison, during our 1991 pilot survey, there were virtually no juvenile recruits, 49 percent of the red urchins were legal size, and nine percent were greater than 5 inches. We implemented modifications to our belt-transect methods, to improve descriptive and quantitative observations. An unexplained observation during our Depoe Bay survey was the common presence of floating and beach-stranded mats of *Macrocystis* algae, traveling in a southward direction with the surface current during June.

Two new purple urchin areas were surveyed, permitted, and harvested at Cape Arago in 1994; one toward Shore Acres (area X) and another at South Cove (area C). We worked up the survey samples to get diameter/weight/gonad weight information. A cooperative/consultative process was used to establish harvest limits based on urchin diver surveys for abundance and size, estimates of adult M from Tom Ebert's publications, and a simple model of: Adult Exploitation Rate = M. An allowance would be made for a large recruit class, if detected.

Staff assisted researchers at OIMB with several urchin research projects. We assisted in intertidal and subtidal urchin surveys in the Cape Arago and Gregory Point areas near Coos Bay. Significant recruit classes were recorded for both intertidal purple urchins and subtidal red urchins. Intertidal purple urchin recruitment had been rare since 1963 (Tom Ebert, pers. comm.). We also observed the purple urchin recruit-class during abalone work at Cape Ferrelo and north of Whaleshead cove. John Schaefer was certified through the University Diving Officer and

provided dive support for Bruce Miller's Sea Grant-funded urchin larval ecology work. Staff made several fruitless searches for the tagged urchins that were outplanted and "lost" by industry in January 1993, near Nellie's Point and at Pirate Cove.

Regulations and Management

The Commission delayed the lottery for unused permits below the 46 permit ceiling on March 23 during a telephone conference call meeting. Several rule changes were made at the December 14 Commission meeting, which will take effect January 1, 1995. They included an indefinite suspension of the permit lottery pending completion of the legislative review of Oregon's permit fishery systems (Senate Bill 938). The May 1 through October 31 urchin harvest closure of Orford Reef was also adopted as an administrative rule.

The permit system was extensively reviewed with industry groups, including two townhall type meetings. Numerous permit system options were prepared, including Individual Transferable Quota options. The industry is looking for a rational way to control effort and allow permits to become transferable. Another element of staff's long-range management plan, harvest refugia, was negotiated with the urchin industry. Two subtidal research reserve areas were adopted in 1994, near Cape Arago and at Depoe Bay, complementing the existing Whale Cove site.

ABALONE INVESTIGATIONS

Recreational harvesters in the Brookings area approached the Department with concerns over the status of abalone populations and a proposal to enhance the stocks with hatchery-produced seed. Simultaneously, a Crescent City abalone culturist, Kendall Smith, offered to sell some of his 2 year old F1 generation produced from Oregon parent stock. This prompted the beginning of an abalone project by staff. A white paper was produced discussing an enhancement effort, stock status, and most importantly a review of historical events and past efforts by our agency to assess and improve abalone stocks. An ad hoc sport group began raising funds for enhancement.

Staff visited the culture facility (a closed system), and subsequently tagged 100 of the seed abalone. DSL granted approval to outplant hatchery abalone on state lands. Pathology tests on the hatchery stock were run courtesy of the California Fish and Game lab which detected the presence of renal coccidian parasites and rickettsial infections of the digestive epithelium. Neither of these are managed-for in California aquaculture, however the few Oregon wild stock that staff has had tested were all negative for the above infections. The presence of these infections was a great surprise, but the culturist then admitted he had held another local culturist's stock (of AbLab origin) during an emergency. The decision was made to not introduce these infected animals into Oregon waters. A third, potentially more serious problem, was discovered in some California hatchery abalone. It is an infestation of the shell margin by a non-native species of sabellid polychaete, probably imported in ballast water.

A survey of outplant sites was conducted with volunteer divers and boat operators. Several high quality sites were located, and 27 large abalone were seen by nine divers making multiple dives. Due to interest at Oregon State University, we collected fourteen animals for the beginning of a native broodstock. Unfortunately there were problems at our Charleston holding facility and only two animals survived.

A world record abalone was reportedly taken in the Cape Ferrelo area, measuring 12 and 5/16 inches across the shell. The harvester was secretive but his guide was Kendall Smith (above), who has area-of-catch evidence. During our review of data taken during a commercial feasibility study in the late '50's, an even larger animal was measured by staff at 12.5 inches. A large red abalone was taken by a school group at Boiler Bay. The animal must have been transported somehow from the Whale Cove outplant site to the south, possibly by kelp dislodgment.

SUBTIDAL HABITAT SURVEY OF COOS BAY

The Army Corps of Engineers had proposed to dump dredge spoils from the lower bay into the survey area as part of an enhancement and cost effective mitigation effort. The proposed enhancement was in response to a Department request for a mitigation project to offset the dredging of a new, 6 acre turning basin near river mile 12. The survey was done to determine if the proposed dumping of quality spoils would enhance the bottom structure for desirable species such as crabs and clams. The area in question is an undeveloped but authorized turning basin in the federal shipping channel, near river mile 6. The Corps was willing to "write off" this turning basin in their future navigation plans, if ODFW felt it was a suitable mitigation site. As an historical note, a great number of bay clams were dredged from the westside turning basin in the 1970's, very near the surveyed area but on the north spit side of the channel.

Procedure

Staff surveyed the bottom substrate, and macrofauna and flora in an area of Coos Bay on September 30th, 1994. Four, 300 meter leadline transects were placed between the center of the shipping channel and the shallow subtidal area of the eastern shore, near Utter Rock at Empire. The transects were deployed parallel to each other and with the flow of the river. The survey was conducted by SCUBA divers operating from a "live" boat. High tide was approximately 10:15, with a 2.6 foot tidal exchange.

Floats marked the ends of the transects and GPS coordinates were taken at the floats. Divers swam along the lead line, recording data at 25 m intervals on plastic slates. Bottom materials were noted from the most to least abundant. Estimates of clam abundance were made by swimming out approximately 2 body lengths at each interval and estimating clams per m². Algae presence was noted by color. Observations on crab abundance by species and size class were noted. Other invertebrates and fish were noted as observed.

Results

The bottom structure was determined to be excellent with a surprising amount of complexity. A major feature of all transects were whole gaper shells in loose piles. Juvenile crabs, shrimp and fish were observed utilizing this shell cover. Transect #1, within the channel, had the thickest shell cover, mixed with cobbles and very little sediment. The relatively large shrimps (about 60mm total length) observed in transect #1 and #2 were probably juvenile dock shrimp (*Pandalus danae*). Respectable numbers of these shrimp were hidden within the piles of shells in the salt wedge influence of the channel. Algae abundance decreased with an increase in depth. Piddocks were always observed imbedded within soft sandstone or mudstone.

Conclusion

It was decided that the dumping would degrade rather than enhance the area, and no alternative subtidal mitigation site could be agreed upon. The site surveyed was probably near the annual peak period of marine influence, species diversity and abundance. A salinity intrusion study and possibly native oyster enhancement may be funded by the Corps as partial mitigation for channel deepening.

Divers: Neil Richmond, Dave Fox, Arlene Merems and John Schaefer

INTERTIDAL INVERTEBRATES

Educational Harvest

During 1994, 102 permits were issued for the scientific or educational collection of marine invertebrates (112 were issued in 1993).

Commercial Harvest

During 1994, 20 permits were issued for the commercial harvest of marine invertebrates (11 were issued in 1993). Total pounds of animals harvested were: sea cucumber, 10,534; sea stars, 3,091. The sea cucumber fishery increased dramatically during the past two years due to a number of urchin divers diving for sea cucumbers off Port Orford. The price rose as high as \$2.00 per pound. The product was destined for the Oriental market.

MISCELLANEOUS

The Shellfish and Marine Habitat Program purchased a new dive survey boat and trailer. It is a 24' by 8.5' aluminum boat with twin outboards and dive platforms.

Staff assembled a sampling manual for the routine fishery and research sampling tasks conducted by the program.

South coast razor clam availability was judged to be poor in 1994.

Staff researched available literature and wrote a discussion paper on rock scallop biology and management, with an update on west coast harvest regulations.

DEVELOPMENTAL FISHERIES

Developmental Fisheries was a new project for the Marine Region in 1994. Administratively, it was put into the shellfish program, even though it deals with finfish as well as shellfish.

The 1993 Legislature passed Senate Bill 81 creating the Developmental Fisheries Program to allow for controlled development of new fisheries. The legislation established policy for the State of Oregon "to institute a management system for developmental fishery resources that addresses both long term commercial and biological values and that protects the long term sustainability of those resources through planned commercial development when appropriate". The term "developmental fishery" was defined as "activity for the development of commercial taking of an underutilized food fish species." The legislation created the Developmental Fishery Board, made up of nine members and five ex-officio members from a broad range of fishing interests.

Under the legislation, the Oregon Fish and Wildlife Commission, after consultation with the Developmental Fishery Board, is required to:

- Establish an annual list of food fish species that are considered to be developmental fishery species.
- Establish and review commercial harvest programs for developmental fishery species.
- Establish methods to obtain biological information necessary to determine the long term sustainability of the resource.
- Establish limited entry harvest systems for developmental fishery species. An annual fee of not more than \$100 to participate in a developmental fishery may be charged by the Commission.
- Issue permits for developmental fisheries within 14 days of receiving a written request for a permit.

In their October meeting, the Commission adopted rules implementing the program to begin January, 1995.

Board Activities

During 1994, the Board or committees of the Board met six times to develop draft administrative rules including a list of developmental species and an appropriate number of permits for each species to establish limited access. In addition, six information workshops were held in coastal communities to gather public input regarding the developmental fishery program and draft administrative rules.

Staff Activities

Staff assisted the Fisheries Board at all meetings and workshops providing background information and assisting with technical details. A staff report was written and presented to the Commission in October (McCrae and Golden, 1994). The report contains detailed information on the program, regulations, procedures, species list, and a synopsis of information for selected species. Staff also worked with personnel in Licensing to establish forms and procedures to issue permits.

1994 Publications

McCrae, J. and J. Golden. 1994. Developmental Fisheries Program Staff Report. Oregon Dept. Fish and Wildlife. Newport, OR. 82 pp.

MARINE HABITAT

Rocky Shores Habitat Survey

During 1993 and 1994, we conducted a two-phase inventory of the natural resources of Oregon's rocky shores. The inventory was intended to support planning work of the Oregon Ocean Policy Advisory Council (OPAC) and provide an information base for future management of rocky shores. Work conducted during phase 1 focused on developing an inventory of existing rocky shore resource information. In 1994, we compiled this information into a report, entitled "Oregon Rocky Shores Natural Resource Inventory.

Phase 2 of our rocky shores study focused on broadening our knowledge of rocky intertidal habitats and communities. This work involved mapping rocky intertidal habitat parameters and executing a field sampling program to examine species assemblages. We will eventually analyze the data from these efforts to draw conclusions about the distribution of various intertidal species assemblages and habitats along the coast. Our work focused on the following 12 representative intertidal sites: Chetco Cove, Cape Ferrello, North Boardman, Humbug Mountain, Rocky Point, Cape Blanco, North Cove (Cape Arago), Sunset Bay, Yachats, Otter Crest, Boiler Bay, and Cape Lookout.

During 1994, we began mapping intertidal habitats using our low tide aerial photographs of the coast as a base. The mapping involved interpreting the photos to delineate various habitat parameters such as substrate type, elevation, tide pools, surge channels, etc., and then digitizing the information onto our GIS. The GIS maps will provide a means to analyze the spatial co-occurrence of habitat parameters and species assemblages. Most of the maps were completed during 1994; the remainder will be completed in 1995.

During the summer of 1994, we completed a cooperative field study with the University of Oregon Institute of Marine Biology (OIMB) to quantitatively sample invertebrate and algal communities at the 12 representative intertidal sites. The sampling methods are described in a report entitled "Rocky Shores Inventory and Assessment" (Fox 1994). We plan to analyze the results of this work along with the habitat maps in 1995 and 1996.

Ocean Policy Advisory Council

In addition to developing the rocky shores inventory, we provided support to the planning work of the Ocean Policy Advisory Council (OPAC). Our work with OPAC included assisting in selection of management designations for rocky shores sites, helping draft text for the rocky shores segment of the Territorial Sea Plan, and providing all of the maps that appear in the rocky shores segment of the Territorial Sea Plan.

CORE Study

During 1994, we began drafting a report that summarizes our 1992 CORE Study work at Orford Reef. The purpose of the report is to summarize the data collection effort and make recommendations for data collection methods to be used in future studies. The report will be completed in 1995.

Miscellaneous

- 1) Dave Fox and Jim Golden participated as part of a team charged with developing an ecosystem management plan for the Department.
- 2) Arlene Merems assisted with wildlife rehabilitation efforts.
- 3) Arlene Merems and June Mohler received SCUBA certification.

1994 Publications

- Fox, D.; A. Merems; B. Miller; M. Long; J. McCrae; J. Mohler. 1994. Oregon rocky shores natural resource inventory. Newport, OR: ODFW, Marine Region. 168pp.
- Fox, D. 1994. Non-harvest human impacts to rocky intertidal habitat - a pilot project. Newport, OR: ODFW, Marine Region. 17pp.
- Fox, D. 1994. Rocky Shores inventory and assessment, summary report for FY93 CZMA Grant: sensitive shoreline resources, task B. Newport, OR: ODFW, Marine Region. 30pp.