

Staff Report Developmental Fisheries Program

Summary of Staff Report

ODFW staff is providing a review of the Developmental Fishery Program for 1996 and asking the Commission to adopt regulation changes in the list of species considered as developmental fishery species and harvest programs.

Key elements and conclusions from the staff report are:

- One hundred and seven permits for the harvest of developmental fishery species have been issued in 1996, to date. Most landings of developmental fishery species have been as by-catch in other fisheries.
- ODFW staff has conducted a survey of bay clams in Tillamook Bay, collected biological information on several developmental species, and obtained a grant to fund a graduate student to develop a publication on developmental species.
- The Developmental Fishery Board considered requests to move brine shrimp from category B to category A on the list of developmental species, remove longline gear as an option for harvesting Tanner crab, and include razor clams on the list of developmental species and allow the commercial harvest of razor clams and gaper clams from the ocean.
- The ODFW staff recommends moving brine shrimp from category B to category A and outlines a harvest program for the species, and removing longline gear as an option for harvesting Tanner crab. ODFW staff does not recommend adding razor clams to the developmental species list or allowing ocean harvest of gaper clams.

Outline of Staff Report

- I. Introduction Page 3**
- II. Annual Report of Developmental Fisheries ActivitiesPage 3**
 - Summarizes permits and landing activities of developmental fishery species.
 - Summarizes research and management activities of developmental fishery program.
 - Reviews procedures for adding species to Developmental Fishery list.
- III. Background of Commercial Brine Shrimp FisheryPage 6**
 - Summaries historical activities.
- IV. Background of Commercial Tanner Crab Fishery Page 7**
 - Summaries historical activities.
- V. Background of Razor Clam Fishery Page 7**
 - Summaries historical activities.
- VI. Staff Analysis of Issues and Options - Recommendations Page 9**
 - Summarizes conclusion of the evaluation of effects.

• *Issue 1. Reclassify brine shrimp from category B to category A.*

- Option A: *(preferred)* Adopt rules reclassifying brine shrimp from category B to category A on the developmental species list and add a harvest program.
- Option B: No action.

• *Issue 2. Removal of longline pot gear for harvest of Tanner crab.*

- Option A: *(preferred)* Adopt rules removing longline pot gear for the harvest of Tanner crab.
- Option B: No action.

• *Issue 3. Addition of razor clams to developmental fishery species list and allow ocean harvest of razor and gaper clams.*

- Option A: Adopts rules adding razor clams to the list of species considered developmental fisheries with a harvest program.
- Option B: *(preferred)* No action.

- Oregon Administrative Rules Page 12**
- Appendix A - Synopsis of information on brine shrimp and razor clams. Page 15**

I. Introduction

The public hearing on November 1 is the annual review of the Developmental Fisheries Program. At the hearing, ODFW staff will: 1) describe the activities of the Developmental Fisheries Program in 1996; and 2) recommend changes to the list and harvest programs of developmental fisheries species.

II. Annual Report of Developmental Fisheries Activities

Permits

ODFW staff has issued over 100 permits for the harvest of developmental fisheries species through August, 1996 (Table 1). Of the more than 200 permits issued in 1995, nine met the landing requirements for renewal for 1996. The permits for three fisheries (gill net swordfish, spot prawns, and Tanner crab) were issued through a lottery as there were more applicants than available permits by the filing deadline. All available permits were issued for four fisheries.

Landings

Landings of developmental fisheries species through July, 1996 are summarized in Table 2. As was the case in 1995, the majority of the landings of developmental species were taken as by-catch in other fisheries. The landings of herring, smelt, and cockle clams are the result of the estuarine fisheries; none have been harvested from the ocean. Most all the landings of octopus have been by-catch of the crab fishery and most of the box crab have been by-catch of the trawl fishery. The landing fees for species in all categories have generated approximately \$8,700 into the developmental fisheries fund in 1996, through July.

Research

Staff made a ride-along trip on a vessel with experimental gear to harvest cockle clams from the ocean. A future trip is planned to attach an underwater video camera to the gear to view how the gear is actually functioning while fishing.

Staff made a second ride-along trip on a trawl vessel harvesting spot prawns. Underwater video gear was attached to the cod-end of the net to view the operation of the fish excluders. Biological data were collected from the harvest of prawns.

Staff provided a considerable amount of direction and time for the Tillamook bay clam survey project funded by the Tillamook Bay National Estuarine Project. Time was spent on project design, staff training, and assistance in data collection. Underwater video footage of commercial clam operations was also collected.

Staff collected biological data on a number of developmental species. The enhanced data collection project collected additional information on the distribution, abundance, size, and sex ratio of Tanner crab from the deep water trawl fishery. The by-catch of mackerel from the whiting fishery provided species composition, size, and age information. Size and sex composition data were collected from a pot fishery for coonstripe shrimp.

We contracted with a grant writer at Oregon State University (OSU) in an effort to locate additional research funds. We were successful in obtaining grants from Oregon State University and National Coastal Resources Institute to fund an OSU graduate student to develop a publication summarizing species information, fishing techniques, processing techniques, and existing markets for developmental species.

Table 1. 1995 Developmental Fishery Permits (as of 8/31/96).

	Permits Allowed	Permits Issued	Renewals from 1995
Pacific hagfish	25	7	
blue shark	10	2	
swordfish	10 other 20 longline	10+* 1	1
northern anchovy & Pacific herring	15	5	
Pacific sardine & Pacific saury	15		
Pacific sandfish	10		
smelt	20		
Pacific pomfret	10		
slender sole	10		
box crab	25	7	
Oregon hair crab & scarlet king crab & grooved tanner crab	10	10*	4
spot shrimp & coonstriped shrimp	6 (3N/3S) trawl 10 (5N/5S) other	3* / 3* 5* / 5*	1 1
sidestripe shrimp			
cockle clams	5	1	
bay clams	20	20	
giant octopus	10	1	
California market squid	30 (15N/15S) trawl	5 / 9	2
other squid spp.	30 (15N/15S) other	2 / 0	
fragile urchin	6 trawl 6 other		
sea cucumber	6 (3N/3S) trawl 10 (5N/5S) diver 10 (5N/5S) other	3	
marine snails	10	2	

sub total 101

+ plus 6 permits for 5 single deliveries
to unsuccessful applicants total 107

* no permits available

N/S -- permits issued geographically by home port,
split at Heteeta Head, 50% N, 50% S

Table 2. Landings of developmental fisheries species, by category, through August, 1996

Category A	Pounds	Category B	Pounds	Category C	Pounds
Pacific hagfish	13,388	salmon shark	-	spiny dogfish	9,080
blue shark	1,068	black hagfish	-	soupin shark	1,248
swordfish	-	Eelpouts	-	skate	633,996
northern anchovy	-	skilfish	-	American shad	329,123
Pacific herring	164,403	carp	-	Pacific cod	154,861
Pacific sardine	10	yellow perch	-	Pacific flatnose	-
Pacific saury	-	brown bullhead	-	Pacific grenadier	635,960
Pacific sandfish	-	northern squawfish	-	cabezon	10,155
smelt	7,304			sculpins	32
Pacific pomfret	-	euphausiids (krill)	-	kelp greenling	1,230
slender sole	-	brine shrimp	-	jack mackerel &	
		Pacific sand crab	-	Pacific mackerel	467,494
box crab	1,298	freshwater mussels	-	greenstriped rockfish	
Oregon hair crab	-			redstripe rockfish	
scarlet king crab	-			shortbelly rockfish	
grooved tanner crab	-			sharpchin rockfish	
spot shrimp	6,443			splitnose rockfish	
coonstriped shrimp	224			Pacific sanddab	151,547
sidestripe shrimp	-			butter sole	-
butter clams	944			English sole	666,294
cockle clams	37,700			rex sole	448,269
gaper clams	3,244			rock sole	4,693
littleneck clams	3,596			sand sole	81,977
softshell clams	153			lemon sole	2,473
giant octopus	11,438			spotted ratfish	-
California market squid	228,491			wolf-eel	3,150
other squid spp.	-			walleye pollock	-
fragile urchin	-				
sea cucumber	-			red rock crab	3,581
marine snails	-			purple sea urchins	-
				crayfish	33,782

Management

Several staff members attended an invertebrate management conference in Seattle with participants from Alaska, British Columbia, Washington, and Oregon. There was considerable interest in Oregon's Developmental Fisheries Program which generated discussions of programs in other locations.

Staff continued to assist the National Marine Fisheries Service in their sampling program on the swordfish fishery which began in mid-August. In exchange, we will have access to data they collect from vessels harvesting off Oregon.

The Developmental Fishery Board considered requests to change brine shrimp from category B to category A on the species list and establish a harvest program, to include the ocean harvest razor and gaper clams on the developmental species list, and to exclude the use of longline pot gear for the harvest of Tanner crab. Under OAR's for the Developmental Fisheries Program, the Fish and Wildlife Commission annually reviews the program and adopts a list of species considered developmental for the next year.

Listing Procedure

To list a food fish species as a developmental fishery species, the Commission determines if the species is underutilized. An underutilized species is defined as a species that is not presently harvested in significant quantities due to poor markets or inadequate gear development or may be caught but not utilized due to poor markets.

If the Commission determines the species is underutilized, it shall:

- 1) Consider existing catch history, biological data, market information, any known or potential conflicts existing rules, or impacts on other species.
- 2) Place the species into one of three categories:
 - A - potential to be economically viable
 - B - unknown potential to be economically viable
 - C - under another state or federal management plan with permit or gear limitations

For species placed in category A, the Commission shall specify the number, qualifications, and conditions of use and renewal of permits. The Commission shall consider:

- 1) the level of available biological information
 - a) When there is a lack of information to meet Statewide Planning Goal 19, the numbers of permits and conditions of use are to be conservative.
 - b) As the level of information increases, numbers of permits and condition of use may be more liberal.
- 2) the availability of resources to conduct research and monitoring.
- 3) a diversity of small and large boat interests and fishing methods.
- 4) a need to prevent conflicts, waste or damage to the environment
- 5) the number of permits needed for market development.

III. Background of Commercial Brine Shrimp Fishery

Landings and Effort

Adult brine shrimp have been harvested in Oregon from Lake Abert by one harvester since 1979. Annual landings in the last ten years have averaged almost 34,000 lb (Table 1). Researchers estimated the annual harvest in 1981 to 1983 (7,500 lb - 10,800 lb) to be approximately 0.05 percent of the estimated shrimp biomass.

Since the late 1930's, brine shrimp has been utilized as fish food and has been considered an excellent source of live food for cultured species of larval fish and crustacea. Adult *Artemia* are mainly collected by scooping them with fine mesh nets. Cysts (eggs) are harvested by congregating them on the water surface with booms and scooping them out of the water with a felt conveyer belt. Accumulations of cysts are sometimes located from the air with a spotter plane.

Management

The Oregon Department of Fish and Wildlife has no specific regulations concerning the harvest of brine shrimp or cysts. Most of the land surrounding Lake Abert is owned by the Bureau of Land Management (BLM); they require permits for access to the lake. Because the lake is a unique ecosystem, the BLM has designated the area as an Area of Critical Environmental Concern. This designation allows the BLM to establish a management plan for the area, including standards such as water quality, to protect the ecosystem of the lake.

Table 3. Annual harvest of brine shrimp in Oregon, 1986-1995: landings (lb) and effort (vessels).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Landings	22,400	23,100	26,600	29,800	39,300	28,500	43,700	43,200	41,000	42,250
Effort	1	1	1	1	1	1	1	1	1	1

IV. Background of Commercial Tanner Crab Fishery

Landings and Effort

Prior to 1994, very little Tanner crab has been landed in Oregon (Table 4): most has been incidental catch from trawl gear. In 1994, two vessels used pot gear to land over 6,600 lb. In 1995, six vessels landed almost 140,000 lb. Four vessel met the minimum annual renewal requirement to renew their permit for 1996. Most all the harvest occurred north of Cascade Head, between 300-550 fm in depth. To-date in 1996, no vessels have made landings of Tanner crab.

Management

Prior to 1995, there were few regulations specific to Tanner crab. The intent of the regulations was to reduce conflicts with Dungeness crab harvest. Tanner crab were added to the developmental species list when the program began in 1995. A maximum of ten permits was established under the Developmental Fishery Program: all ten were issued in 1995 and 1996.

Table 4. Annual harvest of Tanner crab in Oregon, 1986-1995: landings (lb) and effort (vessels).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Landings	0	121	0	16	0	9	9	2	6,640	139,169
Effort	0	1	0	1	0	1	1	1	3	6

V. Background of Razor Clam Fishery

Landings and Effort

There has been interest in the past for mechanical harvest of razors in the ocean but there has been no harvest. Razor clams have been commercially harvested by hand from Oregon beaches for many years. Annual landings have ranged from 0 to 58,000 lb in the last ten years (Table 5). Virtually all the commercial harvest comes from Clatsop county beaches. Beaches farther south do not support large enough populations for a commercial fishery. Up to one third of the recorded harvest is sold as bait for the Dungeness crab fishery.

Razor clams are also a very popular target for recreational clam diggers. Recreational harvest has made up over 85% of the total razor harvest in the past 10 years. The total economic value of Oregon's sport razor clam fishery is estimated to be approximately 1.6 million dollars annually.

Management

In addition to a commercial fishing license, a shellfish harvest permit is needed to commercially harvest razor clams. Recreational harvesters do not need a license. The minimum size limit for commercial harvest is 3.75 inches. There is no size limit for sport harvest; there is a daily bag limit. Presently, razor clams may be taken year-round except from July 15 through August 31 in the area north of Tillamook Head.

Table 5. Annual harvest of razor clams in Oregon, 1986-1995: landings (lb) and effort.

	1986	1987	1988	1989	1990	1991	1992*	1993*	1994	1995
Commercial										
Landings	2,906	29,197	33,910	32,177	13,474	28,580	0	0	19,116	58,830
Effort**	51	173	178	228	151	129	0	0	107	161
Recreational										
Landings	55,300	214,900	216,200	230,200	123,200	136,800	0	0	188,300	171,700
Effort**	46,000	68,000	84,000	97,000	55,000	57,000	0	0	59,000	70,000

* no season due to biological toxins.

**commercial effort is number of diggers, recreational effort is number of digger trips.

VI. Staff Analysis of Issues and Options - Recommendations

The following discusses staff recommendations. The full text of proposed rule changes is attached beginning on Page .

Issue 1. Reclassify brine shrimp from category B to category A.

Option A (Preferred): Staff recommends the Commission adopt rules reclassifying brine shrimp from category B to category A on the developmental species list with the harvest program described below.

Option B: No action

There is not sufficient information to meet the requirements of statewide goal 19 for brine shrimp. Appendix A contains the life history summaries and effects evaluations for each species proposed for the developmental fisheries list. Basic life history information for brine shrimp is fairly well known. Distribution, abundance, and biomass data was documented for brine shrimp in Lake Abert, Oregon in the early 1980's; data needs to be updated with increase in harvest. Information on sustainable yield of brine shrimp is lacking. Some information is available on the use of brine shrimp and cysts by bird populations. Additional information is needed on the effects of harvest activity on disturbance to bird populations.

Lake Abert serves as a staging and feeding area for large numbers of migratory waterfowl and shorebirds. Staging areas provide critical feeding and resting stops between long-distance flights to wintering areas. The total amount of brine shrimp or cysts that could be harvested and not affect food supplies for birds is unknown.

Most of the land surrounding Lake Abert is owned by the Bureau of Land Management (BLM). Because the lake is a unique ecosystem, the BLM has designated the area as an Area of Critical Environmental Concern. This designation allows the BLM to establish a management plan for the area, including standards such as water quality, to protect the ecosystem of the lake. Harvest of brine shrimp or cysts will not affect water quality.

The use of boats on the lake, vehicle traffic on the edge of the lake and spotter planes over the lake raise concerns for disturbance of bird populations. Time and area restrictions would help reduce disturbances to birds.

If brine shrimp are reclassified on the developmental fisheries list from category B to category A, the Commission will be able to establish a harvest program outlining the numbers and conditions of use of permits.

Harvest Program

The following outlines the harvest program recommended by the Developmental Fisheries Board and staff.

A. Numbers of permits.

The Developmental Fisheries Board and staff recommend issuing 6 permits to harvest brine shrimp.

B. Qualification and renewal requirements.

The Developmental Fisheries Board and staff recommend an annual renewal requirement of 5 landings of at least 1000 lb each.

Renewal requirements have also been used to determine initial qualification for permits; a preference given to those who have meet the renewal requirements in at least one year in the past.

C. Other requirements.

Harvest of brine shrimp will be allowed from January through March and July through August. Closed periods will be established to protect nesting and migration seasons for bird populations.

Harvest areas will be restricted to the south half of the lake to reduce disturbances to bird populations.

Landings will be limited to 60,000 lb annually, per vessel, until biomass and sustainable yield data can be collected.

As with other developmental fishery permits, if there are more applicants than available permits, permits would be issued through a lottery.

Issue 2. Removal of longline pot gear for harvest of Tanner crab.

Option A: (*preferred*) Adopt rules removing longline pot gear for the harvest of Tanner crab.

Option B: No action.

In the early summer of 1995, several deep-water trawl skippers expressed concerns about conflicts with Tanner crab gear in their harvest areas. Their main concerns were of gear loss and safety: a trawl vessel with its net caught in long-line Tanner gear would be unable to raise its nets to the surface to untangle the gear. Staff worked with the Tanner vessels to make sure gear was properly marked and several Tanner vessels tried to notify trawl vessels where their gear was located. Staff had several meetings with trawl and Tanner harvesters to explore ways the two fisheries could work together. Beginning in 1996, the Tanner crab permits were modified to include a formal procedure to notify the trawl fleet when and where their gear would be located and limits to the number of pots per string.

Because of the depths involved (300-600 fm), most Tanner crab gear consists of large pots on a long-line system. Individual pots are conical in shape, with the bottom diameter of approximately X feet and a height of approximately x ft. Each individual pot can weigh up to 300 lb. The long-line can have up to 50 pots and be approximately two miles long.

Limiting the gear to single pots may prove to be too inefficient for a fishery to develop but would allow trawl gear to bring the pots to the surface if entanglement occurs.

Issue 3: Addition of razor clams to developmental fishery species list and allow ocean harvest of razor and gaper clams.

Option A: (*preferred*) No action.

There is not sufficient information to meet the requirements of statewide goal 19 for razor clams. Appendix A contains the life history summaries and effects evaluations for each species proposed for the developmental fisheries list. Basic life history information for razor and gaper clams is fairly well known.

Distribution, abundance, and biomass data for ocean populations of razor or gaper clams are unknown. The contribution of subtidal populations to the recruitment of local intertidal populations is unknown and a concern. There is evidence to suggest there no or little dispersal of razor clam eggs and larvae. Local intertidal populations could be very dependant on the recruits from intertidal individuals.

There is a large recreational fishery on razor clams. There could be a large public concern with a subtidal commercial fishery.

Option B: Adopt rules adding razor clams to the list of species considered developmental fisheries with a harvest program and allow the ocean harvest of razor and gaper clams.

If razor clams are included on the developmental fisheries, a harvest program will need to be established outlining the numbers and conditions of use of permits. A developmental fisheries permit is presently available for ocean harvest of cockle clams. Razor and gaper clams could be included on the cockle permit.

Harvest Program

A. Numbers of permits.

The Developmental Fisheries Board recommend including razor and gaper clams on the five permits for ocean harvest of cockle clams.

B. Renewal requirements.

The annual renewal requirement for cockle clams of five landings of at least 100 pounds would also apply to razor and gaper clams.



OREGON ADMINISTRATIVE RULES

OREGON DEPARTMENT OF FISH AND WILDLIFE

Developmental Fisheries Species List

635-06-850 (1) The Developmental Fisheries Species List, Category "A," is as follows:

Common and Scientific Name	Renewal Req. (landings/lb)	No. of Permits	Restrictions
Fish			
Pacific hagfish <i>Eptatretus stouti</i>	5 landings	25	no trawl permits
blue shark <i>Prionace glauca</i>	5/500 or 1/5000	10	A, B, G, I
swordfish <i>Xiphias gladius</i>	5/500 or 1/5000	10 others & 20 floating longline	H, I, K, L
northern anchovy & Pacific herring <i>Engraulis mordax</i> <i>Clupea pallasii</i>	5/500 or 1/5000	15 ocean harvest	F, G, I
Pacific sardine & Pacific saury <i>Sardinops sagax</i> <i>Cololabis saira</i>	5/500 or 1/5000	15 ocean harvest	F, I
Pacific sandfish <i>Trichodon trichodon</i>	5 landings	10	C, E, I, G, no trawl *
eulachon & whitebait smelt & night smelt & longfin smelt & surf smelt <i>Thaleichthys pacificus</i> <i>Allosmerus elongatus</i> <i>Spirinchus starksi</i> <i>Spirinchus thaleichthys</i> <i>Hypomesus pretiosus</i>	5/100	20 ocean harvest	F, I, G, no trawl *
Pacific pomfret <i>Brama japonica</i>	5/100	10	I
slender sole <i>Eopsetta exilis</i>	5/100	10	I
Invertebrates			
box crab <i>Lopholithodes foraminatus</i>	5/100	25	pots only
grooved tanner crab & Oregon hair crab & scarlet king crab <i>Chionoecetes tanneri</i> <i>Paralomis mulitospina</i> <i>Lithodes couesi</i>	5/100	10	single pots only
spot prawn & coonstripe shrimp & sidestripe shrimp <i>Pandalus platyceros</i> <i>Pandalus danae</i> <i>Pandalopsis dispar</i>	5/100 (round weight)	6 trawl & 10 other	I, J, E



OREGON ADMINISTRATIVE RULES

OREGON DEPARTMENT OF FISH AND WILDLIFE

(Category A con't)		Renewal	No. of	Restrictions
Common and Scientific Name		Req. (landings/lb)	Permits	
cockle clams gaper clams razor clams	<i>Clinocardium nuttallii</i> <i>Tresus capax, nuttallii</i> <i>Siliqua patula</i>	5/100	5-ocean only	I, G
cockle clams	<i>Clinocardium nuttallii</i>	none	unlimited other	M,N
butter clams gaper clams native littleneck clams softshell clams	<i>Saxidomus giganteus</i> <i>Tresus capax, nuttallii</i> <i>Protothaca staminea</i> <i>Mya arenaria</i>	qualifying 5/200 or 2500 annual renewal - 5/100 or 2500 annual	20 dive	O
giant octopus	<i>Octopus dofleini</i>	5/100	10	octopus pots only
Market squid & other squid spp.	<i>Loligo opalescens</i> several spp.	5/500 or 1/5000	30 trawl & 30 other	I, J
fragile urchin	<i>Allocentrotus fragilis</i>	5/500	6 trawl & 6 other	I, J
sea cucumber	<i>Parastichopus</i> spp.	5/100	6 trawl & 10 diver & 10 other	I, J
marine snails	various spp.	5/100	10	subtidal only
brine shrimp	<i>Artemia</i> spp.	5/1000	6	

Restrictions

- A - No high seas drift net permits.
- B - No large mesh gill net permits.
- C - No dredging permits.
- D - May have to have a federal "A" permit.
- E - Area specific permits.
- F - Specially adapted small mesh drift/gill net may be permitted.
- G - No permit needed for hand lines or hand harvest.
- H - Specially adapted drift/gill net may be permitted.
- I - Experimental gear permits may be required.
- J - Permits are issued geographically, split at Heceta Head, 50% N/50% S.
- K - Five single-delivery permits will be issued to those who applied by annual filing date, but did not receive a Developmental Fishery Permit.
- L - Gill net gear must conform to California gear restrictions.
- M - Hand harvest only
- N - \$25 fee
- O - Qualifying period of January 1, 1990 through October 16, 1995.

- FOOTNOTE - limited numbers of experimental gear permits may be issued for trawl harvest.



OREGON ADMINISTRATIVE RULES

OREGON DEPARTMENT OF FISH AND WILDLIFE

(2) The Developmental Fisheries Species List, Category "B," is as follows:

Common and Scientific Name		Common and Scientific Name	
<u>Fish</u>			
salmon shark	<i>Lamna ditropis</i>	carp	<i>Cyprinus carpio</i>
black hagfish	<i>Eptatretus deani</i>	yellow perch	<i>Perca flavescens</i>
Eelpouts	family Zoarcidae	brown bullhead	<i>Ameiurus nebulosus</i>
skilfish	<i>Erilepis zonifer</i>	northern squawfish	<i>Ptychocheilus oregonensis</i>
<u>Invertebrates</u>			
euphausiids (krill)	family Euphausiidae	freshwater mussels	families Margaritifera, Anodonta, Gonidea, and Corbicula
Pacific sand crab	<i>Emerita analoga</i>		
[brine shrimp	<i>Artemia salina</i>]		

Appendix A. - Synopsis of information on brine shrimp and razor clams.

Brine Shrimp

Artemia sp.

Ecology

Brine shrimp can be found in salt lakes and brine ponds through out the world. They thrive in extreme environmental conditions such as high salinity and temperature where predators can not survive.

Temperature thresholds are different for different strains of *Artemia*. In general, brine shrimp can survive in temperatures between 6° C and 40° C, with the optimum in the range of 25° C to 30° C. The dehydrated cysts tolerate a much wider temperature range, which never occurs in nature: absolute zero (-273° C) to almost 100° C.

Brine shrimp have been found in supersaturated brines at salinities as high as 340°/∞. The lower salinity limit in which *Artemia* is found in nature, is in most cases a function of the presence of predators. *Artemia* can survive in seawater or brackish water, but have no defenses against predation. As a general rule, lower salinity limits vary from place to place depending on the upper salinity tolerance level of local predators. Salinities in Lake Abert, Oregon have been recorded exceeding 80°/∞.

Life History

Reproduction and Growth

Brine shrimp have the ability to reproduce in two different methods depending on environmental conditions. Under favorable conditions, fertilized eggs can develop directly into free-swimming nauplii. Under extreme environmental conditions (high salinity, low oxygen levels), eggs are surrounded by a thick shell and deposited as cysts which will remain inactive as long as they are kept dry or under anaerobic conditions; they will start to develop when the salinity drops below a certain threshold. At salinities above this threshold, cysts will not hatch because they cannot hydrate enough. The salinity threshold at which cysts will hydrate is different for different strains of *Artemia*. When the conditions are right for hatching, within a matter of hours, the cysts hatch into nauplii which grow to adults in a few weeks.

Adult animals reach 8-10 mm long. Under optimal conditions, brine shrimp can live for several months and reproduce at a rate of up to 300 nauplii or cysts every 4 days.

Food

Brine shrimp are filter-feeders, ingesting organic detritus and microscopic algae and bacteria. In many areas, the presence of high numbers of shrimp often coincides with blooms of microscopic algae.

Artemia can be subject to serious predation in situations where the predator can withstand the harsh environmental conditions. Numerous fish and crustacean species and some insects regularly prey on brine shrimp. One group of animals which is not so limited by the salinity barrier is birds. *Artemia* can be an important part of the diet of several species of waterfowl, gulls, avocets, and flamingos. The principal bird species to be the major consumers of adult brine shrimp and cysts in Lake Abert, Oregon are the Northern Shoveler and the Eared Grebe. Brine shrimp comprise 30% and 17% of their diets, respectively.

Population

In a study in 1981-82, researchers estimated the total abundance of brine shrimp in Lake Abert, Oregon to be approximately 14.5 million lb. Peak abundance of adult shrimp occurred during midsummer. Researchers found no vertical stratification in the lake and horizontal distribution was quite patchy during peak abundance.

The principal method of dispersion of *Artemia* is transportation of cysts by wind and waterfowl, as well as deliberate inoculation by humans into solar salt works.

Harvest

Since the late 1930's, brine shrimp has been utilized as fish food and has been considered an excellent source of live food for cultured species of larval fish and crustacea. Adult *Artemia* are mainly collected by scooping them with fine mesh nets. Cysts are harvested by congregating them on the water surface with booms and scooping them out of the water with a felt conveyer belt. Accumulations of cysts are sometimes located from the air with a spotter plane.

Brine shrimp have been harvested in Oregon from Lake Abert since 1979. Annual landings in the last ten years have averaged almost 34,000 lb (Table 1). Researchers estimated the annual harvest in 1981 to 1983 (7,500 lb - 10,800 lb) to be approximately 0.05 percent of the estimated shrimp biomass.

Table 1. Annual harvest of brine shrimp in Oregon, 1986-1995: landings (lb) and effort (vessels).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Landings	22,400	23,100	26,600	29,800	39,300	28,500	43,700	43,200	41,000	42,250
Effort	1	1	1	1	1	1	1	1	1	1

Management

Present Regulations

The ODFW has no specific regulations concerning the harvest of brine shrimp.

Most of the land surrounding Lake Abert is owned by the Bureau of Land Management (BLM); they require permits for access to the lake. Because the lake is a unique ecosystem, the BLM has designated the area as an Area of Critical Environmental Concern (ACEC). An ACEC is defined as "an area within public lands where special management attention is required to protect and prevent irreparable damage to ... fish and wildlife resources, or other natural systems ...". This designation "recognized the area possesses significant values and establishes special management measures to protect those values" (BLM 1996) and allows the BLM to develop a management plan and establish standards, such as water quality, to protect the ecosystem of the lake.

Suggestions for Future Management

Lake Abert serves as a staging and feeding area for large numbers of migratory waterfowl and shorebirds. Staging areas provide critical feeding and resting stops between long-distance flights to wintering areas. The total amount of brine shrimp that could be harvested and not affect food supplies for birds is unknown.

The use of boats on the lake, vehicle traffic on the edge of the lake and spotter planes over the lake raise concerns for disturbance of bird populations. Time and area restrictions could be established to reduce disturbance.

Effects Evaluation

Information is not sufficient to meet state-wide planning Goal 19. Additional information is needed to determine short-term and long-term effects of harvest on brine shrimp resources and on other resources. Brine shrimp should be managed under the developing fisheries program with conservative numbers of permits and restrictions.

(1) Sustainability of developmental fisheries resources or incidental catch under proposed future harvest;

- a. Brine shrimp are found world wide. However, Lake Abert contains the only significant population in Oregon.
- b. Brine shrimp have been easily transplanted from one area to another.
- c. Brine shrimp are short-lived, fast growing, and have relatively high fecundity.
- d. Dehydrated cysts can survive for very long periods of time until conditions are favorable to develop.
- e. There is no incidental catch of other species.

(2) Biological and ecological effects on critical marine habitats, other habitats and other species supported by those habitats;

- a. Methods of harvest have little impact on habitat.
- b. Harvest activity could cause disturbances to bird populations.
- c. The amount of brine shrimp harvest that would not affect food supply for bird populations is unknown.

(3) Conformity and compatibility with existing uses such as commercial and recreational fishing, non-consumptive uses, public access, etc;

- a. There no recreational harvest of brine shrimp.
- b. There is virtually no other commercial or recreational use of Lake Abert.

(4) Ability of the Department and other agencies to monitor the fishery for needed data and compliance with rules and regulations;

- a. Monitoring of effect on birds would be labor intensive and would require additional staff resources.
- b. Analysis of existing data, sampling and monitoring a new fishery would require additional staff resources.

(5) Recommendations for future fishery development including gear types and effort levels;

- a. Information not sufficient to determine optimum effort levels.

Program Objectives

- (1) Develop scientific information on the stocks and life history of brine shrimp.
 - a. Need opportunities for research sampling.
 - b. Need recording of gear, effort, location, and time on logbooks.
- (2) Develop understanding of effects of harvest on local ecosystem.
 - a. Conduct literature review and analyze food habitat studies.
 - b. Conduct food use studies.
 - b. Need recording of bird disturbances on logbook.
- (3) Develop improved fishing practices and equipment to protect the local resources.
 - a. Review access to lake and harvest techniques to reduce disturbance to aquatic wildlife and damage to terrestrial ecosystem.
- (4) Identify and protect critical habitat and other important biological habitats for brine shrimp or other affected resources.
 - a. Assess frequency and method of vehicle and boat access to the lake for potential damage to soils, vegetation, etc.
- (5) Report findings and research data during annual review.

Management Options

Staff (and Board) Recommendations

- a. Permits - 6
- b. Renewal requirements - 5 landings of 1000 lb.

Other Options

- a. Status quo - species remains in Category B of developmental fisheries list.

References

Boula, K.M. 1985. Foraging ecology of migrant waterbirds, Lake Abert, Oregon. M.S. thesis, Oregon State University, Corvallis. 99 pp.

Bureau of Land Management. 1996. High desert management framework proposed plan amendment and final environmental impact statement for the Lake Abert area of critical environmental concern (ACEC) in Lake County, Oregon. Lakeview District Office, Lakeview, OR. 42pp.

Conte, F. and P. Conte. 1988. Abundance and spatial distribution of *Artemia salina* in Lake Abert, Oregon. *Hydrobiologia* 158:167-172.

Persoone, G. and P. Sorgeloos. 1980. General aspects of the ecology and bigeography of *Artemia*. pp. 3-24. In G. Persoone, P. Sorgeloos, O. Roels, and E. Jaspers (eds). The brine shrimp *Artemia*. Vol 3. Proceedings of the International Symposium on the brine shrimp *Artemia salina*. Universa Press, Wettere, Belgium.

Sorgeloos, P. 1980. Life history of the brine shrimp *Artemia*. pp. xix-xxiii. In G. Persoone, P. Sorgeloos, O. Roels, and E. Jaspers (eds). The brine shrimp *Artemia*. Vol 3. Proceedings of the International Symposium on the brine shrimp *Artemia salina*. Universa Press, Wettere, Belgium.

Sorgeloos, P., P. Lavens, P. Leger, W. Tackaert, and D. Versichele. 1986. Manual for the culture and use of brine shrimp *Artemia* in aquaculture. State University of Ghent, Belgium. 319pp.

Razor clam

Siliqua patula.

Ecology

Razor clams are found on sandy, sea-swept beaches from the Aleutian Islands in Alaska to southern California from the low intertidal zone to shallow subtidal depths. The most highly productive areas are open ocean beaches with a low slope and fine grained sand. The fine grain sand and low slopes aid in holding water in the sand between tides and the pounding surf is important for the quick and continual change of water over the beds.

Adult razor clams are usually about one foot beneath the surface of the sand. They show no lateral movement, but vertical movement is characteristic of the razor.

Life History

Reproduction

Razor clams generally spawn in late spring or early summer; seasons are progressively later at more northern locations. Variations in local spawning times may depend on density, food availability, or other environmental conditions. In some populations, a second, smaller spawning peak may occur in late summer or early fall. Some spawning may take place throughout the year.

Individual clams are either male or female, with the sex ratio of adults being 1 to 1. Estimates of fecundity are up to 6-10 million eggs. Eggs and sperm are broadcast into the water column where fertilization occurs. There is some disagreement as to the dispersal of eggs and larvae. Some researchers suggest there is little dispersal because the eggs sink rapidly and larvae tend to remain in the sand; others suggest larvae are easily moved at least several miles. After a larval period of 5 to 16 weeks, juvenile clams begin to set and dig in the sand.

Maturation in razor clams is more closely related to size than with age. Maturity is commonly reached at a size of about 10 cm, whereas the age at maturity varies with geographic location. Age at maturity is generally 2 years in the Pacific Northwest and 3-4 years in Alaska. Maximum age in California is 5 years, 9-11 years in Oregon and Washington, and 18-19 years on Alaska.

Food and Growth

Razor clams are filter feeders, filtering its food of diatoms and other plankton from the surrounding waters. Numerous species of birds (gulls,

crows, ducks, shorebirds, and scoters) will feed on newly settled clams, a time when they are most vulnerable. Small Dungeness crab, sturgeon, starry flounder and English sole have also been found to eat small clams. There is little information on predation on adult clams.

In general, growth rates are higher in southern populations than in northern populations. Location within the intertidal zone also affects growth rates. Presumably, a longer time under water means increased feeding time and therefore increased growth for clams in the lower intertidal areas. There is no data for growth rates of clams in subtidal areas. A very dense set may stunt the growth of some year-classes. At the end of their first year, clams may reach a length of 3.5 inches and approximately 4.5 inches by the end of the second year. Growth then slows to where at the end of five years, Oregon razors average 5.5 inches in length. Age is determined by counting winter growth checks on the shell.

Population

In Oregon, the largest intertidal populations are found on beaches of Clatsop County, north of Tillamook Head.

Densities of razor clams 1 to 3 months after setting can be very high; up to 3600/ft² found in Washington, with densities of 0 to 100/ft² more common. The highest densities are found in the lower one-third of the intertidal zone in fine, firm damp sand. Densities of adults are also highest in lower intertidal areas. Subtidal populations may also be substantial, but status is not well known.

Researchers estimated a 99% mortality rate for razor clams over their first 8 months of life, 9% from 1-2 years, 30% from 2-3 years, and 40% thereafter. A major source of mortality, especially for young razor clams, is the scouring effect of winter storms.

Harvest

Razor clams have been commercially harvested from Oregon beaches for many years. Annual landings have ranged from 0 to 58,000 lb in the last ten years. All of the harvest is done by hand. Some interest has been expressed for mechanical harvest of razors in the ocean but there has been no harvest.

Razor clams are also a very popular target for recreational clam diggers. Recreational harvest has made up 85 % of the total razor harvest in the past 15 years. The total economic value of Oregon's

sport razor clam fishery is estimated to be approximately 1.6 million dollars annually.

Management

Present Regulations

In addition to a commercial fishing license, a commercial harvester must have a shellfish harvest permit to harvest razor clams. Recreational harvesters do not need a license. The minimum size limit for commercial harvest is 3.75 inches. There is no size limit for sport harvest; there is a daily bag limit. Presently, razor clams may be taken year-round except from July 15 through August 31 in the area north of Tillamook Head.

Suggestions For Future Management

Mechanical harvest of razor clams is not recommended at this time. Mechanical gear would need to be developed for economical harvest of razor clams in the ocean. Effects of gear on habitat and other species would need to be determined.

The effect of silt-generating activities (e.g. dredging) could have impacts to razor clams, especially during and after the time of setting.

The extent and importance of subtidal populations is not well understood. The concept of subtidal populations acting as brood stock for intertidal populations should be verified. Is there a large pool of far-ranging larvae or are local stocks dependant on their own recruits?

Effects Evaluation

Information is not sufficient to meet state-wide planning Goal 19. Additional information is needed to determine short-term and long-term effects of harvesting razor clams on resources and uses of other marine resources, the continental shelf, the Oregon nearshore ocean, and onshore areas. Ocean harvest of razor clams should be managed under the developing fisheries program with conservative numbers of permits and restrictions.

(1) Sustainability of developmental fisheries resources or incidental catch under proposed future harvest;

- a. Life history of razor clams in general is fairly well known.
- b. Distribution and abundance data in the ocean are limited.
- c. Contribution of subtidal ocean clams to intertidal populations is unknown.

(2) Biological and ecological effects on critical marine habitats, other habitats and other species supported by those habitats;

- a. Ocean harvest methods are presently unknown-effect on habitat and other species is unknown.

(3) Conformity and compatibility with existing uses such as commercial and recreational fishing, non-consumptive uses, public access, etc;

- a. Access to the ocean resource by the general public is limited.
- b. There is heavy recreational harvest of razors from some intertidal beach areas.
- c. There are possible conflicts with other fisheries.

(4) Ability of the Department and other agencies to monitor the fishery for needed data and compliance with rules and regulations;

- a. Analysis of existing data, sampling, and monitoring a new fishery would require additional staff resources.

(5) Recommendations for future fishery development including gear types and effort levels;

- a. Information not sufficient to determine optimum effort levels.

Program Objectives

(1) Develop scientific information on the stocks and life history of razor clams.

- a. Need geographic distribution of effort.
- b. Need opportunities for on-board, dockside, and/or research sampling.
- c. Need recording of gear, effort, location, depth, and time on logbooks.
- d. Need analysis of existing trawl survey and commercial fishery incidental catch data.

(2) Develop understanding of effects of harvest on marine ecosystem.

- a. Need information on contribution of subtidal stocks to local intertidal areas.
- b. Conduct literature review and analyze food habitat studies.
- c. Analyze logbook data from all fisheries to determine habitat types associated with directed and incidental fisheries.

(3) Develop improved fishing practices and equipment to protect the ocean resources.

- a. Need research cruises with underwater video gear and/or ride-along trips on harvest vessels.

- b. Analyze logbook data from all fisheries to determine habitat types associated with directed and incidental fisheries.

(4) Identify and protect critical marine habitat and other important biological habitats for razor clams.

- a. Need research sampling to identify ocean juvenile, spawning, and rearing areas.

(5) Report findings and research data during annual review.

Management Options

Staff recommendation

- a. Status quo - species not on developmental fisheries list

Board recommendations

- a. Permits - 5, ocean only (include on cockle permit)
- b. Gear restrictions - experimental gear permits may be required
no permit for hand harvest
- c. Renewal requirement - 5 landings of 100 lb

References

Lassuy, D.R. 1989. Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (Pacific Northwest). Pacific razor clam. US Fish and Wildlife Service. Biological Report 82(11.89).

Morris, R.H., D.P. Abbot, and E.C. Haderlie. 1980. Intertidal invertebrates of California. Stanford University Press. Stanford CA. 690 pp.

Oregon Fish Commission. 1963. Razor clams. Educational Bulletin No. 4. Portland, OR 13 pp.

**Staff Report Developmental Fisheries Program
Addendum**

Outline of Addendum

I. Introduction Page 2

II. Staff Analysis of Issues and Options - Recommendations

• **Issue 4. Review deadline for new applications Page 2**
Option A: (*preferred*) Adopt rules changing the deadline for new applications from March 1 to February 1.

Option B: No action.

• **Issue 5. Issue bay clam dive permits to vessels Page 3**
Option A: (*Board recommended*) Adopt rules reducing the number of permits for bay clam harvest and allowing a permit to be issued to vessel.

Option B: No action.

Oregon Administrative Rules Page 4

I. Introduction

The Developmental Fisheries Board held its last meeting on October 28, 1996. Two issues were discussed at the meeting which are not outlined in our staff report. This addendum summarizes those issues.

II. Staff Analysis of Issues and Options - Recommendations

The following discusses staff and Board recommendations. The full text of proposed rule changes is attached beginning on Page 4.

• *Issue 4. Review deadlines for new applications.*

Background: Presently, the deadline to apply to renew a permit is January 1. After January 1, some time is needed by staff to ensure all fish tickets through December 31 have been received, to review the landings to see who has met the renewal requirements and to determine how many permits are available to new applicants. The deadline of March 1 for new applicants is to determine if a lottery is needed if more applicants apply than available permits.

The result for new applicants is, a loss of two months of fishing time.

At the beginning of the program, this two month delay was needed with the volume of permits and past landings to review. From a staff standpoint, two months isn't now needed to review a reduced volume of applications and landings.

On the positive side, two months does allow time to notify people what permits are available.

Option A: (Preferred) Adopt rules changing the deadline for new applications from March 1 to February 1.

The suggested alternative is to change the deadline for new applications from March 1 to February 1. One month is enough time for staff to review landings and renewal applications. Also, there would be only one month of lost fishing time for new applicants.

The downside is there would be less time to notify people about available permits.

Option B: No action.

Leaving the deadline as is would allow more time to notify people as to what permits are available.

• *Issue 5. Issue bay clam dive permits to vessels.*

Background: Bay clams were added to the developmental fisheries list in 1996. The harvest program presently allows for a maximum of 20 permits issued to individual divers.

At the October 28th meeting, several commercial clam diver presented a petition to the Development Fishery Board requesting a change in the structure in the bay clam dive permits. They would like the permits to be issued to vessels allowing them to hire another diver to work off their vessel if they are unable to dive. They also requested to allow up to two divers to work off one vessel permit.

Issuing permits to vessels would result in the vessel rather than the individual diver getting credit for the harvest. Without owning a vessel, an individual diver would have no security from one year to the next whether they would find a vessel to dive off of.

Without a reduction in the maximum number of permits, allowing two divers per vessel could effectively double the number of allowable harvesters; i.e. if there were 20 vessels, each with two divers there would be 40 harvesters.

Option A (Board recommended): Adopt rules reducing the number of permits for bay clam harvest and allowing a permit to be issued to a vessel as well as an individual.

The Board recommended reducing the maximum number of permits to 10 and allow a permit be issued to either a vessel or an individual. They also recommended to include a permit stipulation of no more than two divers working under a vessel permit at any one time.

Under a system with both vessel permits and individual permits, divers working under a vessel permit need to be made aware their landings would not qualify them for an individual permit for the next year because the landings are credited to the vessel permit.

Option B: No action

Taking no action, would leave the maximum number of permits at 20 and permits would be issued to individuals.

An additional concern is the timing of this issue. Since the issue was brought before the Board at the meeting on October 28, it was not on the agenda that was mailed to all permit holders and other interested parties. Staff has not had the opportunity to discuss the alternatives with other bay clam harvesters. Delaying action on this issue until the December meeting would allow time to receive input from others.



OREGON ADMINISTRATIVE RULES

OREGON DEPARTMENT OF FISH AND WILDLIFE

Procedures for Issuance, Transfer and Renewal of Developmental Fisheries Species Permits

635-006-0910 (1) Applications:

(b) Complete applications must be received postmarked or date-stamped by January 1 of the year of issue for new species added to the developmental fishery list in OAR 635-006-0850, and thereafter by the annual filing date of [March 1] **February 1** of the year of issue;

Developmental Fisheries Species List

635-06-850 (1) The Developmental Fisheries Species List, Category "A," is as follows:

(Category A con't)		Renewal Req. (landings/lb)	No. of Permits	Restrictions
Common and Scientific Name				
cockle clams	<i>Clinocardium nuttallii</i>	none	unlimited other	M,N
butter clams	<i>Saxidomus giganteus</i>			
gaper clams	<i>Tresus capax, nuttallii</i>	qualifying	10 dive	O
native littleneck clams	<i>Protothaca staminea</i>	5/200 or 2500 annual	(individual or vessel permits)	
softshell clams	<i>Mya arenaria</i>	renewal - 5/100 or 2500 annual		