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OREGON DEPARTMENT OF FISH AND WILDLIFE

Staff Report on the Use of Helicopters in the
Dungeness Crab Fishery in Oregon

Problem

In September 1976, Messers. Bob Matthews and Paul Lewis announced a desire to use helicopters to fish for Dungeness crab in Oregon waters. Exploratory fishing began in January. Since that time others have expressed interest. The Oregon State Police closed down the operation on March 21 as a violation of OAR 625-10-165(2) for bringing female and small male crab to the beach and not releasing them immediately. Matthews and Lewis have requested a change in regulation to allow bringing illegal crab to the beach for sorting when helicopters are used.

Background

Initial inquiry was made in September 1976 by Matthews and Lewis for information on licenses and regulation. They were advised that the crew needed licenses and that we would inquire as to whether the helicopter had to be licensed. They were also told that it was illegal to bring female and small male crab to the beach even though they were returned to the water. They were later advised that the machine would not have to be licensed.

The company operated from January to March, exploring initially in the Lincoln City area and later near Yachats before moving to Port Orford. They were seeking areas where boat crabbing was not taking place to (1) not compete with boat fishermen, and (2) improve chances for catching crab. The fishing site chosen at the mouth of Elk River satisfied these requirements. Records show that crab were sold by the company prior to March 28, 1977.

The Department staff did not monitor the operation during this period so has no information on procedure or effect. The Oregon State Police did observe fishing in the Port Orford area and saw the procedures used as in violation of

administrative rule. No action was taken because company personnel misleadingly informed the Oregon State Police that the Newport office of the Oregon Department of Fish and Wildlife had approved the operation. When the Newport office and Oregon State Police did exchange views, the problem was identified and the Oregon State Police took action on March 21. The Newport office at no time gave permission or a permit for the sorting of crab catches on the beach.

Following stopping of fishing, Matthews and Lewis first requested a meeting with the Department (held at Newport on March 23) and then a hearing before the Commission at their scheduled March 28, 1977, meeting. The Newport meeting served primarily to focus the company's request to the Commission, in which they asked that the regulation be changed to allow "helicopter crabbing" and offered to open their operation to study during an evaluation period. The Commission, after hearing the matter on March 28, ordered a three-week evaluation period and scheduled a hearing for April 29, 1977. A permit was issued in the name of the Director on March 29, 1977, and amended on April 8, 1977. (Permit attached.)

Fishermen have commented on the use of helicopters to fish for crab. Two fishermen came to the Newport office and expressed concern that small crab would be killed by falling out of the pots, by mechanical damage due to the wind blast from the machine's rotor or by drying out in transit. Word came to use of other fishermen objecting to this method because they had observed small crab being strewn across water and beach. One letter was received decrying the use of helicopters for crabbing but for no stated reason. Fishermen have objected to the fact that the helicopter does not have to be licensed as unfair. On the other side, fishermen have called it imaginative and capable of being no more damaging than conventional methods.

Evaluation

Evaluation of the use of helicopters in crab fishing required two kinds of observation (1) monitoring of normal fishing procedures and catches, and (2) experiments to determine the degree of mortality of nonlegal crab inherent in this

method. Decisions on the nature of tests and observations were made by the staff; and Bob Hudson, manager of All-Coast Fishermen's Marketing Association, was asked on March 29 for input. He had no comment on design but asked that we contact two Port Orford fishermen to observe and comment on the crabbing operation. They observed fishing on March 31.

Monitoring Normal Operations

Fishing during the period of observation was done in the Port Orford area. Pots similar to but larger than those used by boat fishermen were employed with all baiting, removing of the crab, and repairing of the pots done on shore. Pots were set and retrieved by the helicopter in a continuous operation. Female and small crab were put in a container and returned to the sea periodically. The account of a day of observation that is attached provides a more detailed view of fishing procedure.

We monitored operations on 11 occasions. During that time they pulled 352 pots that had soaked (fished) from a few hours up to 36 hours. The total catch was 6,609 crab of which 6,014 (91%) were legal. Female crab made up 8.7% (574) of the catch and small males 0.3% (21). The mean catch per day and per pot were 859 and 17 respectively.

Concern was expressed for damage to nonlegal crab due to the downdraft from the helicopter rotor, from falling out of the pot in flight and from handling and releasing. None of these conditions were meaningfully inimical. The character of the windblast from the rotor and the distance between the rotor and the crab made downdraft wind on the crabs too light to cause physical damage. Only 7 crab were observed to fall from the pots even though the majority of the pots were observed from pulling to landing. The inactivity of the crabs in flight was the main reason for the low incidence of dropping. Crab to be released were put in a specially rigged garbage can where they rested well. The emptying process was done in a manner and location that did not harm the crab.

Mortality Studies

Laboratory tests of the effects of dehydration, dropping and sudden submer-
sion were conducted because crab did or could experience these factors in normal
crabbing operations. Conditions of the study render the results indicative but
not conclusive.

Nonkeepable crab experience drying conditions on the trip in by helicopter
and while waiting in the container for release. This mortality factor was simu-
lated at the laboratory and crabs tested at 10, 30 and 60 minute levels. Drying
did not cause mortality among uninjured healthy crab but was a factor in the
observed mortality of damaged crab, particularly those with body puncture wounds.
These results necessitate minimizing drying time and the change for fighting
injury.

Crab are subject to dropping from air-lifted pots and information on the
effect of height on mortality was sought. Crab were dropped into water from
heights up to 30 feet, and held several days for observation. Most crabs sur-
vived but a low level of mortality did result from falls in excess of 15 feet.

A method of minimizing damage to nonkeepable crab is to return them to the
ocean in the pot of capture without removing them. Concern existed that the
pressure change from sudden deep submerision would cause mortality. This was
tested with submerision to 40 and 132 feet after being out of the water for 5
and for 60 minutes. No mortality was experienced.

Growth-Impact on Existing Fishery

As many as 30 helicopters may be in the fishery by the 1977-78 season. One
Salem company plans on 15-20 craft and three other people have made inquiries.
Success of the current operation will have a bearing on new operators coming in
as will the abundance of crabs and market availability.

How economically feasible helicopter crabbing is remains to be seen. The
craft now being used cost about \$72,000 to purchase, and \$170 per hour to

operate. At least a two-man ground crew and ground transportation are needed. The catch may have to be transported considerable distances for marketing. With this overhead it is difficult to see where a profit will develop. However, individual ingenuity plus the flexibility of the craft could keep them competitive with the surface vessel fishery. In addition the helicopters are used for other activities so the return on investment does not rely on fishing alone.

The supply of crab seems to be in the second year of a recovery cycle. Since 1954 the crab harvest has reached a peak every five to seven years and the higher level of abundance has lasted three to five years. To date in this season about 7.6 million pounds have been landed compared to 7.2 million pounds for the same period in 1976. Strikes and strict landing quotas by processors have restricted the 1976-77 fishery.

Certain problems arise when any new harvester enters the fishery. There are favorite and traditional areas that most crabbers fish. A new harvester is considered as an outsider and an effort may be made to force the novice into a less productive area or harass his gear by cutting lines or dragging pots to another area. Unsubstantiated claims, rumors and exaggerations may also be made causing the governing agency to take a much closer look at the newcomer than is warranted.

A state/federal cooperative study of the coast-wide Dungeness crab fishery in 1974-76 concluded that the fishery is already probably overgeared compared to what is necessary to take the maximum sustainable yield (MSY) coast-wide. The average number of pots fished in Oregon during 1967-72 was very close to that needed to harvest MSY. This new technology may substantially increase total effort and aggravate what is seen by some as overcapitalization in the crab fishery. Should the Commission want to head off this growth threat it would have to be accomplished on the basis of a fault in their operation rather than effort control. However, it is not clear, at this time, that helicopter crabbing is undesirable from the viewpoint of efficiency and resource utilization. Certainly,

though, a shift to gross use of this method would greatly impact the boat fishery and the coastal community generally.

Discussion

Review of the data gathered through observation and experiment shows that the helicopter technology for catching crab need not be damaging to the resource. While an irresponsible operator could kill or injure a high portion of the non-keepable crab, the risk of this happening appears to be no greater than with the boat fishery.

While there was no observed problem with dropout of small crab or with mortality in releasing procedures we see that other situations might cause damage. Dropout risk could be reduced by requiring a small mesh bottom in the pot and a bridle that holds the pot upright (level). Because crab did not move much in flight, escapement through the larger side meshes would be low or nil. It appears that damage to the small crab would be minimized if they were not handled but returned to the ocean in the pot of capture to escape as they find and desire a way out. However, crab near to or above the legal length would have to be removed and returned separately. Additional monitoring of the fate of nonkeepable crab would be required.

Bringing sublegal and female crab to the beach should not cause death due to dehydration if "turn around" time is kept short; i.e., under 15 minutes. Special care would have to be taken in subfreezing weather.

Having the illegal crab on the beach is of concern to enforcement people because it makes "boot-legging" easier. Control over this problem might be improved by requiring operation from only prearranged locations.

The present OAR's make sorting of crabs on the beach or land illegal (Assistant Attorney General's informal opinion). However, if no sublegal male or female crab are in the pot, it is presently legal to sort on the land. It appears impossible to us for the sorting to occur at sea, with the type of helicopter

used. Allowing the helicopter operation to exist would necessitate change in the present wording of OAR 625-10-165(2).

Since one segment of existing regulations for boat fishermen does not allow nonlegal crab to be brought to the bay or dock, allowing the helicopter fishery to so operate could be giving them prerogatives discriminatory to the boat fishery. This regulation was added as an enforcement aid and to prevent discard of small crab into inhospitable waters. While compatible with the boat fishery, it prevents the practical use of helicopters which need to bring pots to shore to sort the catch. The reasonable thing to do now, if helicopters are to be allowed, is to change current regulation wording so that it applies to both methods as fairly as possible. We have developed wording that relates to the time the illegal crab are out of water rather than transporting them to shore.

For administrative purposes and to be equitable it would be desirable to require a "boat" license for helicopters (or other hovering craft not in the water) engaged in fishing operations. This is now not required. The State Legislature would have to amend the pertinent ORS to enable this to be done.

Because of the high overhead and other costs associated with helicopter crabbing, it is thought that such an operation can only exist profitably in good crab abundance years. Poor years will probably see little helicopter crabbing.

Recommendations

The use of helicopters to retrieve crab pots appears sound from a biological basis. Enforcement problems and the economic impact on the boat fishery through competition for crab and the effect on the market remain as unknown quantities at this time. The seriousness of these problems will be related to the degree of expansion of helicopter crabbing.

If the Commission authorizes the use of helicopters for commercial crabbing, the following recommendations are made:

1. That the Legislature be requested to include helicopters in the boat licensing requirement.

2. That existing regulations pertaining to crabbing have the following additions or changes:

625-10-160

- (5) Crab pots used in helicopter crabbing shall have a maximum mesh size in the bottom of $2 \frac{3}{4}$ inches measured in the longest dimension from opposite corners of a given square.
- (6) Crab pots used in helicopter crabbing shall have bridles fixed to the top frame in such a way as to enable the pot to be carried level enroute from or to the point of capture.

625-10-165 (provided below are changes or additions to this section)

- (2) Any undersized or female Dungeness crab taken from the Pacific Ocean must be released within 15 minutes of capture unharmed into the Pacific Ocean at the point of capture. (Retain second sentence as is.)

DATE: April 7, 1977
TO: Files
FROM: Jack Robinson JR
SUBJECT: Helicopter Crabbing Observations

The operation, as I observed it on March 31, 1977, basically is owned by R. Matthews (owns the choppers) and Paul Lewis who leases the choppers, normally for logging cedar logs and butts. The helicopter used is a small two-lace, bubble-cockpit type. It would be difficult if not impossible to sort crab at sea from the type. It can lift about 1,000 pounds, plus the pilot.

They were fishing about 34 oversized crab pots, six-feet in diameter, with four standard entrance fykes and four 4-3/8 inch escape rings per pot. The pots are lightly constructed with somewhat larger mesh webbing than standard; also having much less ballast-weight than standard. They have had some problems with the pots drifting with currents for that reason (we believe), although the fishermen believe the drifting has perhaps been due to hostile boat fishermen.

The pots were fished normally in about 5 fathoms close to the beach (could see their buoys and trailer buoys with binoculars from the beach). The "chopper" had a 25-foot steel cable hook-line tied on amid ship; the other end was attached to a 6-foot long steel rod ending in a 3-pronged grapple hook. One of the prongs had a short U-shaped "finger" welded onto it. The pilot let the grapple hook down into the water ahead of the buoy of the pot he intended to lift, caught the trailer line with it, lifted the pot buoy line (110 feet long) and pot into the air, and then brought it to the unloading and sorting area adjacent to the beach (in this case, a grassy 3-acre field overlooking the beach about 1/4 mile from the surfline). The pot was lowered (simply by hovering and lowering the chopper) to the ground gently; a crewman (total, 4 on the beach) unhooked the grapple and the crew then proceeded to empty the crabs directly onto the ground. Sub-legal and female crabs were, however, placed gently and immediately into a standard metal garbage can. A previously sorted and emptied pot was then hooked onto the short "finger" previously mentioned, (by its buoy line), the chopper raised until the pot was off the ground and flown out to sea. Release of the buoy line is accomplished simply by hydrodynamics - the line floats off the hook, and the pot, of course, sinks to the bottom. The entire operation for pick-up and return of pot took from 1-5 minutes, per pot.

As I observed it, sublegal, and female crabs (by far the most were females) were collected in the garbage can and then returned to the ocean every 20-45 minutes (out of water that long), averaging about 25 minutes and perhaps 6 pots. The return was said to be more frequent when illegal crab were more abundant in catches (more later on this). The garbage can itself had an ingenious two-rope arrangement whereby it is flown to sea, lowered

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to the surface, contacts the surface bottom first, tips onto its side, and is then picked up by its bottom. This is accomplished by releasing the rope connected to the handle (the other is connected to the bottom of course) by a hook which can be opened electrically by the pilot. The crabs simply slide out of the can into the ocean. More details on this later when our report is written.

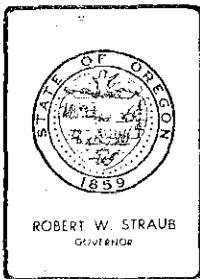
The operation we observed was fairly successful and appeared to be as clean or cleaner than a normal boat operation. The operators had allowed the gear to soak overnight from about 5 p.m. to 8:45 a.m. the day I observed (they used both hanging bait and bait in homemade containers). Their catch from 33 pots worked consisted of 1,011 crabs, of which 23 were females, and 1 sublegal male. Most of the legal crabs were jumbo size, none were softshelled. Average C.L. of legals was 183 mm. The pots were re-set by 10:45 a.m. We watched them pull 22 of these starting at 3:35 p.m. and ending at 5:03 p.m. Four hundred fifty three (453) legals were caught, with quite a few more illegals than in the morning - one male, 59 females. Apparently a minimum soaking time is necessary for the sublegal sized crab to escape the pot, as they were in the same location as overnight on the morning's pull.

We saw only a couple of crabs fall out of the pots while airborne; one of these fell out directly over the sorting area (perhaps from 40 feet high) and was killed by the fall.

We also had opportunity to be directly under the helicopter while he lowered the pot to the ground. No prop-wash wind was evident until he was perhaps 40 feet above us - much less than the interval normally between pot and chopper while enroute from ocean to "port".

In summary, the operation is ingenious, fairly clean (vis a vis health of crabs) as I observed it (although we are conducting experiments here to test delayed mortality on simulated aspects), and was profitable that day, although perhaps with a higher cost than a similar boat operation. We'll continue to observe it until April 19, and write a report on it plus the lab experiments here, thereafter.

ROBINSON:m1



**DEPARTMENT OF
FISH AND WILDLIFE
MARINE REGION**

MARINE SCIENCE DRIVE, BLDG. NO. 3 • NEWPORT, OREGON • 97365

March 29, 1977

Mr. Bob Mathews
Mr. Paul Lewis
Loop Drive, Sand Point
Lincoln City, Oregon 97367

Dear Messrs. Mathews and Lewis:

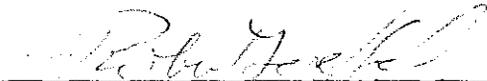
Under the authority of ORS 508.106 and OAR 625-20-040 you are authorized to experimentally conduct commercial fishing operations for Dungeness crab using a helicopter in the waters of the state of Oregon, subject to the following conditions:

1. Provisions of Oregon commercial fishing law will apply except that crab may be brought to the beach for sorting and except as the staff specifically requests departure from those provisions for evaluation purposes. Not more than one point of landing may be used in a given day.
2. Normal company operations will be followed during the period of evaluation except that permittee's equipment and manpower as needed to do aspects of the evaluation will be made available at times and in places specified by the state at no cost to the state.
3. Commercial fishing operations conducted under the permit will take place between 8:00 a.m. March 30, 1977 and 8:00 a.m. April 19, 1977. Operations will be deemed complete for the purposes of this permit when all undersized or female crab brought to beach have been returned to the ocean. Any pots remaining in the ocean after 8:00 a.m. April 19, 1977 can be retrieved by properly licensed surface vessels and legal crab retained or by company equipment in which case all crab contained in the pots will be returned to the ocean.
4. The permittee shall cooperate with the state and will allow Oregon Department of Fish and Wildlife and Oregon State Police personnel to review, observe and participate in the operations as needed for evaluation. Members of the fishing industry or general public invited by the state may also observe operations.
5. Records will be kept by the permittee as indicated in the attached Oregon Department of Fish and Wildlife shellfish logbook and as otherwise specified by the state. Included will be a record of "soaking time" for each group of pots and the number of legal and non-legal crabs in each pot for each pull.

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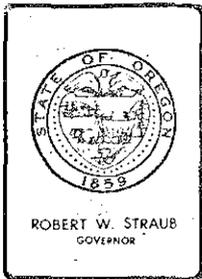
Mr. Bob Mathews
Mr. Paul Lewis
March 29, 1977
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6. A copy of the permit must be kept at the point of landing and processing of crab pots on the beach, at all times that crab are being brought to the beach.
7. Failure to comply with all provisions of this permit shall be grounds for revocation of the permit.



For John R. Donaldson, PhD.
Director Department of Fish and Wildlife

LOEFFEL:m1



**DEPARTMENT OF
FISH AND WILDLIFE
MARINE REGION**

MARINE SCIENCE DRIVE, BLDG. NO. 3 • NEWPORT, OREGON • 97365

April 8, 1977

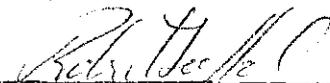
Mr. Bob Mathews
Mr. Paul Lewis
Loop Drive, Sand Point
Lincoln City, Oregon 97367

Dear Messrs. Mathews and Lewis:

I understand that the permit issued to you on March 29, 1977 to engage in the taking of crab with the use of helicopter is viewed by you as limiting you to fishing at one location for the duration of the permit. If you are so interpreting the permit please notice that condition No. 1 which speaks to this matter uses the term "in a given day" and is meant by this agency to allow you latitude to fish anywhere on the Oregon coast you choose, provided that operations won't change location or occur at 2 or more places within a day. You are not restricted to the Elk River site.

After discussing the matter this morning we saw that greater flexibility could be allowed and still keep operations within our ability to observe. Accordingly, you may operate at 2 or more locations on any day provided that they are close enough together and fishing activities are so synchronized that the agency observer has opportunity to monitor all retrieval of pots and landing of crab. The agency observer must be notified of any new location being fished before gear is pulled at that location.

The provisions of the previous paragraph are made a part of the March 29 permit and subject to its conditions.



Robert E. Loeffel

For John R. Donaldson, PhD.
Director Department of Fish and Wildlife

LOEFFEL:m1

Distribution:

Mr. Mathews
Mr. Lewis
Mr. Poling
Dr. Donaldson
Major Hershey
Corporal Sanders
Lieutenant Norton

Crab Fishery**Commercial Fishing**

[ED. NOTE: Administrative Order FC 246 repeals applicable portions of FC 202, 203, 212, and 218.]

Closed Season

625-10-155 (1) It is unlawful to take Dungeness crab for commercial purposes from the Pacific Ocean or Columbia River from August 16 through November 30.

(2) There is no closed season for the taking of Dungeness crab for commercial purposes from the bays and estuaries of this state other than the Columbia River.

Statutory Authority:

Hist: Filed 5-5-72 as FC 246, Eff. 5-15-72
Amended 11-27-74 by FC 285(74-20), Eff. 12-25-74
Amended 6-23-75 by FC 293(75-6), Eff. 7-11-75
Amended by FWC 30, Filed and Eff. 11-28-75

Fishing Gear

625-10-160 It is unlawful to:

(1) Take crab for commercial purposes by any means other than crab rings or crab pots (ORS 509.415).

(2) Use any crab pot constructed subsequent to January 1, 1975, which does not include a minimum of two circular escape ports of at least 4-3/8 inches inside diameter located on the top or side of the pot. If escape ports are placed on the side of the pot, they shall be located in the upper half of the pot. Further, beginning with the 1979-80 season, it will be unlawful to use any crab pot which does not include a minimum of two circular escape ports of at least 4-3/8 inches in diameter.

(3) Take crabs for commercial purposes by crab pots from the Alsea, Coos, Nehalem, Siletz, and Yaquina Bays.

(4) Place, operate, or leave crab rings or pots in the Pacific Ocean during the closed season, except for a four-day period immediately prior to the date the Dungeness crab season opens.

Statutory Authority:

Hist: Filed 5-5-72 as FC 246, Eff. 5-15-72
Amended 11-27-74 by FC 285(74-20), Eff. 12-25-74

Size and Sex

625-10-165 (1) It is unlawful to take or possess for commercial purposes:

(a) Female Dungeness crab.

(b) Male Dungeness crab less than 6-1/4 inches measured the shortest distance through the body of the crab from edge of shell to edge of shell from directly in front of the tenth anterolateral spine.

(2) Any undersize or female Dungeness crab taken from the Pacific Ocean must be released immediately unharmed to the Pacific Ocean and not brought into a bay or a dock. Any undersize or female Dungeness crab taken from a bay must be released immediately unharmed into the fishing area and not brought to the dock.

Statutory Authority:

Hist: Filed 5-5-72 as FC 246, Eff. 5-15-72
Amended by FWC 56, Filed and Eff. 4-26-76

625-10-170 [Filed 5-5-72 as FC 246, Eff. 5-15-72
Amended 11-27-74 by FC 285(74-20), Eff. 12-25-74
Amended 6-23-75 by FC 293(75-6), Eff. 7-11-75
Repealed 12-10-75 by FWC 34, Eff. 1-1-76]

625-10-175 [Filed 5-5-72 as FC 246, Eff. 5-15-72
Repealed 12-10-75 by FWC 34, Eff. 1-1-76]

625-10-180 [Filed 5-5-72 as FC 246, Eff. 5-15-72
Repealed 12-10-75 by FWC 34, Eff. 1-1-76]

625-10-185 [Filed 5-5-72 as FC 246, Eff. 5-15-72
Repealed 12-10-75 by FWC 34, Eff. 1-1-76]

625-10-190 [Filed 5-5-72 as FC 246, Eff. 5-15-72
Repealed 12-10-75 by FWC 34, Eff. 1-1-76]