



Exhibit F

Commercial Market Squid

Oregon Fish and Wildlife Commission
Salem, March 19, 2021
Troy Buell, Marine Resources Program

Photo courtesy of Cameron Sharpe, ODFW



Outline

- **Market squid biology and ecology**
- **Commercial fishery history, development, and description**
- **Current fishery management**
- **Management challenges**
- **Staff recommendations**
- **Looking forward**



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Biology and Ecology

- **Single species – *Doryteuthis (Loligo) opalescens***
- **Short lived – less than 1 year, average age at harvest is 6 months in California**
- **Terminal spawners**
 - Spawning occurs at end of lifespan
 - Females may spawn multiple times during single spawning event
- **Shallow water mating/spawning aggregations**
 - Concentrated in spring and fall off Oregon
- **Eggs deposited on sandy bottom**
- **Hatch into paralarvae in 3-8 weeks**
- **Move to deeper water off continental shelf as they grow and mature**

Market squid
egg cases

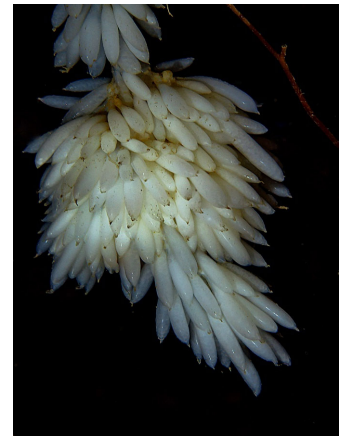
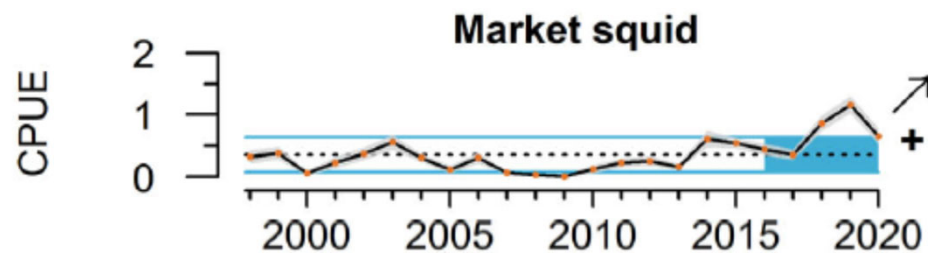


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Biology and Ecology

- Part of forage base for many species of fish, marine mammals, and seabirds
 - No known squid specialists
- “Boom and bust” population cycles
- Affected by El Nino/La Nina
 - More productive in northern areas during El Nino
- Recent increase off Oregon related to Marine Heat Wave(s)?



Standardized market squid catch from NOAA Fisheries Juvenile Salmon Ocean Ecology Survey

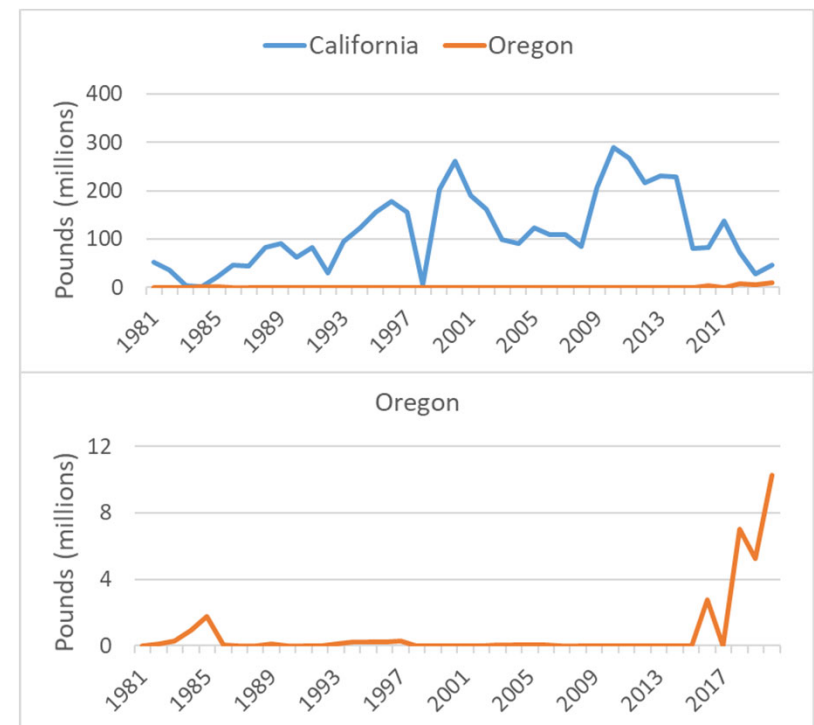
Figure adapted from PFMC Integrated Ecosystem Report 2, March 2021, figure G.1.1. CPUE ($\log_{10}(\text{no}/\text{km}+1)$) for 8 taxa in the Northern California Current Ecosystem, 1998-2000.



Commercial Fishery

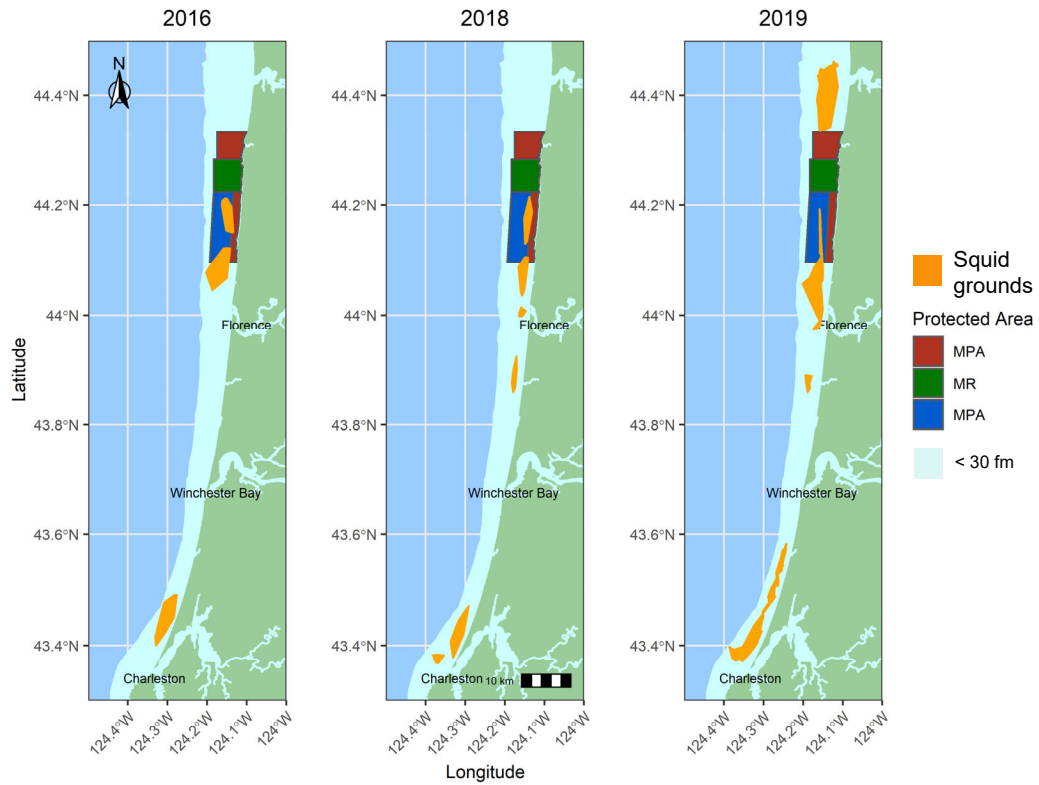
- **California**
 - **Long, consistent history**
 - **Highly developed industry and infrastructure**
 - **Robust fishery management**
 - Restricted participation
 - Annual harvest cap
 - Weekly closures
 - Area closures
 - Considers ecological and social dimensions
- **Oregon**
 - **Short, sporadic history until recently**
 - **Underdeveloped local industry and infrastructure**
 - **Little direct fishery management**
 - Primarily rely on general commercial fishing rules

Market Squid Landed By Year



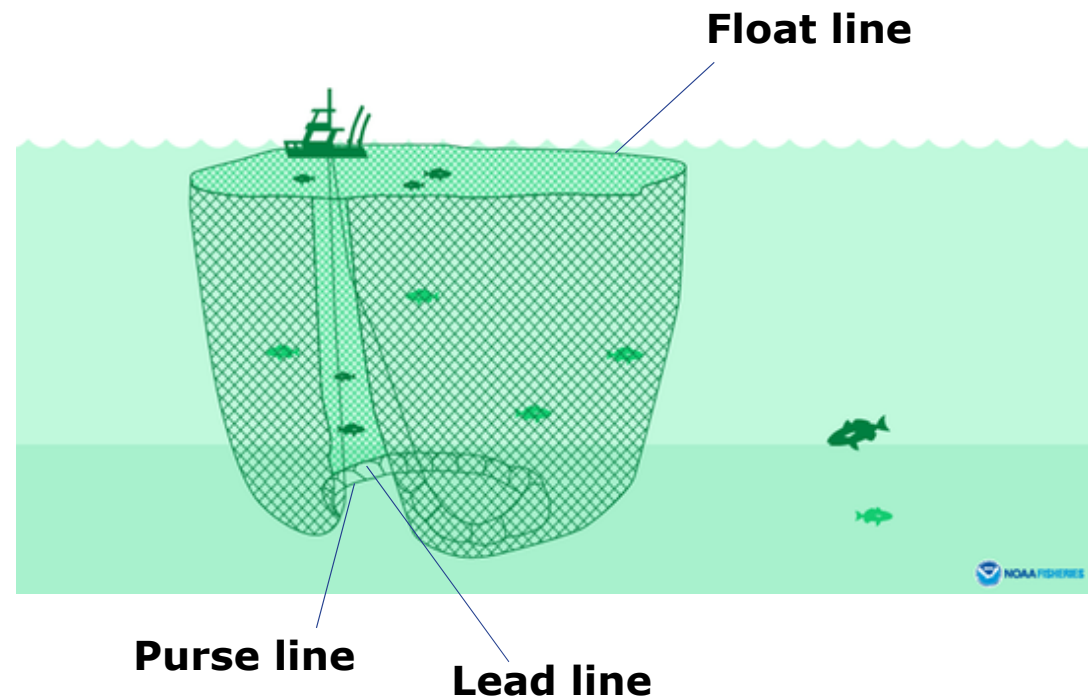
Data downloaded from Pacific Fisheries Information Network (PacFIN)

Recent Fishery Area



Fishing Gear

- **Purse seine**
 - Includes lampara, other encircling nets
 - Vast majority of Oregon landings
- **Light boats**
- **Trawl**
 - State waters only (inside 3 miles)
- **Brail/dipnet**
- **Hook & line**





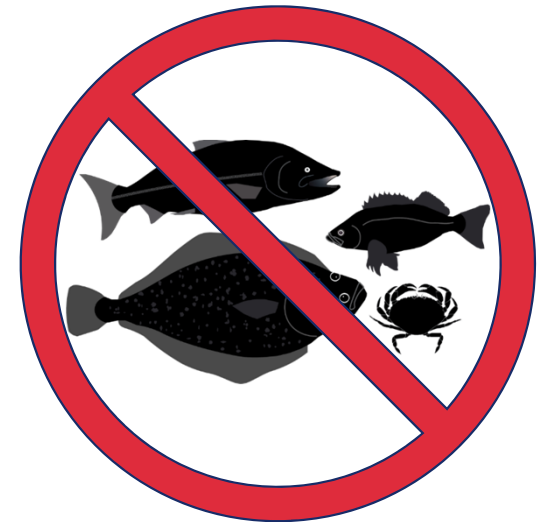
Fishery Management Framework

- **Pacific Fishery Management Council**
 - Coastal Pelagic Species Fishery Management Plan
 - Market squid egg escapement goal = 30%
 - Percent-of-landing limits on sardine bycatch
- **Oregon State Fishery Management**
 - May be more restrictive, but not less, than federal management
 - General commercial fishing rules
 - Coastal Pelagic Species rules
 - Market squid fishery rules
 - Few specific to fishery



Current Oregon Fishery Management

- **Commercial vessel, fishing licenses**
 - Catcher vessels and light boats
- **Harvest Guideline (1984)**
 - 4.5 m pounds coast-wide; or
 - 3.0 m pounds north or south of Heceta Head
 - Public hearing if approached
- **Closed areas**
 - Marine Reserves
 - Marine Protected Areas except
 - Cascade Head South
 - Cape Perpetua Seabird Protection Area
- **Prohibited species (seine, brail, small mesh trawl)**
 - Groundfish
 - Salmon
 - Halibut
 - Crab




Current Oregon Fishery Management

- **Coastal Pelagic Species Regulations (2016)**
 - **Reduction fisheries prohibited**
 - No more than 10% of a landing can be used for purposes other than food for people or fishing bait
 - **Must dipnet groundfish and salmon out of seine before pumping**
 - **Catching vessels may pump up to 20% of each landing from seine of another vessel**
- **Smelt – no more than 1% of landed weight**



Attachment 4



OREGON
Fish & Wildlife
Marine Resources

Marine Resources Program
Oregon Department of Fish and Wildlife
2640 SE Marine Science Drive
Newport, OR 97165
www.oregonstate.or.us/ODFW

Frequently Asked Questions Commercial Market Squid

April 7, 2020

What's required to fish for market squid off Oregon?

- To fish in state waters (inside 3 nautical miles) or to land squid in the state, Oregon commercial licenses, including for the boat, skipper and crew, are required for:
 - Any vessel fishing for squid, excluding a skiff used with purse seine gear.
 - Any vessel participating in the fishery by "lighting" for squid.
- The skipper must complete and submit a logbook, according to the instructions in the logbook. A seine logbook is required for vessels using purse seine, lampara net, brailing, or scooping.
- A commercial vessel may pump market squid onboard directly from the pursed seine of another vessel provided these squid make up no more than 20% of each landing of the receiving vessel, and the vessel receiving squid:
 - Has fished purse seine gear during the current year and pumped resultant catch onboard the same vessel for delivery in Oregon; and
 - Has legal seine gear onboard, in good working order, and
 - Documents the vessel that made the set, any other vessel pumping squid from the pursed seine, and documents catch and location in the ODFW logbook.
- No more than 10% of a squid landing may go toward reduction (e.g., fish meal, fertilizer, etc.)

What are legal fishing gears for squid?

- Legal gears include purse seine, lampara net, brail net, dip net, cast net, & hook and line.
- It is legal to use lights as an attractant for commercial squid fishing. Lights may be operated from a vessel that is independent of the catching vessel, but commercial licenses are required for the light boat, skipper and crew.
- In state waters (inside 3 nautical miles) trawl gear, such as shrimp trawl, is also legal. In federal waters (outside of 3 nautical miles) trawl gear is not legal. Market squid taken as bycatch in federal waters in shrimp or groundfish trawl fisheries must be sorted and discarded at sea or by the wholesale fish dealer when landed. Please contact ODFW Marine Resources Program at 541-867-4741 for details if you intend to use trawl gear to fish for squid.

Are there catch limits?

- There is no squid quota or fishing season. ODFW is required to hold a public meeting to evaluate the squid fishery before (or as soon after as possible) a squid harvest guideline of 4.5 million pounds are landed, with not more than 3 million pounds taken either north or south of Heceta Head.

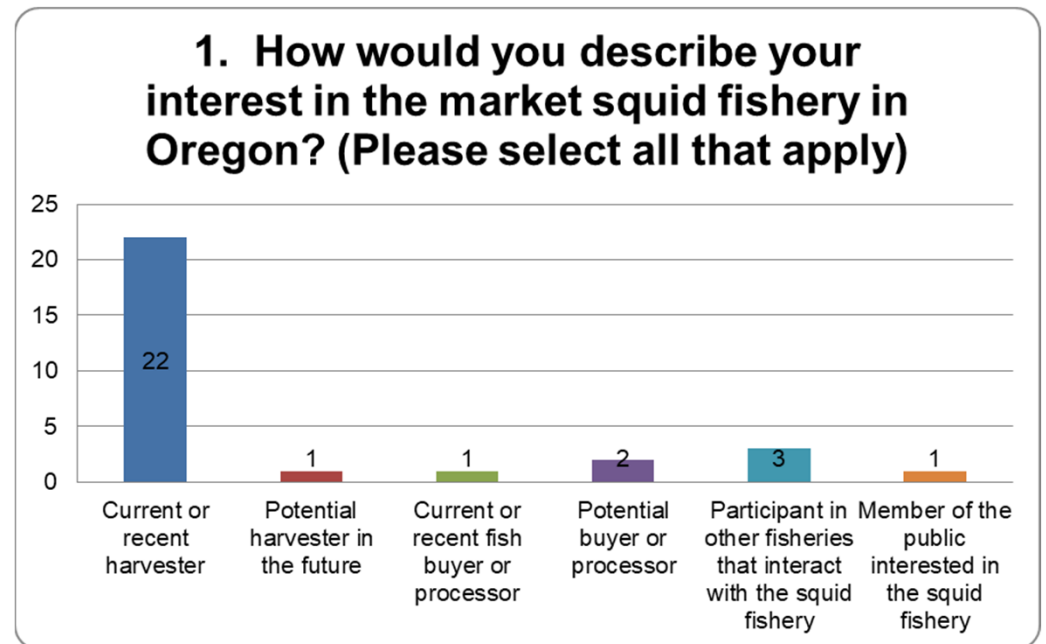
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Public Input

- **Fishery evaluation public hearings**
 - 2016
 - 2018-2020
- **Industry survey**
 - December 2020



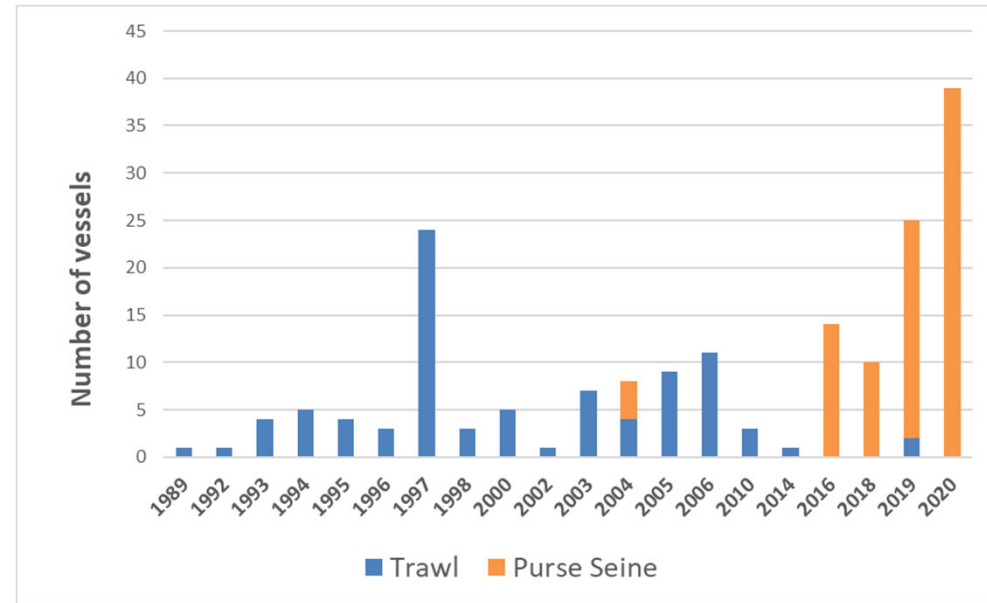
Photo courtesy of Heather VanMeter, Oregon State Police



Management Challenges

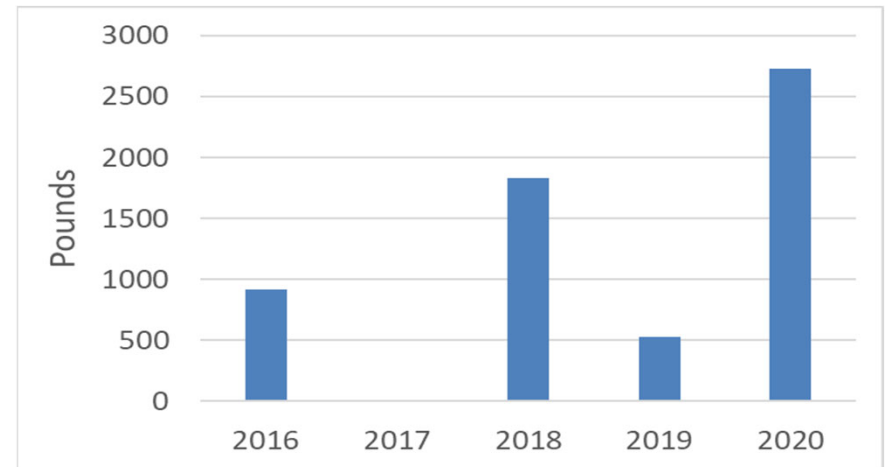
- **Squid resource sustainability**
 - **Rapid growth in landings, number of vessels**
 - **No estimate of population size or harvest rate**
 - **Egg escapement not practical for in-season management**
 - **Fleet can harvest high percent of available (shallow) biomass within days**
 - **Industry concern with rapid pace, overharvest**

Number of vessels with >1,000 pounds of market squid landed by year and gear type



Management Challenges

- **Bycatch and egg case disturbance**
 - **Purse seines reach bottom on shallow squid fishing grounds**
 - **Disturbs benthic habitat and squid egg cases**
 - **Bycatch of crab, sand dollars, and other benthic animals**
- **Conflicts with commercial crab gear**
 - **Can move or “catch” crab pots**



Seine net landings of Dungeness crab (prohibited), ODFW fish ticket data





Management Challenges

- **Independent light boats**
 - **No landings = no record of participation**
 - **No data on number, effectiveness**
 - **Unclear if attracting squid by light falls under current take definition**
- **Marine Protected Area regulations**
 - **Cascade Head South Marine Protected Area (CHSMPA) includes prohibition on take by net gear**
 - **Participants asked if light boats could be used inside CHSMPA to lure squid outside area for take by net gear**
 - **Not clearly prohibited by current regulations**





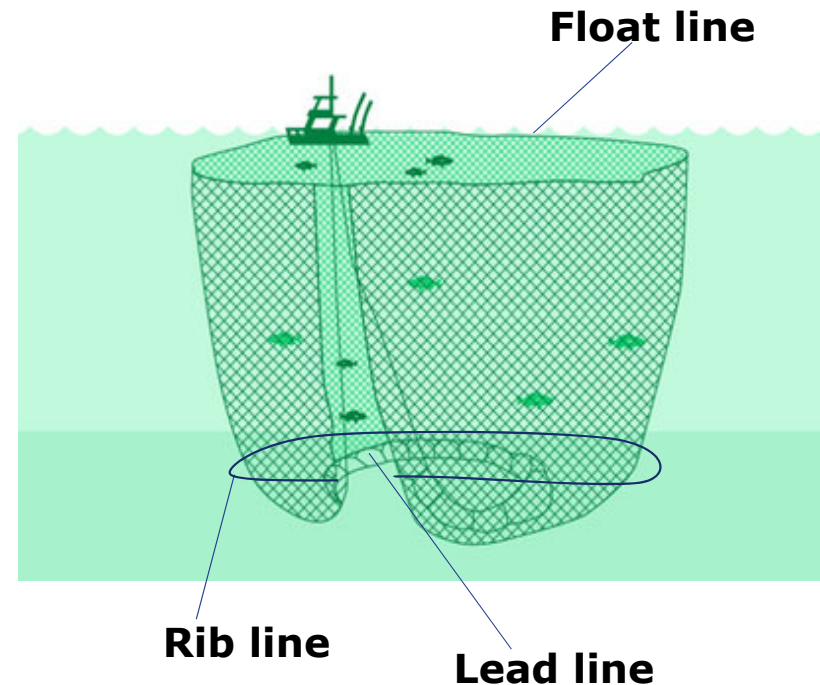
Staff Recommendations (1)

- **Close the fishery 48 continuous hours per week: noon Friday - noon Sunday**
 - **Includes attracting squid by light**
 - **Allows periods of uninterrupted spawning**
 - **Proxy for 30% egg escapement (2/7=29%)**
 - **Consulted industry (via survey) and Oregon State Police on closure days & timing**
 - **Aligned with California management**



Staff Recommendations (2)

- **Require use of a rib line at least 18" above lead line in seine nets**
 - **Allows weighted lead line to pass over bottom and squid eggs with less impact**
 - **Reduces bycatch of benthic animals**
 - **Less likely to "catch" crab pots**
 - **Used by most participants in Oregon fishery**
- **Revise definition of purse seine for commercial ocean fisheries (housekeeping)**
 - **More accurate description of gear currently in use**
 - **Consistent with federal definition**





Staff Recommendations (3)

- **Require light boats to submit logbooks to ODFW**
 - **Creates record of participation**
 - **Provides data on number and effectiveness of light boats**
- **Revise definition of take to include attracting squid by light**
 - **Specific to squid fisheries**





Staff Recommendations (4)

- **Amend rules to include attracting squid by light in take definition for Marine Reserves and Marine Protected Areas**
- **Prohibit use of any appliance or device inside the Cascade Head South Marine Protected Area to attract any species of fish for take by net gear, regardless of whether take by net gear occurs inside or outside CHSMPA**



Looking Forward

- **Continue public hearings when Harvest Guideline approached**
- **Additional management measures discussed at public hearings**
 - **Restricted participation**
 - **Additional gear restrictions**
 - **Light regulation**
 - **Seasonal closure (e.g., December 1-April 15)**





Staff Recommendation Summary

- **Close market squid fishery, including attracting squid by light, from noon Friday through noon Sunday each week**
- **Require seine nets be pursed using a rib line at least 18" above lead line**
- **Require logbook for independent light boats**
- **Revise definition of take to include attracting any species of squid by light**
- **Revise definition of purse seine to more accurately characterize gear used in fishery and make consistent with federal definition**
- **Clarify Marine Reserves and Marine Protected Area regulations**
 - **Revise definition of take to include attracting any species of squid by light**
 - **Prohibit use of any appliance or device inside the CHSMPA to attract any species of fish for capture by net gear**



Questions?



Photo courtesy of Heather VanMeter, Oregon State Police

