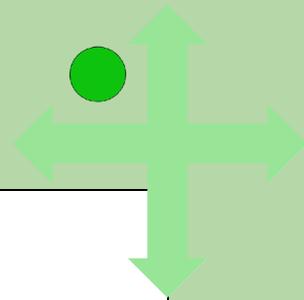


# Plenary: Regional Impacts of Fortune and Favor



## *What aspects of this scenario are particularly relevant for **Oregon**?*

- When the resource (specifically crab) is low fishermen are more likely to reach out to local markets through direct sales. Will this continue when the resource rebounds?
- Relatively steady change in this scenario will make it easier to respond from a management perspective with reasonable confidence about assessment of stocks and related management decisions.
- In terms of range shifts, there is an opportunity for recreational fishing opportunity but need to think how those opportunities can be facilitated. Consider how this will benefit local communities. Opportunities can also connect people to the ecosystem.
- We will still experience extreme events even in this benign scenario. Oregon is in the path storm tracks which will change as weather patterns shift northward.
- Local markets favor fresh over frozen, advantage to smaller vessels.

## *What parts of fishing or specific communities in **Oregon** might be most affected by developments in this scenario?*

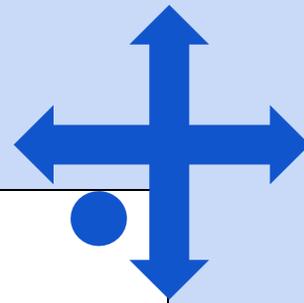
- We've just experienced the loss of international markets for crab, blackcod, etc. coupled with increase in local markets like the description in this scenario
- Pandemic related shrink in restaurants has a big impact on processing/marketing. How will restaurants do business when (some) reopen?
- We have also seen interruptions in the supply chain because of plant closures due to Covid outbreaks. Similar to vaccine distribution in terms of logistics challenges.
- What happens to the fisher community? Recent events in the crab fishery are illustrative in terms of strike over prices. There are outstanding equity issues that would need to be addressed.
- Changes in the way harvesters behave (times and areas of fishing) will affect the research community since a lot of data gathering occurs on fishing vessels.
- With range shifts commercial fishers will need to gear up to harvest them. A contemporary example is the appearance of market squid off Oregon.
- It has been difficult for the Oregon trawl fleet to plan their operations over the past year, particularly because it is a high volume fishery that can't easily focus on local markets alone. There are also regulatory constraints that have combined with the effects of the pandemic.

What specific storylines could you imagine happening in this scenario in **Oregon**?

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# Plenary: Regional Impacts of Blue Revolution



*What aspects of this scenario are particularly relevant for **Oregon**?*

- More sophisticated data gathering will be necessary and provision of data in near real time. Example is putting oxygen sensors on crab pots to detect hypoxic zones
- Increase in autonomous data gathering needs to be accompanied with increased data processing capabilities. It is very challenging to stay ahead of big data demands when government resources for this are limited.
- Need to fish smarter, not harder.
- With offshore energy development there will be a reduction in fishing opportunity and will be more concentrated in some areas. This will lead to more interaction with protected species like whales and sea turtles. We will need to find new methods to protect these species from fishery bycatch.
- With wind energy development the key issue is marine space for the fishing industry. How much marine space will be taken up by energy facilities? While this may offer opportunities for recreational fisheries, it will present challenges for the commercial sector in terms of being able to make a living when fishing areas are constrained.
- From central Oregon to N. California is a very rich environment for wind energy development. Stakeholder groups like fishers need to be part of the conversation early with respect to siting.
- Oregon is likely to see offshore wind energy development.
- It will be necessary to look at the use of northward shifting species (such as forage fish) in aquaculture on other wild species that may be also shifting north.
- Demand from marine aquaculture for forage fish as feed stock could adversely affect wild stocks and related fisheries. Harvest of forage fish for this purpose will also affect other ecosystem components such as seabirds and whales.
- With the development of offshore wind it will be important not to chase what's "trendy." We will likely see a lot of government edicts and the fishing industry will need to be very diligent in terms of poorly planned development of these energy resources. A historical example is hydro development.
- With policy decisions promoting "blue/green" energy development, care will need to be taken of the full range of effects. (The Aral Sea is another historical development of poorly planned development with cumulative effects.)

*What parts of fishing or specific communities in **Oregon** might be most affected by developments in this scenario?*

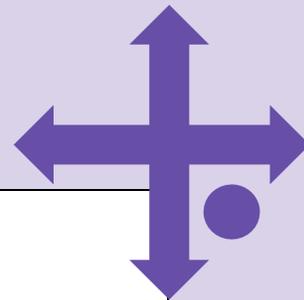
- The fishing industry will need to modernize (propulsion) technology. Will it be economically feasible to do this when we are in a low abundance situation? [Recent announcements from the auto industry about going all electric are a harbinger of what could be applied to marine propulsion.] -- Another option to consider is sail technology for carbon neutral propulsion.



*What specific storylines could you imagine happening in this scenario in **Oregon**?*



# Plenary: Regional Impacts of Hollowed Out



*What aspects of this scenario are particularly relevant for **Oregon**?*

- Loss of infrastructure is very relevant for Oregon. If your infrastructure goes away, even if environmental conditions improve the capacity for fisheries to rebound will be limited. Salmon has been a big driver of the historical loss of fishery related infrastructure, followed by groundfish.
- Coastal communities have become more dependent on tourism and recreation which has cultural implications.

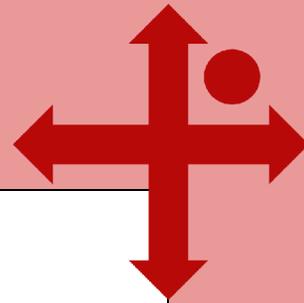
*What parts of fishing or specific communities in **Oregon** might be most affected by developments in this scenario?*

- Fishers are likely to abandon their boats and there are not well developed programs for dealing with abandoned and derelict vessels. Right now it falls on the port and the costs of removing and breakup vessels can be quite high.
- This scenario will have a much greater impact on smaller, less diversified coastal communities that are primarily dependent on fishing. In response, we need to start thinking now about business/income diversification in these communities.
- Fishing dependent communities will need to develop more resilience. This will need to be a conscious effort by these communities. Resilience will include the development of reserve capacity to get through hard times.
- There will be a need for the fishing fleet to transition without becoming too corporate. The effects on small vessels needs to be considered in particular.
- Local appreciation for the environment in fishing communities will have huge implications in a larger political social context. Hopefully, communities will be asking questions about environmental conditions in this very adverse scenario.

*What specific storylines could you imagine happening in this scenario in **Oregon**?*

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# Plenary: Regional Impacts of Box of Chocolates



*What aspects of this scenario are particularly relevant for **Oregon**?*

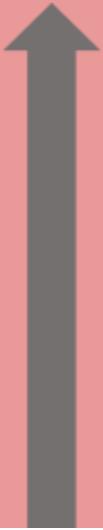
- As new species move in, there will be a need to reconsider the regulatory environment with respect to permits.
- Technological innovation to gather and process will need to be coupled with an agile regulatory response.
- A more agile/nimble regulatory response will be needed. We won't have the luxury to have a process that takes 2-3 years for a new management measure to be implemented.
- The scientific enterprise will need to better track range shifts. For Oregon the common division of stocks at the 40-10 line (Cape Mendocino) will be a factor. Stock boundaries may need to be reconsidered to accurately assess stock status.
- Discussions about management will need to be international as stocks cross international boundaries.
- Regional-scale sampling nodes, increase in research off the Oregon coast is very important. What has to be done to make that happen?
- The revolution in communications technology opens new ways to inform consumers about market/product shifts.
- Boom bust cycles make monitoring and assessment more challenging but it will be essential to allow predictability. New modeling approaches could help us to predict rapid change.
- Historically, variations in food supply have triggered new food production methods. So aquaculture could become an important source of supply in this scenario.

*What parts of fishing or specific communities in **Oregon** might be most affected by developments in this scenario?*

- Marketing will need to be more adaptable as the availability of species rapidly shifts.
- When new stocks appear, there will be a need to build trust of harvesters among consumers so they appreciate consumption of new stocks. There will be a need to encourage consumers to diversify their consumption habits.
- Harvesters will need to form good relationships with buyers and consumers. With a boom and bust situation it can be very difficult to re-establish markets once species become abundant again. Planning will be needed.

*What specific storylines could you imagine happening in this scenario in **Oregon**?*

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# Breakout 1: Implications for communities in Oregon

*For each scenario:*

- 1. What will communities in Oregon be most concerned about?*
- 2. What's happening that provides a potential upside for communities in Oregon?*

## Concerns:

- Status Quo: unpredictable fisheries, different environmental impacts, changing prices and availability, impacts to different sectors of the communities
- from processor standpoint- one size does not fit all especially for something that brings in 30,000-40,000 lbs-- does not fit the local market turn around
- rapid changes that require being nimble and agile→ how does that get put into the real world? ex. gear changes, how many different tools can you have on your multitool before it doesn't fit
- Keeping employment opportunities consistent in unpredictable markets is a challenge, mechanization is also a challenge
  - people start hoarding their money, don't invest in their plants etc.
- Aquaculture- both a challenge and an opportunity
- maintaining infrastructure in times where the fishery sways the other way, maintaining ice facilities etc. especially in smaller ports
- local markets-- what is the scale? just as much fish if not more, trying to move as much product as we have

## Concerns:

- smaller ports do not have a consistent flow of a single product, don't have the structure to keep going
- someone has to pay for it, cost associated with the infrastructure
  - owner or investment to maintain the infrastructure- have to have a plan of how you are going to support it
- hard to sell something if you can't say when, or if
  - retail has consolidated (ex. Alberston's bought Safeway, Kroger bought Fred Meyers)-- they want absolutes so that you can fill the observes (<80% fill rate often don't want to do business)
- scale things down, how much revenue are you going to get in a local market?
- multi-species markets and infrastructure, transportation and cold storage, will need a smoothing factor, be able to move it around and keep it in good quality
  - what can you do to piggyback on local infrastructure?
- flexibility and nimbleness to management- allow opportunities as they become available

currently ( offset from the volume that now goes abroad)

- groundfish is super important in Astoria-- but need to move that local product to other areas -- regional scale networks and supply chains
- domestic market v. local market
- Do we have the infrastructure to accommodate the different fleets needs and volume
- Radiation in tuna-- being prepared for the extreme events

#### Upsides:

- opportunity to create direct to market opportunities “selling off the boat”
- people themselves are agile and can adapt--> what are the upper limits to that flexibility
- Economic development: Tourist stuff→ economic viability, coastal development, revenue to offset the fishing costs
  - Plants are leaving and art galleries are coming in
- Aquaculture
- Increasing opportunity to develop niche markets to a group of restaurants or a group of direct buyers that understands the new expanded ranges -- distilling information to the public
  - need infrastructure to go along with local markets
- Community Supported Agriculture model ( or Community Supported Fisheries)- subscribe to a local set of boats with information and with fish

- shift from one fish to another could be a challenge if not presented properly
- Aquaculture- space use conflicts, marketability
- moving to non-ocean protein sources-- because of extreme events making it more unpredictable & harder to harvest
- increase in unpredictability in choke species-- so the target might be there but the access might not be

#### Upsides:

- technological advancement to develop indicators, where managers can take advantage of indicators of fisheries that are up and coming
- partnering with other cold storage processors: what can you do to piggyback on local infrastructure?
  - thinking outside the box of chocolates
- developing artisanal products -- make sure that the opportunities are available
  - marketing opportunities
- Co-op type structures to take advantage of different markets and maintaining infrastructure
- shifting from fish to fish could provide an opportunity for education and how to prepare it, market development
- Aquaculture- helps to smooth out boom and bust cycles
- Aquaculture and wild caught be processed in the same plant - same infrastructure

- Infrastructure that we have matches the communities that we are working in, how do we want to grow?

- 

### Concerns:

- Alternative energy (offshore wind)- space and use conflicts, limitations to the fleets
  - if all of the affected stakeholders are not at the table, people can get left out
- cultural bias against adapting to service potential alternative energy
- unknown impacts of hypoxia, and other climate change
- loss of sense of community-identity→ some might not want to hybrid their activities
- potential to lose the fishing knowledge
- potential loss of infrastructure
- potential for boom and bust- in offshore wind, infrastructure -- the next generation might go with fusion energy
  - when you move on from wind energy the original fisheries infrastructure wouldn't be there
- challenges how we define communities
  - getting fishers to the table might be easy with the 12 month trawl fleet, might be harder to capture the folks who move (to AK), tuna stakeholders
- wages: regional markets instead of hyper local markets, we pay PNW better than many other areas

### Concerns:

- It is awful!
- Not as many opportunities to engage in the fishing industry
  - finding culturally acceptable employment and livelihoods
  - generally-turn to tourism or other visitor based economies, often not accepted by the culture
- loss of identity
  - they don't fish, they are fishermen, that is who they are
  - how do we do that?
- loss of critical infrastructure--impact to the tax base, water use, fewer kids, fewer people doing to the hospitals
  - multiple effects-gear stores, cold storage
  - don't have the ability to support the infrastructure for the few who can still fish
  - lower wages in the communities
- water is toxic, if not totally wiped out there might be some fishing opportunities
- domestic relationships between states would need maintained-- if you only have one stock that is moving, it will be vital to be able to move "freely" between states or internationally
- **decrease in supply** will increase value

### Upsides:

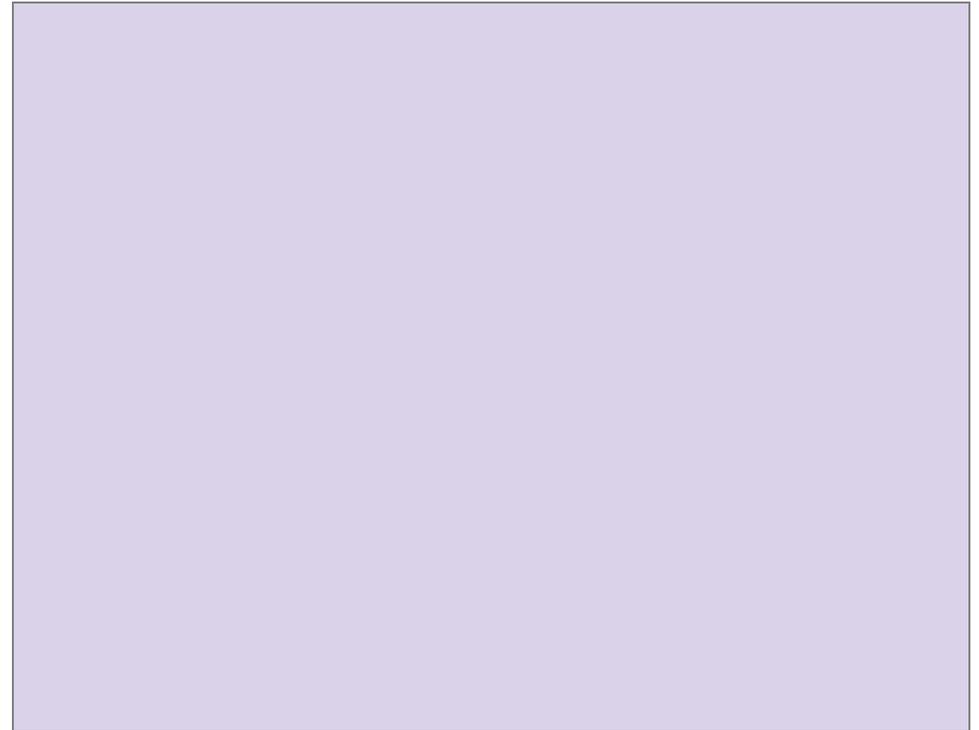
- will our products be able to stand up in those regional markets at the price point that we are used to
- make this region attractive but presents challenges when moving products out of the area
- How do we define community?
  - rural, traditional, families involved
  - who is included, there could be room to expand our definition to include DEI concepts
- How do we apply clean energy to the fishing industry?
- Challenges with examples that are going on on the East Coast with the fleets
- Wind turbine blade arc 700 feet( in diameter)-- might limit who can actually diversify into that wind energy industry
- outside group coming into-- transfer of wealth away from our small local communities
- cumulative impacts- ex.whale entanglement in dungeness crab fishery
  - would that make it too hard to continue
  - what is the right balance, between fighting climate change, having west coast energy, and continuing our fisheries
- what is the proper process to get the stakeholders in the room, so that we can ask the right questions?
  - compensation for fishermen to attend meetings for their input

#### Upsides:

- opportunity to bring people together and pre-plan

- starts conversations in communities about what people can transition to
  - What do we want to look like?
  - We have the opportunity to put programs in place to figure out what we want to look like, training etc.
  - We have the ability to craft the stories we tell right now, since we are planning now
- Cultural component- other values other than the product
  - focus on the community aspect, maintain support and invest in the enduring existence in the culture-- opportunity is that we can start telling that story and making that market for the community and culture of fishing
- Finding the culturally acceptable livelihood that fishing industry can transition to
- Aquaculture- protein base
- increase in value because of decrease in supply
- **Overarching across all scenarios:** social marketing if we can get ahead of it on a global level

- fishing businesses diversify to potentially service that industry, develop niche fishing
- interesting alliances
- fishermen could be the ones who get cross trained to repair windmills (as an example)
- how do we define community?
  - rural, traditional, families involved
  - who is included, there could be room to expand our definition to include DEI concepts
- Innovations that could be applied to the fleet that is in the clean energy umbrella
- diversifying the data collection to involve more of the fleet could provide more live data that could feed into more agile management
- Is there opportunity to come in at a local scale, as opposed to a multinational company?



# Breakout 1: Implications for Harvesters in Oregon

*For each scenario:*

- 1. What will Oregon Harvesters be most concerned about?*
- 2. What's happening that provides a potential upside for Oregon Harvesters?*

## Concerns:

- Government agencies need to be adaptable in domestic and international management (this applies across all the scenarios).
- The traditional user pay funding system will be challenged as the user base declines. This applies specifically to ODFW (state level). This is also an issue with federal agencies as well. Cost will have to be shared more broadly.
- Interactions with marine mammals will change over time and management agencies will have to be proactive by finding solutions to mitigate fishery interactions.
- A focus on domestic markets could challenge profitability for some fisheries and fishery targets. Many harvesters rely on foreign sales for some species (sablefish a prime example). Domestic tastes could make marketing hard. Some sort of fill in species will have to be found that are appealing to US consumers. Alternatively, methods to build the domestic markets need to be found.
- [applies to all scenarios] Uncertain effect on traditional sources for capitalization. New capital will be needed but it is unclear where it will come from. The effect on

## Concerns:

- Caution will be needed in making predictions since we will experience new ocean conditions compared to what has occurred historically. Even with new technologies rapidly changing conditions will make modeling and prediction much more difficult.
- Different knowledge domains between fishermen and scientists.
- Distribution of protected species (leatherback sea turtles) presents new challenges.
- Increasing need to control abundant protected species impacting other, less abundant species (e.g., sea lions versus salmon).
- [all scenarios]: processing costs will go up with highly variable availability of fish. These costs could be passed onto harvesters.
- [all scenarios] expansion of marketing boards. More collaboration and expansion of seafood awareness and promotion.
- Processors will have to be more adaptable to varying conditions.
- 

## Upsides:

permit valuation is related to this; permits are a big part of a firm's assets (and value could change).

- Dearth of new entrants if fishing faces a bleak future.
- The costs of gear innovation have to be considered in terms of economic feasibility.
- There will need to be a faster process for developing and authorizing new gear types. And people with ideas about gear design/innovation will need to get out on fishing boats to see how those operations work. Collaboration among harvesters, researchers, and managers will be essential.
- 

#### Upsides:

- With a stable and growing opportunities could allow new people to enter fisheries. It could allow small scale fishermen to diversify (similar in Box of Chocolates).
- Harvesters using new and innovative selective gear could find a niche. Could offer new market opportunities.
- Across all permit classes, a decline in permit value could have benefits such as lowering entry barriers, especially for people who are willing to assume risk of innovations. Likewise, crew could purchase permits to have a stake in fisheries.
- This is the best of the four scenarios but there's always uncertainty when it comes to fishing!
- Science driven management can continue under this scenario.
- Potential buy in of communities based on fishing opportunity.

- Potential benefits for both small and large boats as long as there is flexibility. Small boats could do some of the CSA type stuff while large boats could travel farther to find fish.
- Monitoring technology could provide more confidence in current ocean conditions could speed management decision making, opening fisheries for shifting, newly appearing species.
- PFMC harvest strategies lend themselves to this type of scenario given experience with weak stock management. The basic structure of the management system could still function while the challenge will lie with fishermen figuring out when to fish.
- Opportunity for technological innovation, for example in tuna fisheries. This would include forecasting habitat and the development of more effective fishing gear.
- New markets will need to be developed with the appearance of new species the public is not ready for, especially if it's in large volume.
- Direct to consumer sales could help fishermen adapt to varying stock abundance.

### Concerns:

- Other ocean uses (energy production) could displace fisheries; alternatively, fisheries could be destabilized and then pushed out.
- Small vessels have a disadvantage because of the inability to travel longer distances to find fish. Bigger impact on ports with only small boat fleets. Could see further consolidation of fishing into a fewer number of ports.
- Smaller vessels could benefit from “Locavore” marketing but this scenario would favor large vessels.
- The disappearance of small vessels affects the culture/lifeways of fishing communities.
- Displacement leads to concentration of fishing in smaller areas; focusing on the species in that area leads to resource damage/depletion.
- Loss of port infrastructure supporting the fishing industry if the small boat fleet declines. Fishing vessels displaced by sailboats/recreational vessels.
- Competition for CPS stocks as feedstocks for aquaculture; loss of this forage for wild species.
- The loss of small vessels will hasten the decline in community cohesion and social resources. If you no longer buy off the boats, there is a loss of a connection between communities and fisheries. You will also lose a lot of local knowledge.
- Risk of corporate ownership of fishing sector.
- Loss of connection to the ecosystem and coastal communities.

### Concerns:

- Trickle down from challenges to recreational fleet in terms of the construction and sale of fishing vessels. Possible loss of production facilities when sales volume declines below some threshold.
- Fishery managers are going to want to monitor fisheries more closely. This could increase costs to harvesters to an unsupportable level.
- There could be a downward spiral of increasingly tighter management restrictions on fisheries.
- Will we be less precautionary when constraints on fisheries become extremely tight? This could have ecosystem impacts.
- Direct to consumer sale will need to be facilitated.
- Management regimes where fishing seasons are set independent of weather constraints (decline in fishable days) will need to be rethought so when good weather comes it’s possible to fish.
- The level of cooperation between harvesters and managers we have now could be eroded. There could be a real loss of trust among fishermen. This could reduce the potential opportunities that could be found through cooperation. The bad news going to worse news erodes these relationships.
- Doubt the PFMC will allow overharvest (but conditions could be so bad that the management system can’t cope).

### Upsides:

- Due to lower fixed costs to fish and ability to share space with other users, small boats could fare quite well under this scenario, where fewer fish are available. They might fish in traditional sports fishing areas. This would present a challenge to large vessels, which would be a disadvantage.
- There would be competition for crew who would be recruited to work on industry support vessels. (And those jobs could be more stable and better paying). But would those industries recruit from the same pool of workers?

#### Upsides:

- Large vessels/firms could benefit under this scenario.
- Recreational vessels could fish around offshore facilities (wind energy). But need some sort of management regime to allow this. Prompts the need to think proactively about sharing marine space among different users.
- Other ocean users (energy) could share in resource management costs. Plus those facilities could become monitoring platforms (or energy source for monitoring platforms). Could take some of the pressure of the fishery sector.
- If offshore facilities can be an at-sea energy source it could help in the development of electric propulsion systems for fishing vessels. (But some skepticism about the feasibility.)
- Sail power systems could be developed.

- A more flexible experimental permitting system could facilitate needed innovation.
- Catches could pay fishermen better as a boutique offering (high prices for limited supply).
- Globally there are fisheries in similar environmental conditions as we would see off Oregon; we could learn from the adaptations that fishermen have made in those other parts of the world.
- An opportunity to expand recognition of fishermen as food producers on the same scale as farmers are treated. There should be economic support to maintain the capital stock of fisheries. (But no takeover of fish management by the USDA!)

# Breakout 1: Implications for fishery managers / scientists in Oregon

*For each scenario:*

1. *What will managers be most concerned about?*
2. *What's happening that provides a potential upside for managers?*

## Concerns:

- A lot of mistakes could be made, we may think that what has worked in the past will work in the future, science may lag which could lead to bad decisions. Scallop example - poor or incomplete science led to scallops being wiped out.
- If change is gradual, the need for change in management and regulation may not be obvious, i.e. lack of urgency.
- We could be complacent in data needs, we need to do better with the information that we do have and are collecting. Change is coming and we need to prepare for it even if it seems gradual.
- Usual parameters for recruitment may not hold true under this scenario. It's a dangerous assumption that they will hold over time.
- We need to look at global demand and how it is changing markets when thinking about impacts of ocean change and what fishers will have to cope with.
- There is a need to better understand how biology will respond to changing ocean conditions, not just shifts in distribution but basic changes in biology (e.g. feeding, growth, reproduction, etc.). There is a lot we still don't know.

## Concerns:

- Management currently cannot handle quick changes, we need 'if/then triggers', for example, so we can act more quickly. Need to update management to be more flexible.
- We will be overwhelmed with data streams if we don't get processes in place. Need to process data faster so that it can be used in a more timely manner so we can react faster
- Need more modeling / management strategy evaluations (e.g. whiting) to develop different scenarios and better understand how stocks might respond to changes, could provide a better understanding of risk and uncertainty. Could help improve and speed up the management decision process.
- Because of the variability, there is a risk of undermining public confidence in our ability to model and predict the responses of marine resources to environmental changes to support management decisions.

### Upsides:

- We will have time to respond in a more measured way.
- There will still be a good earning base for the fishing fleet and resources to support innovation to adapt to future changes.
- We will have more time to improve societal narratives and behavior, and outreach opportunities
- We have time to be proactive rather than reactive
- There is confidence in science and our ability to prepare for change which could lead to more funding for science

### Upsides:

- Again, opportunity for innovation, exploration of new methods, products, value added products, etc.
- We will be forced to do more long range thinking. Need to take a longer view and look past noise / interannual variability
- If some or several stocks do really well, we can feed a growing population
- New technologies will really help fishery managers respond to real time conditions and lead to better management.

### Concerns:

- Immediate need for inclusiveness and good communication structure among different groups and sectors. Train is leaving the station and multi-sector activities are affecting fisheries/fishing grounds.
- Communication is only as good as the understanding of legitimate information and critical thinking skills within the general public. This applies across all scenarios and especially in the Blue Revolution scenario because there are a lot of competing interests and information.
- Changes in species' ranges will require the public to adapt to what resources are available. e.g. Dungeness crab and seasonal shifts / start dates of fisheries
- Aquaculture concerns around siting, feed stocks, impacts of products competing with local fisheries, disease outbreaks; aquaculture species are replacing wild caught species, it will become even more

### Concerns:

- How do we allocate shrinking resources among fishing communities and also protect marine mammals and other species that depend on marine resources for sustenance
- How do we best allocate space to avoid good fishing areas and other unintended consequences, e.g. need to consider overlap between hypoxic zones and fishing grounds
- How we do build resilience in different communities, e.g. science, fishing, and coastal communities
- A lot of competition for federal and state funding resources within and outside of fisheries science and management (disaster relief funding)
- What can we do to help communities that rely heavily on the fishing industry - the most vulnerable communities? Who do we help?

important to know where fish are coming from (e.g. aquaculture vs. wild) and about the sustainability of aquaculture and fisheries.

- How will wind turbines impact fishery independent surveys? How do we need to adjust to provide accurate info for stock assessments?
- We will need to consider ecological impacts of new infrastructure
- If species shift north, surveys may not capture them and it may be challenging to interpret catch information (e.g. shift in distribution vs. reduction in population abundance)
- Range compression of commercial and recreational fisheries due to infrastructure/platforms will lead to challenges associated with incidental catches, whales entanglements, etc. Could have negative impacts on habitat but there's also potential to create new habitat/substrate.

#### Upsides:

- Other employment opportunities beyond fishing that might benefit ports and coastal communities
- Species may shift more gradually so we will have more time to plan and adjust fisheries independent surveys. Sudden shifts are harder to adjust to in terms of time, budget and where to sample.
- Other industries can help improve infrastructure in ports that can support a diversity of industries
- Aquaculture - Lower trophic level species / shellfish can provide benefits, e.g. value added habitat, but we

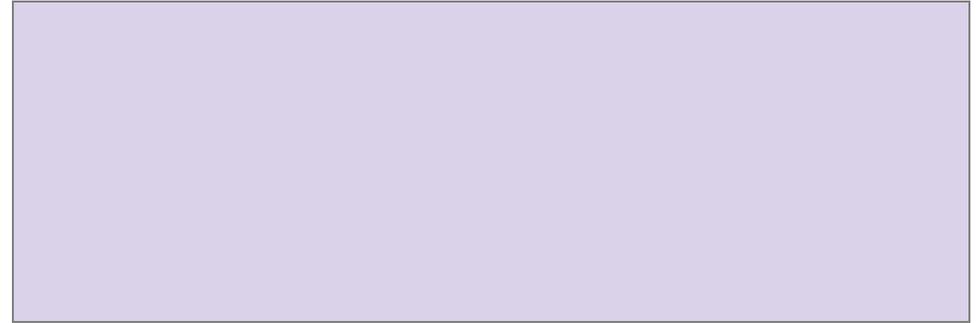
- Equity issues will arise as access to fishing opportunities shrink

#### Upsides:

- Our society responds to crises so this could get people's attention, support, and increase funding. Could force people to react before it gets too bad.
- May increase value and potentially the quality of fish, lead to creativity around developing higher value uses for fish that are currently undervalued (fish meal, 'trash' fish), opens the door for a lot of innovation

need to carefully consider and minimize the potential negative impacts.

- Need to make sure distribution of benefits go back to the public and not just to a select wealthy few - equity issues need to be considered.
- A lot more ocean sensors can be added to ocean platforms



## Breakout 2: Potential actions for communities in Oregon

- Cost-- where are the resources going to come from to implement the changes that are needed?
- How do we enhance access to capital for incoming fishermen?
  - new entrants into the fishery, young, agile newcomers
    - We need to make sure that they can make \$
  - also applies to infrastructure developments
- Federal budgets that have climate change on the forefront-- make our needs known to federal representatives, making our voices heard and understood
- Regulatory- fishery management plan alterations, council process needs to move faster to take advantage of opportunities ( legal access to the fish)
  - Plan for how the Council is going to work faster
  - Action: Council Process for regulating gear changes and more dynamic opportunity
- Developing local/regional scale markets-- regulatory structure around transport and food safety -- helping people navigate that process to develop new distribution
  - Action could be to simplify the process

*For each scenario:*

*If you knew this scenario was going to be the future, what should communities do now? (i.e. identify **actions** to prepare for this situation, to ensure it happens, or to avoid it happening)*

Lots of other fish that can fill our markets if we can't provide the fish

(pull marketing discussion from fortune and favor)

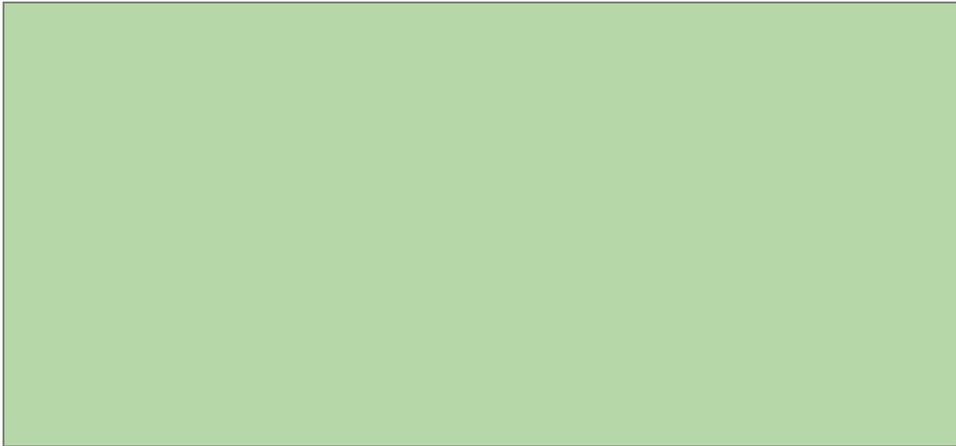
- Efforts to develop new markets domestically-- knowledge gap of what is actually being landed in OR
- Awareness campaign- funding for Trawl commission, and Positively Groundfish to expand on the markets that we presently have to show what we are landing in OR
  - Does raised awareness mean changed behaviour, how do you know if it is making a difference?
  - How do we evaluate the impact of our actions?
  - restaurants can help lead the charge with this
  - Action is that we need money to do this
- Point of Sale campaign-- promote deeper awareness of WHERE that fish actually came from "OR CAUGHT"
- linking awareness campaign to point of sale - here is what we catch in OR and here is where you buy it...
- starting with local places-- ex. Local Ocean dockbox, watching it grow from local to regional
  - if you have everything together to make a meal, everything is contained within

- Investment in monitoring so that the science is there to allow for expedited Council process
  - Climate, Oceanographic Indicators and Fishery monitoring
  - Tipping points need to be developed in our system--especially for those species that we think will be here in all the scenarios
- Efforts to develop new markets domestically-- knowledge gap of what is actually being landed in OR
- Awareness campaign- funding for Trawl commission, and Positively Groundfish to expand on the markets that we presently have to show what we are landing in OR
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- coming from the community, then you can infuse the identity of the community into that box
- this is a good entry point that can have the consumer looking for the fish species after they have made the recipe
- POSS is doing a similar box, where everyone gets their box and then the consumers make it and get on a zoom call to talk about it
- Infrastructure- local seafood access point -- seafood hub at the Port, seafood market within that structure (start new discussion)
- ACTION: Co-op regional, local, domestic - other coasts will be also having climate challenges, partner with other domestic fisheries (ex. other Coast) to make sure that those markets stay open
- Ex. NE is already in this process with lobsters moving North and Black Sea Bass moving in
- Tie in CSF, investing in the fishing business, product will change over time, there is not always going to be your favorite fish, variability, we make sure you get quality and support that experience
  - Seasonality- nothing but change, helping people understand the dynamic system
  - Trust your fishermen, more radical fluctuations in supply but it will be okay, here is how you make these fish
  - recipes to go along with new fish and appropriate spices
- Large processors are also doing the recipes-- frozen seafood

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- POSS is doing a similar box, where everyone gets their box and then the consumers make it and get on a zoom call to talk about it
- Infrastructure- local seafood access point -- seafood hub at the Port, seafood market within that structure

- throw away a lot of fresh currently
- Action: we will need to smooth out the supply-- freezing will be a potential way, aquaculture can perhaps be a substitute to fill the same niche
- Space use planning to figure out how to pursue aquaculture and make sure it is compatible with current fishing industry
- technological advancements--predictability of ecological and fisheries indicators -- to feed into the management cycle to allow the Council to be more agile
- FDA commodity boards and Dept of Commerce-- big difference in promotion
  - If NOAA becomes more involved in promotion, Council level concerned with management, may not understand how it affects fishermen, processor and markets → action might be more education
  - industry will have to put money into not a sure bet-- so the Council needs a little more understanding on the interaction the business, marketing and supply chain so that the Council can make the best management decisions
  - Economist and Marketing person on each team--strengthen the link between those two things
- Council promoting funding to explore other marketing or develop different fisheries
  - legislative support for funding to make sure the infrastructure remains, as well as, development of marketing or different fisheries



- Manage things in silos right now- how will each of these FMPs interact
  - Action: Portfolio analysis to match how people fish would help us understand- Portfolio risk analysis
  - This coordination has started to happen between Groundfish, salmon but needs to be strengthened-->ones that interact as bycatch or choke species

- Action: Risk assessment of Spatial use stakeholders
- Technology actions: central to this scenario, decentralization, diversification for fishing vessels, disbursement of information, where are you, where can you fish
- regulations become even more complicated and on a finer scale
- Technology on shoreside, data processing technology, AI technology?, computational technology to inform fisheries management
- risk assessment -BOEM is doing independent risk assessment on wind turbines, need an independent review
- monitoring surveys need to be prioritized for the Council process (NMFS surveys etc. )
- Ability to develop new fisheries on newly moved species
- better integration between BOEM's process for developing new technology and the Council process so that the Council can provide input

- Action: strengthen supports for mental health in our communities (identity component)
- preparing people for a change in identity- reframe the loss of fishing identity, how do we transform ourselves into something different
- Council continuing to invest in science-- have a handle on what scenario we are actually dealing with
  - Extremely hard to make a decision when it is highly volatile
  - understanding of still trying to maintain infrastructure
- Recreational conversation has not been present-- storm chasers, people who want to see the big changes
  - Deadliest Catch into something that is safe for the community
  - Looking at what people in areas of significant environmental concern, tying fishermen identity to where we are now to the future
- industry reaching out to influencers-- crowdsourcing, marketing type hackathons, there is a lot of public

- BOEM does not have to have public input-- Caren is on the OR section, but there is a lot of planning and action already underway
- RODA (responsible ocean development alliance) can help inform the stakeholder process-- as a way to enter and give information to the BOEM reps
- OCEAN is trying to pass information to the BOEM reps and get involved in the process
- funds that are identified and set aside for mitigations for the project, if you are not early input you don't have as strong of a voice

interest and it is a way to get quick feedback and a lot of reach

- suite of social services are probably insufficient for the loss of income and identity
- Science will tell us what we have to work with: schooling species might be opportunities for bigger boats, working waterfront idea, rethink the fleet structure
- start preparing for the worst, what type of resources do we need in the communities?
- Action: Community level risk assessments, dealing with infrastructure, rank the risk, only a couple vessels in one (?) port, social services are built out in the other communities, some communities can start building up their resiliency, putting resources towards those communities
- Role of the port as an asset, food access, food security
  - Ports and fisherman essential components of disaster relief
  - future where communities are in need, supply chains are dried up, front line workers could be the fishermen
  - funding question to FEMA to have our fishermen be first responders for our rural communities

## Breakout 2: Potential actions for Harvesters in Oregon

*For each scenario:*

*If you knew this scenario was going to be the future, what should harvesters do now? (i.e. identify **actions** to prepare for this situation, to ensure it happens, or to avoid it happening)*

### Fortune and favor

- Cut out the middlemen - facilitate direct to consumer sales as part of harvester sales portfolios. There can be 2-3 middlemen between harvester and consumer. Identify regulatory restrictions holding up direct to consumer sales. (A challenge to corporate America.)
- Challenge of direct sales / dock sales is the small population in most fishing communities. So perhaps this is part of a portfolio of sales opportunities. Consider a vertical integration strategy where individual harvesters work through co-ops, specialist processors, marketing experts.
- Direct marketing in Alaska doesn't mean "selling off the boat" but lining up marketing opportunities. It isn't in competition with incumbent processors. They can co-exist and work together. [System concept]
- In Half Moon Bay direct D. crab sales were at \$9/lb and people lined up. Created some problems for the port manager (crowding, etc.)
- Find ways to increase the number of processors (or sales channels). A distribution system with few processors is more fragile - if one shuts down it has a big impact on harvesters. This would also benefit fishing communities.

### Box of chocolates

- [Monitoring = identifying opportunities in real time so harvesters can take advantage of abundant stocks]
- Management flexibility will have to improve. The PFMC process will need a pre-approved menu of options that can be implemented rapidly without a lot of process. Example of temporary rules at the state level. They last 6 months and only require an administrative process rather than a full decision making process. But temporary rules are usually used to stop something but in this scenario they would need to be used to allow something - open up a fishing opportunity. This could be a challenge because that sort of action causes a lot more debate. Start thinking about this now because it will take much work! Build "if-then" structure into regulations.
- Aspects of the PFMC salmon process provide examples of flexibility.
- Recreational fishing will be a more solid, steady component of a port's fishery portfolio.
- Federal process needs a lot more flexibility for recreational management.
- Recognize the importance of recreational fisheries in many ports.

- Encourage fishermen/communities to take a more proactive stance in preparing for the impacts of climate futures. What groups do we need to reach out to? - Politicians (e.g., state and fed. leg. staff, Governor's office), port commissioners, fishing associations, chambers of commerce in coastal communities; all these play a role in the direct marketing approach
- Figure out what stocks are in adjacent waters, which will need survey work.
- Fishermen need to develop more selective gear and get it through the regulatory process. This will be needed as stock availability changes.

- Educate the public and the politicians: A PR strategy

#### Blue revolution

- Start now figuring out how to make the exempted fishing process work for smaller vessels. Especially thinking through it could be deployed for targeting new species. Find alternatives to costly monitoring methods (e.g., observers) where costs are prohibitive for small vessels - . Think through risk mitigation for someone taking on a new, different method.
- Take a look at regulatory discards - valuable fish that have to be thrown over the side. Perhaps a system where such fish would be segregated and sent through a distribution channel of some kind to meet protein needs of society. Reduce waste when stocks are declining. [Example of prohibited salmon retained in whiting fishery within regulatory framework; P. halibut bycatch quota system to discourage bycatch]

#### Hollowed out

- [Direct marketing - see Fortune and Favor]
- [Monitoring - see Blue Revolution]
- A piece in the direct marketing puzzle is for harvesters to work together to truck fresh fish inland.
- High value species like bluefin tuna, opah would be easy to market if / when they appear in Oregon waters
- Establish a fisheries engineering program at OSU to help with gear development and other innovations. Would address a lot of the ideas brought up here (marketing, gear, etc.) PSMFC has a bycatch engineering grant program.
- Think about other occupations for fishery participants considering the cultural dimension. In Southern Oregon fishing is a big part of the community fabric so in a bleak future consider occupations that sustain local culture.

- Opah is an example of an unmanaged species where markets are being developed in Southern California. But need to have some assurance as to regulatory framework - reducing uncertainty about future regulation facilitates market development.
- Lobby for more funding to subsidize innovation in gear technology.
- Protect wild stocks from impacts of aquaculture. Forage species, ocean zoning, aquaculture waste products, aggregation of predators like sea lions
- Costs of electronic monitoring is falling offering opportunities

- How do we capture fishermen's knowledge? Is land based aquaculture part of the puzzle? Preserve cultural history; oral history projects to tell people about what things were like.
- Ports will diversify away from fishing such as small scale lumber shipping, convert gear storage areas to other uses. Reserve a portion of a port area for any fishing fleet that remains.
- An expanded definition of climate refugee could apply to this scenario. Think about how to help people who want to keep fishing to move to new locations where there are still options.

## Breakout 2: Potential actions for fishery managers / scientists in Oregon

*For each scenario:*

*If you knew this scenario was going to be the future, what should managers do now? What should they consider doing in this scenario in future? (i.e. identify **actions** to prepare for this situation, to ensure it happens, or to avoid it happening)*

- Science: need to maintain vigilance in the survey data collection effort. Are There extreme events happening?
- (All scenarios) - accelerate our use of data between NOAA and academia
- (All scenarios) - important for researchers and mgrs to appeal for increased resources. Tax revenue gutted, and will affect science teams. We are asked to do a lot - the asks are not decreasing in frequency.
- Re: survey data - expect surprises. Must look in new locations (as well existing survey approaches). If things are changing, then LT data sets are not enough.
- Continue and expand the opportunity for collaborative work re survey and research science. Offers from fishers - what data can we help provide? It's a big challenge to take them up on offers. Provides the best opportunity.
- Don't become complacent. There is a sense of urgency driven by the amount of data. Leverage the efficacy of machine learning, and the systems to post processes and make it applicable. (all scenarios)
- Changing the narrative and how we communicate about this. We need to keep and increase this. Even in this scenario, we will see surprises. Narrative - the

- Build more timeliness and flexibility into the regulatory process, so able to react more quickly to changing conditions. Speed up the federal process of regulatory changes
- Better facility collaboration, academia, public, agencies. Better facilitate working relationships
- Use citizen science
- Get ready for all of the wonderful data, do NASA style mission team to get ready. Work the problem really hard. Simulating sail drones, how does that go into the model, predictions. Need head organization--NOAA. Would also include citizen science.
- Seafood marketing and availability. Return to "Fish of the Day", what do we have available and make the best use of it. Rather than trying to be dependent on the same species every day.
- Modeling and management strategy evaluation exercises are very valuable. Time, effort, and resource intensive. Takes years, knowledge, and technical facilities. Need to make investments by agencies in this type of thing. Need to improve capacity to bring in management side to some of this modeling Fishery and resource responses.

need to respond to changing climate. NOT just that we need to describe physical environment, but what are the connections we are expecting in biological environment (e.g. a year out)

- Needing more flexibility in the mgt process - data streams in in pursuit of this goal. Re management data - are we working towards electronic fish tickets fast enough? Strong push towards this - esp in OR. In terms of recreational mgt data, we are more timely than other places.
- FaF provides thriving local fisheries. Look at how we could scale up community supported fisheries. There are nascent efforts to do this. Who has studied this?
- (all) Scaling up - need for skills training to partner with community colleges (marketing, processing)
- (all scenarios) - workforces no longer tethered to urban environments. Start building more of a community into coastal communities. Some energy and ideas there.

- 2010 by Levin and Dufault.

<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-2979.2010.00355.x>

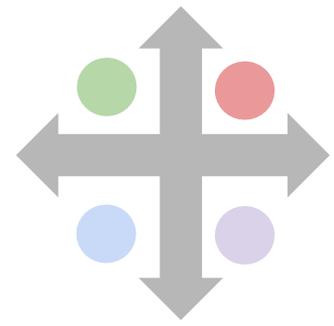
- Get a seat at the table. Really effective comms from the beginning. Feel like they have a voice. Get all of the players involved.
- (all scenarios) How can we add energy and approaches within communications . How we communicate the science and management decisions, and why it is important. Good scientific communication skills, tools, outreach needed
- Communications/ connections across agencies, between/among scientists, between federal and state agencies. share information with each other, at every level, so we can share with fishery participants
- Get good maps of benthic habitat, water column, other habitat aspects, for areas under stress.
- Habitat is really important when looking at not only wind, but offshore aquaculture. Not all negative, able to do carbon capture with something like kelp.
- Deal with all levels of new entrants, small scale up to corporate level
- Example: In Feb, PFMC's Habitat Committee is having a [briefing](#) on offshore wind and aquaculture and impacts to the environment. an initial opportunity to share information across all PFMC advisory bodies.
- Get information on what other national council's are doing on similar issues
- What are other nations doing, how are they approaching these types of scenarios
  - Re other nations reviews an interesting paper was published "The future of ocean governance." Rev Fish Biol Fisheries
  - <https://doi.org/10.1007/s11160-020-09631-x>

- Have to stay on education about eating lower in the food web, move away from flagship species we eat now. Marketing challenges.
- A lot we can do that impacts how much fish is being caught, but don't know whether the "fishing communities" want to continue being "fishing communities". Need to know what direction our communities are going. Will need help from local governments, local groups, local plans. Communication/ coordination at different government levels.
- (all scenarios) infrastructure a big issue, how do we target infrastructure aid
- Community issue is a circular argument, want good economies, realize want to be more diversified. Lack of communication of economic value. Build resilience in terms of structures, carbon sequestration issues. More connecting of the dots in understanding of what is driving the communities.
- Do some homework in respect to insurance vehicles on the hurt that is going to happen to fisheries, similar to agriculture on land. Proactive, rather than disaster relief afterwards. Help soften the blows.
- Want to start putting more thought into how to provide flexibility for our fishing fleets in when and how they harvest allowable catches. Think about IFQ systems, or other management systems.
- What are the effects of climate change that will fall out of the action that we are currently contemplating. Is it something the PFMC discusses regularly as part of their actions. More warning if part of regular practice.

- get credit for carbon offset for fishing communities giving up areas

- Will need to adjust how we do weak stock and mixed stock management.

# Breakout 3: Looking Across Scenarios - Communities Priority Actions



*Review your suggested actions across all 4 scenarios. What does this tell you about the priorities for Oregon communities to prepare for these futures?*

## **Which suggested actions seem to work across all or most scenarios?**

- Marketing piece connects across all scenarios, primarily fortune and favor and box of chocolates
  - Council can educate themselves about marketing but have little to do with it
    - Use platforms to educate others on the things that they are doing to improve fisheries sustainability -- be careful that they don't step outside their "bounds" -- weekly post about why you should feel good about eating West Coast fish
    - Improving on what we have done so far since we have done a lot of sustainability practices
  - Need a good supply chain in order to impact the market
- More flexibility and quick response of the Council
  - What does flexibility mean?
  - Need to plan on how you are going to make flexible regulations, so that it can occur in quick time and react to changing species or other considerations
- Social labor issues: Standard of MSC, Dolphinsafe are all standards that were developed outside of the US-- labor laws will change how business is done, helping to plan the transition of the fishing culture
  - Understanding outside influence and impact in labor laws ex.Plant- 48 hours of working, Fishing vessels- 72 hours, not based on a monthly salary unlike the most of the world
  - FISH? Stakeholders who can then impact the International conversation -- as they are dealing with it in a culturally relevant way to the country that they are in
  - Change how many people you will have to have, room & board

## **What actions are important to do because they prevent the worst-case situation?**

- Starting the conversation to make things more efficient on the regulatory side, where do you put the effort and limited time available

## **What actions are important because it enables a good future?**

- Online meeting and mentorship to involve more people in the Council process

## **What actions help build flexibility to cope with the future?**

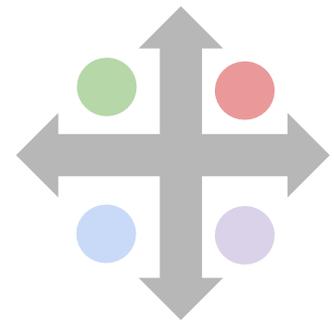
- We have never defined what flexibility in fisheries management is-- depends on who you ask
- What does flexibility mean to communities?
  - Mechanism that gives you the ability to circumvent the long process that allows for different opportunities
  - Boats are out fishing, processor and families all need the flexibility
  - Mix of data, stock assessments to get flexibility in the Council process
  - We go through everything possible to not overfish, sometimes we are not close to the ACL-- prioritize not dealing with those stocks that we have low % of ACL caught ( ex. Dover Sole), prioritize other things
- Online meetings with new technologies to enable more stakeholder involvement
  - To get critical inputs of all the community members that have been affected, different language barriers
  - We need to understand our own communities better in order to move forward ex. Different diverse communities of different language, binary/ nonbinary, “family” occupation where labor laws tell us that people shouldn’t be on the boat before 18 years old
- MREP program of mentorship-- very intimidating for people outside of the Council family
- Foster local use product for immediate consumption CSF ( Community Supported Fishery) -- expand market to frozen, could still have the same box structure, seasonal species v. what is available
  - Expand number of fish species that are used

## **What should you stop doing given these scenarios?**

- Council process is cumbersome
  - Advisory bodies can do a lot more homework and save time on the Council floor (ex. Workload planning)
  - Focusing on time--10 people gave 4 minutes testimony instead of 5 minutes, you could pick up an extra agenda item, public record, but being cognizant of when we talk and what we are talking about could allow for more agenda items
    - North Pacific - 3 minutes per individual, 6 for a group
  - Issues that have been going on for a long period of time, drags on
  - Focusing on the most important things, only will get more complicated as these scenarios go on

- Optimum yield - if we are delaying fishing that can occur you are not going to get OY
- Time is valuable to all of us, not utilizing the time efficiently

# Breakout 3: Looking Across Scenarios - Harvester Priority Actions



*Review your suggested actions across all scenarios. What does this tell you about the priorities for Oregon harvesters to prepare for these futures?*

## Which suggested actions seem to work across all or most scenarios?

- Maintain diversity in the commercial fleet while maintaining recreational opportunities. (Also keep in mind opportunities for traditional/subsistence fisheries).
  - Develop programs that help small vessels/businesses better able to adapt to changing conditions:
    - Identify the barriers and finding ways to remove them
    - Guidance on navigating the regulatory process
    - Marketing opportunities; how to do marketing
    - Training on business development
  - Likewise, consider diversity in the marketing of fishery products
    - Development of direct marketing opportunities focused on small vessels. (Those marketing channels probably don't work for large vessels)
    - To maintain diversity of processors and their capabilities reserve waterfront public land for fishery infrastructure. Likely state, county and local authorities involved. And other entities like chambers of commerce.
- Regulatory structures:
  - Revise to facilitate new marketing opportunities, particularly directly connecting harvesters to consumers, who may be at a distance from coastal communities. (This may be mostly within state authority.)
  - Create regulatory structures that are more flexible and nimble. Examples:
    - temporary rule framework used by Oregon
    - “if then” regulatory frameworks
  - Reduce bureaucratic layers involved in the decision making process to allow a faster reaction time.

- Explore ways to transfer regulatory authority from the federal government to the state government, since the state is more nimble.
  - If there are new fishing opportunities exempted fishing permits are the way to develop them; we need to make this permitting process faster.
- Awareness and education
  - Target audiences
    - Legislators - funding opportunities and reform of regulatory frameworks
    - Communities: Stewardship; support for local seafood
    - Consumer education - try new fish!
    - Those involved in the supply chain for newly available fish: How to harvest? Process? Market?
  - Who is the best voice to bring these messages to these audiences?
    - Develop brand identity for fishery products.
    - Trusted thought leaders, e.g. chefs and other influencers. Channels include cooking shows, websites (fish specific recipe site)
    - Example of cattlemen's wives as an effective promotional entity.
    - Fishermen need to embrace social media to get messages across to the public. Capitalize on existing fishing related affinity groups (anglers, etc.), which often spread the word about what kinds of fish are appearing in local waters.
    - Change public perceptions about fisheries using social media opportunities. We need professional help for marketing like a marketing specialist to work with fishermen in this realm.
    - We all need to be proactive versus reactive: harvesters, consumers, regulators.

**What actions are important to do because they prevent the worst-case situation?**

- Fishing industry and communities need a united voice to to address climate change issues and solutions across the board

**What actions are important because it enables a good future?**

- 

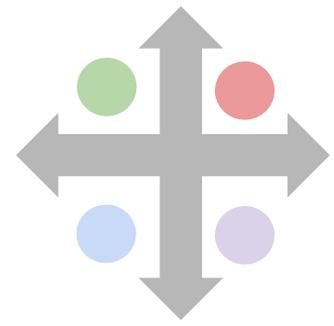
**What actions help build flexibility to cope with the future?**

- 

**What should you stop doing given these scenarios?**



# Breakout 3: Looking Across Scenarios - Fishery Manager Priority Actions



*Review all the suggested actions across all scenarios. What does this tell you about the priorities for Oregon fishery managers to prepare for these futures?*

## Which suggested actions seem to work across all or most scenarios?

- Communication and collaboration on multiple levels
  - Management and science
  - Management and industry
  - Multiple levels of government
  - Stakeholders and all levels of management
- Marketing strategies
  - Forum to inform (example Positively Groundfish)
  - Potentially diminishing returns for certain scenarios
  - Economic explanations on west coast products (currently in a market penetration mode)
- In scenarios with species abundance increase there may be a need for flexibility in management (i.e. EFP) especially for smaller boats for species that are not as abundant. Since EFPs have monitoring requirements this can be cost prohibitive.
- Need for more information to inform Council decisions. Continued and more science to inform management of fisheries. This includes fish biology responses to climate variability in order to set appropriate catch levels etc.
- Support and funding are needed to support monitoring efforts and have the capacity to continue the surveys and the collaboration between the different agencies, academia, and industry.
- There should be prioritization of research about biology and changing climates as well as gear research and development and funds should be used to increase not only funding for this research but also the personnel to conduct this research.
- Communication strategies are needed to be clear with fishing industry members and public and the uncertainty with predictions (i.e. stock assessments). There is a need to utilize and hire communication specialists to bridge the gap between the different communication styles.

- Changing the regulatory process to make it more reactive and nimble. Reduce the timeframe of responses for regulations or set up the regulations with a framework that is more responsive. This could include if/then statements and triggers to initiate responses (example the halibut catch sharing program).

### **What actions are important to do because they prevent the worst-case situation?**

- Flexibility to adjust harvest levels depending on the changes in abundance of species
- The last 14 months (COVID) could be an example of the worst case scenario (loss of businesses, surveys, etc.) and we should use this as a learning experience.
- Continue to stay informed about the state of the environment (these data streams were not always available and should be prioritized in order to maintain information about changing climates and variability)

### **What actions are important because it enables a good future?**

- Flexibility and nimbleness (from managers, harvesters, processors, markets. etc.)
- EFP (exempted from regulations) there are also experimental fishing and could consider new gears, new approaches, etc.
- The whole EFP process should be re-evaluated (simpler and more well defined) with standards and benchmarks since it varies between FMPs
- Reevaluate and simplify the process for EFPs for industry so that the requirements are not limiting participation (especially for smaller vessels)
- Morphing the SK process with EFP is a potential idea -- can the Council be more directed about the types of EFP proposals they would like to see? Problems that Council would like to solve?

### **What actions help build flexibility to cope with the future?**

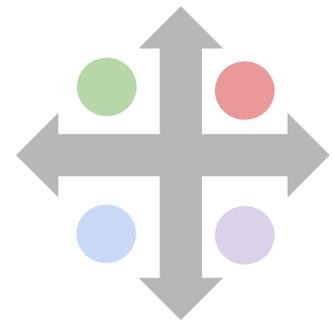
- Making Council action NEPA compliant
  - Green light/red light approach
- A lot of things listed above (if/then approaches to rule making process)

### **What should you stop doing given these scenarios?**

- Boggling things down with process and procedure ;)

- Reducing funding to basic monitoring programs
- Reduction in staffing levels through attrition
- The Council meeting process could be more flexible
  - For most people going to a Council meeting and speaking can be intimidating
  - Online can increase participation from smaller vessel owners
  - Do not want to have distrust with industry and management in the process through lack of participation
  - Increase communication on participation process

# Breakout 3: Looking Across Scenarios - Fishery Science Priority Actions



*Review your suggested actions across all scenarios. What does this tell you about the priorities for Oregon fishery scientists to prepare for these futures?*

## Which suggested actions seem to work across all or most scenarios?

- Robust and diverse sampling strategies as possible, give ourselves time to compare platforms (sail drones, NOAA ships, fishing vessels). Alternatively, accelerate effort to use existing data and data coming online - proactive effort to address the scenarios.
- Fishing vessels are ready to serve as platforms, host instruments, etc. - early warning system built into the system - train fishermen to help with providing real time data.
- Need to prioritize data and analysis efforts that address key questions that need to be answered.
- Some key questions / items on agenda of scientists:
  - impacts of blue revolution on fisheries - can learn from other ecosystems around the world (e.g. Norway and wind development). How can we be more intelligent about potential outcomes and getting ahead of them?
  - There is room to bring in other relevant sciences (behavioral, psychology) to inform reactions to ocean change.
  - Early detection around range shifts is a key area of research to help prepare fishing fleets and industry. How do we know when changes in ocean conditions are causing a wholesale shift in the ecosystem?
  - What are the mechanisms driving ecosystem responses - need to get past correlations to develop reliable forecasts.
- Need capabilities to analyze, visualize and report on data. A lot of data streams and large amounts of data will need to be processed. Challenges with hiring skilled analysts / data scientists at NOAA for various reasons. Important to develop a pipeline of data analysts and scientists (e.g. NOAA/OSU faculty positions).
- Decade of the Ocean - use this to increase focus on fisheries, climate, climate action, clean energy, many of the points brought up during the workshop. Currently not enough visibility on the issues facing the oceans.
- Data information transfer is important for communication and relationship building between different groups and communities.

- Communication about many different aspects of ocean change is critical, how can it be in service of communities? Scientists are increasingly becoming great communicators.
- Having fishing community at the table - which is also at the root of equity issues
- Better job communicating with legislators at all levels and must occur regularly to keep up with pace of change. Work with groups associated with emerging technologies and activities

**What actions are important to do because they prevent the worst-case situation?**

- 

**What actions are important because it enables a good future?**

- 

**What actions help build flexibility to cope with the future?**

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**What should you stop doing given these scenarios?**

- Scope for changing the rules for using NOAA survey data be changed - can it be used in real-time? More easily accessible to the public and more quickly - less than 1-2 year turnaround time? Need a more nimble system overall and a faster turnaround time can help with this.