

**7/14/09 Marine Reserves Work Plan Science Workshop  
Breakout group exercise to discuss research/monitoring objectives**

**I. BIOLOGICAL / ECOLOGICAL GROUPS**

**A. Pilot sites**

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**1. Must Do (Dave's group)**

*1.a. Group Discussion:*

- Determine effect of size
- Indicators that need to be monitored
  - Do literature review, talk to others who are monitoring to determine ideal indicators to monitor
- Baseline info: biological diversity, abundance, distribution
- Mapping habitat types, determining what's out there
  - Shallow-nice, but long-term
- Fishing impacts
- Identify comparison areas
- Estimates of expected response times: realistically, what those times are. Times will affect sampling/monitoring program
- Use what's been completed at redfish rocks as a reference/prelim study for other sites
- Develop methods/protocols: use standardized methods as much as possible; use protocols similar to existing programs
- Need to share data/make accessible

*1.b. Sticky notes (copied verbatim):*

- Determine effects of marine reserve size
  - Marine reserve size – determine how the size of the marine reserve relates to species composition and community structure
  - The problem of replication in any studies with need for replication
  - Determine best spatial scale for sampling in each site, and whether MR/MPA size is big enough
  - How does the size of the MR affect changes in populations? (Look at core of MR compared to edges)
- Determine Indicators:
  - Determine sets of species that are robust and sensitive to monitor over long term. Designate species to be evaluated and determine their status.
  - Establish what “minimum baseline” level of study is
  - Is “minimum baseline level .rqmt” adequate to do real evaluation? Or are we stuck with “best available” as an excuse in future?
  - Identify best and most distinguishable indicators of  $\Delta$  and/or function (use existing data). Treatment =  $\Delta$  fishing mortality rate of fished spp, gear impacts (if any)

- Use the scientific literature to help plan the studies of baseline & monitoring.
- Need to determine what is known already
- Indicators of rate of change and its effect on habitat/biota (will baseline be changed)
- Define species to use as indicators
- Indicators
  - Less ambiguous
  - Relative to size of site
- Habitat:
  - Create habitat maps for each area with best avail. data
  - Characterize habitat types-especially separating types that will need different assessment methods
  - Evaluate current condition of site
    1. Map habitats
      - Uses
        - I.D. comparison sites
        - fishery effects on habitat
        - fish & invert community
        - fish home ranges
  - How does more detailed habitat data affect our understanding (& use) of other data?
- Species to survey:
  - Presence/absence of fish
    1. salmon
    2. groundfish
    3. coastal pelagics
    4. age structure
    5. life history parameters
  - Inventory invertebrate community
    1. done on a seasonal basis
    2. can these species be used as an indication of change in site over time?
  - Fished species
  - Inventory epibenthic/benthic community –done on a seasonal basis
  - Evaluate current condition of site. Look at key components of communities e.g.
    1. kelp cover
    2. long-lived benthic inverts e.g. urchins
    3. rockfish/fish specific
    4. others identified
  - Sea urchin & macro algae cover; rockfish size & species composition (include reference sites)
  - Marine mammals; birds
- Methodology:
  - Determine feasibility of sampling by fishermen (protocols? \$? permits?)

- Need to define analytical framework upfront
  1. spatial & temporal components
  2. fewer reserves-temporal component more important
- use existing methods, metrics, standardizations; use existing programs; define monitoring process
- sampling methodology
  1. appropriate methods
  2. stand. protocols (cross-inst.)
  3. feasible (cost/benefit)
  4. environ. standards for methods
- assessment of sampling methods
  1. protocols
  2. variables
  3. do assessment early on
- Other:
  - How effective is enforcement and what is fishing effort at comparison area?
  - Get POORT & NSAT together so Otter Rock can follow Redfish workplan/goals
  - Determine sampling methods & protocols
  - Get estimate of response time of species in reserves
  - Assessment of biological diversity, abundance and associations as a baseline, to the extent practicable
  - Project biological data (HUD) onto habitat maps to chart abundance, diversity and presence/absence by area, by habitat type etc. This is a fundamental baseline result
  - Do a detailed assessment of MPA Redfish
  - Identify comparison areas. Depth, habitat, oceanography, quantify fishing level
  - Identify fishing impacts on habitat (direct, indirect). Monitor in fished sites; literature review/
  - Call them reserve/comparison areas.
  - A website needs to be established immediately where quasi day-to-day progress is posted, along with regular slightly more formal reports, on a monthly basis.

## **2. Can do with additional funds (Dave's group)**

### *2.a. Group Discussion:*

- Home ranges, recruitment, export
- Food chain studies
- Oceanographic data

### *2.b. Sticky notes (copied verbatim):*

- Describe oceanographic variables:
  - Set a parameter of 3 variables that must be similar (20% variance) to be able to use for data comparisons. Oceanographic variables:

1. temp
  2. visibility
  3. current velocity
- Need to track interannual variations in ocean conditions. Why? One's evaluation of the success or failure of a MR will depend in part on presence/absence of persistently good/bad ocean conditions
  - Oceanographic variability needs to be sampled at spatial scale of MR.
  - Determine water quality characteristics of the site. Done on a seasonal basis
- Home range
  - Recruitment & export
  - Need to determine the degree to which the food chain at a site is maintained locally vs. remotely

### 3. **Longer-term or outside scope of work (Dave's group)**

#### 3.a. *Sticky notes (copied verbatim):*

- Inshore habitat data. Higher priority for Otter Rock.

### 4. **John's group (not prioritized)**

#### 4.a. *Group Discussion*

- Sampling for water quality data
- Identify keystone species for site (esp. important for baseline)
- Establish permanent transects/plots for repeat monitoring
- Monitor recruitment to reserve and adjacent controls
- Changes in biogenic habitat over time

Others from audience:

- Stock composition

Audience generally agrees

#### 4.b. *Sticky notes (copied verbatim):*

- Population sizes & size structure of representative flora and fauna
- Density and size frequency of fish & inverts inside & outside reserve
- Annual sampling for species
- Find out size & age of fish
- Survey the amount of stuff in the area
- Baseline characterization – pilot project site: develop a snap-shot characteristic of marine biodiversity (spp. list) and ambient habitat characteristics (topography, type, etc.), and population size/age structure within the marine reserve and comparison area.
- Species inventory with associated habitat types – repeated at some interval
- Residence time w/in MR/MPA for select focal spp
- Changes in habitats over time? –benthic, algal
- Mark areas with buoys & land markers
- Larval community between reserves and to reserves. [?] origin of spp.
- Characterize spatial variability to assist in selection of appropriate sample sizes

- Establishment of permanent plots or transects for repeat monitoring
- Monitor recruitment of fish & inverts to [?] in reserve and adjacent control
- Continuous sampling for water-column properties (identify seasonal timing, interannual variability)
- Identify comparison site in similar oceanographic context (flow, upwelling, ...)
- Have a comparison site for both of the 2 pilot sites
- Do comparable research on both the pilot site & comparison site – biological & baseline surveys
- B.1. Habitat characterization (types, distribution, condition)
- B.2. oceanographic characterization (regionally in/out of reserve)
- B.3. ecological characterization (spp. distr. & abundance, size distr.)
- B.4. conduct 1, 2, 3 @scale of inside/outside reserves to infer @ that spatial scale
- B.5. identify drivers/processes/indicators
- B.6. determine appropriate sampling methods for each variable (1, 2, 3) & complementary sampling methods
- B.7. set environmental standards for sampling methods

## **B. Evaluation sites**

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### **1. Must do (Dave's group)**

#### *1.a. Group Discussion:*

- Discuss boundaries and define sites
- Be sure to bring in size/spacing info that's out there
- Identify shifts in fishing effort (really socio econ)
- Do data gap analysis at each site
- Bring in info about ocean conditions/ocean forcing
- Literature review of existing data

#### *1.b. Sticky notes (copied verbatim):*

- Synthesis of existing knowledge
- Presence of rare habitats
- Do the eval sites box out fishermen/users from fishable habitat?
- Are there habitats/species that are worthy of protection by a reserve?
- Species inventory by habitat in a site
- Literature review of existing info
- Physical habitat: topography, complexity, depth
- Identify likely shifts in fishing effort (→ impacts)
- How similar are ocean conditions and oceanographic forcing among “evaluation sites”
- Data gap analysis is for each site and for whole state
- Lack of socio-econ data
- Items to do for pilot sites will be done later for evaluation sites
- Size issue-bring in size & spacing recommendations
- Literature review of existing physical, chemical, biological data in synthesis form
- Determine (restate) min size of reserve area or MPA to meet local objectives

- Do evaluation site boundaries make sense environmentally?
- Consideration of potential for linking sites to increase ecological connectivity
- Make these groups start drawing some lines/polygons

## 2. **Johns group (not prioritized)**

### 2.a. *Group Discussion:*

- Species inventory
- Physical habitat
  - Getting a handle on topography and presence of rare habitats
- Temporal component
- Understanding what biological communities are associated with physical habitats
- focus on iconic species
- identify target species, what you might expect for outcomes
- Couple proposals with reference areas
- Get handle on upwelling, dissolved
- Connections to existing and future reserve sites

### 2.b. *Sticky notes (copied verbatim):*

- Location/extent of nursery areas for target fishery species and other species of concern
- Summary of marine mammals-use of haulouts and nearshore environment. Identify charismatic megafauna.
- How large does a new MR need to be to provide sufficient protection to achieve the design goals?
- Identify targeted species of concern. What is hoped for result of having this MR?
- Develop a synthesis of existing technical data and traditional knowledge about the habitats, living resources, and ecological processes for the marine reserve and comparison area and identify data gaps.
- Presence of comparable comparison areas outside proposed reserve
- Goal: identify primary objectives of the new MR. Is it enhance biodiversity? Restore natural better age structure? Increase fishery yield? “Rationale”
- Develop a simple conceptual model that identifies links between ambient ecosystem drivers, ecological indicators, and system response for the marine reserve and comparison area.
- Document the species composition, abundance, and distribution for primary community groups (i.e. benthic invertebrates, seaweed/kelps, fishes, seabirds, marine mammals).
- Species habitat associations
- Baseline habitat assessment. What types of habitat are there, depth distributions, etc.
- Spatial distribution of habitats-benthic habitat classification; -appropriate spatial scale of resolution of habitats
- General idea of seafloor topography
- Presence of any remarkable habitats deserving of protection

- Basic oceanographic information pertaining to source/sink recruitment information e.g. is this area in a known retention area, upwelling center, region of strong accretion
- Flow regime: upwelling intensity, stratification, flushing time
- Water column properties: nutrients, dissolved oxygen, pollutant sources
- Bird & mammal usage patterns inside & outside proposed reserve
- Biodiversity assessment (indices) within the region of interest (both in eval site & surrounding comp area)
- Presence/spatial distribution of species of special concern-endangered species; iconic species
- What species live in this proposed MR currently? What is their abundance?
- Location of any unique biological processes/events-spawning aggregations; migration routes; key foraging areas/events
- How will the new Oregon territorial water MR complement the existing 2 Oregon MR & future national (federal) protected regions? Contribute to the network of reserves: “Connectivity”
- What habitat (bottom substrate) types occur & %patch in the proposed reserve? Single type, mix of types
- Determine & document the characteristics of intertidal, sub-tidal, and deep water habitats throughout the proposed marine reserve and a comparable area
- Bottom characteristics-depth; type/habitat
- Lists of benthic species found in the site (i.e. general assessment of diversity)

### 3. Group Discussion

Missing:

- What about forage fish and zooplankton?
- Impacts from sea mammals
- Impacts from human actions (other than fishing)
  - Point source pollution, etc.

Other Comments:

- Keep it very simple for evaluation sites

## II. SOCIOECONOMIC GROUP

### A. Evaluation sites

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#### 1. Must Do

##### 1.a. Group Discussion

- Understand spatially explicit human uses in and outside area, both extractive and non-extractive
- Next step: look at benefits, costs, and impacts (+ and -)
  - First order impacts: direct economic impact to fishery
  - Second order impacts: money filtering through economy
    - For costs, given limited time and funding, assume total loss of closed area for first order impacts. Gives crude extent of impacts.

- Benefits really get more into monitoring, because practically hard to predict.
- Relative importance of areas
- Social/economic value

1.b. *Sticky notes (copied verbatim)*

- Human uses
  - Describe the current, past, and likely future uses of the physical location of the proposed reserve. Who goes there? What do they do? Where else do they do this?
  - What are the consumptive and non consumptive uses of this area?  
Objective: to obtain the above data
  - How can we generate “spatially” specific use information on use of the site?
  - What are the uses of the evaluation site?
  - Background/catalog on uses in sites using existing information on all human uses
  - Spatial concentration of extractive user effort
  - Importance of human use relative to the local economies. Scope is relative
  - how to rate/value of heritage concerns? Effects on tourism-fishing charters, tours, etc. as opposed to benefits of MRs.
  - Generations of users (fishermen) have traditionally used these sites-consideration of cultural heritage (rights) must be considered
  - Must consider relocation (over crowding) when fishing patterns are changed. E.g. those who normally would have fished a MR have to encroach on others who traditionally fished outside the MR
  - Information on catch from within the geographic (MR) areas and information on alternative fishing strategies-and related expected change in harvest and cost
  - Characterize extent (spatial) and relative importance of past/current extractive & non-extractive uses
  - Use existing and historical data to assign values to certain activities and their importance to their communities. Economic gain [?]
  - Characterize existing users of the rocky intertidal areas to inform proposed development-#'s; types of users (extractive, disturbing, recreational, commercial, etc.)
  - What fisheries existed in these areas...how will these change with new sites
  - Must consider traditional fishing patterns that will be disrupted (MPA) or eliminated (MR) and weigh against potential of beneficial peer-reviewable science
  - On site surveys of intertidal uses incl. observation-#'s; types of users
  - Re a particular ocean space: existing uses; benefits produced; distribution of benefits; history of use; community dependence

- Understand the effect of the MR/MPA on human behavior (vs. changes in regs or changes in uses)-isolate effects of MR
- Economic impact connected to human uses: benefits/costs/impacts
  - What are cost/earnings profiles of ocean industries? How  $\Delta$  over time
  - What are the major costs associated with the site
  - What are the economic & social benefits generated at the site?
  - Economic valuation on non use of marine resources e.g. wildlife viewing, ecological long term values
  - What are the effects on ex vessel value (&prices) of displacement caused by marine reserves on the commercial fishery? What are the effects of designation on producer costs
  - Designation of an MR will initiate new economic activity associated with the site (e.g. research, monitoring, enforcement, education, tourism)
  - What if changes in management actually increases the value/productivity of the fishery that is being displaced? Would it still be characterized as a cost?
- Stated relative importance of areas
  - To what extent is commercial or sport fishing or other activity lost or displaced as a result of marine reserve designation? What is the economic impact of this? Are negative impacts mitigated by
    - Fishing in substitute areas (effort shifts or behavioral response)
    - Increased populations of fish in nonreserve areas
  - Determine social values of existing uses of the rocky intertidal-existence values; value to protect that habitat; willingness to preclude extractive activities and other potentially disturbing activities; conduct onsite surveys
- Other
  - Info to inform/refine site
    1. Human use patterns over time/space
    2. Economic impact of marine/coastal areas
    3. Connections: ecological structure/functions
      - Human uses
      - Economic impact
    4. Expected ecological responses to MPAs-short term; long term
    5. Given 4, expected socio-econ effects
  - How does the info/data gathered in this area relate to the other additional sites under consideration?
  - What biological/ecological processes take place in the proposed MR that have cultural or economic values? What are these value; how will designation of the MR change these values

## 2. Can do with additional funding

### 2.a. Sticky notes (*copied verbatim*)

- How does this area contribute short/long term to the city, county & state economy
- What are the identified revenue streams following into/out of this community
- Value of expansion to have [?]fishing facilities? Value of supporting shore side businesses? (How to reconcile in area to be taken out of production)

- Build a database for ongoing economic data collection. Ensure that the data coll'n and retention is consistent

### 3. **Longer term/outside of scope**

#### 3.a *Sticky notes (copied verbatim)*

- How will users behave in response to alternative design changes to the site?
- For a defined space: substitution possibilities (areas); likely response of existing uses to exclusion
- What are the 1<sup>st</sup> order, 2<sup>nd</sup> order, induced impacts of reserve in particular areas
- How are different areas of the ocean linked to upstream industries/econ. activities (regional econ model)/other areas

## B. **Pilot sites**

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### 1. **Must Do**

#### 1.a. *Group Discussion*

- Everything listed for evaluation sites
- Monitor shifts in behavior/use over time
- Discussion about reserve serving as control area
- Recommendation to form advisory group to help ODFW dig deeper into appropriate studies, research objectives, etc.
- Understand effect of MPA. Think of as a human ecosystem- what all changed in the habitat to get a particular effect?

#### 1.b. *Sticky notes (copied verbatim)*

- Everything identified for evaluation/proposal sites
- Synthesis of existing info & data
- Interactive database & mapping capacity to explore siting options/data
- Changes in use/shifts in behavior (in & outside of MR site)

### 2. **Can do with additional funding**

#### 2.a. *Sticky notes (copied verbatim)*

- Detailed spatial info w/in MR area & in comparison areas → proxies for human behavior changes
- Monitor continuing human uses of the rocky intertidal, are uses changing over time-could use go up based on designation; types of uses could change

### 3. **Discussion**

- Struggle b/c of 14 month timeframe. Measuring/monitoring behavioral changes needs longer timeframe.
- Need to be able to pull out/isolate effects of reserves, so need to be able to collect correct data and do correct analysis.
- Discussion about HB 3013: bill doesn't constrain analysis. Sets a floor, not a ceiling.

- Discussion about how to isolate effects of reserves in state waters vs. federal regulations like RCA.
  - Astrid: in CA, initially constrained analysis to state waters. ended up doing more of a cumulative effects analysis. So look at state waters and federal waters in context of whole fishing grounds.
    - Don't limit data collection and analysis to state waters.
- Address regulations by looking at cumulative effects
- Aaron: effort shift/increased fishing in remaining area. Could lead to curtailments in other areas.
- Difference in short term filling in data gaps and longer term monitoring.
- Look at local effects (within locale, how much of an effect was it? How much of an affect in certain port, county, statewide?)
  - Relative as well as cumulative impacts analysis
- Correlation is hard enough, so is it possible to get over that and look at causality?
  - Useful to think about staged development of our knowledge. Get the low lying fruit first, progress towards more complex questions.