Does the MBNMS need more MPAs to protect the ecosystem?

Socio-economic study - Barbara Walker (UCSB)
Research Needs - Doyle Hanan (MLPA member)
Modeling - Ray Hilborn and Carl Walters
Review of existing regulations and effects - R. Parrish
Do we need additional protection in the Monterey Bay National Marine Sanctuary

Monterey Landings

2006   179 tons   1.4%
1996   12,383 tons
# National Marine Sanctuaries

<table>
<thead>
<tr>
<th>Region</th>
<th>NMS</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAST COAST</td>
<td>3</td>
<td>896 sq mi</td>
</tr>
<tr>
<td>WEST COAST</td>
<td>6</td>
<td>12,852 sq mi</td>
</tr>
<tr>
<td>HR 1187 new area</td>
<td></td>
<td>15,118 sq mi</td>
</tr>
</tbody>
</table>

- Olympic Coast: 3,310
- Cordell Bank: 526 + new 736
- Gulf of Farallons: 1,255 + new 1,530
- Monterey Bay: 5,328
- Davidson Seamount: 775
- Channel Islands: 1,658

<table>
<thead>
<tr>
<th>Region</th>
<th>NMS</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>GULF COAST</td>
<td>2</td>
<td>3,857 sq mi</td>
</tr>
</tbody>
</table>

New NMS
HR 1187

3 Central California NMS extend 250 nm

Same as entire coast of Oregon

Half of the outer coast of Washington is in Olympic NMS
HR 1187

SEC. 3. POLICY AND PURPOSE

c) Effect on Fishing Activities- Nothing in this Act is intended to alter any existing authorities regarding the conduct and location of fishing activities in the Sanctuaries.
Ecosystem-based fishery Mgt.

1. Was ecosystem function in federal waters threatened by past federal management?
2. What are the existing protections?
3. How successful are existing protections?
4. Is ecosystem function in federal waters threatened by current federal management?
5. If threatened: what type of regulations will be the most beneficial?
1. Was ecosystem function in federal waters threatened by past federal management?

Before federal management
Whales, pinnipeds, otters, sardine, mackerel and some salmonid stocks were exploited to near extinction

On my watch
A number of groundfish species were overfished.

WHY?

Biologists used same concept as MPA advocates
Assumed high density-dependence with quick population doubling time at low biomass

Tropical reef fishes - double 2-3 yrs 40%
Productive CC groundfish - double 7-10 yrs 10%
Many CC groundfish - double 15-25 yrs 3%
2. What are the existing protections?

Report describes most of the California gear, area, season, size, sex, and bag limit regulations. Summarizes them by habitat type.

--- Very complicated, overlapping series of regulations that provide considerable ecosystem and fishery protection.

NOT ENOUGH PROTECTION OR NEAR TOTAL PROTECTION
Exceptions pot shellfish crab, lobster, spot prawn SSS

1. Some important species in hard-bottom nearshore, shelf and deeper habitats not adequately protected by California regulations.

2. In contrast, the total effect of traditional regulations make it impossible to economically harvest all but a few species living on soft-bottom nearshore, shelf and shelf break habitats.

3. Provide considerable ecosystem protection
   (rockfish gillnet restrictions : protect birds and mammals)
2. What are the existing protections?

Pacific Fisheries Management Council

Federal regulations based on fishery management plans (FMPs)
Direct Control of Catch (DCC) - Optimum Yield - bimonthly limits
Traditional gear limitations - ecosystem protections
Essential Fish Habitat areas (MPAs) - ecosystem protections
Temporary MPAs - Rockfish Conservation Areas - weak stock mgt.
Belief-based Management
Knowledge-based Management
Adaptive Management
Static Management

Single Species Management
Ecosystem Management
Pacific Fisheries Management Council

knowledge-based, adaptive, single species management

Salmon fishery   No fishing season 2008.
Stock Synthesis Biomass Models
Weak stock management  - RCAs
Sardine Harvest Rule
3. How successful are existing protections?

Trends in the abundance of groundfish stocks off the west coast

1950 biomass 2.4 million tons

- Bocaccio
- Chilipepper rockfish
- English sole
- Ling cod south
- Pacific Ocean Perch (WA OR)
- Canary rockfish
- Arrowtooth
- Yellowtail rockfish
- Longspine thornyhead
- Shortspine thornyhead
- Widow rockfish
- Shortbelly rockfish
- Dover sole
- Sablefish

Reduced OYs
RCAs
Belief-based, static, ecosystem management

NGOs and Forage Species
Krill fishing prohibited - AB 2712 - forage fish

NGOs and Trawling
Trawl buyout in Central California
Legislation prohibiting trawling in State Waters AB 2712
Present MBNMS MPA proposal
2 Active Trawl permits in MBNMS - None South of Pt. Sur
## Landings in MBNMS

(Santa Cruz, Moss Landing, Monterey)

<table>
<thead>
<tr>
<th></th>
<th>1996</th>
<th>2006</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>25,774 tons</td>
<td>29,969 tons</td>
<td>+16%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$18,448</td>
<td>$6,402</td>
<td>-65%</td>
<td></td>
</tr>
<tr>
<td>Sardine, anchovy</td>
<td>12,722</td>
<td>27,939</td>
<td>93.2%</td>
<td>+120%</td>
</tr>
<tr>
<td>Other pelagics</td>
<td>3,917</td>
<td>873</td>
<td>2.9%</td>
<td>-78%</td>
</tr>
<tr>
<td>Total slope species</td>
<td>3,228</td>
<td>806</td>
<td>2.7%</td>
<td>-75%</td>
</tr>
<tr>
<td>Total everything else</td>
<td>2,068</td>
<td>372</td>
<td>1.2%</td>
<td>-82%</td>
</tr>
</tbody>
</table>

Pelagics were 96% of 2006 Landings
MPAs not effective protection for pelagic species
<table>
<thead>
<tr>
<th>COASTAL PELAGICS</th>
<th>tons</th>
<th>1996</th>
<th>%</th>
<th>2006</th>
<th>%</th>
<th>change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sardine</td>
<td></td>
<td>8,805</td>
<td>34.2%</td>
<td>19,523</td>
<td>65.1%</td>
<td>+122%</td>
</tr>
<tr>
<td>Anchovy</td>
<td></td>
<td>3,917</td>
<td>15.2%</td>
<td>8,416</td>
<td>28.1%</td>
<td>+115%</td>
</tr>
<tr>
<td>Squid</td>
<td></td>
<td>5,150</td>
<td>20.0%</td>
<td>561</td>
<td>1.9%</td>
<td>-89%</td>
</tr>
<tr>
<td>Mackerel unspec.</td>
<td></td>
<td>877</td>
<td>3.4%</td>
<td>189</td>
<td></td>
<td>-78%</td>
</tr>
<tr>
<td>Herring</td>
<td></td>
<td>274</td>
<td>1.1%</td>
<td>41</td>
<td></td>
<td>-85%</td>
</tr>
<tr>
<td><strong>HIGHLY MIGRATORY PELAGICS</strong></td>
<td>tons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albacore</td>
<td></td>
<td>238</td>
<td></td>
<td>22</td>
<td></td>
<td>-91%</td>
</tr>
<tr>
<td>Swordfish</td>
<td></td>
<td>221</td>
<td></td>
<td>19</td>
<td></td>
<td>-92%</td>
</tr>
<tr>
<td>Opah</td>
<td></td>
<td>20</td>
<td></td>
<td>1</td>
<td></td>
<td>-95%</td>
</tr>
<tr>
<td>Thresher shark</td>
<td></td>
<td>15</td>
<td></td>
<td>&lt;1</td>
<td></td>
<td>-99%</td>
</tr>
<tr>
<td>Bluefin tuna</td>
<td></td>
<td>13</td>
<td></td>
<td>&lt;1</td>
<td></td>
<td>-99%</td>
</tr>
<tr>
<td>Chinook salmon</td>
<td></td>
<td>937</td>
<td>3.6%</td>
<td>37</td>
<td></td>
<td>-96%</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>14</td>
<td></td>
<td>4</td>
<td></td>
<td>-69%</td>
</tr>
</tbody>
</table>
## Slope species - 2.7% 2006 landings

<table>
<thead>
<tr>
<th>Species</th>
<th>1996</th>
<th>2006</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>3,228</td>
<td>806</td>
<td>-75%</td>
</tr>
<tr>
<td>Grenadier</td>
<td>994</td>
<td>46</td>
<td>-95%</td>
</tr>
<tr>
<td>Dover sole</td>
<td>849</td>
<td>214</td>
<td>-75%</td>
</tr>
<tr>
<td>Sablefish</td>
<td>773</td>
<td>273</td>
<td>-65%</td>
</tr>
<tr>
<td>Thornyheads (2 sp.)</td>
<td>420</td>
<td>126</td>
<td>-70%</td>
</tr>
<tr>
<td>Splitnose Rockfish</td>
<td>160</td>
<td>96</td>
<td>-40%</td>
</tr>
<tr>
<td>Blackgill Rockfish</td>
<td>28</td>
<td>17</td>
<td>-39%</td>
</tr>
<tr>
<td>Bank Rockfish</td>
<td>4</td>
<td>22</td>
<td>+573%</td>
</tr>
</tbody>
</table>

Slope species - 2.7% 2006 landings
### Everything else - 1.2% 2006 landings

<table>
<thead>
<tr>
<th>Species</th>
<th>1996</th>
<th>2006</th>
<th>change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL</strong></td>
<td>2,068</td>
<td>372 tons</td>
<td>-82%</td>
</tr>
<tr>
<td>Bocaccio</td>
<td>126</td>
<td>2</td>
<td>-98%</td>
</tr>
<tr>
<td>Chilipepper Rf.</td>
<td>674</td>
<td>11</td>
<td>-98%</td>
</tr>
<tr>
<td>Widow Rf.</td>
<td>174</td>
<td>4</td>
<td>-98%</td>
</tr>
<tr>
<td>Sanddab</td>
<td>124</td>
<td>4</td>
<td>-93%</td>
</tr>
<tr>
<td>English sole</td>
<td>109</td>
<td>9</td>
<td>-92%</td>
</tr>
<tr>
<td>Rex sole</td>
<td>107</td>
<td>12</td>
<td>-89%</td>
</tr>
<tr>
<td>Lingcod</td>
<td>84</td>
<td>6</td>
<td>-92%</td>
</tr>
<tr>
<td>California halibut</td>
<td>56</td>
<td>35</td>
<td>-37%</td>
</tr>
<tr>
<td>Petrale sole</td>
<td>123</td>
<td>94</td>
<td>-33%</td>
</tr>
<tr>
<td>Spot Prawn</td>
<td>35</td>
<td>31</td>
<td>-11%</td>
</tr>
<tr>
<td>Dungeness crab</td>
<td>17</td>
<td>83</td>
<td>+392%</td>
</tr>
<tr>
<td>All other species</td>
<td>437</td>
<td>67</td>
<td>-75%</td>
</tr>
</tbody>
</table>
Why did the landings of non-pelagics and highly migratory species decline so markedly over the last decade?

Greatly reduced federal catch limits for groundfish

Rockfish Conservation Area (2003)

Area-based drift gillnet restrictions for leatherback turtles (2001)

State Nearshore Species Management Plan

Reduction in the number of commercial fishers:

(20,363 California comm. fishers in 1980 : 3,835 in 2007)
(9,229 comm. boats in 1980 ; 4,856 in 1996 : 2,968 in 2007)

Limited entry, trawler buy-outs, loss of shore facilities, economics
Do we need additional protection in the Monterey Bay National Marine Sanctuary

Monterey Landings

2006    179 tons    1.4%
1996    12,383 tons
Since 2006

• 21 State MPAs created in MBNMS
• State no-trawl zone extended to 12 miles in MB
• 3 EFH Areas created in MB area (4,908 sq mi)
• Drift gillnet closed for HMS
• Trawl buyout of majority of Fed. trawl permits
  . between Pt Conception and Golden Gate
  . 2 active Fed. Permits in MBNMS; 0 south of MB
• Additional reductions in groundfish catch limits
State MPAs

State waters
no-trawl
Fed. MPA
Federal Essential Fish Habitat MPAs
Federal Essential Fish Habitat MPAs
Federal Essential Fish Habitat MPAs

Established June 12, 2006
3 EFH areas in study area
Total 4,907 sq mi
  1,435 in study area
DSM  775 sq mi

Figure 2-36: Areas Identified as Ecologically Important Areas Under the Council Preferred Alternative – Central California. (new since DEIS)
Area and percentage of area by habitat type for no trawling and no take of bottomfish MPAs.
(data provided by Sophie De Beukela MBNMS)

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Depth Meters</th>
<th>Area sq mi</th>
<th>No Trawling</th>
<th>No Bottomfish</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>RCA  -RCA</td>
<td>RCA  -RCA</td>
</tr>
<tr>
<td>Nearshore</td>
<td>0-30</td>
<td>164</td>
<td>99% 99%</td>
<td>18% 17%</td>
</tr>
<tr>
<td>Shelf</td>
<td>30-100</td>
<td>542</td>
<td>74% 73%</td>
<td>48% 12%</td>
</tr>
<tr>
<td>Shelf break</td>
<td>100-300</td>
<td>399</td>
<td>37% 23%</td>
<td>36% 5%</td>
</tr>
<tr>
<td>Upper slope</td>
<td>300-800</td>
<td>897</td>
<td>22% 20%</td>
<td>7% 2%</td>
</tr>
<tr>
<td>Lower slope</td>
<td>800-3000</td>
<td>2141</td>
<td>81% 81%</td>
<td>0% 0%</td>
</tr>
<tr>
<td>Rise</td>
<td>3000+</td>
<td>70</td>
<td>100% 100%</td>
<td>0% 0%</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>4215</td>
<td>64% 62%</td>
<td>12% 3%</td>
</tr>
<tr>
<td>Davidson Sea Mount</td>
<td></td>
<td>775</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
MPAs with no trawling
MPAs with no take of bottomfishes

Davidson Sea Mount
Pelagic finfish
Ecosystem Protection - unfished stock sizes for major pelagic and groundfish species in the California Current ecosystem.

- Pacific whiting
- Pacific sardine
- Jack mackerel
- Northern anchovy
- Pacific mackerel
- Sablefish
- Dover sole
- Shortbelly rockfish
- Widow rockfish
- Shortspine thornyhead
- Longspine thornyhead
- Yellowtail rockfish
- Canary rockfish
- Pacific Ocean Perch (WA OR)
- Ling cod south
- English sole
- Chili pepper rockfish
- Bocaccio
- Darkblotched
- Petrale Sole South
- Vermilion rockfish (Calif.)
- Blackgill rockfish (Calif.)
- Black rockfish
- Bank rockfish

Cabezon 1,350 mt

Groundfish Species 12%

Pacific Mackerel

Anchovy

Jack Mackerel

Sardine

Whiting 9,200,000 MT

2005 landings 397,165 tons

Bocaccio 70,000 mt

MBNMS 2006 landings non-pelagics 1,178 tons
5. If ecosystem function is threatened what type of regulations will be the most beneficial

Two competing strategies for ecosystem protection
MPAs vs Quotas (catch limits)

MPAs work where they decrease the catch.

Overfished territorial species (tropical reef species)

MPAs will have little population effect in areas with highly regulated catch limits because they will not result in catch reductions.

WHY - Catch limits achieved outside
Catch limits and MPAs

With catch limits in place the only way that catch will be reduced is if densities outside the MPAs become so low that the catch limits cannot be caught.

Example: Lobster with a pretend annual OY

Compare 25% MPAs vs 25% OY reduction

2 tons fuel + 0.5 ton bait = 1 ton lobster

Fuel at $3.50 per gallon = $875/ton

Lobster at $10.00 per lb = $20,000/ton
2 tons fuel + 0.5 ton bait = 1 ton lobster

After 10 yrs MPAs: CPUE - 33% : Catch same
3 tons fuel + 0.75 ton bait = 1 ton lobster
No reduction in catch : No increase in population
more lobster in MPAs balanced by less outside

After 10 yrs MPAs: CPUE -50% : Catch - 25%
4 tons fuel + 1 ton bait to = 1 ton lobster
Reduction in catch after 5 yrs : X increase in population
more lobster in MPAs and less outside

After 10 yrs Quota: CPUE +20% : Catch same
1.6 tons fuel + 0.4 ton bait = 1 ton lobster
Reduction in catch 10 yrs : 2X increase in population
more lobster everywhere
Ecosystem Management

Major Problem: Un-coordinated management by 4 different agencies with 4 different philosophies.

California State Legislature
California Fish and Game Commission
Pacific Fisheries Management Council
National Marine Sanctuaries
Do we need additional protection in the Monterey Bay National Marine Sanctuary

Monterey Landings

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1996      12,383 tons