# Management Options for California's Dungeness Crab Fishery

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# To Be Discussed …

- Conditions in California's dungeness crab fishery
  > Biological sustainability
  > Economic sustainability
  > Social issues

- Extent of excess capacity in the fishery

- Potential approaches to dealing with excess capacity
  > Individual fishery quotas
  > Stricter limited entry criteria
  > Industry/government funded buyback
  > Permit stacking

- Assessing potential approaches with existing data

- Conclusions and recommendations

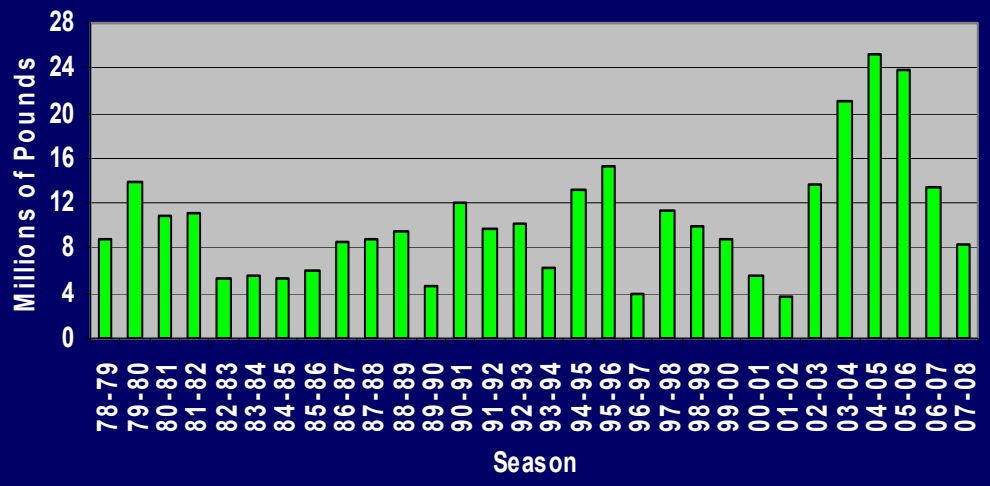
# Is the crab fishery biological sustainable?

- Biological sustainability a necessary but not sufficient condition for economic sustainability.
- Some capacity management measures require a TAC.

# Some Views on Biological Sustainability

"… Dungeness crab populations off northern California, Oregon and Washington have produced landings that have fluctuated around a fairly stable long-term mean for more than 30 years. One might therefore consider this resource to have a healthy status ….Fishery management has rested on the very simple, though biologically sound, 3-S principles and typically restrictive fishery regulations such as landings quotas have never been imposed on this fishery. A casual assessment of healthy status therefore rests on limited information" (Hankin and Warner, 2001)

**California Dungeness Crab Landings, 78-79 to 07-08 Seasons**
**(Source: B. McVeigh, CDFG)**




"The fishery has been fully and intensively exploited for at least 40 years. Approximately 80% to 90% of the legal-sized male crabs are harvested each season. Despite this intense harvest and high variability in abundance, most scientists and industry participants feel that current regulations are adequately protecting the crab resource" (Dewees et al., 2004).

# California Dungeness Crab Fishery

*Current Conditions*

- Highly marketable species
- Dungeness crab restrictions in other states
- Reduced opportunities in other fisheries
- Management
  - > 3-S
  - > Gear restrictions
  - > Limited entry

*Economic/Social Outcomes*

- Race for fish
  - > Excess harvest capacity
  - > Concentration of harvest early in season
  - > Reduced safety at sea
  - > Social conflict
  - > Distributional effects (e.g., among vessel "types", geographic areas)

# Excess capacity = difference between "harvest capacity" and "available harvest"

| *Harvest Capacity* | *Available Harvest* |
|---|---|
| Maximum amount that a fleet or vessel is able, or willing and able, to catch in a year/season, given factors such as fixed & variable inputs and resource, regulatory & market constraints.<br><br>• Potential capacity – based on physical features of boat (e.g., GRT)<br>• Demonstrated capacity – reflecting vessel "track record" | Expected long-term yield<br>• MSY<br>• TAC<br>• Historical harvest level |

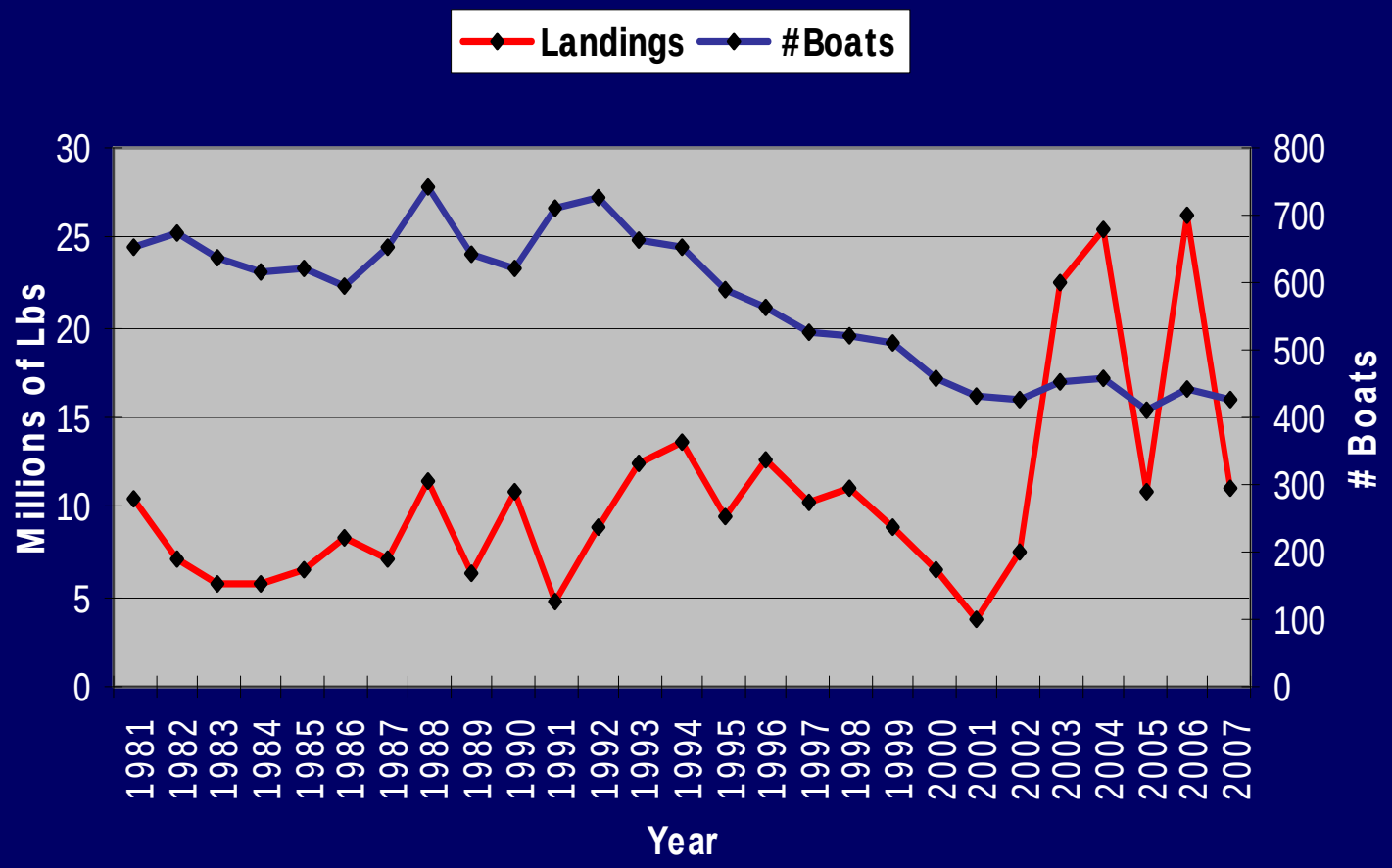
# Estimating Excess Capacity in California's Crab Fishery

- Select time period reflecting relatively unconstrained fishery (or minimum regulatory conditions likely to persist in future)
- No MSY or TAC → define "available harvest" as maximum annual harvest attained during time period
- For each vessel, define "harvest capacity" as vessel's maximum annual landings during time period
- Order vessels in descending order of harvest capacity
- Determine number of vessels needed to take available harvest

# Defining "Available Harvest"

Landings and # Vessels Participating in California's Dungeness Crab Fishery, 1981-2007

(Source: PacFIN)




Highly variable nature of crab landings → multiple time periods used for excess capacity analysis:

> 1999-2002 (low harvest)
> 1996-1998, 2005, 2007 (medium harvest)
> 2003, 2004, 2006 (high harvest)
> 1996-2007 (all years)

# Excess capacity is significant at low/medium/high levels of resource availability

(Source: PacFIN)

| *Time Period* | *Available Harvest (max annual harvest during time period)* | *# Boats Needed to Take Available Harvest* |
|---|---|---|
| 1999-2002 (low harvest) | 8.8M pounds | 152 |
| 1996-1998, 2005, 2007 (medium harvest) | 12.6M pounds | 123 |
| 2003, 2004, 2006 (high harvest) | 26.3M pounds | 162 |
| 1996-2007 (all years) | 26.3M pounds | 156 |

# Distributional Effects:

## Concentration of Crab Landings Among Vessels, 1996-2007

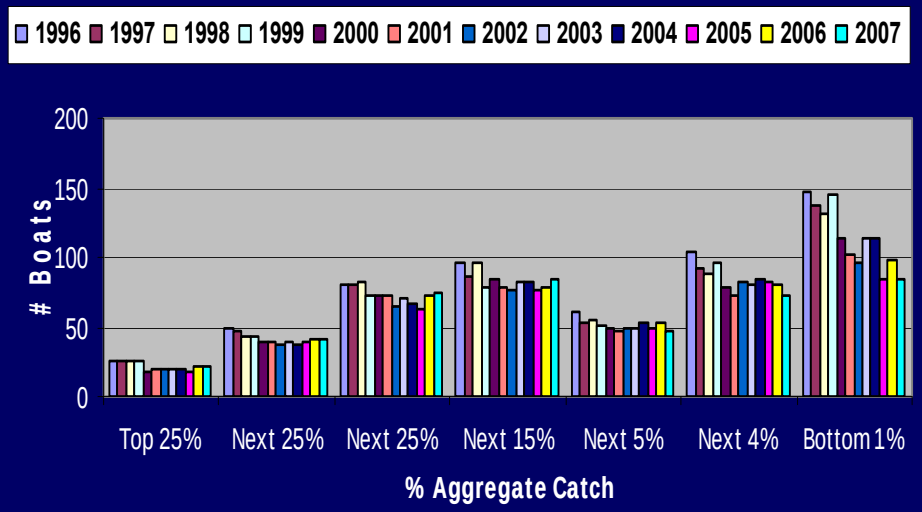
(Source: PacFIN)

> # and % of vessels accounting for majority of landings relatively stable over time

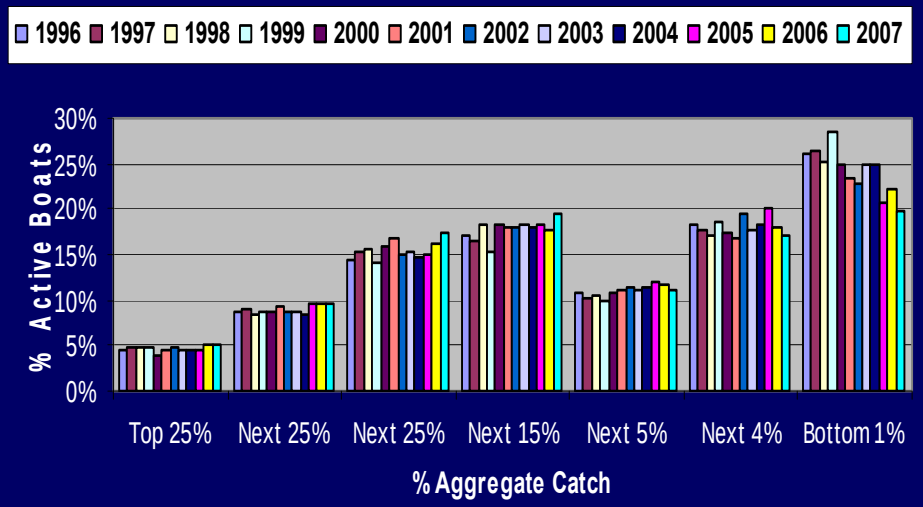
> Not clear whether composition of vessels (vessel size, homeport, etc.) accounting for majority of landings also stable

> Decline in active fleet largely due to decline in vessels making small landings

### Absolute Concentration of Landings, 1996-2007




### Relative Concentration of Landings, 1996-2007



# Potential Capacity Reduction Approaches

| | *Limited Entry (LE) or Buyback* | *Indiv Fishery Quota (IFQ)* | *Permit Stacking* |
|---|---|---|---|
| *Who's in/ who's out* | > More stringent LE?<br>> Buyback criteria | Initial allocation criteria | More stringent LE? |
| *Need TAC?* | No | Yes | Yes |
| *Potential Vessel Ownership Issues* | Vessel transferability<br>Limits on # vessels owned<br>Owner on board<br>Grandfathering | | |
| *Potential Vessel Operation Issues* | *Other effort constraints (deal with "capital stuffing"):*<br>> Transferability constraints among vessels of diff sizes<br>> Limits on traps/trap certificates (tiering, transferability)<br>> Haul freq limits per vessel<br>> Day/night fishing restrictions (may be redundant if have haul limits) | *IFQ conditions:*<br>> Transferability<br>> Overages/underages<br>> Vessel limits | *Duration of vessel landing limits:*<br>> Trip<br>> Season<br>*Conditions:*<br>> Tiering<br>> Stacking |

| *Capacity Reduction Approaches* | *Some Major Features* |
|---|---|
| Individual fishery quotas | Reduces incentive to race for fish.<br>Economic benefits to remaining vessels & crew.<br>Focus on maximizing economic value of quota share.<br>Requires TAC.<br>Management tends to be complex and costly.<br>Sensitivities associated with holding/trading fishery output (as a public good). |
| Limited entry or buyback | Does not reduce incentive to race for fish.<br>Short-term economic benefits to remaining vessels & crew.<br>Long-term economic benefits depend on ability to minimize “capital stuffing”.<br>Does not require TAC. |
| Permit stacking | Can have effects similar to IFQs except: less complex/costly, less flexible.<br>Requires TAC. |

# Fleet Reduction Via Industry/Government Funded Buyback

*Potential Benefits*

- Facilitates vessel exit.
- Buyback can be tied to prohibitions on reuse/resale of exiting vessels/gear/permits to prevent spillover to fisheries.
  - > Reuse/resale prohibitions require higher buyback price.
  - > If industry-funded: possibility of sharing buyback costs with participants in spillover fisheries.

*Potential Challenges*

- Design of buyback (e.g., favoring low vs. high bids) has important implications.
- Exiting vessel owner may use buyback $ to finance purchase of another vessel – worsen capacity problem if new vessel more efficient than old.
- Bought-out vessels may have exited anyway – buyback merely accelerates departure.
- Increases demand for vessels → buyback participants may get higher price than would have received in absence of buyback.
- Industry-funded buyback requires industry leadership and ability to forge consensus.
- Buyback sponsor (whether industry or government) must be convinced that benefits exceed costs.

# Evaluating Options …

- Need for clear and transparent management objectives
  > Clear vision regarding desirable features of fishery and fleet (e.g., static/flexible, homogeneous/diverse, geographic distribution)
  > Harvest capacity goal

- Some objectives may only be achievable at expense of others

- Biological sustainability a necessary but not sufficient condition for economic sustainability
  > Is 3-S an adequate alternative to TAC?
  > Some capacity management measures require a TAC

- Need for realistic expectations
  > What resources are available for assessment, management, monitoring, enforcement, buyback?
  > What other factors affect ability to address issue (e.g., effect of holiday demand on concentration of effort early in season)

- All capacity management approaches (including the status quo) have direct/ indirect distributional consequences
  > Inaction represents a choice

- Careful deliberation needed to ensure effectiveness of management recommendations and minimize unintended consequences

# Information That Can Contribute To Deliberations

- Landings receipts
  > Vessel-level activity – crab volume/revenue, participation in other fisheries, seasonal landings pattern, port(s) of landing
  > Mean, median, maximum landings per trip
  > # vessels qualifying for LE or initial IFQ allocation (if based on historical participation)
  > Landings distribution among vessels

- Permit data
  > Distribution of vessel activity by vessel size class, vessel port/state of residence, etc.
  > # owners of multiple vessels

- Vessel-level trap usage data unavailable (no logbooks)
  > Trap limit experiences in OR & WA
  > Dewees et al (2004): ~300 traps/vessel
  > Implement trap limits on "trial" basis?

- Examples of other relevant information
  > WA buyback proposal
  > Studies of crab fishery (e.g., Dewees et al 2004, Hackett et al 2004)

# Need for “management recommendations” by Jan 15, 2010

- Existing landings receipt & permit data, industry knowledge, and experiences in other states can be used to inform management recommendations.
- Given complexity of capacity reduction approaches, difficult to have final detailed recommendations by deadline.
- Determine which broad approach(es) - IFQs, limited entry, industry/government funded buyback - warrant further consideration. Then evaluate potential features of each such approach.
- Develop mechanism and timeline for implementing preferred approach that provide opportunity for trial periods, interim evaluations , etc. before final implementation.