



NOAA's National Marine Fisheries Service
Southwest Regional Office- Habitat Conservation Division

2008 San Diego Bay Eelgrass Inventory and Bathymetry Update

San Diego Unified Port District
Environmental Advisory Committee
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Background

- Eelgrass (*Zostera marina*) is a marine plant typically found in soft-bottom bays and estuaries (Ranges from Baja to AK)
- Plays an important ecological role via biological/physical benefits
 - nursery habitat for commercial/recreational fish (predation refuge and food source)
 - trapping sediment and clarifying water
 - highest primary production of any nearshore marine ecosystem
 - fed on directly by birds, fish and inverts
 - supports epiphytic organisms fed on by others
- Valuable tool in examining long-term trends in ecosystem health due to its location at watershed/coast interface and adaptability to a wide range of stressors





Eelgrass Surveys

- Primarily a subtidal habitat and difficult to monitor
- First comprehensive eelgrass survey in SD Bay was completed by Navy in 1993 (sidescan sonar with divers for ground truthing)
- Navy and SD Unified Port District performed another baywide survey in 1999 using single beam sonar
- In 2004, Merkel & Associates performed both eelgrass and bathymetric survey using sidescan and single-beam sonar
- Most recent 2008 survey is a continuation of these efforts to illustrate long-term trends

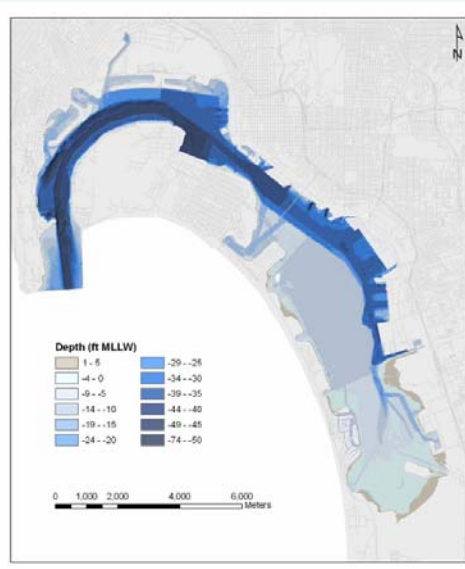


Methods

- Equipment
 - Digital sidescan sonar system (600 kHz); overlapping 40m swaths
 - Pole-mounted single-beam echosounder system
 - Differential GPS used for navigation
 - Fathometer (50 kHz) for bathymetric data
- Data collected over 31 survey days by Merkel & Associates
- Sidescan data were post-processed into geo-rectified mosaic images covering the bay
- Images imported into GIS and eelgrass bed boundaries digitized based on acoustic signatures of eelgrass
- Ground-truthing performed by divers (also video spot checks and low-tide surface inspections)



Results - Bathymetry



- Bay characterized by historic dredging and filling activities
- Most of the bay < 50 ft. MLLW
- Main navigation channel (to -50) extends to aircraft carrier turning basin, then steps up going south
- North and Central dredged for navigation
- South-Central dredged to a relatively flat -11 ft. MLLW
- Far South end retains much of its historic shallow bathymetry



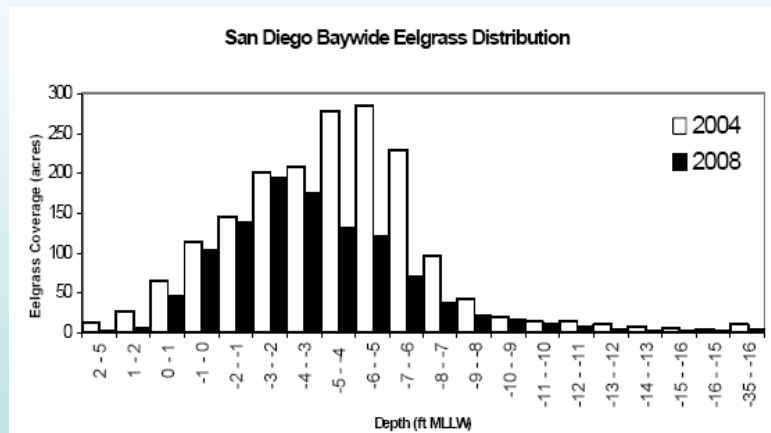
Results - Eelgrass



- 2008 survey followed similar pattern observed in prior years (~ 1,319 acres)
- Ranged in depth mainly from +1 to -8 ft MLLW (broad-leaved beds near mouth > -12 ft)
- Greatest extent found within the shallow southern ecoregion (large areas < -6 ft)
- Extensive beds along shallow, gradually sloping soft shoreline of western Bay
- Smaller beds scattered throughout shallow, developed regions of bay w/ sufficient light
- Also prevalent near Bay mouth



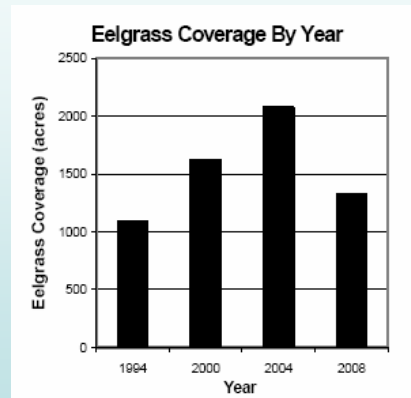
Results – Eelgrass (Cont'd)



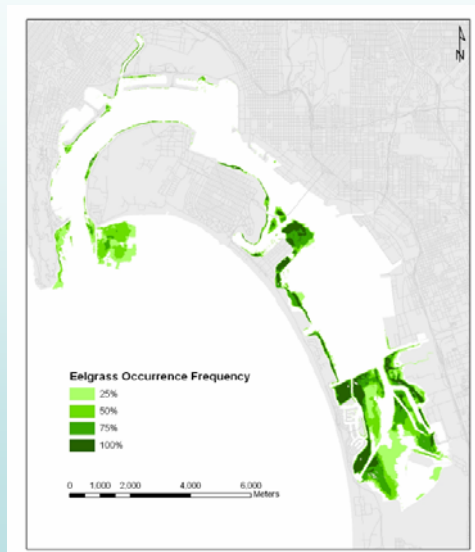
Results – Eelgrass (Cont'd)

Long-term comparisons show:

- 1993-99 An expansion of 572 acres (54%) from 1,061 to 1,634 acres
- 1999-04 Increase of 441 acres (27%) from 1,634 to 2,078 acres
- 2004-08 Declined from 2,078 to 1,319 acres (37%)
- Hopeful this recent decline is transitory as there are signs of recovery
- Eelgrass appears to be expanding in recent decades due to improved water quality and restoration efforts
- Important to continue these studies to understand the normal patterns of eelgrass distribution within the Bay



Results – Eelgrass (Cont'd)



Eelgrass occurrence frequency for the baywide survey years 1993, 1999, 2004, 2008



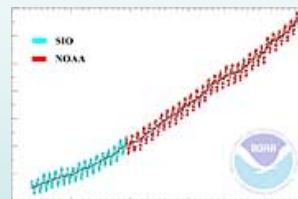
Regulatory Authority and Guidelines

- As a submerged aquatic habitat, eelgrass is given special status under the Clean Water Act, 1972 Section 404(b)(1), “Guidelines for Specification of Disposal Sites for Dredged or Fill Material”, Subpart E, “Potential Impacts on Special Aquatic Sites.”
- This special status has led to many mitigation efforts implemented under the Southern California Eelgrass Mitigation Policy (SCEMP), which have successfully established eelgrass beds within the Bay
- SCEMP—standardized, inter-agency (NMFS, USFWS, CDFG) guidelines adopted '91, incl. mapping req's, for avoiding/mitigating adverse impacts (http://swr.nmfs.noaa.gov/hcd/policies/EELPOLrev11_final.pdf)
- Resource managers need to consider that areas lacking eelgrass during one survey year may have it at another time
- Not all beds provide the same consistency in habitat values through time
- Need to consider these issues when evaluating land-use projects



Going Forward

- Continue this baywide monitoring program
- Supplement the low-frequency baywide surveys with high-frequency annual or quarterly surveys to estimate eelgrass changes in the interim
- Climate Change - “The Wild Card”
 - Increased Temperatures affecting eelgrass abundance and distribution?
 - Increased frequency and intensity of El Niño events
 - Sea level rise limiting shallow sub-tidal and mudflat regions within the Bay suitable for eelgrass – general loss of fringe habitat?
 - Other?



Record of CO₂ measurements at Mauna Lao, HI (1957-2004)

