Ecologically-Based Mooring Feasibility and Planning Study Richardson's Bay Regional Agency

Issue: Moorings and Vessel Activities in Richardson's Bay Are Impacting Valuable Ecological Resources – Principally Eelgrass

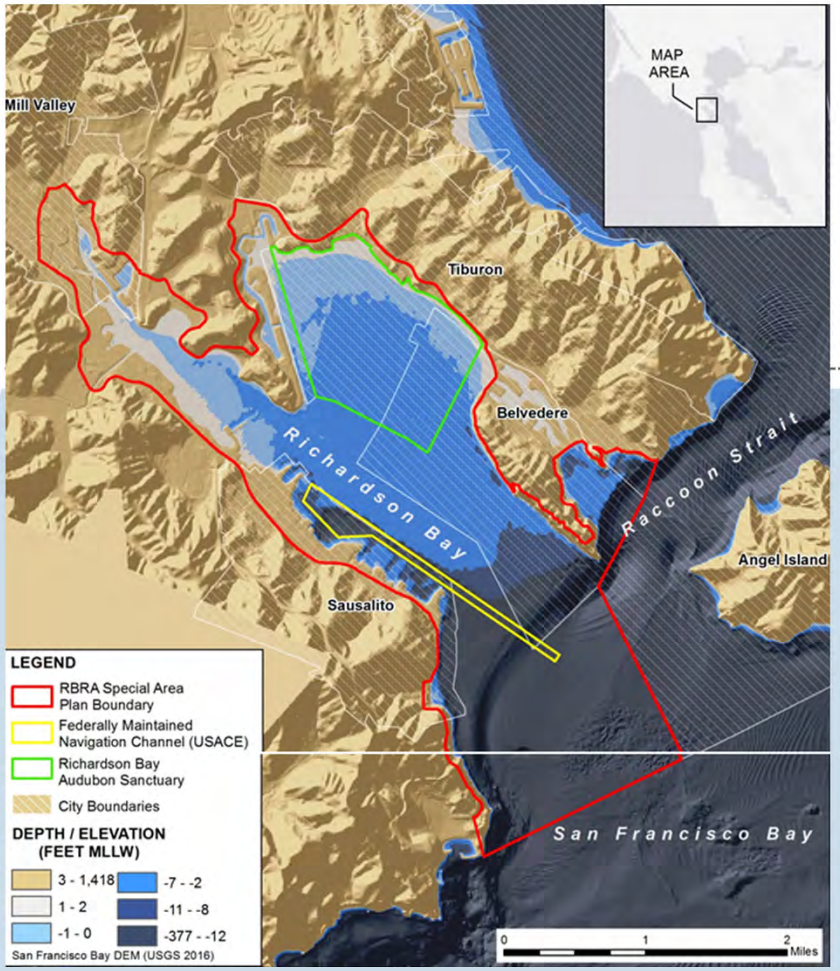
Planning Study Area

AREAS OF STUDY

- RBRA ADMINISTERED WATERS
- SAUSALITO WATERS
- BELVEDERE COVE

AREAS EXCLUDED

- SHALLOWS OF MILL VALLEY
- WATERS OF RACCOON STRAIT
- RB AUDUBON SANCTUARY
- FEDERAL NAVIGATION CHANNEL



Study Purpose

- IDENTIFY ECOLOGICAL CONFLICTS WITH MOORINGS
- QUANTIFY IMPACTS WHERE PRACTICAL
- ASSESS POTENTIAL MEANS TO REDUCED IMPACT LEVELS
- EVALUATE FEASIBILITY OF RETAINING MOORINGS
- ASSESS CARRYING CAPACITY OF MOORINGS
- MAKE RECOMMENDATIONS ON MEANS TO RESOLVE CONFLICTS
- PROVIDE SCIENTIFIC/TECHNICAL INPUT TO DECISION MAKERS

Recommendation Guidelines

- STUDY RECOMMENDATIONS SHOULD BE VIABLE
  - Must be safe
  - Must be fundable and sustainable
  - Must be permittable
  - Must be manageable and enforceable long-term
  - Must accommodate transition
  - Must be widely acceptable

NOT the Study Purpose

- LANDSIDE SUPPORT FACILITIES FOR MOORINGS
- SOCIAL AND SOCIAL JUSTICE ISSUES
- POLICY ISSUES RELATED TO MOORINGS

Additional Steps

- AGENCIES AND PUBLIC CONSIDERATION OF STUDY RESULTS
- AGENCY FORMULATION OF A PROJECT
- PROJECT DESIGN AND MANAGEMENT PLAN DEVELOPMENT
  - Moorings or no moorings
  - Moorings - how many, what size, and configurations
  - Management and operational and enforcement plan
  - Financing plan (capital and operational funding)
  - Transition or phasing plan
- FUNDING STRATEGY AND SECURE FUNDING
- ENVIRONMENTAL REVIEW AND PERMITTING

Data Collection Approach

- REVIEW EXISTING DATA ON ECOLOGICAL RESOURCES
- COLLECT NEW EELGRASS AND BATHYMETRIC DATA
- REVIEW MOORINGS DISTRIBUTION THROUGH TIME
- COLLECT ADDITIONAL INFORMATION THROUGH INTERVIEWS

Data Analysis Approach

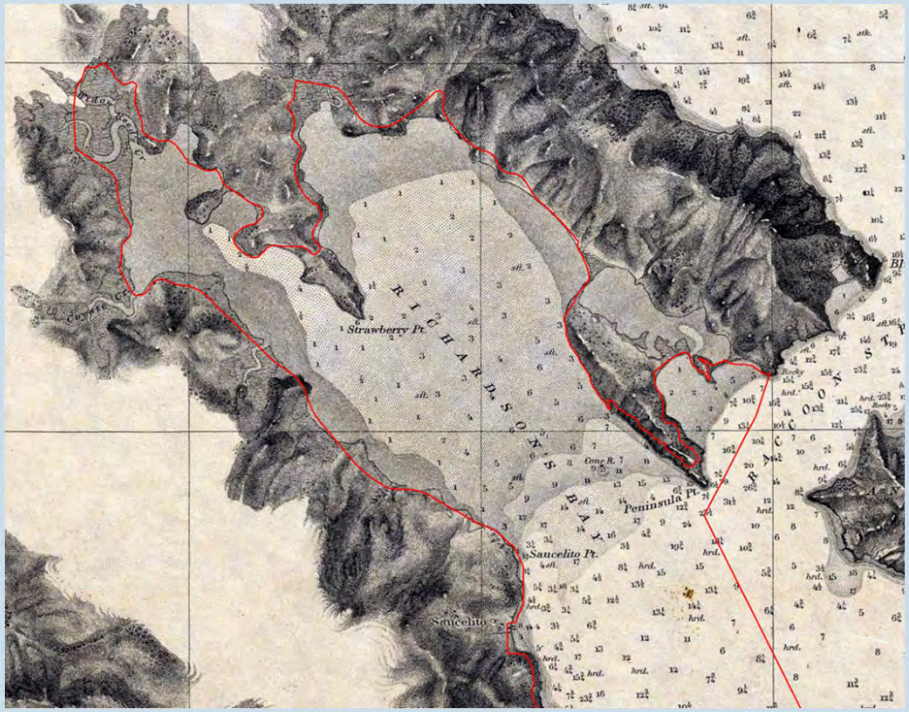
- PREPARE SPATIAL DATA FOR ECOLOGICAL RESOURCES
- PREPARE SPATIAL DATA FOR CONSTRAINING FACTORS
- SUMMARIZE CONDITIONS THROUGH TIME AND TODAY
- PREPARE A SPATIAL MODEL OF MOORING SUITABILITY

Data Summary Approach

- DETERMINE IF RETAINING MOORINGS IS FEASIBLE
- IDENTIFY CAPACITY OF BAY FOR MOORINGS
- MAKE RECOMMENDATIONS FOR A PATH FORWARD

Bay Bathymetry

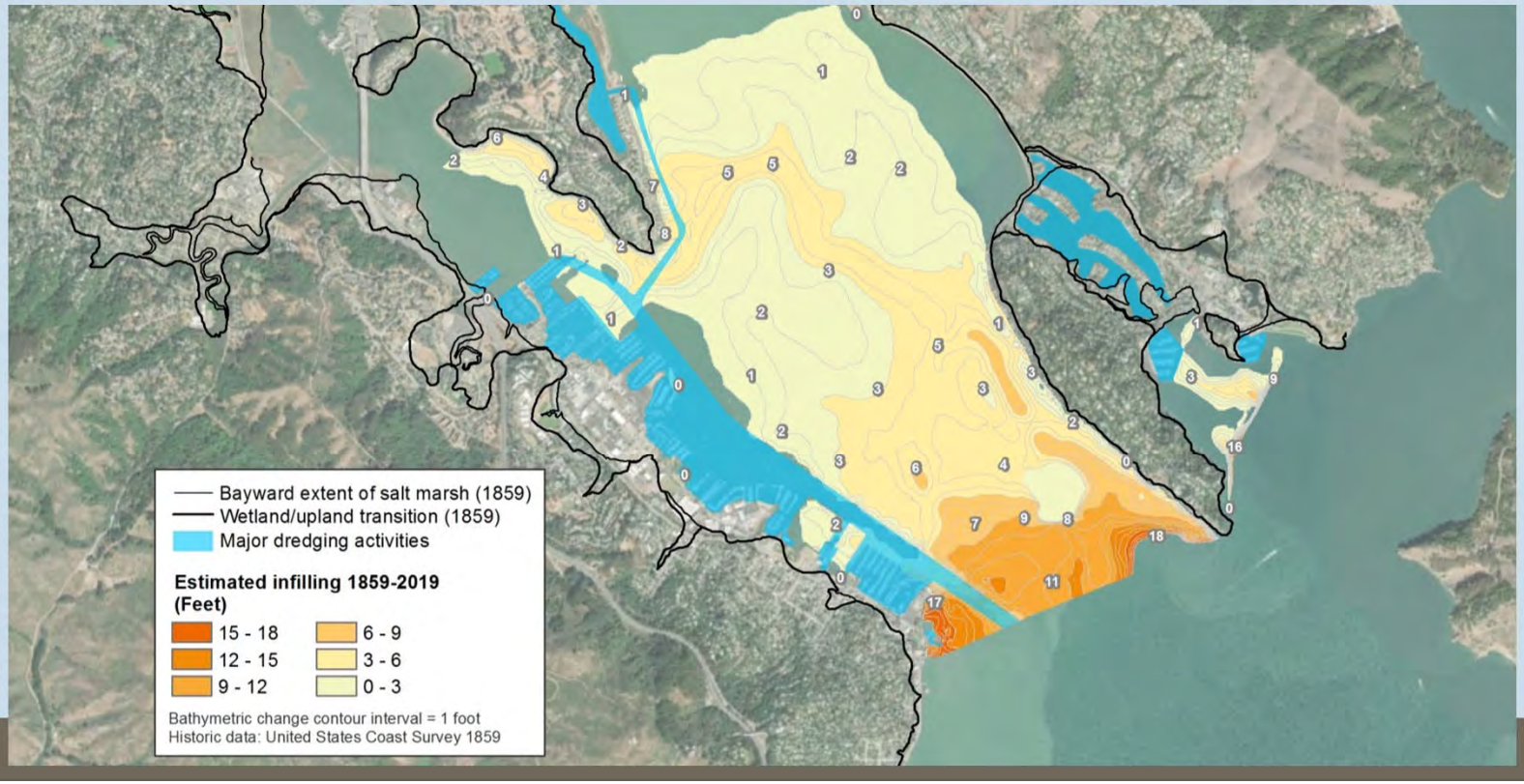
1859



2019

Change in Bathymetry (1859-2019)

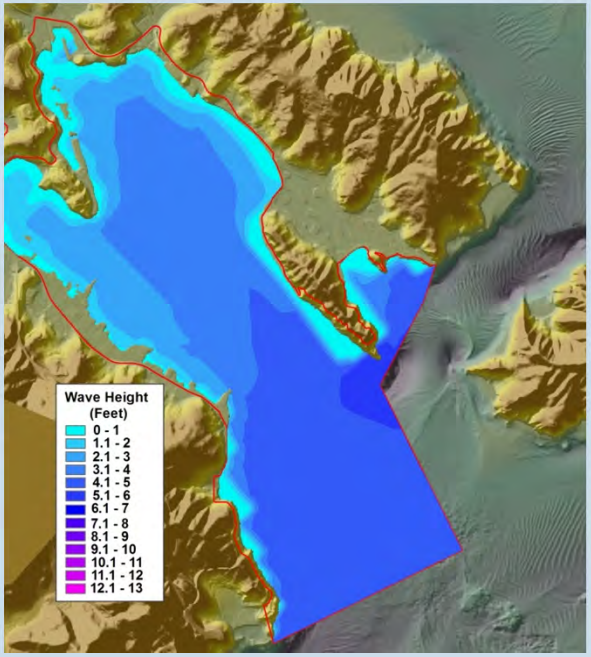
- AVERAGE OF 0.15 INCH/YEAR



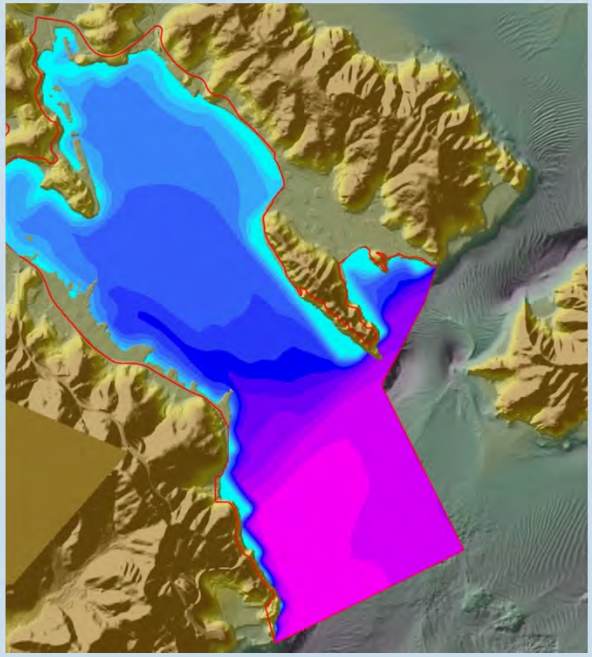
Wave Climate OCOF USGS Modeling

1-YEAR MAXIMUM WAVE

20-YEAR MAXIMUM WAVE

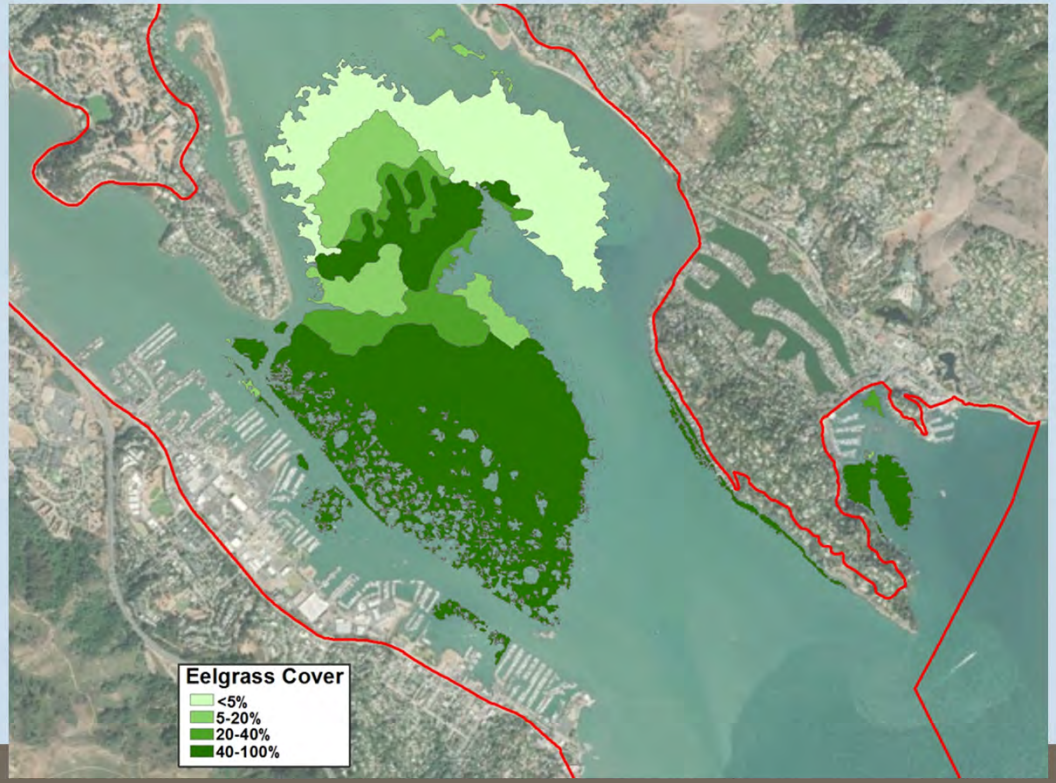


100-YEAR MAXIMUM WAVE

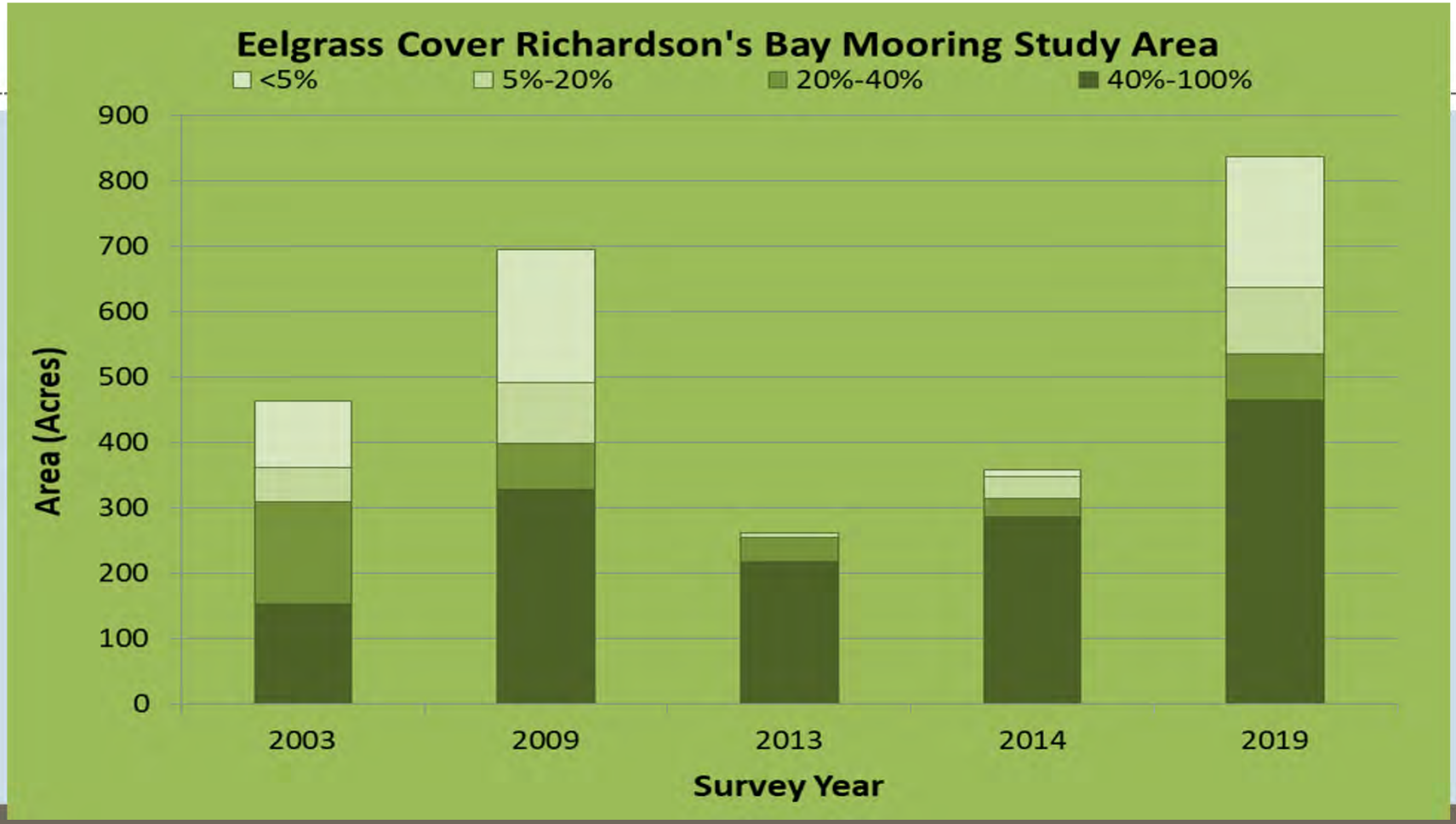


2019 Eelgrass in Richardson's Bay

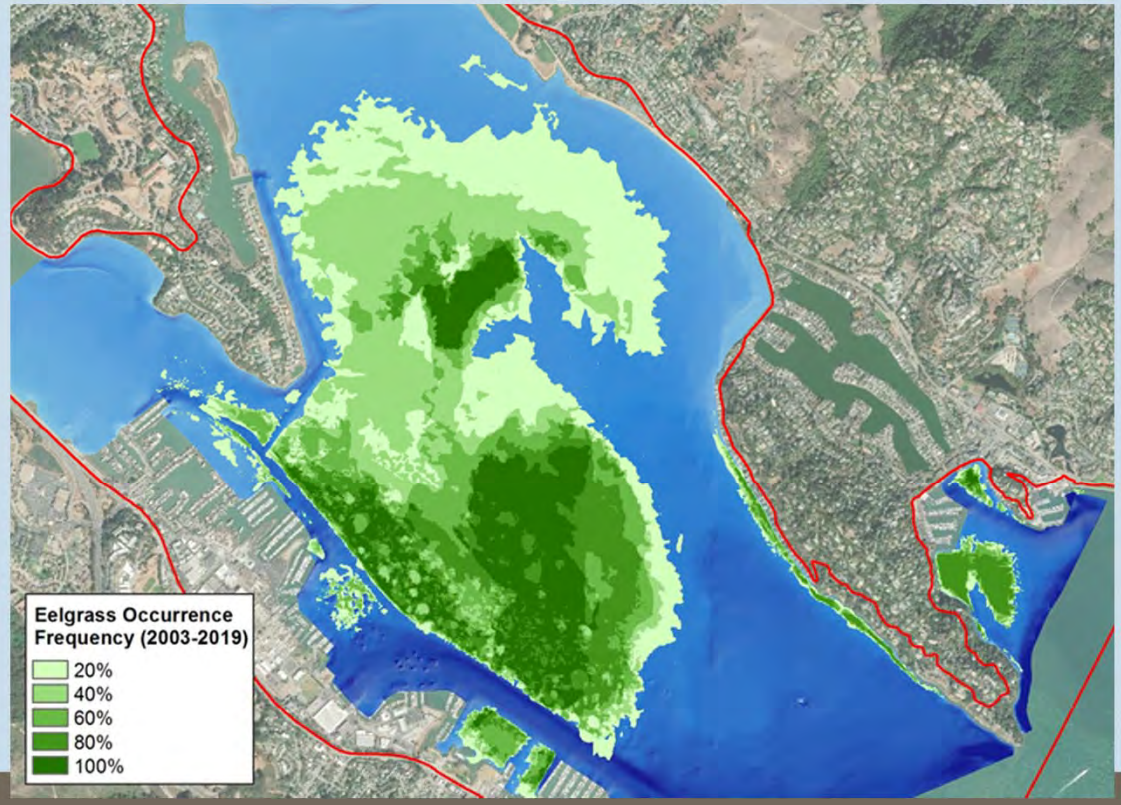
- 837.3 ACRES (JUNE-JULY 2019)



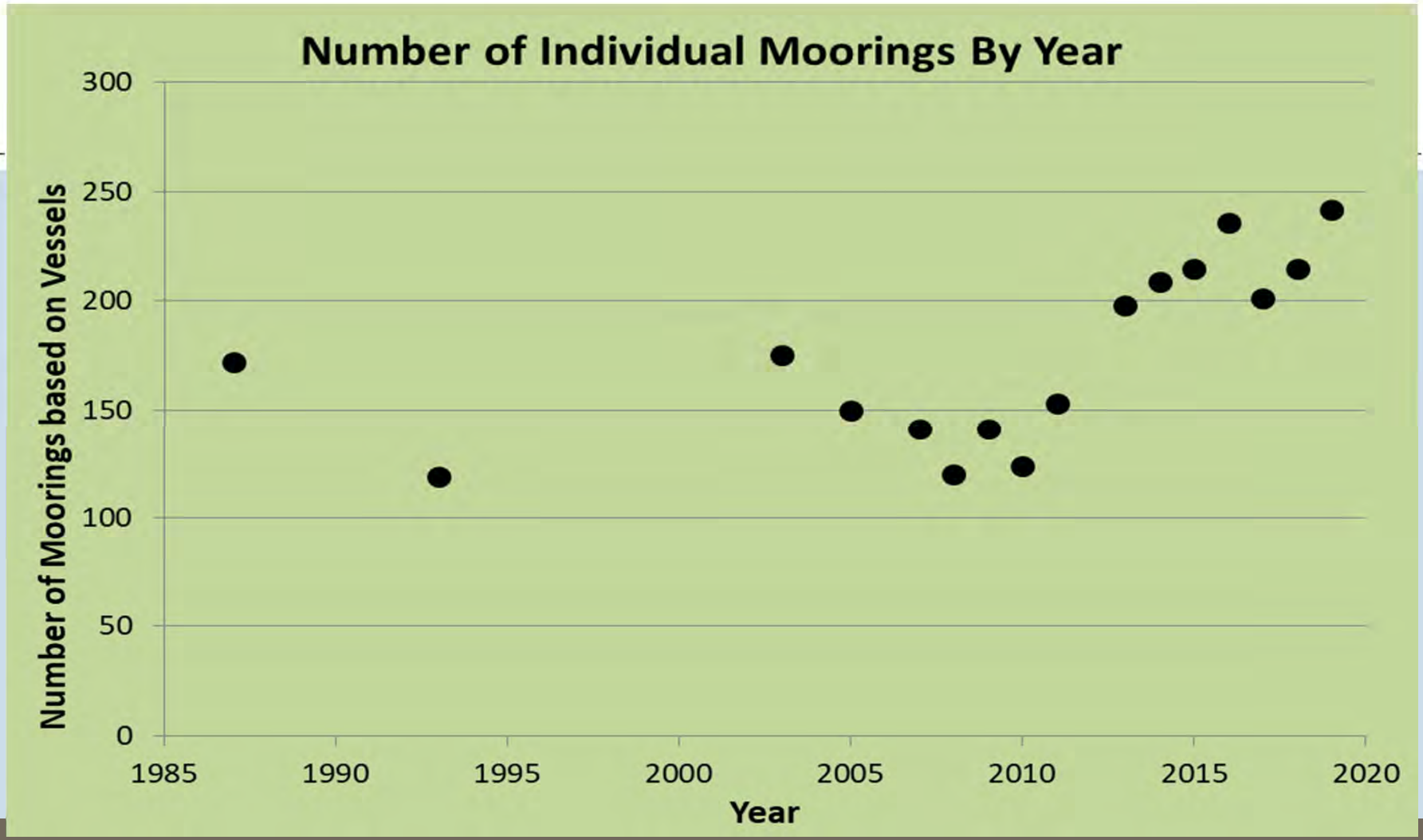
Eelgrass History in Richardson's Bay



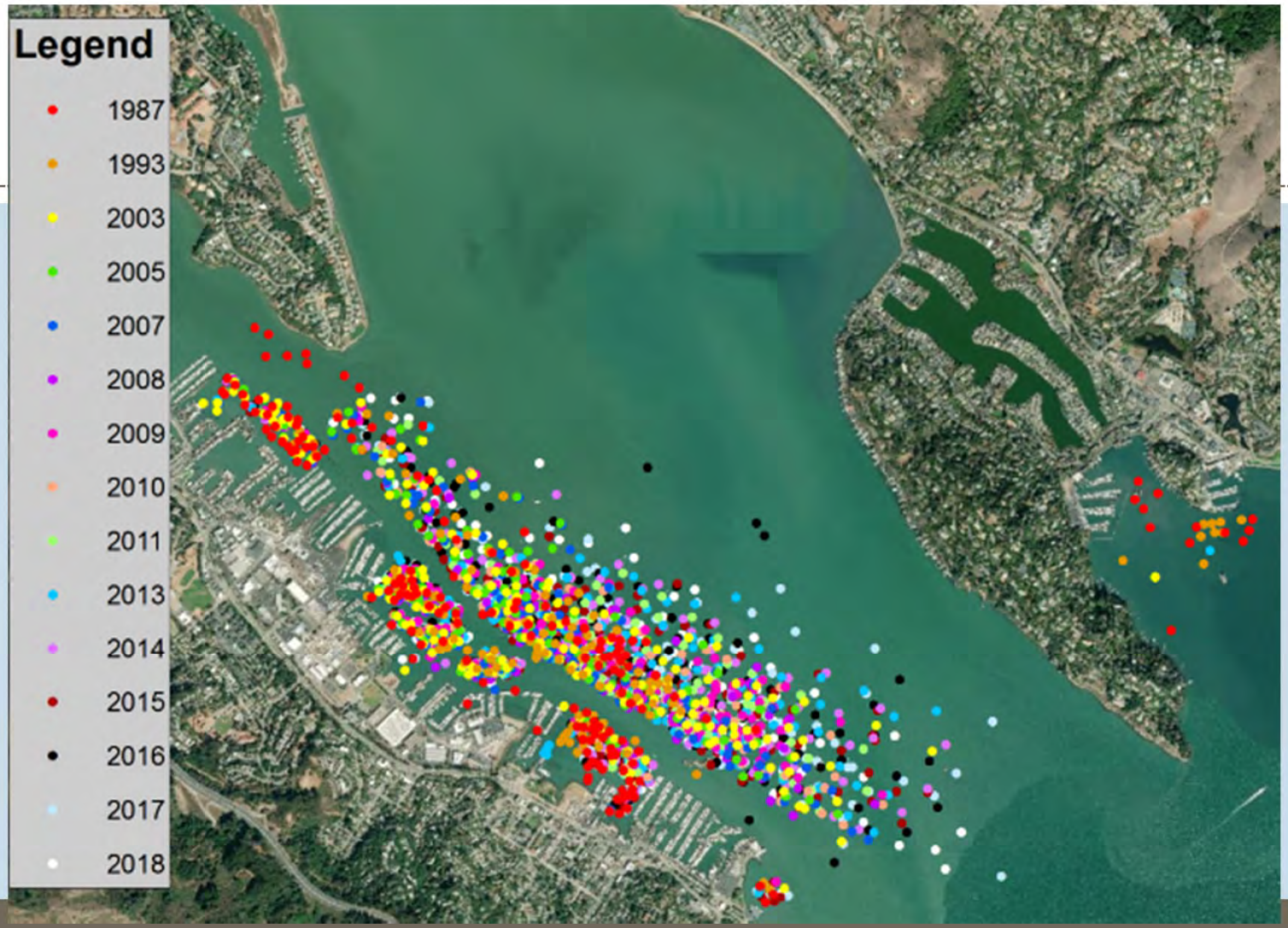
Eelgrass Frequency Distribution (2003-2019)



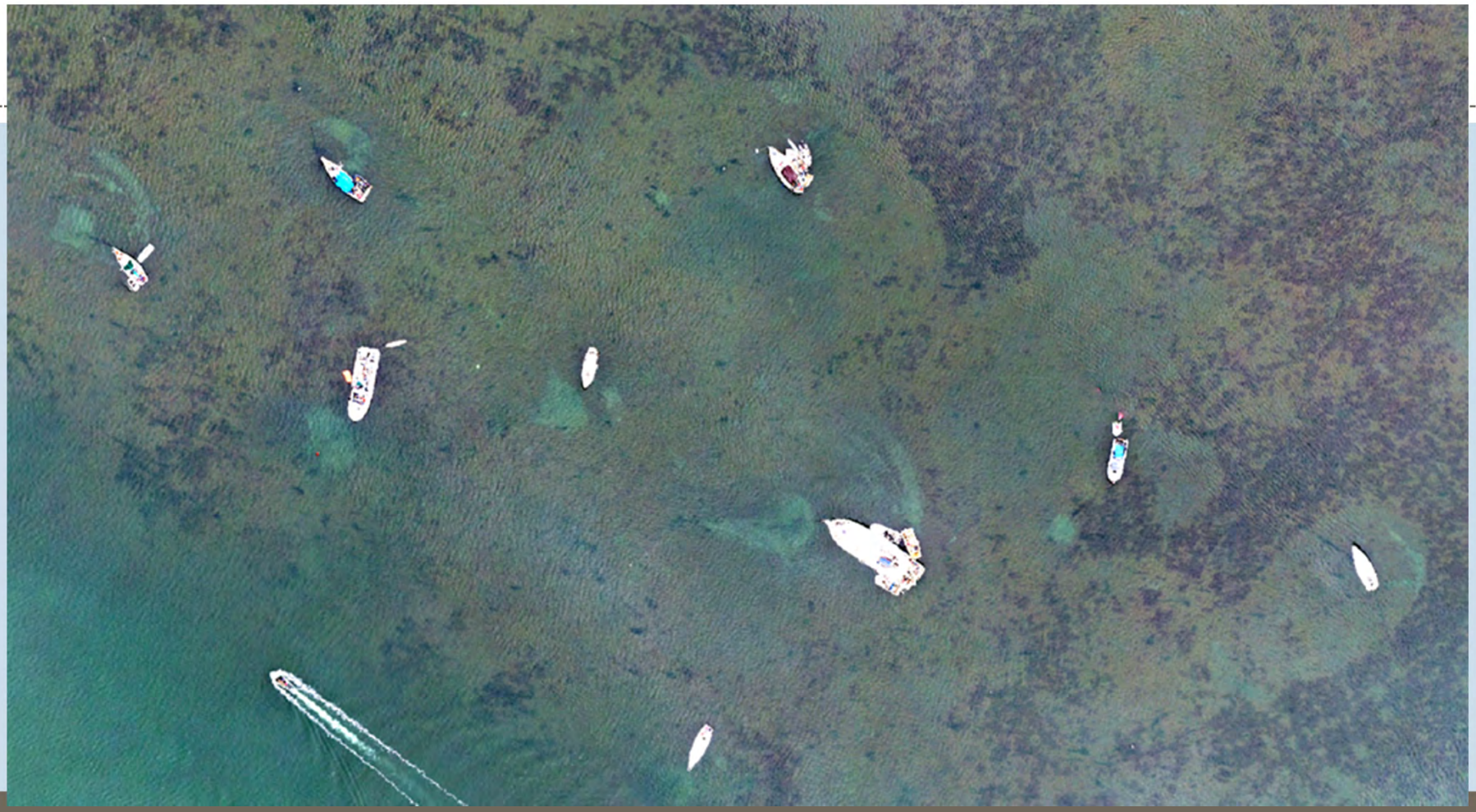
Changes in Mooring Count Over Time



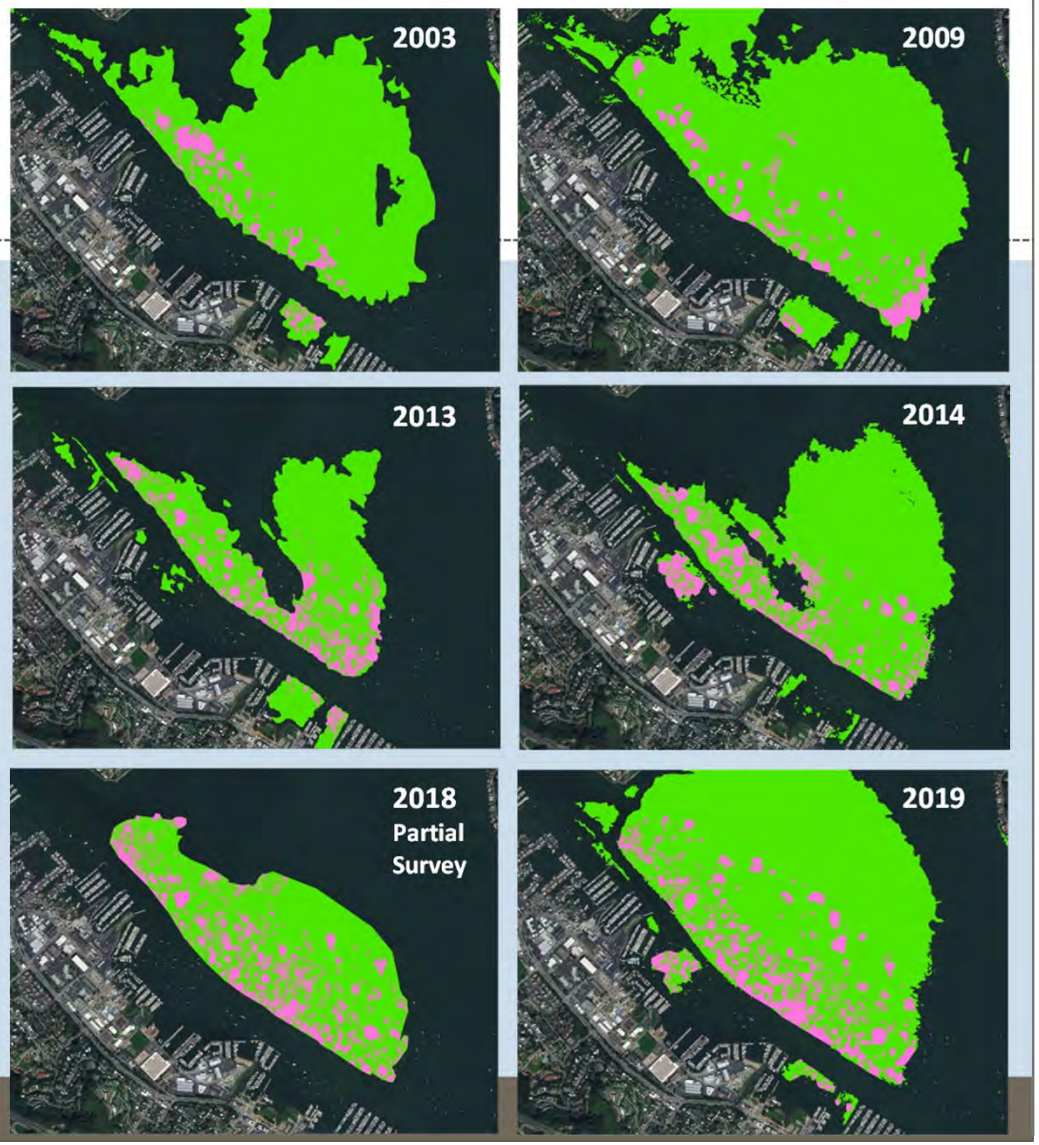
Mooring Distribution (1987-2018)



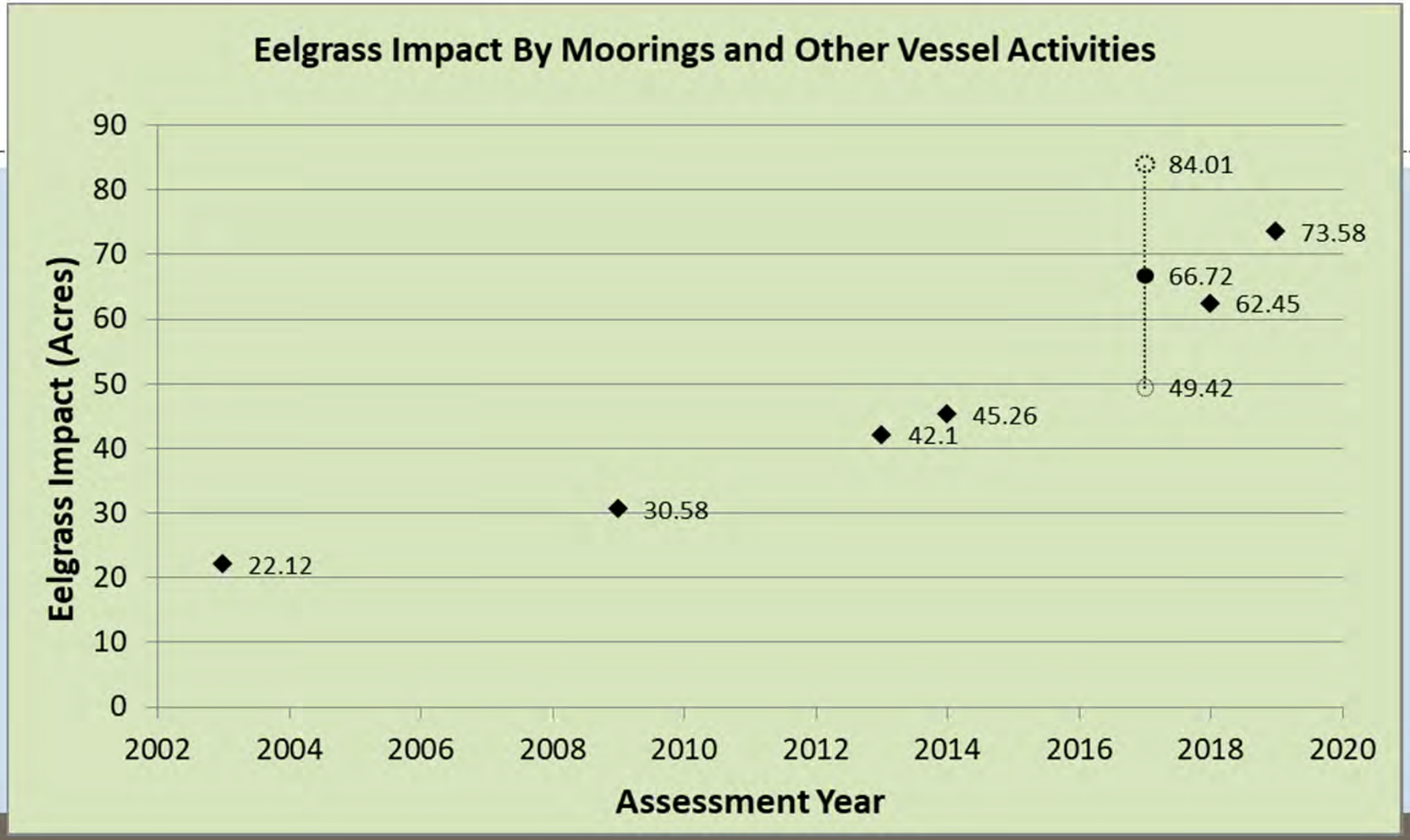
Eelgrass Damage from Moorings and Vessels



Eelgrass Damage from Moorings and Vessels (2003-2019)

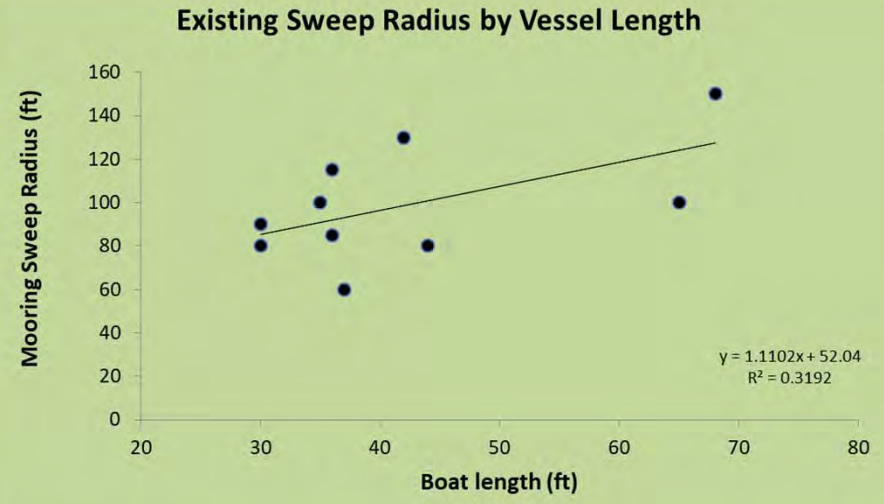


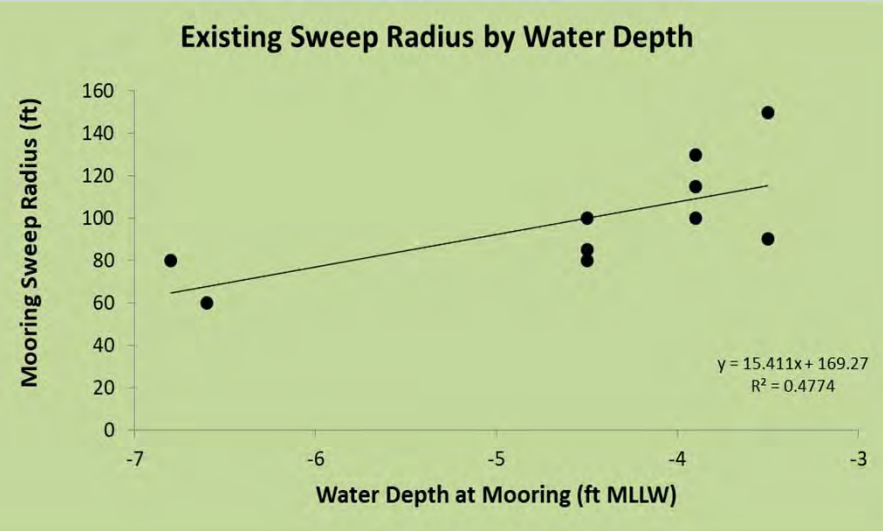
Eelgrass Damage from Moorings and Vessels



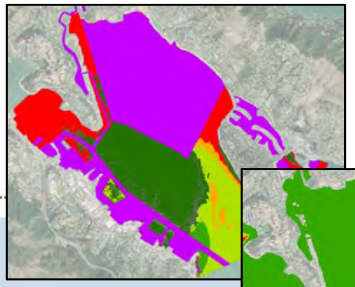
Existing Moorings in Eelgrass Beds

- SWEEP RADII DO NOT ALIGN WITH DEPTHS OR LENGTHS
- SINGLE POINT MOORINGS W/GROUND TACKLE DOMINATE
- TWIN ANCHOR MOORINGS ARE LESS COMMON
- TWIN ANCHORS LESS IMPACT THAN SINGLE POINT

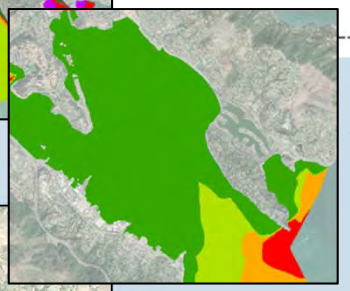




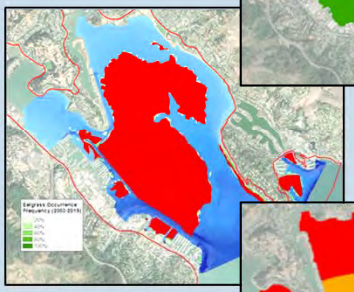
Ecological Impact Avoidance Model



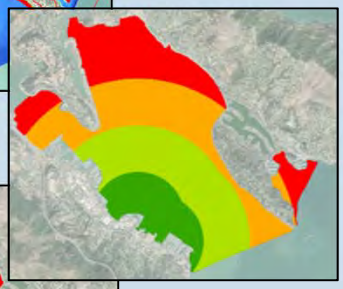
WATER USE



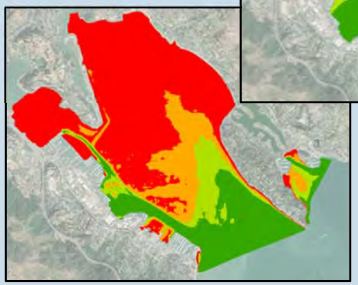
WAVES



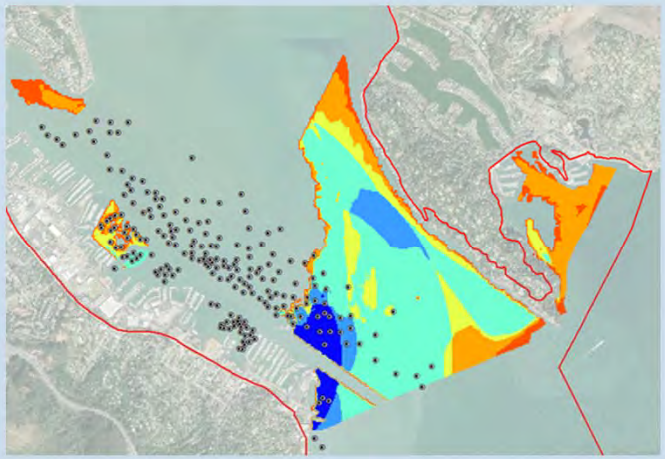
EELGRASS



DISTANCE



BATHYMETRY



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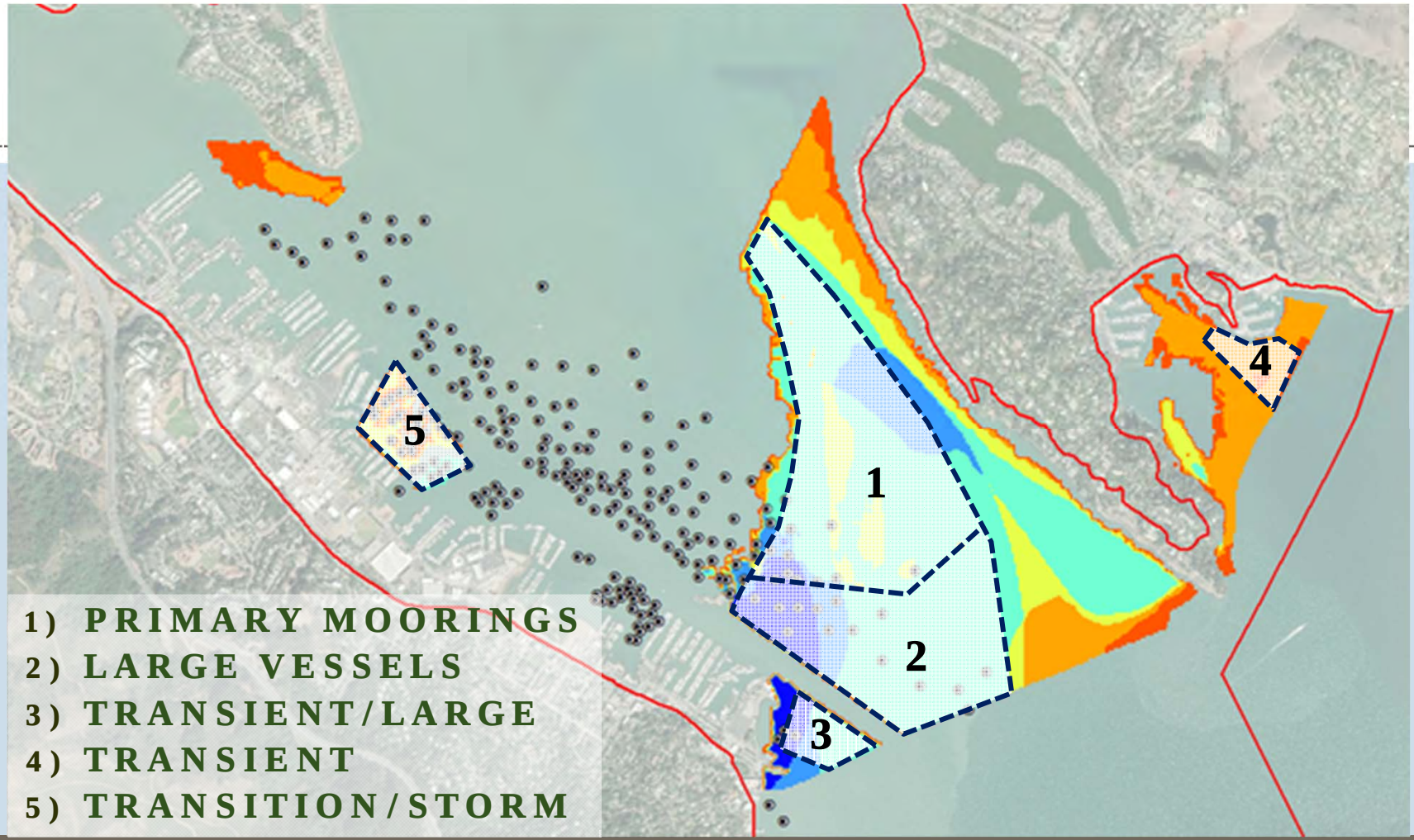
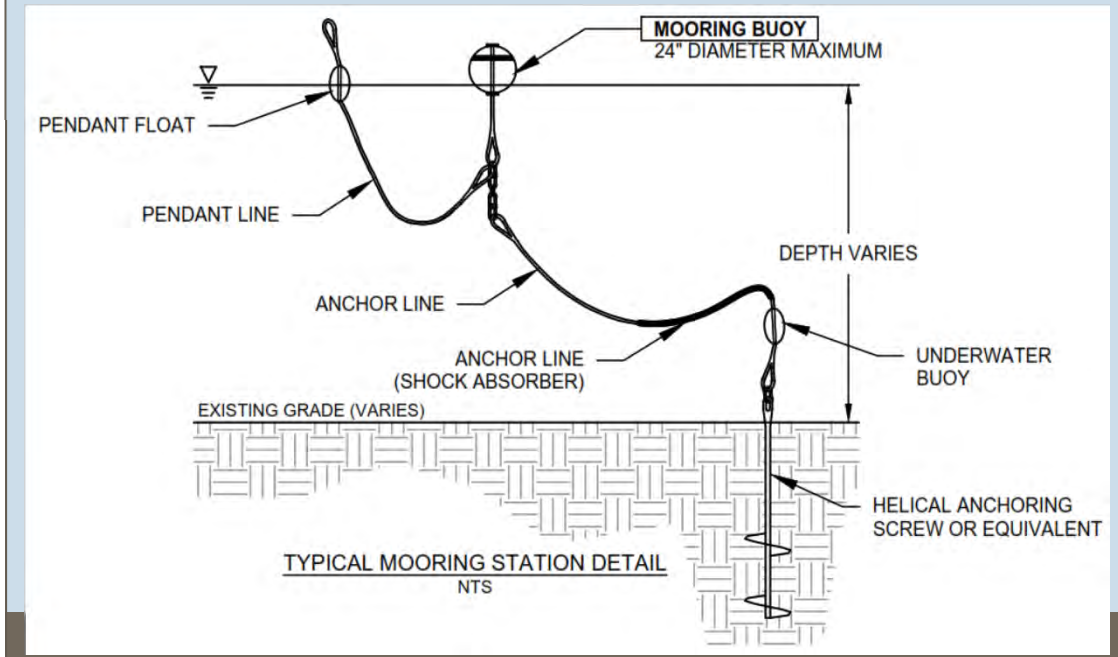
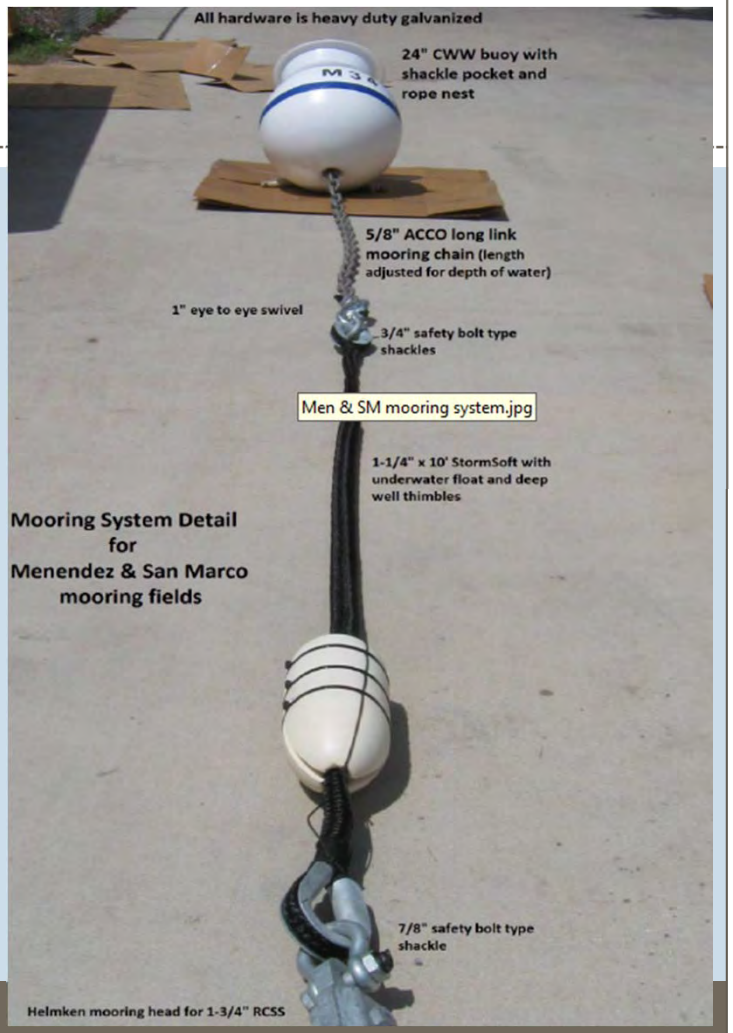


Conservation Moorings

TYPICAL CONFIGURATION





Conservation Moorings

BENEFITS

- TIGHTER PACKING RATIOS (SMALLER RADII)
- ELIMINATE GROUND TACKLE SCOUR IMPACTS
- IMPROVE RODE AND PENDANT ELASTICITY
- REDUCE POTENTIAL FOR CLEAT PULL-OUT
- REDUCE MAINTENANCE COST PER MOORING
- LESS MOBILE TACKLE

DRAWBACKS

- INITIAL CAPITAL COST
- LESS MOBILE TACKLE
- LIMITED SUPPLIERS
- LOW FAMILIARITY BY ANCHOR-OUTS

Conservation Moorings Tight Radii

Recommendations

- RELOCATE VESSELS OUT OF EELGRASS
- ELIMINATE NEW INFLUX OF VESSELS AND ANCHOR-OUTS
- REDUCE UNOCCUPIED VESSELS
- ONE RESIDENT, ONE VESSEL GOAL
- PUBLICLY OWNED CONSERVATION MOORINGS
- MOORING ADDRESSES AND VESSELS REGISTERED
- EFFECTIVE ENFORCEMENT
- REGULAR TACKLE INSPECTIONS
- COMMUNITY COLLABORATION RELIANCE/SUPPORT
- REVENUE GENERATION TO SUPPORT MAINTENANCE COSTS
- CAPITAL FUNDING –GRANTS OR MITIGATION FUNDS?