

Public Meeting

Development of Total Maximum Daily Loads (TMDLs) for Biostimulatory Substances in the Elkhorn Slough Watershed

November 29, 2016

Steven Saiz and Shanta Keeling

Central Coast Water Board TMDL Program



Today's Objectives

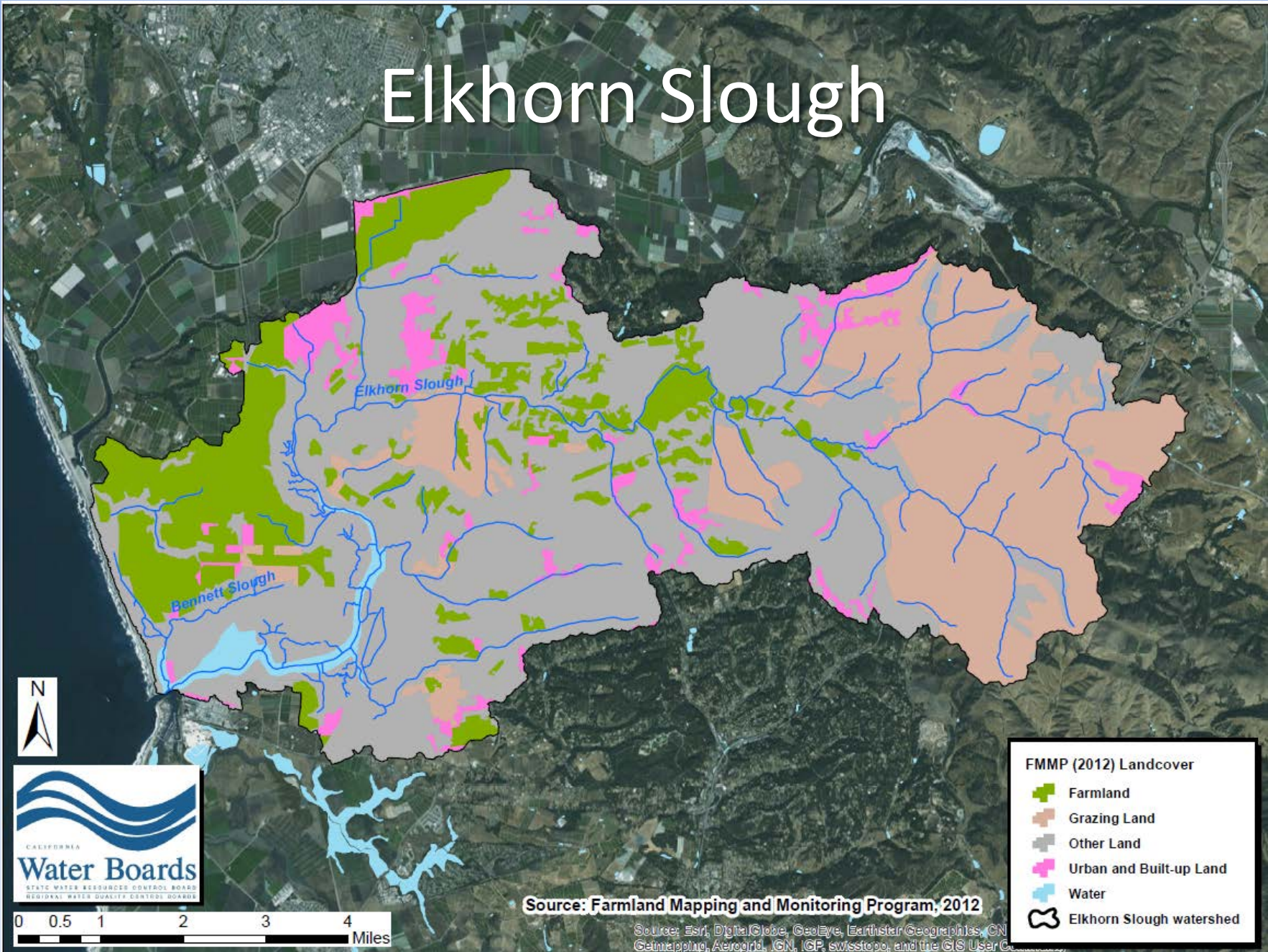
1. Status update on the TMDL Data Analysis Report.
2. Discussion of next steps for the TMDL.
3. Receive feedback, answer questions, engage in discussion about the project.

Reminder Why We're Here

- Exceedances of water quality standards in Elkhorn Slough, Moss Landing Harbor, Carneros Creek, and Bennett Slough.
 - Dissolved oxygen
 - pH
 - Un-ionized ammonia
 - Chlorophyll-a

In general, **biostimulation**

Elkhorn Slough



Source: Farmland Mapping and Monitoring Program, 2012

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNR, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Part 1. TMDL Data Analysis Report

- Data sources
- Pollutants analyzed
- Spatial trends
- Temporal trends

**Total Maximum Daily Loads for
Biostimulatory Substances
in the Elkhorn Slough Watershed**

Data Analysis Report

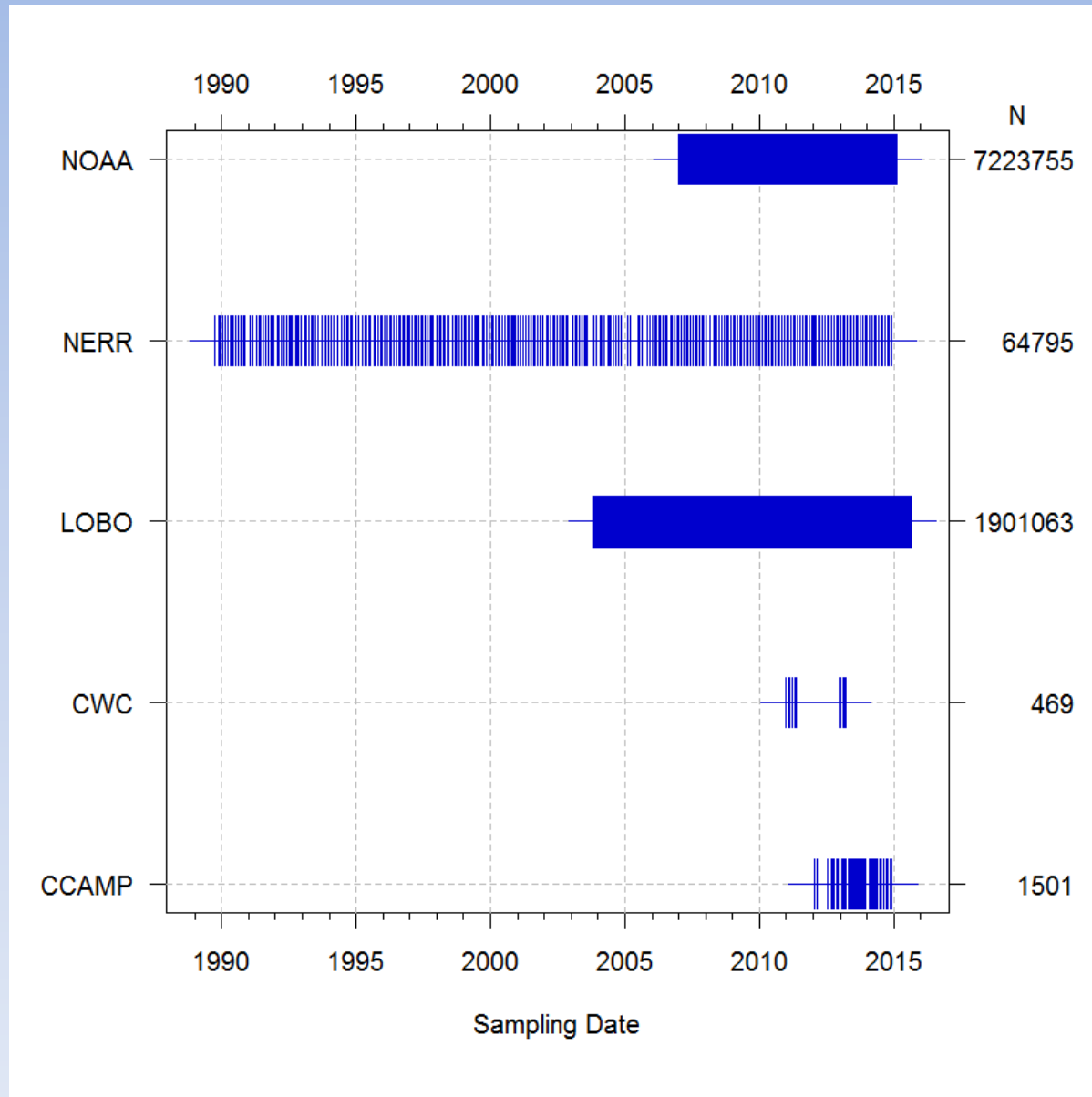


Draft September 26, 2016

**California Regional Water Quality Control Board
Central Coast Region
California Environmental Protection Agency**

Available on our website

Monitoring Data Sources





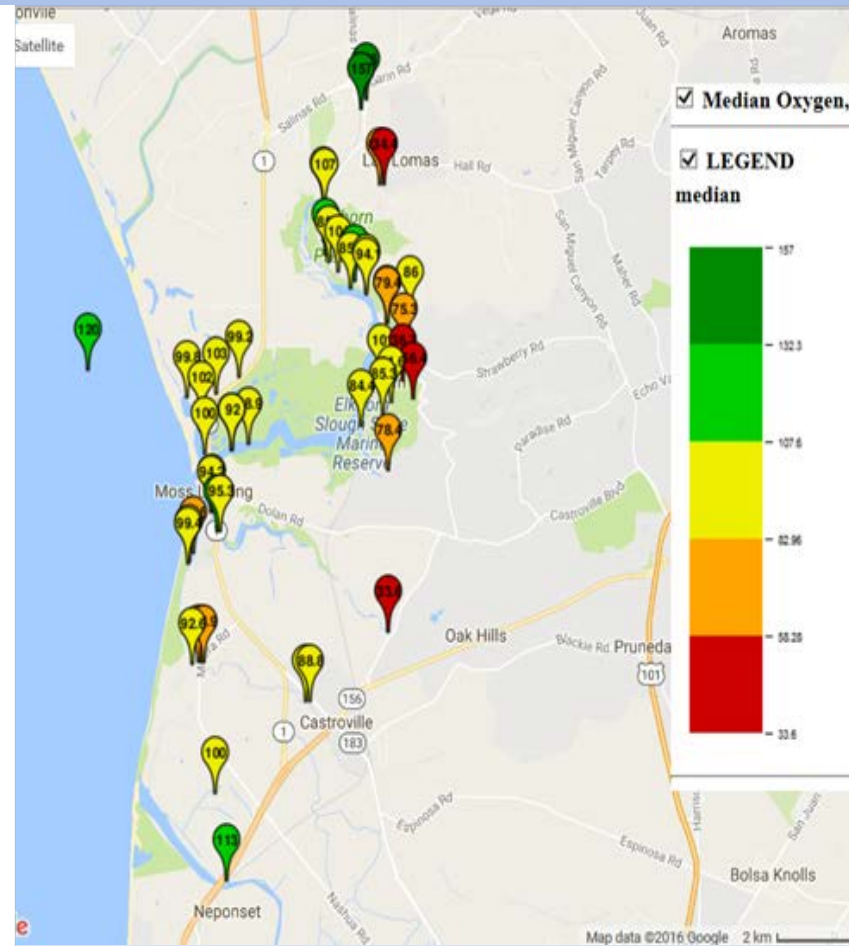
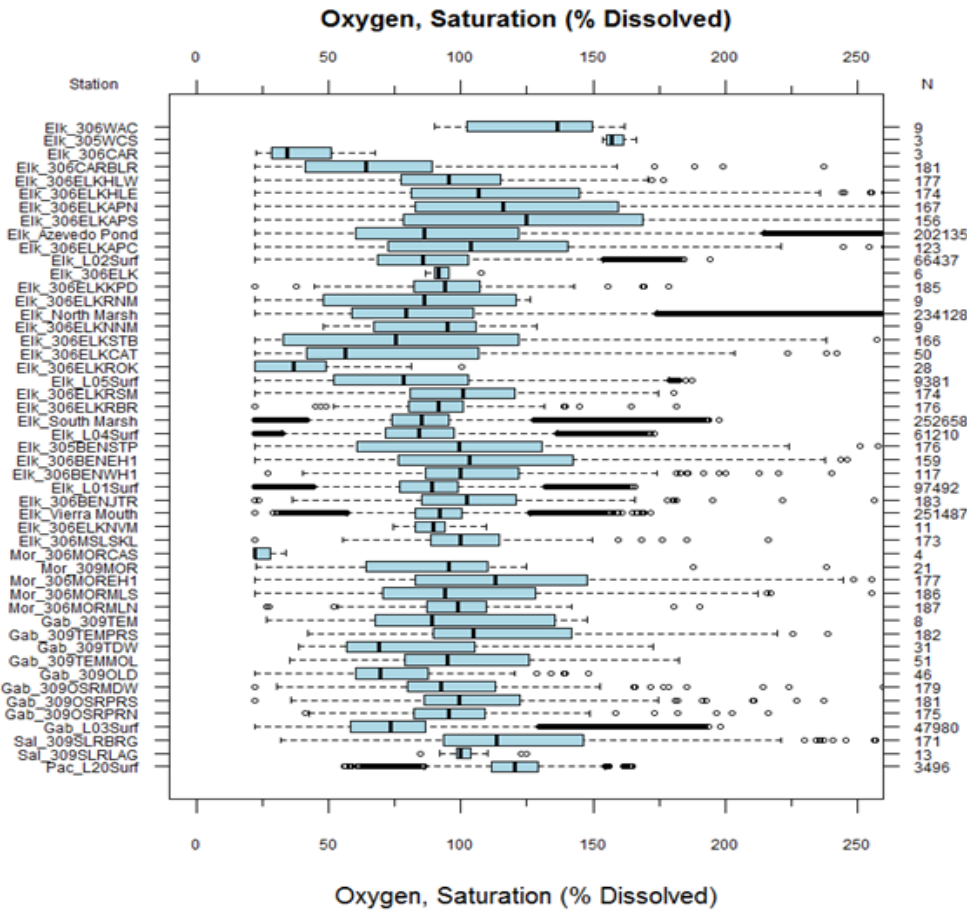
Analyte	Records Count
Temperature	1,391,552
Water Depth	1,236,410
Oxygen, Saturation	1,230,475
Oxygen, Dissolved	1,181,665
Salinity	1,147,518
Turbidity	964,962
pH	872,458
Specific Conductivity	806,389
Nitrate as N	290,955
Chlorophyll a	36,843
Orthophosphate as P	8,398
Ammonia (NH3) as N, Un-ionized	7,198
Ammonia (NH3+NH4) as N, Total	6,349
Nitrite as N	3,037
Nitrate + Nitrite as N	2,253
Ammonia (NH4) as N, Ionized	2,076
Floating Algae	1,579
Nitrogen, Total	1,300
Phosphorus as P	166

Spatial Trends


Descriptive statistics (*mean, interquartile range (IQR), minimum, 25th percentile, median, 75th percentile, maximum, sampling date range*).

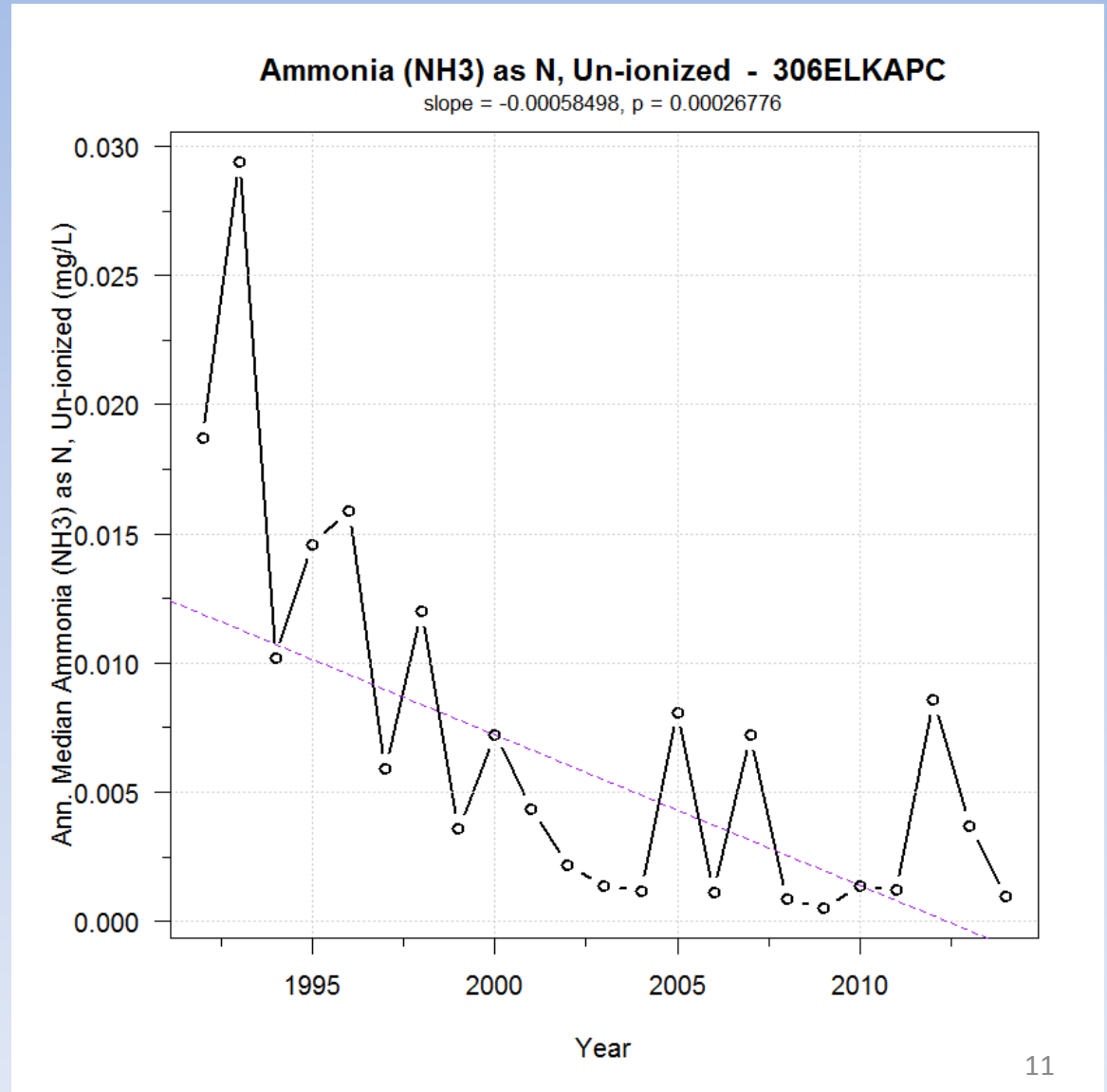
- By analyte.
- By analyte – monitoring station.
- By analyte – monitoring station – monitoring year.
- By analyte analyte – monitoring station – monitoring year/month.

Dissolved Oxygen Example



Long-term Trends

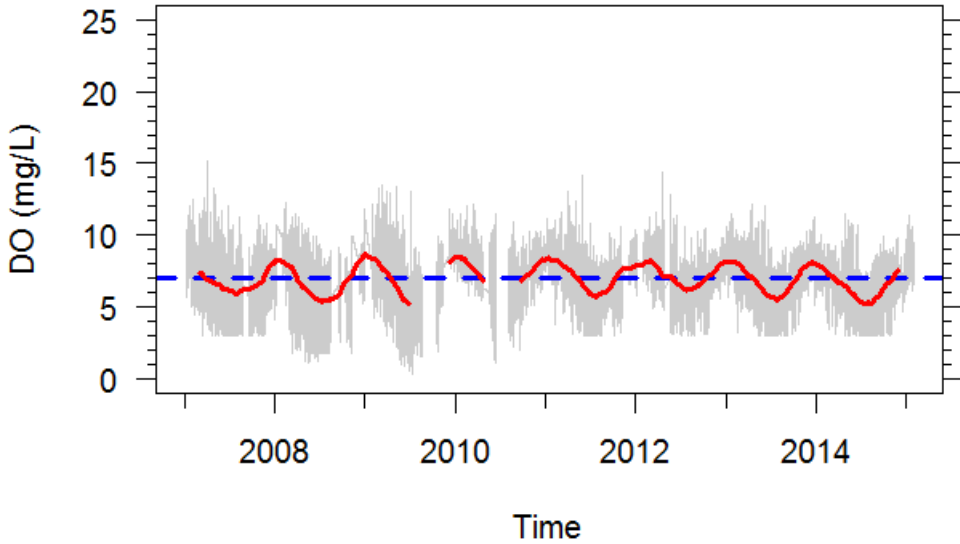
- 54 significantly increasing trends.
- 50 signif. decreasing trends.
- Example 



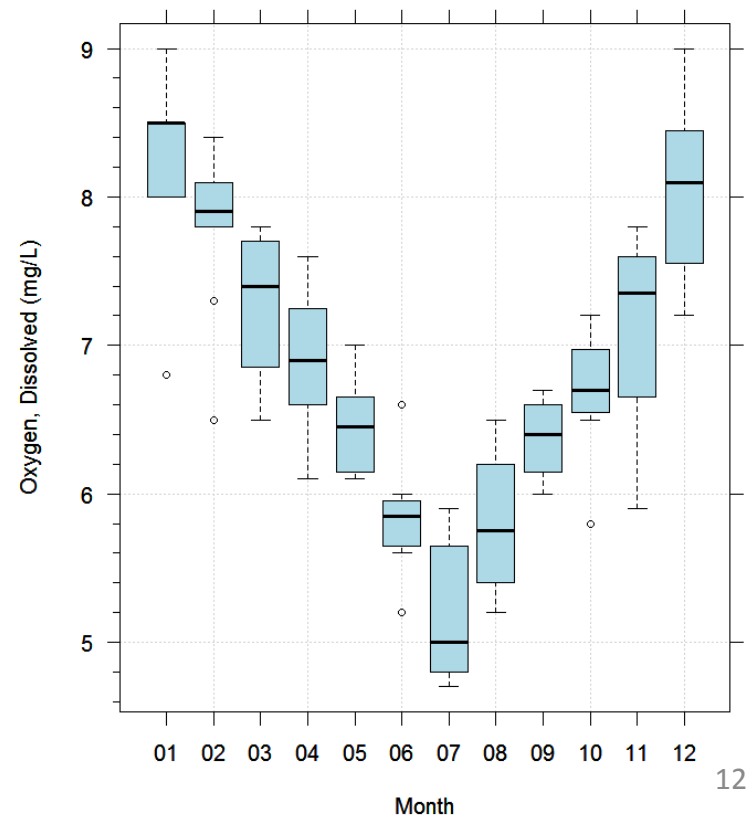
Seasonal Trends

South Marsh

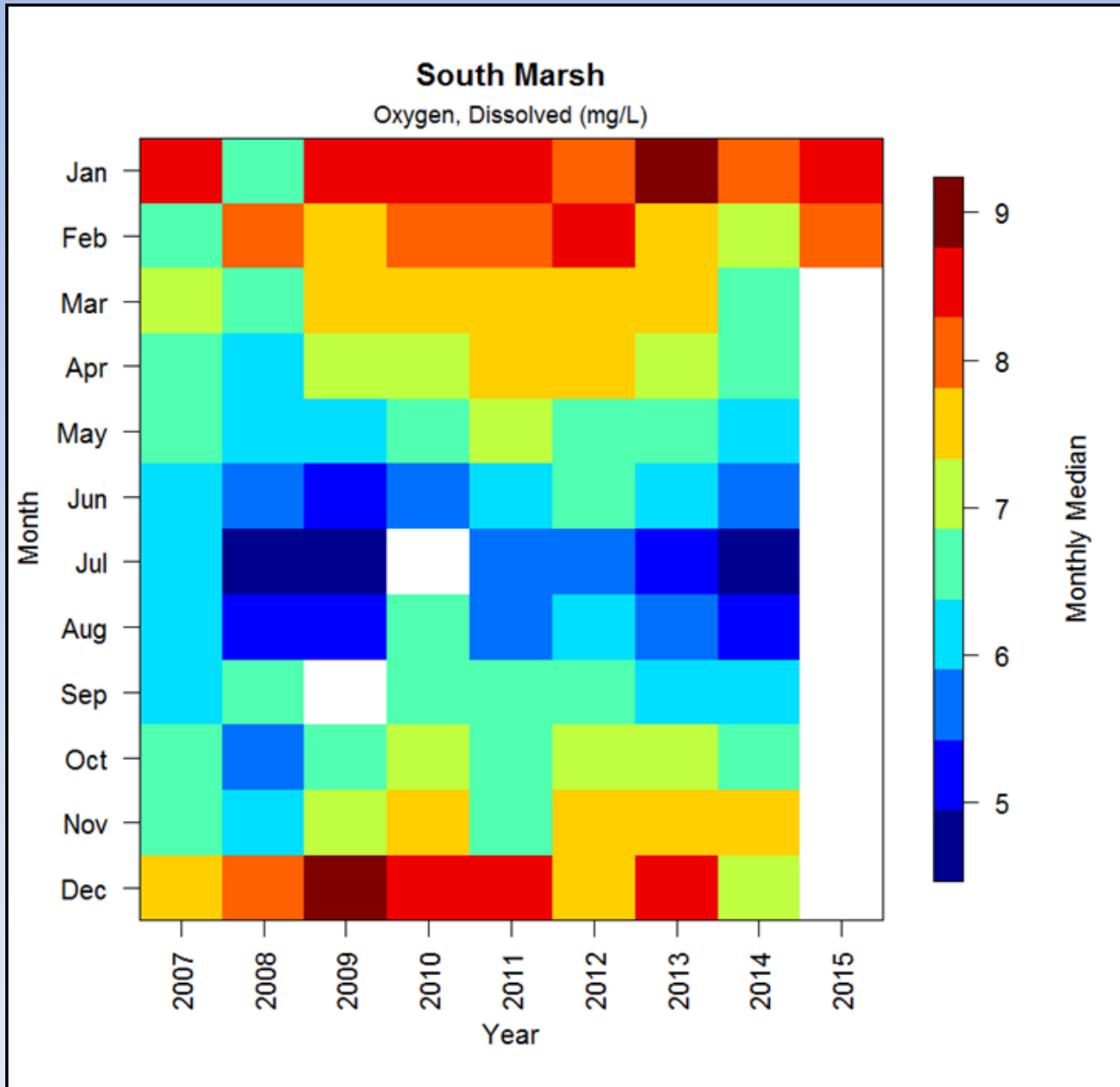
From 2007-01-01 to 2015-02-03. N = 258022.



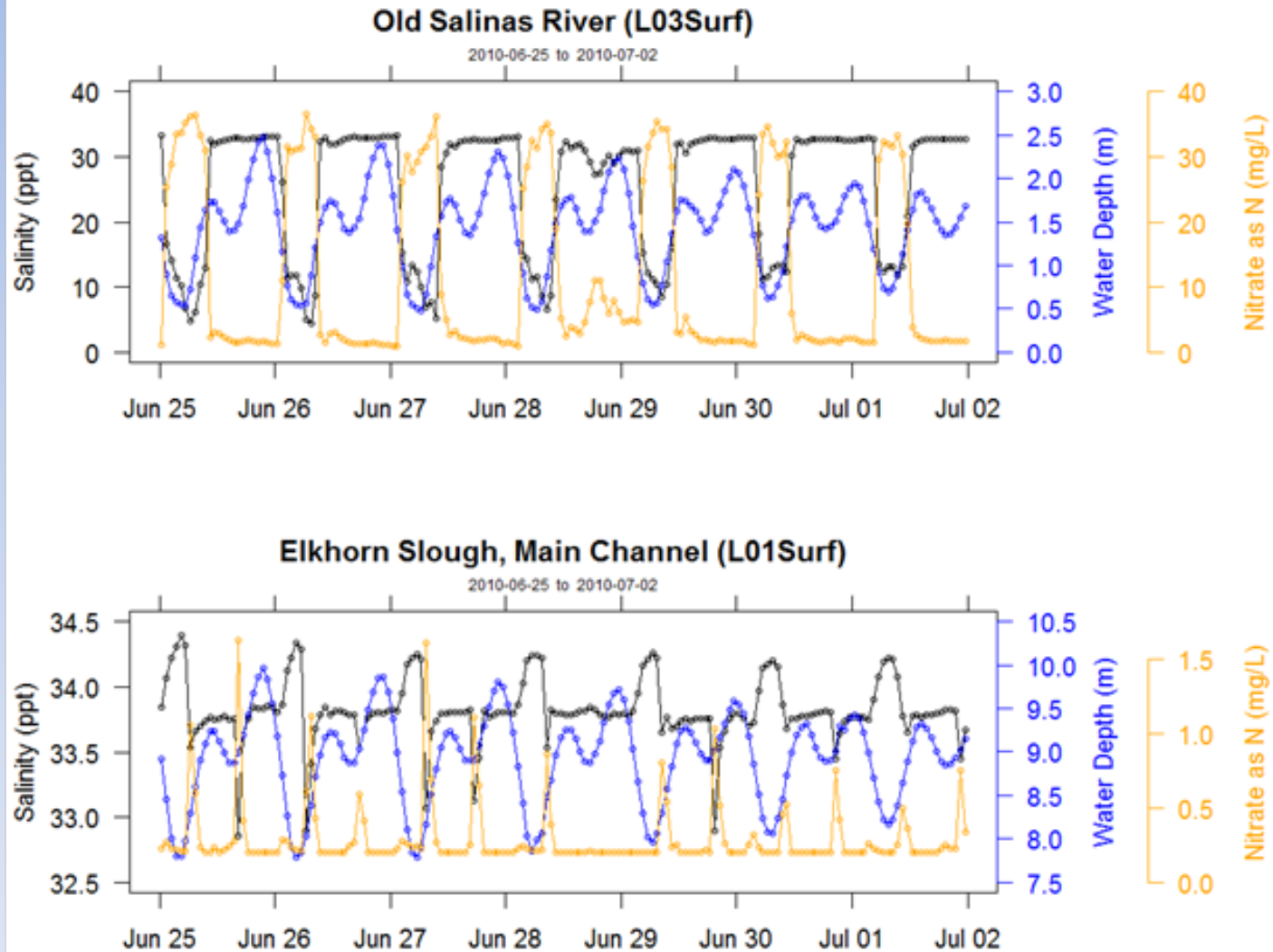
Oxygen, Dissolved at South Marsh 2007 - 2015



Seasonal Trends



Daily or Tidal Trends

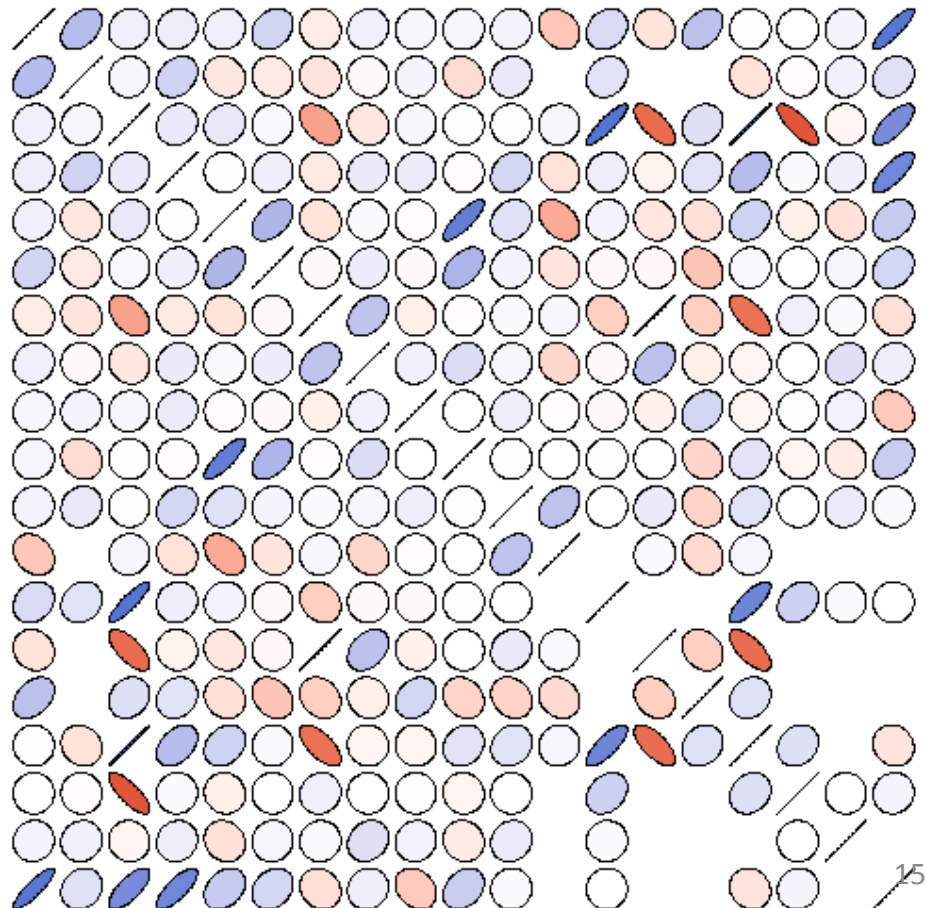


Association Between Analytes

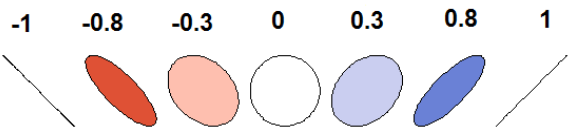
Elkhorn (37 stations)

NH3N.mgPL
TotAmmon.mgPL
NO3N.mgPL
oPO4P.mgPL
DO.mgPL
pH.units
Salinity.ppt
wTemp.C
Turbid.NTU
DOsat.pct
Chla.ugPL
wDepth.m
TotN.mgPL
spCond.mSpcm
NH4N.mgPL
NO3NO2N.mgPL
NO2N.mgPL
FIAlg.pct
PhosP.mgPL

NH3N.mgPL
TotAmmon.mgPL
NO3N.mgPL
oPO4P.mgPL
DO.mgPL
pH.units
Salinity.ppt
wTemp.C
Turbid.NTU
DOsat.pct
Chla.ugPL
wDepth.m
TotN.mgPL
spCond.mSpcm
NH4N.mgPL
NO3NO2N.mgPL
NO2N.mgPL
FIAlg.pct
PhosP.mgPL



Correlation Coefficient (r) key



Part 2. Next Steps

- Numeric targets
- Mass loading evaluation
- Source analysis
- Implementation recommendations
- Draft TMDL Report (2017)

Part 2. Next Steps (cont.)

Possible Numeric Target Options

1. Reduce nutrients by X% (e.g. 25%)
2. Use numeric targets from nearby watersheds
 - Lower Salinas TMDL, Pajaro River TMDL
3. Use numeric targets from TMDLs developed by other Regional waterboards
4. Use other models
 - that include ocean/Old Salinas River inflow
 - that include only watershed loading
5. Others?

Part 3. Discussion

- Discussion and questions about the project.

Website and Contact Info

http://www.waterboards.ca.gov/centralcoast/water_issues/programs/tmdl/docs/elkhorn_slough/do/index.shtml

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Website and Contact Info (cont.)

CA.GOV CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
CENTRAL COAST REGIONAL WATER QUALITY CONTROL BOARD

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www.waterboards.ca.gov/centralcoast

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- The 2012 Accor...
- New! Ex Parte Co...
- Water Board contracts with U.S. Geological Survey to test domestic wells in Salinas and Pajaro Valleys
- Water Board launches Groundwater Assessment and Protection (GAP) program webpage
- "Sampling My Private Well"

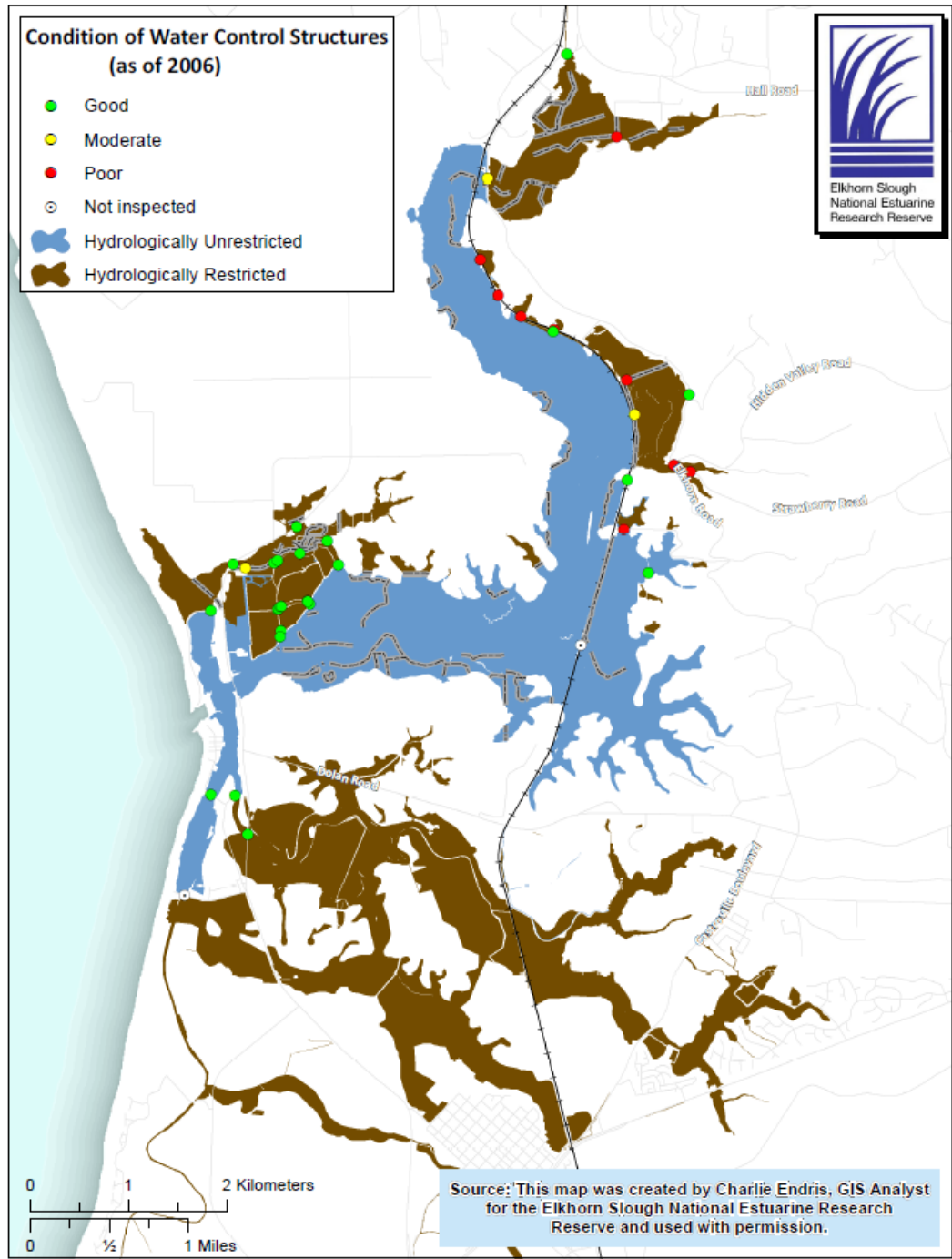
Thank You!



(extra slides start here)

Condition of Water Control Structures (as of 2006)

- Good
- Moderate
- Poor
- Not inspected
- Hydrologically Unrestricted
- Hydrologically Restricted



Source: This map was created by Charlie Endris, GIS Analyst for the Elkhorn Slough National Estuarine Research Reserve and used with permission.