California
North Coast Region
Protecting California's Water

NORTH COAST CYANOHAB RISK FACTORS AND WATER QUALITY MANAGEMENT STRATEGIES

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Presentation Topics

- Identify Water Quality Risk Factors Contributing to CyanoHABs
- Describe Examples of North Coast CyanoHab Risk Factors
- Provide Examples of North Coast Water Quality Management Polices, Regulations, to Address CyanoHABs

CyanoHAB WQ Risk Factors

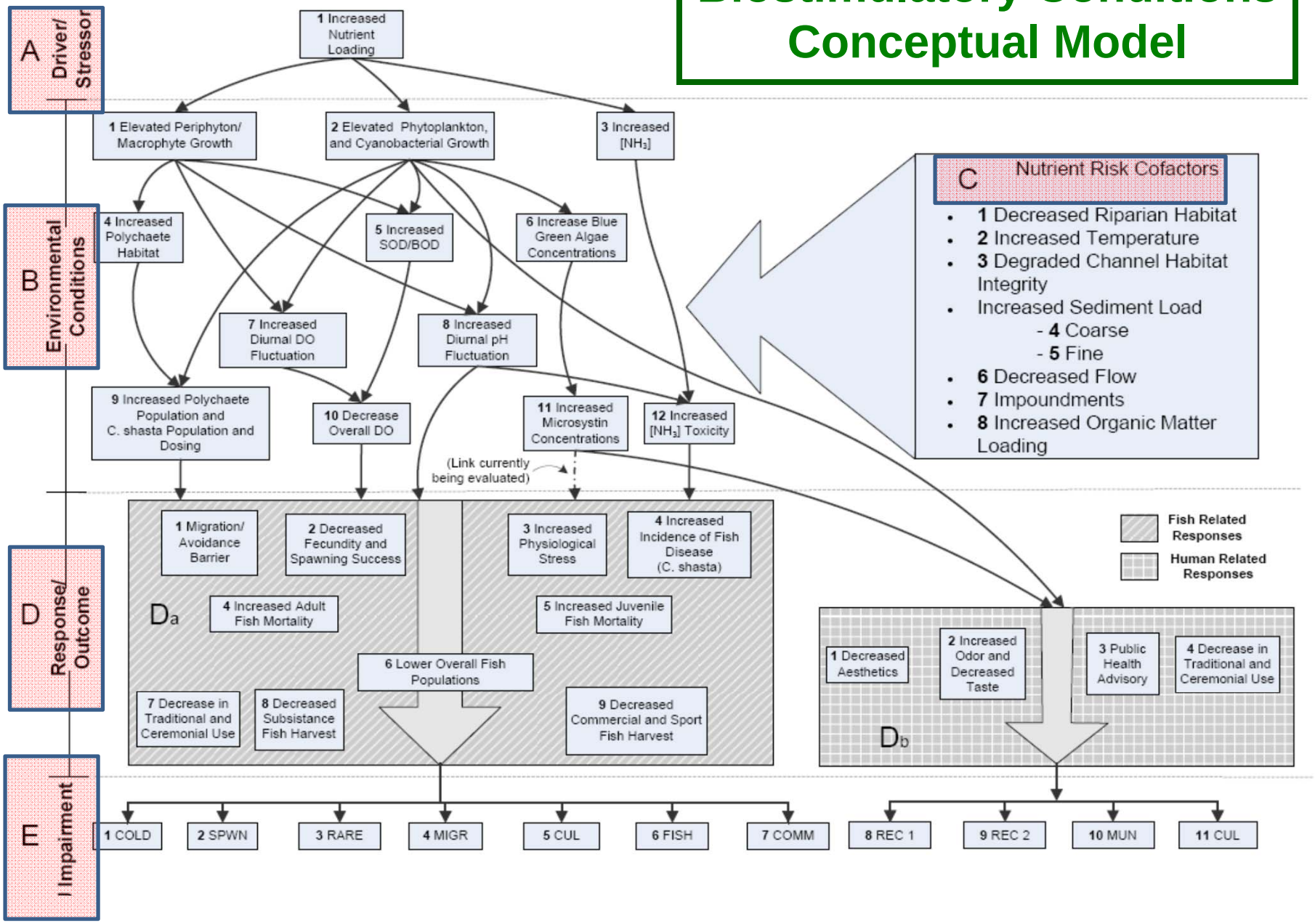
Paerl and Otten, 2012

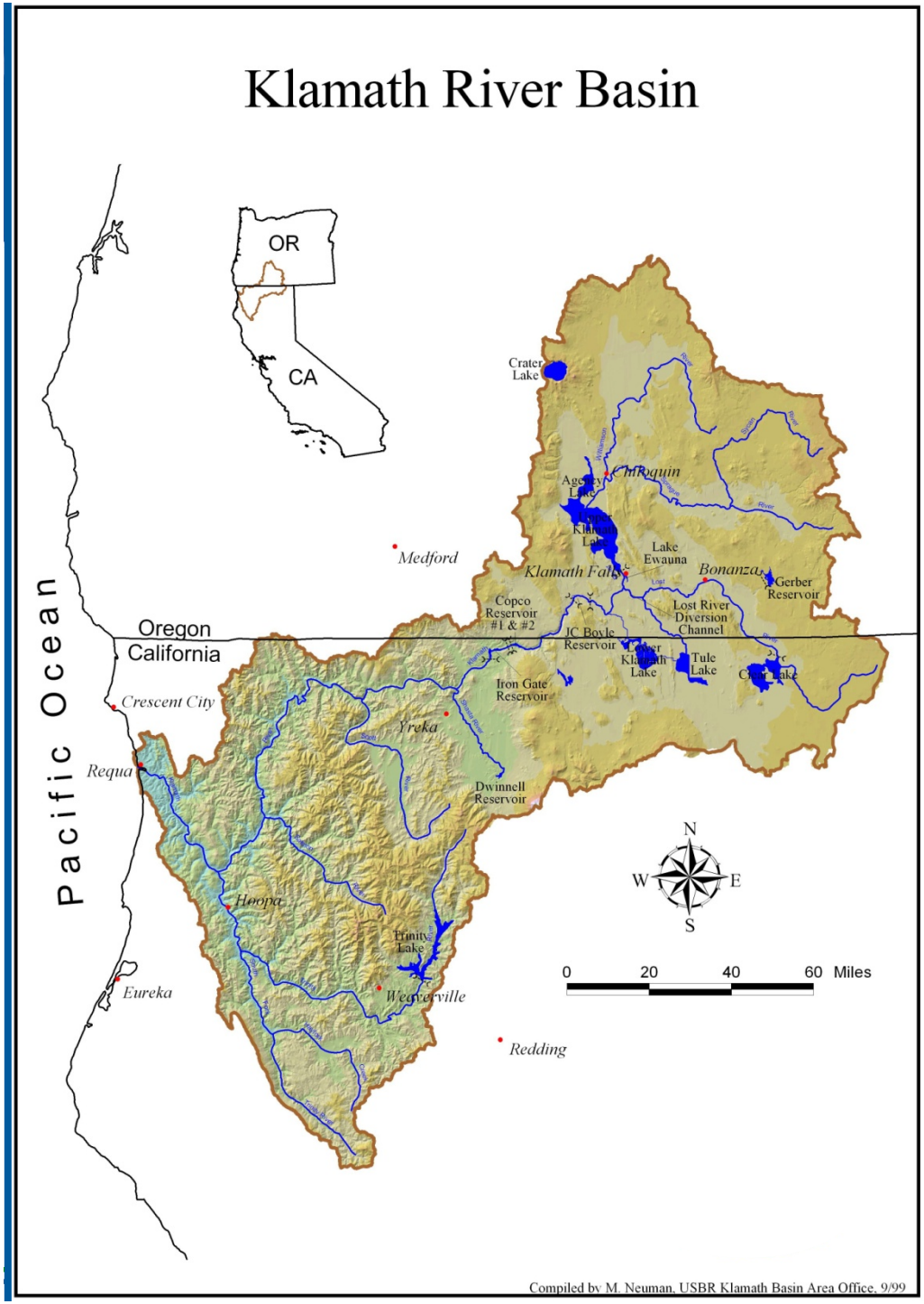
- High TP concentrations
- High TP / TN ratios
- Increased stratification
- Low Turbulence
- High light
- Warm temperature
- High DOC
- Others

Biostimulatory Conditions

- Reduced Riparian Canopy
- Channel Morphology
- Impoundments
- Reduced Flows
- Pollutant Loading
- Watershed Conditions
- Others

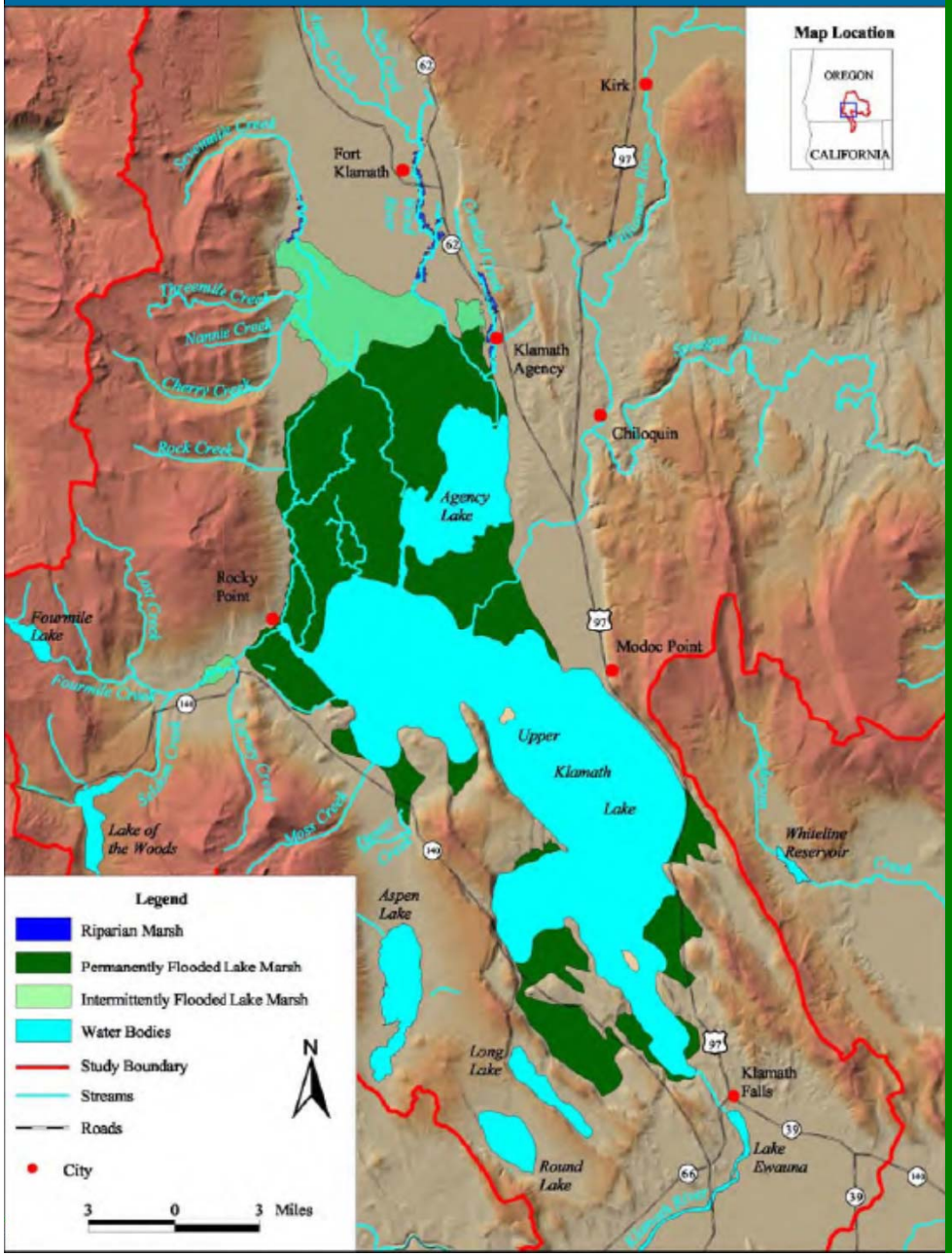
Biostimulatory Conditions Conceptual Model



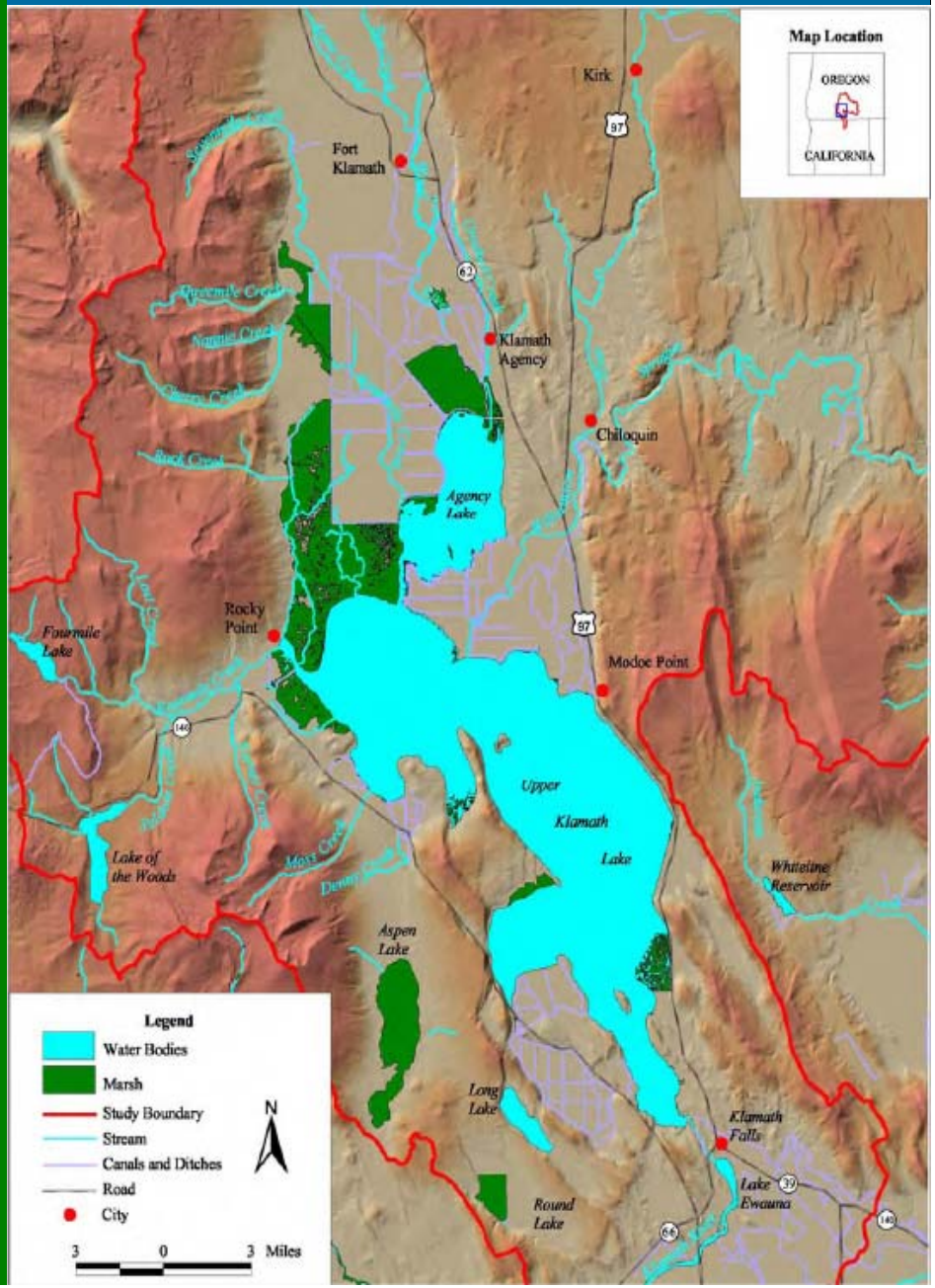


Klamath River: CyanoHAB Risk Factors & Management Actions

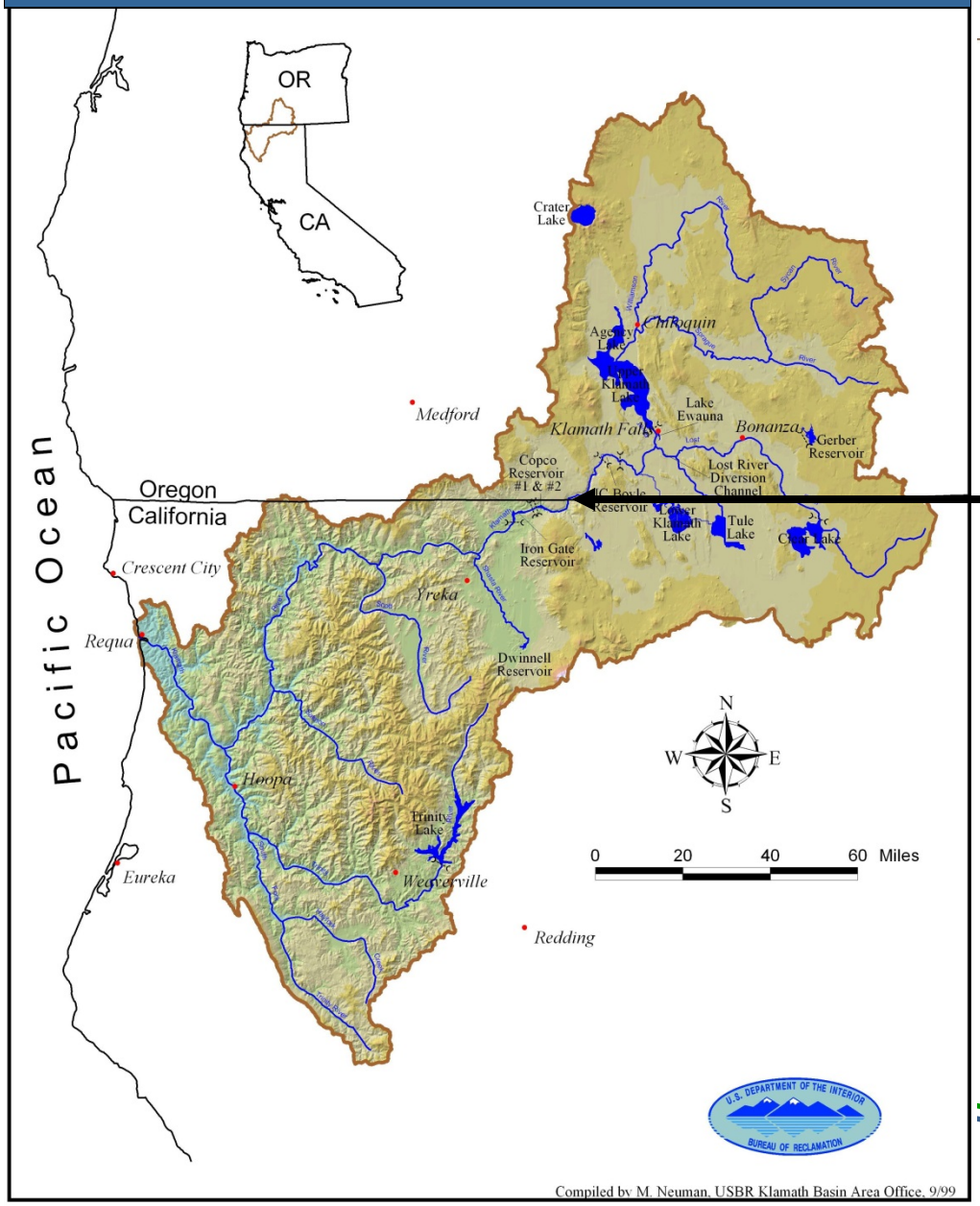
Natural Lake & Marsh Areas of UKL

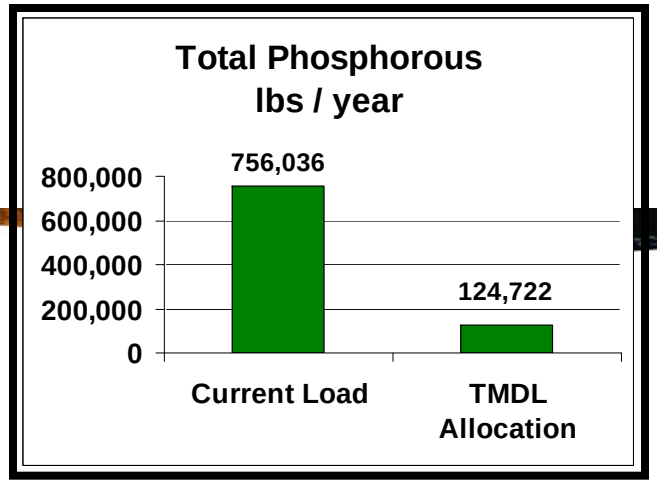


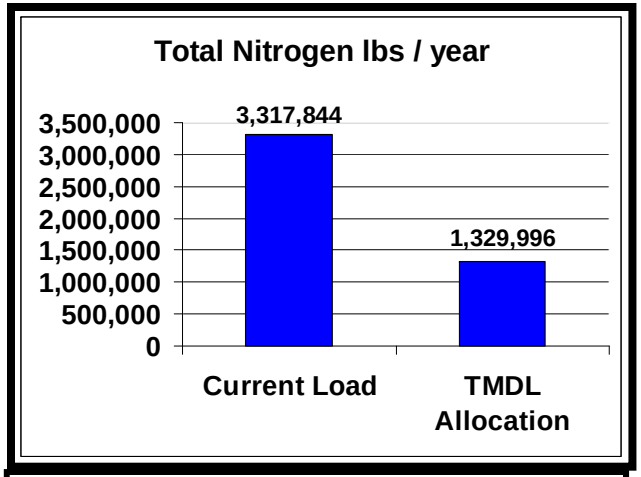
Current Lake & Marsh Areas of UKL

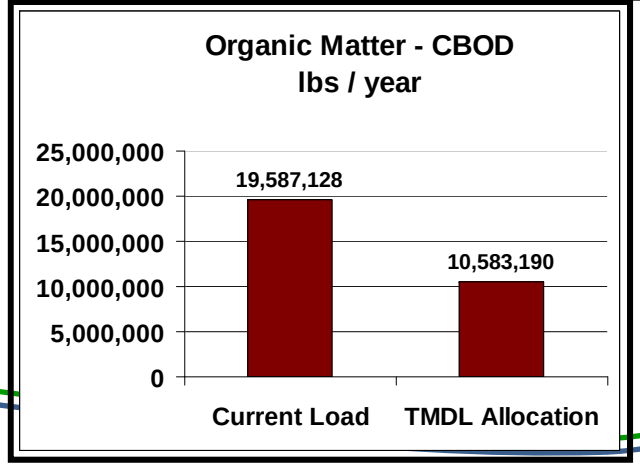


Pollutant Loads at OR / CA Stateline









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Klamath River Impoundments

Copco I & II Dams

Iron Gate Dam

Photo by Gary Thain / Herald and News

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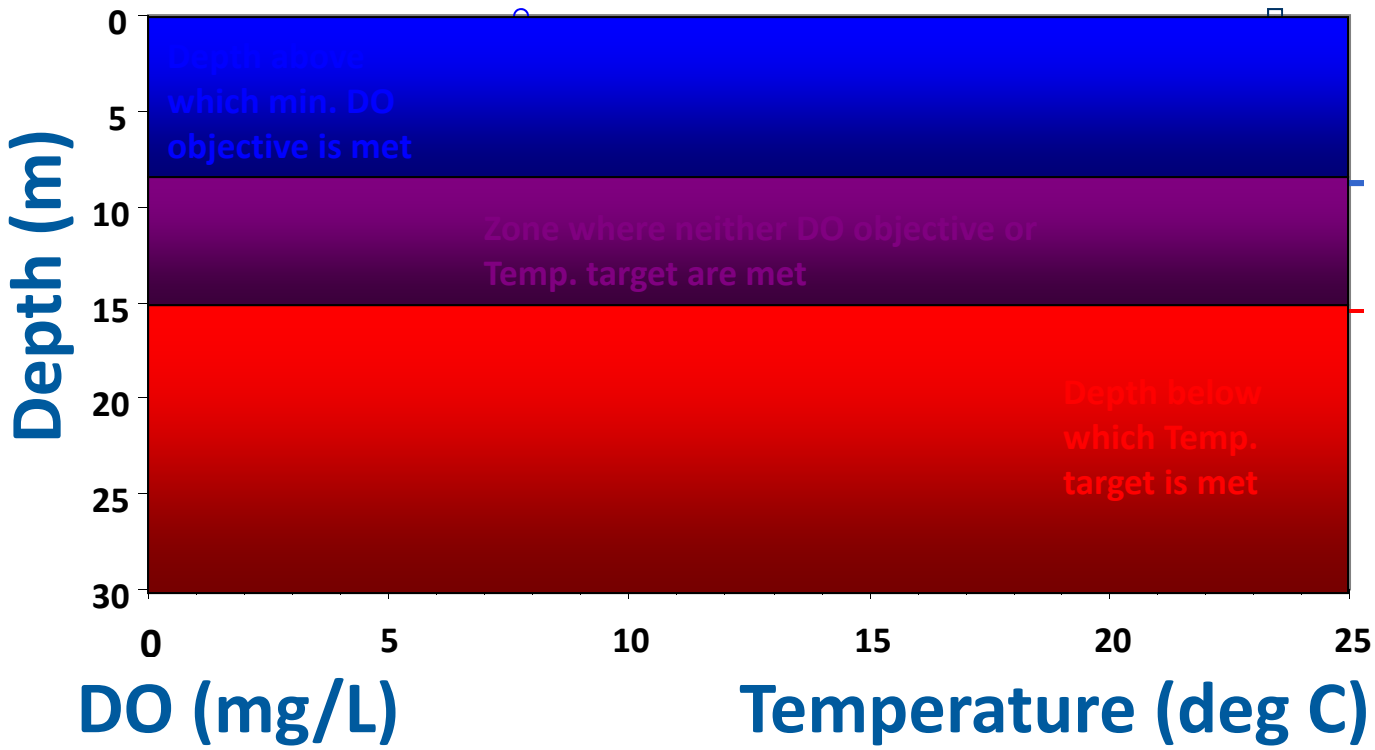
Reservoir Stratification

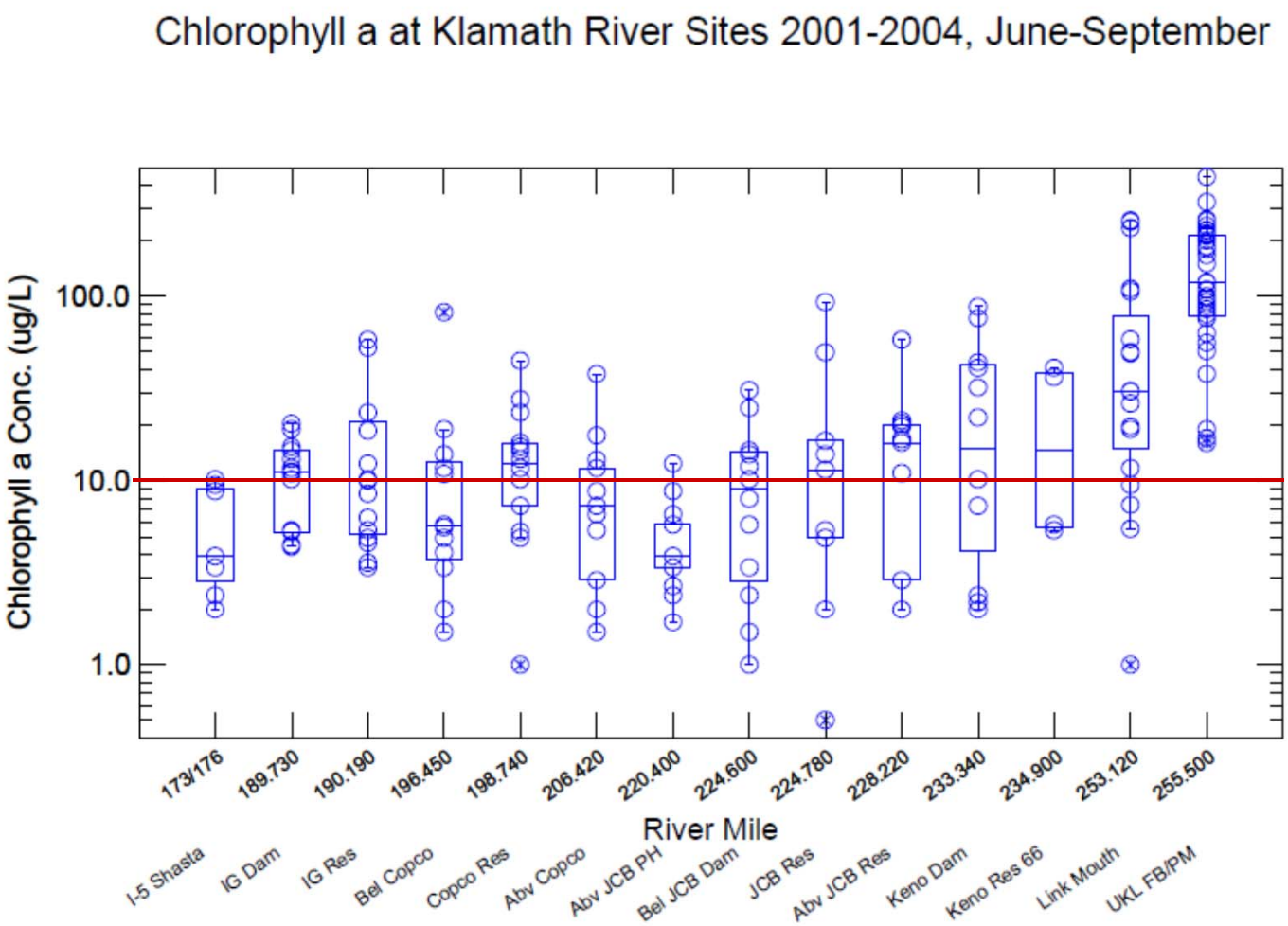
Iron Gate Reservoir – Mean for June, July, & August



Mean DO ———

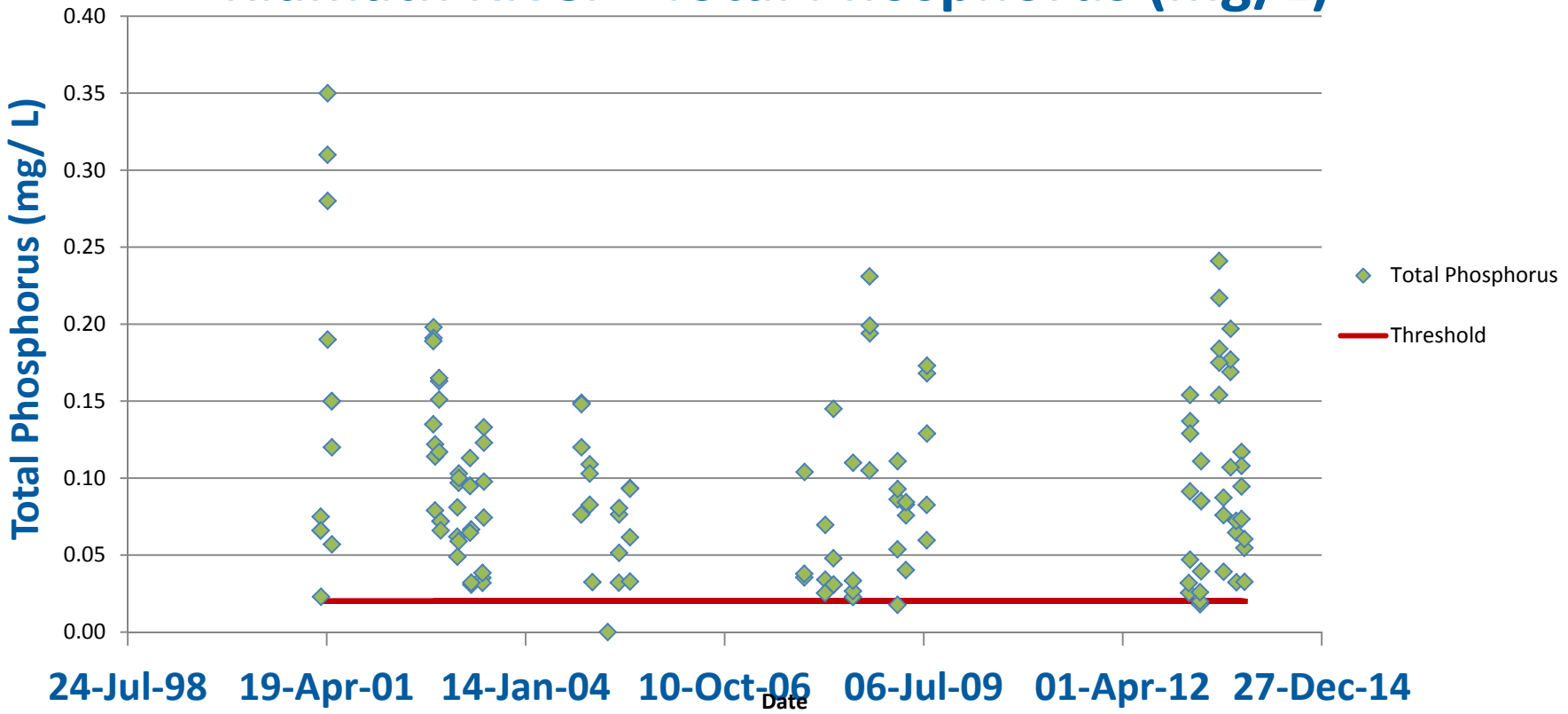
Mean Temp. ———

Klamath River - Chlorophyll a

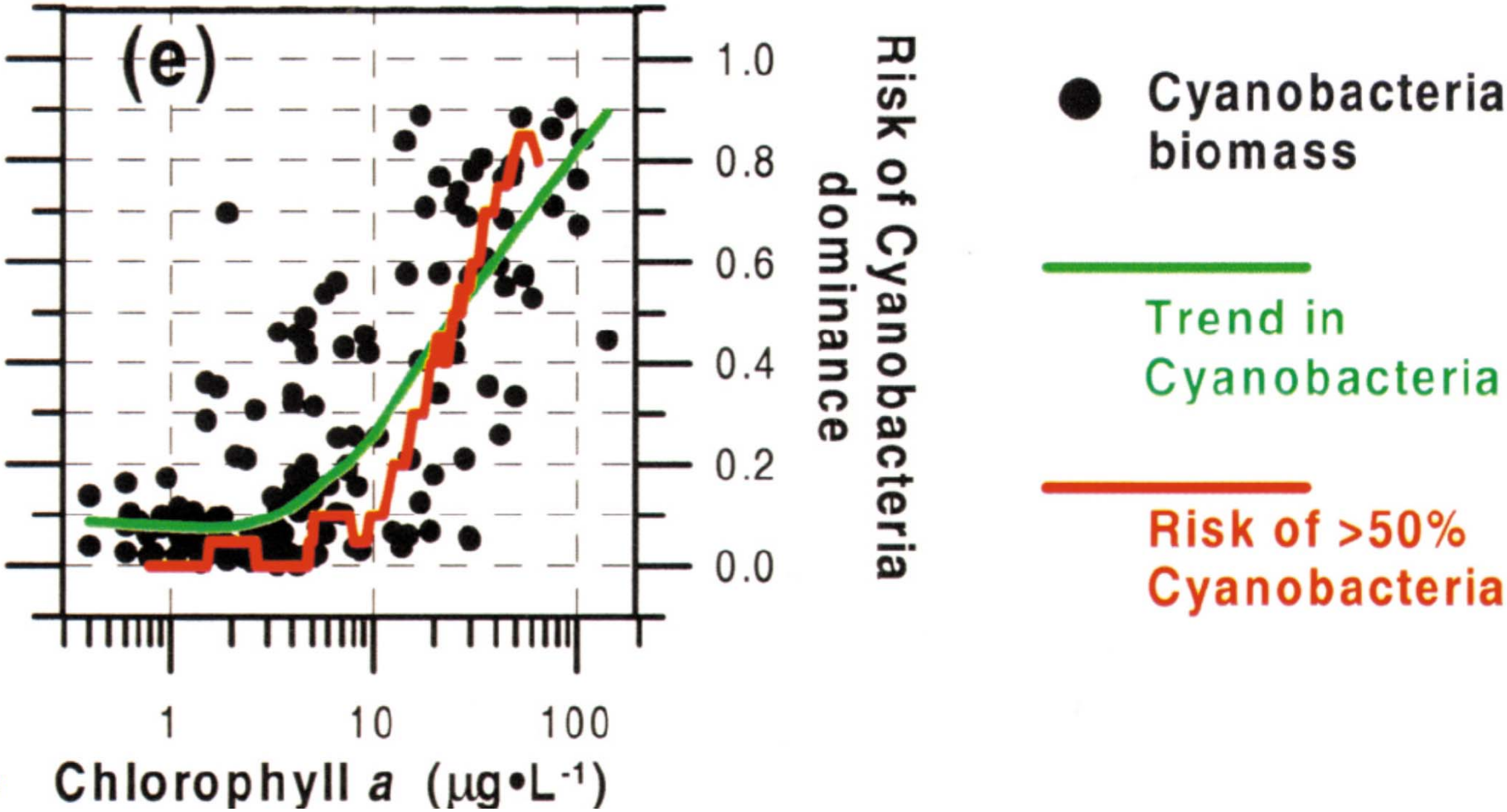


Stateline to Estuary

Klamath River - Total Phosphorus (mg/L)

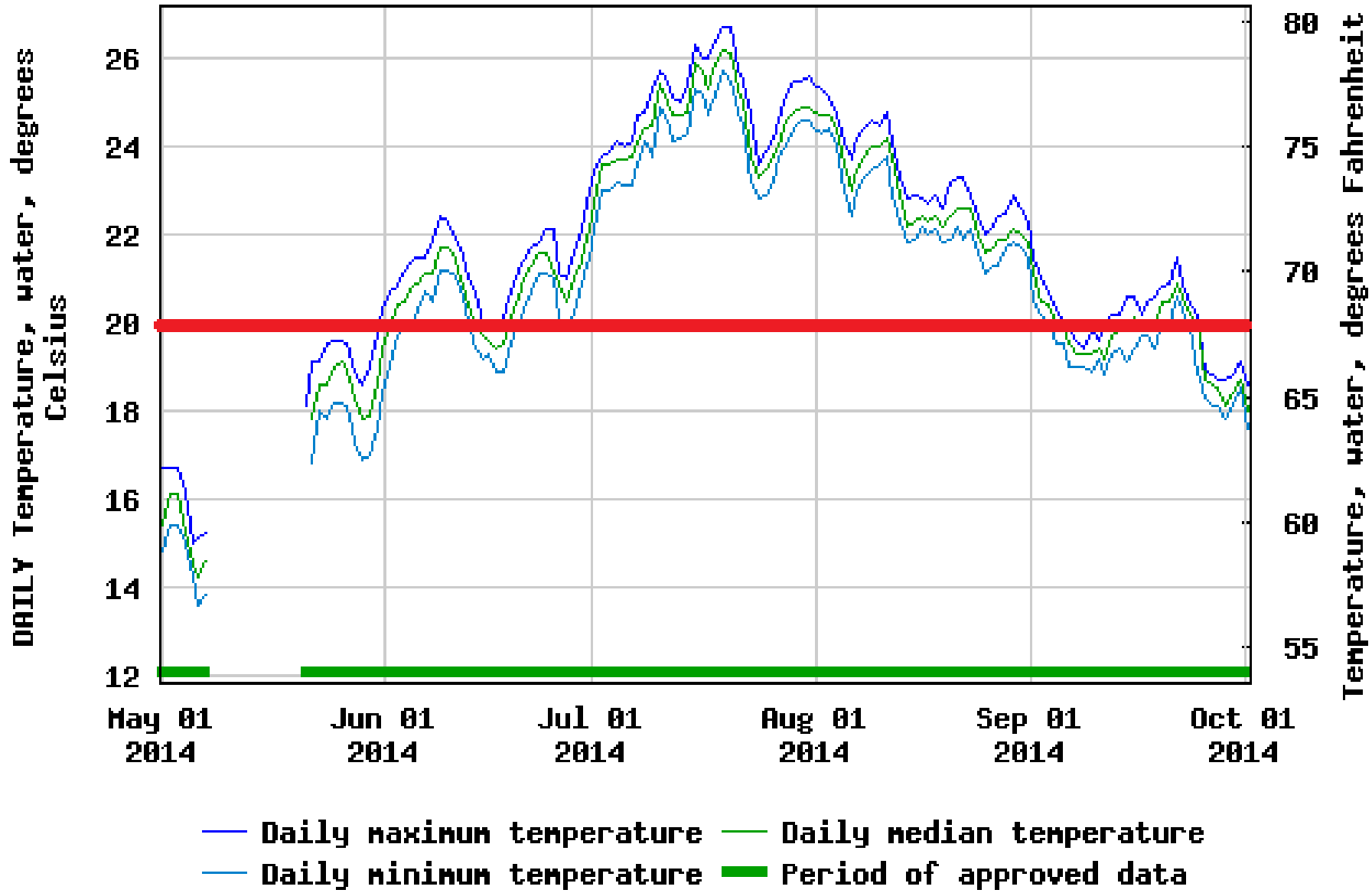


Algal population dynamics



USGS

USGS 11523000 KLAMATH R A ORLEANS



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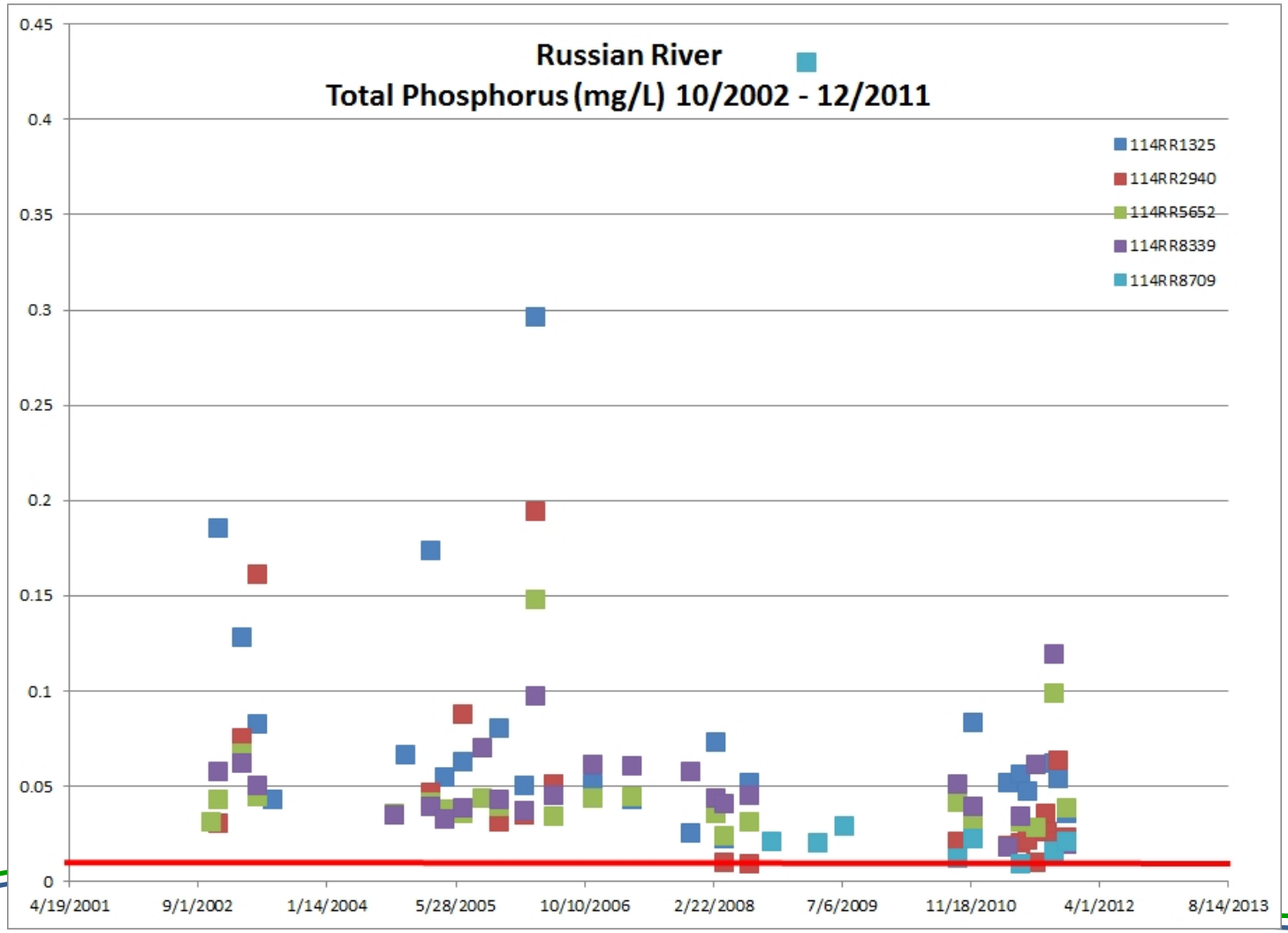
Russian River Nutrient Conditions



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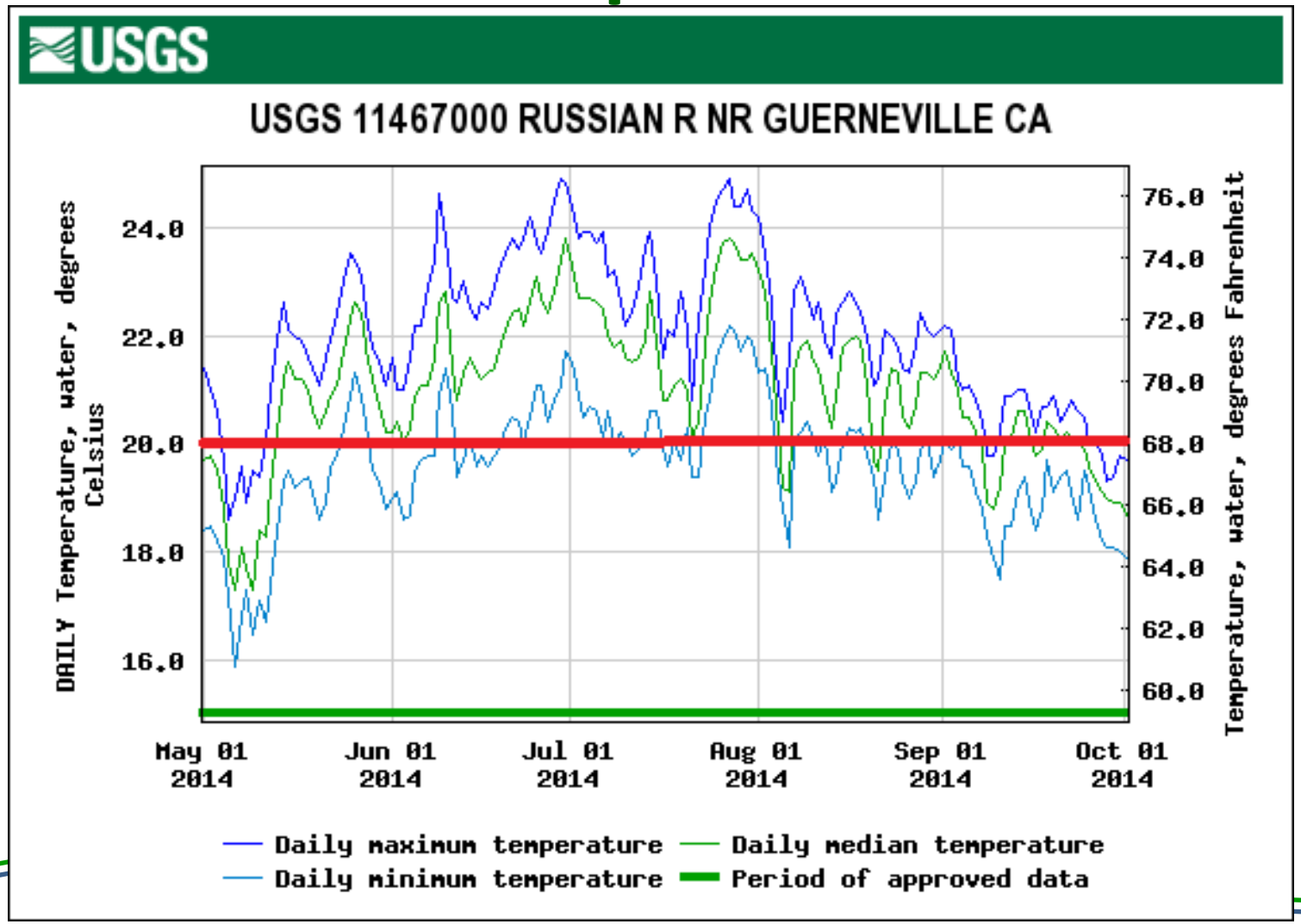
Russian River Temperature Conditions



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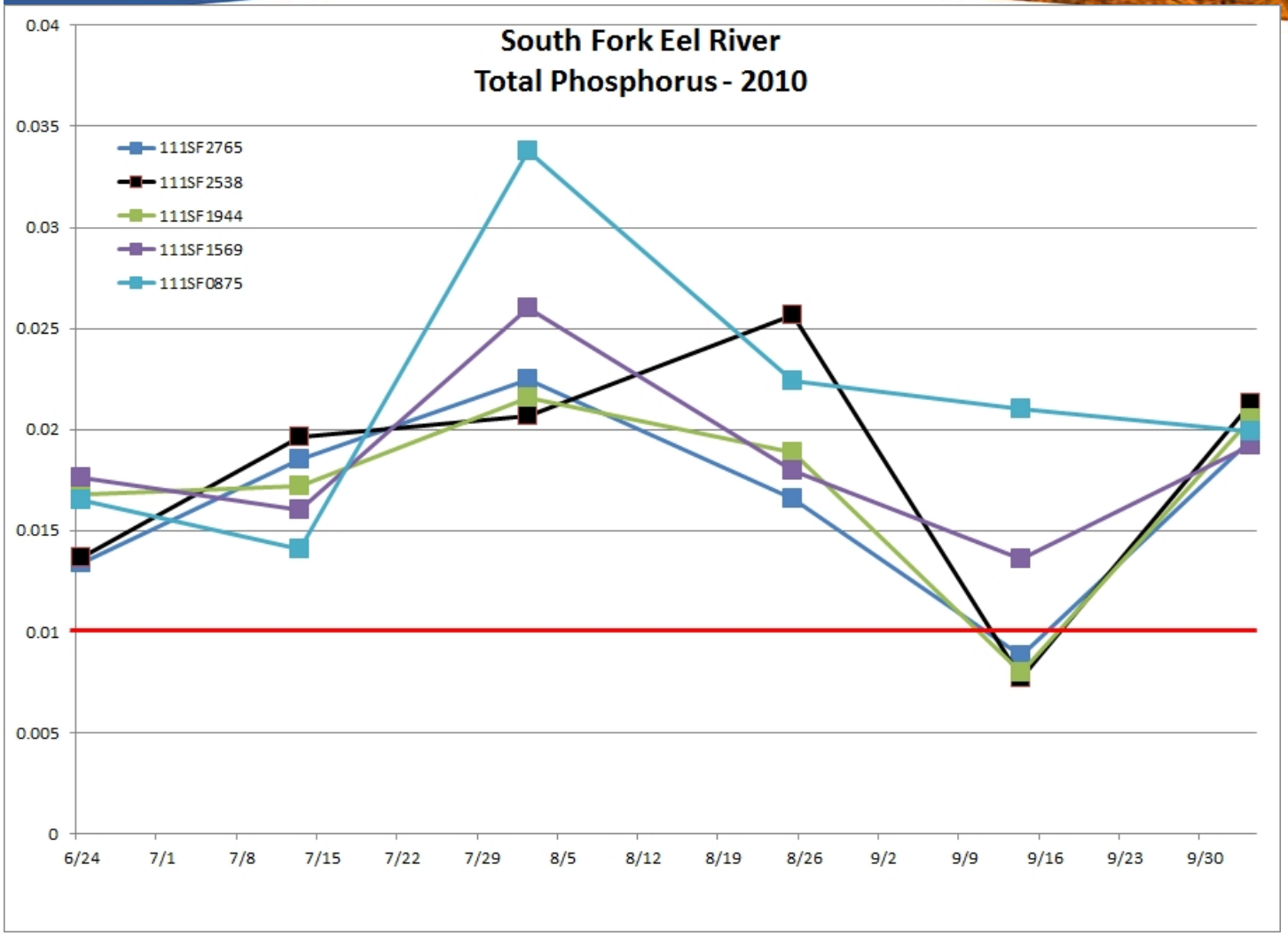
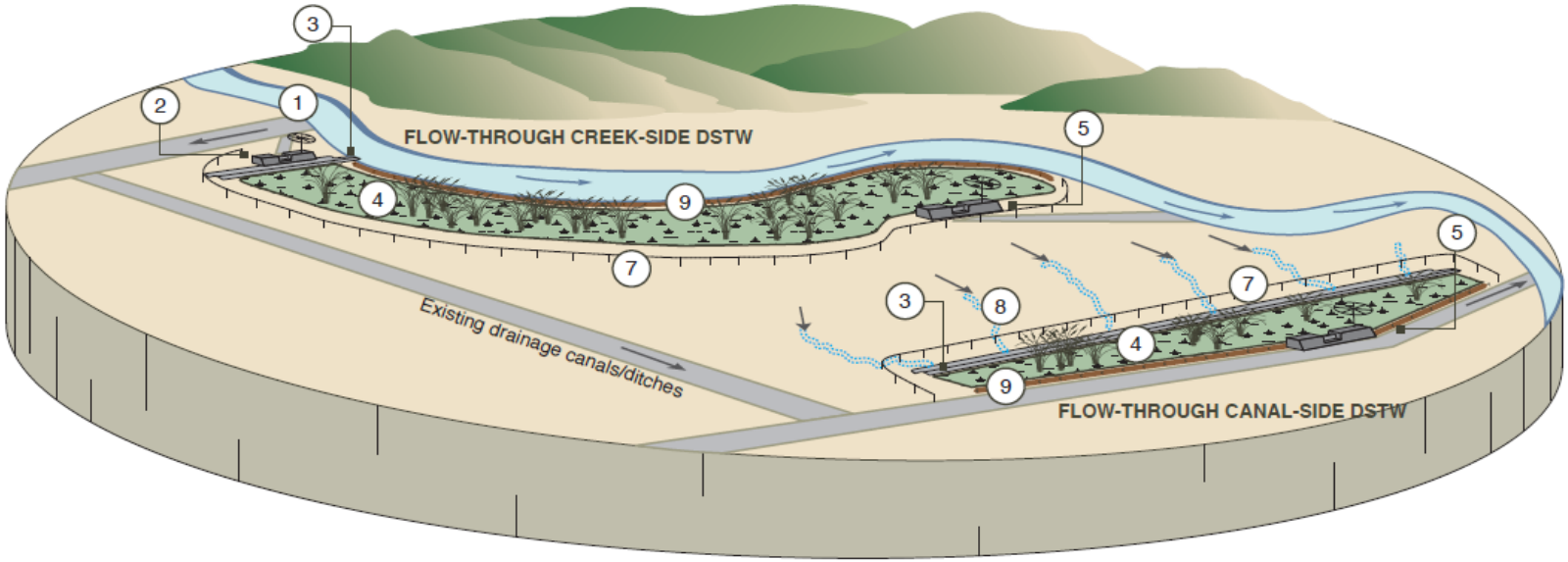


South Fork Eel Nutrient Conditions

Diffuse Source Wetland Treatment Systems

Fig. 3.7 Concept designs for flow-through creek-side and flow-through canal-side DSTWs.



Project Network Design

REHABILITATED WETLANDS ALONG UPPER KLAMATH LAKE, AGENCY LAKE, LAKE EWAUNA, KENO IMPOUNDMENT

SEDIMENT P SEQUESTRATION USING ALUM MICRO-FLOC W/AERATION/OXYGENATION

DSTWs IN WOOD AND SPRAGUE RIVER VALLEYS

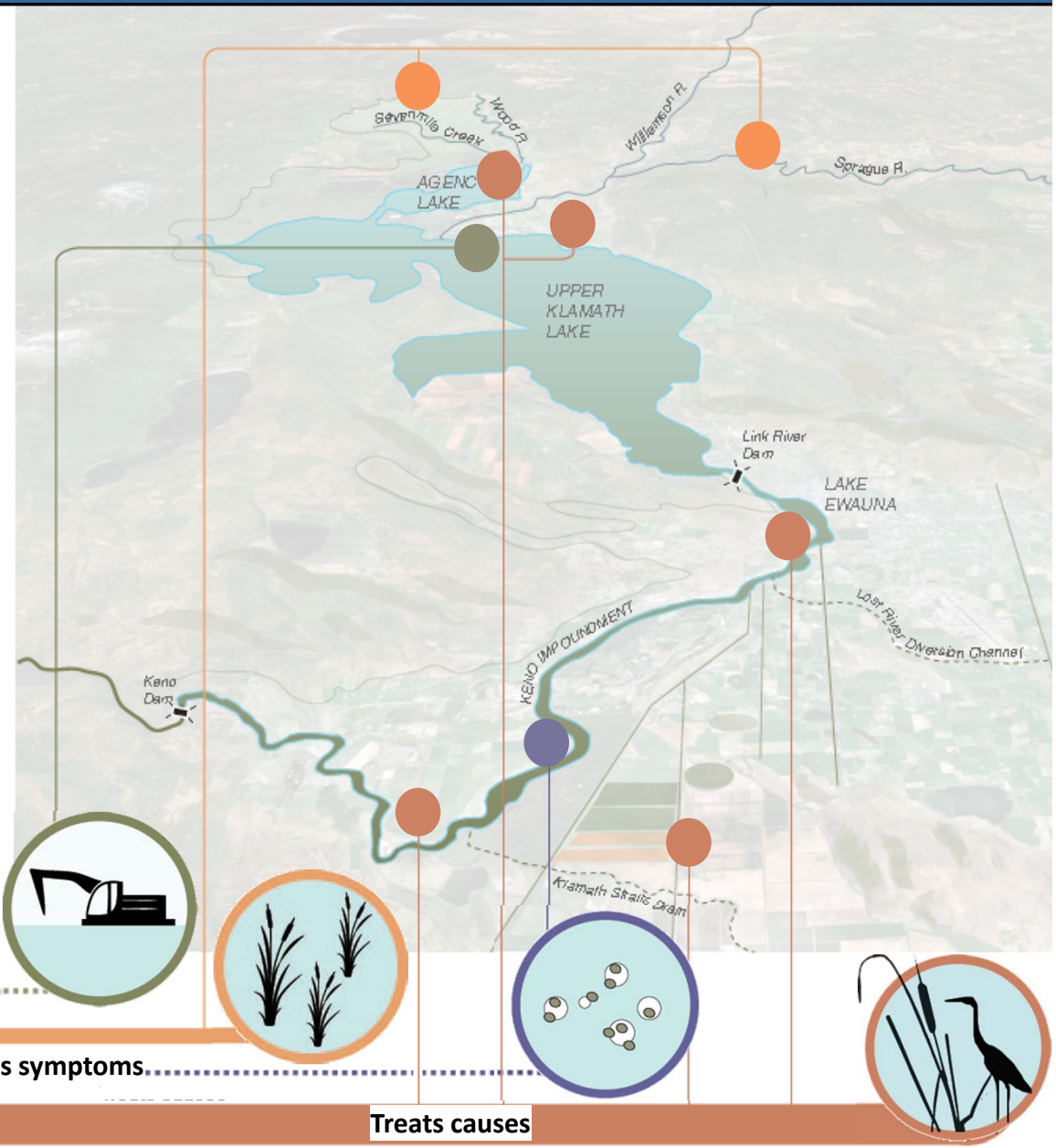
TARGETED DREDGING IN UKL & AGENCY LAKE COMBINED W/IN-BASIN SEDIMENT RE-USE

Years to effective treatment: 3-5

Treatment is immediate

Years to effective treatment: 1-2

Treatment is immediate



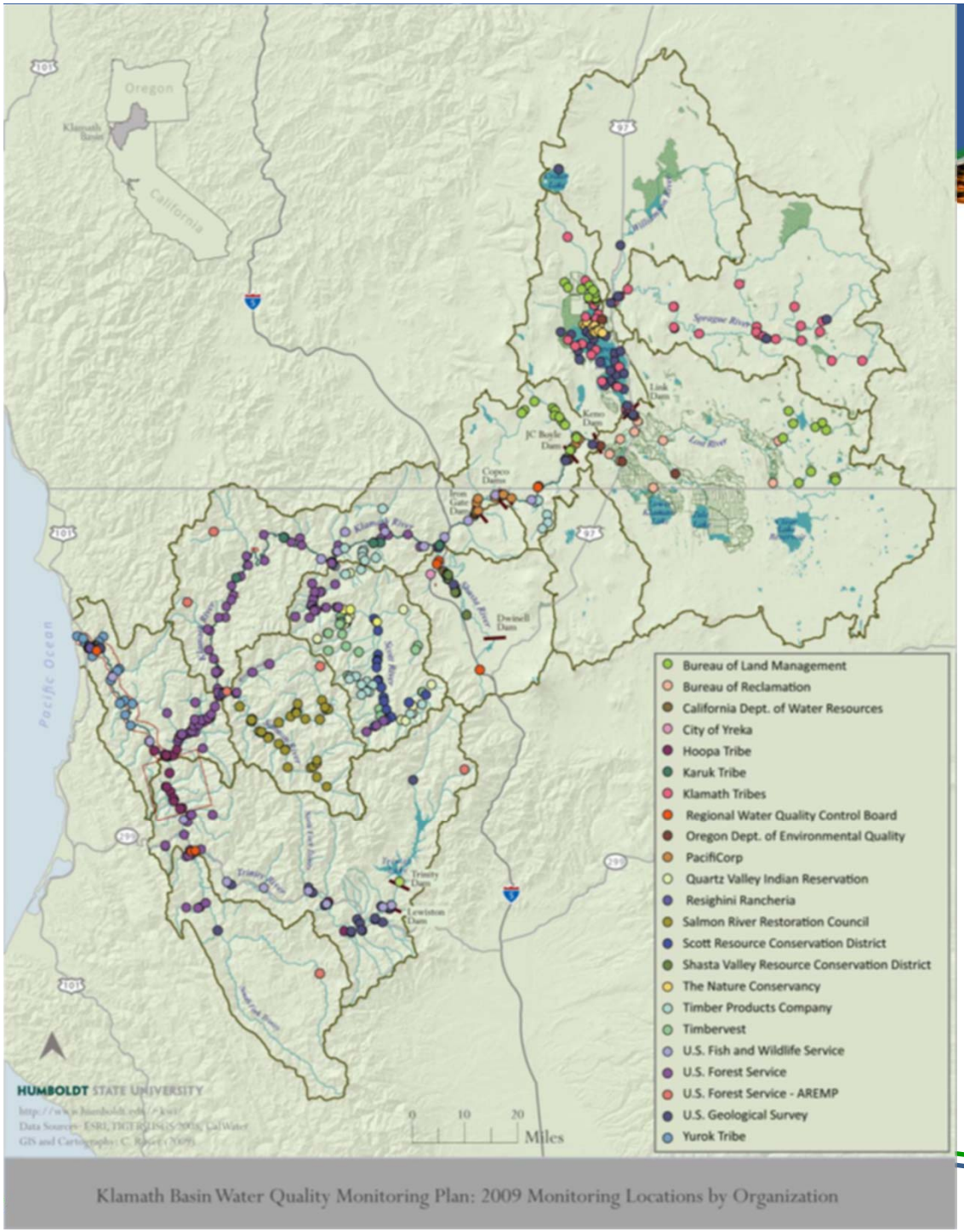
Treats symptoms

Treats causes

Treats symptoms

Treats causes

Years of effective treatment: 5-10 years 15-20 years 20-30 years 30-50 years



Klamath Basin Water Quality Monitoring Plan: 2009 Monitoring Locations by Organization

Klamath Basin Monitoring Program

- Monitoring coordination
- Common analytical methods and sampling protocols
- Data management
- Membership organization
- Watershed stewardship assessment reports
- Web Information Portal (Blue-green Algae Tracker)
- www.kbmp.net

Regional Water Board Water Quality Tools

- Policies, Permits, and Regulations
- TMDLs = Comprehensive Assessments and Solutions to Water Quality Impairments
- Grant & Loan Programs
- Rural Roads Initiative
- Management of Forest Lands
- Cannabis Water Quality Permit Program

Regional Water Board Water Quality Tools

- Dredge & Fill permits -- 401 Certifications
- Water Quality Restoration Grants and Contracts
- Development of Flow Objectives – CA Water Action Plan
- Division of Water Rights - Water Rights Process
- Watershed Stewardship Partnerships