

LBWC TAC

September 26, 2013

TP TMDL Update and Chl a Target Refinement

Troy Smith

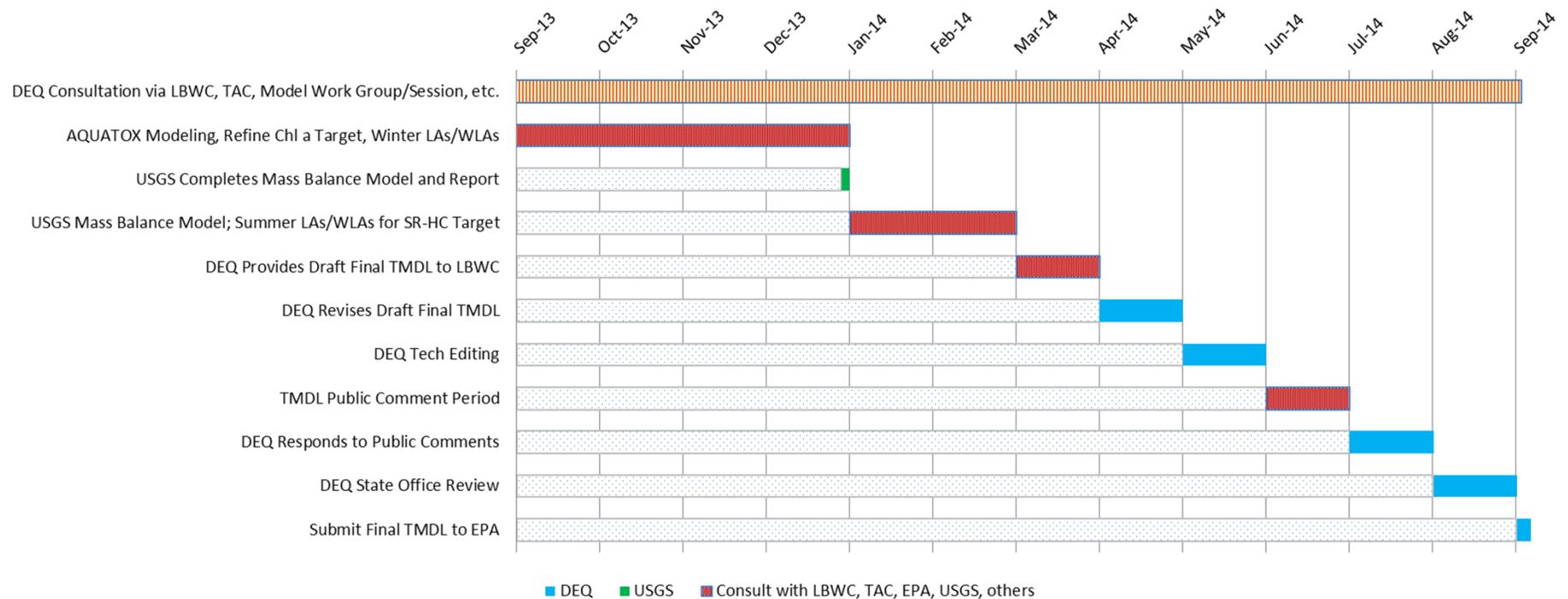
Watershed Coordinator

DEQ – Boise Regional Office



Part I. Timeline and Developments

Lower Boise River TP TMDL **Draft** Adjusted Timeline - September 20, 2013



AQUATOX Modeling

- ATOX Model Workgroup

- Approaching model calibration
- Jonathan Clough and Dick Park as consultants

- Data, reports, draft models, etc.

- <http://www.deq.idaho.gov/regional-offices-issues/boise/basin-watershed-advisory-groups/lower-boise-river-wag.aspx>



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Lower Boise River Watershed Advisory Group (WAG)

Watershed advisory groups (WAGs) are groups of interested citizens that provide local public input and guidance to DEQ during the development of water quality improvement plans or "Total Maximum Daily Loads" (TMDLs) for water bodies that fail to meet water quality standards. TMDLs are designed to reduce the levels of pollutants, such as bacteria and sediment, in impaired water bodies.

The Lower Boise River WAG was formed to develop and implement TMDLs to improve water quality in the Lower Boise River. DEQ will consult with WAG participants on a regular basis throughout the TMDL development and/or five-year review process.

» [Lower Boise Watershed Council Website](#)

Upcoming Meetings

Lower Boise Watershed Council Modeling Workgroup - Work Session
Tuesday, September 24, 2013, 10 a.m. to Noon
DEQ State Office
Conference Room B
1410 N. Hilton, Boise

Lower Boise Watershed Council TAC Meeting
Thursday, September 26, 2013, 9 to 11 a.m.
Meridian City Hall
33 East Broadway Ave., Meridian

Special Pollutant Trading Discussion Meeting
Thursday, October 3, 2013, 9 a.m. to 12 p.m.
DEQ State Office
Conference Rooms A and B
1410 N. Hilton, Boise

Lower Boise Watershed Council Meeting
Thursday, October 10, 2013, 7 p.m.
DEQ State Office
1410 N. Hilton, Boise

Review Documents

- Phosphorus
- Sediment/Bacteria
- » [Draft Lower Boise River Tributaries TMDL: 2013 Addendum](#) (June 2013)

Previous Meetings

- Modeling Work Session Meetings
- » [AQUATOX Modeling Data](#)
- » [AQUATOX Model Files](#) - Use "public" for the username and password when

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Related Pages

- [Total Maximum Daily Loads \(TMDLs\): Water Quality Improvement Plans](#)
- [Watershed Advisory Groups](#)

AQUATOX – cont'd

- Model, supporting docs, and training at:
- <http://water.epa.gov/scitech/datait/models/aquatox/download.cfm>

Water: AQUATOX

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Download AQUATOX

- [System requirements](#)
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System Requirements

Minimum:

- Windows 98, 2000, NT, or XP
- 1 GB RAM
- 1 GB free disk space

Recommended:

- Pentium PC, 2.0GHz or higher (or equivalent)
- Windows XP, Vista, or 7
- 2 GB RAM
- 32 GB free disk space

Download AQUATOX, Release 3.1

Installation Information

You are downloading a zipped InstallAware file. This file includes the AQUATOX model, example studies, and data libraries (zip, 10.7MB). Once the download completes, unzip the first file, then double-click the executable file. The file will unzip and be installed on your Windows PC. Please follow the instructions from the InstallAware.

Notes on Installing AQUATOX Release 3.1 under Windows 7, Vista, or XP Operating Systems. Aquatox 3.1 is 64-bit OS compatible.

1. **AQUATOX must be initially installed by an Administrator.**
2. **If AQUATOX will exclusively be run using an "administrator" account, no additional changes need to be made.**
3. **If AQUATOX will be run by a user with a "standard" account, full read and write privileges must be given to that user for the directory in which AQUATOX has been installed.**

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AQUATOX – cont'd

- Information Available Now
- When Model is Calibrated for Existing Conditions:
 - Present a model walk-thru (tentatively October 24th TAC)
 - similar to HDR presentation on May 23
 - Jonathan Clough and/or Dick Park to participate and provide expertise, model Q&A, etc.

Mass Balance

- USGS Mass Balance Model and Report
 - Due December 2013



Prepared In cooperation with the Idaho Department of Environmental Quality

Evaluation of Total Phosphorus Mass Balance in the Lower
Boise River, Southwestern Idaho

By Alexandra B. Etheridge

- Intensive Workgroups
 - Develop Flow Adjustments and Scenarios

Arriving Soon:

DRAFT TMDL Chapters 1 - 4

1. Subbasin Characterization
2. Water Quality Concerns and Status
3. Pollutant Source Inventory
4. Summary of Past and Present Pollution Control Efforts...
5. **TMDL**
6. **Conclusions**

Part II.a.

Refine Benthic Chl a Target

- SR-HC Target:

- TP of 0.07 mg/L May 1 – September 30

- Current Benthic Chl a Target

- A mean benthic chlorophyll-a biomass target of ≤ 150 mg/m²

- Mainstem AUs of the Lower Boise River

Why Need to Refine Target?

- Devil is in the details...
 - Location, Duration, Frequency
- Mean target must clearly apply to...
 - AQUATOX modeling
 - TMDL development
 - TMDL implementation

Attached algae growth commonly quantified as chlorophyll a per square meter of stream bottom



40 mg Chl a /m²



120 mg Chl a /m²

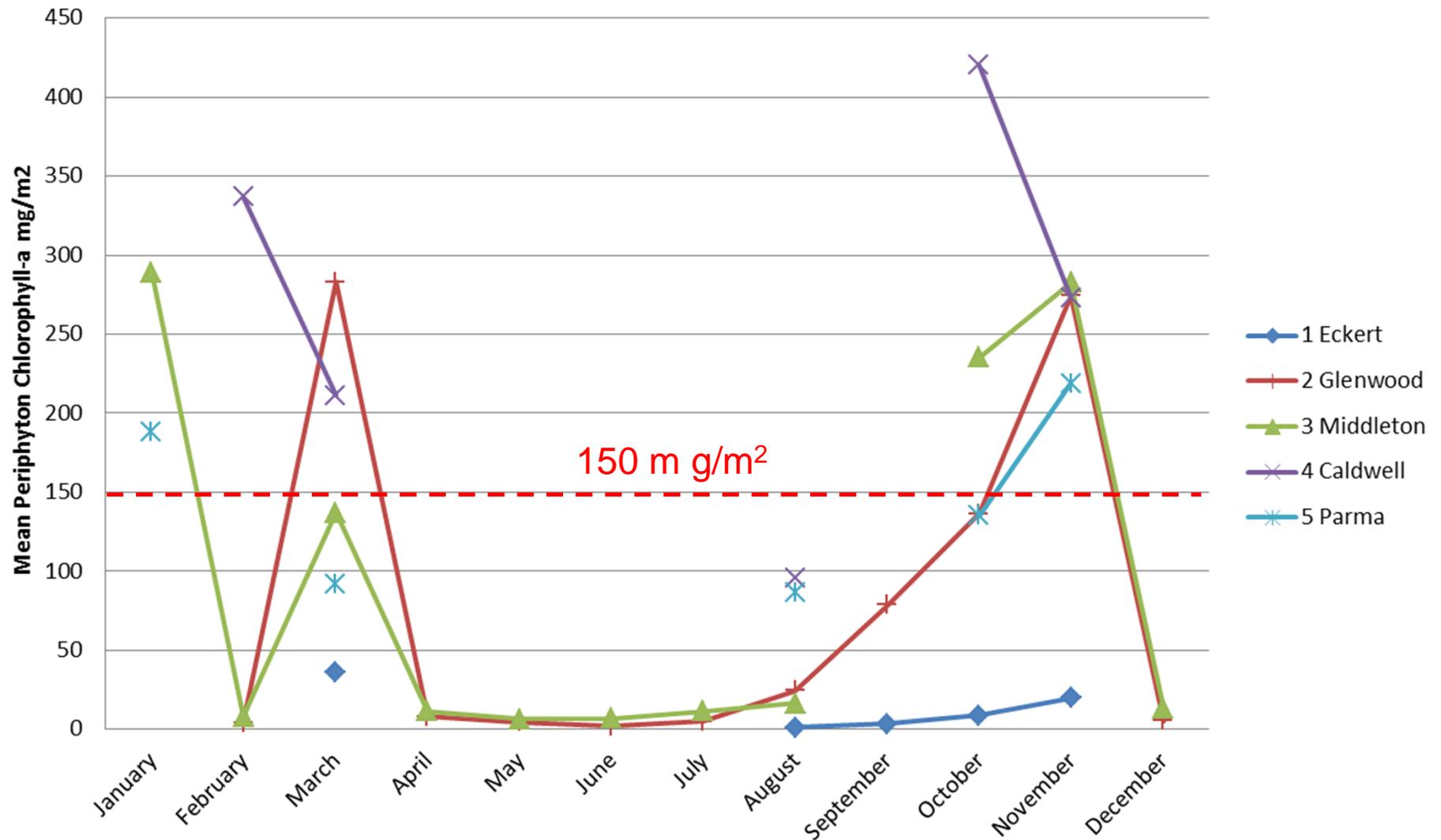


300 mg Chl a /m²

Source: *Overview of Montana's Draft Numeric Nutrient Criteria and their Implementation*. Suplee, M. July 26, 2013. Board of Environmental Review Meeting.

LBR Data

Mean Benthic Chlorophyll-a Values on the LBR

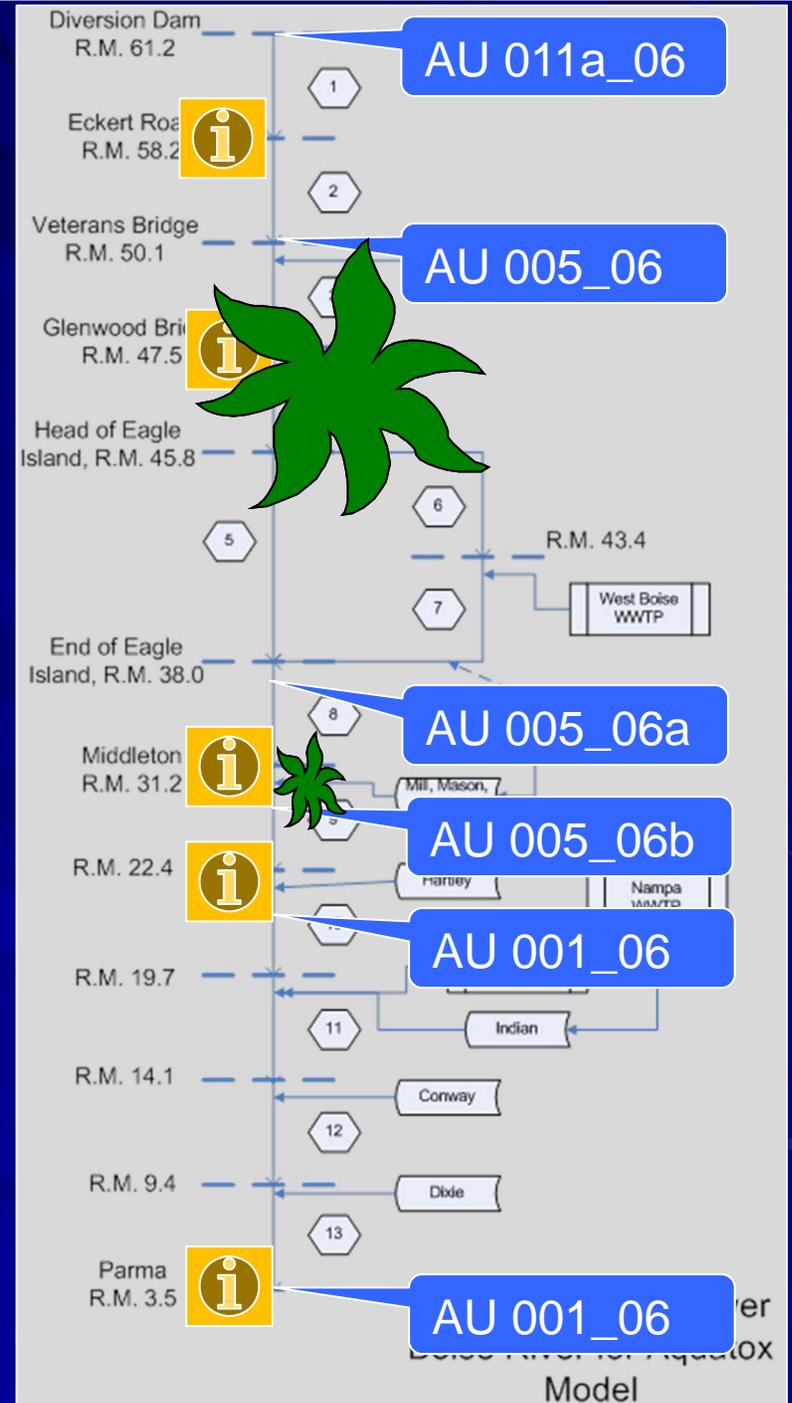


LBR Data – cont'd

Historical Monthly Mean Benthic Chl a Biomass on the LBR (mg/m ²)												
-number of samples in orange-												
Station	January	February	March	April	May	June	July	August	September	October	November	December
1 Eckert			36.0					1.0	3.3	8.7	19.8	
			1					4	3	23	12	
2 Glenwood		4.2	283.0	8.1	4.6	2.0	4.9	24.6	78.5	136.4	274.2	5.2
		3	1	7	2	3	2	8	2	27	5	4
3 Middleton	289.0	7.8	137.0	11.6	6.4	6.7	11.5	16.2		235.2	282.6	13.2
	1	3	1	6	2	2	2	8		17	16	4
4 Caldwell		337.0	211.0					95.9		420.2	272.9	
		1	1					4		13	15	
5 Parma	188.0		92.0					86.7		135.1	219.0	
	1		1					4		13	10	

Location

- ATOX Modeling
 - Mean target applied to each ATOX segment
- TMDL Development
 - Modeling to guide TP LAs/WLAs for AUs
- TMDL Implementation
 - Mean target as indicator of impairment for each AU



Frequency & Duration

■ ATOX Modeling

- Mean target applied monthly (or seasonally)
- Help identify likely target exceedance periods

■ TMDL Development

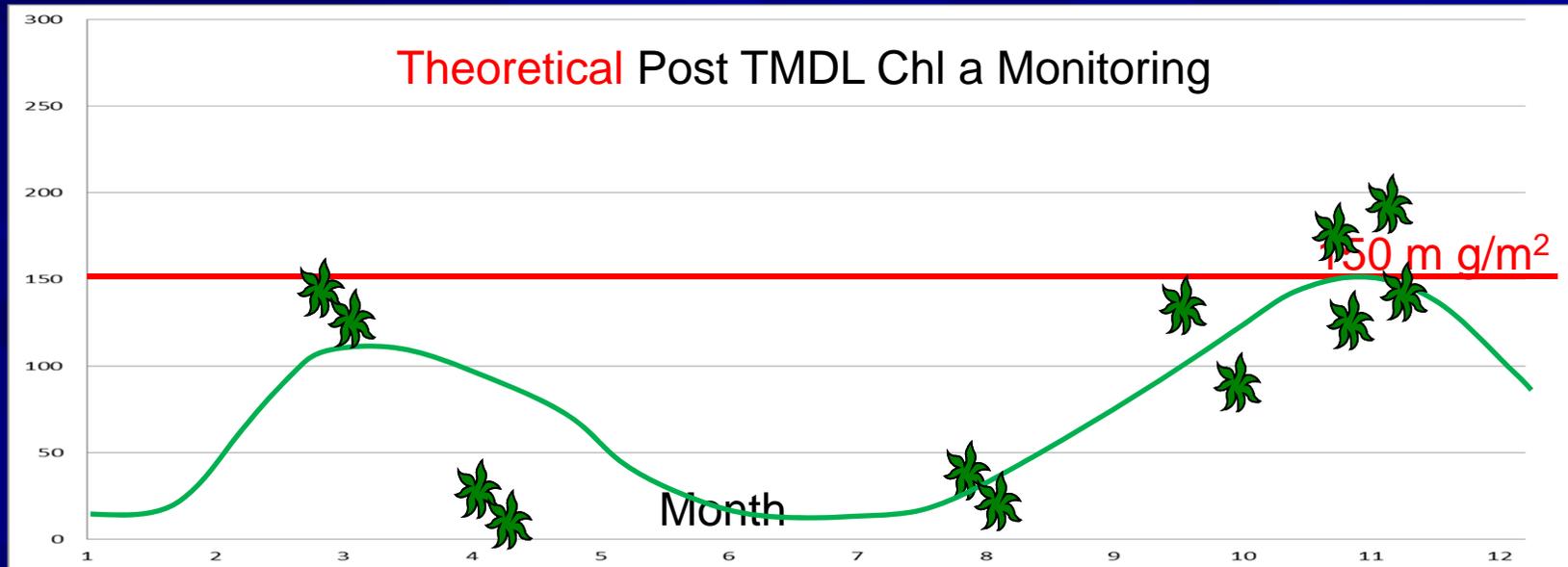
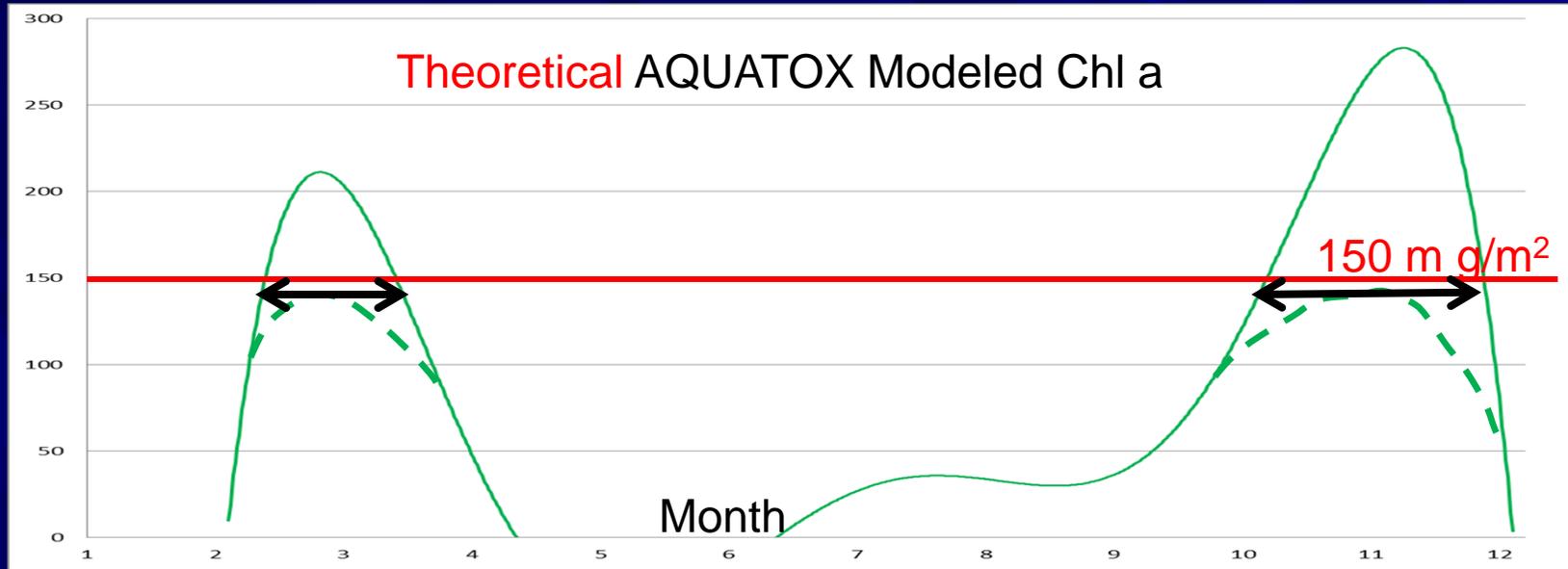
- Chl a relationships to guide TP LAs/WLAs

■ TMDL Implementation

- Mean target as indicator of impairment for each month (or season) during critical periods

Frequency & Duration – cont'd

Chl a Avg/Mo.



Arithmetic vs. Geometric Mean

- Geomean is more appropriate for:
 - Percentage change, population growth, diversity indices, etc.
- Arithmetic mean is more appropriate for:
 - Average or middle frequency range
- Geometric mean is always less than or equal to the arithmetic mean

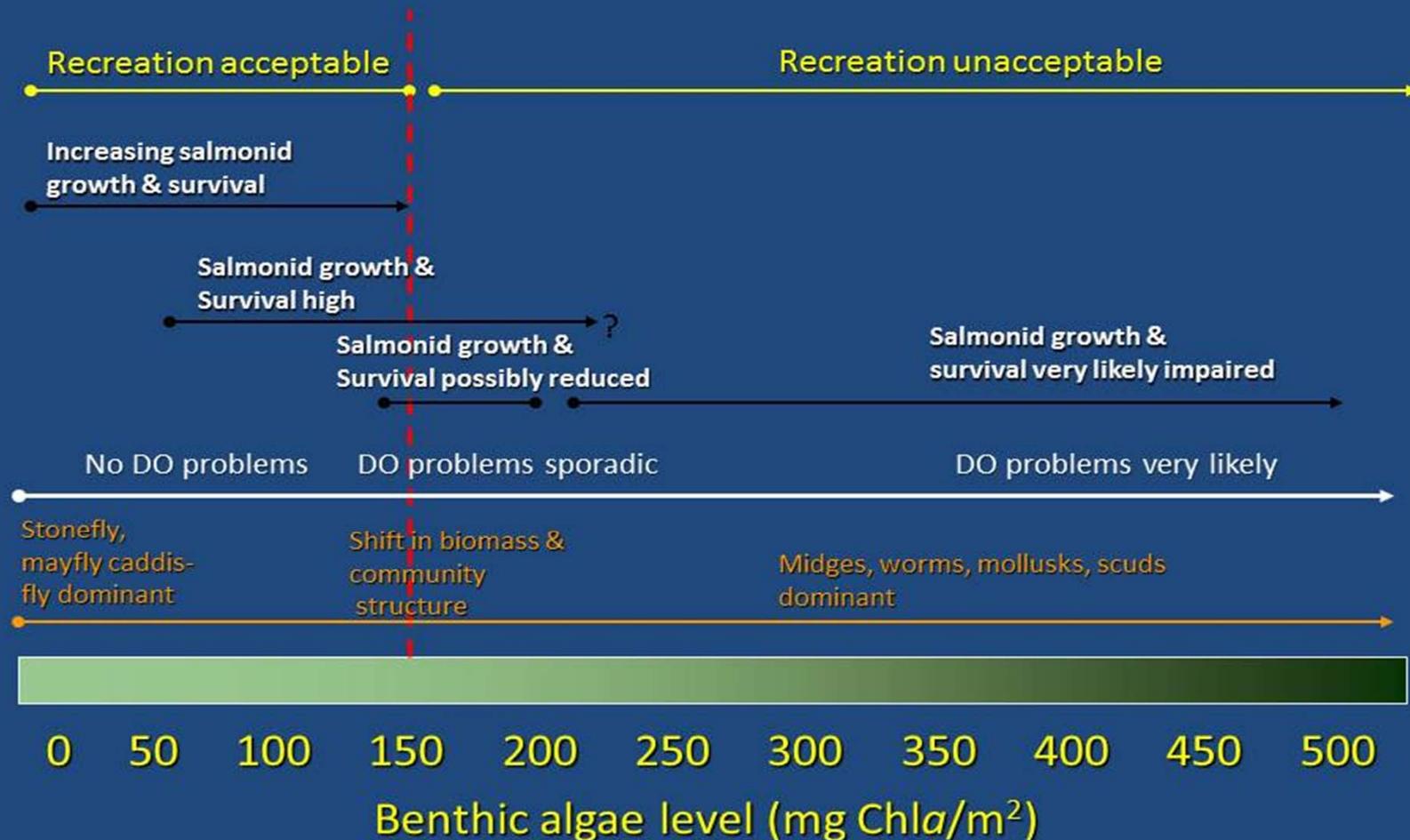
Part II.b.

Maximum Benthic Chl a Target

- A max benthic chlorophyll-a biomass target of ≤ 200 mg/m²
 - Not applied during AQUATOX Modeling
 - Not applied in development of TMDL LAs/WLAs
- TMDL Implementation
 - Max target as indicator of impairment not potentially captured through use of mean target

Ecological Implications

Known/likely effects on wadeable-streams at different algae levels (western MT)



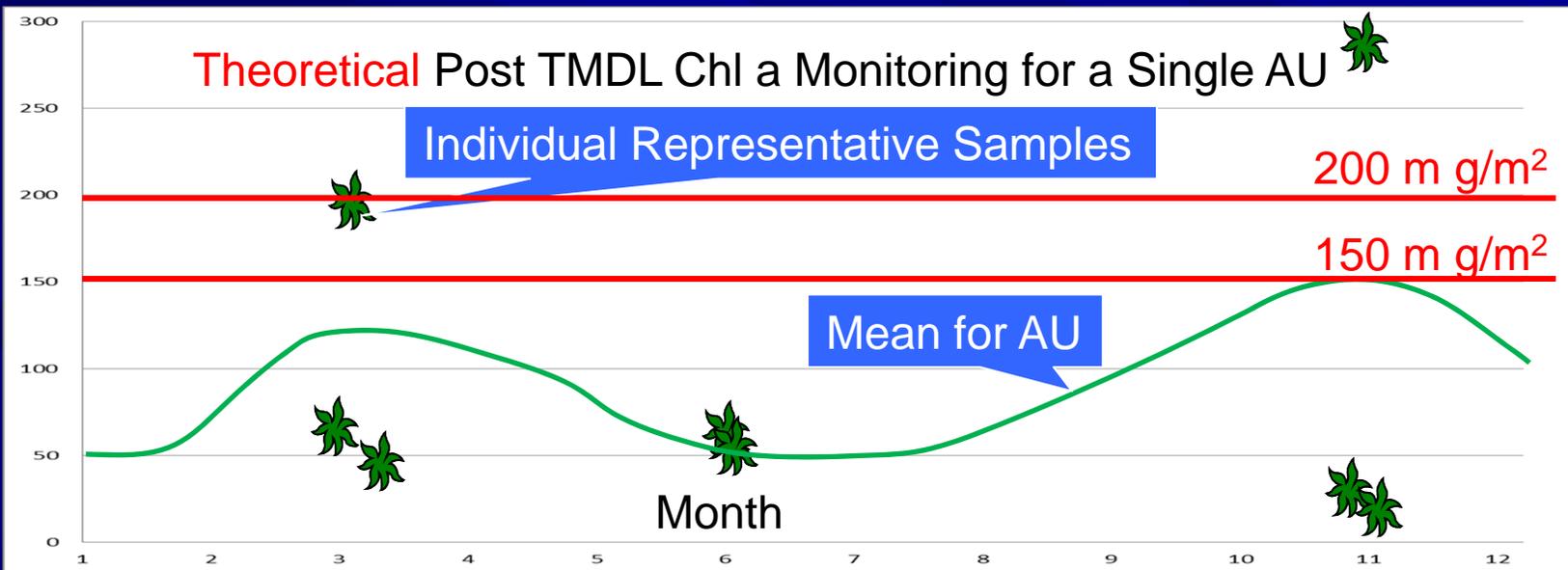
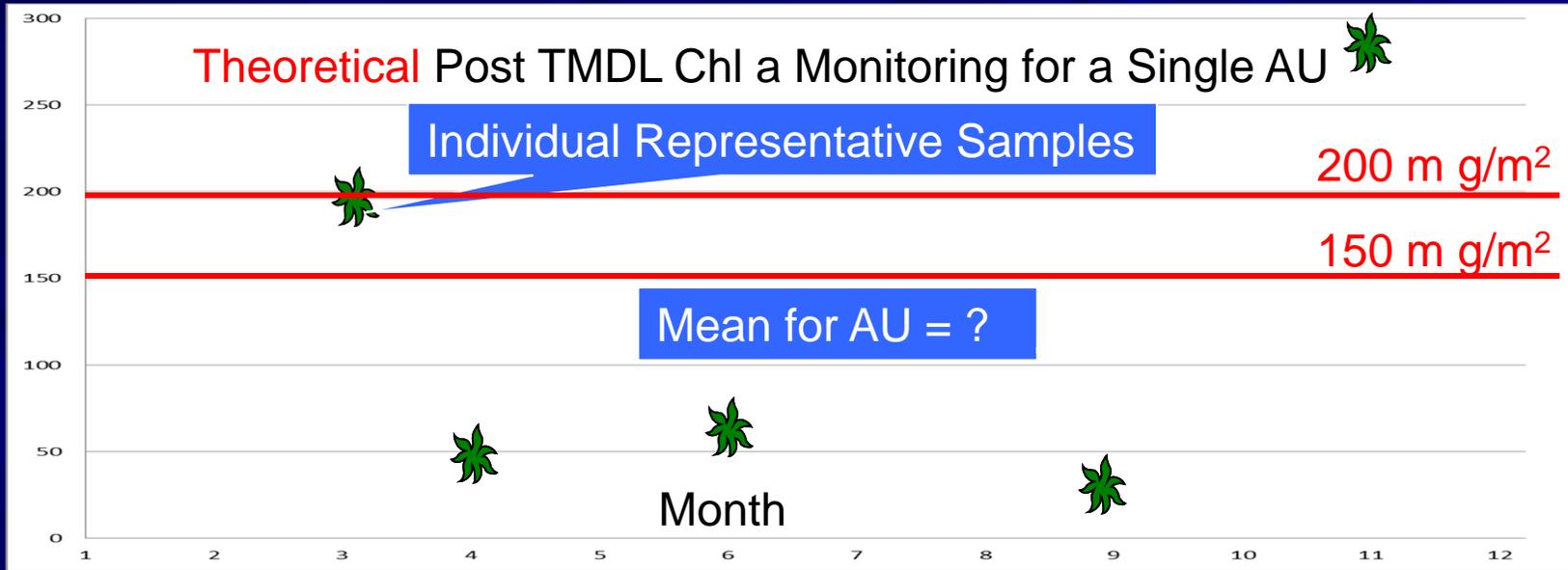
Source: *Overview of Montana's Draft Numeric Nutrient Criteria and their Implementation*. Suplee, M. July 26, 2013. Board of Environmental Review Meeting.

LBR Data – cont'd

Site	Number of Years Sampled by Month (Red = Benthic Chl a > 200 mg/m ²)											
	Jan	Feb	March	A	M	J	J	A	S	Oct	Nov	Dec
Eck.			1					2	2	9	5	
Glen. Year		3	1/1 (13)	5	2	3	2	5	2	3/10 (96, 98, 03)	3/3 (99, 05, 06)	4
Midd. Year	1/1 (02)	3	1	4	2	2	2	5	0	4/9 (95, 96, 00, 12)	4/6 (98, 99, 04, 06)	4
Cald. Year		1/1 (02)	1/1 (13)					2		6/7 (96, 00, 02 03, 07, 12)	4/5 (98, 99, 04, 06)	
Parma Year	1		1					2		2/7 (00, 07)	3/6 (98, 99, 08)	

Max Target – cont'd

Chl a Biomass Sample



112

152

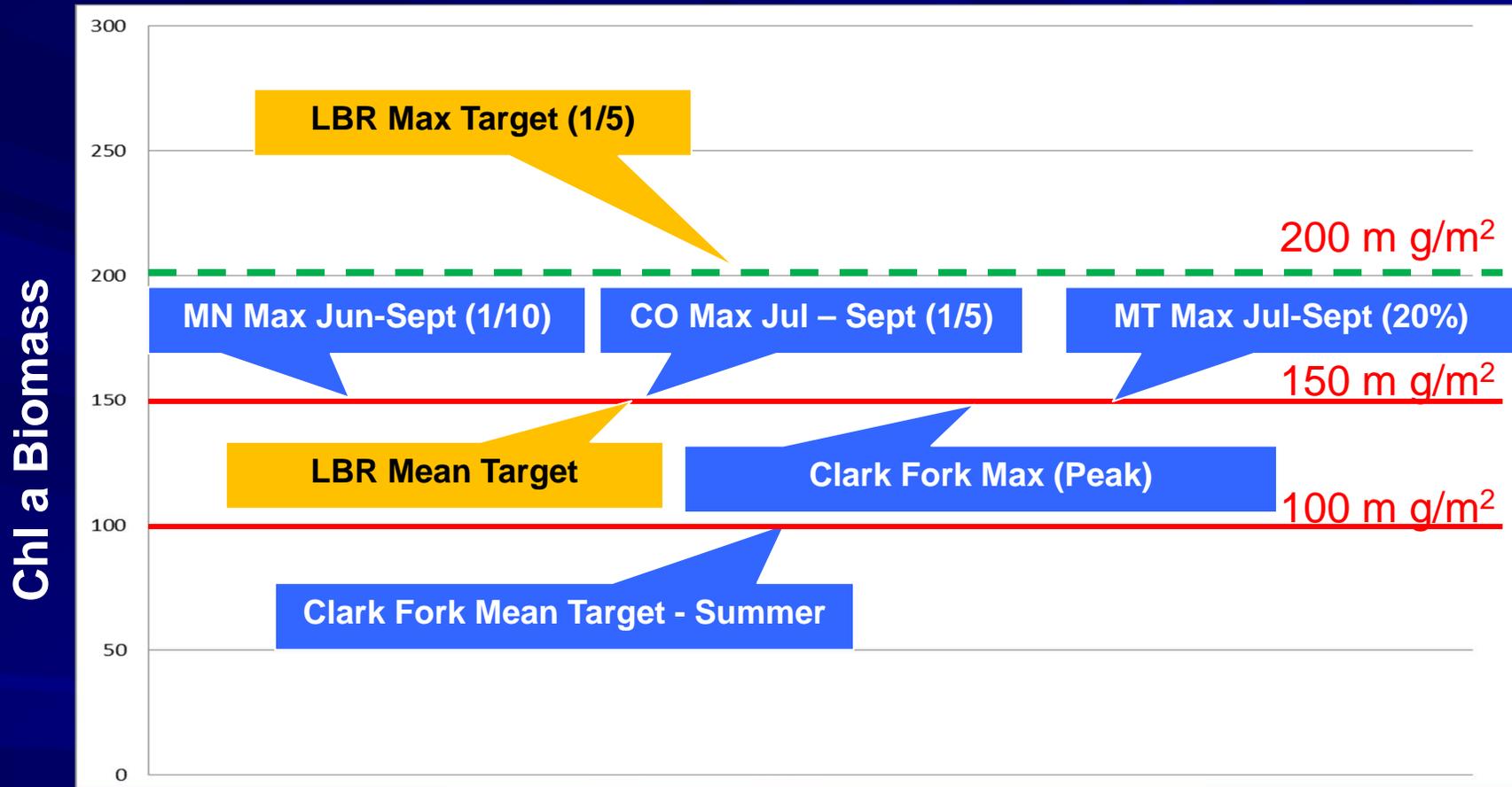
299

235

202

Source: 2009. Suplee et al. *How green is too green? Public opinion of what constitutes undesirable algae levels in streams.* JAWRA 45(1):123 – 140.

LBR vs. Other Waters



Recommendations

- A mean benthic chlorophyll-a biomass target of $\leq 150 \text{ mg/m}^2$
 - ATOX segments (Modeling) and AUs (TMDL)
 - Monthly (or seasonal) basis
 - During critical periods (TBD)
- A maximum benthic chlorophyll-a biomass target of $\leq 200 \text{ mg/m}^2$ (1/5 year exceedance allowed)
 - Applied during TMDL implementation as indicator of impairment
 - Not applied to LA/WLA allocations

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