

LOW COST NUTRIENT REMOVAL IN MONTANA



GRANT WEAVER, PE & WWTP OPERATOR

PRESIDENT

g.weaver@cleanwaterops.com



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Nitrogen & Phosphorus Removal in Montana



Comparing Nutrient Removal at Montana wwtps

Advanced (BNR) wwtps

	total-N <u>(mg/L)</u>	total-P <u>(mg/L)</u>
Bozeman	5	0.3
Missoula	9	0.2
Kalispell	8	0.2
Lewistown	2	1.0

Combined cost: \$70,000,000

Conventional wwtps

	total-N <u>(mg/L)</u>	total-P <u>(mg/L)</u>
Chinook	3	1.2
Conrad	7	0.15
Hardin	5	2.4
Hamilton	3	4.0

Combined cost: \$20,000



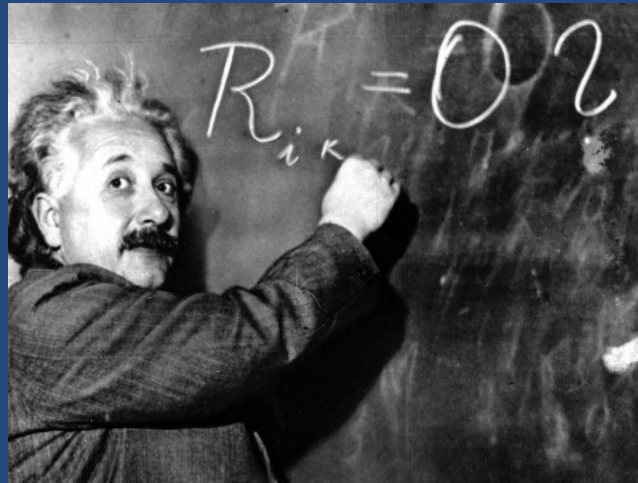
Nutrient Removal Training

Science

Engineering Strategies

Case Studies

Class Exercises



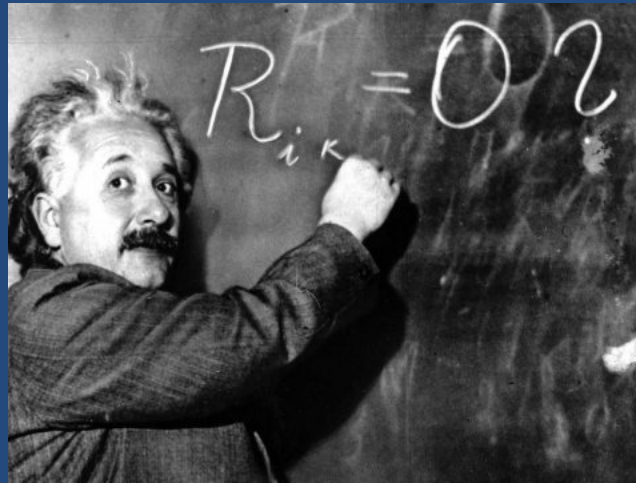
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Technical Support

Site Visits

Process Control Plan

Consultant Support

DEQ Support



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***RAISED EXPECTATIONS
EMPOWERMENT
RECOGNITION***

Technical Support

Site Visits

Process Control Plan

Consultant Support

DEQ Support

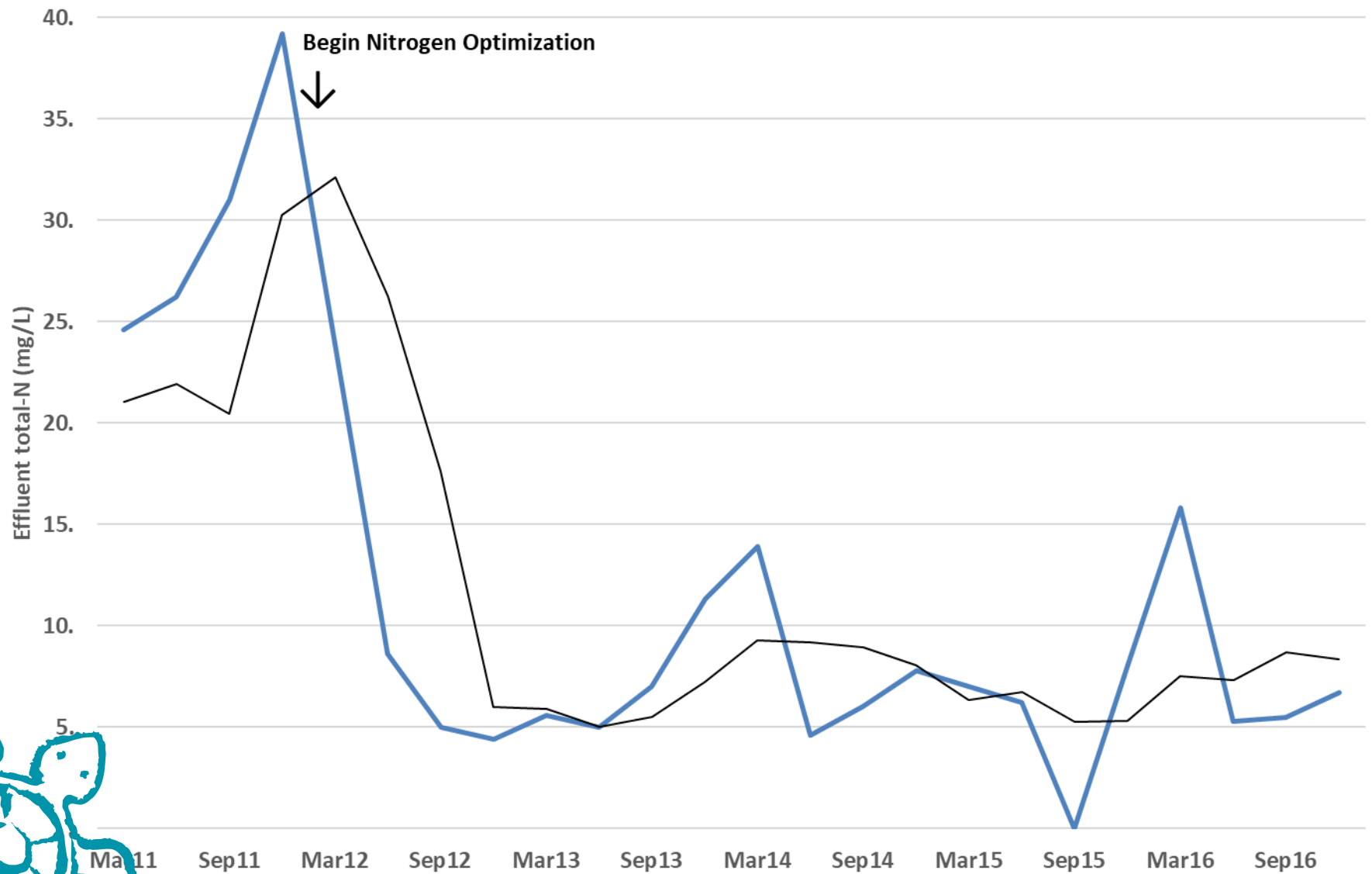


*Conrad, Montana
(0.5 MGD: 2,600 people)*



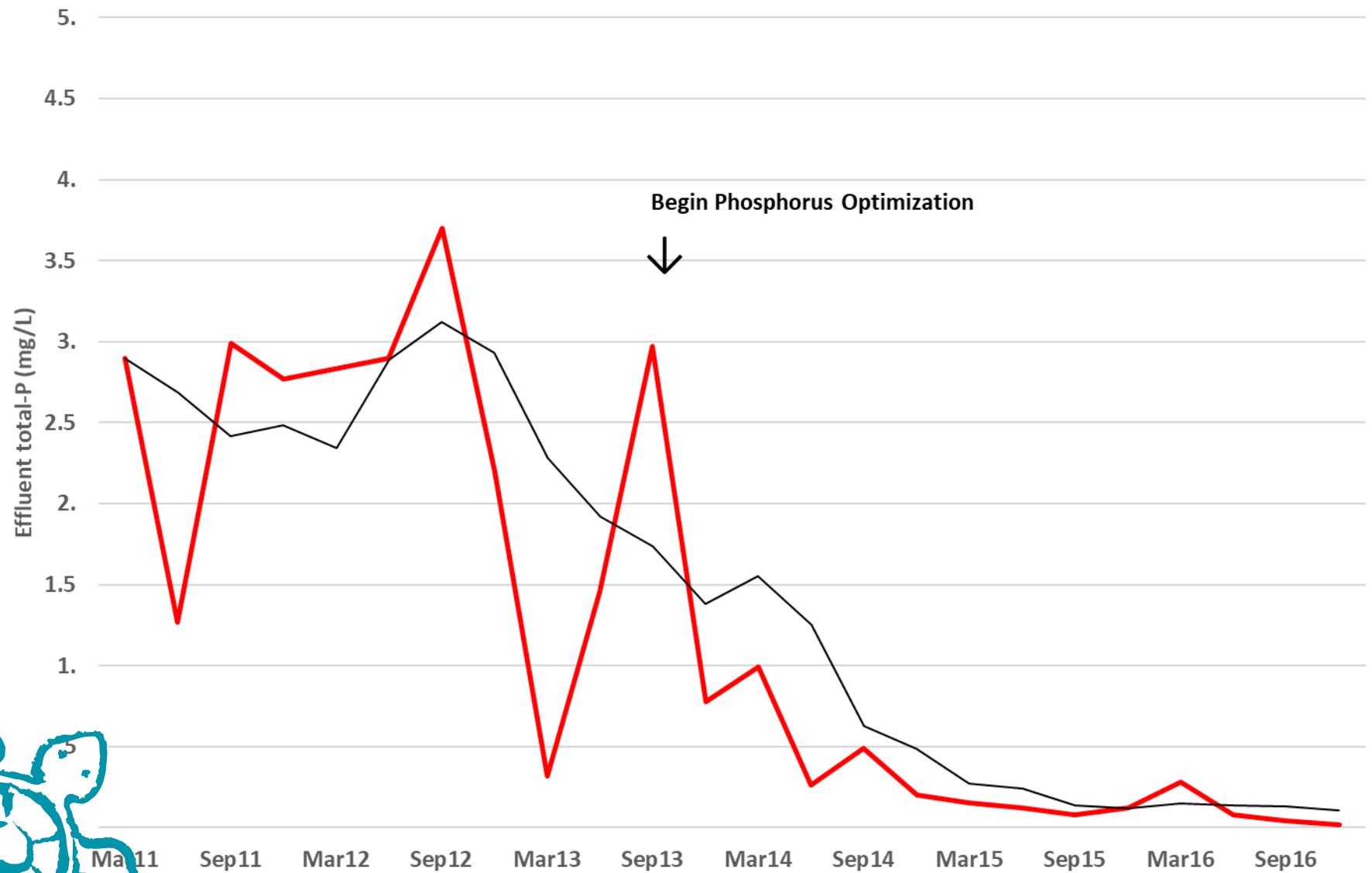
Conrad, Montana

Effluent total-N (Daily Composites collected Quarterly)
2010-2016



Conrad, Montana

Effluent total-P (Daily Composites collected Quarterly)
2010-2016



Opportunities for State & Federal Regulators

Training:

- Operators

- State & Federal Staff

Redefine Wastewater Inspections:

- Support Process Changes, including non-O&M Manual practices

- Technology Transfer

Regulator/Operator Partnership

Reward Excellence (“Need” vs. Compliance vs. Excellence)



Opportunities for Permit Writers

Annual Reporting on Optimization Efforts (MA / EPA Region 1)

Optimization Studies (MT & TN)

Optimize: Implementation (MT)

Modify/Delay Numerical Limits per Optimization Results (TN)

Support and Empower Optimization Efforts



Discussion

High expectations are the
key to everything.

~Sam Walton
From: RaiseYourMind.com



g.weaver@cleanwaterops.com



Montana

Bigfork
Big Sky
Billings
Boulder
Bozeman
Chinook
Colstrip
Columbia Falls
Conrad
Dillon
East Helena
Forsyth
Glendive
Hamilton
Hardin
Havre
Helena
Kalispell
Lafayette
Laurel
Lewistown
Libby
Lolo
Miles City
Missoula

Wyoming

Laramie

Connecticut

Colchester-East Hampton
East Haddam
Farmington
Groton
New Canaan
New Hartford
Plainfield
Portland
Suffield
Windham

Massachusetts

Amherst
Barnstable
Easthampton
Greenfield
Montague
Newburyport
Northfield
Palmer
South Deerfield
South Hadley
Sunderland
Upton
Westfield

New Hampshire

Keene

Kentucky

Hopkinsville

South Carolina

Greeneville

Tennessee

Athens
Baileyton
Bartlett
Collierville
Cookeville
Crossville
Humboldt
Lafayette
LaFollette
Livingston
Millington
Missoula
Nashville
Norris
Oak Ridge

Texas

Nottingham MUD (Houston)



Nitrogen Removal without Facility Upgrades



	<u>t-N Before</u>	<u>t-N After</u>
Suffield, CT	7	2
Chinook, MT	26	3
Hardin, MT	18	5
Montague, MA	30	5
Cookeville, TN	25	5
Upton, MA	22	6
Conrad, MT	35	7
Big Sky, MT	25	8
Plainfield, CT	25	10
Colchester-East Hampton, CT	24	12
Libby, MT	32	21



Phosphorus Removal without Facility Upgrades

	<u>t-P Before</u>	<u>t-P After</u>
Conrad, MT	2.1	0.15
Westfield, MA	1.0	0.5*
Palmer, MA	0.65	0.65*
Montague, MA	3	0.9
Cookeville, TN	3	1.3
Chinook, MT	2.8	1.2
Athens, TN	3	1.8*

*chemical reduction of 50% or more

