

Regulatory Experiences from the Headwaters State of Colorado—This May Be Your State Next



- **Colorado is the headwaters state for three main river basins:**
- Colorado River Basin—flows out of the central Rocky Mountains. At Lee's Ferry in Arizona it becomes the upper and lower Colorado river. The river ultimately dumps into the Gulf of California. The Colorado Compact consists of upper and lower agreements; 1) Upper is between Co, NM, Utah, Wyoming & very small % Arizona 2) Lower is Nevada, Arizona and California
- Rio Grande River Basin--flows from southwestern Colorado to the Gulf of Mexico. The Rio Grande Compact is between Colorado, New Mexico and Texas
- Arkansas River Basin-flows from Rocky Mountains Collegiate Peaks to Kansas and then Oklahoma and Arkansas.

Colorado Does Some Heavy Lifting

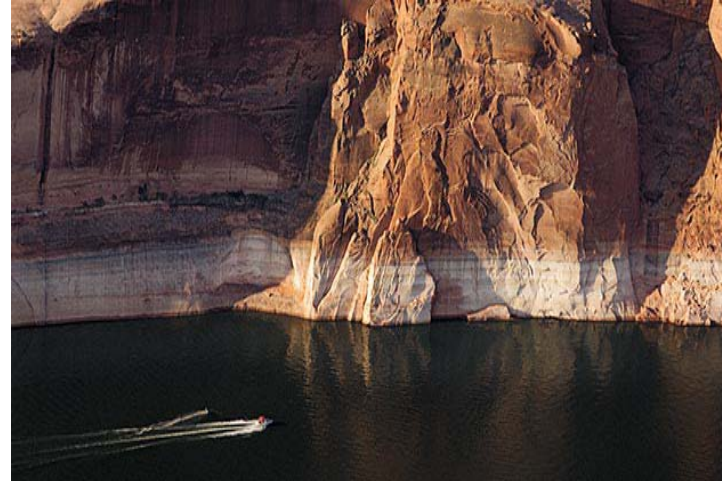
- Many Colorado water quality standards staff believe because Colorado is the headwaters state we owe the other states and users downstream the cleanest water we can provide.
- Is this realistic?

The Saga of Nutrients

- January 9, 2001 Federal Register Notice; EPA recommends states and tribes develop a nutrient criteria to be implemented in 2004
- Colorado Water Quality Control Division (Division) initially began their work on nutrients in 2004
- Geoffrey Grubbs, Director for EPA's OST sent memo to state administrators with additional guidance and *flexibility* in developing plans
- Colorado began a nutrient work group with intention of separating lakes/reservoirs and rivers/streams



- Colorado has initial thoughts on developing nutrient criteria:
 - Fully reflect localized conditions and protect specific designated uses utilizing EPA's technical guidance
 - Develop a Unique System
 - Begin collecting data
 - Define "expected condition"
 - Link data to the "designated uses"



- Existing approach for reservoirs (Control Regulations) using Chl-a as the measurement for P and N
- Isolate streams and wadeable rivers
- Data gathering to include: total Nitrogen, total Phosphorus, Chlorophyll α and Periphyton
- physical habitat data included bank stability, slope, riparian integrity, flow, stream substrate
- Macroinvertebrates data was being collected.

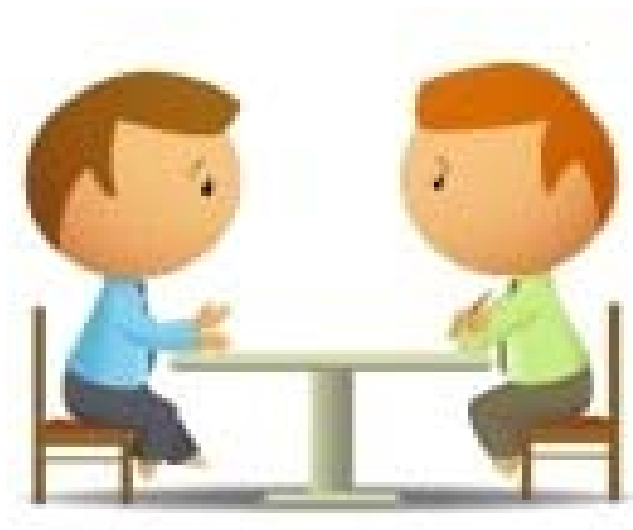
Spring Forward to 2006



- The Division announced plans to develop their approach with the intent of having **numbers** to propose for the next Basic Standards Triennial Review in **2010**. The announcement included their plans to develop numeric criteria for rivers/streams

- The Division let stakeholders know they had already initiated an incremental approach to the development of nutrient criteria
- Their premise was excessive algal abundance is the **principal** agent of impairment.
- Thresholds for the concentration of chlorophyll, a practical measure for algal abundance, would be used to identify potential threats to Uses. Where threats are perceived, a site-specific linkage between chlorophyll and phosphorus would be used to implement controls. i.e. numeric standards

The Issue Scoping Hearing for Basic Standards would be in
October 2008.



2007 The Division Was Still working on Conceptual Plans

Reference criteria and use of a descriptor methods.

Division Continues on Path

- The Division announced they were using the same approach to regulate lakes/reservoirs and rivers/streams
- MMI (multimetric index) to determine health of macroinvertebrates
- Use of literature chosen by Division that described mechanisms which link nutrients to the health of the macroinvertebrate community.
- Total P and total N concentration data from Colorado streams along with the bioassessments used to derive the numeric thresholds in three steps – characterization of unimpacted conditions (anchor point), definition of the stressor-response relationship, and threshold setting (proposed 85th percentile due to past usage for ambient conditions)

Summer of 2007

- The Division presented a very ambitious schedule. It included all data evaluation, evaluation of MMI with real data, gather other states approaches (few existed), review fish data, prepare for Commission hearing to be completed in June 2010.

Nutrient Criteria Development Schedule Table 2 (Revised)			
Milestones and Proposed Schedule for Nutrient Criteria Development			
Waterbody Type	Task Description	Product	Date
L/R ₁	L/R Acquire information from CDOW regarding "High Quality" fisheries		Aug-07
R/S ₂	R/S Acquire nutrient & biological info datasets		Ongoing
L/R	L/R Acquire chlorophyll a and profile (temp, nutrients, DO, depth) datasets		Ongoing
R/S	R/S Test approach on available data		October 07
L/R	L/R Test approach on available data		October 07
both	Evaluate approach	Present results of approach testing	October 23, 2007
both	Revise approach if necessary	Prepare draft methodology documents	January 08
both	Data processing of third-party data		Ongoing
L/R	Review "Multiple criteria with trigger-levels" approach (eg Arizona) lake nutrient standards and evaluate for use in Colorado	Written evaluation and discussion at stakeholder meeting.	March 08
R/S	R/S Develop relationship for N&P vs MMI and O/E for Plains, Xeric, Mountain regions (coord w/ RALUC's effort)	Refine draft methodology document.	Nov 07 - Sept 08
L/R	L/R Develop relationships for Chlorophyll a vs "fishery quality" for lakes and reservoirs based on elevation strata.	Refine draft methodology document.	Nov 07 - Sept 08
both	Conduct precision analysis on sites with multiple years of data		Nov 07 - Sept 08
L/R	L/R Develop linkage between chlorophyll and nutrients (response ratio).		Nov 07 - Sept 08
both	Reg #31 Issue Scoping Hearing	Describe approach, initial relationships and	October 08

Stakeholders Address Concerns

- POTWs do not generate Phosphorous
- Very little **total** loading of P is discharged from most POTWs
- Concerned regulators may look exclusively at POTWs/permitted point sources to achieve nutrient reductions in receiving waters
- Other contributors should be considered – Ag, urban runoff, etc.
- Nutrient removal poses extreme operational challenges for POTWs
- Consider Site Specific standards for site specific Uses (water supply, aquatic life, recreation)
- Concern for Listing for Impairment

What Stakeholders Requested

- Frequent, regularly scheduled meetings
- More stakeholder input and attendance at meetings: Ag, industry, stormwater, environmental groups, CAFOs, others
- Access to data and Divisions' evaluations of it
- Consideration of alternative approaches that would be approved by EPA
 - Arizona narrative standard as a framework
 - Implementation using numerics
- SLOW DOWN THE PROCESS

Issues We all Agreed On



- Data is important
- Method is important
- Interpretation of data is important
- Causal agent is important
- Relationship between chl-a and P is important
- Nutrients can cause degradation in streams/rivers and lakes/reservoirs

Issues We Could Not Agree On (and there were a lot)



- Who was going to develop answers
- Do we need a numeric standard for nitrogen
- Method for developing the criteria
- Does the presence of algal matter prove P or N is the culprit
- Unintended consequences—treatment causes other problems
- State Standards vs. site specific standards only
- How much responsibility does Ag and non-point need to own
- What about all the other causes of stream and lake deterioration
- Who's going to pay the bill
- What about low income areas, small towns, large rivers small discharges?

- Is Chl-a the best translator
- Is there really enough data from all basins, elevations, population areas, ag areas and eco-regions
- Is development of a “plan forward” a better solution for the 2010 hearing
- Is EPAs’ commitment to accelerate the pace on nutrient criteria development and implementation for all western states or just us
- Is the Divisions’ use of literature the best sources
- Can we use Total Inorganic Nitrogen in lieu of TN
- Etc. etc. etc.

Groups Began to Forum

Colorado Nutrient Coalition (CNC) made up of many POTWs, water purveyors, non-point sources, some Ag and industry was formed. It had over 100 members. Tad Foster/John Hall hired

Environmental Representatives

Metro Reclamation District Makes Proposal

Metro WW proposed new option-- Control Regulation for lakes/reservoirs and rivers/streams. It would be based on best available technology.

The Division was warm to the proposal and began working on it.

Water and Power Authority

- Responsible for making loans through revolving funds
- Concerned money would not be available for these new regulations
- Requested delay in hearing and \$400,000 money from funds to hire contractor to conduct state wide cost/benefit analysis
- Commission concurred and so began the c/b analysis
- Delayed hearing till June 2012

Benefit -Cost Summary for the State of Colorado, 2014 through 2038, Present Value 2010 Dollars

	Tier 1--85	Tier 2—31 existing	Tier 3—31 new
Total Benefits	\$1,944,370,000	\$2,359,916,000	\$3,360,269,000
Total Cost	\$2,432,228,000	\$4,977,881,000	\$24,898,027,000
Net Present Value	(\$487,858,000)	(\$2,617,967,000)	(\$21,537,757,000)
Benefit-Cost Ratio	0.8 : 1	0.47 : 1	0.13 : 1

CNC Goes to the Legislature

**HOUSE JOINT RESOLUTION CONCERNING COST-EFFECTIVE
NUTRIENT REGULATION IN COLORADO WATERS**

- Results of Resolution:
- Yes from the House
- No from the Senate
- Ultimately did not stop the process but the Division was forced by the resolution to provide regular updates

Hearing June 2012; Final Outcome

- Two regulations adopted-Regulation 31 and 85
- Regulation 31.17 interim numerical values for phosphorus, nitrogen and chlorophyll-a
- chlorophyll *a* value of 5.0 ug/L to **protect human health** in DUWS lakes
- 150 mg chlorophyll *a* / m² for the abundance of benthic periphyton (attached algae) for **protection of the recreational use in rivers and streams.**
- interim numerical values for total nitrogen (TN) and total phosphorus (TP) in Colorado's rivers and streams. Values represent annual median concentrations with an allowable exceedance frequency of once in five years.

- Numbers were created by using Colorado's Multimetric Index (MMI) and total taxa metric to measure the "health" of the macroinvertebrate community.
- Median MMI defines typical biological condition in unimpacted sites. The 85th percentile of the TN and TP concentration was used as the *anchor point nutrient level* since that statistic commonly has been used in Colorado to characterize the existing ambient condition. Anchor point is based on little or no human disturbance
- Interim values for phosphorus and chlorophyll-*a* will not be used for the adoption of water quality standards for specific water bodies in Colorado prior to May 31, 2022, except as described below. (headwater areas above permitted dischargers)

Regulation 85/Control Regulation

- Contains numeric effluent limitations for domestic wastewater treatment plants and other wastewater dischargers that use active treatment
- Describes steps to be taken by other point source dischargers and nonpoint sources to address nutrients
- Establishes monitoring requirements for point source dischargers which can be used to better characterize nutrient sources and current nutrient conditions

And the Numbers Are.....

- Interim Total Phosphorus Values--

Lakes and Reservoirs, cold, >25 acres	25 ug/L 1
Lakes and Reservoirs, warm > 25 acres	83 ug/L 1
Lakes and Reservoirs, <=25 acres	RESERVED
Rivers and Streams – cold	110 ug/L 2
Rivers and Streams - warm	170 ug/L 2

- summer (July 1-September 30) average Total Phosphorus (ug/L) in the mixed layer of lakes (median of multiple depths), allowable exceedance frequency 1-in-5 years.
- 2 annual median Total Phosphorus (ug/L), allowable exceedance frequency 1-in-5 years.

- Interim Total Nitrogen Values--

Lakes and Reservoirs, cold, >25 acres	426 ug/L 1
Lakes and Reservoirs, warm, > 25 acres	910 ug/L 1
Lakes and Reservoirs, <=25 acres	RESERVED
Rivers and Streams – cold	1,250 ug/L 2
Rivers and Streams - warm	2,010 ug/L 2

- 1 summer (July 1–September 30) average Total Nitrogen (ug/L) in the mixed layer of lakes (median of
- multiple depths), allowable exceedance frequency 1-in-5 years.
- 2 annual median Total Nitrogen (ug/L), allowable exceedance frequency 1-in-5 years.

Reg 85 Existing Dischargers

PARAMETER	PARAMETER LIMITATIONS	
	Annual Median ¹	95 th Percentile ²
(a) Total Phosphorus	1.0 mg/L	2.5 mg/L
(b) Total Inorganic Nitrogen as N ³	15 mg/L	20 mg/L

1 Running Annual Median: The median of all samples taken in the most recent 12 calendar months.

2 The 95th percentile of all samples taken in the most recent 12 calendar months.

3 Determined as the sum of nitrate as N, nitrite as N, and ammonia as N.

Reg 85 New Dischargers

PARAMETER	PARAMETER LIMITATIONS	
	Annual Median ¹	95 th Percentile ²
(a) Total Phosphorus	0.7 mg/L	1.75 mg/L
(b) Total Inorganic Nitrogen as N ³	7 mg/L	14 mg/L

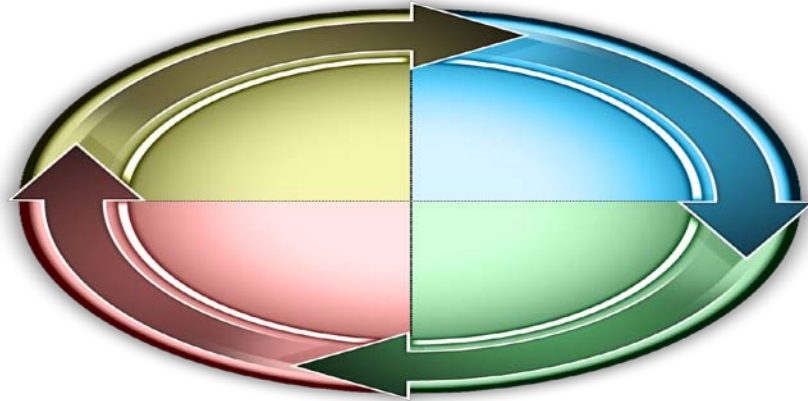
1 Running Annual Median: The median of all samples taken in the most recent 12 calendar months.

2 The 95th percentile of all samples taken in the most recent 12 calendar months.

3 Determined as the sum of nitrate as N, nitrite as N, and ammonia as N.

In the End

- Hundreds of thousands of \$\$ spent directly and indirectly
- Thousands of hours of time committed
- Broken relationships
- Over 300 documents posted to the Work group website—I didn't count the number on the Commission site
- Two and a half days of hearing
- Disappointment in lack of time given to stakeholders at the hearing
- At the end of the day the Division acknowledged the cost exceeded the benefit but decided to go ahead anyway



Circles back to my initial question? Is it realistic for Colorado to do the heavy lifting?

Questions?

Mary Gardner
Environmental Compliance
Manager
Littleton/Englewood WWTP

