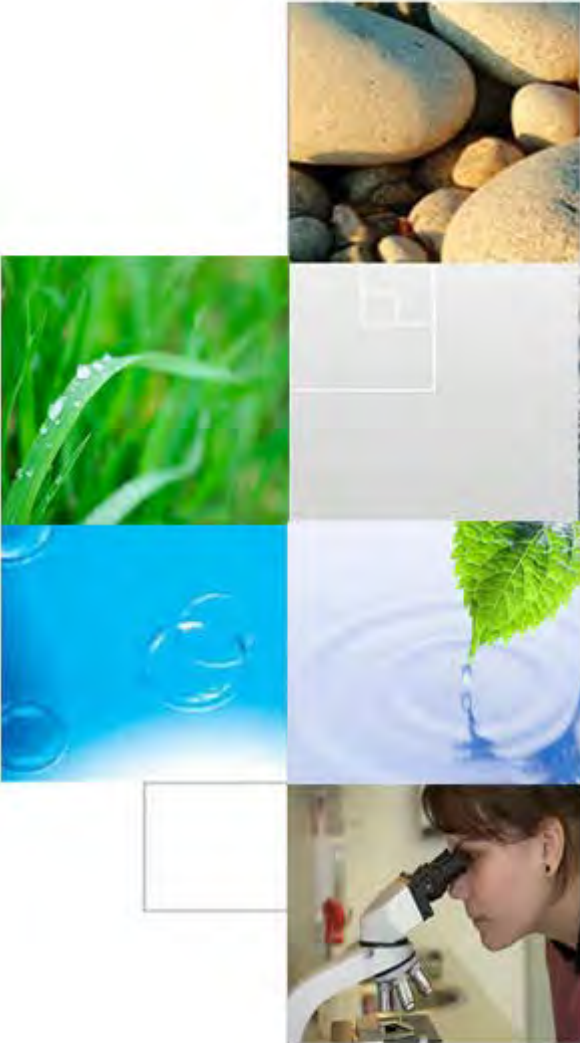


Presented By: Shaun Roark

Basic Standards Workgroup Temperature Issues Summary

CWWUC
13 May 2015





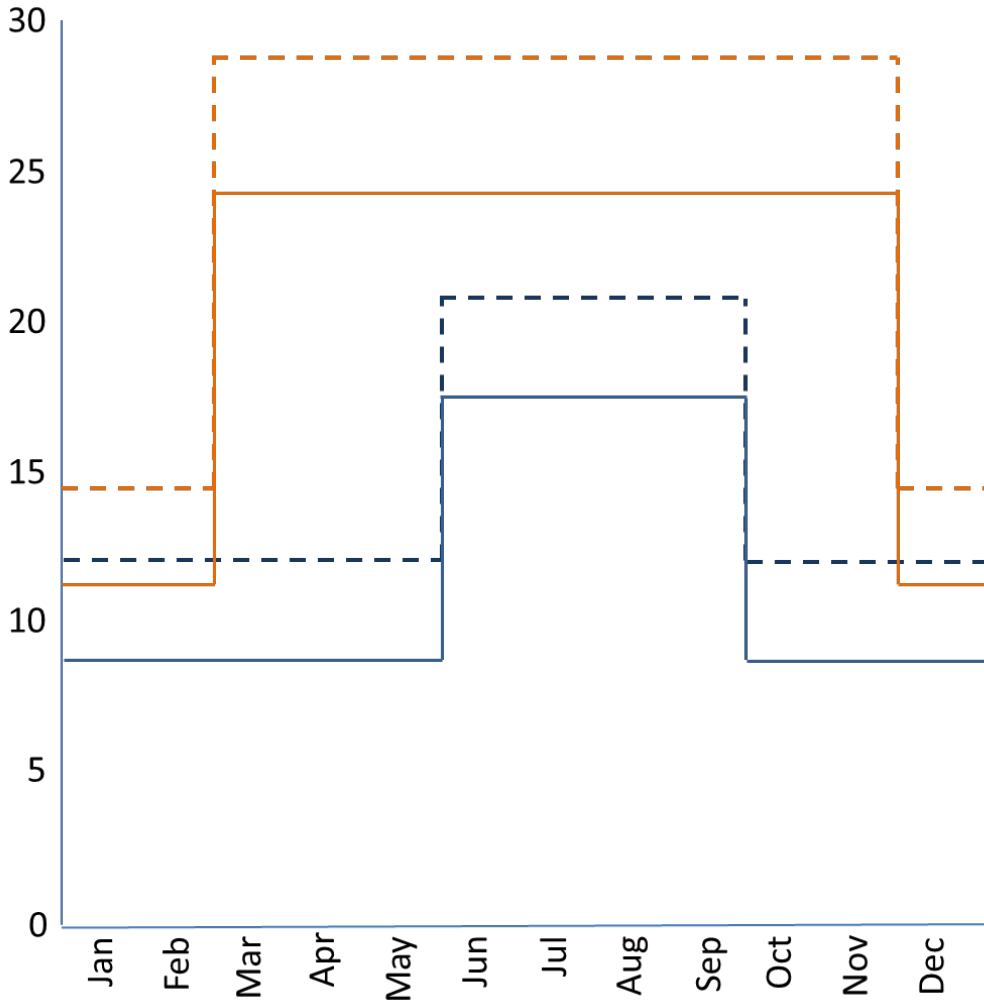
Basic Standards Workgroup

- Monthly meetings
 - October 2014 – Dec 2015
 - April and May cancelled
 - Division work load
 - Temperature database updates
 - Next meeting June 24
- 18 issues for discussion
 - 5 related to temperature



Temperature Standards

Major revision 2005-7; refined in 2010.



Warm Stream Tier 1

Cold Stream Tier 1

- CS-I MWAT
- - - CS-I DM
- WS-I MWAT
- - - WS-I DM





Temp Standards Example

Temperature Tier	Tier Code	Species Expected	Applicable Months	Temperature Standard (°C)	
				Chronic (MWAT)	Acute (DM)
Cold Stream Tier I	CS-I	brook trout, cutthroat trout	Summer June-Sept	95 th centile <u>upper optimum</u> temp	95 th centile <u>upper lethal</u> temp
				17	21.7
			Winter Oct-May	<u>Spawning temp</u> requirement for trout	Max temp for <u>incubation and hatching</u>
				9	13
Warm Stream Tier I	WS-I	common shiner, Johnny darter, orangethroat darter	Summer Mar-Nov	95 th centile <u>upper optimum</u> temp	95 th centile <u>upper lethal</u> temp
				24.2	29
			Winter Dec-Feb	No scientific basis, 50% of summer chronic	No scientific basis, 50% of summer acute
				12.1	14.5



Not shown: CS-II, CL, CLL, WS-II, WS-III, WL



List of Work Group Issues (temperature-related)

1. Definition of Existing Quality¹
2. Acute Values for Winter Season¹
3. Shoulder Season Implementation¹
4. Implementation in Discharge Permits²
5. Warm Water Temperature Standards
Sector-Based Variance²

¹ WQCD lead, ² External party lead



Definition of Existing Quality

- Warmest temperature in a stream
 - Excluding data during allowable exceptions
- Ambient standards, effluent limits, 303d assessment
 - Inconsistencies in implementation
- Maximum Weekly Average Temp (WAT) over a three year period
 - Except high air temp (>90% of monthly max)
 - Except low flows (daily or monthly avg < critical low flow)
 - Except shoulder season excursion days (cold)





Definition of Existing Quality

Division Memo, Nov 18, 2014

Division proposes to modify definition

- Currently: Max WAT in a 3-yr period (does not include allowable exceedence freq)
- Proposed 1: Max WAT with a 3-yr allowable exceedence period
- Proposed 2: Develop a statistic (like the 85th, but not the 85th) that represents exceedence frequency
 - Eliminates need to review excursion data
 - Builds in an exceedence frequency





Existing Quality Problems

Identification of excursion periods

- Time consuming – 2 hrs per segment
- Cannot be automated
- Uncertain – Use regional air temp and nearest flow gage
- WQCD Standards and Assessment not using same approach for excursions





Existing Quality Alternatives

For exclusions, instead of detailed data review WQCD considering:

- Percentile (e.g., 99th or 95th)
- Recurrence Interval of Annual Max
- (Other ambient standards use a percentile approach)



Existing Quality Alternatives

WQCD example



Boulder 75thSt WWTP					
Summer	Maximum	Ambient - excursions	99 th centile	95 th centile	Recurrence Interval
EQ (DM)	27.48	27.32	26.31	24.63	26.69
PEL (DM)	28.63	28.64	28.67	28.72	28.66
EQ (MWAT)	23.63	23.16	23.18	22.07	23.15
PEL (MWAT)	27.77	27.80	27.80	27.88	27.80

Boulder 75thSt WWTP					
Winter	Maximum	Ambient - excursions	99 th centile	95 th centile	Recurrence Interval
EQ (DM)	10.08	9.58	7.77	6.13	8.48
PEL (DM)	14.57	14.60	14.72	14.82	14.67
EQ (MWAT)	5.23	3.23	3.99	3.08	4.34
PEL (MWAT)	14.42	14.56	14.50	14.57	14.48

lowest

highest



Existing Quality Alternatives

Summary

- WQCD proposes to redefine:
 - Allow for 1 in 3 exclusion
 - Percentile or recurrence interval approach?
 - Efficiency and consistency
 - But which one? Scientific or technical basis?
 - Consistency among Standards, Permits, and Assessment



Acute Standards for Winter Warm Water Streams

Division for Workgroup, Feb 19, 2015



“Warm water winter acute temperature standards are set at $\frac{1}{2}$ the summer acute value.

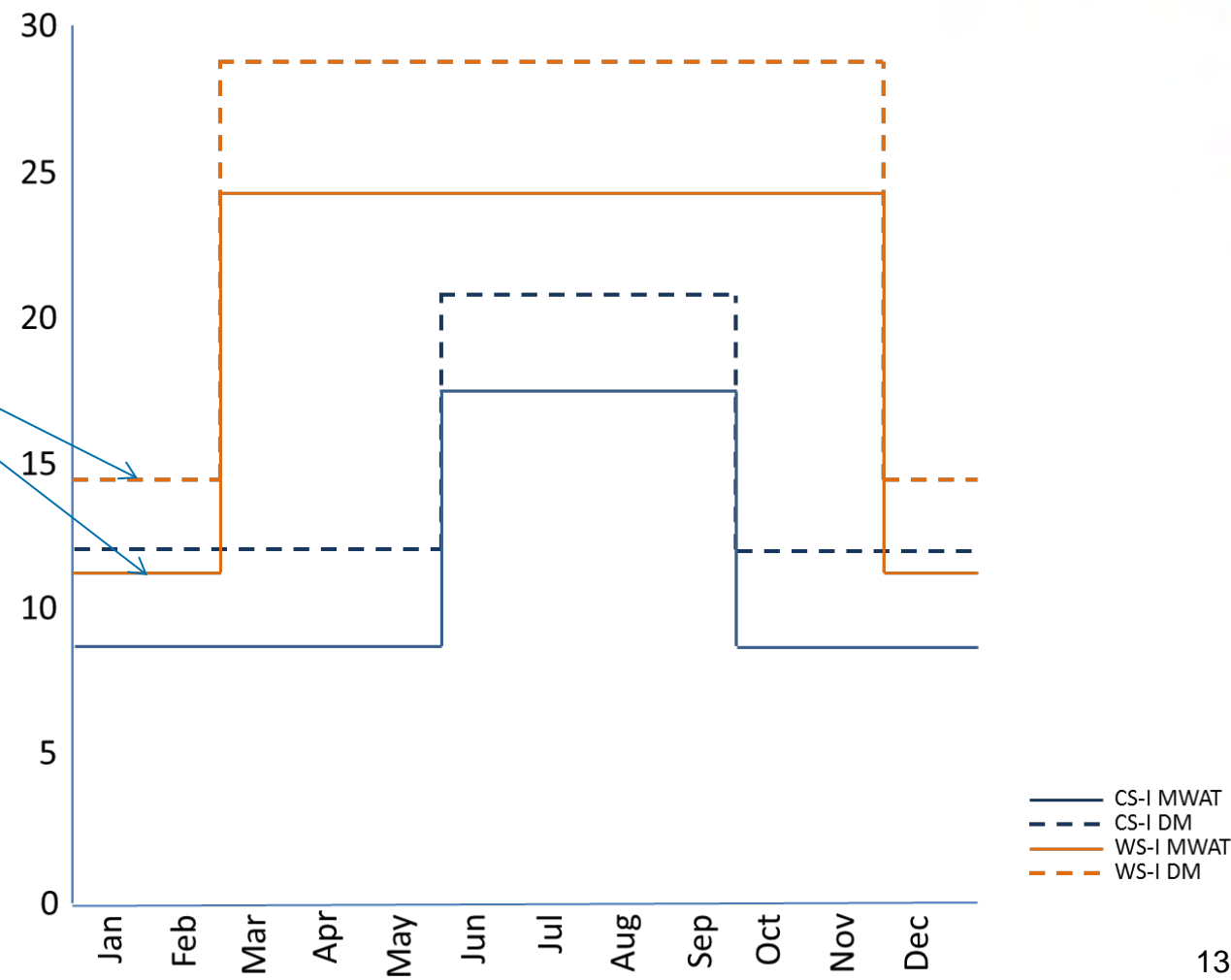
The group has committed to exploring methods to calculate a scientifically-defensible winter acute value...”

Key point: Current WWW acute TVS 14.5°C is not expected to cause acute effects

Acute Standards for Winter Warm Water Streams



No scientific basis,
50% of summer





Winter Acute Std for WW

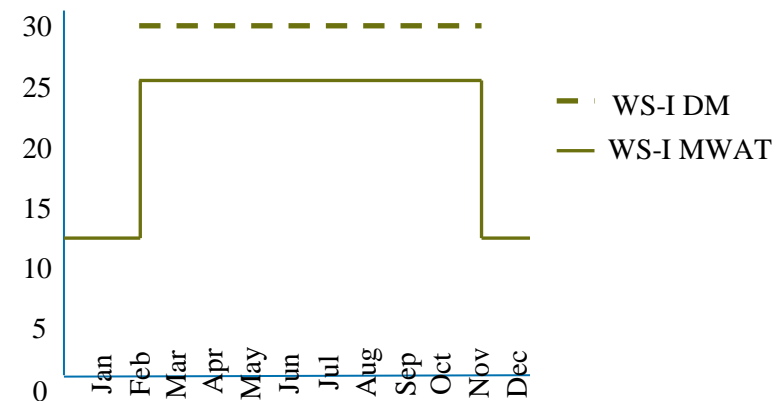
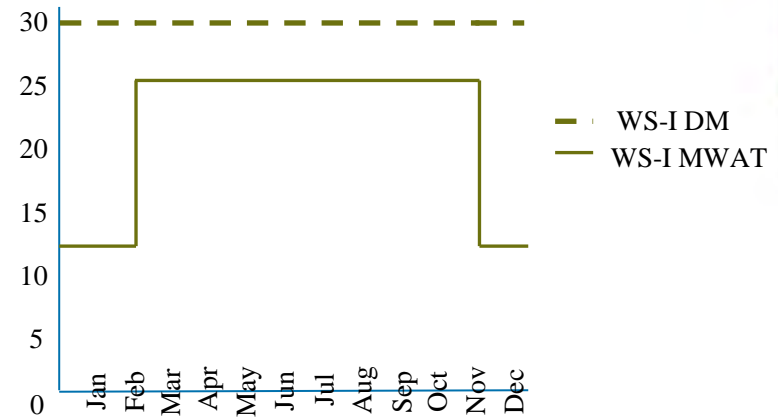
WQCD Issues Scoping, Oct 1, 2014

Proposed:

- Apply summer acute standards year-round
- or
- Delete the winter acute standard

What about chronic?

Less scientific basis for removing chronic??



Acute Standards for Winter Warm Water Streams

CPW, Dec 16, 2014

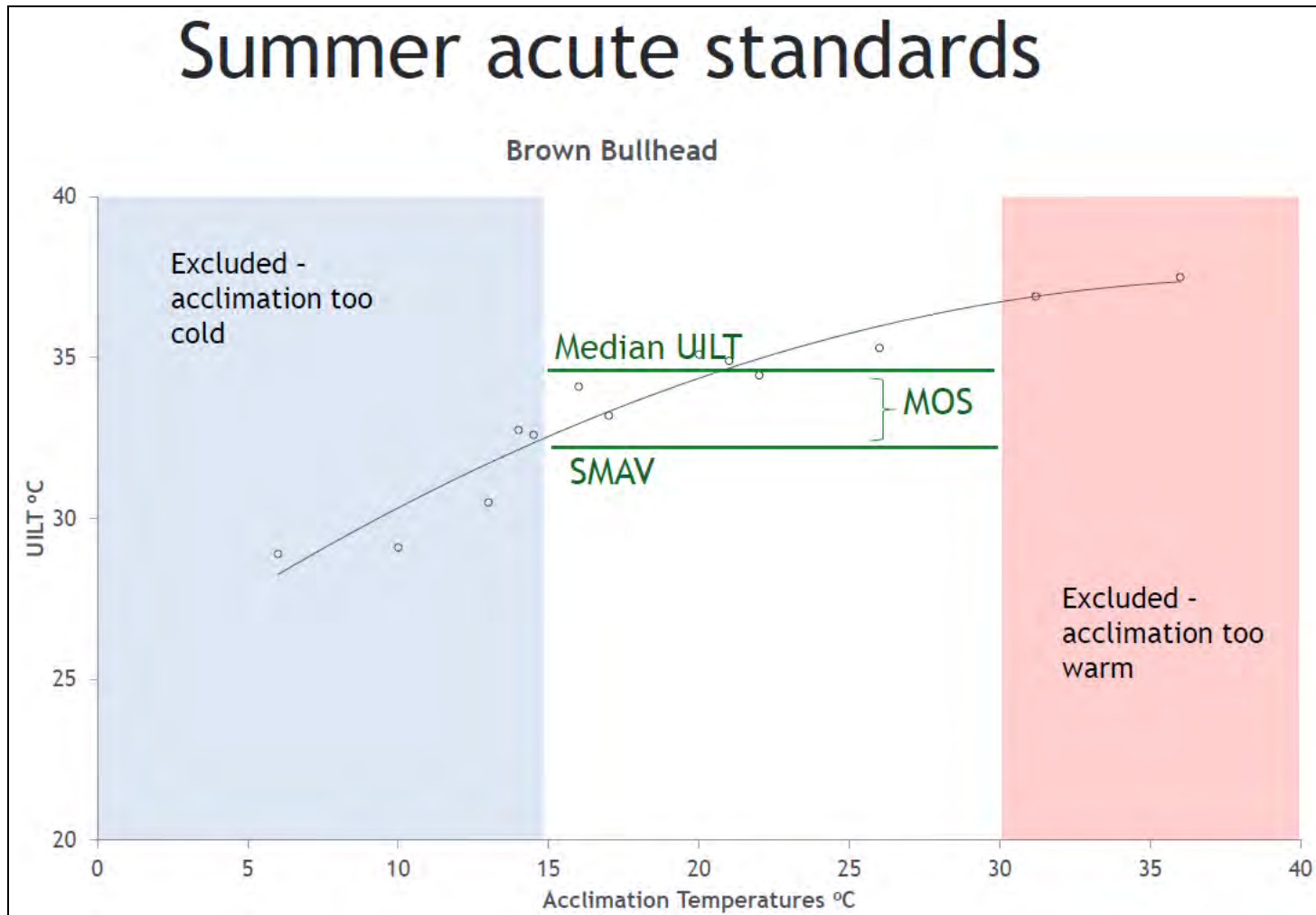


CPW opposes WQCD proposal:

- Existing data support retention of seasonal acute standards
- Scientifically defensible winter acute values can be calculated
- Winter acute standards can be calculated from thermal toxicity test run at cold acclimation temps
- Suggest likely greater than current winter acute TVS

Acute Standards for Winter Warm Water Streams

CPW, Dec 16, 2014



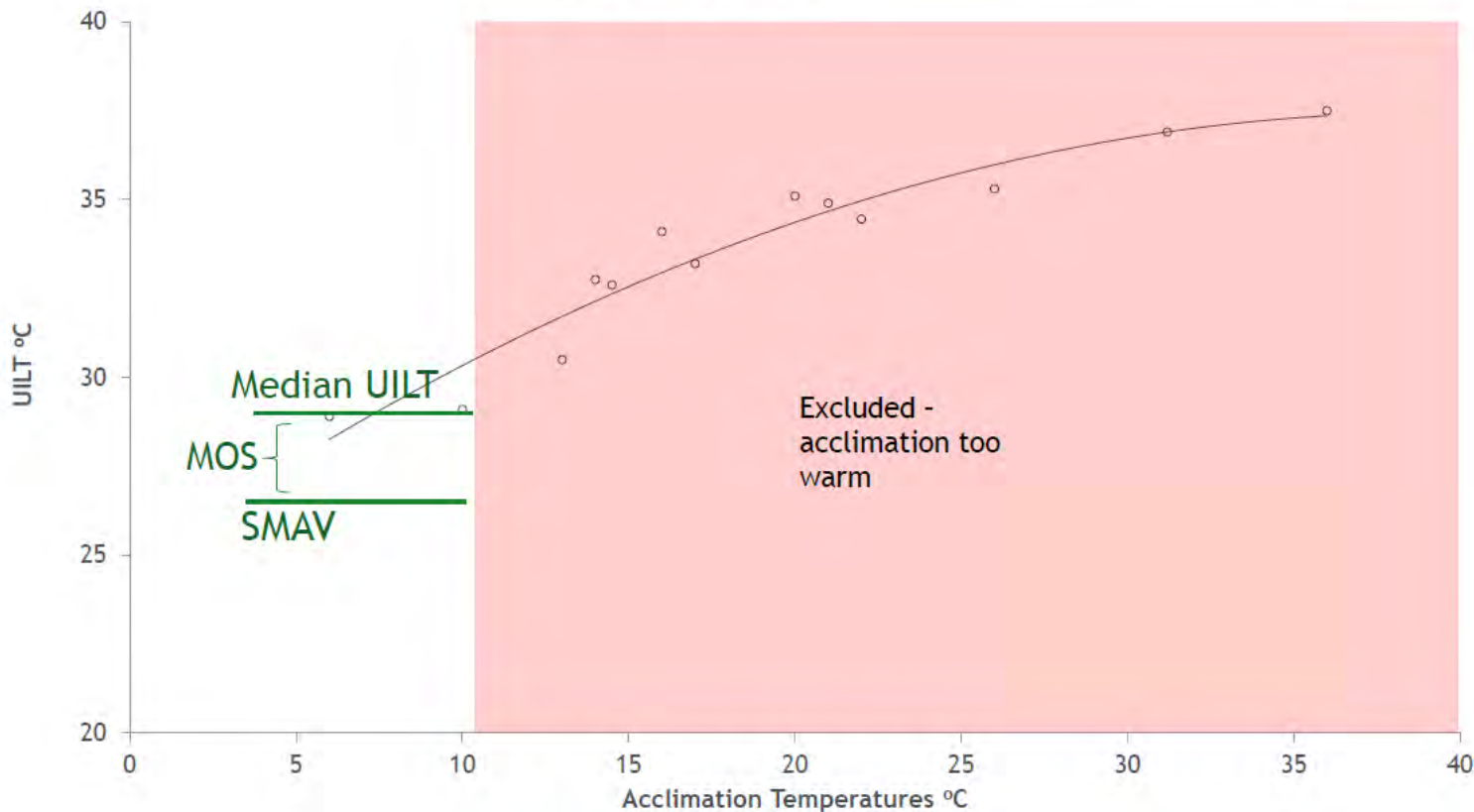
Acute Standards for Winter Warm Water Streams

CPW, Dec 16, 2014



Proposed winter acute standard

Brown Bullhead



Acute Standards for Winter Warm Water Streams



Status

- WQCD contracting to have temperature database (from ~2007) updated
- Technical subgroup to evaluate data and feasibility of CPW proposed approach
- Not clear how chronic standard will or will not be addressed





Shoulder Season Implementation

Division (for the Workgroup), Feb 19, 2015

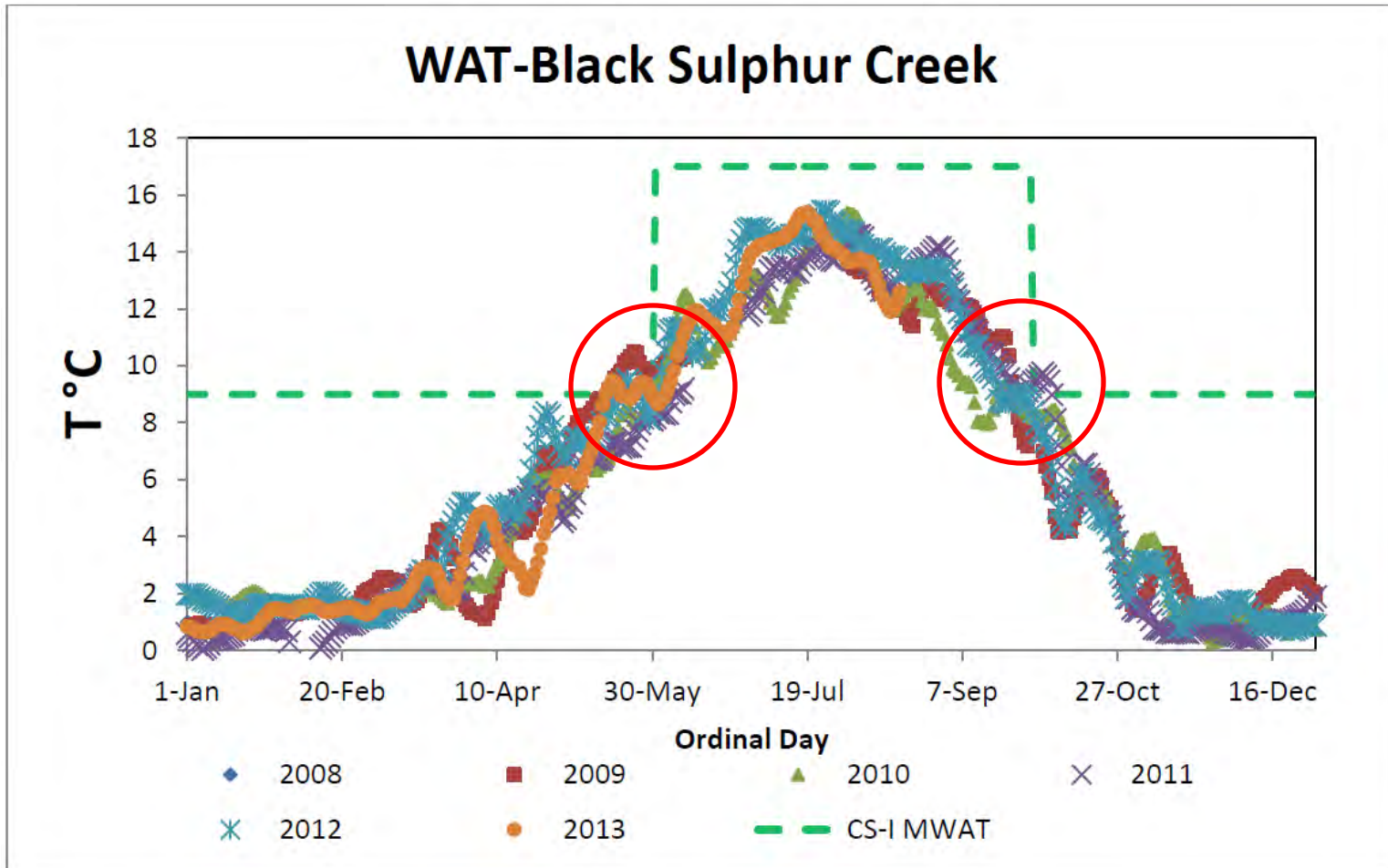
“The current abrupt change from winter to summer standards does not reflect the natural seasonal pattern and sometimes is a challenge for assessment and compliance.

The group will explore alternatives that will allow for a more flexible approach.”



Shoulder Season Implementation

Division, Feb 19, 2015





Shoulder Season Implementation

Division Memo, Nov 11, 2014

Division proposed two options for relief:

1. Revise TVS:

- Numeric criteria only for the core winter and summer months
- Narrative applies during 4 transitional months

2. Revise TVS:

- Existing MWAT and DM for core winter and summer months
- Stepped MWAT and DM criteria that are 30-d avg in each of 4 transitional month.

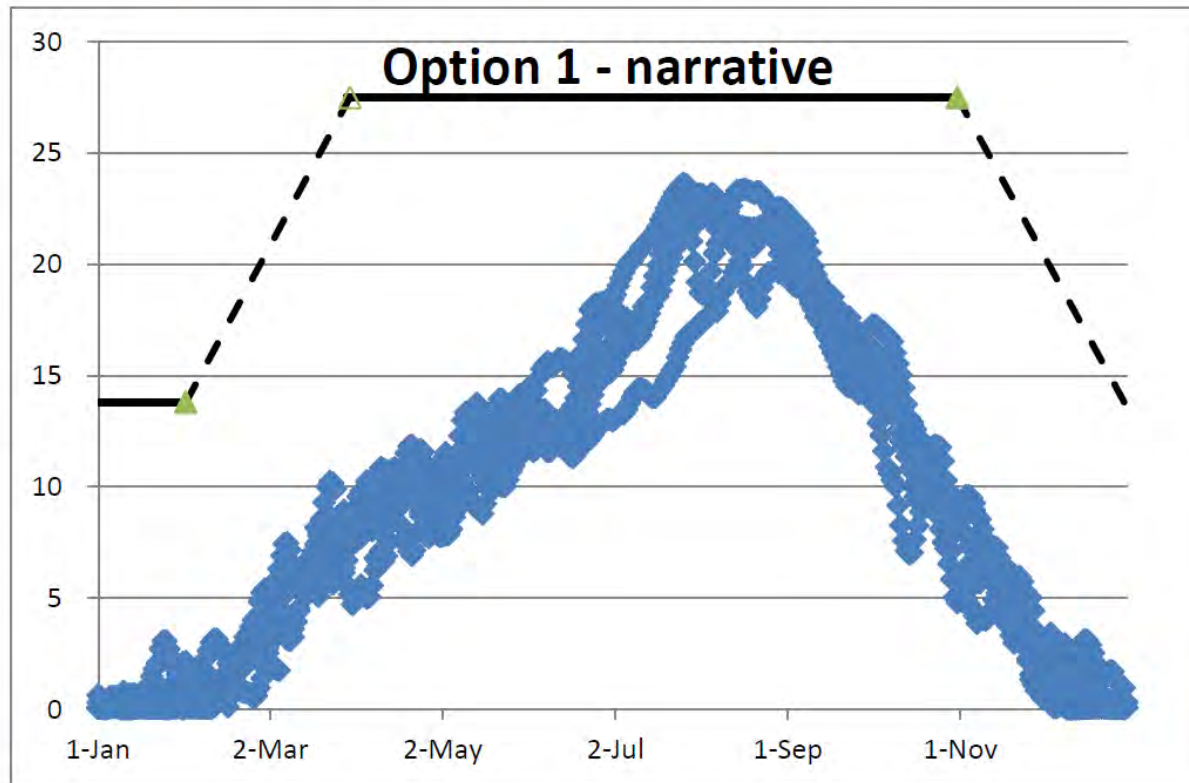
Similar approach for warm and cold streams





Shoulder Season Implementation

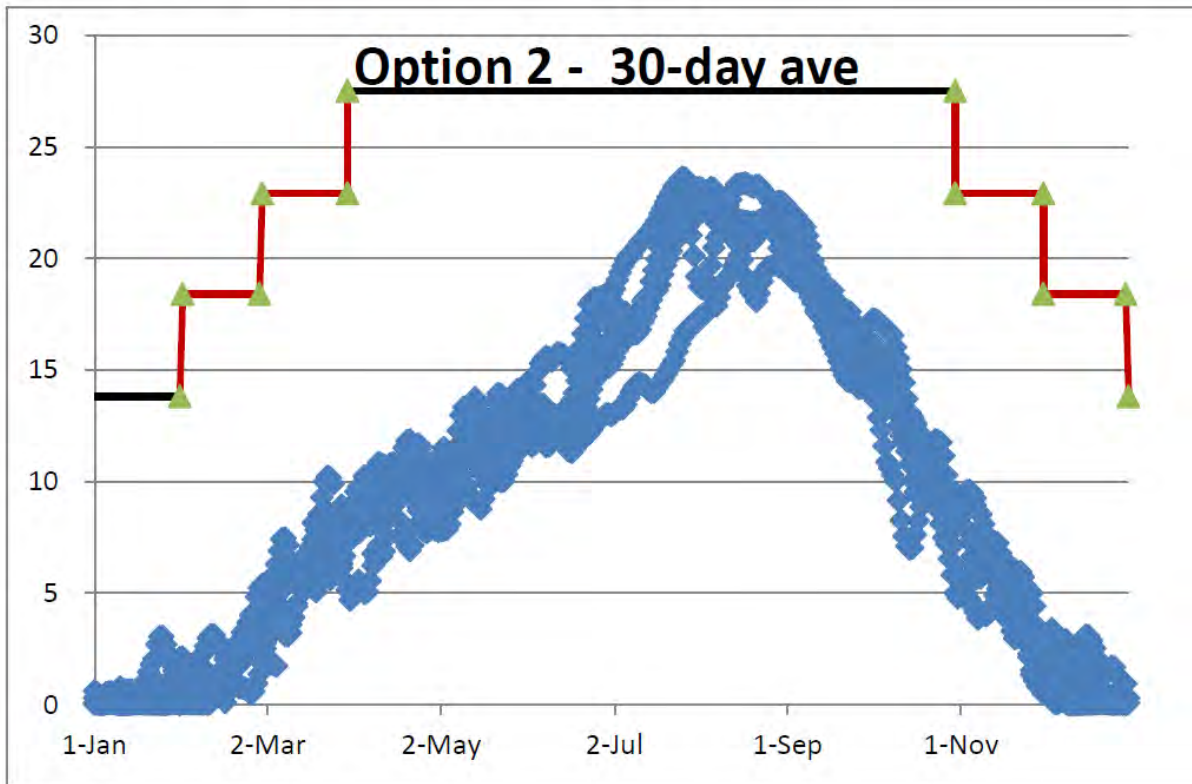
Option 1: Narrative Standards for Transition Months Revise the table value so that each tier has numeric criteria only for the core winter and summer months and the narrative applies during the four transitional months.





Shoulder Season Implementation

Option 2: Revise the table value so that each tier keeps the numeric criteria for the core winter and summer months and new, stepwise 30-day average criteria are adopted for the four transitional months.





Shoulder Season Implementation

CPW, March 19, 2015

CPW opposes WQCD proposal

- Cold streams
 - Narrative or stepped shoulders: not protective of critical spawning and incubation temperatures

- Warm streams
 - Narrative or stepped shoulders: do not provide long enough or cold enough winter for successful spawning
 - Even current temp standards may not be protective





Shoulder Season Implementation

CPW, March 19, 2015

Warm streams literature cited

- Minnows:
 - Low temp essential for normal gonadal proliferation – Ahsan 1966
- Striped Bass:
 - Females exposed to 18°C had diminished hormone levels, reduced egg size, premature degeneration of ovaries – Clark et al 2005
- Yellow Perch:
 - Growth of ovaries is during winter; Optimum gonad maturation at 6°C or lower for 185 days – Jones et al 1977
- Walleye:
 - Require extended cool period below 10°C throughout winter – Miller 1967;
 - Failed to reproduce at 10 to 12.5°C throughout winter
- White sucker:
 - Percent hatch decreases with increased incubation temperature – McCormick et al 1977
- Similar literature for cold stream species also discussed
- Concludes that current standards may not be low enough to be protective



But do these studies really support CPWs assertions?

Are there other studies not cited that may be relevant?

Shoulder Season Implementation

CPW, March 19, 2015



Potential path forward (CPW)

- Continue to revise and update temp standards to protect fisheries and aquatic life
- Explore heat removal treatment options – Feasibility study being explored by WQCD
- Address compliance issues with variance?
- Potential for sector-based variance



Shoulder Season Implementation

CPW, March 19, 2015



Summary

- WQCD suggested options for shoulder season relief
- CPW opposes
 - Presents literature
 - Suggests in-depth review of recent literature
- WQCD seeking support in literature review
- Need to address validity of CPW argument



Implementation in Permits

Division for Workgroup, Feb 19, 2015

“Many of the provisions in [Standards] Reg 31 are redundant with provisions in the Permit Rules (Reg 61) or are no longer applicable or appropriate.

The group will identify opportunities to reduce redundancy”





Implementation in Permits

- 2008 WQCD memo WQP-23
 - Implementation of Temp Stds in Permits
 - Needs updates after 2010 revisions to TVS
- 2014 Permit Issues Forum White Paper
 - Implementation of Temp Stds in Permits
- This subgroup has presented suggestions on updates to Reg 31.14 (Integration into discharge permits)





Implementation in Permits

Examples from white paper

- Calculation of air temperature exclusion is unclear
- Permit limits calcs should exclude allowable excursion data
- Upstream ambient temp for assimilative capacity should not be based on max MWAT and DM
- Consider exemption for industries that do not actively heat or cool water
- Many more...



Warm Water Temp Std Sector-based Variance

Division for Workgroup, Feb 19, 2015

“A variety of compliance issues existing with effluent limits derived from these standards.

The group will explore alternatives.”



Warm Water Temp Std Sector-based Variance

- Small subgroup is working on this.
- Next meeting is July 1.
- Division will have (may have?) money from Colorado Water Resources and Power Development Authority to hire a consultant to study temp reduction in WWTPs.





Recap: Work Group Issues

(temperature-related)

1. Definition of Existing Quality
2. Acute Values for Winter Season
3. Shoulder Season Implementation
4. Implementation in Discharge Permits
5. Warm Water Temperature Standards
Sector-Based Variance
6. Next BS Workgroup Meeting is June 24



2015 S. Platte Basin Proposals

(those that included temperature)

- Centennial Water and Sanitation District
- City of Boulder
- Climax Molybdenum Co.
- Littleton/Englewood Wastewater Treatment Plant
- Ft. Collins
- Greeley
- Metro Wastewater Reclamation District
- MillerCoors
- Plum Creek Water Reclamation Authority
- Black Hawk & Black Hawk/Central City Sanitation



Proponent Proposals

	Temporary Modification			Site-Specific Standard		Tier Change
	New	Existing		Narrative	Numeric	
		Date Extension	Segment Extension			
Proponent						
Centennial WSD		x	x			
City of Boulder				x (shoulder)		
Climax Molybdenum Co.	x (shoulder)					
Littleton/Englewood WWTP					x (shoulder)	
Ft. Collins	x (shoulder)					
Greeley	x (shoulder)					
Metro WRD		x				
MillerCoors				x	x	
Plum Creek WRA	x (shoulder)					
Black Hawk/Central City SD		x				x

WQCD supports overall proposal but with questions and suggestions

WQCD does not support the proposal but offers questions and suggestions

Questions?





Shoulder Season Site Specific Standard

City of Boulder-Boulder Creek (Segment 9)

- Narrative site-specific standard for fall transition season: “Temperature shall maintain a normal pattern of seasonal fluctuation”
 - Temperature exceedances (downstream of WWTF) only occurred during low water flow and high air temperature (both in relation to seasonal averages)
 - WQCD: Does not support Boulder’s Proposal
 - Exceedances did not occur upstream of the WWTF and can be attributed directly to the WWTF
 - » Explain how Boulder would evaluate attainment of the narrative standard for purposes of the 303d list and at the time of permit renewal
 - » Consider including more steps to develop a more natural and gradual pattern
 - » Can this wait until after the Basic Standards?
 - » Is Boulder willing to consider a temporary modification?



Shoulder Season Site Specific Standards

Littleton/Englewood Wastewater Treatment Plant South Platte River (Segment 14)

- **Numeric site-specific standard for spring and fall transition seasons and replacement of summer season start date (Mar not Feb)**
 - Transition season standards should reflect values intermediate between TVS for summer and winter
 - **WQCD: Does not support L/E's Proposal**
 - Method of development and the assertions concerning use protection do not result in an appropriate standard
 - » Provide information for how temperature standards for the transition months were derived
 - » Consider how the proposed start date for the start of the summer season would affect permitting and assessment
 - » Consider including more steps to develop a more natural and gradual pattern
 - » Can this wait until after the Basic Standards?
 - » Is L/E willing to consider a temporary modification?



Site-Specific Standards

MillerCoors-Clear Creek

(Segments 11a, 11b, 14a, 14b, and 15)

- **Relax the temperature standards to accommodate the current thermal characteristics of its discharges**
 - Resegmentation of 11a, 11b, 14a, and 14b based on effects of diversion structures
 - Deletion of standards in 14a-15 from Nov-March because of effluent dependence
 - Numeric summer values based on ‘current conditions’
 - Footnote that departs from the narrative standard that protects against abrupt temperature changes in 14a-15
 - “Ambient water temperature may cool rapidly during high flow events, and may warm rapidly when high flow events end.”





Site-Specific Standards

MillCoors Continued

- **WQCD: Do not fully support any of MillerCoor's proposals**
 - Segment 11 resegmentation is not based on hydrological or biological differences (e.g., Ford Street Bridge is not a hydrologic feature)
 - Clear Creek is not effluent-dependent
 - Data provided does not support the conclusion that 'current conditions' support a balanced fish community
 - Footnote revision, lack of winter standards, and proposed summer standards are not protective of aquatic life





Temporary Modification

Centennial Water and Sanitation District-

Upper South Platte River Basin (Segments 14 & 16g)

- **Temporary modification (T=current conditions) extension and expansion (June 19: Seg 14-Jan and Seg 16g-Dec through Feb)**
 - **Compliance problems are predicted for winter season**
 - **WQCD: Supports the idea of applying a temporary modification but not one as broad**
 - Consider limiting the temporary modification to Marcy Gulch below the Centennial outfall, for only the winter months
 - Revise the plan to explain how more data will be collected and utilized (i.e., how the 2013 UAA will be augmented)





Temporary Modification

Climax Molybdenum Co.-Woods Creek (Clear Creek Segment 7)

- **Temporary modification (T=current conditions) during shoulder season months (expiring June 2019)**
 - **Woods Creek has been re-exposed (previously in pipeline)**
 - **WQCD: Generally supports the proposal**
 - Provide clarification of regarding all pipe re-routing
 - Consider alternate sampling locations
 - Reconsider plans to resolve uncertainty and the temporary modification expiration date (related to the appropriate start of habitat assessments)





Temporary Modification

Fort Collins-Cache la Poudre (Segments 11 & 12)

- **Temporary modification (T=current conditions) during shoulder season months (expiring December 2020)**
 - **Compliance problems are predicted for winter season and there is uncertainty in the appropriate winter standard to protect current and future uses**
 - **WQCD: Supports the idea of applying a temporary modification**
 - **Consider an expiration date of December 2018**
 - **Provide an analysis to show predicted standards exceedances**
 - **Provide additional rationale for a TM in Segment 12**
 - **Provide a summary of all data currently available**





Temporary Modification

Greeley-Cache la Poudre (Segment 12)

- **Temporary modification (T=current conditions) during shoulder season months (expiring December 2020)**
 - **Compliance problems are predicted for summer season**
 - **Uncertainty in the appropriate standard to protect current and future uses**
 - **Questions if the existing quality due to natural or human-induced irreversible conditions**
 - **WQCD: Supports the idea of applying a temporary modification**
 - **Provide more information regarding the suggested consideration of a site-specific standard**
 - **Clarify explanation of standards compliance uncertainty**





Temporary Modification

Metro Wastewater Reclamation District- South Platte River (Segment 15)

- **Temporary modification (T=current conditions) extension (expiring December 2020); and a Discharger-Specific Variance (DSV) determined at the 2020 hearing**
 - **Uncertainty regarding the water quality standard necessary to protect current and/or future uses**
 - **WQCD: Supports the idea of extending the temporary modification but not as long**
 - **Believes the DSV can be completed sooner and recommends the TM expiration of June 2017**



Temporary Modification

Plum Creek Water Reclamation Authority (PCWRA)-

Plum Creek and East Plum Creek (Segment 10a)

- **Temporary modification (T=current conditions) during shoulder season months (expiring June 2019)**
 - **Predicted winter compliance problem (shoulder seasons)**
 - **WQCD: Supports the idea of applying a temporary modification but not one as broad**
 - Consider limiting the temporary modification to EPC below the PCWRA outfall, for winter months only
 - Revise the uncertainty analysis
 - Revise the plan to explain how more data will be collected and utilized (i.e., how the 2009 UAA will be augmented).





Temporary Modification

Black Hawk & Black Hawk/Central City Sanitation District-Clear Creek (Segment 13b)

- **Retain Temperature Modification (T=current conditions) until Dec 2018 (date previously decided upon) while a DSV is considered**
 - **Water temperature exceeds standards *upstream* and downstream of effluent during summer and shoulder seasons**
 - **WQCD: Continues to support the extension of the current temporary modification**
 - **Uncertainty of existing standards**
 - **In-stream conditions are expected to change**





Temperature Tier Change

Black Hawk & Black Hawk/Central City Sanitation District-Clear Creek (Segment 13b)

- **Temperature tier for Segment 13b changed from CS-I to CS-II**
- **Segment only supports a brown trout fishery**
 - Metals contaminations in the segment are too high to support brook trout (a colder water species)
- **WQCD: Does not support the tier change**
 - Consider that the current TM protects BH until 12/31/2018
 - Consider that water conditions may improve enough to support brook trout in the future (future upstream WTP)
 - Suggests waiting until WTP is constructed and water quality stabilizes before changes are made to segment classification

