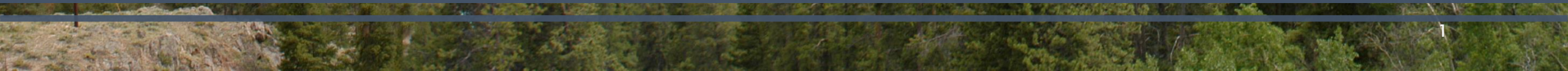
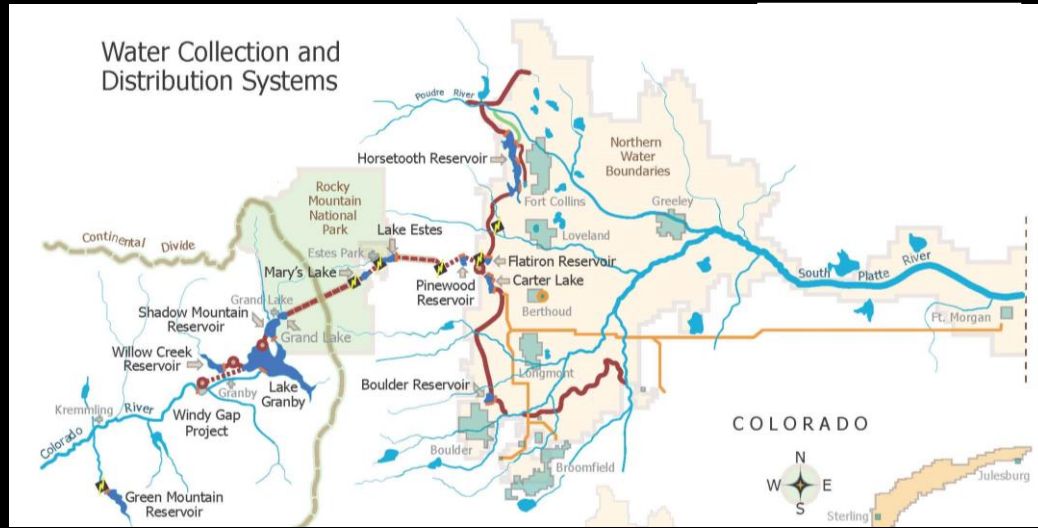




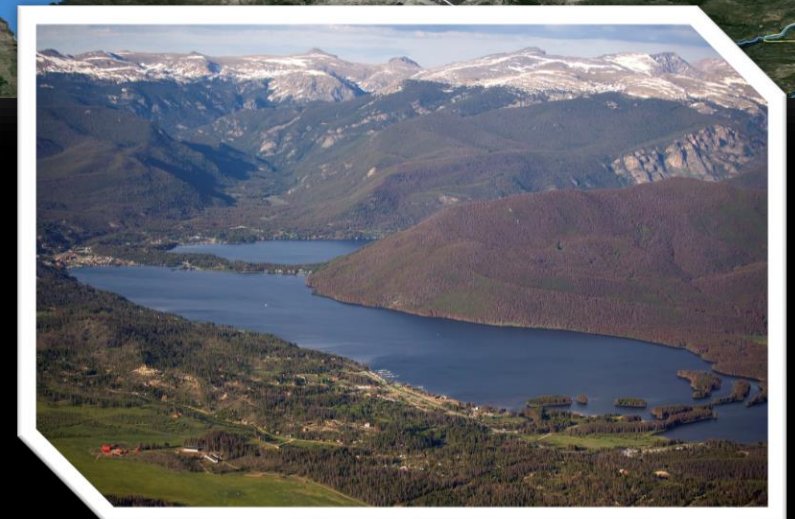
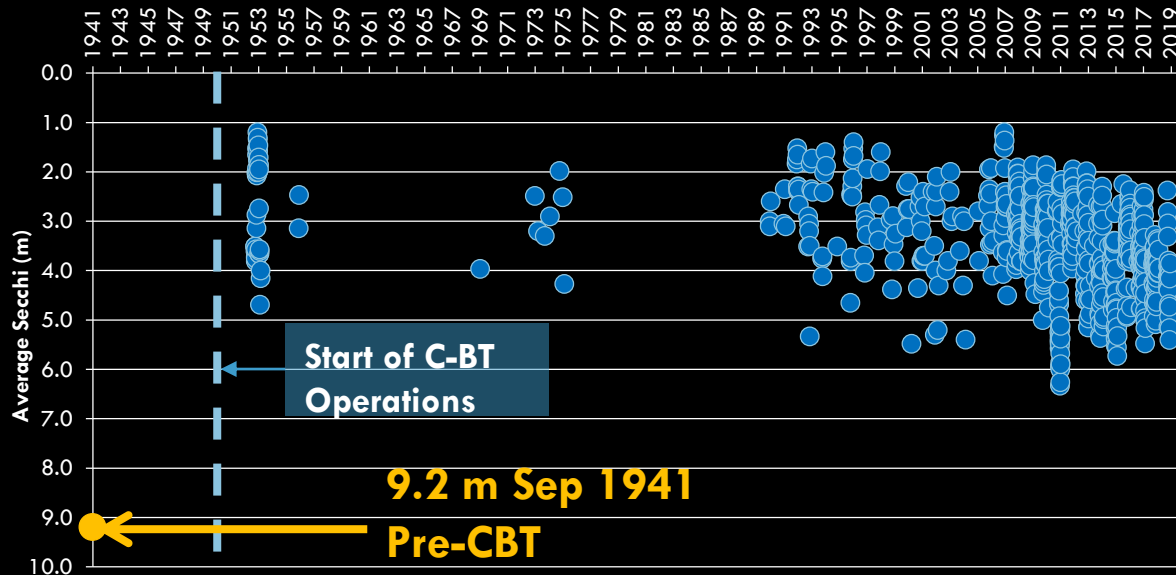
Grand Lake Clarity Adaptive Management Progress Update



Grand Lake & the Colorado-Big Thompson Project



Average Grand Lake Secchi no Viewscope (1941-2019)



Grand Lake Clarity Standard



2008

- Dual numeric and narrative standard
- 4 meter numerical standard with a delayed effective date is appropriate policy choice to encourage cooperative efforts
- The highest level of clarity attainable consistent with:
 - The exercise of water rights
 - The protection of aquatic life

2014

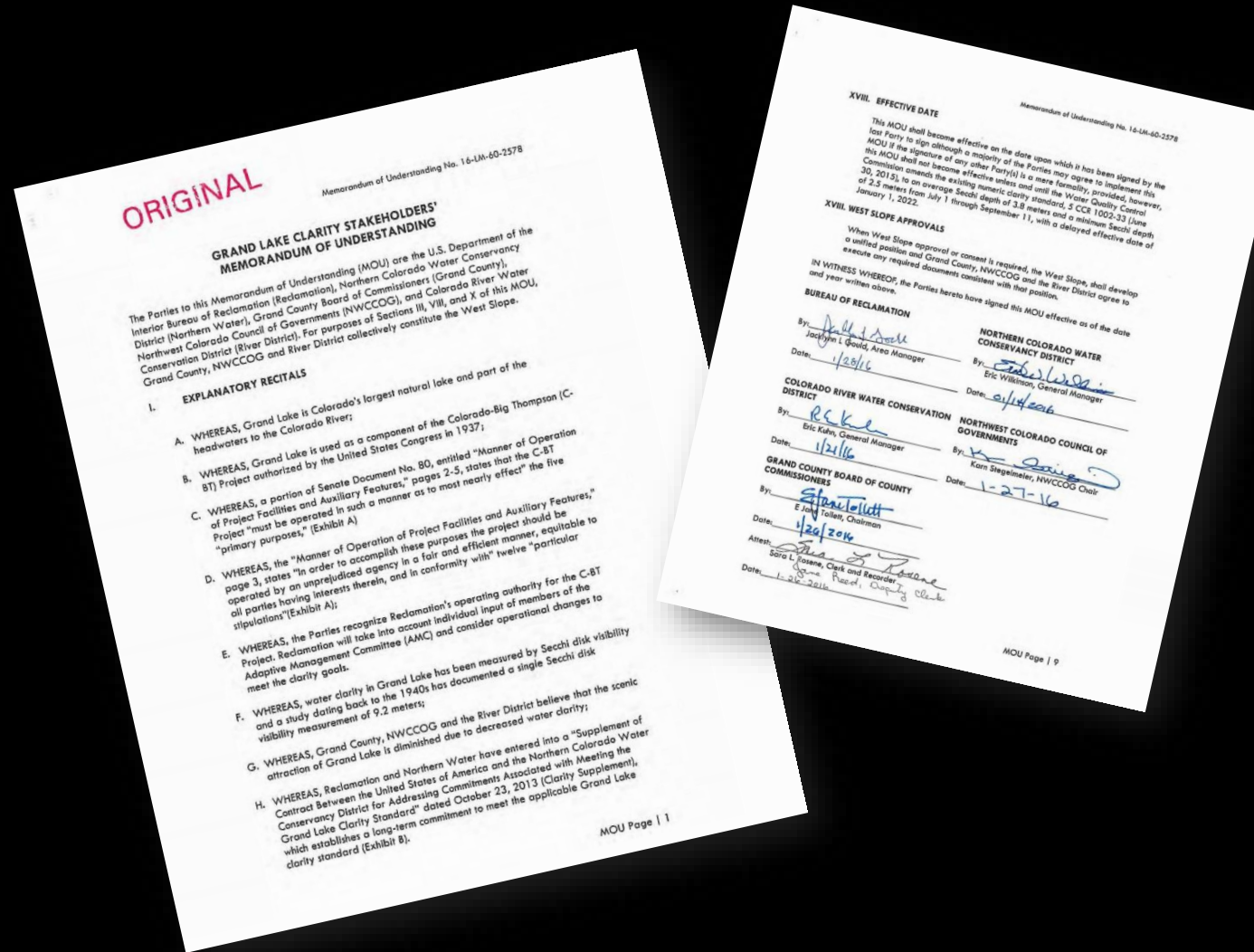
- The Commission expects and anticipates a cooperative effort that will focus on identifying an attainable and protective Grand Lake clarity standard.
- The Commission adopted a change to the narrative clarity standard that added “protection of water quality throughout the Three Lakes System” as another consideration for attainability

2016 Hearing Conclusions

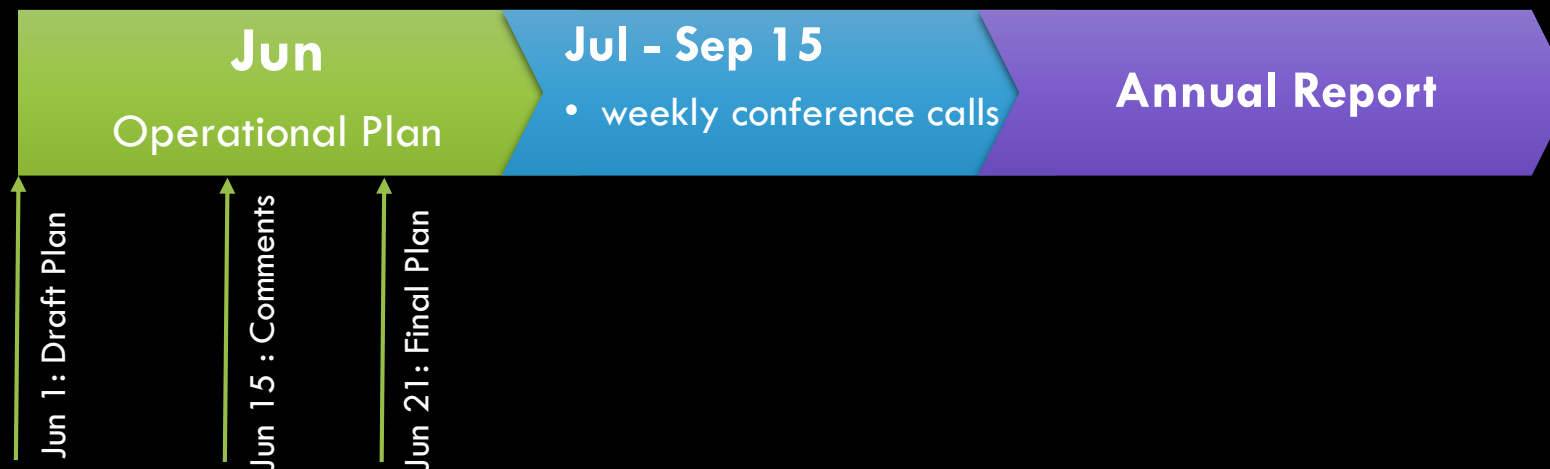
Emphasis on the narrative standard

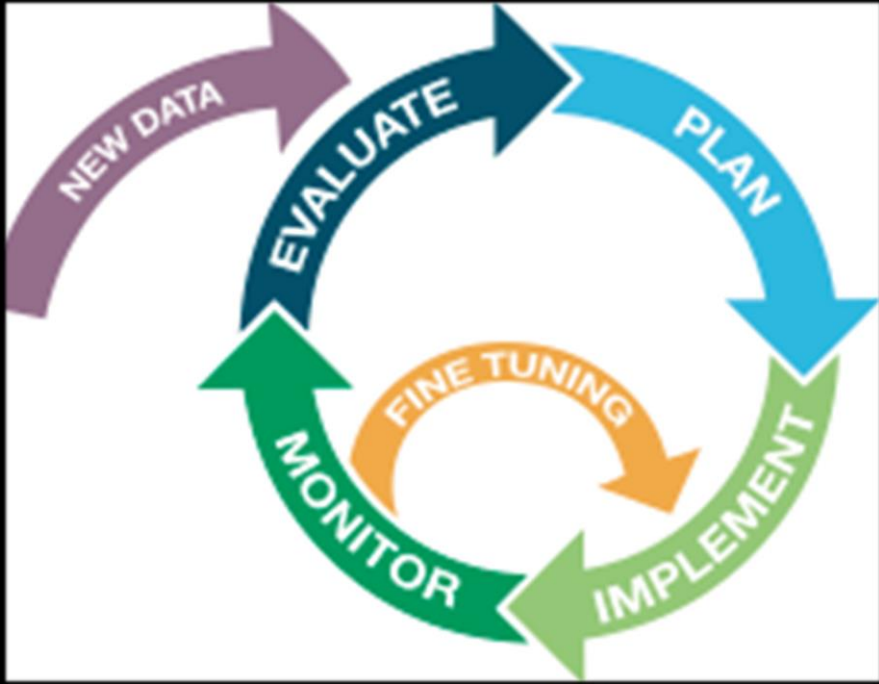
2.5 m and 3.8 m adopted as goal qualifiers

DO and pH water quality triggers for Shadow Mountain Reservoir



Adaptive Management MOU nuts & bolts





Adaptive Management

Progress Update

2016-2019 Adaptive Management Results

	Goals/ Triggers	2016	2017	2018	2019
Grand Lake Clarity Running Average Jul- Sep 11 (m)	3.8	3.2 m	3.9 m	4.61m	4.78 m
Grand Lake Clarity Running Minimum Jul- Sep 11 (m)	2.5	2.4 m	2.71m	3.93 m	4.0 m
Shadow Mountain Surface pH	8	>8 (8.9 max) (8/5-9/5)	>8 (9.3 max) (8/8-9/11)	>8 (connecting channel >9)	>8 (8.26 max)
Shadow Mountain Bottom DO (mg/L)	3	Threshold not triggered	Threshold not triggered	Threshold not triggered	Threshold not triggered

Year	Jul-Sep 11 Annual Average Secchi (viewscope)	Clarity Goal	Actual minus Goal	Goal Met?
2005	2.8	3.8	-1.03	N
2006	3.2	3.8	-0.57	N
2007	2.7	3.8	-1.14	N
2008	2.9	3.8	-0.91	N
2009	3.5	3.8	-0.26	N
2010	3.1	3.8	-0.72	N
2011	5.6	3.8	1.77	Y
2012	2.9	3.8	-0.93	N
2013	3.3	3.8	-0.50	N
2014	4.3	3.8	0.48	Y
2015	4.4	3.8	0.64	Y
2016	3.3	3.8	-0.53	N
2017	3.9	3.8	0.09	Y
2018	4.6	3.8	0.79	Y
2019	4.9	3.8	1.11	Y

Secchi data with viewscope, averaged daily using GL-WES, GL-MID and GL-ATW.

All three sites may not have been sampled on the same day historically.

Data were averaged daily regardless of how many of the three sites had been measured for Secchi.

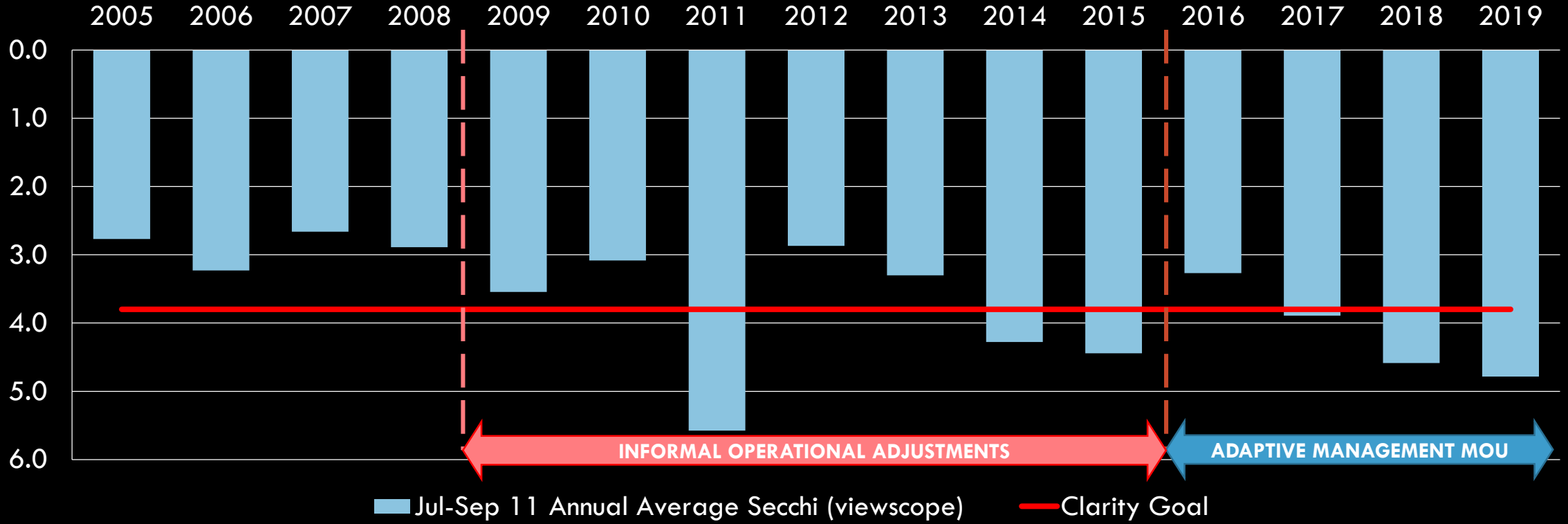


Historical Context Goal Qualifier Assessment

# Years Goal Met	6
Total # of Years	15
% of Years Goal Met	40%
% of Years Goal Met in last 5 years	80%

Avg Goal Qualifier (3.8 m) – Retrospective

Jul-Sep 11 Seasonal Annual Average Secchi with viewscope (meters) based on GL-ATW, GL-MID and GL-WES daily mean



Min Goal Qualifier (2.5 m) – Retrospective

Jul-Sep 11 Seasonal Annual Minimum Secchi with viewscope (meters) based on GL-ATW, GL-MID and GL-WES daily mean

