



**SOMETIMES UNACHIEVABLE:
Cold Water Early Life-stage Dissolved
Oxygen Criteria**



UTAH DEPARTMENT of
ENVIRONMENTAL QUALITY

**WATER
QUALITY**

STANDARDS WORKGROUP 1/11/22

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Class 3A D.O. criteria (Table 2.14.2)

| | Early Life-Stages | All Other Life-Stages |
|-----------------------|-------------------|-----------------------|
| 30-day average (mg/l) | | 6.5 |
| 7-day average (mg/l) | 9.5 | 5.0 |
| Minimum (mg/l) | 8.0 | 4.0 |

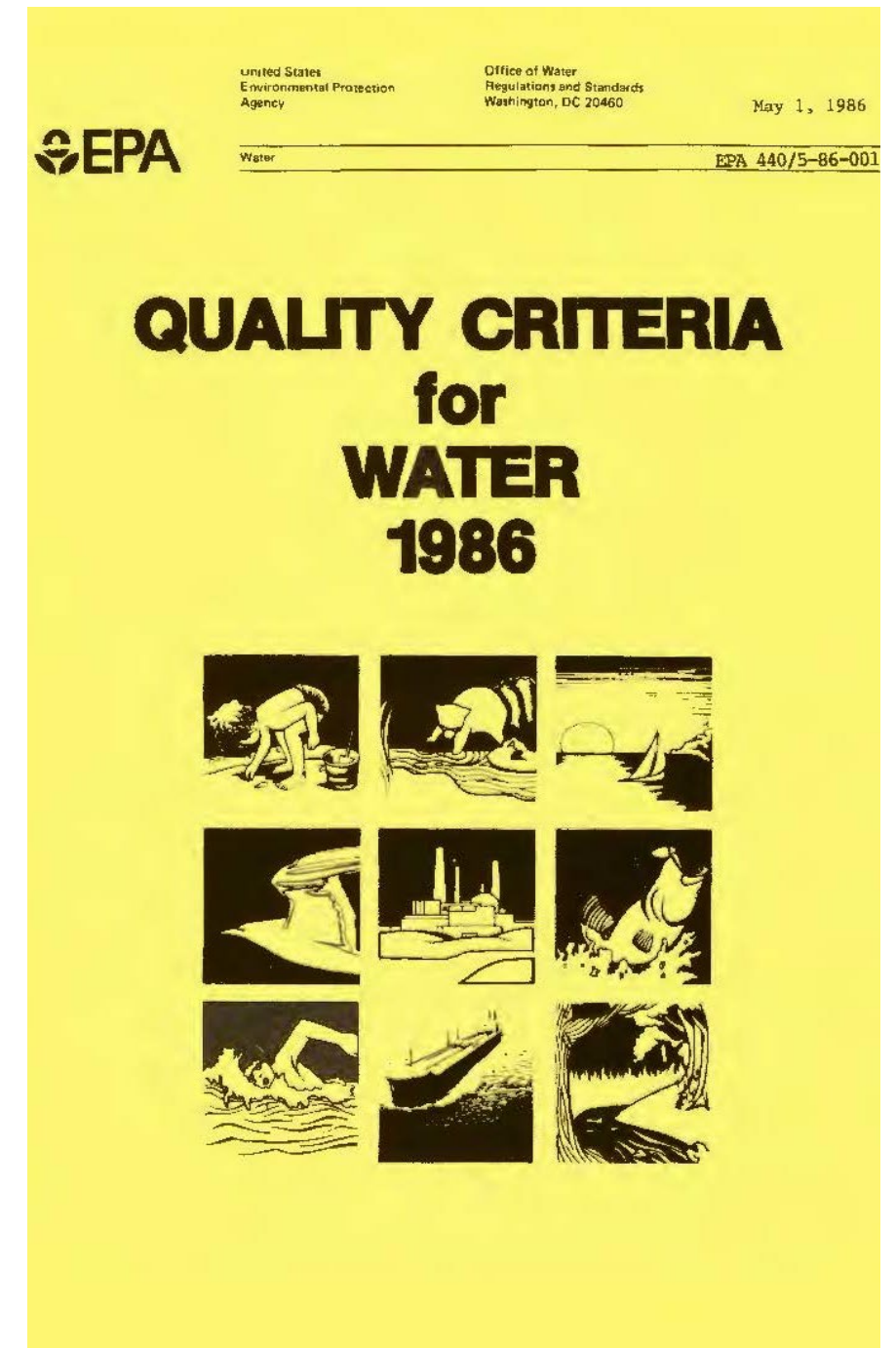
Per the EPA “Gold Book”, ELS criteria are the water column criteria adjusted by 3 mg/l to support the intergravel D.O. for fish eggs.

Bases for Utah criteria

Fish most sensitive

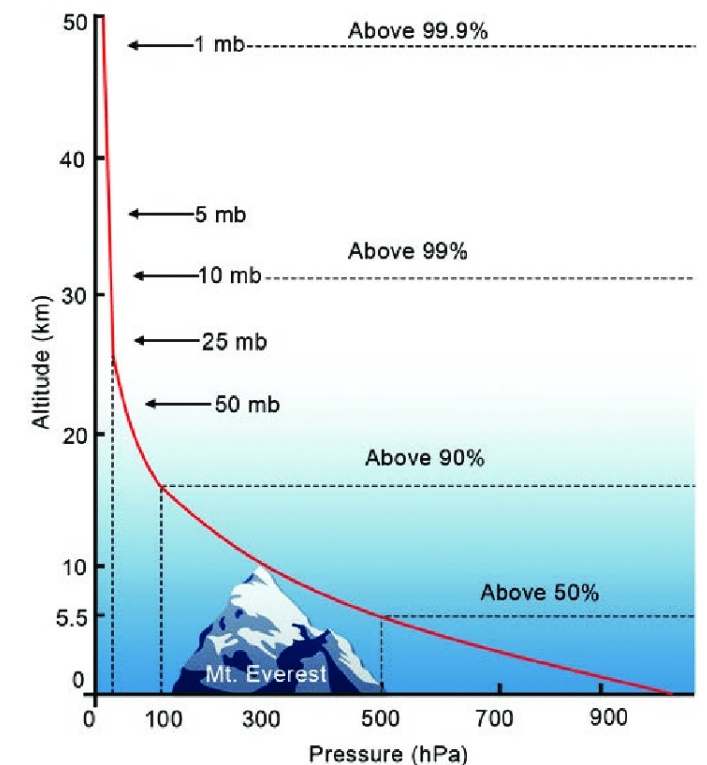
Recommended means are close to no-effects levels.
Minima are associated with “slight production impairment”

“Where natural conditions alone create dissolved oxygen concentrations less than 110 percent of the applicable criteria means or minima or both, the minimum acceptable concentration is 90 percent of the natural concentration.”



Factors affecting D.O. saturation

1. Air pressure (elevation-dependent): lower pressure = lower saturation concentration
2. Water temperature: higher temperatures = lower saturation concentration
3. Salinity: higher salinity = lower saturation concentration

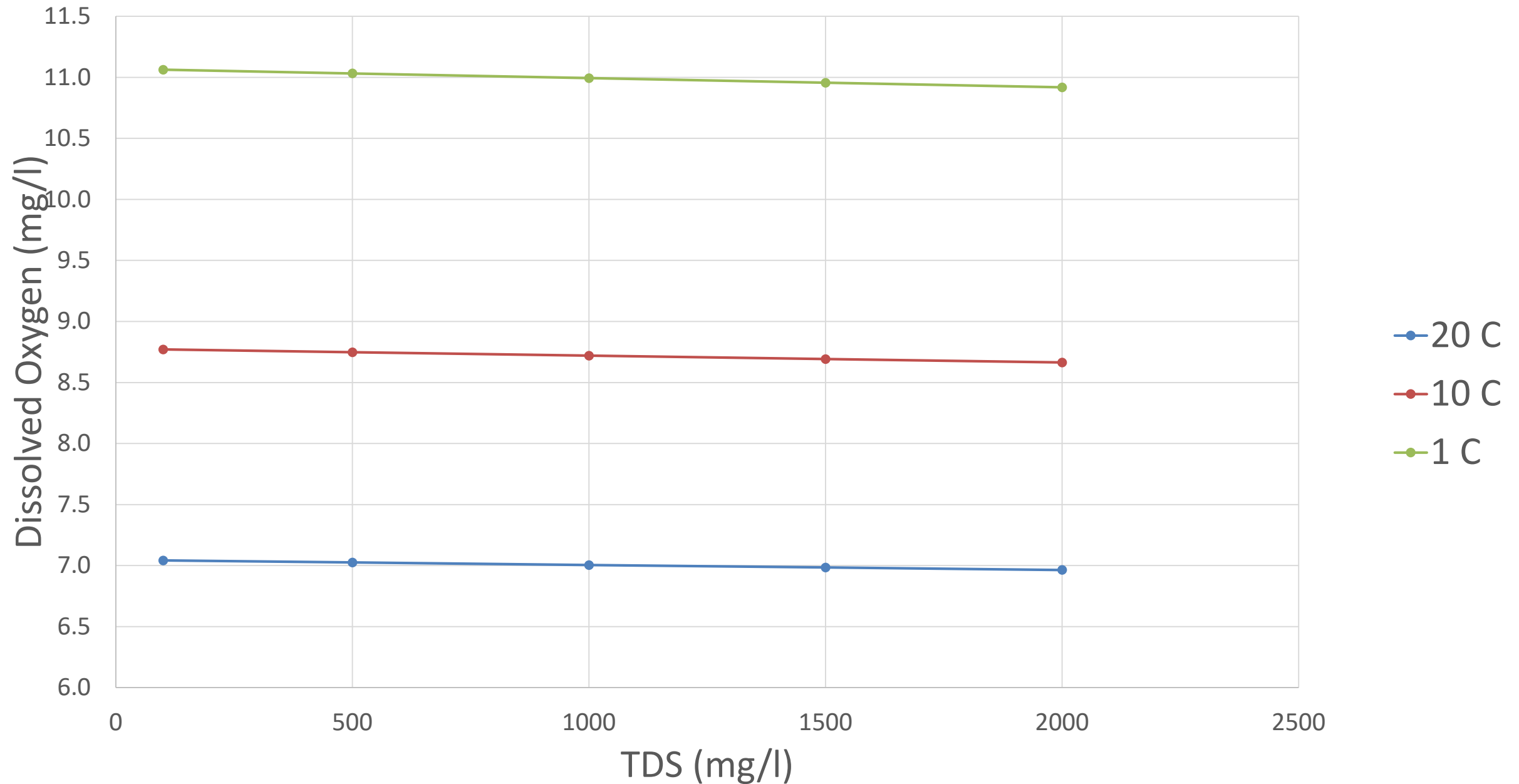


[Branislava Lalic \(2018\)](#)

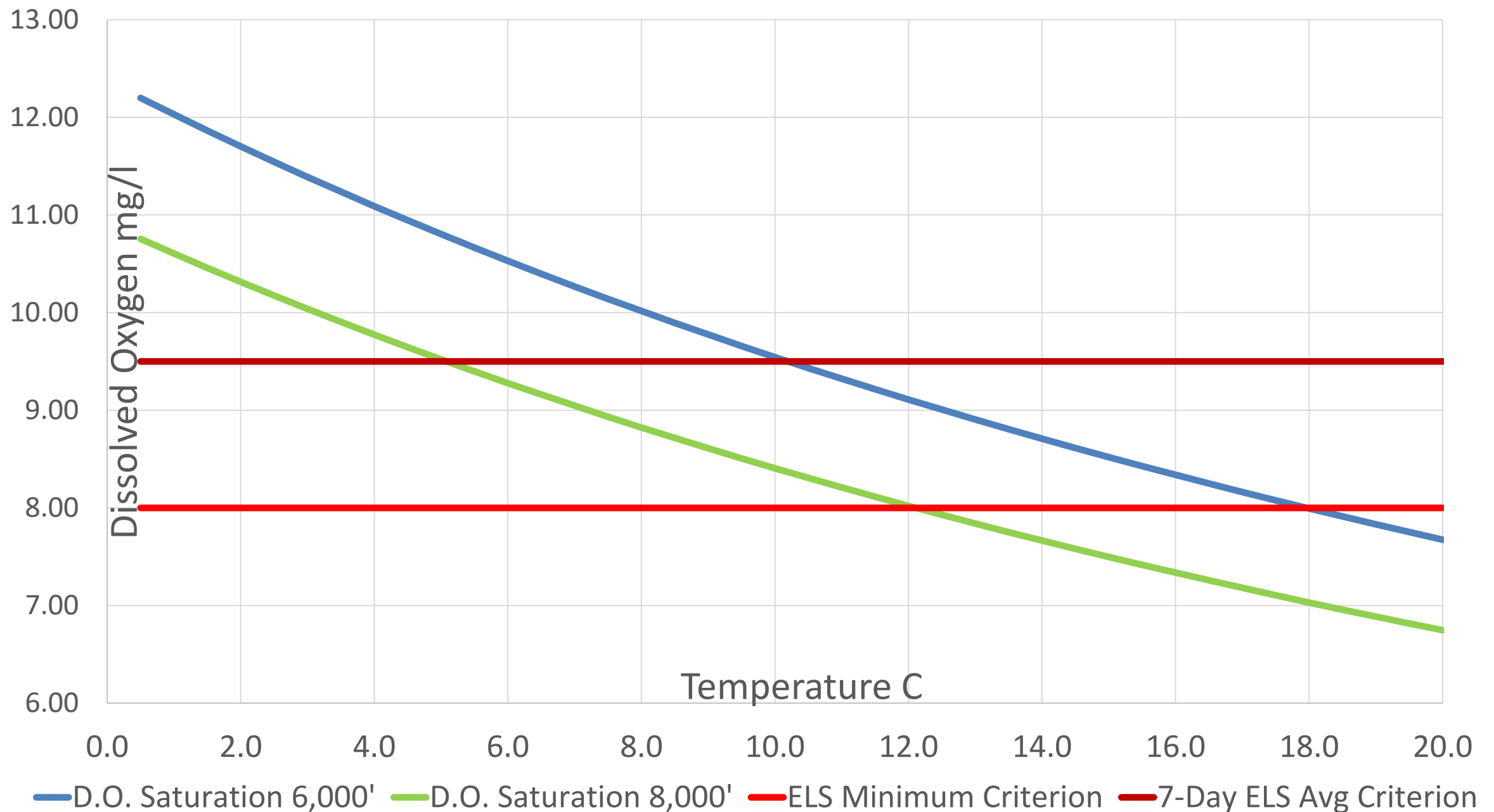


Salinity has minor affect on saturation

Dissolved Oxygen Saturation vs TDS at 3 Water Temperatures



Dissolved Oxygen Saturation and Criteria at Different Temperatures and Elevations (TDS=500 mg/l)



Discussion of options

Add an exception footnote

1. EPA Gold Book: “Where natural conditions alone create dissolved oxygen concentrations less than 110 percent of the applicable criteria means or minima or both, the minimum acceptable concentration is 90 percent of the natural concentration.”
2. Wyoming: “in no case shall be interpreted to require dissolved oxygen concentrations greater than 100 percent saturation at ambient temperature and elevation.”
3. Other?

Site-specific criteria

Thank You

