Deschutes River Basin

Water quality and fisheries

April 6, 2022
Environmental Quality Commission

Presentation Outline

- ❑ Introduction and overview
- ❑ Oregon DEQ: Smita Mehta
- ❑ Oregon Department of Fish and Wildlife: Mike Harrington
- ❑ PGE/Pelton Round Butte: Megan Hill
- ❑ Deschutes River Conservancy: Kate Fitzpatrick
- ❑ Deschutes River Alliance: Ben Kirsch
- ❑ Discussion and next steps

Four guiding questions

1. What is the status of your water quality/fisheries/restoration work?
2. What priorities and objectives is your organization working toward in the Deschutes River basin?
3. What are your observations regarding water quality and fisheries management tradeoffs or tensions in meeting those multiple priorities/objectives?
4. What do you see as opportunities for cooperation/collaboration?

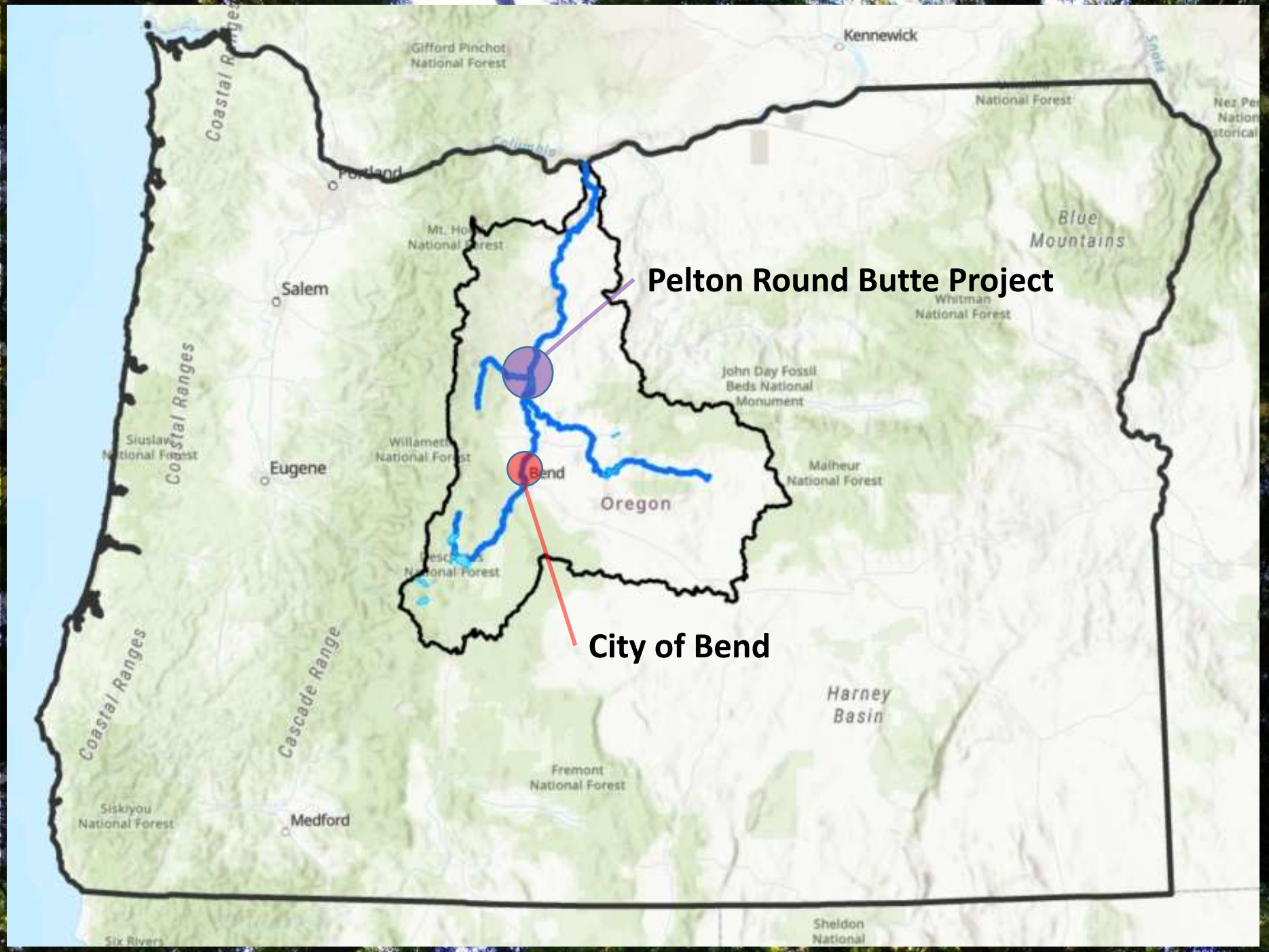
Overview of Water Quality in the Deschutes Basin

Smita Mehta

April 6, 2022, EQC meeting

State of Oregon
DEQ Department of Environmental Quality

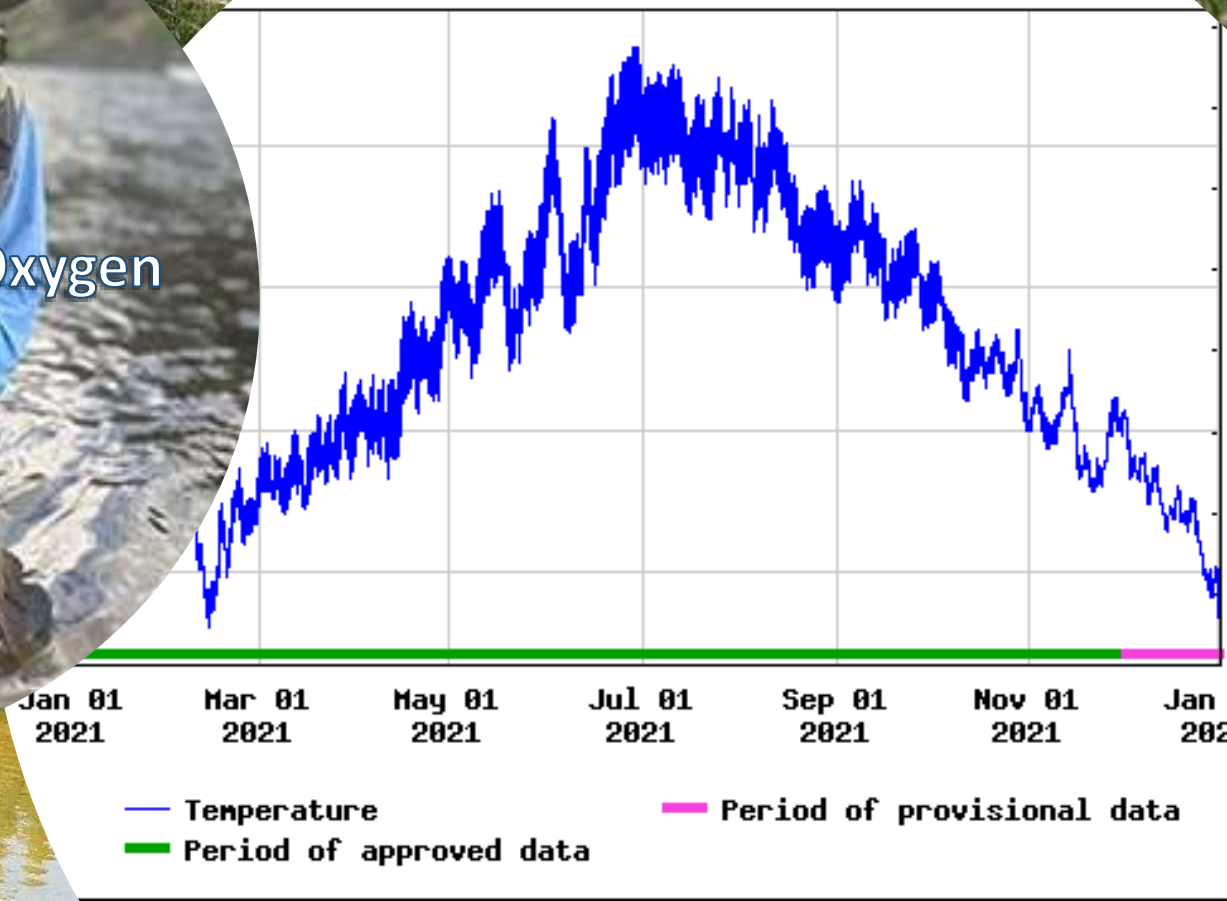
Deschutes Basin Geography



State of Oregon
DEQ Department of Environmental Quality

Nutrients

High Temperatures



pH and Dissolved Oxygen

Altered Flow Regimes

Harmful Algal Blooms

Upper Deschutes Watershed Council

Bend Bulletin

DEQ's WQ work in the Deschutes

State of Oregon
DEQ Department of Environmental Quality

Deschutes River Fisheries Overview

Mike Harrington
Oregon Department of Fish and Wildlife
Fish Division Administrator

Deschutes Basin

- Three primary tributaries
- Pelton Round Butte Hydroelectric Project- PGE & CTWS

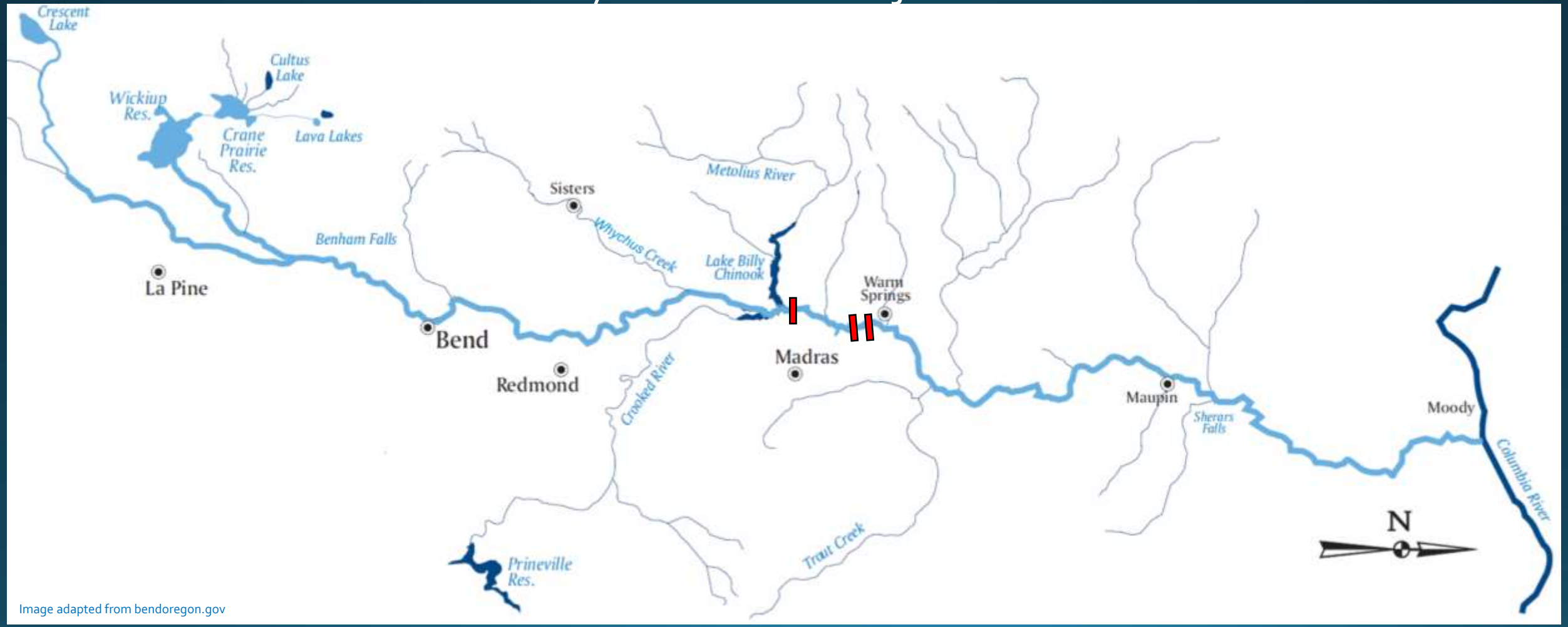


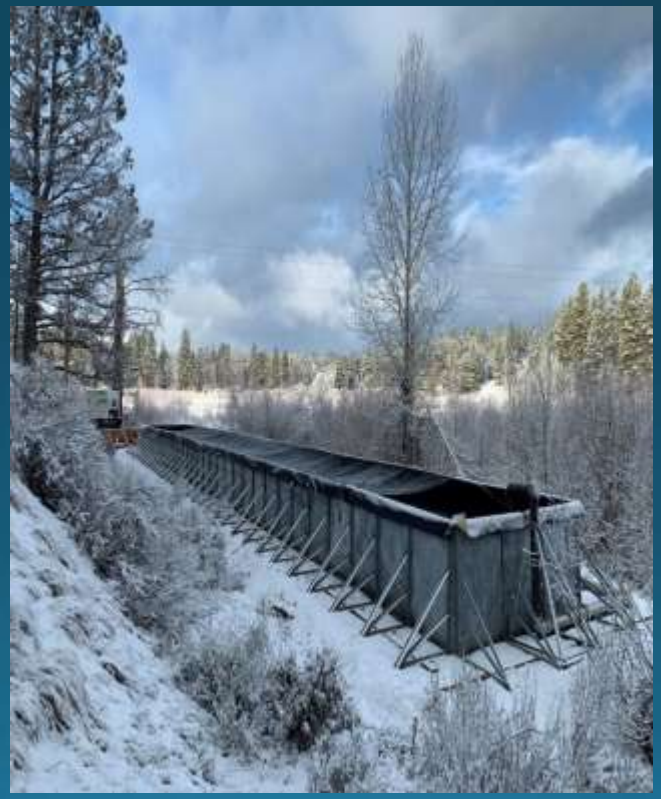
Image adapted from bendoregon.gov

Anadromous Fish Reintroduction

- Smolt release program
- Selective water withdrawal tower/fish collection facility
- Pelton adult fish trap re-design (in progress)

Metolius Pond Net Pens

Ochoco Creek Live Cars



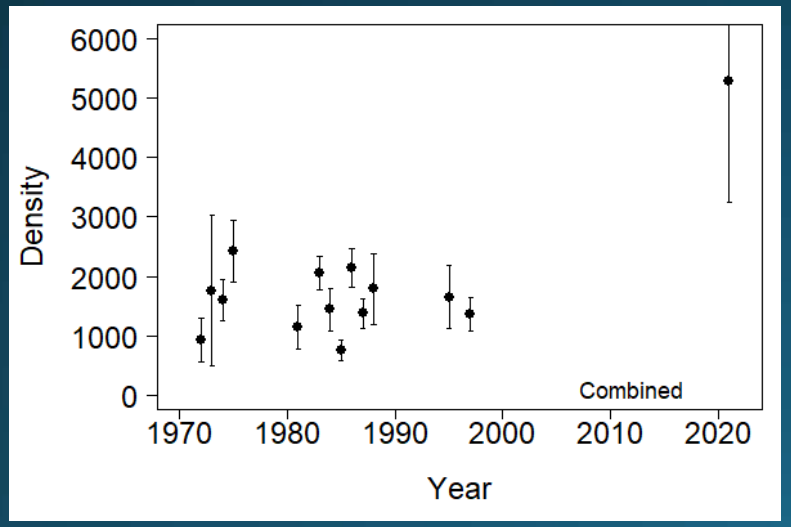
Camp Polk Acclimation Facility

Opal Springs Hatchery

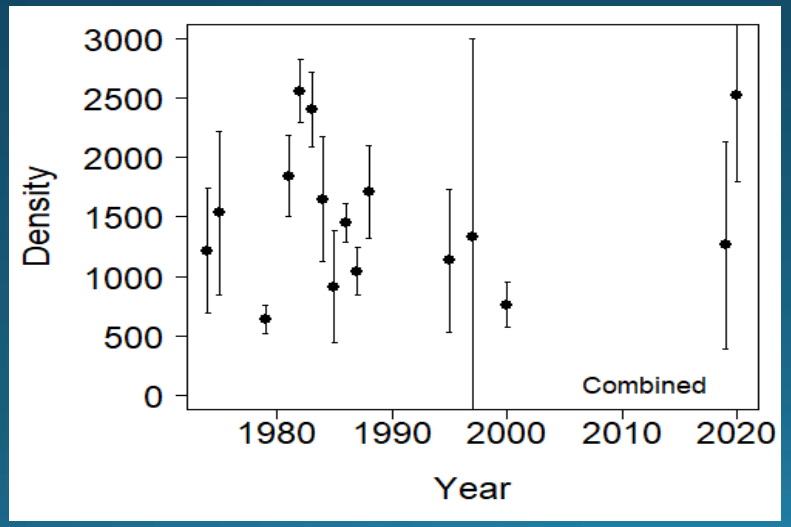
Redband Trout Monitoring

- Abundant density estimates (fish per mile)
- Coefficient of condition (K) is healthy
- Good growth rates, especially years 1-3 prior to maturation

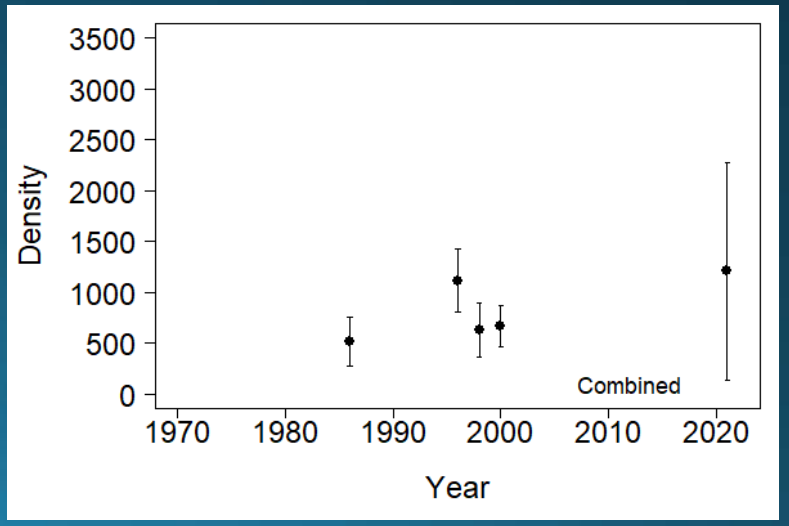
North Junction



Nena Creek Area



Jones Canyon



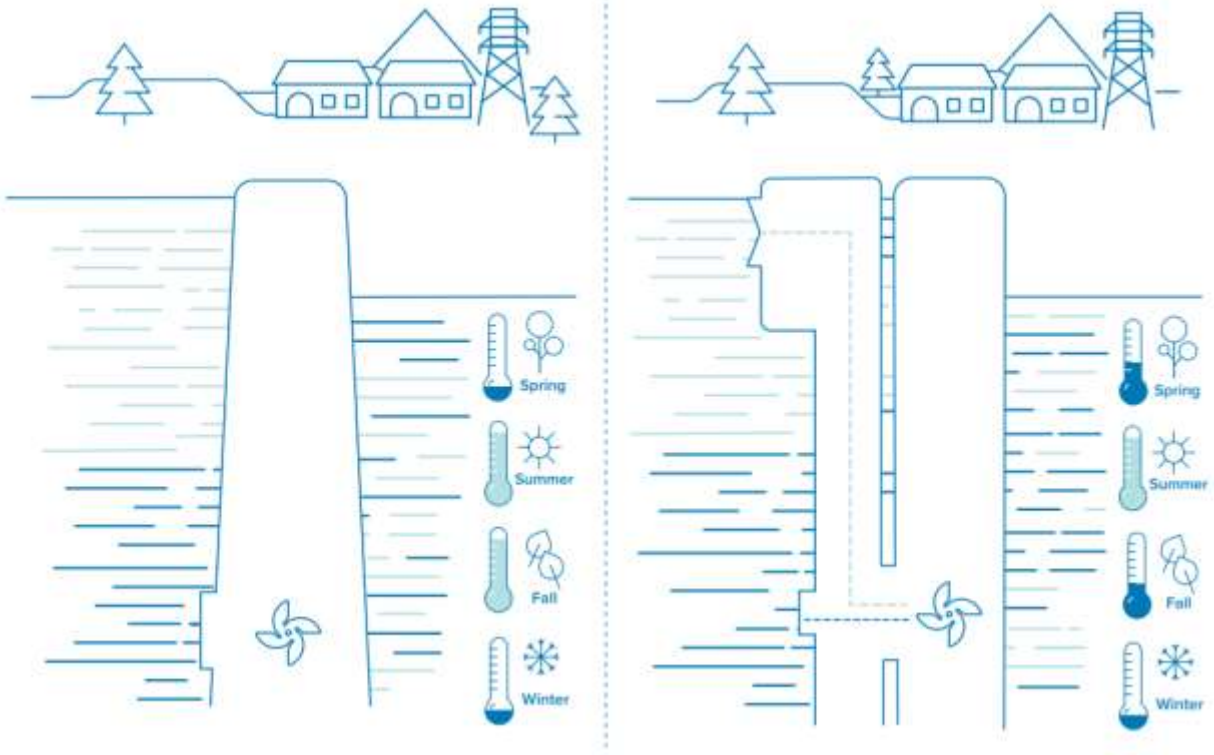
Pelton Round Butte Fisheries and Water Quality

Megan Hill, Natural Resources Manager

April 2022

Before SWW (1964-2010)

Current Operations (2010-Today)



Deschutes Basin Water Quality Study

View full report and data at:
https://portlandgeneral.com/waterquality

2015-2017
years data were collected

12
sites sampled in the Lower Deschutes River

11
tributaries sampled

6
sites sampled in the reservoirs

23
parameters measured

226
days spent sampling

645
rocks scraped for periphyton samples

1997
year historical water quality study was conducted

4
models developed and tested

11
scenarios modeled

9,500+
water quality data points measured in a lab

13
PGE staff involved in data collection

The Fish Committee developed this graphic to illustrate Deschutes Basin water quality focusing on what support is needed most and where it would be most impactful.

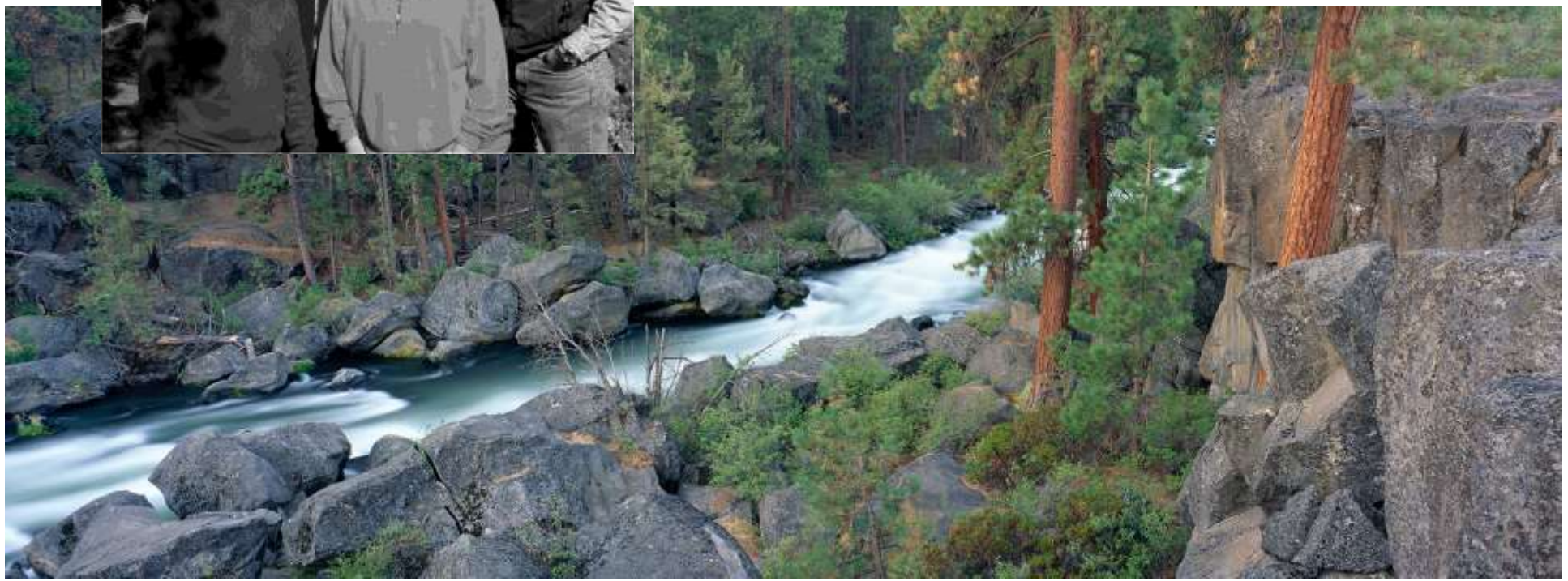
Fish Committee Members
*Portland General Electric
*Confederated Tribes of the Warm Springs
NOAA Fisheries
U.S. Fish and Wildlife Service
*Oregon Dept. of Fish and Wildlife
*Oregon Dept. of Environmental Quality
*U.S. Forest Service
U.S. Bureau of Land Management
U.S. Bureau of Indian Affairs
*Native Fish Society
*Trout Unlimited
WaterWatch
American Rivers
Freshwater Trust

Check out prbfishcommittee.com to view the full graphic and the reintroduction roadmap.

DESCHUTES RIVER
CONSERVANCY

Kate Fitzpatrick, Executive Director
Environmental Quality Commission Meeting
April 6, 2022

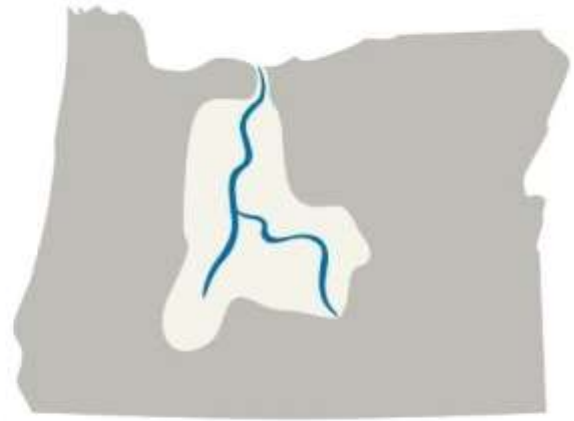
DESCHUTES RIVER
CONSERVANCY



Mission:
To Restore Streamflow and Water Quality in the Deschutes Basin

THE DESCHUTES BASIN

We honor the native people who have called this region home for thousands of years. We join them in stewardship of our rivers for the next seven generations.



DRC Priorities

- Streamflow Restoration
- Integrated Benefits through Deschutes Partnership
  - Leveraging benefits in the reintroduction reaches
  - Helping meet 20 C temperature target in Whychus Creek
- Other partnerships to leverage benefits
  - Flow-habitat restoration strategy in upper Deschutes
  - Emerging Trout Creek flow-habitat restoration strategy
  - **Crooked River Water Quality Partnership**

Deschutes River

98% of flows were diverted for irrigation

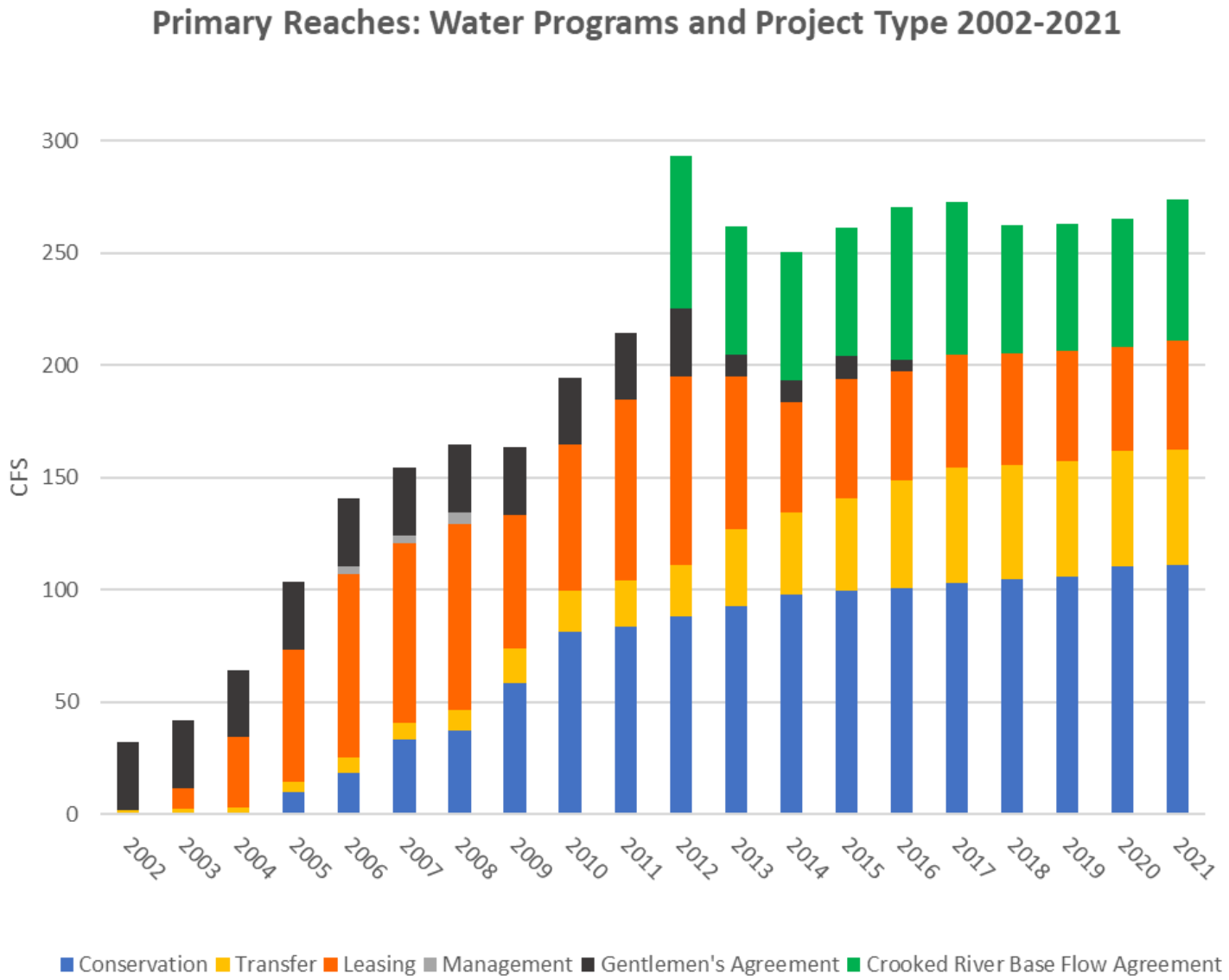
Whychus Creek

Every 2 out of 3 years, the creek would run dry

Crooked River

Extensively diverted flows would leave only a trickle of water at Smith Rock

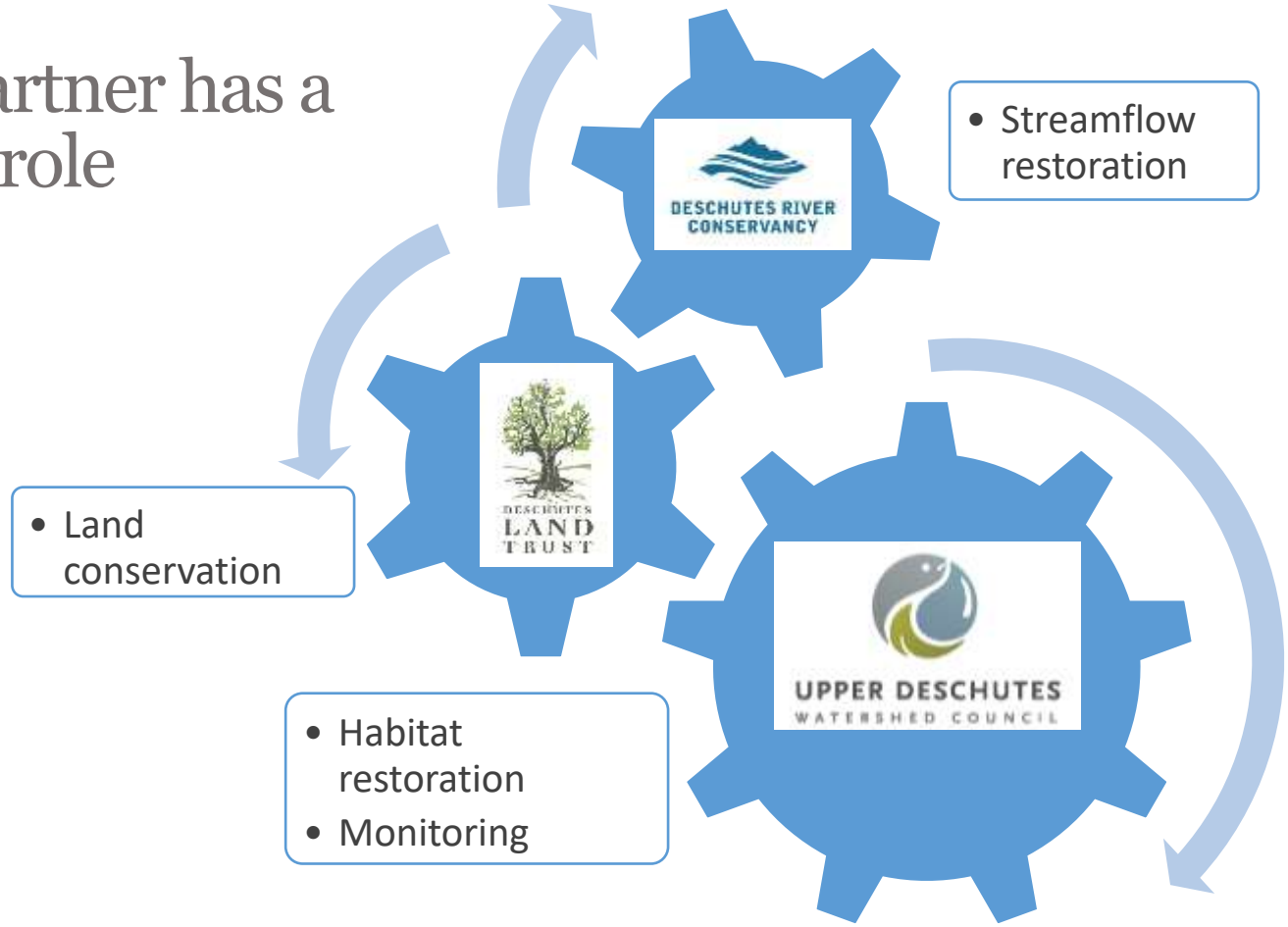
Streamflow Restoration Results 2002-2021



Whychus Creek

Deschutes Partnership

Each partner has a unique role



Holistic Results

- Flow restoration & water quality benefits
- Partnerships to restore related habitat/natural storage
- Maintained or improved reliability for agriculture
- Generation of groundwater mitigation credits for cities
- Community collaborative capacity



Water Quality Focus

- Temperature and water quality benefits through streamflow restoration
  - Flow-temperature monitoring informs work
- Partnership approach to meeting 20 C temperature target in Whychus Creek
- COID Dry Canyon Feasibility Study (Crooked River benefits)
- Crooked River Water Quality Partnership

Opportunities for Collaboration

- Crooked River Water Quality Partnership***
- Continued work in Whychus Creek
- DEQ engagement on the Deschutes Basin Water Collaborative Instream Committee
- Emerging upper Deschutes issues (algal blooms, nitrate issues, surface water quality impacts associated with low reservoir levels)
- So many ops and we look forward to it!!

Water Quality in the lower Deschutes River

Ben Kirsch

Deschutes River Alliance

April 6, 2022

These are the conditions facing the lower Deschutes

These are the conditions facing the lower Deschutes

As a major mitigation measure for the new license period, the Joint Applicants propose to reintroduce anadromous fish upstream of the Project. To enhance surface currents in Lake Billy Chinook, the reservoir upstream of Round Butte Dam, the Joint Applicants propose to construct a selective water withdrawal facility (SWW) at the existing Round Butte Dam intake tower. This new facility will allow water withdrawal from both the surface (warmer epilimnion) and the bottom (cooler hypolimnion) of the reservoir. This new facility will meet two significant purposes:

- Help the Project meet temperature and water quality goals and standards in the lower Deschutes River and Project reservoirs, and,

- Allow the withdrawal of surface waters during salmonid smolt migration periods to facilitate the capture of downstream emigrating smolts from Lake Billy Chinook in support of the anadromous fish reintroduction goal

These are the conditions facing the lower Deschutes

The Issues

- Pervasive nuisance algae coat rocks throughout the river
- High pH levels reflective of increased algae
- Pollution-tolerant insect thriving
- Dissolved oxygen harmed by algal growth as well
  - Not supporting redband trout spawning and incubation needs

- Temperature levels higher overall and for longer periods
  - Conducive to algal growth
  - Increases prevalence of fish parasites (e.g. *C. shasta*)
  - Shifts resident fish spawning
- High temperatures harmful to ESA-listed bull trout
- Weakens cold water refuge at mouth in the Columbia River

4.0 pH (HYDROGEN ION CONCENTRATION) MANAGEMENT PLAN

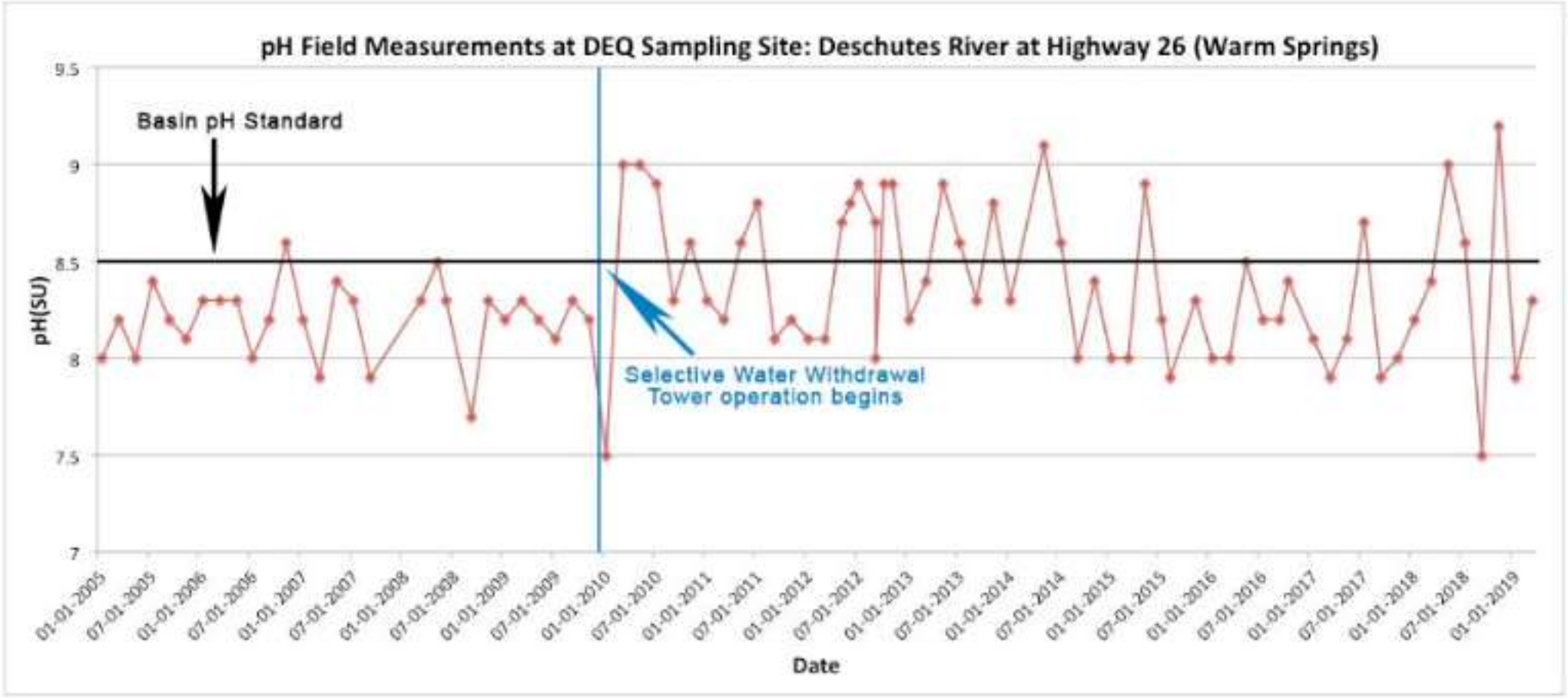
4.1 ODEQ and CTWS pH standards

The applicable ODEQ and Tribal water quality standards can be found in OAR 340-41 and Tribal Ordinance 80, respectively.

4.2 Application to the Pelton Round Butte Hydroelectric Project

The pH criterion of 6.5 to 8.5 Standard Units applies in the lower river. This same criterion also applies in the Project reservoirs with an exception allowed for exceedances of 8.5 in instances where all practical measures are being employed to minimize exceedance

- WQMMP pH standard = 6.5 to 8.5
- 2022 pH standard = 6.5 to 8.5



pH standard = 6.5 to 8.5

Figure 18. pH measurements taken from similar times of day and month from 2005-2019 (pre- and post-SWW Tower). pH above 8.5 occurred in ~4% of measurements (n=28) from 2005-2009 (pre-SWW Tower) compared to 38% of measurements (n=58) from 2010-2019 (post-SWW Tower).

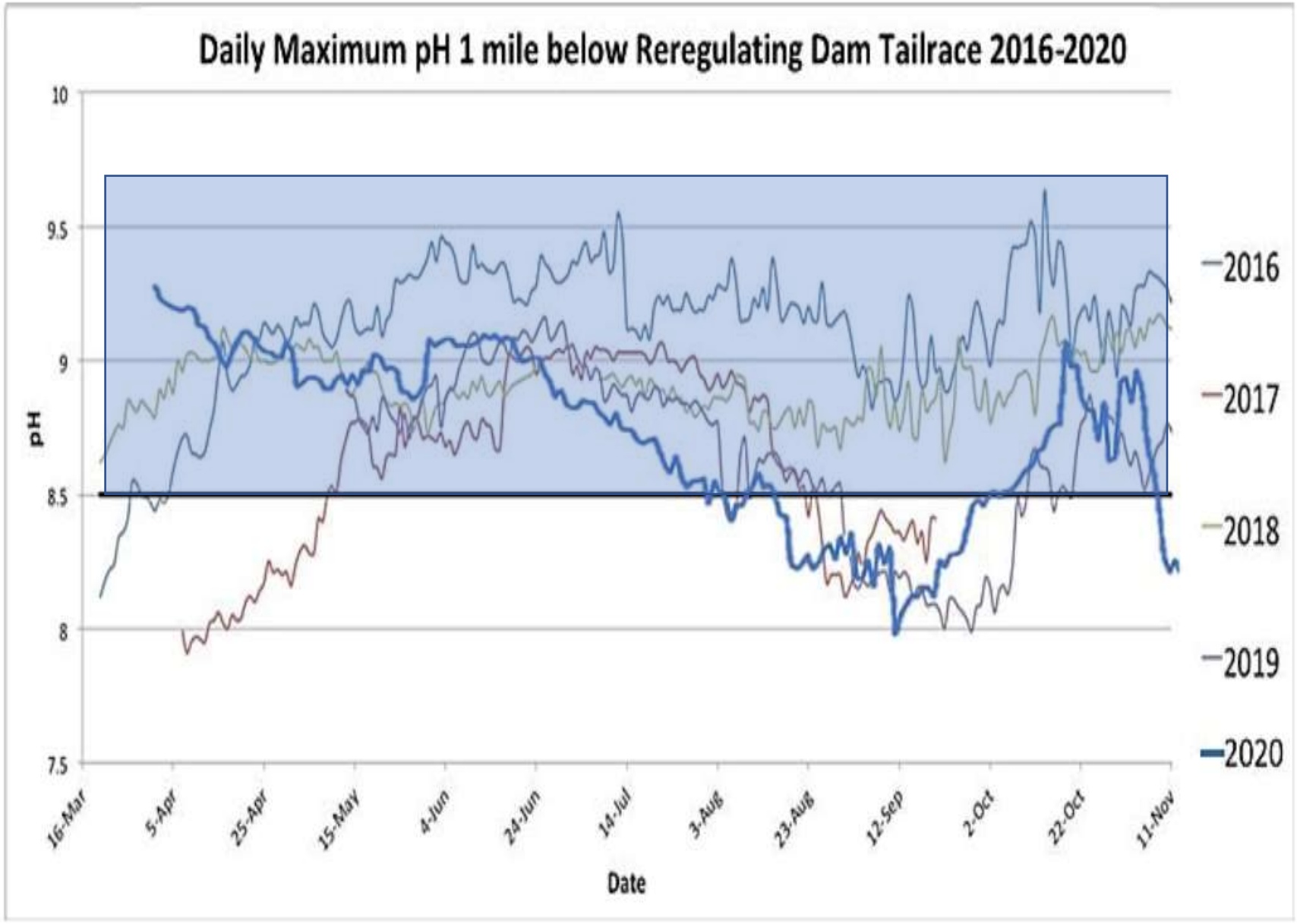


Figure 7. 2016-2020 Daily maximum pH records at River Mile 99 of the lower Deschutes River (DRA water quality reports).

pH standard = 6.5 to 8.5

- 2016 = above 9.0
- 2017 = above 9.0
- 2018 = above 9.0
- 2019 = above 9.0
- 2020 = above 9.0

3.0 DISSOLVED OXYGEN MANAGEMENT PLAN

3.1 ODEQ and CTWS dissolved oxygen standards

The applicable ODEQ and Tribal water quality standards can be found in OAR 340-41 and Tribal Ordinance 80, respectively.

3.2 Application to the Pelton Round Butte Hydroelectric Project

The ODEQ and CTWS salmonid spawning DO criterion will apply to the Deschutes River downstream of the PRB Project during the periods of salmonid spawning and incubation, which in the lower Deschutes River is the entire year.

Based on water quality modeling (Khangaonkar 2001), the percentages of surface and bottom withdrawals listed in Table 2.1 would result in ambient DO concentrations in the Project discharge in excess of 11.0 mg/L during most of the year. During the 3.5 months (approximately 1 August through 15 November) when modeling indicates that DO concentrations would fall below 11.0 mg/L, they would still exceed 9.0 mg/L.

The Joint Applicants acknowledge that the 11.0 mg/L criterion is applicable in light of currently available information. The determination of whether the IGDO criterion will be met under selective withdrawal conditions cannot be made before selective withdrawal has been implemented and DO concentrations downstream reflect the actual blends being discharged. Accordingly, until post selective withdrawal IGDO monitoring demonstrates whether the 9.0 mg/L alternate criterion is applicable, the 11.0 mg/L criterion will apply.

- WQMMP DO Standard = 11.0/9.0 mg/l
  - Year-round
- 2022 DO Standard = 11.0/9.0 mg/l
  - During spawning through fry emergence
    - Deemed to be Jan 1 to Jun 15

2016 Hourly DO

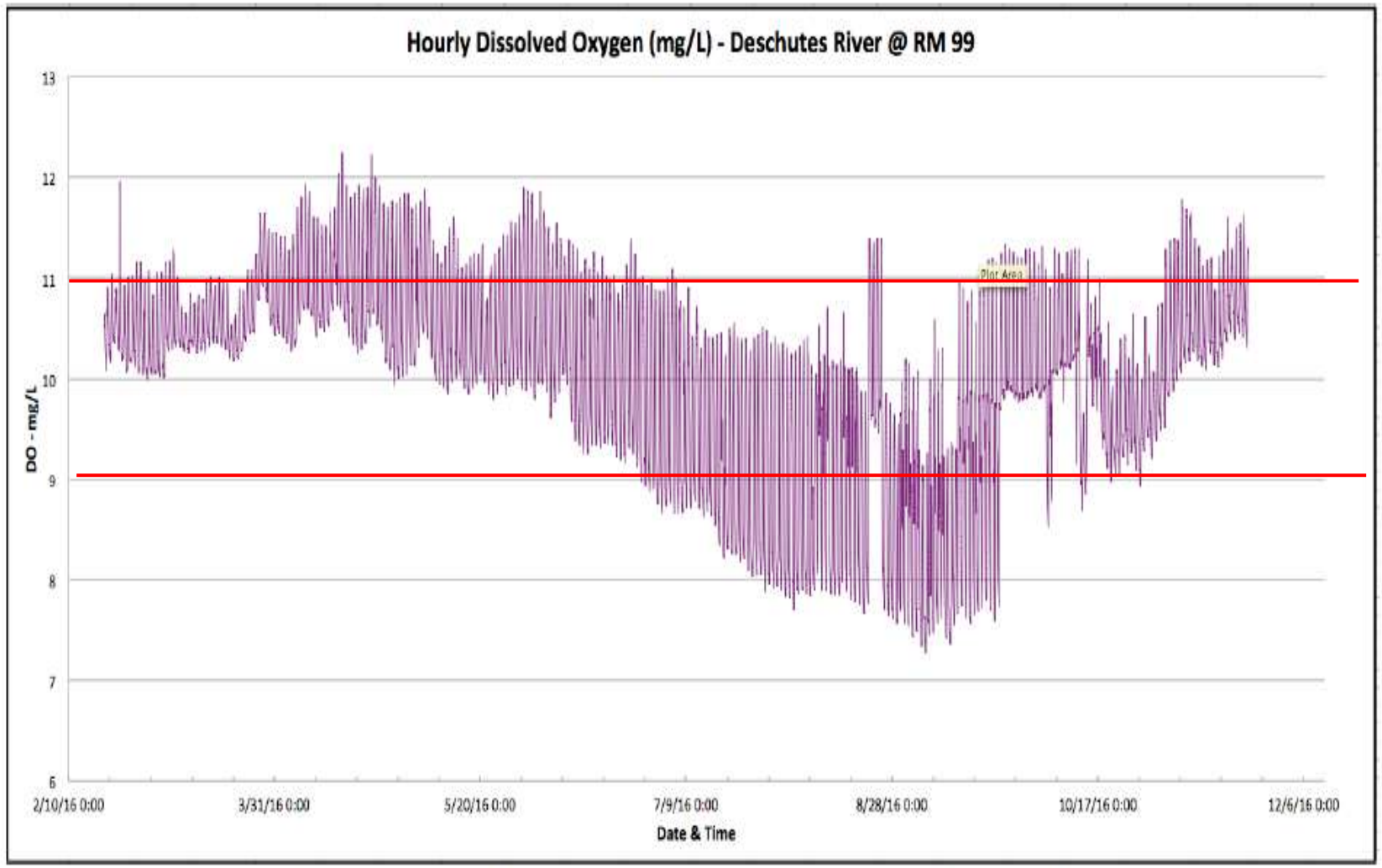


Figure 8. Hourly dissolved oxygen concentrations at River Mile 99, one mile below Reregulating Dam tailrace.

The large daily changes in DO is a clear indication of excessive algal growth and nutrient enrichment.

2016 Hourly DO

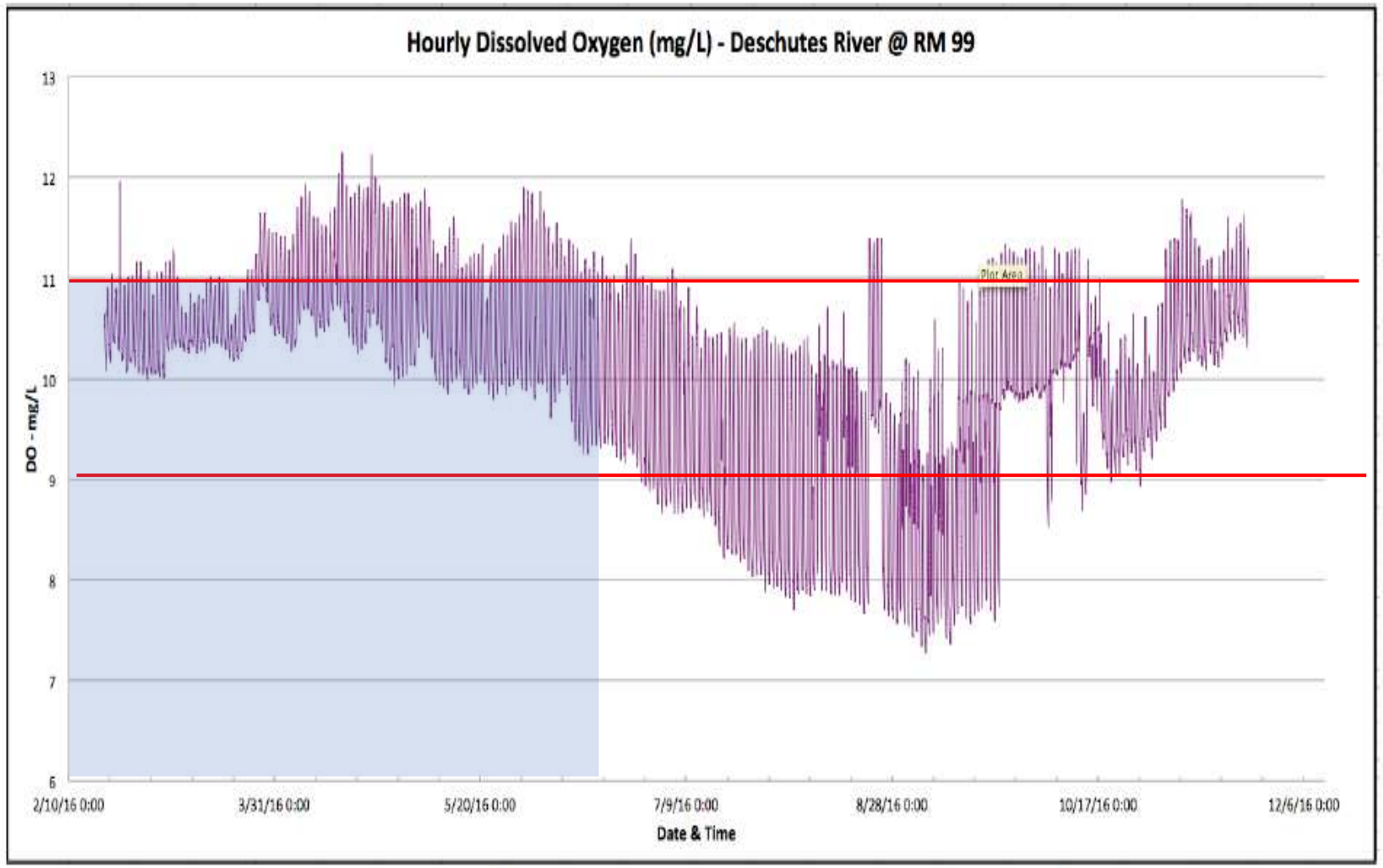


Figure 8. Hourly dissolved oxygen concentrations at River Mile 99, one mile below Reregulating Dam tailrace.

- DO Standard = 11.0/9.0 mg/l
  - During DEQ's deemed spawning through fry emergence

2016 Hourly DO

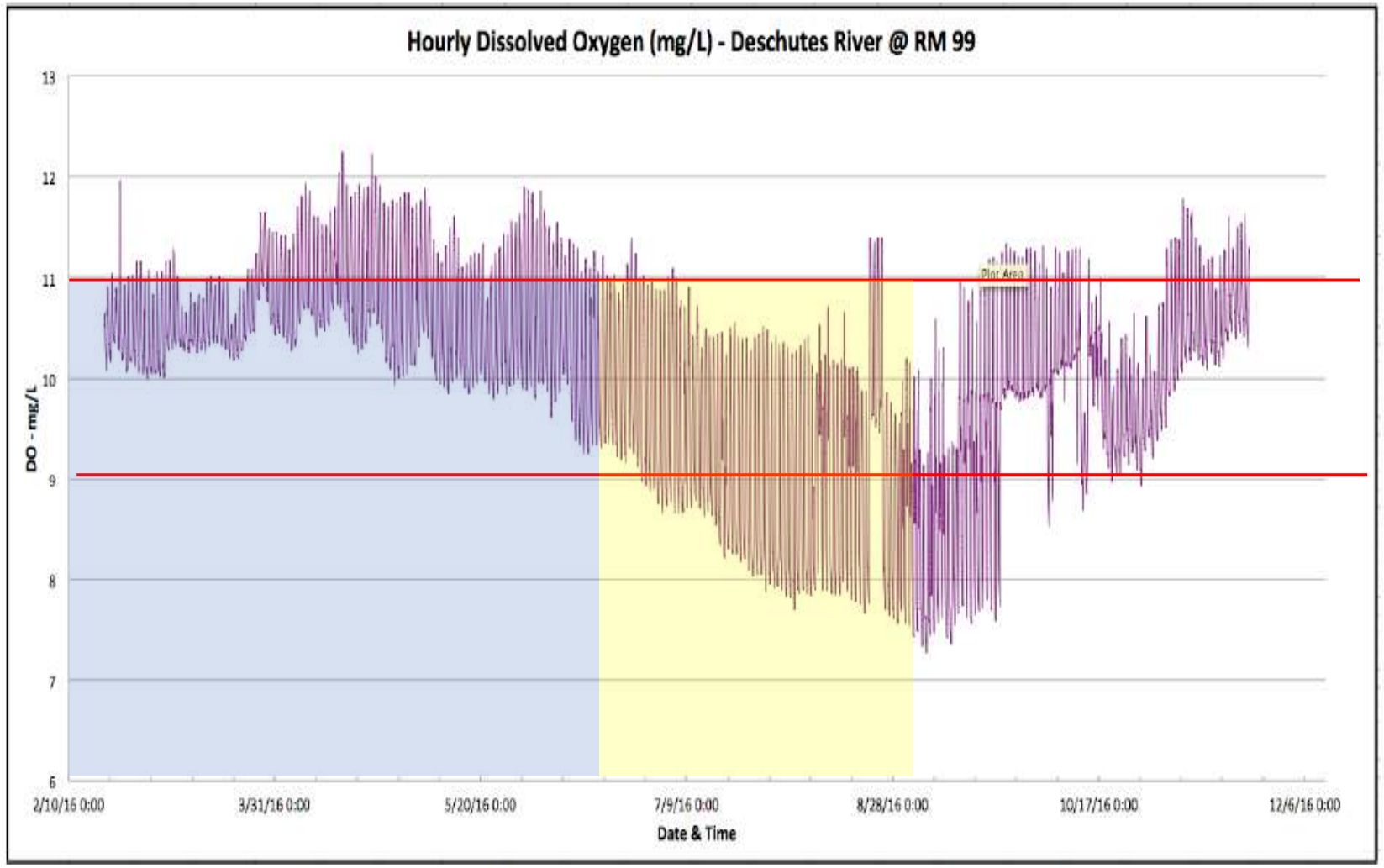


Figure 8. Hourly dissolved oxygen concentrations at River Mile 99, one mile below Reregulating Dam tailrace.

- DO Standard = 11.0/9.0 mg/l
  - During DEQ's deemed spawning through fry emergence

<u>including ODFW designations for resident redband trout's spawning through fry emergence</u>

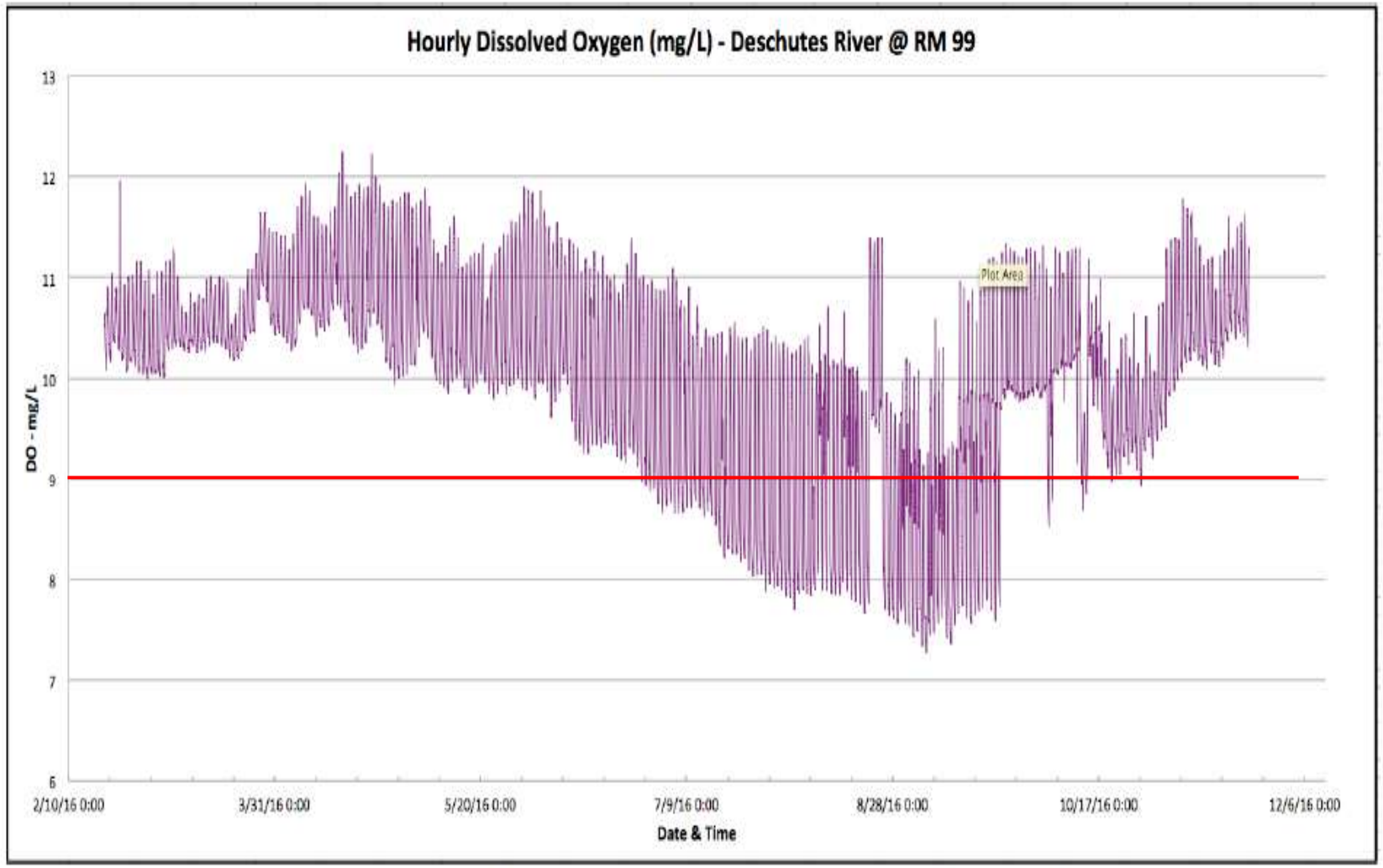


Figure 8. Hourly dissolved oxygen concentrations at River Mile 99, one mile below Reregulating Dam tailrace.

- WQMMP DO Standard = 11.0/9.0 mg/l
  - Year-round
- 2022 DO Standard = 11.0/9.0 mg/l
  - Jan 1 to Jun 15
- 2016
  - Below 8.0 mg/l

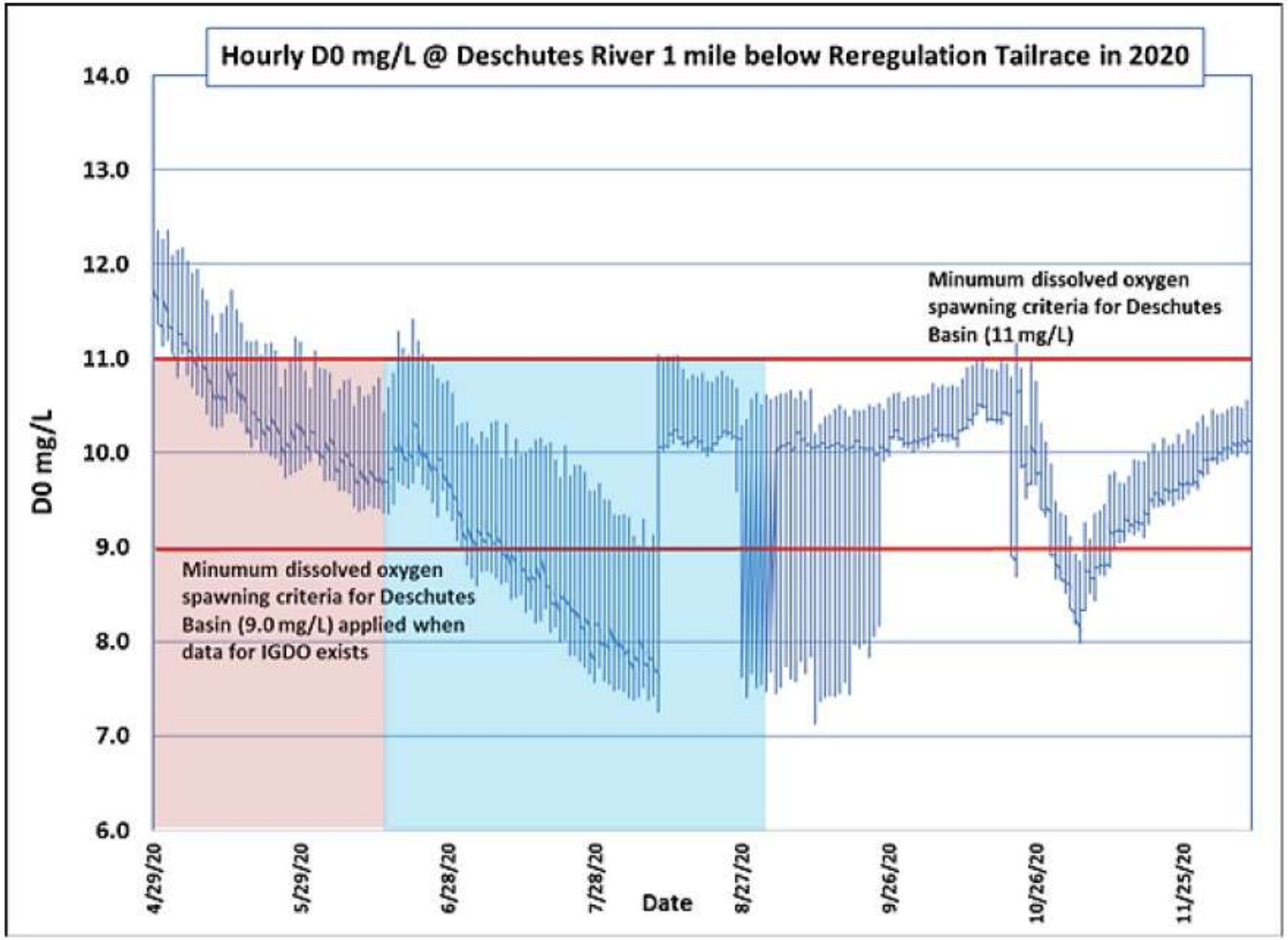


Figure 4. 2020 Hourly dissolved oxygen concentration (mg/L) at River Mile 99 of the lower Deschutes River. The red lines show the minimum dissolved oxygen basin standards based on two separate criteria. Designated salmon and steelhead spawning period highlighted in pink until June 15th, with residential trout spawning highlighted through September 1st in blue.

- WQMMP DO Standard = 11.0/9.0 mg/l
  - Year-round
- 2022 DO Standard = 11.0/9.0 mg/l
  - Jan 1 to Jun 15
- 2016
  - Below 8.0 mg/l
- 2020
  - Below 8.0 mg/l

2.0 WATER TEMPERATURE MANAGEMENT PLAN

2.1 ODEQ and CTWS temperature standards

The applicable ODEQ and Tribal water quality standards can be found in OAR 340-41 and Tribal Ordinance 80, respectively.

2.2 Application to the Pelton Round Butte Hydroelectric Project

As required by the Federal Clean Water Act, the temperature standard that must be satisfied for the lower Deschutes River below the Project's Reregulating Dam is the most stringent applicable standard, the State's bull trout standard. The DEQ and the WCB interpret the temperature standard to restrict the PRB Project from warming the water discharged into the lower Deschutes River below the Reregulating Dam more than 0.25 °F over what would occur at that location in the river if the PRB Project were not in place, when surface waters exceed 50°F (10°C) or when federally listed Threatened and Endangered species use the river.

- 2004 Bull Trout Standard = 10ºC (50ºF)
- 2022 Bull Trout Standard = 12ºC (54ºF)

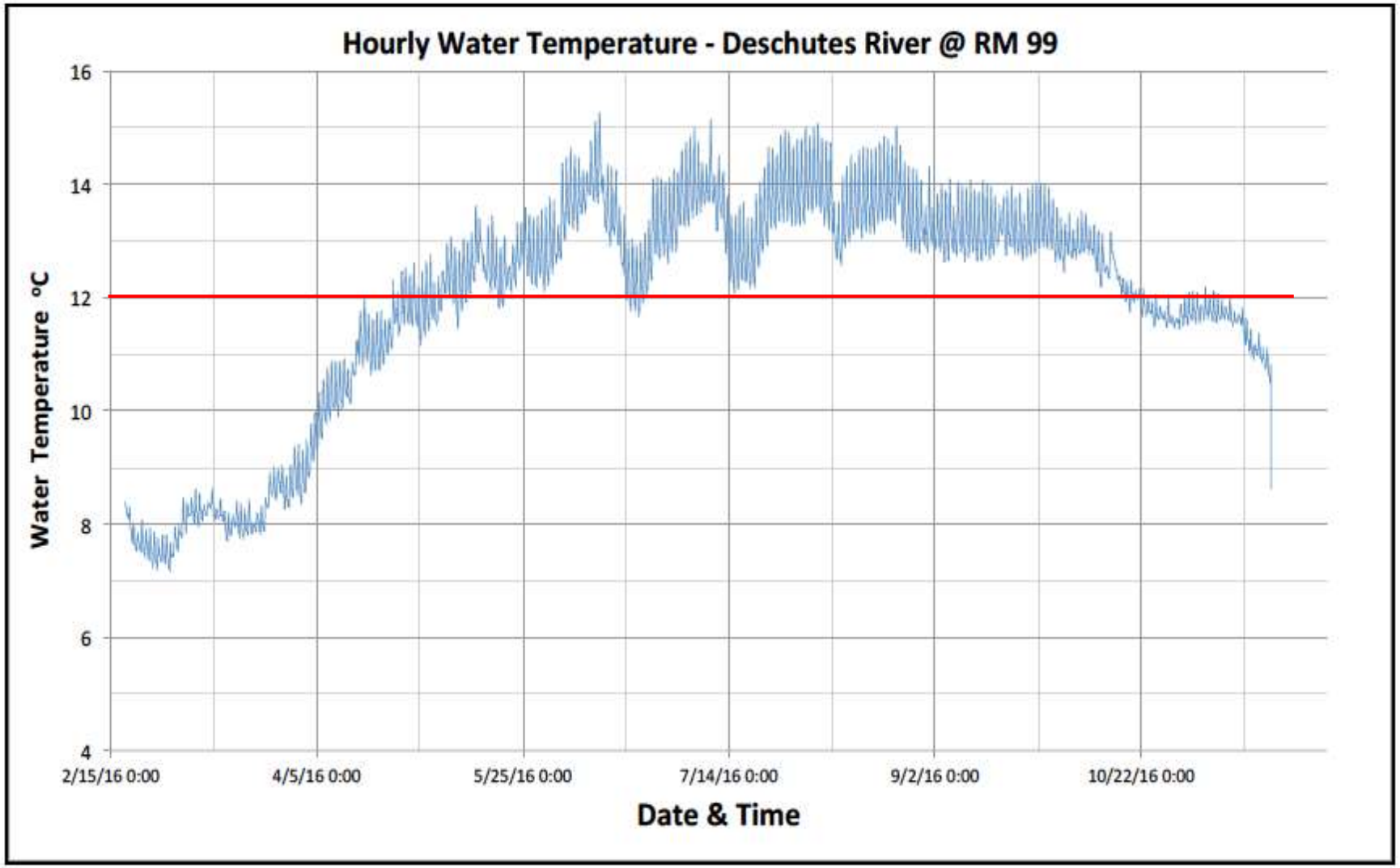
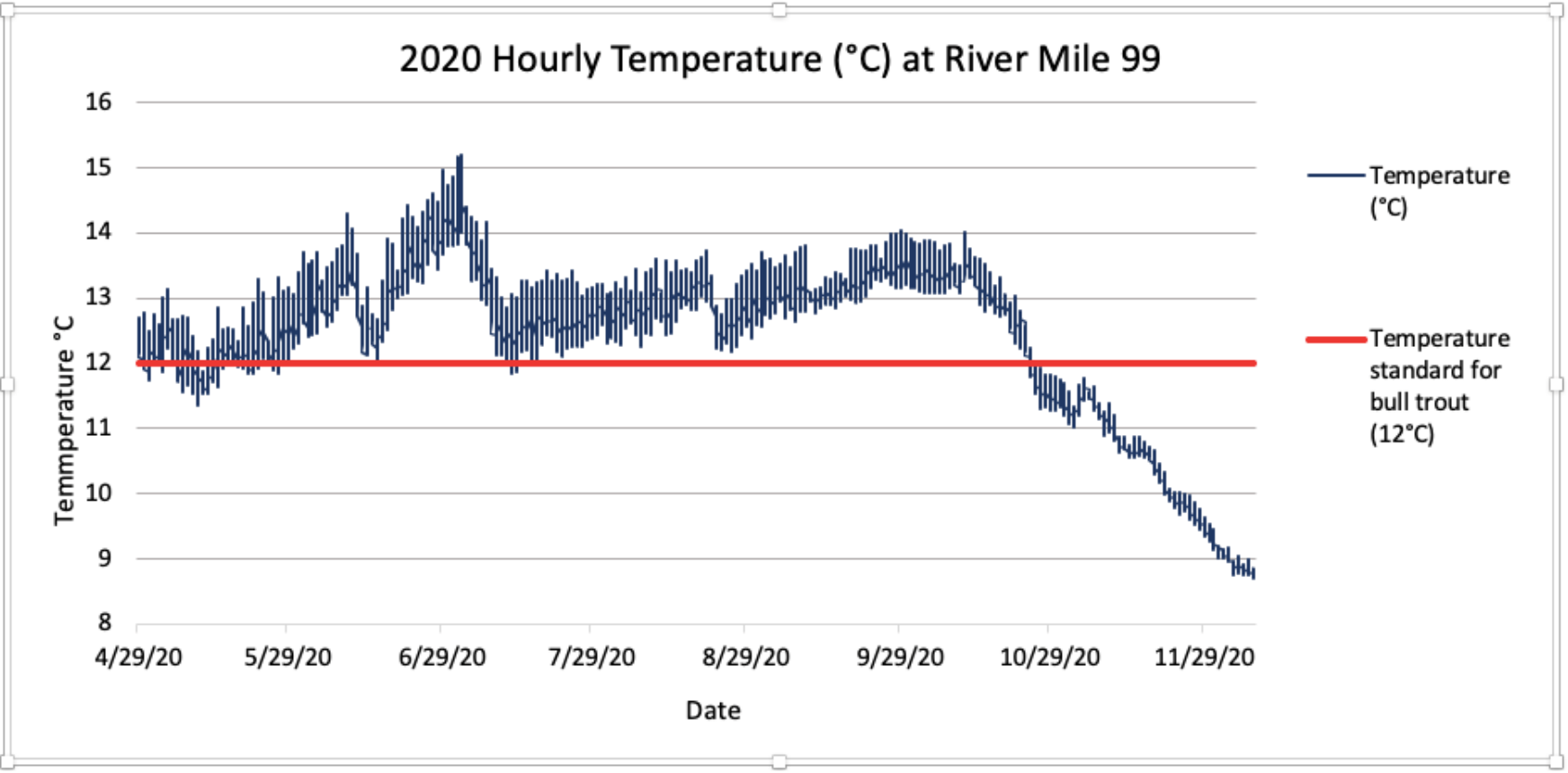


Figure 6. 2016 hourly water temperature at River Mile 99, one mile below Reregulating Dam tailrace.

- 2004 Bull Trout Standard = 10ºC (50ºF)
- 2022 Bull Trout Standard = 12ºC (54ºF)

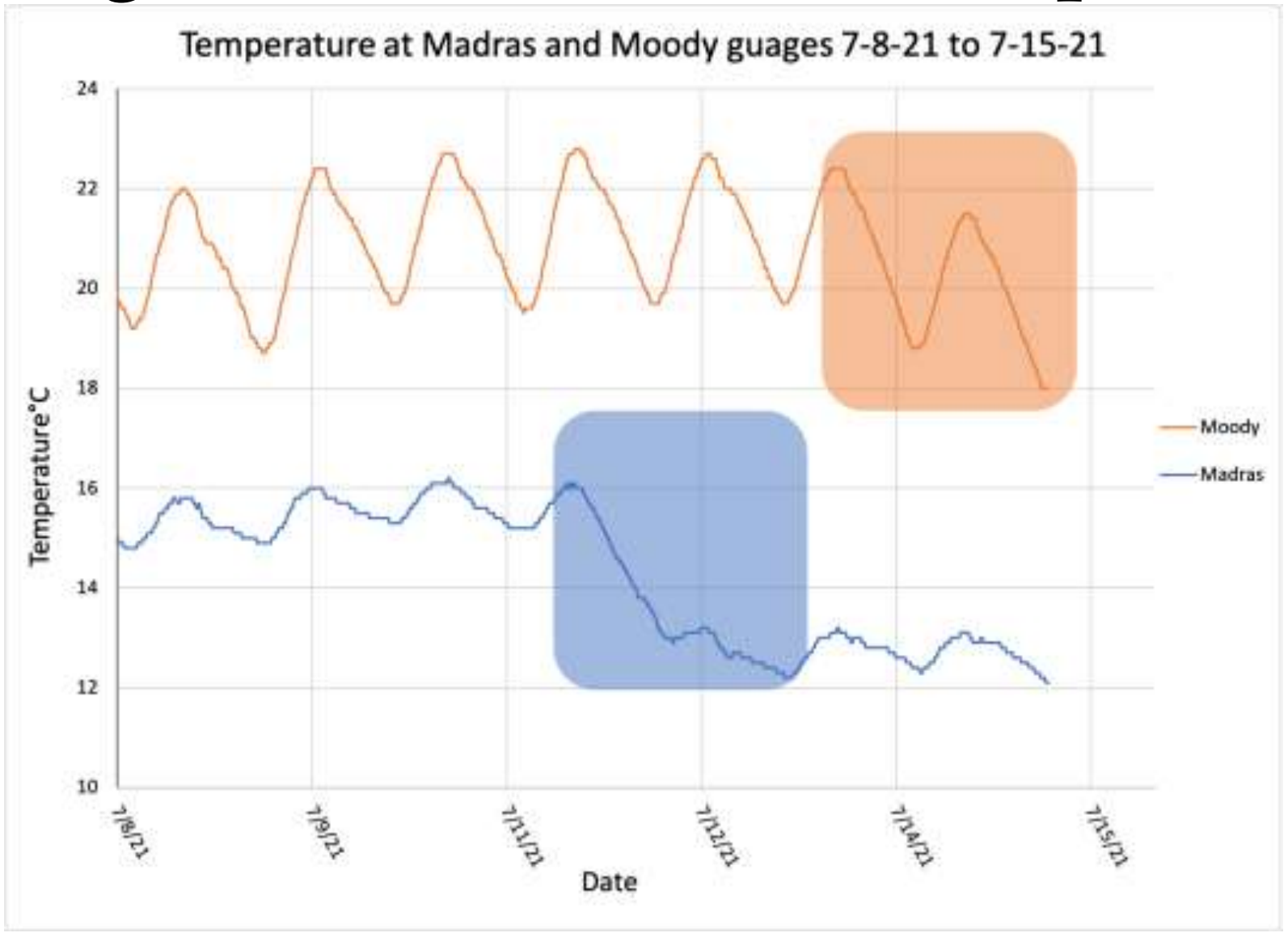
- 2016
  - Above 14ºC



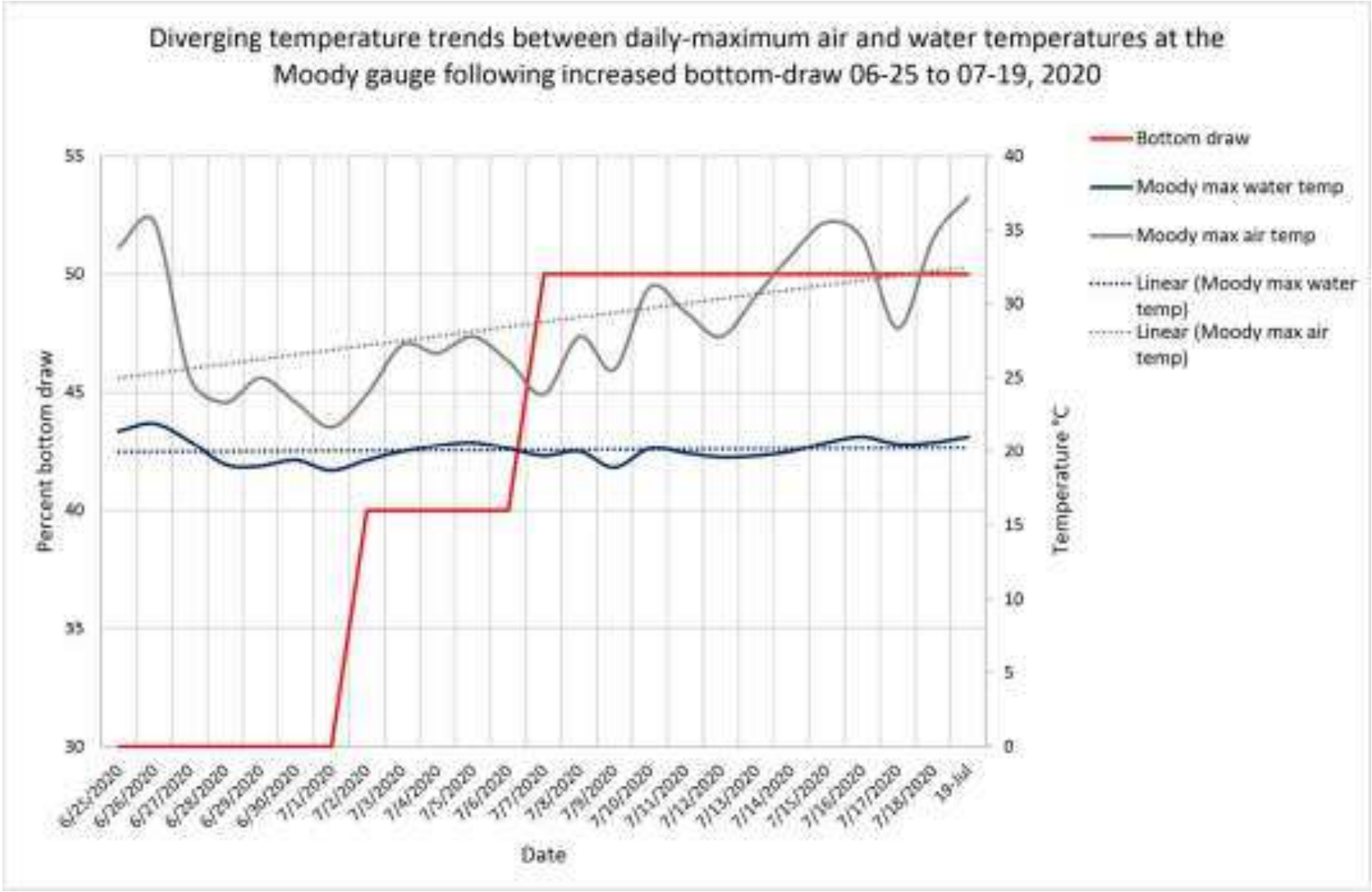
- 2004 Bull Trout Standard = 10ºC (50ºF)
- 2022 Bull Trout Standard = 12ºC (54ºF)

- 2016
  - Above 14ºC
- 2020
  - Above 13ºC
  - As high as 15ºC

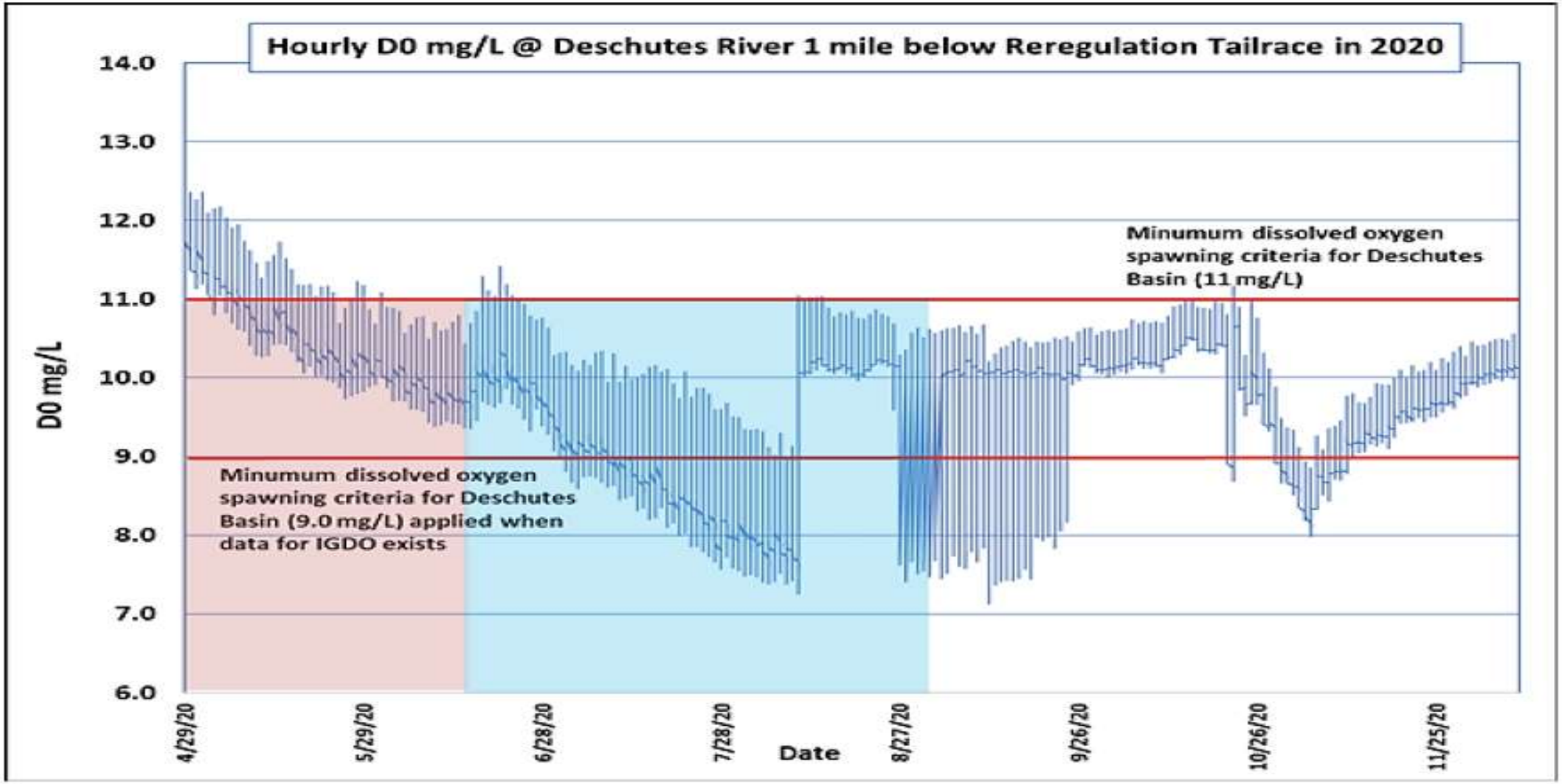
Changes that benefitted temperature



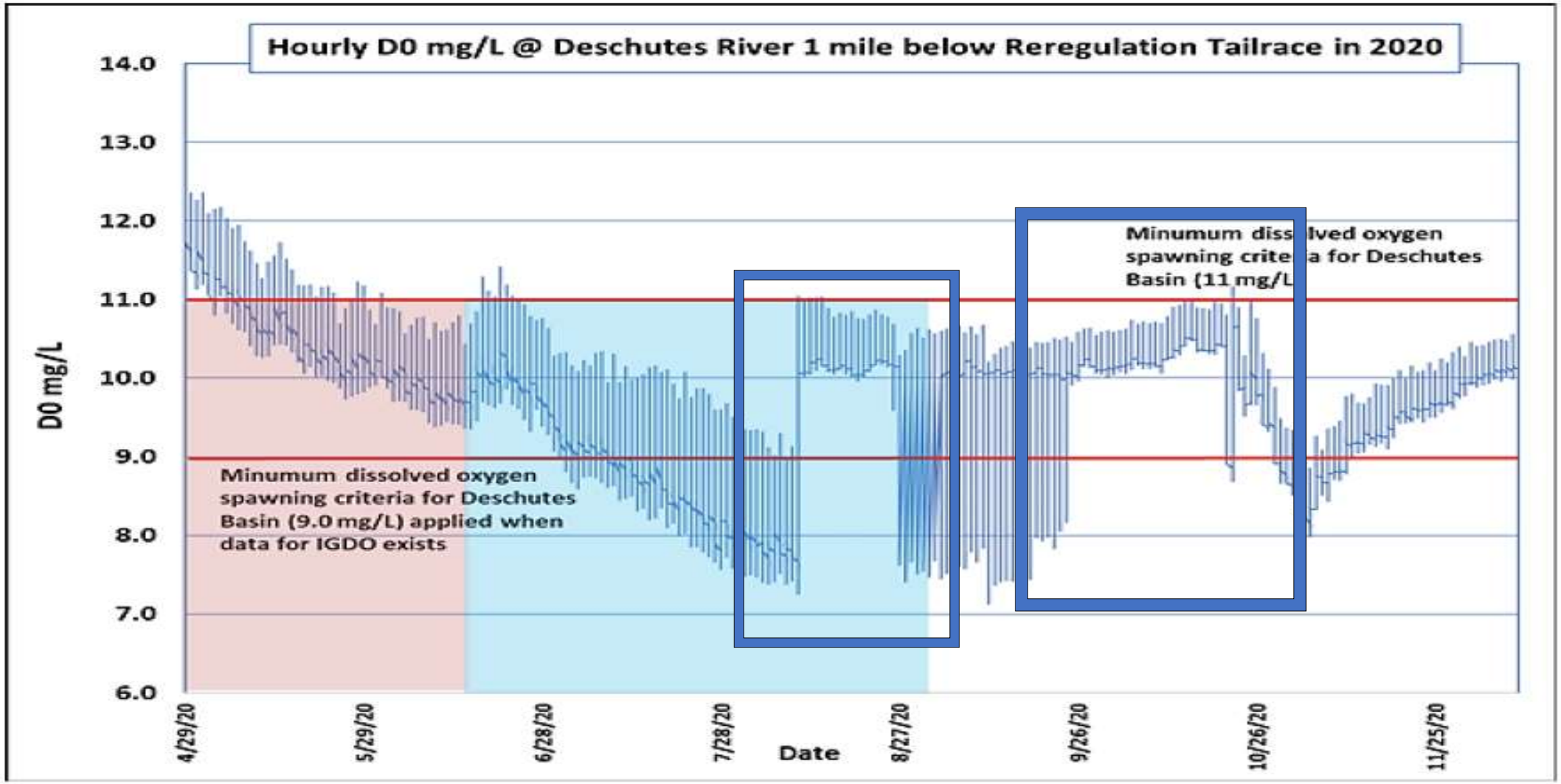
Changes that benefitted temperature



Changes that benefitted dissolved oxygen



Changes that benefitted dissolved oxygen



DRA's Priorities and Objectives

That the Environmental Quality Commission ensures that the Department of Environmental Quality enforces all of the water quality standards that apply in the lower Deschutes River according to Oregon's water quality laws and the mutually agreed-to requirements in the Section 401 Water Quality Certification and Water Quality Management and Monitoring Plan.

Four guiding questions

1. What is the status of your water quality/fisheries/restoration work?
2. What priorities and objectives is your organization working toward in the Deschutes River basin?
3. What are your observations regarding water quality and fisheries management tradeoffs or tensions in meeting those multiple priorities/objectives?
4. What do you see as opportunities for cooperation/collaboration?