CITY OF BOISE

CLEAN WATER ACT 316(a)

THERMAL VARIANCE

Kate Harris
TEMPERATURE – NOT UNIQUE TO THE BOISE RIVER

Leading Cause of Impairment by Miles of Rivers and Streams
TEMPERATURE COMPLIANCE ALTERNATIVES EVALUATION
WHAT IS A 316(a) THERMAL VARIANCE?

• 316(a) authorizes alternative thermal effluent limits (ATEL) when effluent limitations are more stringent than necessary to assure protection and propagation of a Balanced Indigenous Community (BIC) in a water body receiving a thermal discharge
  • Regulations at 40 CFR 125.70 through 125.73

• Demonstration Project
  • Type I demonstration – based on field studies to assess “prior appreciable harm” to the BIC from a discharge.
  • Type II demonstration – a predictive demonstration conducted to assure that the proposed ATELs will provide adequate protection and propagation of the BIC.
IDAHO RULES AND GUIDANCE ON 316(a)

• DEQ primacy for Idaho Pollutant Discharge Elimination System (IPDES) regulations
  • Idaho Administration Procedures Act (IDAPA) 58, Title 01, Chapter 25 (IDAPA 58.01.25)
  • Adopted by the DEQ board and approved by the Idaho legislature
  • Mirror, are consistent with, and cite the applicable federal regulations
  • Become effective July 1, 2018

• IPDES: User’s Guide to Permitting and Compliance, Volume 1—General Information, April 2017
  • Specific to 316(a) demonstrations and variances
  • Consistent with the EPA and state regulations
  • Section 8, Table 5 addresses variances, including Section 316(a)
CITY OF BOISE 316(a) THERMAL VARIANCE REQUEST

- Data review and compilation
- Identified Representative and Important Species (RIS)
- Type I Demonstration
- Calculated ATELS
- Type 2 Demonstration
TYPE I DEMONSTRATION - ASSESSMENT OF PRIOR APPRECIABLE HARM

Determines whether there are impacted aquatic communities downstream of the existing WRF thermal effluent discharges

• Three lines of evidence
  1. Comparison of RIS presence
  2. Comparison of fish and benthic macroinvertebrate community condition, and
  3. Comparison of temperature-specific fish and benthic macroinvertebrate community attributes
Three lines of evidence

1. Comparison of RIS presence
   • No longitudinal trends except for the mottled sculpin and shorthead sculpin
   • Shorthead sculpin consistent reduction in presence going downstream

2. Comparison of fish and BMI community condition
   • No longitudinal trend in River Fish Index
   • Mixed results of longitudinal trend in River Macroinvertebrate Index

3. Comparison of temperature-specific community metrics
   • Trending towards warm-water species, but the trend is incremental and not punctuated at WRFs
NUMERIC ATEL APPROACH

• Performance Based:
  • Historical WRF effluent temperatures
  • Adjusted for predicted climate change

• Mixing Zone, Thermal Plume Criteria Check:
  • Confirmed performance-based ATEL comply with:

  • Within 2 seconds of plume travel from the point of discharge, maximum temperatures should not exceed 32 °C.
  • The cross-sectional area of the receiving water body exceeding 25 °C should be limited to less than 5%.
  • The cross-sectional area of the receiving water body exceeding 21 °C should be limited to less than 25%, or if upstream temperatures exceed 21 °C, then at least 75% of the receiving water body should not have temperature increases of more than 0.3 °C.
  • In spawning and egg incubation areas, the maximum weekly maximum stream temperatures should not exceed 13 °C, or the temperatures should not be increased by more than 0.3 °C above ambient stream temperatures during times when spawning and incubation occur.

<table>
<thead>
<tr>
<th>Period</th>
<th>Lander St., degrees C</th>
<th>W. Boise, degrees C</th>
</tr>
</thead>
<tbody>
<tr>
<td>January-March</td>
<td>23.3</td>
<td>18.8</td>
</tr>
<tr>
<td>April-June</td>
<td>25.8</td>
<td>24.5</td>
</tr>
<tr>
<td>July-September</td>
<td>25.1</td>
<td>25.4</td>
</tr>
<tr>
<td>October-December</td>
<td>26.0</td>
<td>23.3</td>
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</tbody>
</table>
TYPE II DEMONSTRATION

Determines whether the existing and future river temperature exceeds the thermal limits of the RIS

- Evaluated RIS thresholds
- Two lines of evidence
  1. Comparison of near-field (mixing zones) temperature
  2. Comparison of far-field modeled temperatures
TYPE II DEMONSTRATION
PREDICTED TEMPERATURE EXCEEDANCE (%) OF RIS TEMPERATURE THRESHOLDS (NEAR FIELD)
Comparison of near-field (mixing zone) temperatures

- For Lander St., near instantaneous mixing across the diffuser
- For West Boise plume dimensions in the South Channel
  - Current conditions, 9% plume area > 21 degrees C
  - Future conditions, 3% plume area > 21 degrees C
  - Both scenarios, 0.03% plume area > 25 degrees C

Comparison of far-field modeling

- Lander St
  - No RIS Exceedances for current or design flow scenarios during median flow year
- West Boise
  - No RIS Exceedances for current or design flow scenarios during the median flow year
  - Only shorthead sculpin exceedances during the low flow year
  - Even without WRF discharge, shorthead sculpin exceeded during the low flow year
  - Spawning criteria exceeded during the low flow year
TO MEET FUTURE CONDITIONS

• Implement a comprehensive temperature and biological monitoring program
  • Robust data for recurring evaluation
• Investigate mainstem and sidestream river habitat improvement projects
  • Restoration projects can readily mitigate minor temperature effects of the City’s growth related thermal discharges from the WRFs
• Coordination/cooperation with river management agencies and organizations
  • Determine best restoration projects and approaches with:
    • U.S. Bureau of Reclamation
    • U.S. Army Corps of Engineers
    • Flood Control District #10
    • IDEQ
    • IDFG
    • Trout Unlimited
• Divert effluent flows and associated thermal loads to Farmers Union Canal during irrigation season
WHERE ARE WE?

- Working on final draft for IDEQ (in cooperation with EPA) review
- Draft Idaho Recycled Water Reuse permit
ANTICIPATED QUESTIONS

• What is the permit language or condition?
  • Alternate thermal effluent limit (ATEL) replaces the proposed or current temperature limit

• How long is the variance good for?
  • Variances are reviewed with each permit renewal

• When is a 316(a) request submitted?
  • The request is due by close of the draft comment period.
    • This is not the demonstration project

• Who approves the variance?
  • As of July 1, 2018 – the Idaho Department of Environmental Quality
316A – A VISION OF WHAT COULD BE

• What we’re seeing today are lawsuits on offsets
• What could be is a win-win-win for all involved within the confines of CWA

The goal of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.
BOISE RIVER – MULTIPLE USES
DAMS
BIOTIC INTEGRITY SUMMARY

- The Boise River is moderately impaired in the upper reaches and declines gradually downstream.

  - Increasing
    - Substrate embeddedness
    - Sediment deposition

  - Decreasing
    - Habitat complexity
    - Fish cover
    - Frequency of riffles

Photos: IDFG
• Final December 2016
• Section 2.7.2 – Temperature
  • Within 2 seconds of plume travel from the point of discharge, maximum temperatures should not exceed 32 °C.
  • The cross-sectional area of the receiving water body exceeding 25 °C should be limited to less than 5%.
  • The cross-sectional area of the receiving water body exceeding 21 °C should be limited to less than 25%, or if upstream temperatures exceed 21 °C, then at least 75% of the receiving water body should not have temperature increases of more than 0.3 °C.
  • In spawning and egg incubation areas, the maximum weekly maximum stream temperatures should not exceed 13 °C, or the temperatures should not be increased by more than 0.3 °C above ambient stream temperatures during times when spawning and incubation occur.
<table>
<thead>
<tr>
<th>Thermal Threshold (°C)</th>
<th>RIS critical thermal limits MDMT</th>
<th>Biothermal Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown Trout</td>
<td>24.1</td>
<td>95th percentile of weekly mean temperature observed</td>
</tr>
<tr>
<td>Mountain Whitefish</td>
<td>23.2</td>
<td>95th percentile of weekly mean temperature observed</td>
</tr>
<tr>
<td>Rainbow Trout</td>
<td>25</td>
<td>Upper avoidance temperature</td>
</tr>
<tr>
<td>Mottled Sculpin</td>
<td>24</td>
<td>Maximum observed temperature</td>
</tr>
<tr>
<td>Shorthead Sculpin</td>
<td>21</td>
<td>Maximum observed temperature</td>
</tr>
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</table>

- Considered field observation and controlled experiments
- Chose greater value of the upper avoidance temperature or the 95th percentile of observed temperatures
- Mottled sculpin and shorthead sculpin did not have these attributes defined, so the upper end of the observation ranges were used
## TYPE II DEMONSTRATION

### PREDICTED TEMPERATURE EXCEEDANCE (%) OF RIS TEMPERATURE THRESHOLDS (FAR FIELD)

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<tbody>
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<td>Design WRF</td>
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<td>0</td>
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<tr>
<td>Mountain whitefish</td>
<td>No WRF</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Existing WRF</td>
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<td>0</td>
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<tr>
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<td>Design WRF</td>
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<tr>
<td>Rainbow trout</td>
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<td>Design WRF</td>
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<tr>
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<tr>
<td>Shorthead sculpin</td>
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<td>Existing WRF</td>
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<tr>
<td></td>
<td>Design WRF</td>
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<td>27</td>
<td>0</td>
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</tr>
</tbody>
</table>

- Temperature was always below RIS thresholds during the median flow year.
- During low flow year, shorthead sculpin threshold was exceeded for all three scenarios at West Boise (even without WRF discharge).
- During low flow year, shorthead sculpin threshold was exceeded for existing conditions.

Note: Percent exceedance was calculated using the 93-day critical period (June 21 – September 21).
Note: Maximum daily maximum temperature (MDMT) was used to calculate exceedances.