

# NDEP Bureau of Water Quality Planning

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## Review of Lahontan Reservoir Water Quality Standards

### Focus Group Meeting #2

*July 29, 2013*

# Focus Group Activities

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- ◆ Beneficial Uses
- ◆ Other Criteria
- ◆ Antidegradation Criteria (RMHQs)
- ◆ Nutrient Criteria

# Current Reach in NAC 445A.1824



# Reach Description Change

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- Options – Separate out Lahontan Reservoir
  - ◆ Break reach into 2 reaches
    - ◆ 1) Carson River – Highway 95A to Lahontan Reservoir
    - ◆ 2) Lahontan Reservoir
  - ◆ Combine Carson River subreach with upstream
    - ◆ 1) NAC 445A.1822 – Carson River from Dayton Bridge to Highway 95A
      - Change to “Dayton to Lahontan Reservoir”
    - ◆ 2) Lahontan Reservoir

# Designated Beneficial Uses

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*The following beneficial uses are currently in the regulations. NDEP proposes to retain all.*

- **Livestock Watering** – Releases used for watering
- **Irrigation** – Releases used for irrigation
- **Aquatic Life** – Variety of game and nongame species
- **Contact Recreation** – Swimming, skiing
- **Noncontact Recreation** – Boating, fishing
- **Municipal or Domestic Supply**
  - ◆ Indirectly used – influences wells/springs used by State Parks; recharges groundwater in Lahontan Valley
- **Industrial Supply** - hydroelectric generation
- **Wildlife** – variety of wildlife species

# Routine Parameters with Numeric Criteria

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- Temperature
- pH
- Total phosphates \*
- Nitrogen species \*
- **Total ammonia \*\***
- Dissolved oxygen
- Total Suspended Solids
- Turbidity
- Color
- Total Dissolved Solids
- Chlorides
- Sulfate
- Sodium Adsorption Ratio
- Alkalinity
- E. coli
- Fecal Coliform

\* Discussed next Focus Group meeting

\*\* Part of statewide criteria – not to be reviewed

# CYA

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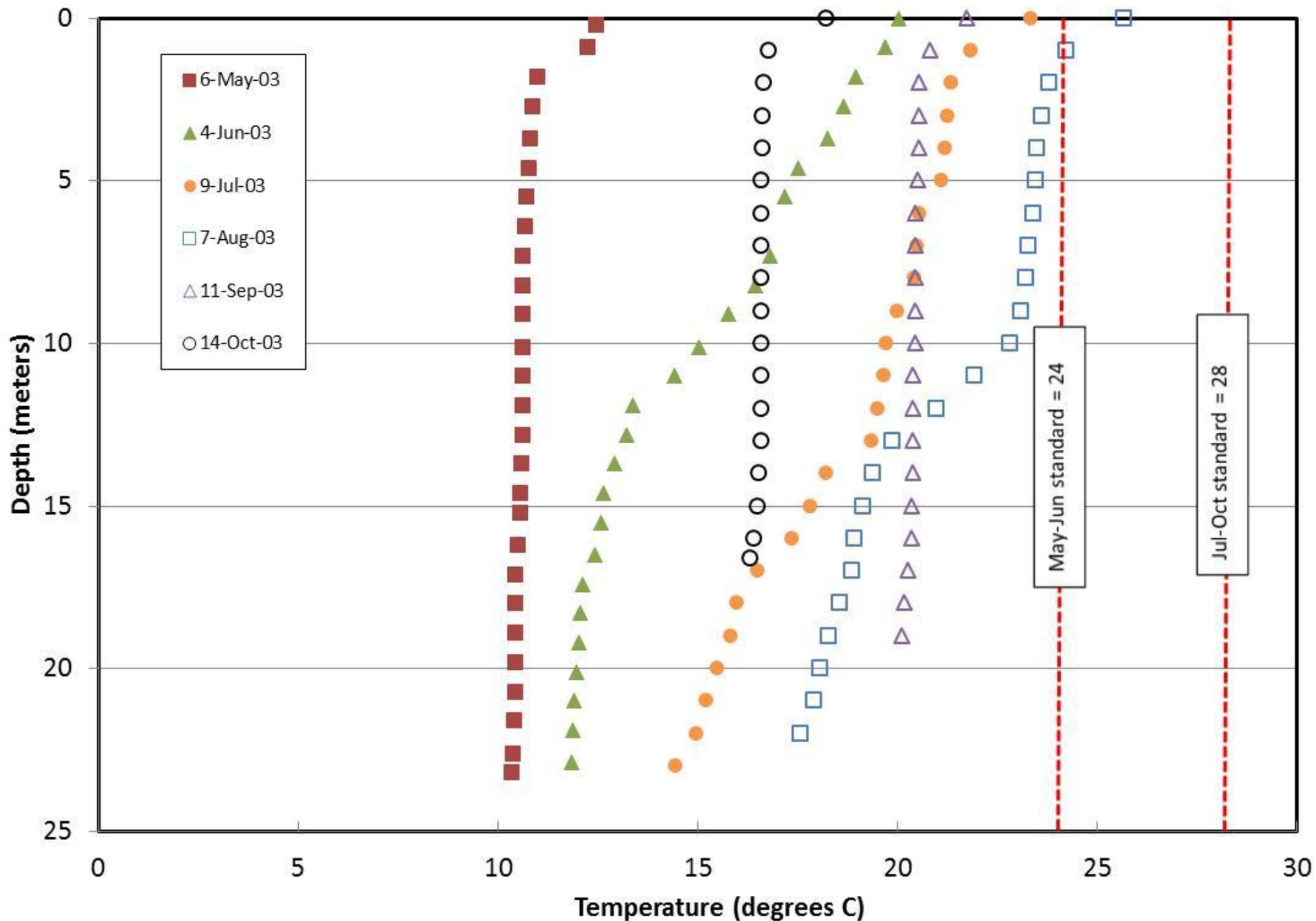
The following recommendations are preliminary and subject to change!

# Temperature

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- Nov-Mar < 11 °C
  - Apr-Jun < 24 °C
  - Jul-Oct < 28 °C
  - $\Delta T \leq 2$  °C - Maximum allowable increase at boundary of mixing zone
- 
- Set in 1984 based upon NDOW and EPA recommendations for warmwater fish.
  - >99% of temperature readings (2003-05, 2012) met standards
  - No new recommendations available. No NAC changes recommended at this time

# Temperature Profiles at LR5 - 2003



# pH

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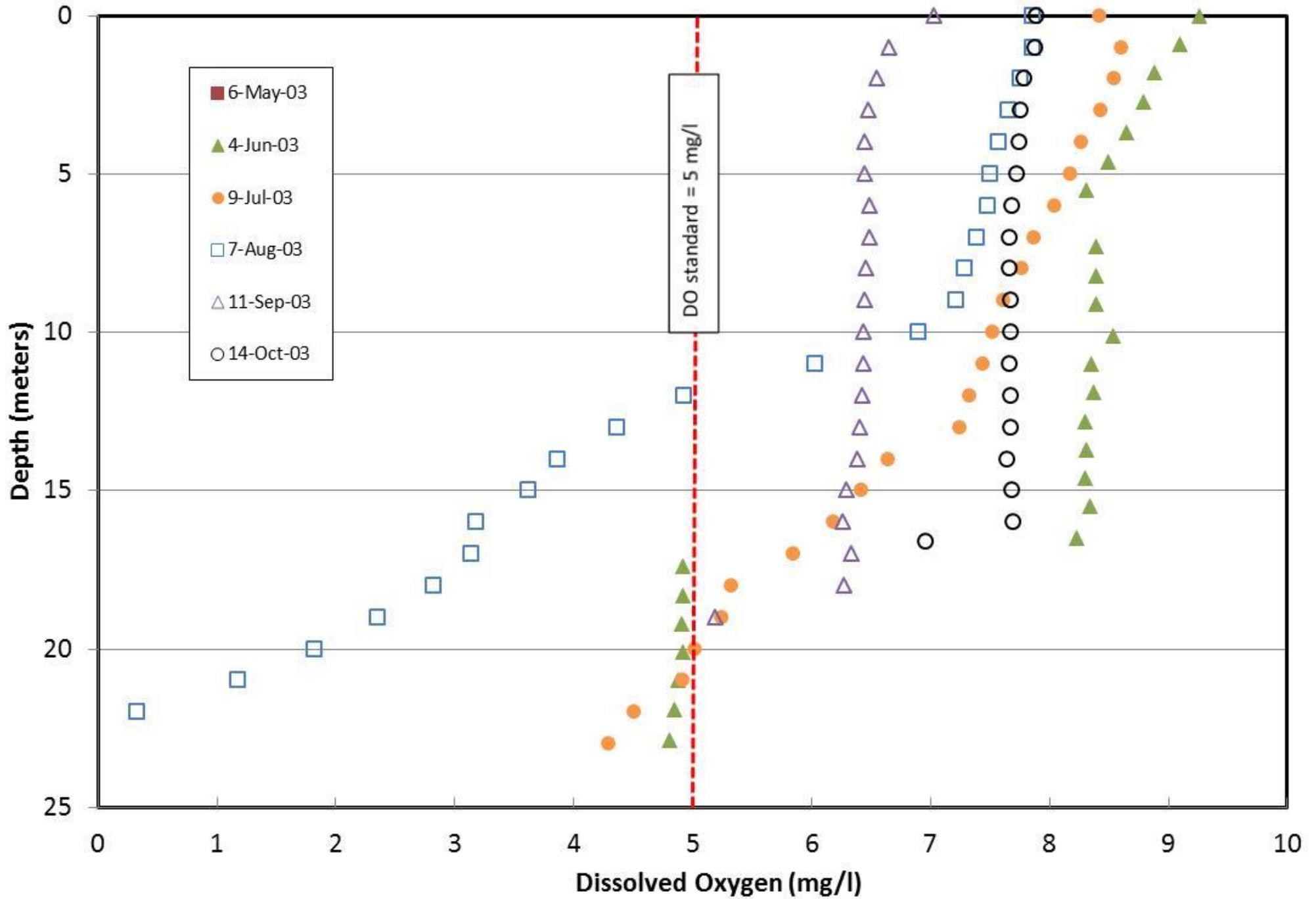
- 6.5 – 9.0
- Set in 2002 based upon EPA recommendations (1984) Gold Book) for aquatic life
- 100% of pH readings (2003-05, 2012) met standards
- No new EPA recommendations. No changes recommended by NDEP

# Dissolved Oxygen

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- 5.0 mg/l
- Set in 1984 based upon EPA recommendations (1976 Red Book) for aquatic life
- >95% of DO readings (2003-05, 2012) met standards
  - ◆ Typically occurs in the lower depths during stratification
- Current EPA recommendation (1984 Gold Book) is 5 mg/l for warmwater fisheries
- Low DO in hypolimnion is common in many lakes/reservoirs. Organic matter settles, decomposes, and DO is consumed.

# Dissolved Oxygen Profiles at LR5 - 2003



# Dissolved Oxygen

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- Proposed change: Retain 5.0 mg/l with criteria applying to entire water column, except during times of stratification when criteria apply only in epilimnion
  - ◆ We've used this for other waters
  - ◆ Oklahoma has used similar criteria

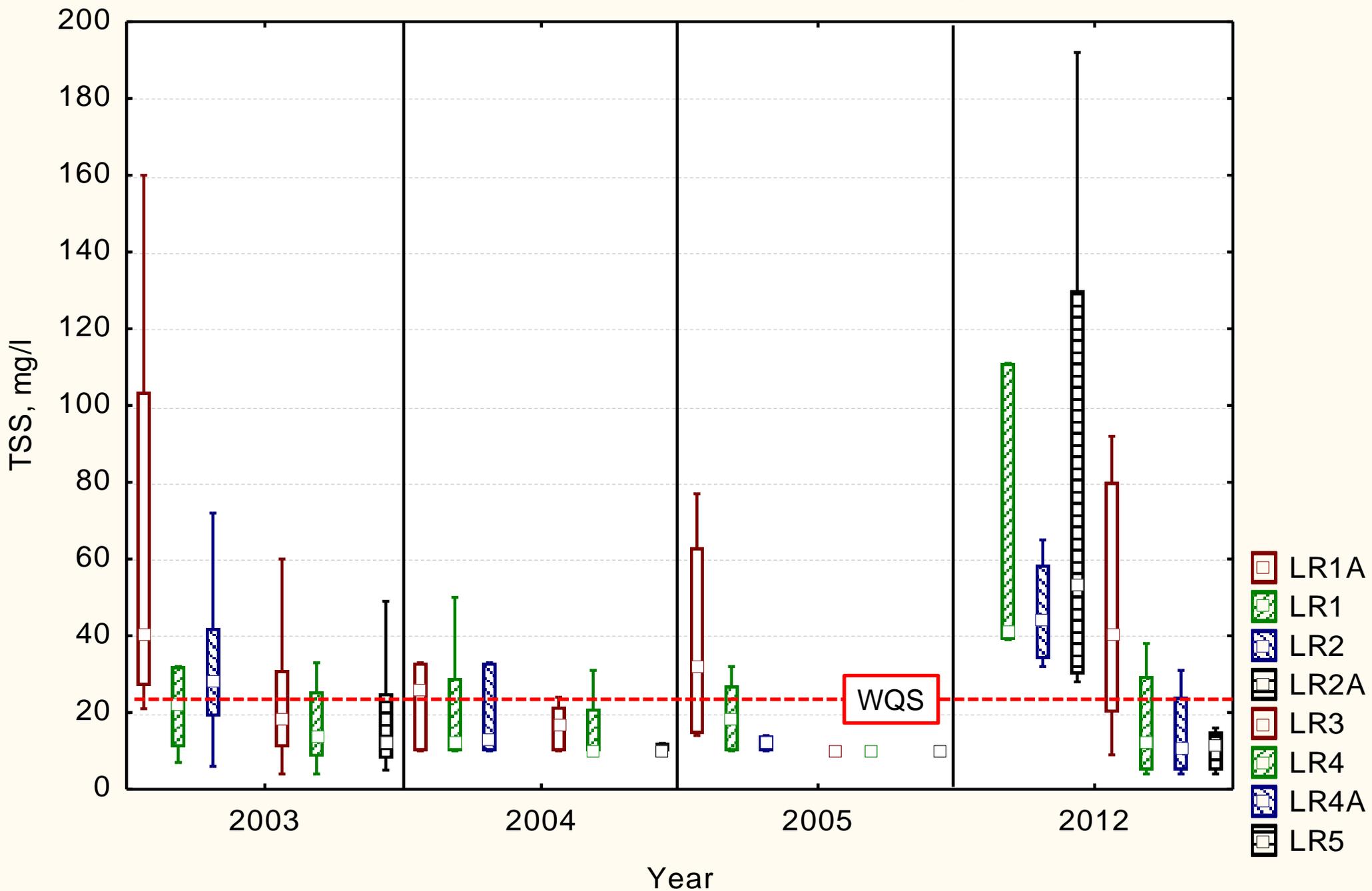
# Total Suspended Solids

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- 25 mg/l
- Set in 1984 based upon EPA's Blue Book (1972)
  - ◆ 25 mg/l – High level of protection of aquatic life
  - ◆ 80 mg/l – Moderate level of protection of aquatic life
  - ◆ Carson River up to, but not including, Stateline – TSS set at 80 mg/l
  - ◆ Lower levels were expected due to settling, so 25 mg/l was selected.
- ~20% of TSS readings (2003-05, 2012) exceed standards. On 303(d) List as impaired. Worst conditions are in the upper basins.

# TSS Throughout Water Column

Median; Box: 25%-75%; Whisker: Non-Outlier Range



# Total Suspended Solids

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- EPA guidance documents subsequent to 1972 Blue Book have not provided any recommendations for TSS. EPA recognizes the need for updated criteria. No NAC changes are recommended until EPA revises guidance.

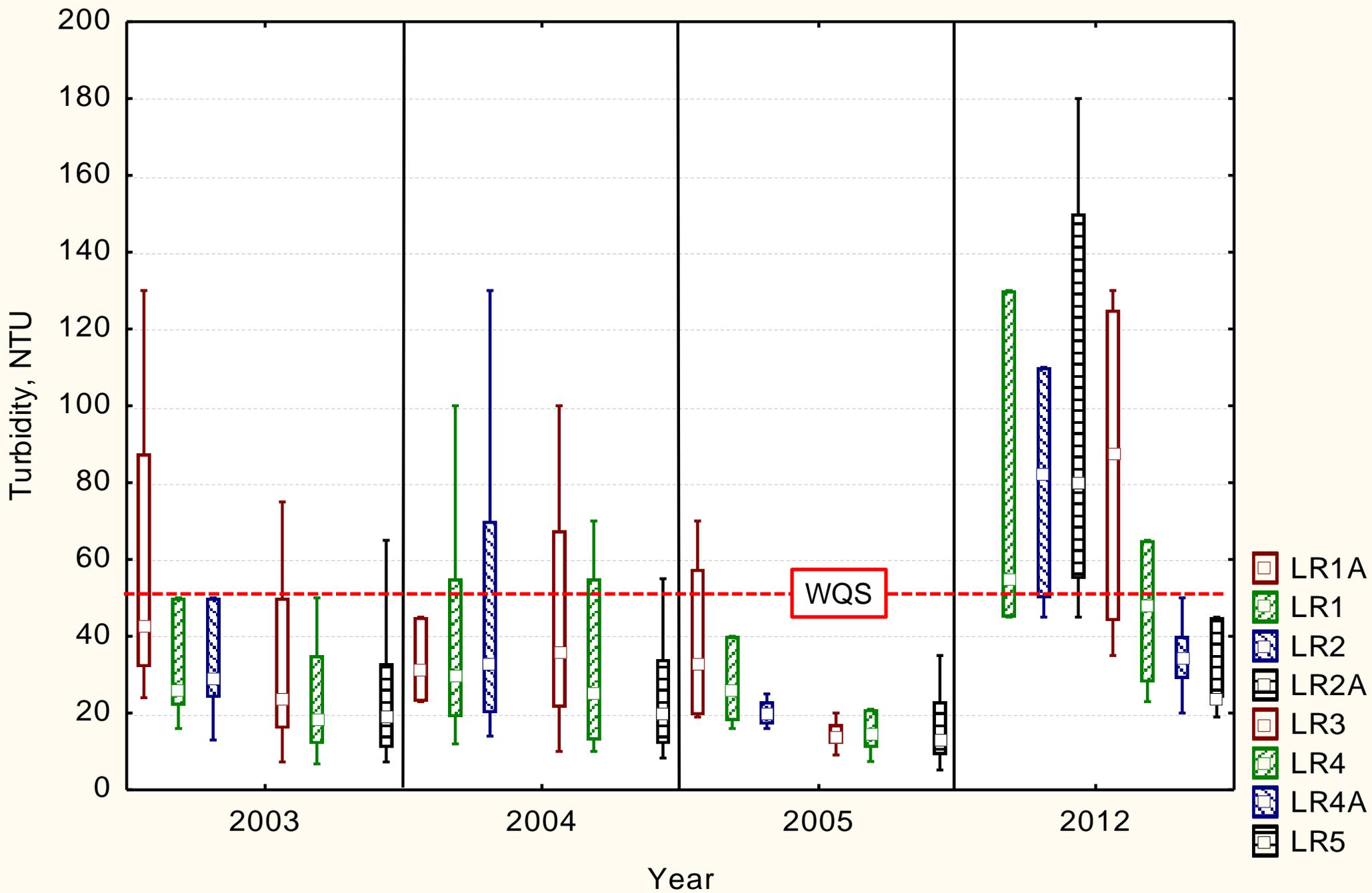
# Turbidity

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- 50 NTU (nephelometric turbidity units)
- Set in 1984 based upon EPA's Green Book (1968) for protection of warmwater fish
- ~15% of TSS readings (2003-05, 2012) exceed standards. On 303(d) List as impaired. Worst conditions are in the upper basins.

# Turbidity Throughout the Water Column

Median; Box: 25%-75%; Whisker: Non-Outlier Range



# Turbidity

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- EPA guidance documents subsequent to 1968 Green Book have not provided any recommendations for Turbidity. EPA recognizes the need for updated criteria. No NAC changes are recommended until EPA revises guidance.

# Color

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- 75 PCU (platinum-cobalt units)
- Set in 1984 based upon EPA's Red Book (1968) for protection of municipal or domestic supplies
- 99% of color readings (2003-05, 2012) meet standards.
- No new EPA recommendations. No NAC changes recommended at this time

# Total Dissolved Solids

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- 500 mg/l (Annual Average)
- Set in 1984, for protection of municipal or domestic supplies, based upon 1977 Water Supply Regulations established by Nevada Division of Health
  - ◆ 500 mg/l – if exceeded, suppliers were required to notify customers
  - ◆ 1,000 mg/l – suppliers required to meet
- 100% of TDS readings (2003-05, 2012) meet standards.
- In 2004, Board of Health set TDS standard at 1,000 mg/l.
- No NAC changes are proposed at this time.

# Chlorides

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- 250 mg/l (single value)
- Set in 1984, for the protection of municipal or domestic supplies, based upon 1977 Water Supply Regulations established by Nevada Division of Health
  - ◆ 250 mg/l – if exceeded, suppliers were required to notify customers
  - ◆ 400 mg/l – suppliers required to meet
- 100% of chloride readings (2003-05, 2012) meet standards.
- In 2004, Board of Health set Chloride standard at 400 mg/l.

# Chlorides

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- ◆ EPA recommendations for aquatic life
  - ◆ 230 mg/l – 96-hour
  - ◆ 860 mg/l – 1-hour
- ◆ Propose to establish these standards for Lahontan Reservoir

# Sulfates

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- 250 mg/l (single value)
- Set in 1984 , for the protection of municipal or domestic supplies, based upon 1977 Water Supply Regulations established by Nevada Division of Health
  - ◆ 250 mg/l – if exceeded, suppliers were required to notify customers
  - ◆ 500 mg/l – suppliers required to meet
- 100% of sulfate readings (2003-05, 2012) meet standards.
- In 2004, Board of Health set sulfate standard at 500 mg/l.
- No NAC changes proposed at this time.

# Sodium Adsorption Ratio

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- 8 (unitless)
- Calculated based upon sodium, calcium, magnesium
- Set in 1984 for the protection of irrigation based upon 1976 EPA guidance
- 100% of SAR (2003-05, 2012) meet standards.
- No new EPA guidance. No changes are recommended at this time

# Alkalinity

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- <25% change from natural conditions – difficult to assess
- Set in 1984 for the protection of aquatic life based upon 1972 EPA guidance.
- Alkalinity buffers pH change; can complex with some toxic heavy metals and reduce their toxicity
- Current EPA recommendations – 20 mg/l or more of Calcium Carbonate
- 100% of alkalinity samples (2003-05, 2012) currently meet this recommendation
- Recommended changing to current EPA guidance – >20 mg/l Calcium Carbonate

# E coli

- SV – 235 No./100 ml; AGM – 126 No./100 ml
- Set in 2002 for the protection of contact recreation based upon 1986 EPA guidance.
  - ◆ Guidance included range of Single Value criteria depending upon the level of recreation use
- New EPA recommendations

Criteria Elements	Illness Rate = 36 per 1,000 (Equivalent to that assumed for 1986 Criteria)		Illness Rate = 32 per 1,000	
	GM	STV	GM	STV
E. Coli	126	410	100	320

- ◆ GM – 30-day limit; STV - <10% exceedance during 30-day period
- ◆ Rarely have sufficient data to evaluate 30-day standards
- 100% of E coli samples (2003-05, 2012) currently meet this recommendation
- Proposed NAC Changes
  - ◆ Single Value = 410 No./100 ml
  - ◆ AGM – no change

# Fecal Coliform

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- SV – 1,000 No./100 ml
- Set in 2012 for the protection of irrigation and wildlife based upon 1972 EPA guidance. No more recent recommendations exist.
- 100% of fecal coliform samples (2003-05, 2012) currently meet this standard
- No changes are recommended

# Summary – Beneficial Use Standards

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- Break lake out into separate reach
- DO – modify to account for stratification
- Chloride – modify for protection of aquatic life
- Alkalinity – modify in accordance with EPA guidance
- E coli – revise single value

# RMHQs

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- Requirements to Maintain Existing Higher Quality
  - ◆ Set for routine parameters where the existing quality is better than beneficial use standards
  - ◆ Primarily set to protect higher quality degradation from permitted discharges
    - ◆ Degradation (up to Beneficial Use standard) allowed if justified due to social/economic factors
  
- Current Lahontan RMHQs
  - ◆ Appear to be based upon quality near the dam – set in 1984
    - ◆ Temperature
    - ◆ Total Nitrogen
    - ◆ Turbidity
    - ◆ Color
    - ◆ TDS
    - ◆ Chloride
    - ◆ Sulfate
    - ◆ SAR
    - ◆ Fecal Coliform

# Temperature RMHQ

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- Existing RMHQ -  $\Delta T = 0^\circ$ 
  - ◆ Maximum allowable increase at boundary of mixing zone
- Set in 1984 to control degradation from discharge of heated effluent
- No changes proposed

# Turbidity RMHQs

- Existing RMHQs set in 1984
  - ◆ SV – 27 NTU
  - ◆ AA – 15 NTU

Parameter	From 1984 Rationale Document			95 <sup>th</sup> Percentile (2003-05) <b>LR5</b>	Proposed RMHQs
	Standards (set in 1980)	95% Confidence Interval (1966- 83)	Existing RMHQs (set in 1984)		
Single Value	27	14	27	45	No Change
Annual Average	15	Insufficient data	15	23	No Change

# Color RMHQ

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- Existing Color RMHQ set in 1984
  - ◆ Increase in color must not be more than 10 PCU above natural conditions
- Natural condition based standards very challenging to implement
- 95<sup>th</sup> Percentile (2003-05) = 30 PCU
- Beneficial Use WQS = 75 PCU
- Recommend changing RMHQ to SV = 30 PCU

# TDS RMHQs

- Existing RMHQs set in 1984
  - ◆ SV = 225 mg/l
  - ◆ AA = 175 mg/l

Parameter	From 1984 Rationale Document			95 <sup>th</sup> Percentile (2003-05) LR5	Proposed RMHQs
	Standards (set in 1980)	95% Confidence Interval (1966- 83)	Existing RMHQs (set in 1984		
Single Value	250	225	225	240	No Change
Annual Average	175	203	175	192	No Change

# Chloride RMHQs

- Existing RMHQs set in 1984
  - ◆ SV = 15 mg/l
  - ◆ AA = 9 mg/l

Parameter	From 1984 Rationale Document			95 <sup>th</sup> Percentile (2003-05) <b>LR5</b>	Proposed RMHQs
	Standards (set in 1980)	95% Confidence Interval (1966- 83)	Existing RMHQs (set in 1984)		
Single Value	15	19	15	18	No change
Annual Average	9	16	9	14	No change

# Sulfate RMHQs

- Existing RMHQs set in 1984
  - ◆ SV = 50 mg/l
  - ◆ AA = 35 mg/l

Parameter	From 1984 Rationale Document				95 <sup>th</sup> Percentile (2003-05) <b>LR5</b>	Proposed RMHQs
	Standards (set in 1980)	95% Confidence Interval (1966-83)	Average (1966-83)	Existing RMHQs (set in 1984)		
Single Value	NA	47	33	50	40	40
Annual Average	NA	Insufficient data	34	35	33	No change

# SAR RMHQ

- Existing RMHQ set in 1984
  - ◆ AA = 2

Parameter	From 1984 Rationale Document				Average (2003-04) <b>LR5</b>	Proposed RMHQs
	Standards (set in 1980)	95% Confidence Interval (1966-83)	Average (one year)	Existing RMHQs		
Annual Average	NA	Insufficient data	1.1	2	1.3	No Change

# Fecal Coliform RMHQ

- Existing RMHQ set in 1984
  - ◆ SV = 75 No./100 ml
  - ◆ AA = 25 No./100 ml

Parameter	From 1984 Rationale Document			95 <sup>th</sup> Percentile (2003-05)  LR5	Proposed RMHQs
	Standards (set in 1980)	95% Confidence Interval (1966- 83)	Existing RMHQs		
Single Value	75	79	75	12	
Annual Geometric Mean	25	Insufficient	25	7	

# RMHQ Summary

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- Include footnote – identifying as based upon conditions near the dam.
- Change Color – remove natural conditions based criteria, replace with Single Value
- Sulfate – revise Single Value

# Thank You

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