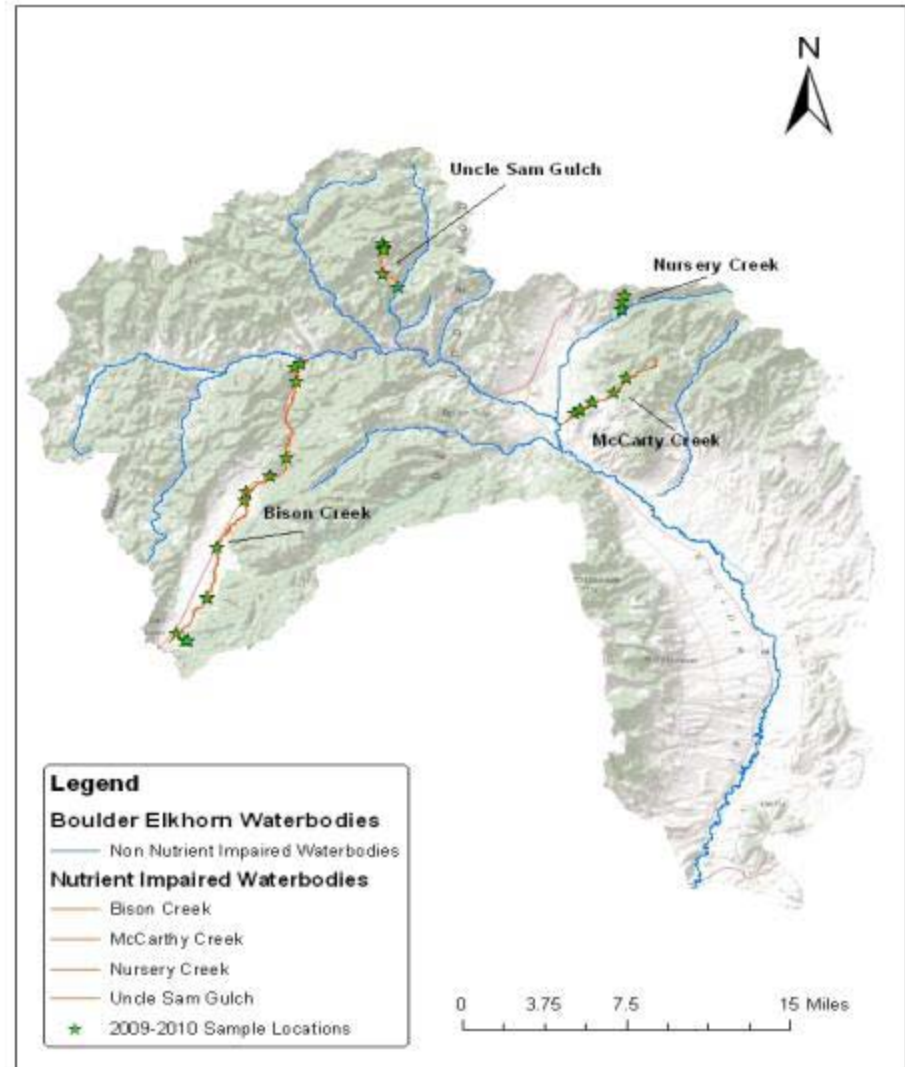


Nutrient TMDLs

2012 TMDL

Development Streams

- Bison Creek
- Uncle Sam Gulch
- Nursery Creek
- McCarty Creek



Nutrient TMDLs

Nutrients : naturally occurring chemical elements required for a functioning aquatic ecosystem.

Occurrences:

Typically occur in the forms of Nitrogen and Phosphorous

Excess inputs of nutrients may:

Cause toxicity to aquatic life
(nitrogen in the form of ammonia)

Inhibit hemoglobin function in infants

Accelerate algal growth

Depletion of dissolved oxygen
-creates toxic conditions
for fish and bugs



Nutrient Impaired Stream Listings

- 2010 Listed Nutrient Impaired Streams
 - Bison Creek (Nitrates)
 - Uncle Sam Gulch (Nitrate Nitrogen)
 - Nursery Creek (TKN, Nitrate + Nitrite)
 - McCarty Creek (Total Phosphorous)
 - Cataract Creek (Nitrate Nitrogen)
 - North Fork Little Boulder River (TKN)
- 2012 TMDLs Developed
 - Bison Creek (TN, TP)
 - Uncle Sam Gulch (NO₂+NO₃)
 - Nursery Creek (TN, TP, NO₂+NO₃)
 - McCarty Creek (TP)

Sources Assessment

- DEQ TMDL sampling

- 2009: 5 sites during 2 low flow (July - September) sampling events
- 2010: 12 sites during 3 low flow events
- 2011: 3 sites during 2 low flow events

- Parameters

- Total Nitrogen (TN)
- Nitrate plus Nitrite ($\text{NO}_2 + \text{NO}_3$)
- Total Phosphorous (TP)
- Chlorophyll *a*
- Ash Free Dry Weight
- Macroinvertebrate
- Flow



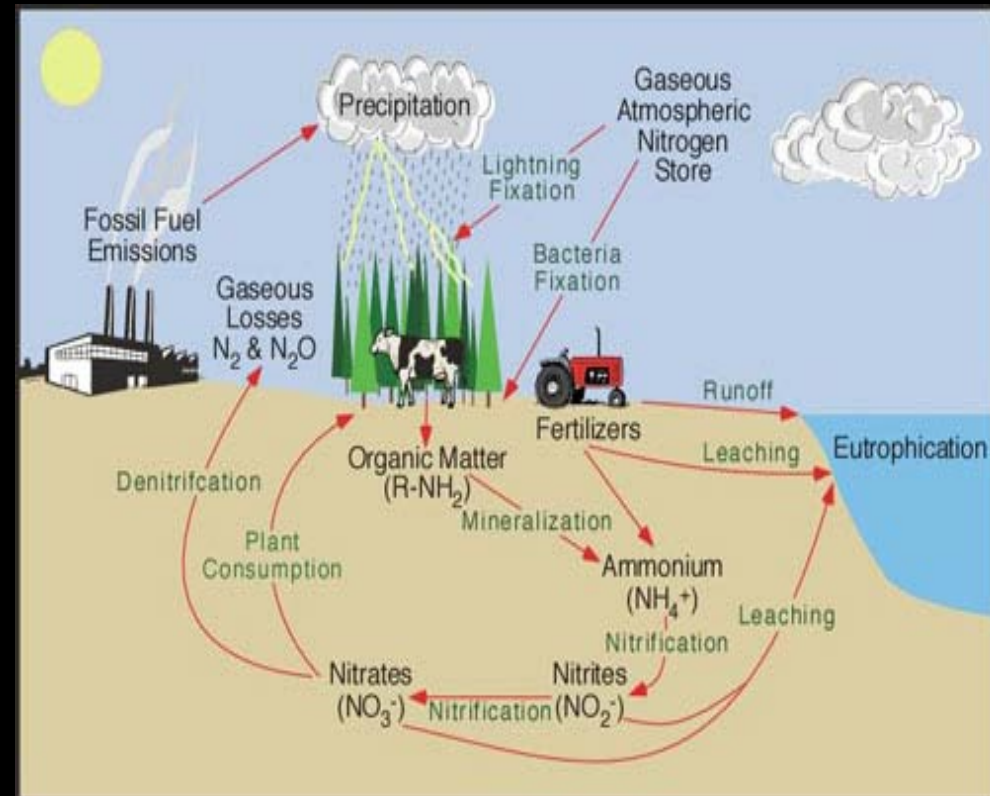
Nutrient Source Categories

Natural Sources

- Result of regional and local geology, soils, climatic and hydrologic processes
- Natural biochemical processes
- Natural vegetative decay

Human Caused Sources

- **Agricultural Land Use**
 - Grazing practices
 - Domestic animal waste
 - Vegetative decay from feeding operations
- **On Site Septic Systems**
 - Majority is Low density (<50/sq mile)
 - Minor contributions of moderate and high density (50-300 and > 300 /sq mile)
- **Historical Mining and Milling**
 - 1860's- 1960's (lead, zinc, gold, silver, Iron)
 - Waste rack and tailings still present
- **Silvicultural Practices**
 - Timber harvest
 - Forest Fires/Prescribed Burns



Nutrient Target Values

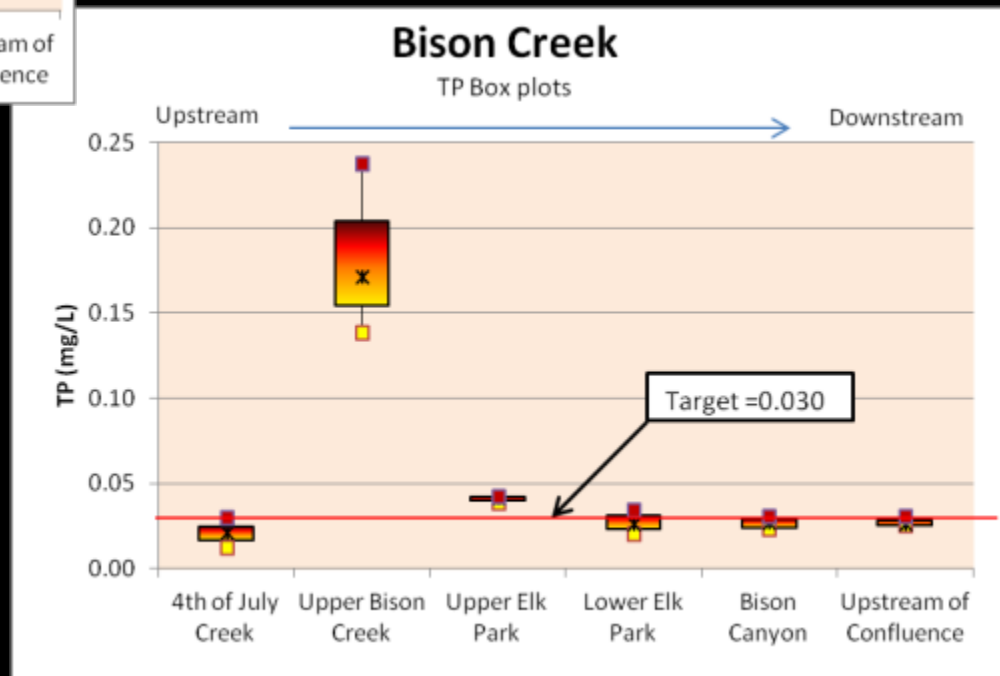
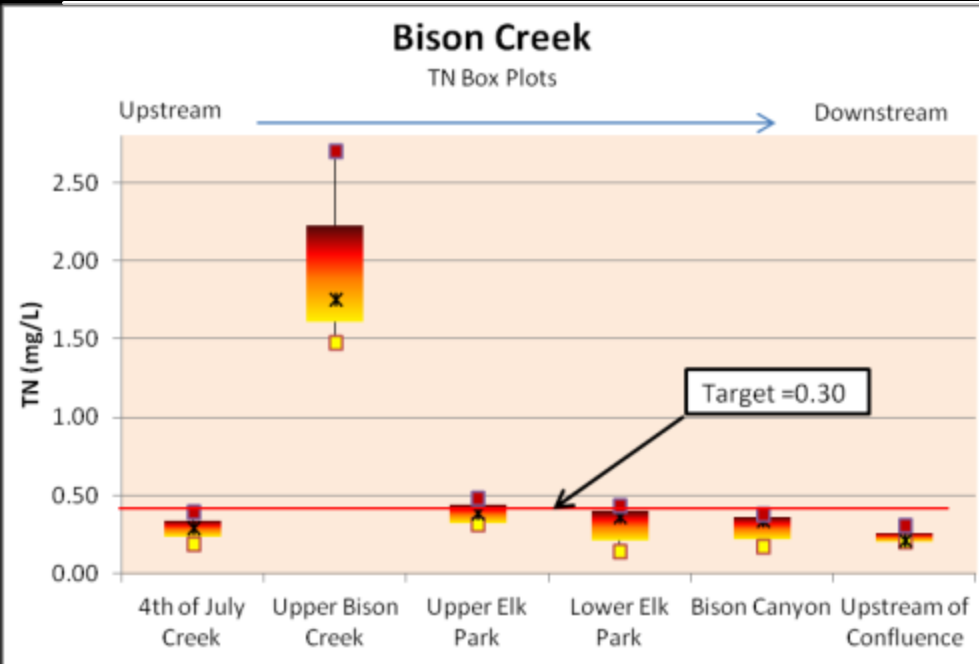
- DEQ has conducted a number of technical studies in pursuit of numeric criteria for nutrients and is in the process of developing draft nutrient criteria.
- Based on public perception of what level of algae is perceived as “undesirable”, {Suplee, 2009}.
- Outcomes of nutrient stressor-response studies that determine nutrient concentrations that will maintain algal growth below undesirable levels {Suplee, 2008}.
- NO₂+NO₃ based on levels that cause excess algae and human health standards in DEQ-7.
- TN and TP based on Draft numeric nutrient criteria.

Nutrient Targets for the Boulder Elkhorn TPA	
Parameter	Target Value
Nitrate + Nitrite (NO ₃ +NO ₂)	≤ 0.100 mg/L
Total Nitrogen (TN)	≤ 0.300 mg/L
Total Phosphorus (TP)	≤ 0.030 mg/L
Chlorophyll- <i>a</i> (or Ash Free Dry Weight)	≤ 120 mg/m ² (≤35 g AFDW/m ²)

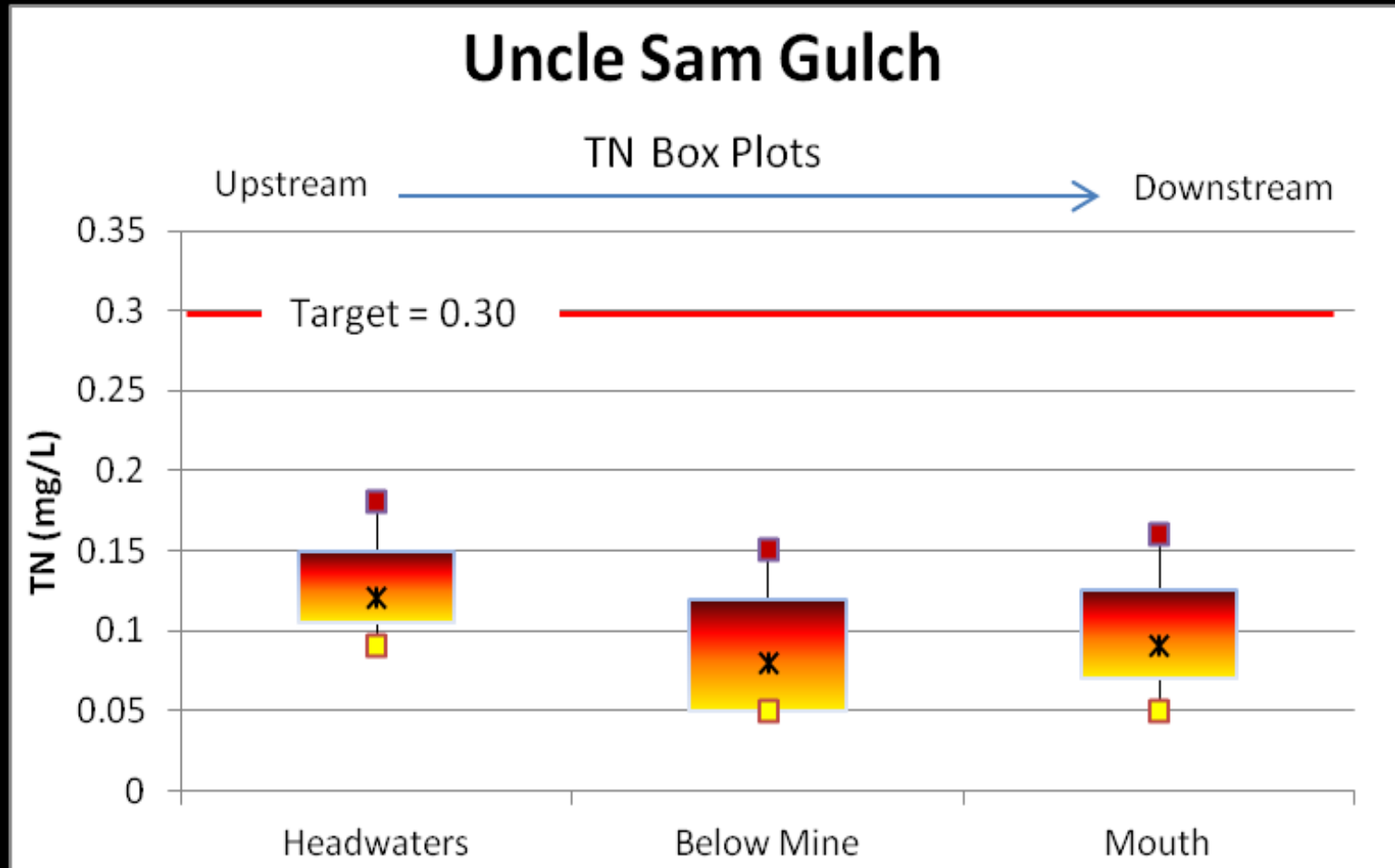
Nutrient TMDLs and How This Information is Used

1. Water Quality Targets
2. Existing Nutrient Load Quantification
3. TMDL Development and Allocations
4. Monitoring & Restoration

Bison Creek Existing Conditions



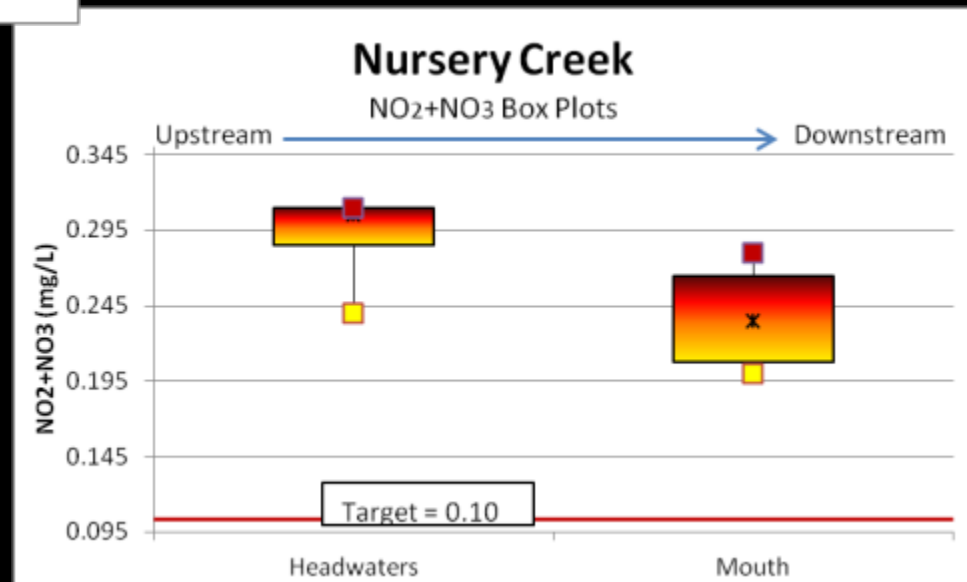
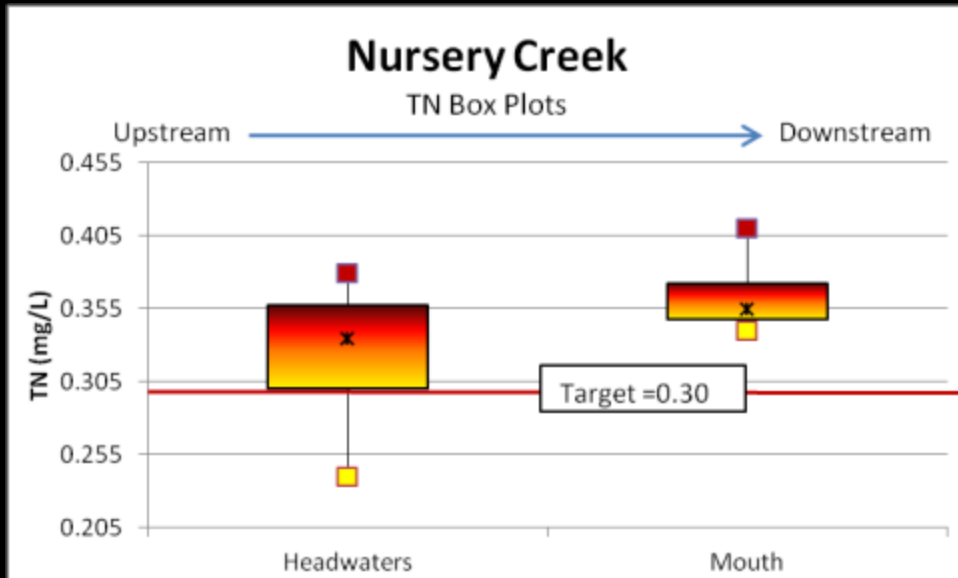
Uncle Sam Gulch Existing Conditions



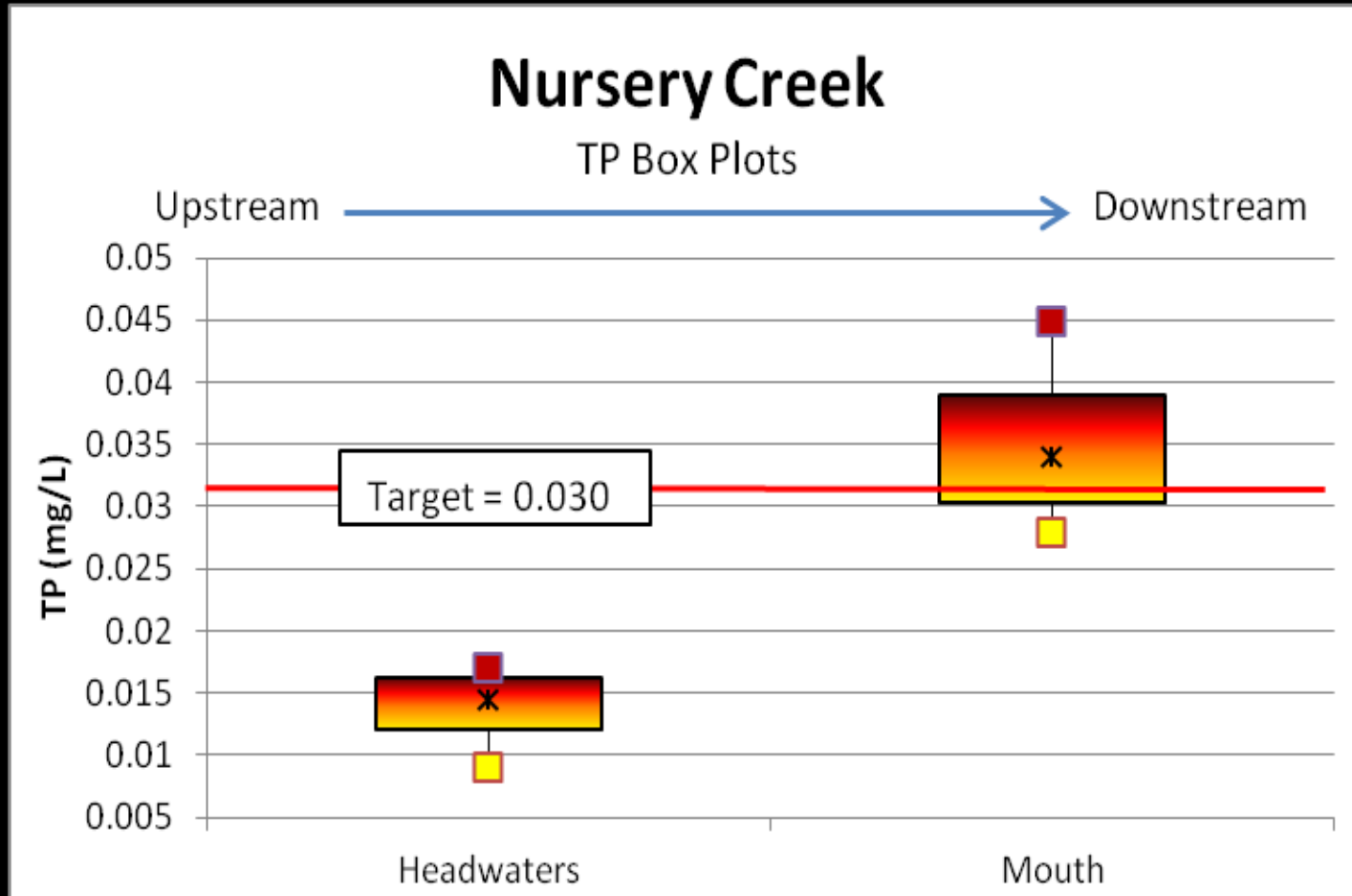
Uncle Sam Gulch Algae



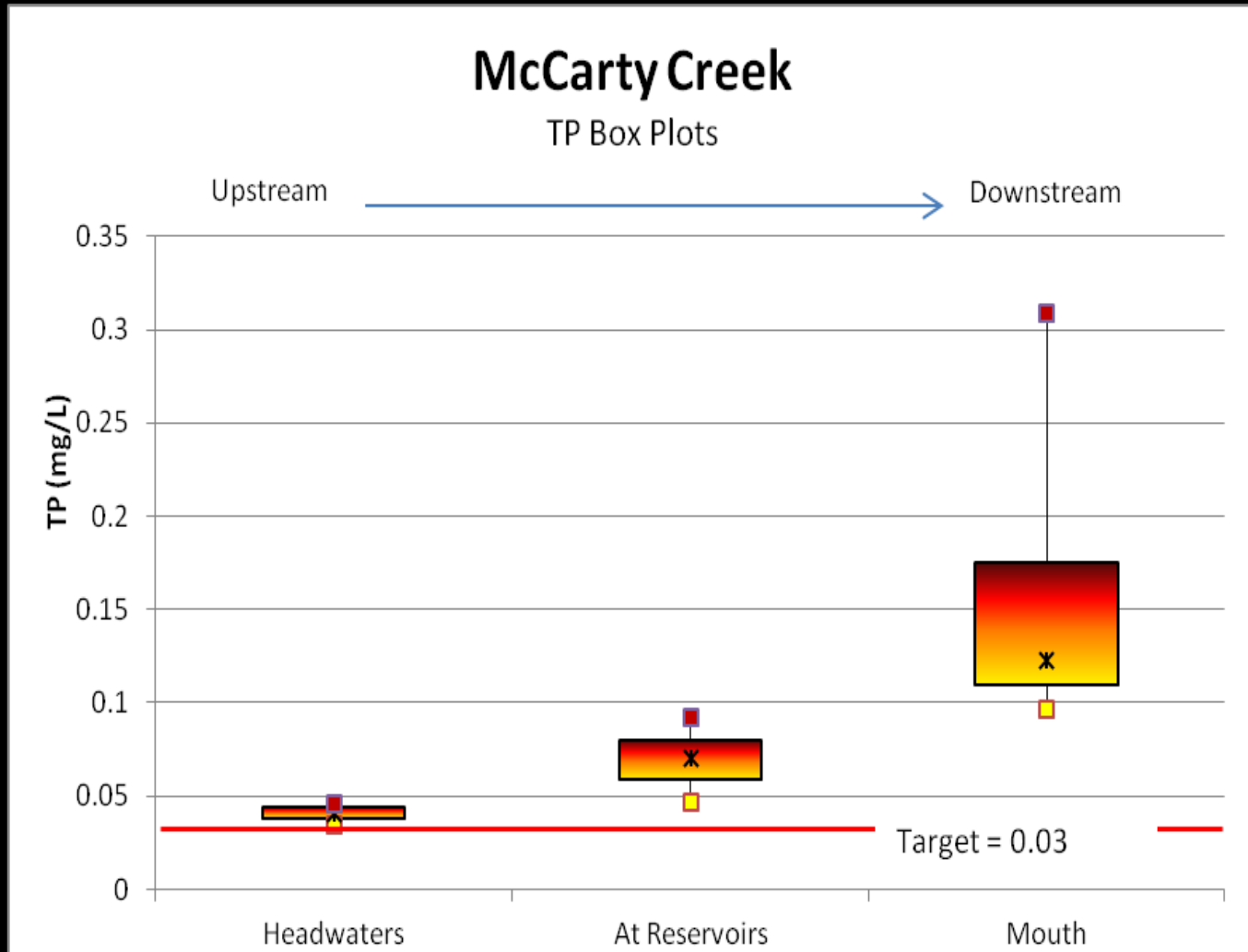
Nursery Creek Existing Conditions



Nursery Creek Existing Conditions (cont)



McCarty Creek Existing Conditions



Nutrient TMDLs

Next Steps?

- Continue Development of TMDL;
Integrate all source assessment info
for load quantification into TMDL
development and allocations
- Draft and distribute TMDL document for
stakeholder review
- Finalize and publish TMDL document



Questions ?