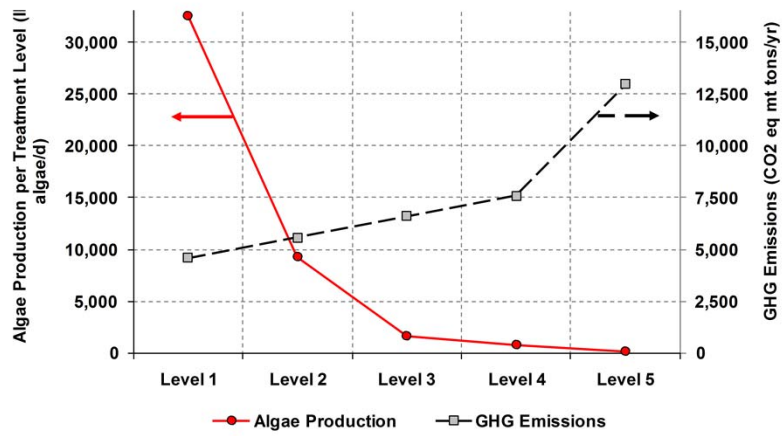


Lower Boise River Nutrient TMDL TAC Meeting 8/22/13

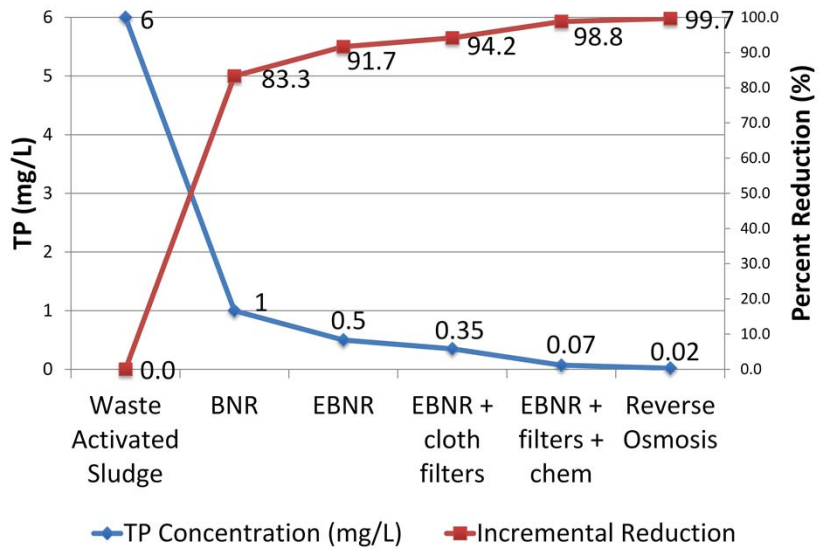
Municipal WWTF considerations

Presented by Kate Harris, City of Boise



- Level 1 – Secondary Treatment (no nutrient removal)
- Level 2 – Biological Nutrient Removal (TP 1 mg/L and TN 8 mg/L)
- Level 3 – Enhanced Nutrient Removal (TP 0.1 – 0.3 mg/l, TN 4-8 mg/L)
- Level 4 – Limit of Treatment Technology (TP <0.1 mg/L, TN 3 mg/L)
- Level 5 – Reverse Osmosis (TP<0.02 mg/L, TN 2 mg/L)

Total Phosphorus Concentration and Removal at WWTF Technology Steps



Finding a Balance Between Nutrient Removal in Wastewater Treatment and Sustainability

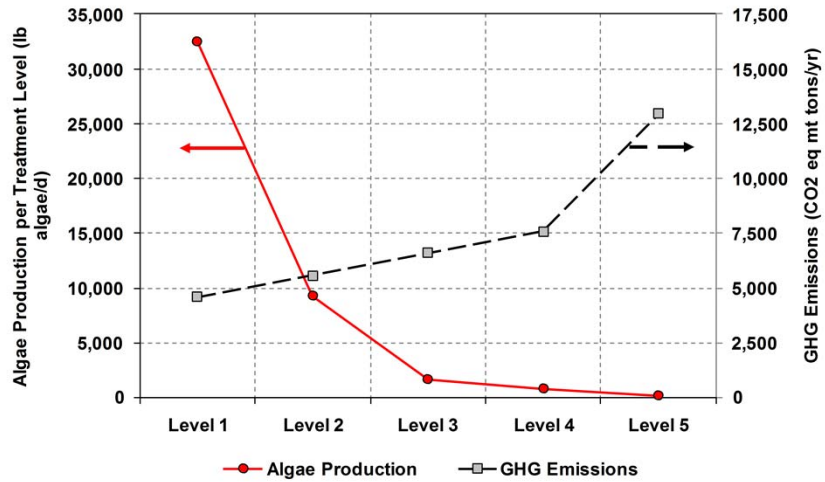


Figure 4-6. GHG Emissions and Algae Production per Treatment Level.

Source: WERF 2011

Municipal Wastewater at a Glance

- 11 NPDES permitted municipal WWTFs in LBR watershed
 - 73 MGD Design Capacity
 - 56 MGD Current Discharge
- 4 Mainstem Dischargers
 - 49 MGD Design Capacity
 - ~37 MGD Current Discharge
- 7 Tributary Dischargers
 - 24 MGD Design Capacity
 - ~18 Current Discharge

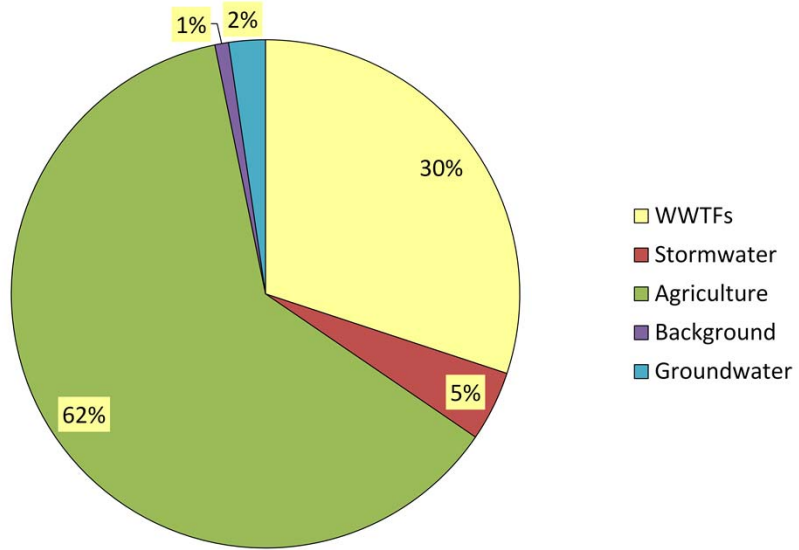
WWTF	Design Flow (MGD)	Current Flow (MGD)
Boise - Lander	15	14
Boise – West Boise	24	15
Middleton	1.83	0.5
Caldwell	8.5	7.9
Star	0.33	0.2?
Meridian	7	6.2
Nampa	11.8	11
Kuna	3.5	0.3
Notus	0.11	0.05?
Wilder	0.25	0.18
Greenleaf	0.24	0.15?

Municipal Wastewater at a Glance

WWTF	Design Flow (MGD)	Current Flow (MGD)	Receiving Water
Boise - Lander	15	14	Boise River
Boise – West Boise	24	15	Boise River
Middleton	1.83	0.5	Boise River
Caldwell	8.5	7.9	Boise River
Star	0.33	0.2?	Lawrence Kennedy Canal
Meridian	7	6.2	Fivemile Creek
Nampa	11.8	11	Indian Creek
Kuna	3.5	0.3	Indian Creek
Notus	0.11	0.05?	Conway Gulch
Wilder	0.25	0.18	Wilder Ditch
Greenleaf	0.24	0.15?	West End Drain

Effluent Total Phosphorus permit limit = 0.07 mg/L, May-September

Estimated Parma Total Phosphorus Loads



Source: LBR Total Phosphorus Implementation Plan (2008)

Hypothetical Mass Balance Model Scenarios

- Municipal reductions (and associated trades) only
- Scenarios
 - 0.07 mg/L TP at end of pipe
 - 0.350 mg/L discharge + offset at 1.5:1
 - 0.500 mg/L discharge + offset at 1.5:1

1.5:1 ratio is what Boise did and is based on 20 year NPV

Lower cap up front, higher OM, 20 year NPV same

Most have cost differential/savings – represents upper bound of limits

Not counting for WQ issues etc

Assumptions

- 75 MGD with all municipalities opting to trade at 0.35 and 0.5 with a 1.5:1 ratio
- Unaccounted for flow TP concentration was equal to the average of the tributary inflow concentrations from Middleton to Parma
- Only estimated/calculated the reductions for the mainstem WWTFs, Meridian and Nampa
- Offsets were distributed proportionally from the four largest TP sources

Tributary WWTF Assumptions

- Fifteenmile Creek
 - Calculated Meridian loads, assumed 50% of the flow was diverted, and removed the pounds (at 0.07, 0.35 and 0.5 mg/L) from the Fifteenmile Creek load to the Boise River
- Indian Creek
 - Calculated Nampa loads, assumed that 80% of the flow was diverted, and removed the associated pounds for the 3 scenarios from the Indian Creek load to the Boise River

Trade example (Aug 2012)

At 0.350:

75 MGD needs to trade 263 pounds

$$((75 \text{ MGD} * 0.35 * 8.34) - (75 \text{ MGD} * .07 * 8.34)) * 1.5 =$$

$$(219 \text{ pounds} - 44 \text{ pounds}) * 1.5 = 263 \text{ pounds}$$

Tributary	Total Phosphorus Load (lbs)	Percent of total	Offset pounds removed at 0.350
Dixie	491	45%	118
Mason Creek	271	25%	65
Indian Creek (includes Nampa)	177	16%	42
Fifteenmile Creek (includes Meridian)	157	14%	38
Total	1096		263

Next runner ups were Mill Slough (includes Star WWTF) at 131 lbs and Conway Gulch at 67 pounds

Hypothetical Mass Balance Model Scenario Results

Scenario	Parma Concentration (mg/L)	Parma % Reduction from Current	Unaccounted for flow TP (mg/L)	Further reduction required to meet 0.07 mg/L at Parma
Current Conditions (Aug 2012, USGS data)	0.303		0.25	77%
WWTFs at 0.07 mg/L TP at end of pipe	0.249	18%	0.22	72%
WWTFs at 0.350 mg/L TP + offset at 1.5:1	0.210	31%	0.20	67%
WWTFs at 0.5 mg/L TP + offset at 1.5:1	0.189	38%	0.19	63%

Reasonable assurance

Dixie 137 lbs/day but will remove 171 lbs/day to ensure that we meet our target – variations in water flow rate, raw water quality and project TP removal efficiency
 Our current permit identifies civil and administrative penalties not to exceed \$37,500 per violation of any permit condition or limitation.
 Exceed May monthly limit (31 days) is \$1,162,500.