LC = MOS + NB + LA + WLA = TMDL

Draft May-Sept Load Allocation Analysis for the LBR TP TMDL

Lower Boise Watershed Council - TAC

April 3, 2014

IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

TMDL Modeling

AQUATOX Model

- Quantify chlorophyll a and phosphorus relationships
- Allocation tool to meet the chlorophyll-a target of 150 mg/m^2

USGS Mass Balance Model and Duration Curves

- Quantify current TP loads
- Allocation tools to meet the May-September 0.07 mg/L TP target at the mouth

Table 4.0.9. Calculated total phosphorus load allocations for tributary, point and nonpoint sources to the Snake River - Hells Canyon TMDL reach based on calculated average flows (May through September).

Segment	Load Allocation[a,b] (kg/day)	Percent Reduction
Snake River Inflow	1,379	28
Owyhee River	71	73
Boise River	242	78
Malheur River	58	88
Payette River	469	34
Weiser River	136	65
Drains	91	86
Ungaged flows	137	64
Total Upstream Snake River Load Allocations	2582	54
Total Upstream Snake River Waste Load Allocations	153	
Total Upstream Snake River Segment Load and Waste Load Allocations	2,735[c]	
Burnt River	21	60
Powder River	33	74
Unmeasured Tributaries to Brownlee	40	50
Total Brownlee Reservoir Segment	2,829[d]	
Unmeasured Tributaries to Oxbow	10	50
Total Oxbow Reservoir Segment	2,839	

[a] The SR-HC TMDL target for total phosphorus for each tributary is a concentration of less than or equal to 0.07 mg/L total phosphorus as measured at the mouth of the tributary and applies from May through September. Because the total phosphorus target is concentration-based, actual allowable tributary load allocations under the TMDL are dependant on actual tributary flow and will fluctuate year to year. The total phosphorus load allocations listed in this table are based on averaged tributary flows measured in 1979, 1995 and 2000, which were average Snake River flow years, not necessarily average tributary flow years. Therefore they do not necessarily represent the calculated load allocations for any specific year or different series of years.

REFERENCES

An Approach for Using Load Duration Curves in the Development of TMDLs

http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/2007_08_23_tmdl_duration_curve_guide_aug2007.pdf

USGS
science for a changing world

Prepared in cooperation with the Idaho Department of Environmental Quality

Evaluation of Total Phosphorus Mass Balance in the Lower Boise River, Southwestern Idaho

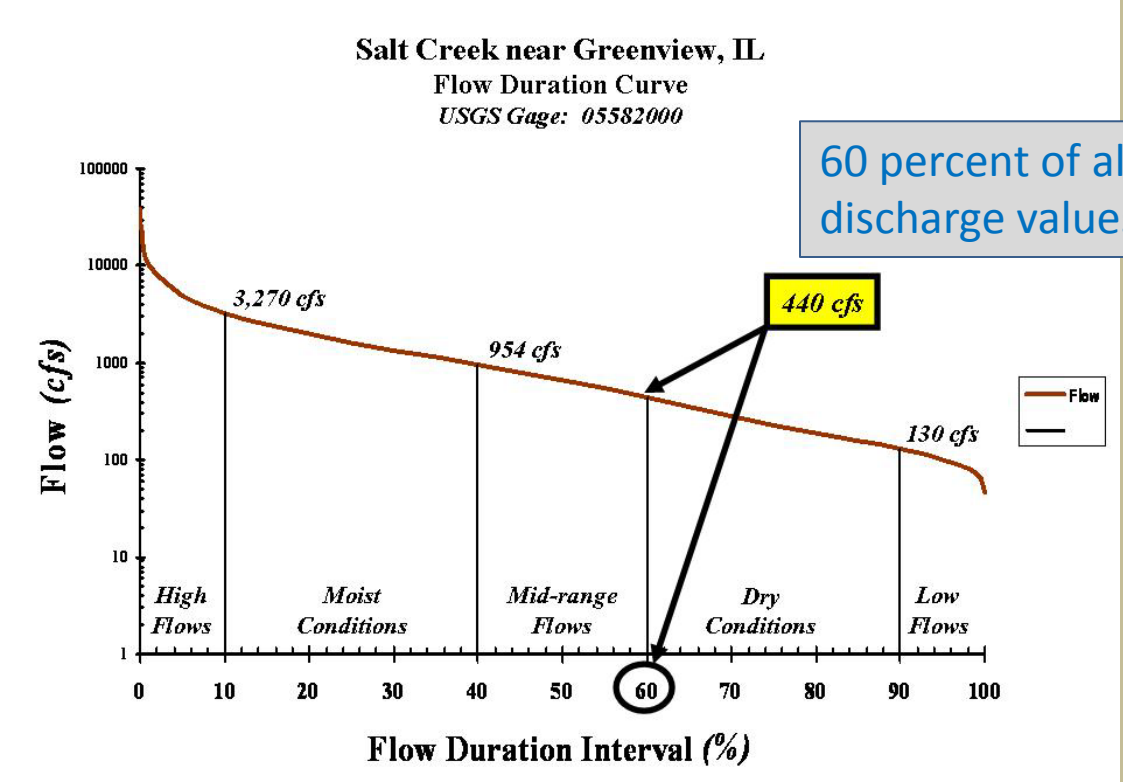
Scientific Investigations Report 2013–5220

http://pubs.usgs.gov/sir/2013/5220/

U.S. Department of the Interior
U.S. Geological Survey

What is a Flow Duration Curve?

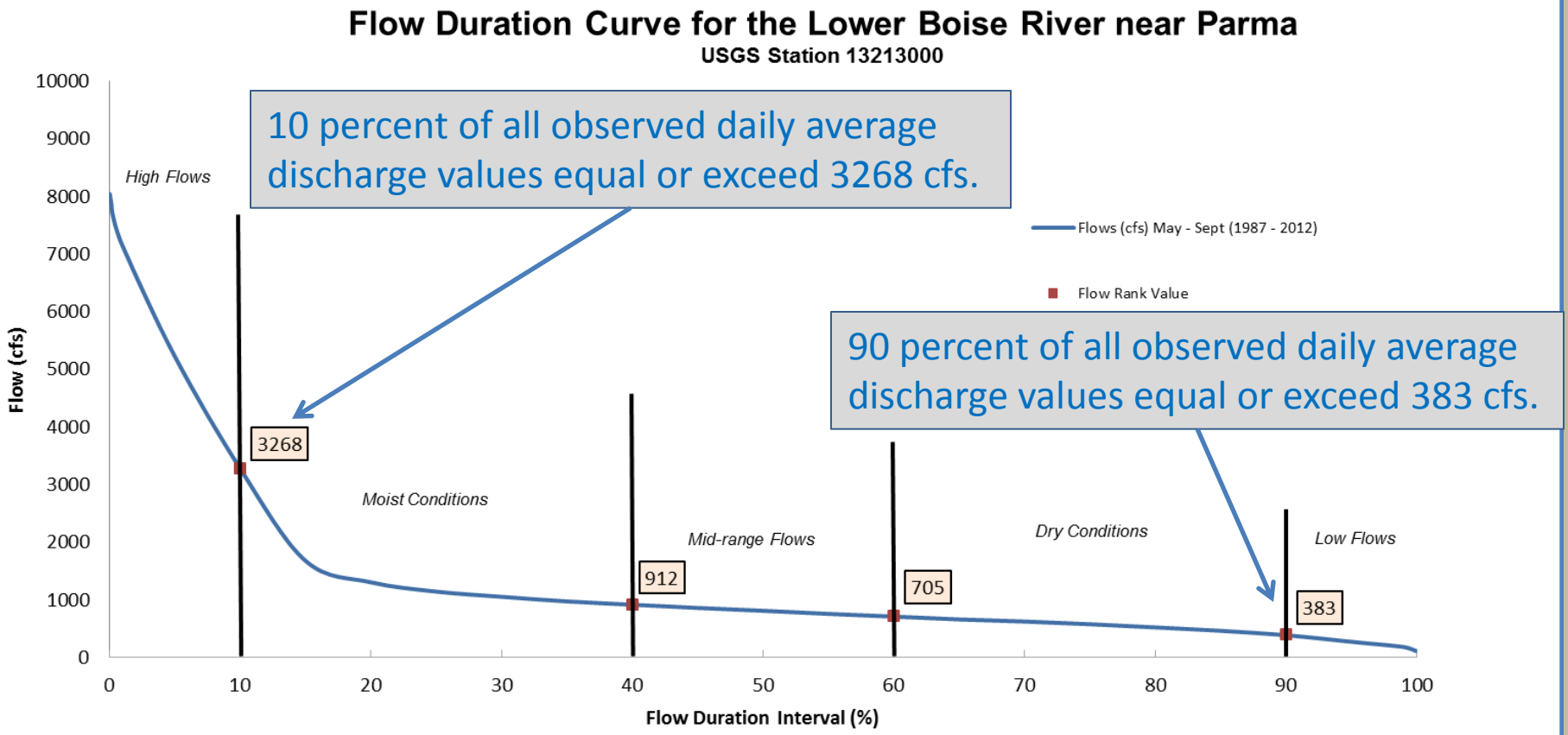
- Historic flow data over time
- The percent of time values are met or exceeded
- Evaluate relationships between flow and load capacities



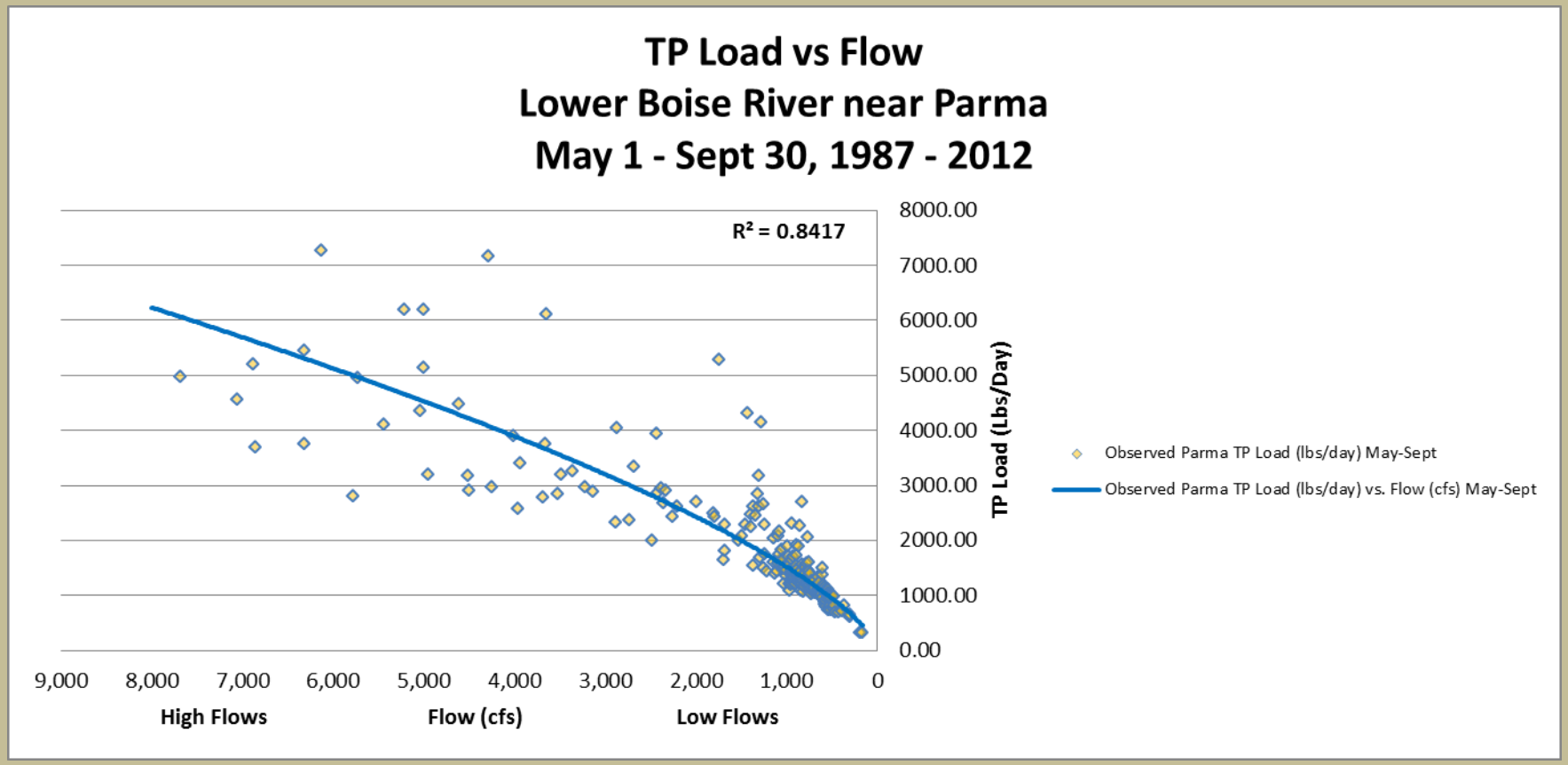
60 percent of all observed daily average stream discharge values equal or exceed 440 cfs.

Source: EPA. 2007. An Approach for Using Load Duration Curves in the Development of TMDLs.

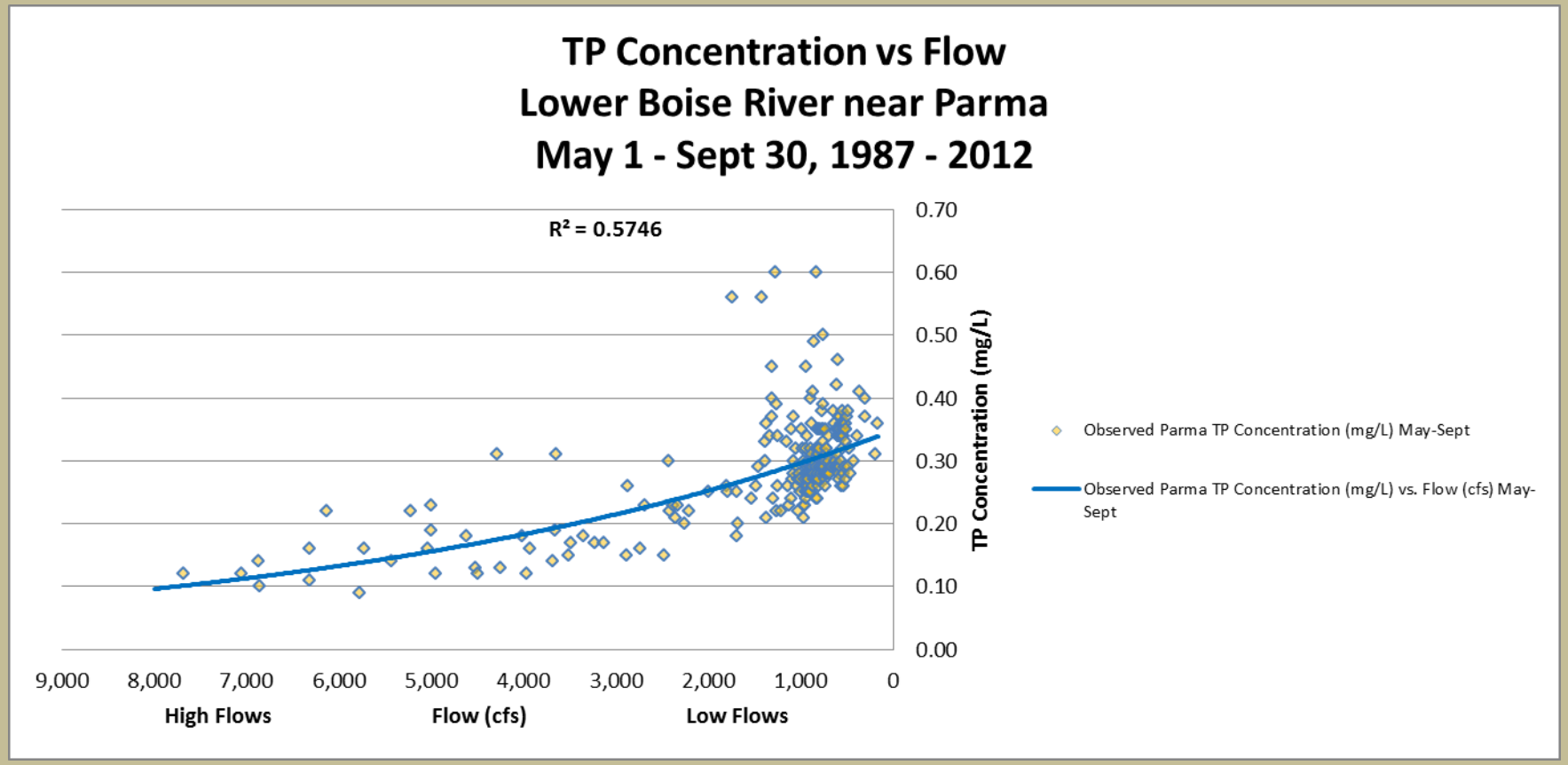
May-September Flows at Parma



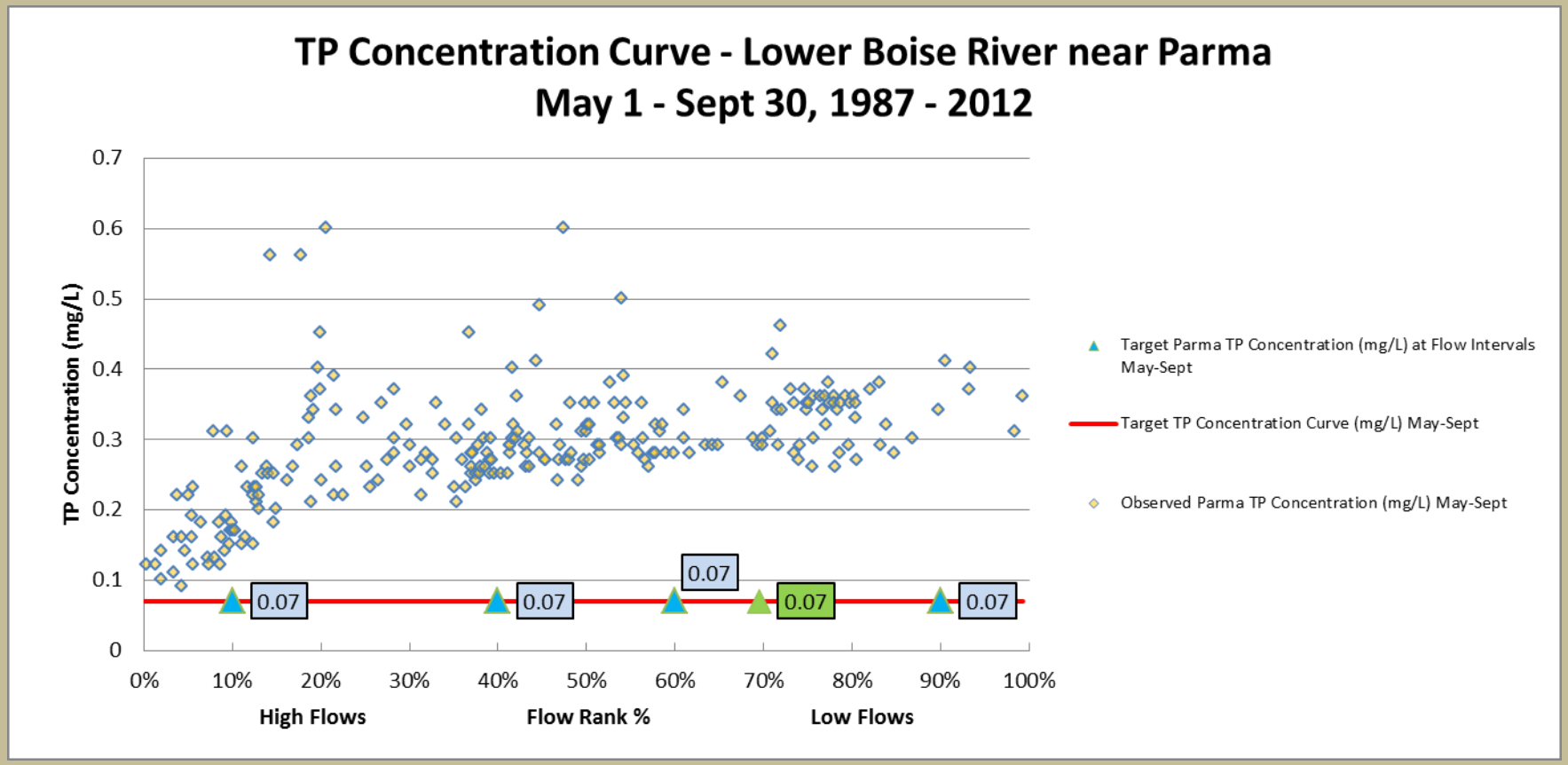
Parma TP Load vs. Flow



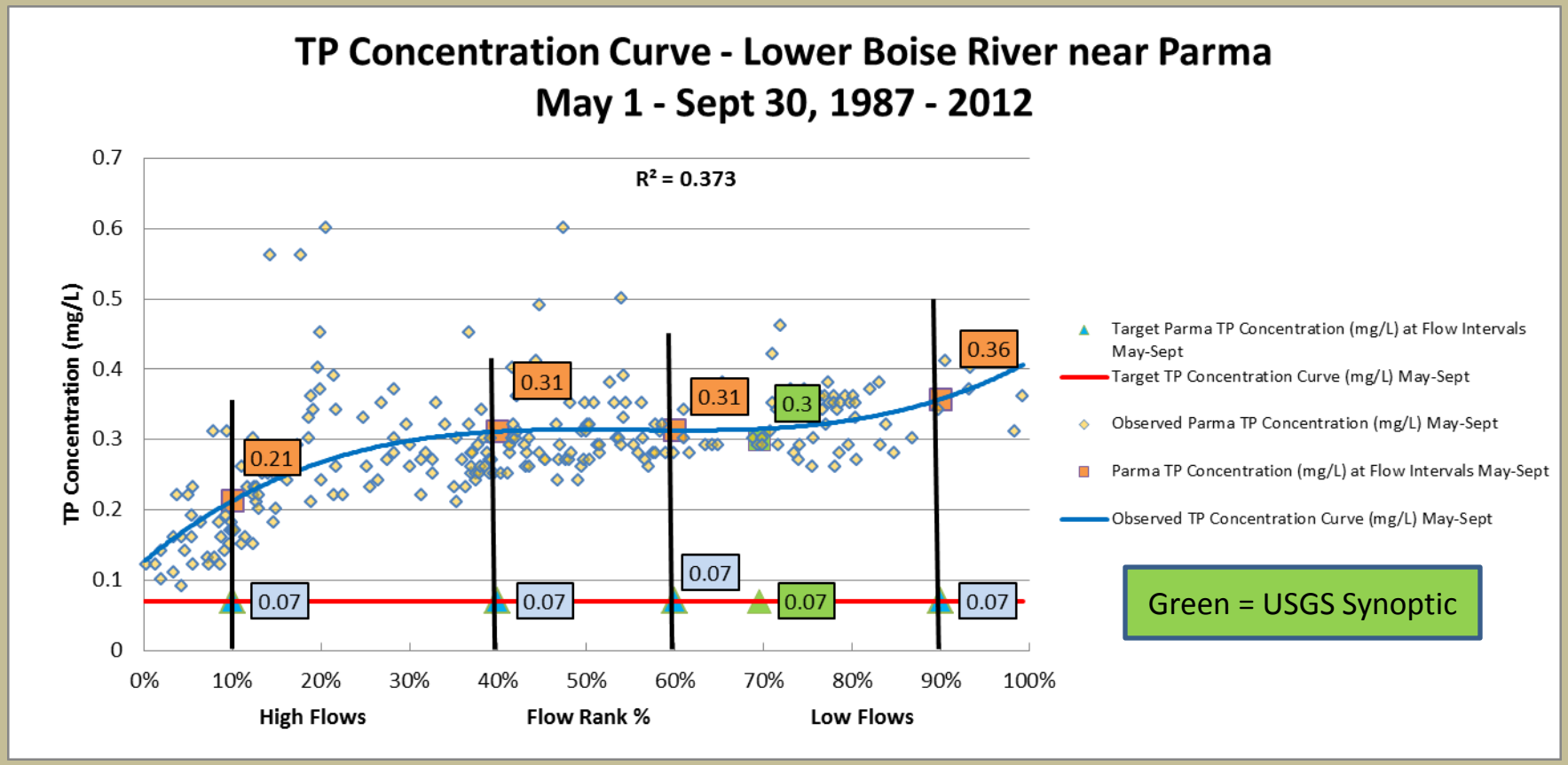
Parma TP Concentration vs. Flow



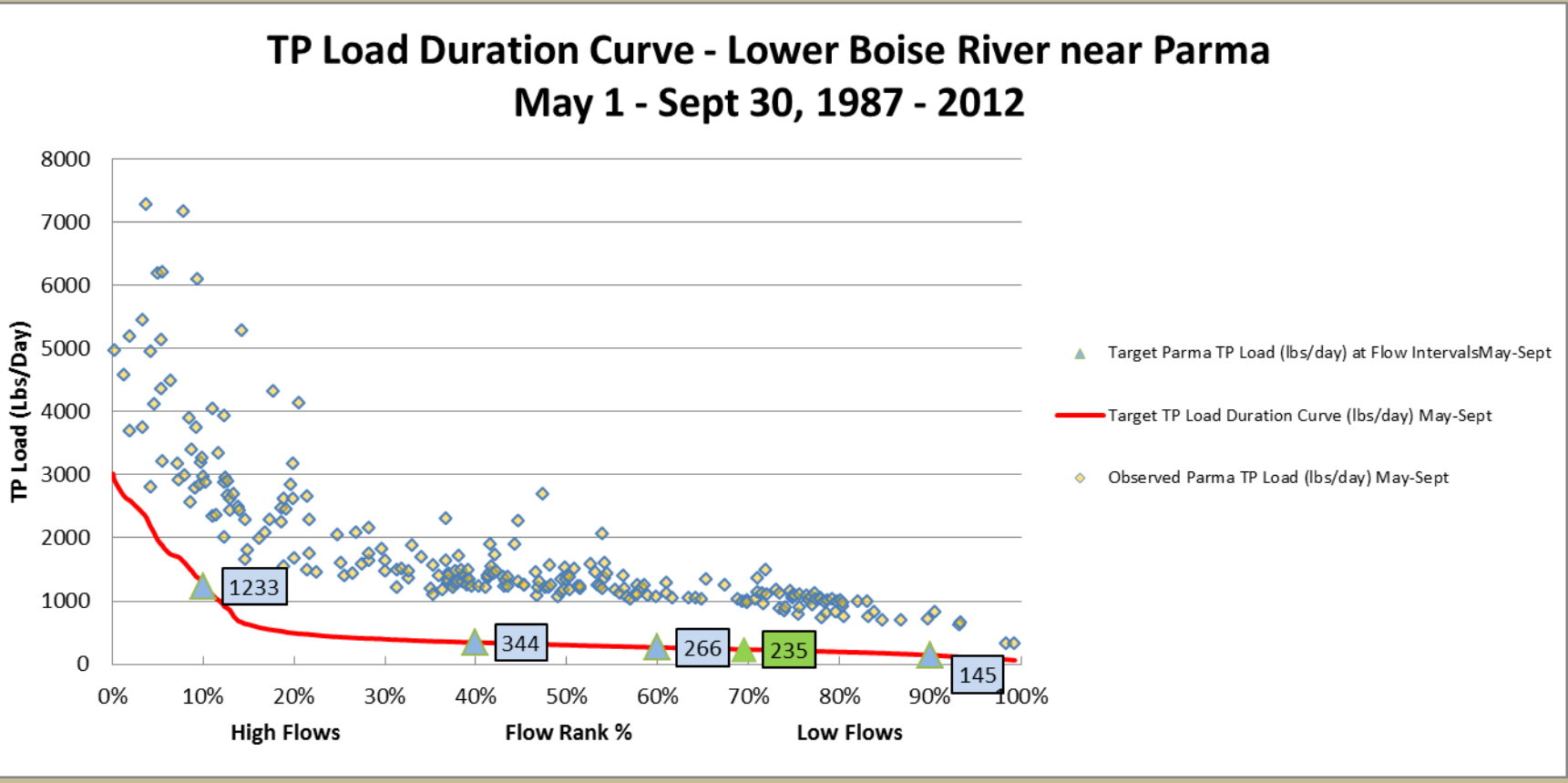
Parma TP Concentration Data



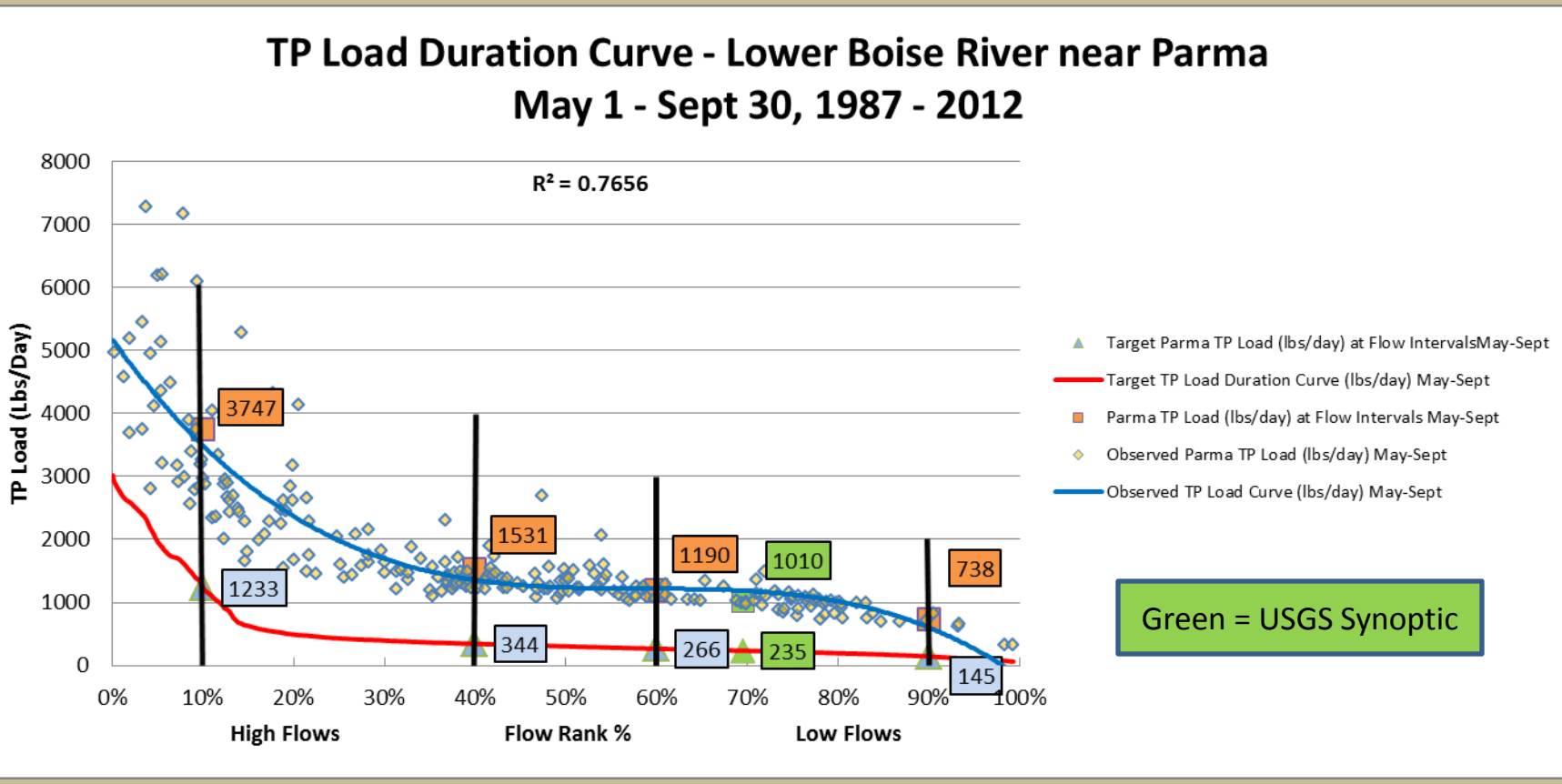
PARMA TP CONCENTRATION DATA



PARMA TP LOAD DATA



PARMA TP LOAD DATA



Parma TP Load Summary

Parma Flow (cfs)	Current Parma Load (Load Duration) (mg/l)	(lbs/day)	Parma Load Capacity (Load Duration) (mg/l)	(lbs/day)	Parma Load Reduction lbs/day	% Red.
3268	0.21	3747	0.07	1233	-2514	67%
912	0.31	1531	0.07	344	-1187	78%
705	0.31	1190	0.07	266	-924	78%
624	0.30	1010	0.07	235	-775	77%
620	0.32	1054	0.07	234	-820	78%
383	0.36	738	0.07	145	-594	80%

USGS

Reference

Current Lower Boise River TP Inputs

Parma Flow	Current Background TP Inputs[1]		Current WWTF TP Inputs[2]			Current Tributary TP Inputs w/o WWTFs[3]			Current Ground Water TP Inputs[4]			Current Storm Water TP Inputs[5]	Current TP Inputs
(cfs)	(mg/L)	(lbs/day)	(cfs)	(mg/L)	(lbs/day)	(cfs)	(mg/L)	(lbs/day)	(cfs)	(mg/L)	(lbs/day)	(lbs/day)	(lbs/day)
3268	0.02	352	117.9	2.37	1504	850	0.25	1163	-1390	0.21	-1611	44	1452
912	0.02	98	117.9	2.37	1504	850	0.25	1163	164	0.21	190	44	2999
705	0.02	76	117.9	2.37	1504	834	0.22	979	300	0.21	348	44	2950
624	0.015	50	84.0	3.18	1440	888	0.18	880	485	0.21	562		2932
620	0.015	50	117.9	2.37	1504	834	0.22	979	485	0.21	562		3095
383	0.02	41	117.9	2.37	1504	834	0.22	979	398	0.21	461	44	3029

(A) Lander, West Boise, Meridian, Middleton, Nampa, Caldwell

(B) …plus IDFG, Darigold, Star, Sorrento, Kuna, Notus, Wilder, Greenleaf, ConAgra

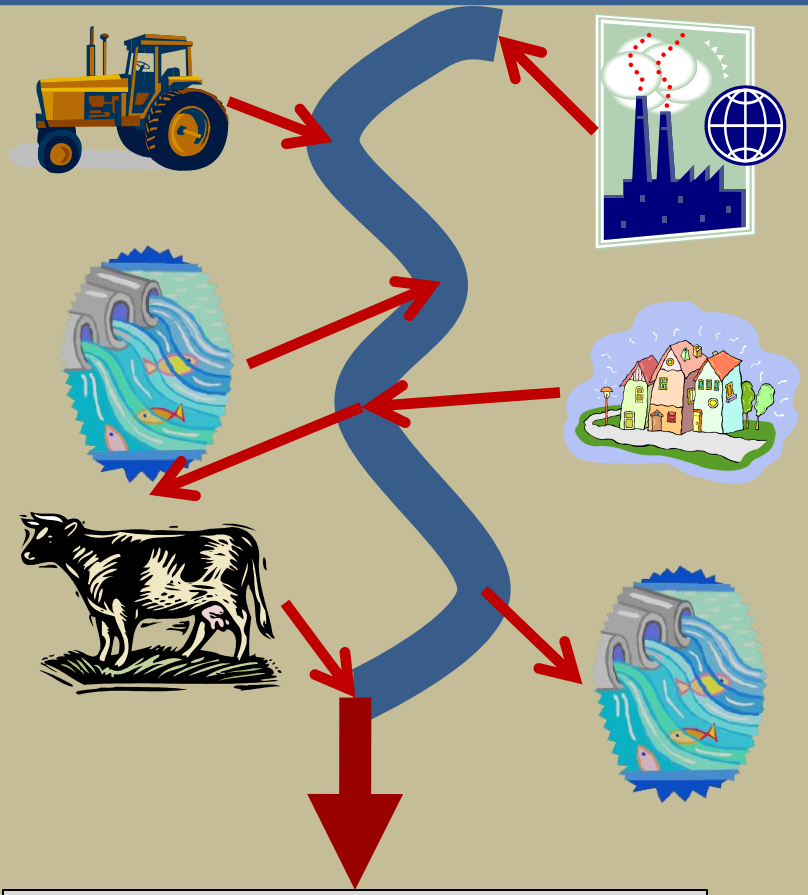
Without (A) Sources

Without (B) Sources

Provisional USGS Ground Water Recommendations

Ratio of TP Inputs to Parma Loads

Parma Flow (cfs)	Current TP Inputs (lbs/day)	Current Parma TP Load (lbs/day)	TP Inputs Reaching Parma (%)
3268	1452	3747	258%
912	2999	1531	51%
705	2950	1190	40%
624	2932	1010	34%
620	3095	1054	34%
383	3029	738	24%



Projected Lower Boise River TP Allocations

Parma Flow	Background TP Allocations[1]		Projected WWTF Flow and TP Allocations[2]			Tributary TP Allocations w/o WWTF Projected Flows and Loads[3]			Ground Water TP Allocations[4]			Storm Water TP Allocations[5]	TP Input Allocations
(cfs)	(mg/L)	(lbs/day)	(cfs)	(mg/L)	(lbs/day)	(cfs)	(mg/L)	(lbs/day)	(cfs)	(mg/L)	(lbs/day)	(lbs/day)	(lbs/day)
3268	0.02	352	157.6	0.30	255	778	0.10	419	-1390	0.08	-599	22	449
912	0.02	98	157.6	0.15	127	778	0.08	336	164	0.08	71	22	654
705	0.02	76	157.6	0.10	85	762	0.08	328	300	0.08	129	22	641
624	0.015	50	110.4	0.15	89	885	0.07	334	485	0.08	209		683
620	0.015	50	157.6	0.11	93	762	0.08	328	485	0.08	209		681
383	0.02	41	157.6	0.09	76	762	0.07	287	398	0.07	150	22	577

(A) Lander, West Boise, Meridian, Middleton, Nampa, Caldwell

(B) …plus IDFG, Darigold, Star, Sorrento, Kuna, Notus, Wilder, Greenleaf, ConAgra

Without (A) Sources

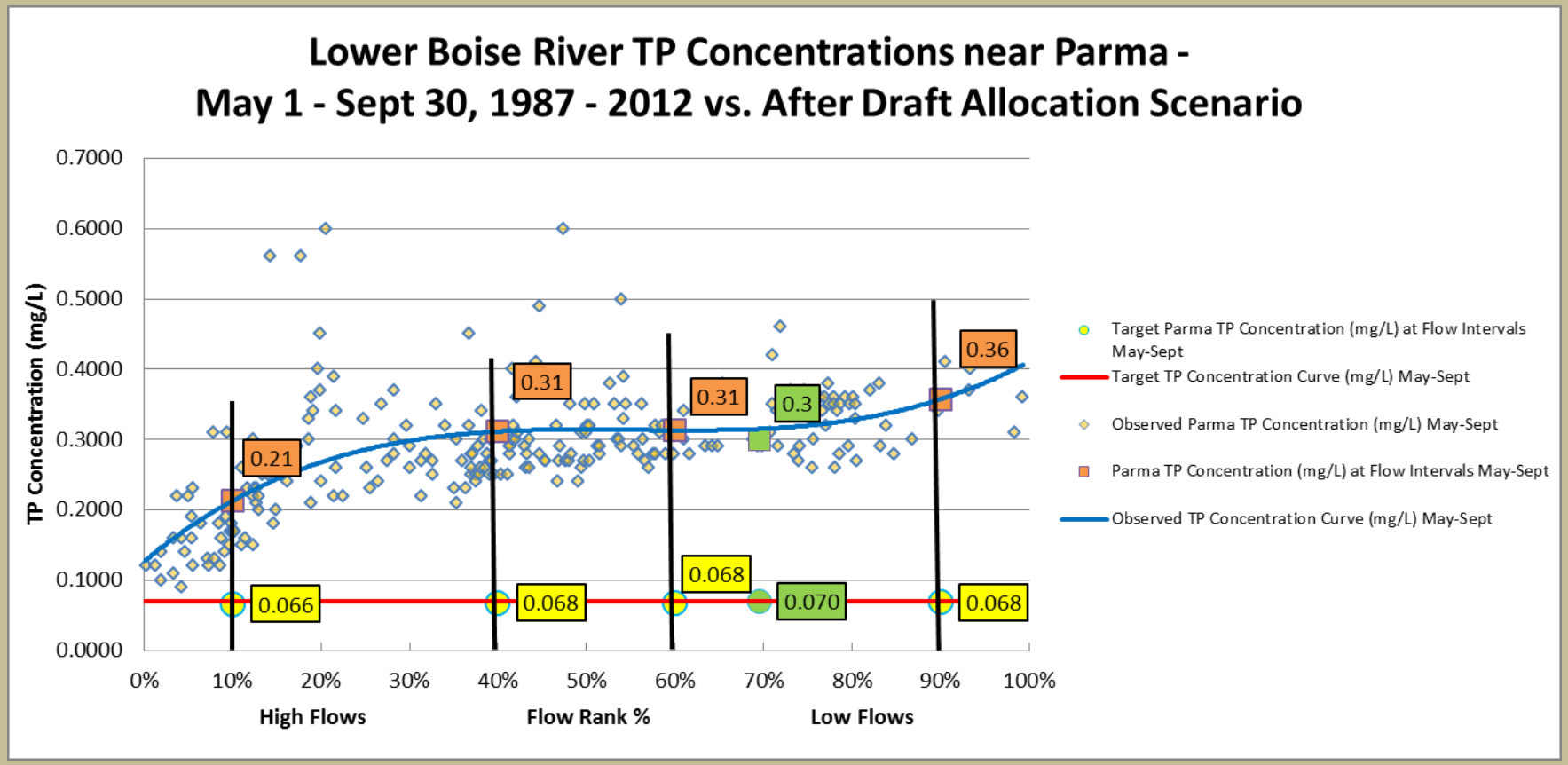
Without (B) Sources

Provisional USGS Ground Water Recommendations

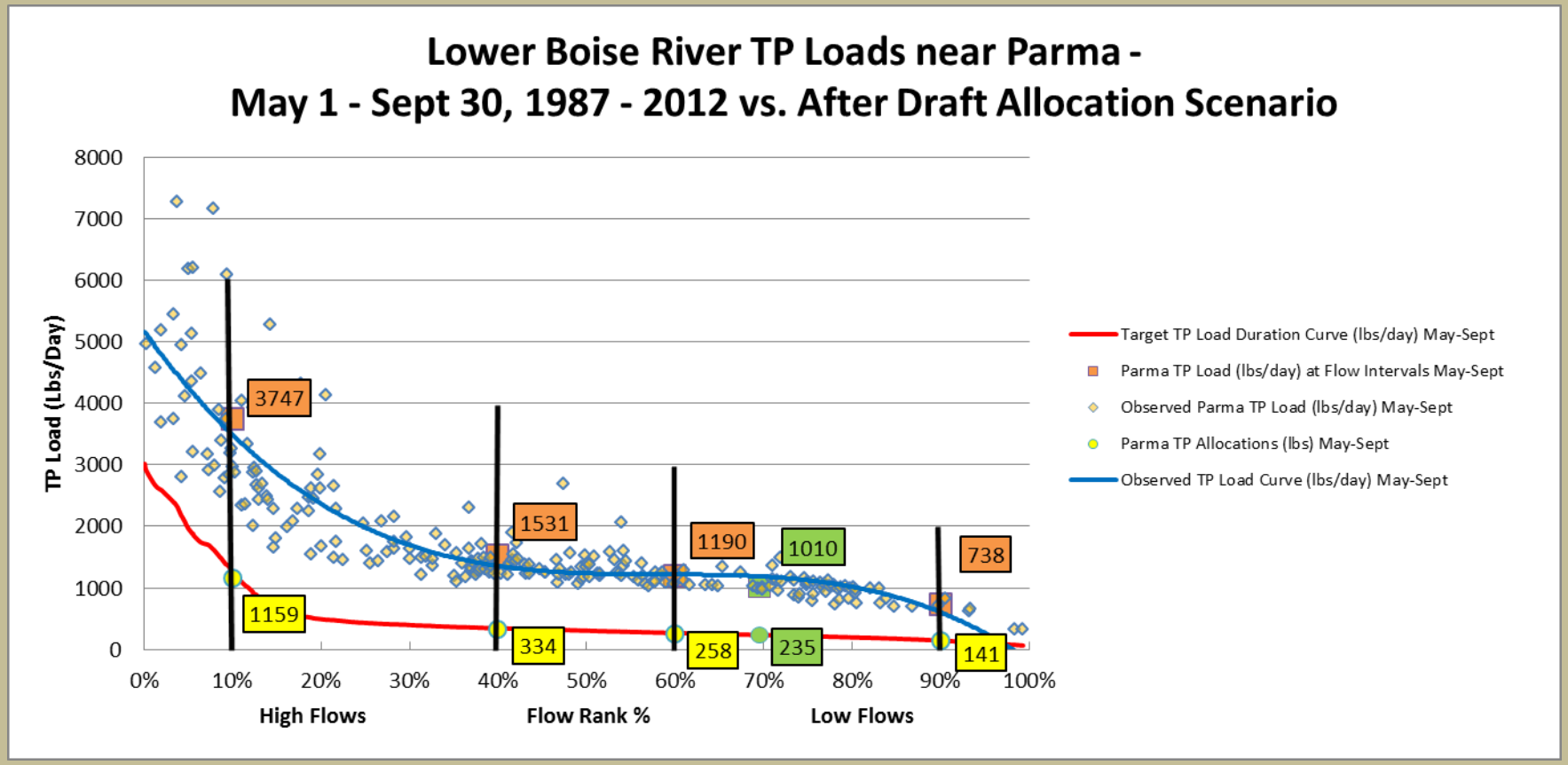
Ratio of TP Inputs to Parma Loads

Parma Flow	TP Input Allocations		TP Inputs Reaching Parma		Parma TP Load Allocations	Parma TP Load Capacity
(cfs)	(lbs/day)		(%)		(lbs/day)	(lbs/day)
3268	449	X	258%	=	1159	1233
912	654	X	51%	=	334	344
705	641	X	40%	=	258	266
624	683	X	34%	=	235	235
620	681	X	34%	=	232	234
383	577	X	24%	=	141	145

Parma TP Concentrations After Allocations



PARMA TP LOADS AFTER ALLOCATIONS



Support for Approach

1. The concentration-based May-September SR-HC TMDL 0.07 mg/L TP allocation target is directly related to flow
2. R^2 correlations = 0.84 and 0.57, for TP load and concentration vs. Parma flows, respectively
3. Similar results using USGS mass balance model and duration curves
4. The USGS mass balance model indicates that biogeochemical processes have a limited effect on TP concentrations in August 2012

Some Assumptions for Approach

1. Background Concentration at Diversion = Parma
   - Conservative approach (100% reaches Parma)
2. TP Input Loads translate to TP Loads at Parma
   - All sources potentially contribute TP in equal proportion
   - Not possible to track TP sources to Parma
3. Groundwater based on adjustments using USGS mass balance model
4. USGS mass balance model not appropriate tool to vary flows

Potential Next Steps

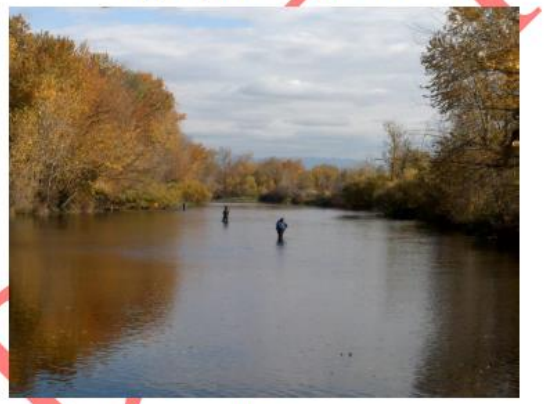
- Identify appropriate modifications
  - Must be transparent and defensible
- Determine inter-sector allocations
  - Relative allocations for point, non-point, GW, stormwater, and background sectors??
- Determine intra-sector allocations
  - Equal concentration, equal % reduction, etc.??
- How to translate for NPDES permits??

http://www.deq.idaho.gov/regional-offices-issues/boise/basin-watershed-advisory-groups/lower-boise-river-wag.aspx

Lower Boise River Subbasin Assessment and Total Maximum Daily Load

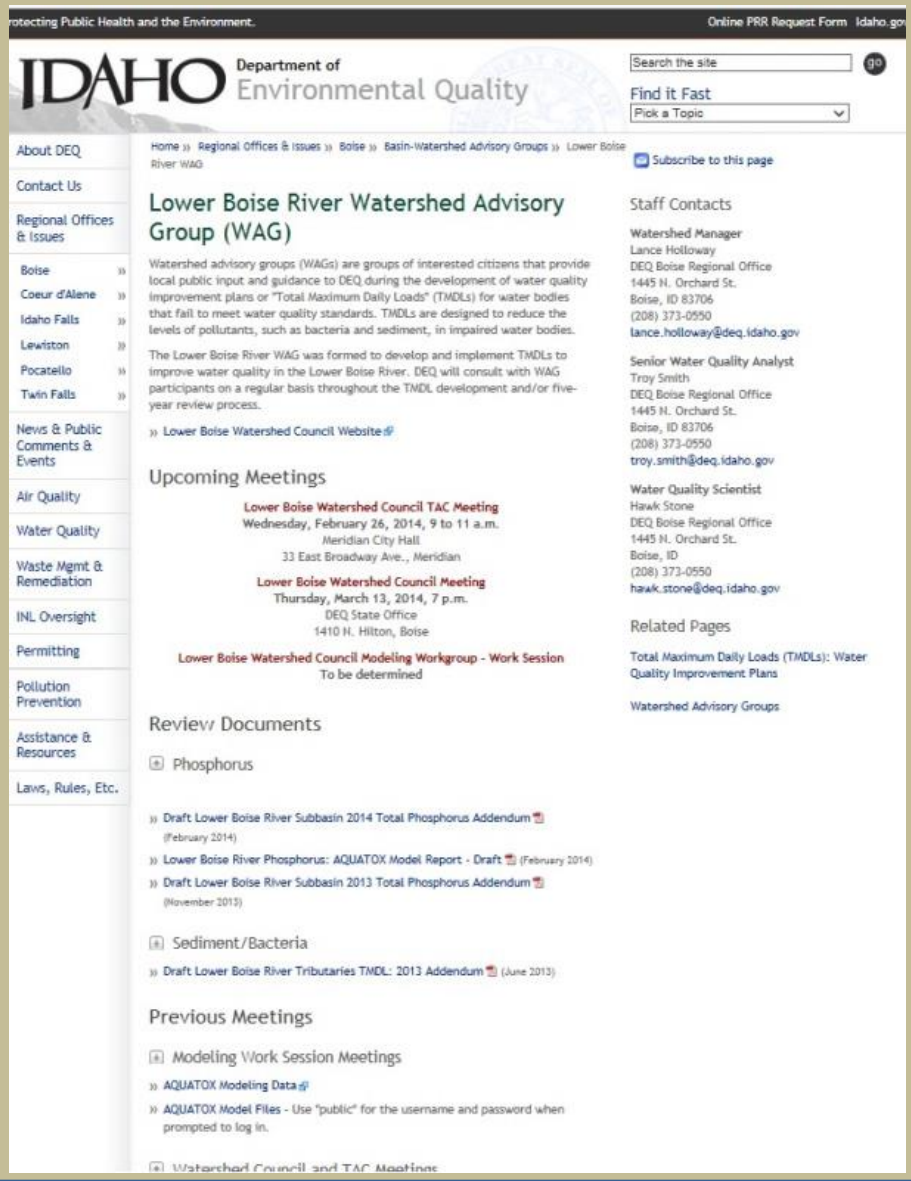
2014 Total Phosphorus Addendum to Lower Boise River, Mason Creek, and Sand Hollow Creek TMDLs

Hydrologic Unit Code 17050114



Draft

State of Idaho
Department of Environmental Quality



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Lower Boise River Watershed Advisory Group (WAG)

Watershed advisory groups (WAGs) are groups of interested citizens that provide local public input and guidance to DEQ during the development of water quality improvement plans or "Total Maximum Daily Loads" (TMDLs) for water bodies that fail to meet water quality standards. TMDLs are designed to reduce the levels of pollutants, such as bacteria and sediment, in impaired water bodies.

The Lower Boise River WAG was formed to develop and implement TMDLs to improve water quality in the Lower Boise River. DEQ will consult with WAG participants on a regular basis throughout the TMDL development and/or five-year review process.

» Lower Boise Watershed Council Website

Upcoming Meetings

Lower Boise Watershed Council TAC Meeting
Wednesday, February 26, 2014, 9 to 11 a.m.
Meridian City Hall
33 East Broadway Ave., Meridian

Lower Boise Watershed Council Meeting
Thursday, March 13, 2014, 7 p.m.
DEQ State Office
1410 N. Hilton, Boise

Lower Boise Watershed Council Modeling Workgroup - Work Session
To be determined

Review Documents

Phosphorus

» Draft Lower Boise River Subbasin 2014 Total Phosphorus Addendum (February 2014)
» Lower Boise River Phosphorus: AQUATOX Model Report - Draft (February 2014)
» Draft Lower Boise River Subbasin 2013 Total Phosphorus Addendum (November 2013)

Sediment/Bacteria

» Draft Lower Boise River Tributaries TMDL: 2013 Addendum (June 2013)

Previous Meetings

Modeling Work Session Meetings

» AQUATOX Modeling Data
» AQUATOX Model Files - Use "public" for the username and password when prompted to log in.

Watershed Council and TAC Meetings

Staff Contacts

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Related Pages

Total Maximum Daily Loads (TMDLs): Water Quality Improvement Plans

Watershed Advisory Groups

¡Thank You!

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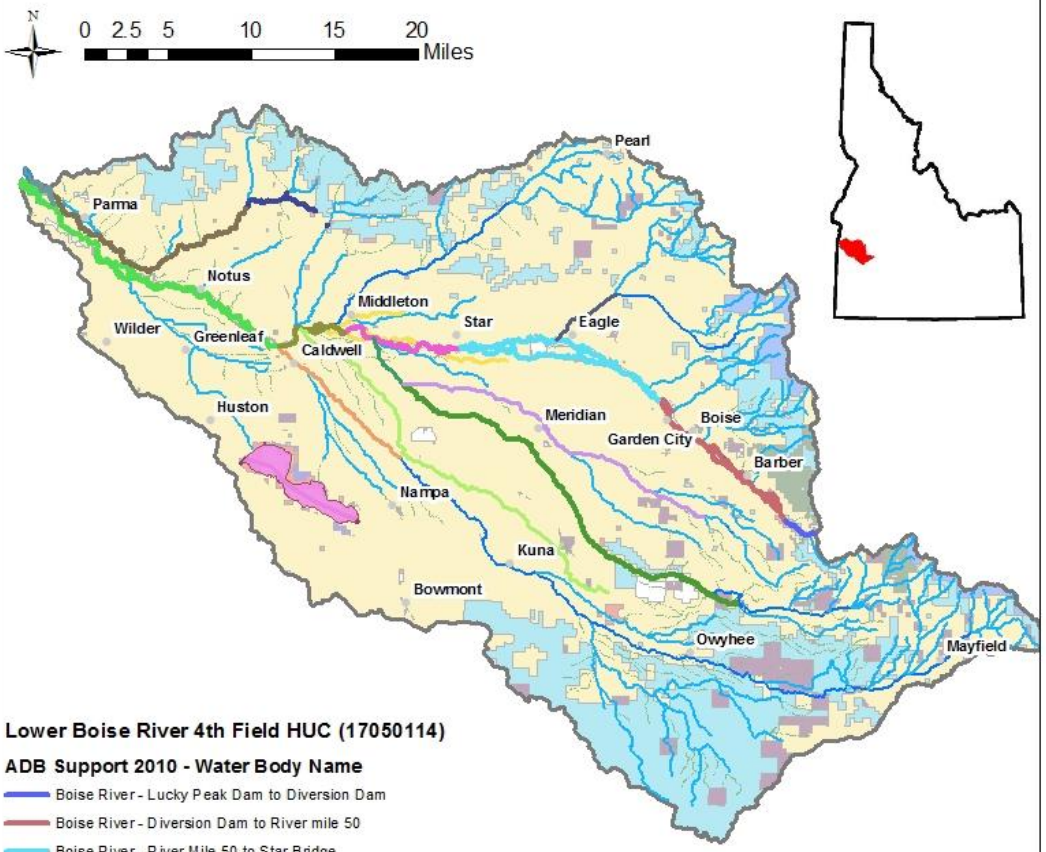
Extra Slides

Lower Boise River Subbasin (HUC 17050114)



Lower Boise River 4th Field HUC (17050114)

ADB Support 2010 - Water Body Name

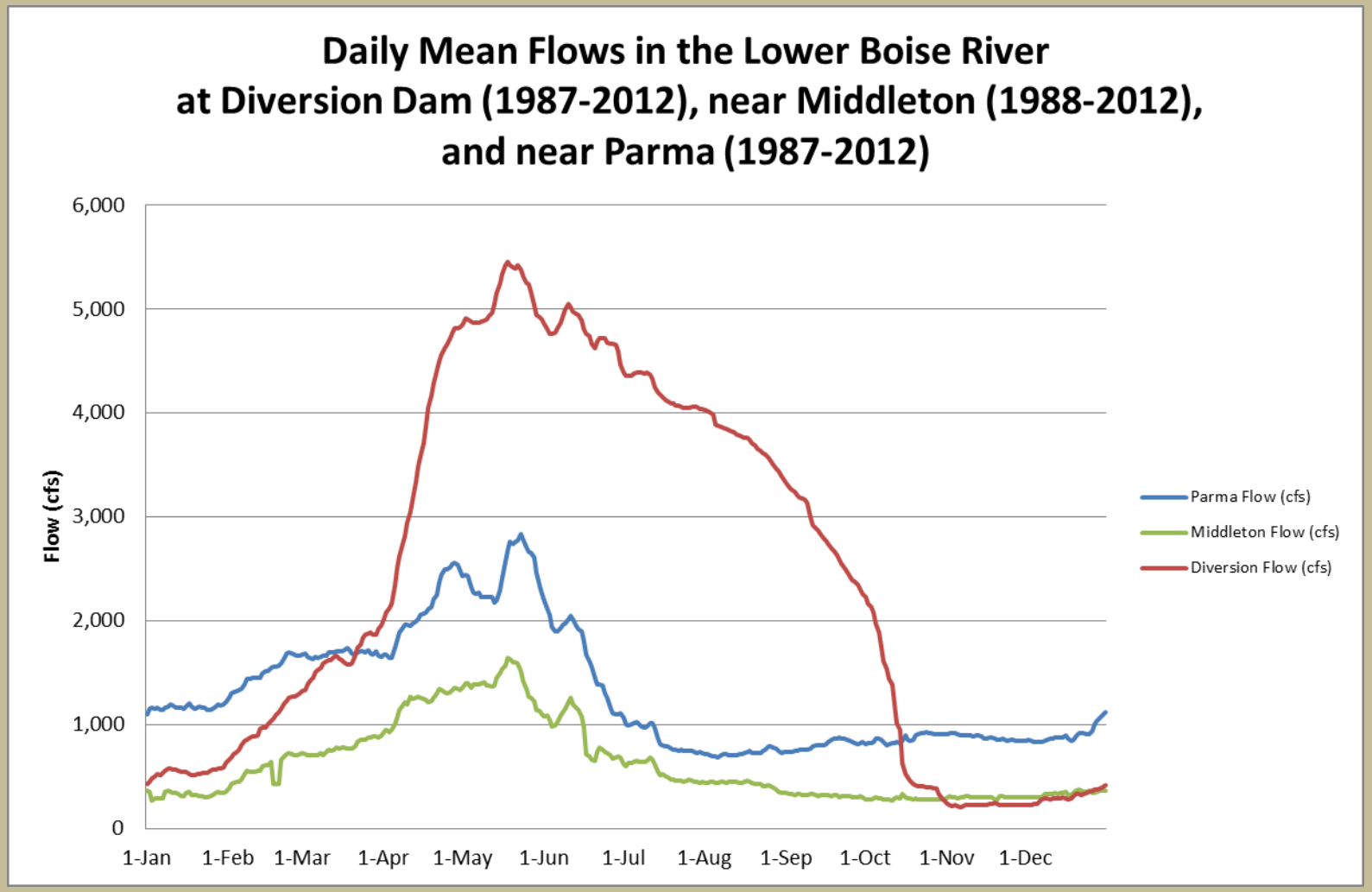
- Boise River - Lucky Peak Dam to Diversion Dam
- Boise River - Diversion Dam to River mile 50
- Boise River - River Mile 50 to Star Bridge
- Boise River-Star to Middleton
- Boise River-Middleton to Indian Creek
- Boise River - Indian Creek to mouth
- Dry Creek - 4th order (Spring Valley Creek to mouth)
- Fifteenmile Creek - 4th order (Fivemile Creek to mouth)
- Fivemile Creek - 3rd order
- Indian Creek - 4th order below 11th Ave. in Nampa
- Lake Lowell
- Mason Creek - entire watershed
- Mill Slough and Phyllis Slough
- Sand Hollow Creek (C-Line Canal to I-84)
- Sand Hollow Creek - I-84 to Sharp Road
- Sand Hollow Creek - Sharp Road to Snake River
- Tenmile Creek - 3rd order below Blacks Creek Reservoir

Landstatus

OWNER TYPE

- BLM
- BOR
- NWR
- OTHER
- PRIVATE
- STATE
- STATEFG
- USFS

Lower Boise River Flows



Parma vs. Middleton Flows