Lower Clark Fork Watershed Advisory Group

June 26, 2006

Background: Why do TMDL's?

- The Clean Water Act requires states to develop water quality standards
- Idaho's standards have been developed and approved by the EPA
- Standards are intended to protect, restore and preserve water quality so waters are available for their intended (beneficial) use
- Total Maximum Daily Loads (TMDLs) are required for all waterbodies not meeting water quality standards
- Targets for pollution reduction can focus protection and restoration efforts (implementation plan)

Time frame for Clean water Act- late 1970s

Time frame for approval of WQS - ongoing since 1970s

Uses: drinking water, swimming (primary contact recreation), boating (secondary contact recreation), and fishing (cold and warm water).

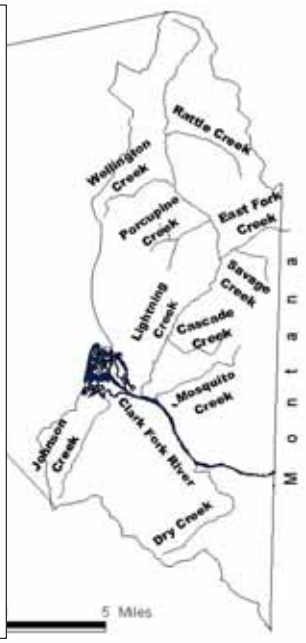
Uses are designated in a variety of ways. Most waters have had uses designated by the state, but for those that don't have designated uses, the presumed uses are cold water aquatic life and primary contact recreation.

Beneficial Uses

Water Body	Uses[a]	Type of Use
Clark Fork River (Idaho/Montana Border to Lake Pend Oreille)	CWAL, SS, PCR, DWS, SRW	Designated
Lightning Creek (Source to Mouth)		
Johnson Creek (Source to Mouth)	CWAL, SS, PCR or SCR	Existing
Cascade Creek (Source to Mouth)	CWAL, SS, SCR	Existing
East Fork Creek (Idaho/Montana Border to Mouth)	CWAL, SS, SCR	Existing
Rattle Creek (Source to Mouth)	CWAL, SS, SCR	Existing
Dry Creek (Source to Mouth)	CWAL, SS, SCR	Existing
Savage Creek (Idaho/Montana Border to Mouth)	CWAL, SS, SCR	Existing
Wellington Creek (Source to Mouth)	CWAL, SS, SCR	Existing

303(d) Listed Streams - 2002

Lower Clark Fork River:
TDG, Metals, Temperature, Unknown
Johnson Creek:
Temperature, Sediment
Dry & Twin Creek: *Temperature*
Lightning Creek:
Unknown, Temperature
Porcupine & Morris Creeks:
Unknown, Temperature
Cascade Creek*: *Temperature*
East Fork Creek:
Temperature, Sediment
Savage Creek: *Temperature*
Rattle Creek: *Temperature*
Wellington Creek: *Sediment, Temperature*



TMDLs Completed

- Metals on mainstem Clark Fork (Cadmium, Copper, Zinc)
- Temperature (excluding mainstem Clark Fork River)
- Sediment
- Total Dissolved Gas on mainstem Clark Fork River

Metals TMDL

- The goal of the metals TMDLs are to insure that water quality standards to protect aquatic life are not exceeded in the mainstem Lower Clark Fork River.
- The WAG directed IDEQ at the December 2005 meeting that given current listing, and data available that a TMDL expressing limits at Idaho Water Quality Standards is advised
- Drafts are presented for Cadmium, Zinc, Copper

Changes to Metals TMDL

- Explicit Margin of Safety Removed
- Summary tables added
- Load capacity calculations did not change

Summary of Metals Data

	Source	Dissolved Cadmium	Dissolved Copper	Dissolved Zinc	Date of Record
Sample Size	USGS	33	33	33	Variable between 1989-1999; 2000-2001
	Tri-State	44	45	44	2001-2003 (sampling continued to present)
Number of Exceedances	USGS	2 CCC 1 CMC	4 CCC 2 CMC	0	
	Tri-State	1 CCC	0	1 CCC	
Minimum Value (ug/L)	USGS	< 0.04	<1.0	1 (verify with USGS)	
	Tri-State	0.5 (U[1])	0.5 (U)	0.25 (U)	
Maximum Value (ug/L)	USGS	2	38	28	
	Tri-State	1	3	80.8	

[1] U = Below laboratory detection limit. Reported as one-half the detection limit.

Since 1990, exceedances of the acute criteria (CMC) occurred for cadmium (1991), and copper (twice in 1992). Exceedances of the chronic criteria (CCC) for cadmium (1990, 1991, 2003), copper (1990, three times in 1992) and zinc (2003) have also occurred. Note that both criteria are evaluated using the best available data, which are single event samples.

Cadmium TMDL

Cadmium Load Capacity			
	Flow (cfs)	Cadmium CCC (ug/L)	Load Capacity (lb/day)
7Q10[1]	6054	0.74	24
10th percentile[2]	8400	0.74	33
50th percentile	16900	0.74	67
90th percentile	44600	0.74	178

[1] 7Q10 is the minimum 7-day average flow over a ten year period. Data from 1994-2004 were used.
[2] 10th, 50th, and 90th percentile flows are based on USGS dataset below Cabinet Gorge Dam from 1960-2004.

Copper TMDL/Load Capacity

Copper Load Capacity			
	Flow (cfs)	Copper CCC (ug/L)	Load Capacity (lb/day)
7Q10	6054	7.8	254
10th percentile	8400	7.8	353
50th percentile	16900	7.8	710
90th percentile	44600	7.8	1875

Zinc TMDL/Load Capacity

Zinc Load Capacity			
	Flow (cfs)	Zinc CCC (ug/L)	Load Capacity (lb/day)
7Q10	6054	80.3	2620
10th percentile	8400	80.3	3635
50th percentile	16900	80.3	7313
90th percentile	44600	80.3	19300

Goal of Temperature TMDLs

- Temperature TMDLs are based on the Potential Natural Vegetation Method
- Goal is to return streams to a condition of full potential natural vegetation shading.
  - This is also based on returning streams to natural stream width, so temperature and sediment TMDL implementation actions often are linked.
- Presumption is that a stream with full potential natural vegetation will provide stream conditions fully supporting of salmonid spawning
  - Represents a functioning riparian area. (Literature supports a riparian area at least one site potential tree lengths to protect riparian function, i.e. bank stability, water filtratition, stream shading, etc)

Temperature TMDLs Have Been Developed for all Assessment Units in the Subbasin (exculding mainstem Clark Fork River).
The TMDLs for the Assesment Units below are Advisory at this time, because they are currently not on the 303(d) list.

Water Body Name	Assessment Unit	2002 Boundaries	Temperature TMDL Status	Recommended Changes to Integrated Report
West Fork Elk Creek	17010213PN006_02	West Fork Elk Creek Source to Idaho/Montana Border	Advisory TMDL Only	
West Fork Blue Creek	17010213PN007_02	West Fork Blue Creek source to Idaho/Montana border	Advisory TMDL Only	
Gold Creek	17010213PN008_02	Gold Creek source to Idaho/Montana border	Advisory TMDL Only	
Spring Creek	170213PN021_02	Spring Creek Source to confluence with Lightning Creek	Advisory TMDL Only	
Johnson Creek delta area	17010213PN001_03	Johnson Creek – third order portion in the delta area of the Lower Clark Fork River	Advisory TMDL Only	
Clark Fork River	17010213PN003_02	First and second order unnamed tributaries to Clark Fork River	Advisory TMDL Only	
Derr Creek	17010213PN001_02		Advisory TMDL Only	

Temperature Sub-group

- Potential Natural Vegetation Model based on shade curves for representative vegetation types, WAG has had on-going discussion regarding which curves are most representative of Lower Clark Fork Subbasin

"Original Proposal"
(Average of four shade curves representative of LCF vegetation types – height and distribution)

- 1) South Fork Clearwater River (IDEQ, 2004) VRU 8 (stream breaklands, cedar and grand fir),
- 2) South Fork Clearwater River (IDEQ, 2004) VRU 10 (uplands, alder, grand fir, and subalpine fir),
- 3) Mattole River (CRWQCB, 2002) redwood forest,
- 4) Willamette Basin (ODEQ, 2004a) Qalc (80% forest, ht.=88.2ft., density=71%).

Sub-group Proposal

1) South Fork Clearwater River (IDEQ, 2004) VRU 8 (stream breaklands, cedar and grand fir), - applied below 4000 feet elevation, forested
2) South Fork Clearwater River (IDEQ, 2004) VRU 10 (uplands, alder, grand fir, and subalpine fir), - applied above 4000 feet elevation, forested

(Remove Mattole and Willemette River Shade Curves.)

Note that instead of classes, the actual shade target is used for shade curves when only using one to represent the area. This is preference of EPA.


South Fork Clearwater River
VRU 8 Vegetation Community
MEA 11
Photo provided by Nick Gerhardt - Forest Hydrologist, Nez Perce National Forest

South Fork Clearwater River
VRU 10 Vegetation Community

VRU 10 (alder, grand fir, subalpine fire uplands) in background

VRU 6 (grand fir, subalpine fir cold basins) and VRU 17 (cedar and grand fir rolling hills) in the foreground

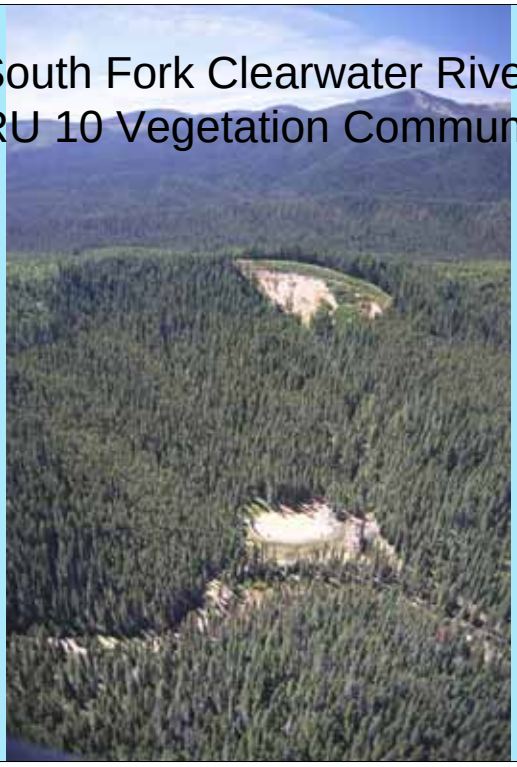


Photo provided by Nick Gerhardt - Forest Hydrologist, Nez Perce National Forest

Differences in Shade Targets
South Fork Clearwater VRU 8/10 vs. VRU 8/10, Mattole River and Willamette Basin average

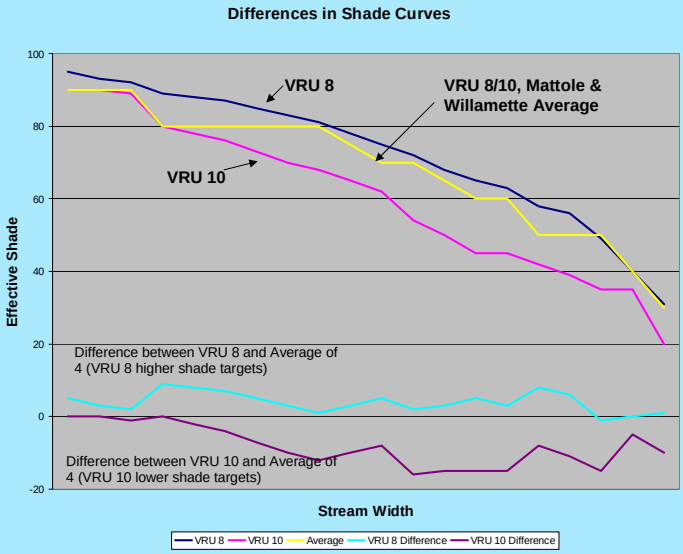
Effective Shade	Stream Width (m)																			
	2	3	4	5	6	7	8	9	10	11	12	14	16	18	19	21	24	28	40	54
VRU 8	95	93	92	89	88	87	85	83	81	78	75	72	68	65	63	58	56	49	40	31
VRU 10	90	90	89	80	78	76	73	70	68	65	62	54	50	45	45	42	39	35	35	20
VRU 8, VRU 10, Mattole, Willamette average	90	90	90	80	80	80	80	80	80	75	70	70	65	60	60	50	50	50	40	30
VRU 8 Change	5	3	2	9	8	7	5	3	1	3	5	2	3	5	3	8	6	-1	0	1
VRU 10 Change	0	0	-1	0	-2	-4	-7	-10	-12	-10	-8	-16	-15	-15	-15	-8	-11	-15	-5	-10

Average of four shade curves (VRU 8/10, Mattole River and Willamette Basin)

VRU 8 shade targets higher than previously calculated

VRU 10 shade targets lower than previously calculated

Differences in Shade



Differences in Reductions for areas above 4000 feet

Changes in percent solar loading using VRU 10 above 4000 feet.

Stream	Assessment Unit	% Solar load reduction*	% Solar load reduction**	Difference
Lunch Creek	ID17010213PN019_02	73	73	0
Quartz Creek		27	27	0
Moose Creek		54	52	2
Gem Creek		66	66	0
Gordon Creek		62	59	3
Deer Creek		42	40	2
Fall Creek		54	53	1
Sheep Creek	ID17010213PN017_02	54	53	1
Bear Creek				
Rattle Creek	ID17010213PN018_02	61	56	5
Steep Creek	ID17010213PN016_02	62	61	1
Jost Creek				
Mud Creek				
Silvertip Creek				
Trapper Creek				
Unnamed Trib.				

* Percent solar load reduction using VRU8, VRU10, Mattole River and Willamette Basin shade curves.
** Percent solar load reduction using VRU10 shade curve only.

Differences in Reductions for areas below 4000 feet

Changes in percent solar loading using VRU 8 below 4000 feet.

Stream	Assessment Unit	% Solar load reduction*	% Solar load reduction**	Difference
Wellington Creek*	ID17010213PN020_02	38	37	-1
Porcupine Creek*	ID17010213PN016_02	53	52	-1
Eastfork Creek	ID17010213PN014_02 ID17010213PN014_03	54	59	-5
Morris Creek*	ID17010213PN013_02	51	66	-15
Regal Creek	ID17010213PN013_02	40	58	-18
Cascade Creek	ID17010213PN012_02	55	67	-12
Spring Creek	ID17010213PN021_02	45	49	-4
Unnamed Tributaries between Eastfork and Morris	ID17010213PN013_02	69	79	-10
Main Steam Lightning Creek	ID17010213PN010_04 ID17010213PN011_04 ID17010213PN013_04 ID17010213PN016_03 ID17010213PN017_03 ID17010213PN019_03 ID17010213PN019_02	64	64	0
Mosquito Creek	ID17010213PN009_02	39	52	-13
Gold Creek	ID17010213PN008_02	56	69	-13
West Fork Blue Creek	ID17010213PN007_02	44	35	9
Johnson Creek	ID17010213PN002_02 ID17010213PN002_03	59	73	-14
Deer Creek	ID17010213PN001_02	29	30	-1
Twin Creek	ID17010213PN004_02 ID17010213PN004_03	46	50	-4
Dry Creek	ID17010213PN004_02	26	48	-22
Unnamed Tributary	ID17010213PN003_02 ID17010213PN006_02	42	49	-7

Goal of Sediment TMDLs

- Excess Sediment can alter stream structure and contribute to stream warming
- Excess bedload identified as critical concern in Lightning Creek system
- IDEQ BURP data showed moderate to impaired stream conditions to support Cold Water Aquatic Life and Salmonid Spawning
- Sediment TMDLs set targets for reducing human-caused sediment inputs into impaired streams

Model Results for Current sediment load, background load and load capacity at sediment target for watersheds above sediment load target.

Watershed	Load type	Watershed acreage	Modeled % above background	Estimated existing load (tons/year)	Natural background (tons/year)	Load capacity at 54% above natural background (tons/year)	Load Reduction Required (tons/year)	% Load Reduction Required
Rattle Creek	Sediment	6,770	228%	636	194	299	337	174%
Wellington Creek	Sediment	6,405	177%	407	147	226	181	123%
Quartz Creek	Sediment	3,226	139%	130	54	83	47	85%
Lightning Creek Mainstem*	Sediment	44,859	66%	3,932	2,362	3,637	295	12%
Twin Creek	Sediment	7,567	71%	297	174	268	29	17%
Johnson Creek	Sediment	9,166	66%	352	212	326	26	12%

* Main stem Lightning Creek including Spring, Cascade, Porcupine and East Fork Creeks and excluding Rattle, Wellington, Quartz, Morris, Savage and Lightning Creek headwater streams above Moose Creek.

Sediment TMDL Summary Table of Recommendations

Stream	Water Body Segment/ AU	Pollutant	TMDL(s) Completed	Recommended Changes to Integrated Report	Justification
Lower Lightning Creek	ID17010213PN010_04 ID17010213PN011_02 ID17010213PN011_04 ID17010213PN013_02 ID17010213PN013_04	Sediment	Yes	Move to section 4a	Completed TMDL
Middle Lightning Creek	ID17010213PN016_02 ID17010213PN016_03 ID17010213PN017_02 ID17010213PN017_03	Sediment	Yes	Move to section 4a	Completed TMDL
Upper Lightning Creek	ID17010213PN019_02 ID17010213PN019_03	Sediment	Yes	Move to section 4a	Completed TMDL
Rattle Creek	ID17010213PN018_02	Sediment	Yes	Add to integrated report.	Current load above target
East Fork Creek	ID17010213PN014_02 ID17010213PN014_03	Sediment	yes – Receives sediment reduction allocation based on Lightning Creek	Move to section 4a	Completed TMDL
Wellington Creek	ID17010213PN020_02	Sediment	Yes	Add to integrated report.	Current load above target
Johnson Creek	ID17010213PN002_02 ID17010213PN002_03	Sediment	Yes	Move to section 4a	Completed TMDL
Twin Creek	ID17010213PN004_02 ID17010213PN004_03	Sediment	Yes	Add to integrated report	Current load above target

Total Dissolved Gas TMDL

- The goal of the TDG TMDL is to insure that Idaho Water Quality Standards for TDG (110% saturation) are met in the mainstem Lower Clark Fork River in order to protect aquatic life in the Clark Fork/Pend Oreille system.
- The standard is set at Idaho Water Quality Standard less a 2% Margin of Safety at the Idaho/Montana border.
- No net increase of TDG will be allowed between Cabinet Gorge forebay and below Cabinet Gorge dam.
- It is somewhat atypical to express a TMDL as a % because of properties of gases, etc, so narrative explanations of target are important and will be adjusted as required to EPA.