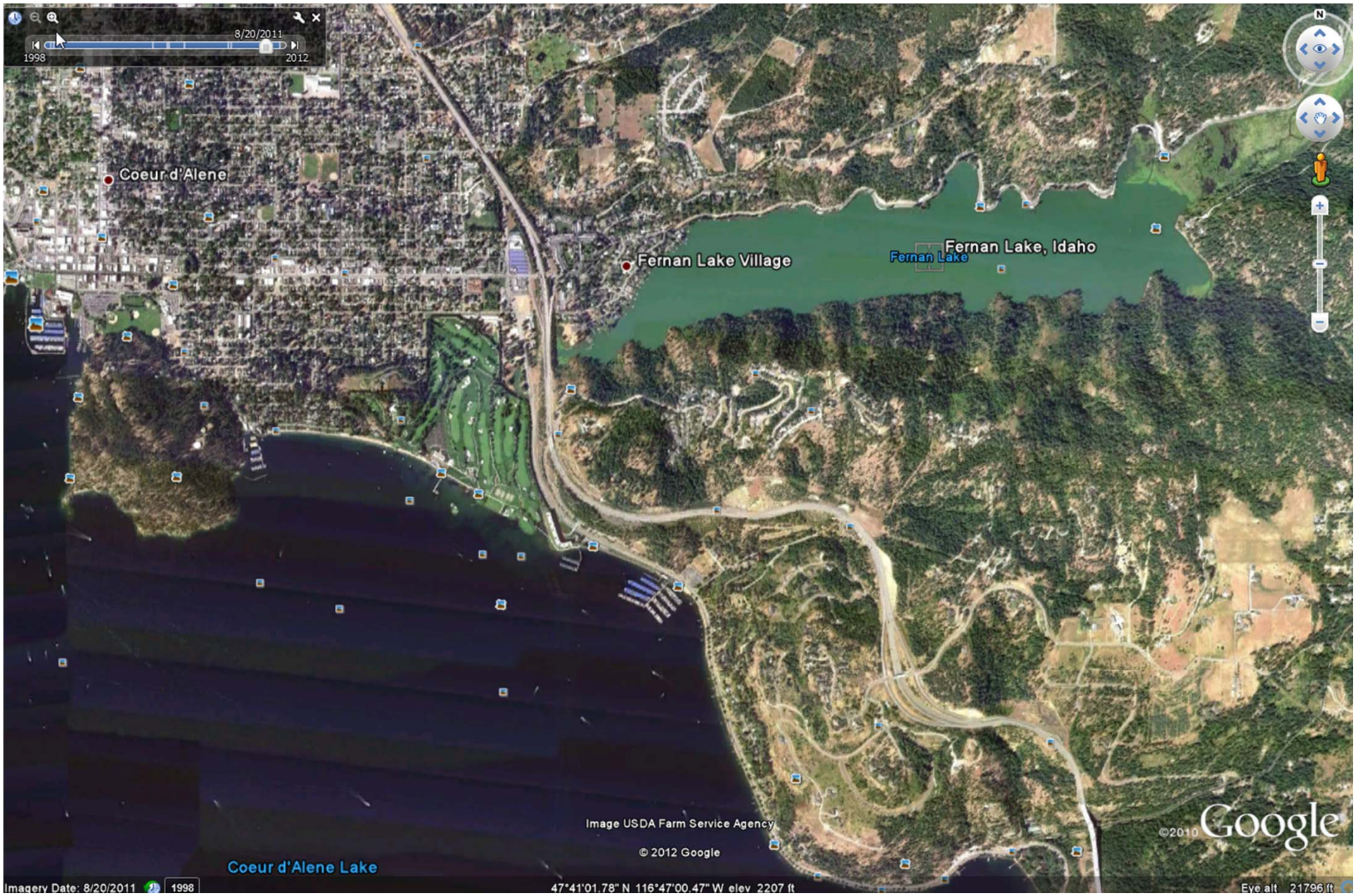
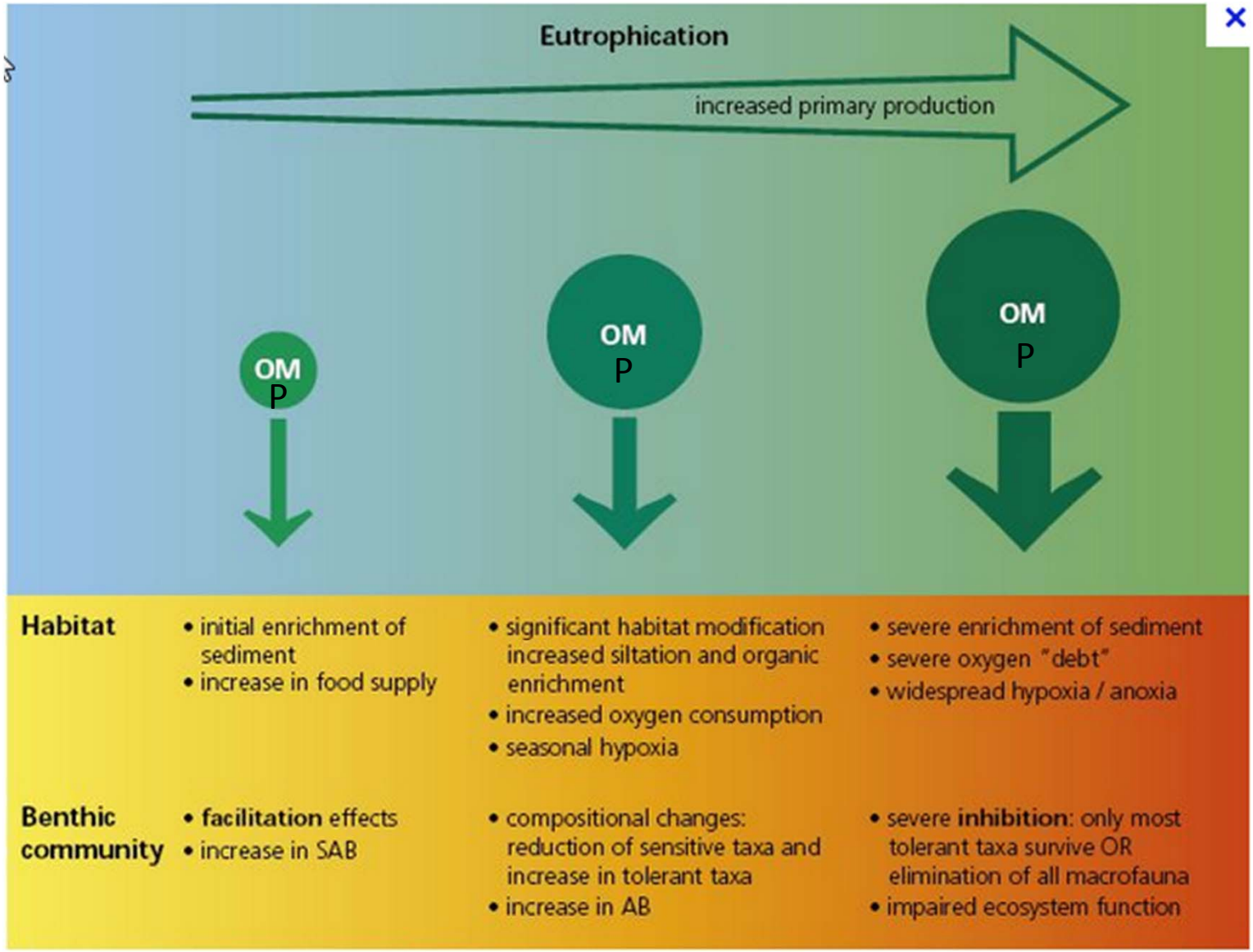
Fernan Lake TMDL Presentation

Coeur d'Alene Lake Watershed Advisory Group

October 19th 2012

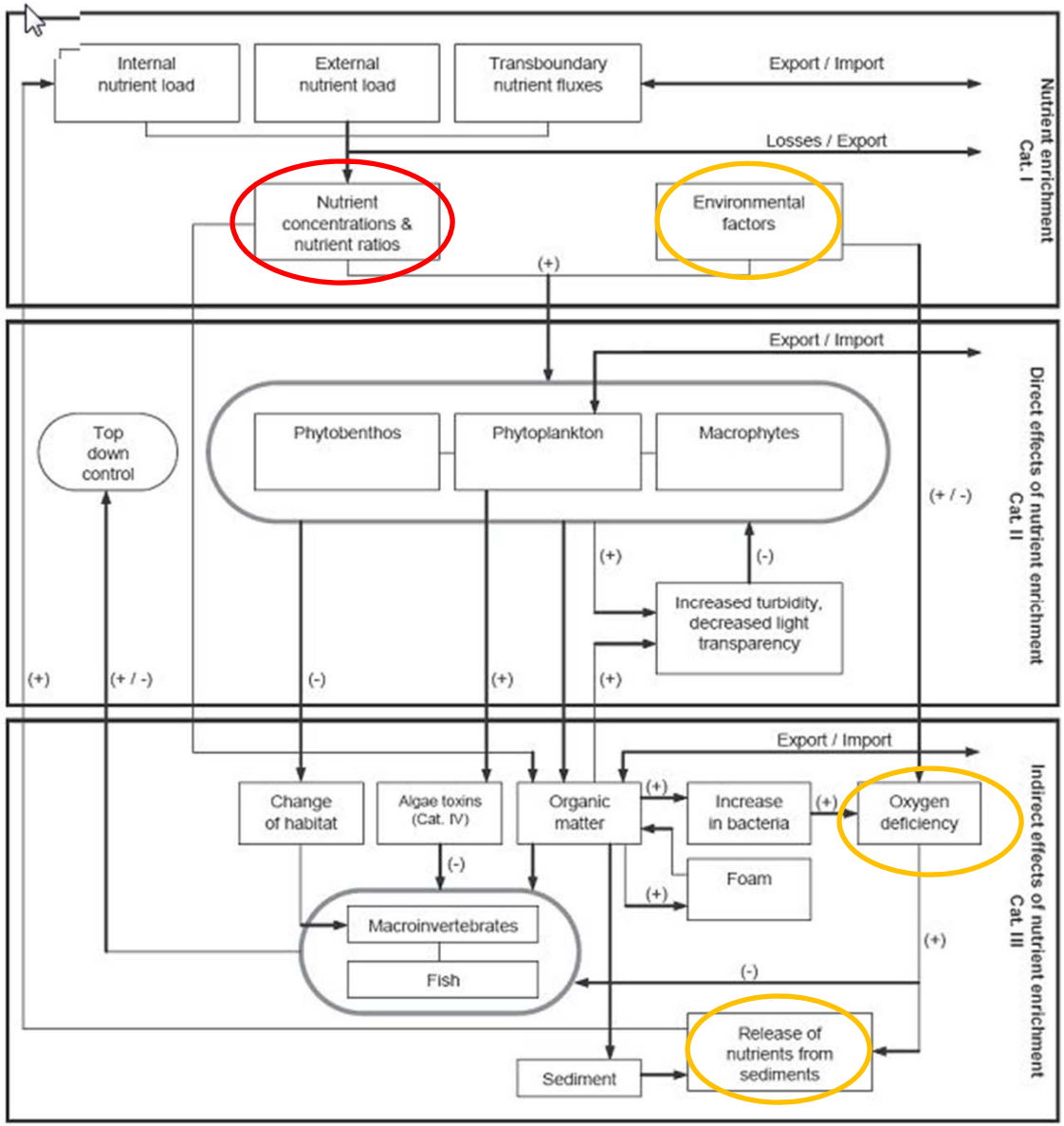
Idaho Department of Environmental Quality


8/20/2011
1998
2012
Coeur d'Alene
Fernan Lake Village
Fernan Lake, Idaho
Fernan Lake
Image USDA Farm Service Agency
© 2012 Google
©2010 Google
Coeur d'Alene Lake
Imagery Date: 8/20/2011
1998
47°41'01.78" N 116°47'00.47" W elev 2207 ft
Eye alt 21796 ft



Source: Helsinki Commission (http://www.helcom.fi/BSAP_assessment/eutro)

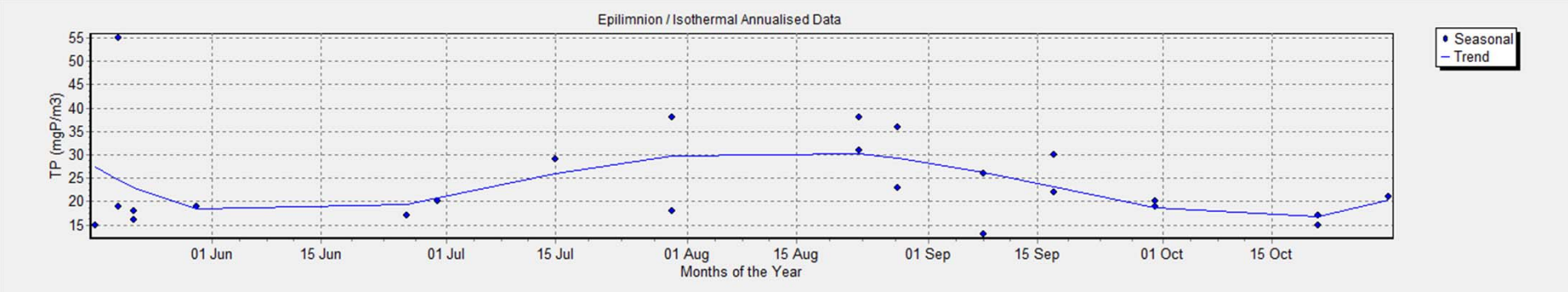
A Conceptual Model of Eutrophication



The general conceptual framework to assess eutrophication in all categories of surface waters. "+" indicates enhancement, "–" indicates reduction. Round boxes indicate quality elements of the WFD.

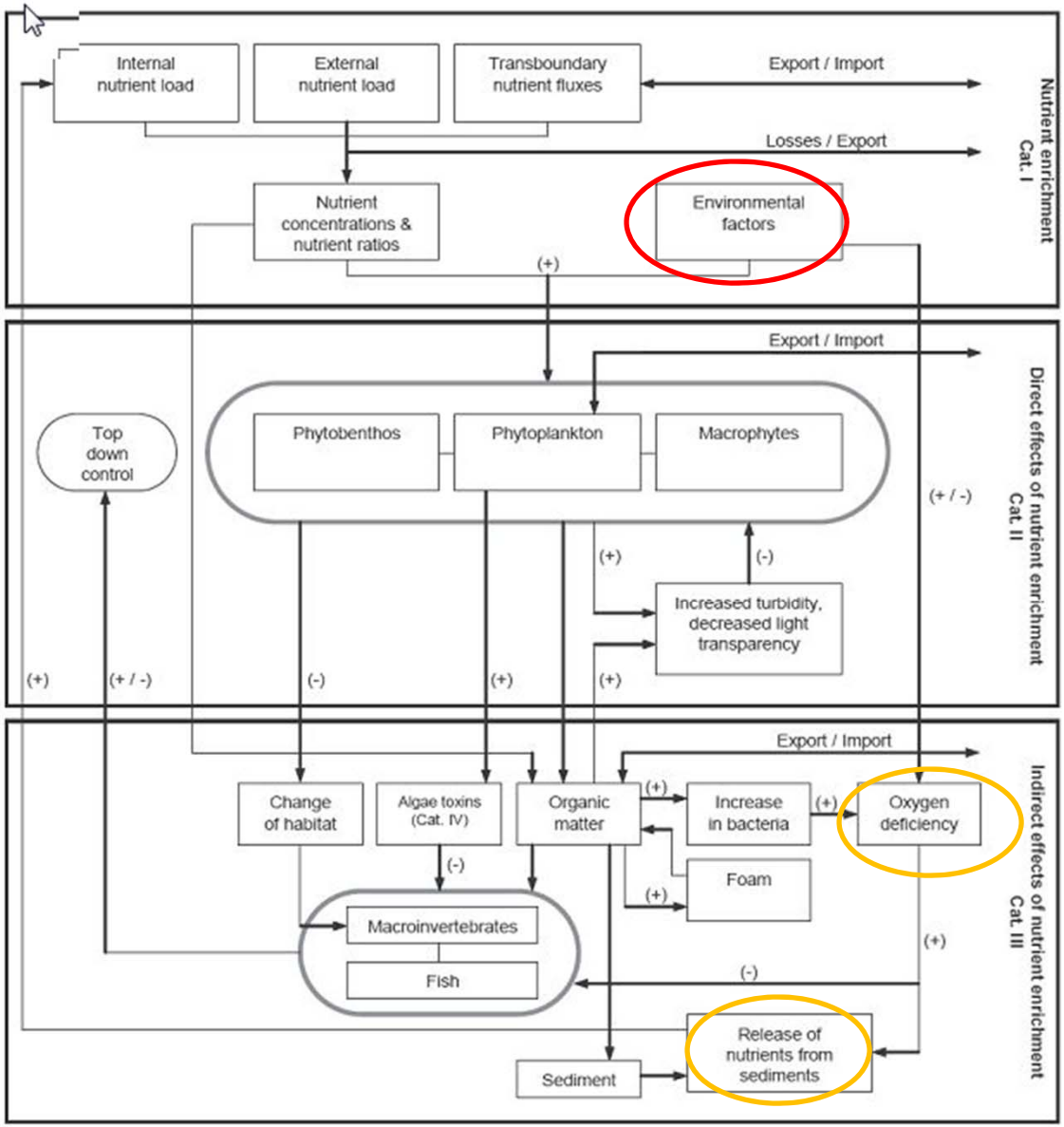
Source: Helsinki Commission (http://www.helcom.fi/BSAP_assessment/eutro)

Annualized



- Method to compare data collected from different times in the year.
- Blue line represents average conditions in an average year

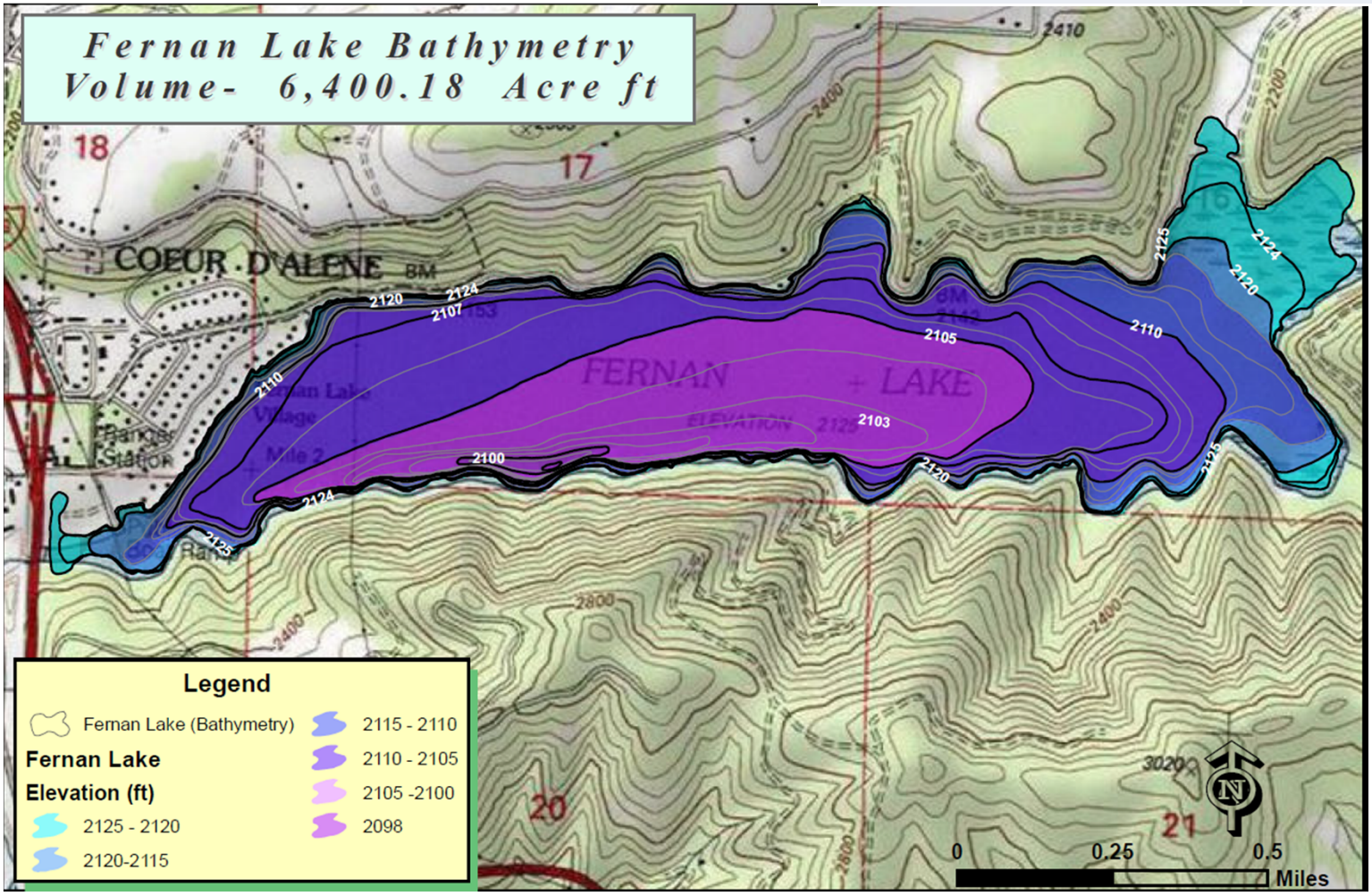
A Conceptual Model of Eutrophication



The general conceptual framework to assess eutrophication in all categories of surface waters. "+" indicates enhancement, "–" indicates reduction. Round boxes indicate quality elements of the WFD.

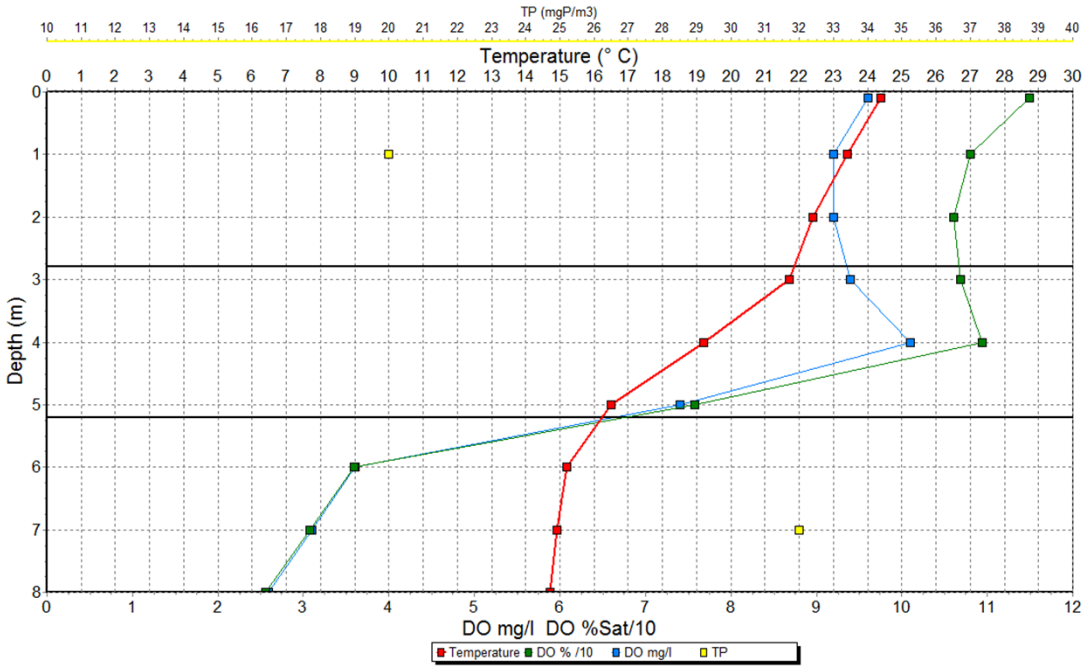
Source: Helsinki Commission (http://www.helcom.fi/BSAP_assessment/eutro)

Characteristic	Value[a]
MORPHOMETRY	
Elevation	649 meter (2130 feet)
Area of Watershed or Drainage	49.7 km^2 (19.2 $mile^2$)
Lake Volume	7,894,510 m^3 (6400 acre-feet)
Surface Area	1.5 km^2 (381 acres)
Mean Depth (volume/surface area)	5.1 meter (16.8 feet)
Greatest Depth	8.2 meter (27 feet)

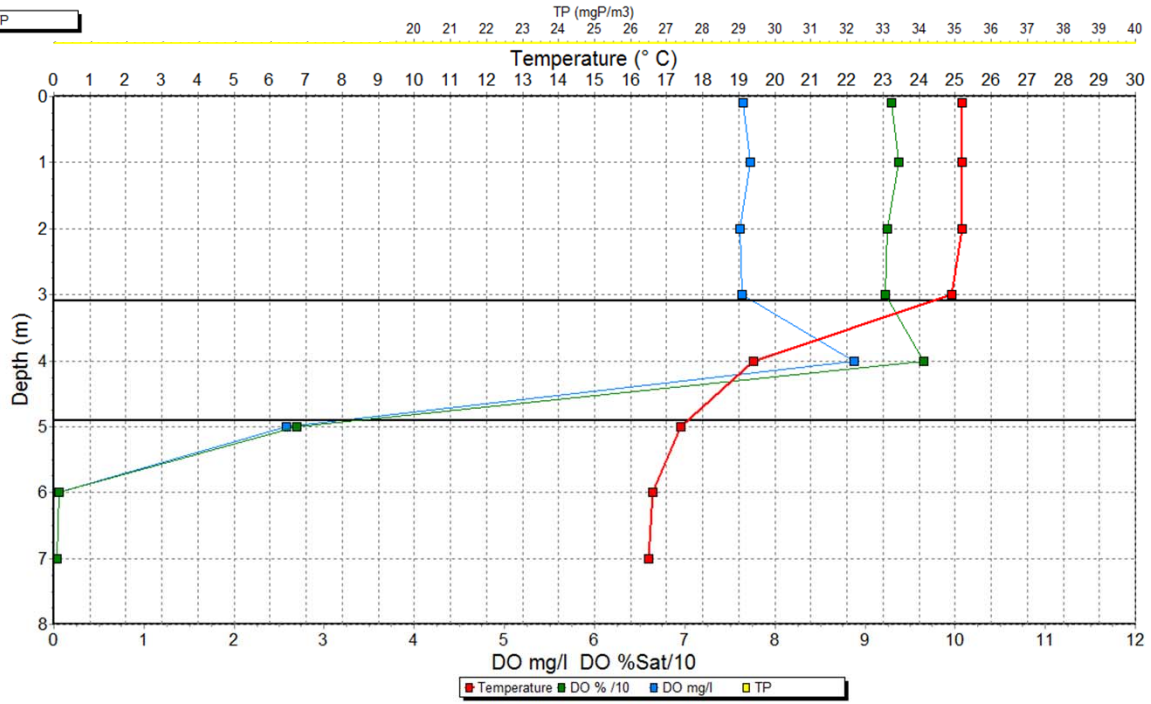


Thermal Stratification

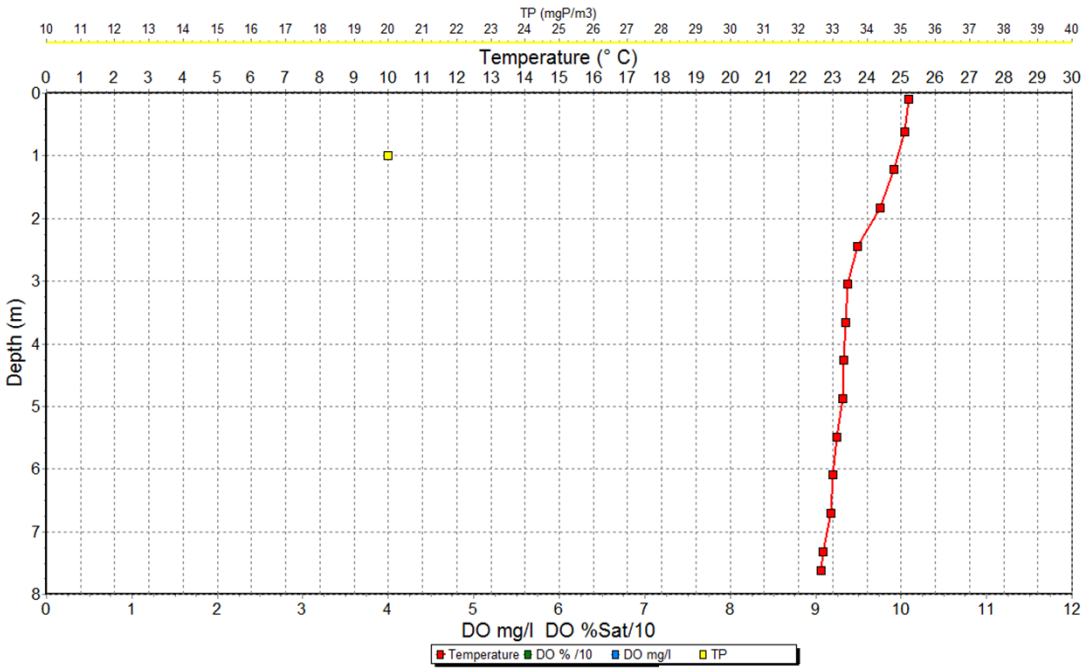
June 30, 2008



July 20, 2012

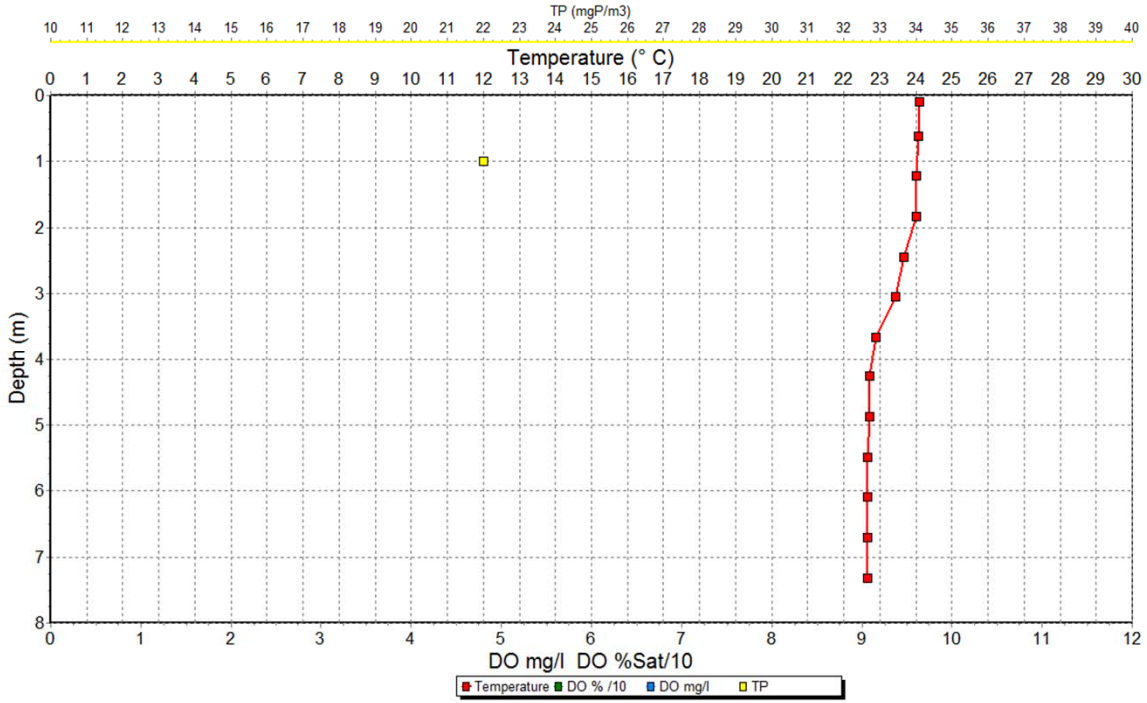


July 21, 2003

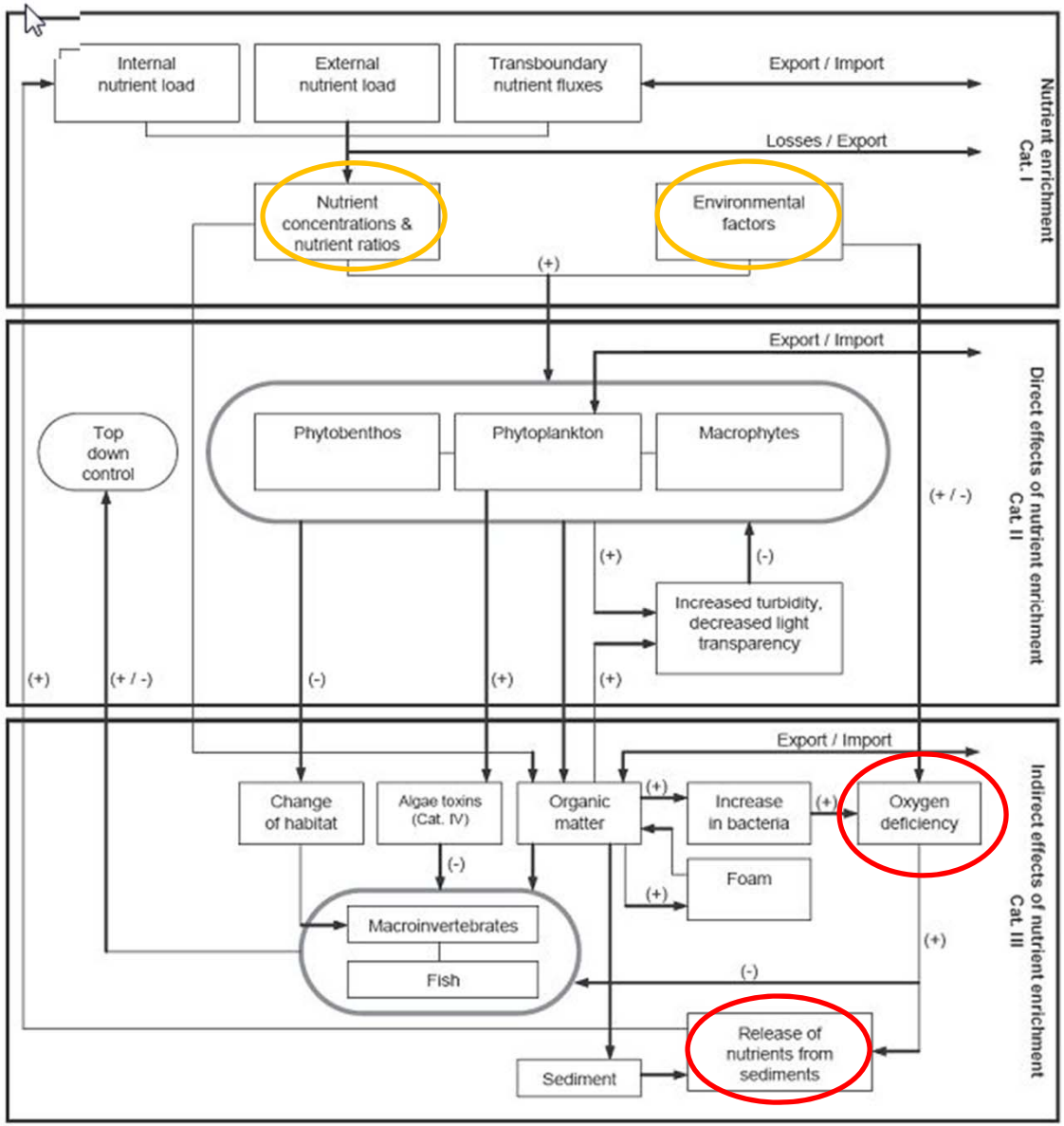


~~Thermal Stratification~~

August 19, 2003



A Conceptual Model of Eutrophication



The general conceptual framework to assess eutrophication in all categories of surface waters. "+" indicates enhancement, "–" indicates reduction. Round boxes indicate quality elements of the WFD.

Source: Helsinki Commission (http://www.helcom.fi/BSAP_assessment/eutro)

Fernan Lake Stratification

	1990	1991	2003	2005	2006	2007	2008	2009	2010	2011	2012
January	--	--	--	--	--	--	--	Strat	--	--	--
April	--	--	--	--	--	Iso	--	--	--	--	--
May	Iso	--	Iso	Iso	Iso	Iso	Strat	--		--	Strat
June	Strat	--	Iso	Iso	--	--	Strat	--	Iso	--	--
July	--	Iso	Iso	--	--	Iso	--	--	--	--	Strat
August	Iso	--	Iso	--	--	--	Iso	--	--	Iso	Iso
September	Iso	--	Iso	--	--	Iso	Iso	--	--	Iso	--
October	--	--	--	--	--	--	Iso	--	--	--	--
November	--	--	--	--	--	--	--	--	--	--	--

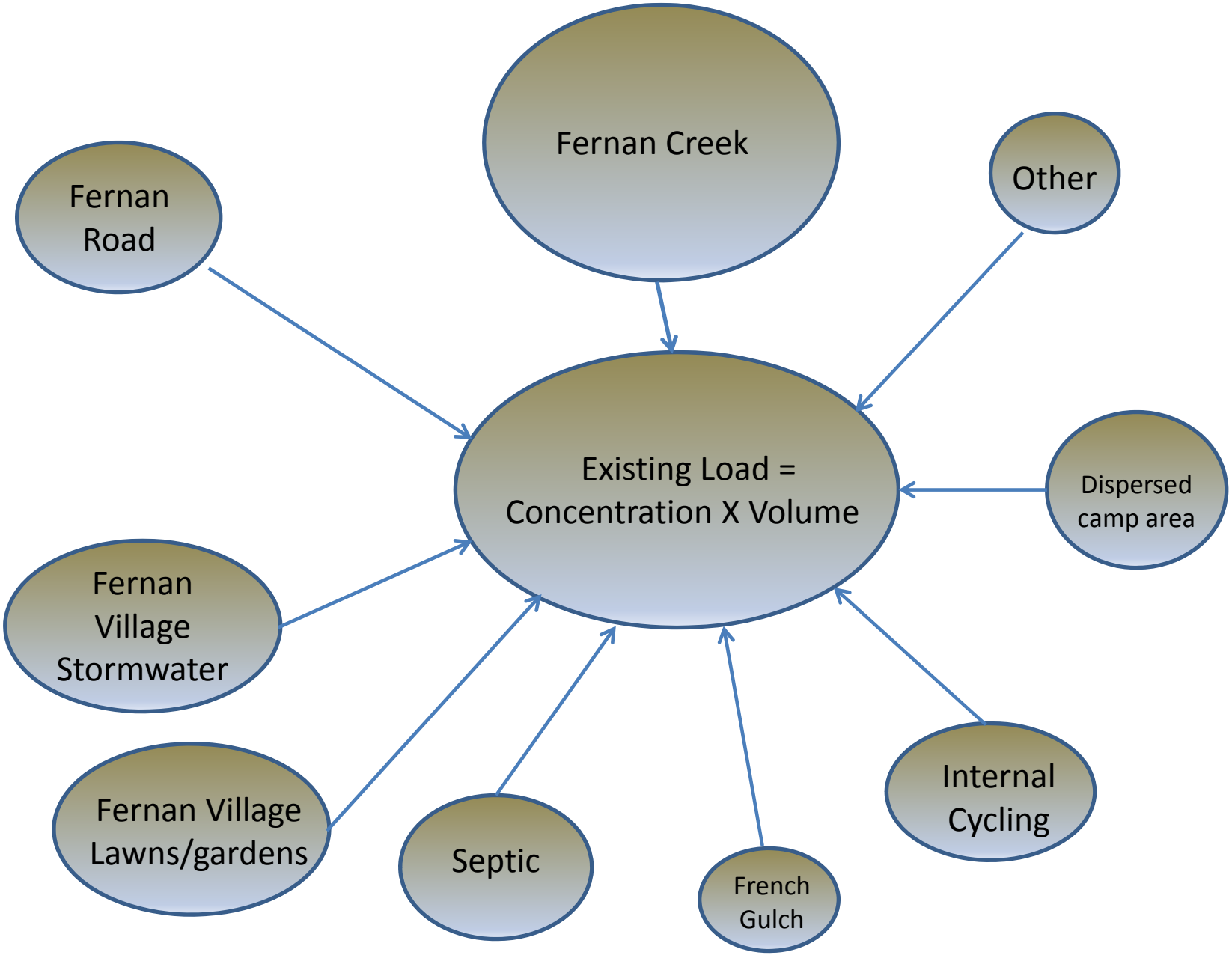
Oxygen Deficiency?

DO below 6 mg/L, but is exempt from Idaho's Water Quality Standard because it was observed in the bottom 20% of profile.

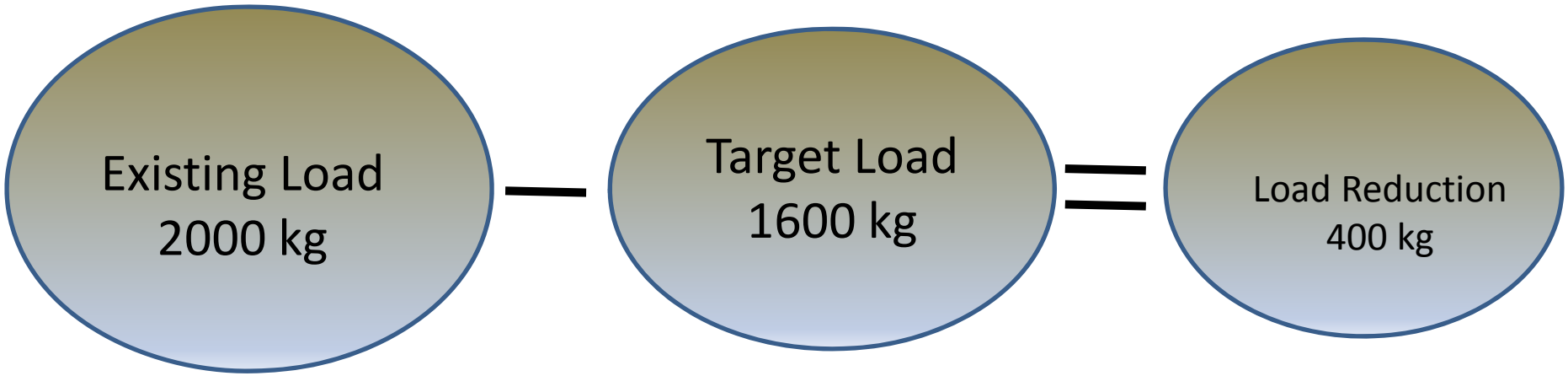
DO below 6 mg/L, but is exempt from Idaho's Water Quality Standard because it was observed in the hypolimnion of stratified conditions in the lake.

Date	Location	Data Source	Depth (meters)							
			0	1	2	3	4	5	6	7
5/22/1990	Deep	LWQA	--	9.4	9.2	9.0	8.7	7.9	7.5	
6/26/1990	Deep	LWQA	--	8.3	8.4	8.6	9.2	6.0	4.1	3.6
8/8/1990	Deep	LWQA	--	8.2	8.2	8.2	8.2	6.3	5.1	0.8
9/17/1990	Deep	LWQA	--	8.5	8.6	8.4	8.3	7.9	7.6	--
10/30/1990	Deep	LWQA	--	9.1	8.8	8.7	8.6	8.6	8.5	--
7/24/1991	Deep	LWQA	--	8.4	8.3	8.2	8.1	8.1	--	--
6/24/2003	Deep	Contract	6.9	6.4	6.5	6.4	6.9	7.0	6.9	4.8
7/1/2003	Deep	Contract	6.8	6.8	6.9	6.8	7.0	6.5	5.2	5.1
7/21/2003	Deep	Contract	7.1	6.0	6.1	7.1	7.4	6.9	6.4	5.4
7/29/2003	Deep	Contract	7.9	6.4	7.1	7.2	7.3	7.3	7.1	5.6
8/7/2003	Deep	Contract	7.0	6.5	6.6	6.5	6.9	6.4	6.4	3.8
8/19/2003	Deep	Contract	7.5	7.2	7.2	7.4	7.7	7.1	7.4	6.9
8/27/2003	Deep	Contract	8.1	7.5	8.1	7.4	7.7	7.1	7.4	3.5
9/4/2003	Deep	Contract	8.7	7.7	8.1	7.7	7.1	6.9	7.0	3.7
9/15/2003	Deep	Contract	7.7	7.7	7.3	7.1	6.8	7.0	6.0	3.75
5/9/2005	Deep	CVMP	--	7.93	7.5	7.49	7.69	7.59	4.17	3.85
6/6/2005	Deep	CVMP	7.02	7.02	6.41	6.55	6.7	6.58	6.46	6.75
5/11/2006	Deep	CVMP	9.57	9.32	9.47	9.28	8.92	9.17	8.98	9.02
4/16/2007	Deep	CVMP	7.5	7.49	7.43	7.37	7.28	7.37	7.38	7.29
5/14/2007	Deep	CVMP	9.04	8369	8.73	8.63	8.35	8.4	8.21	6.62
7/16/2007	Deep	CVMP	7.7	7.6	7.3	7.1	7	6.1	2.6	1.8
9/18/2007	Deep	CVMP	7.02	6.64	6.67	6.7	6.71	6.75	6.4	6.29
5/30/2008	Deep	CVMP	10.1	10.0	10.1	10.3	9.7	5.8	5.8	5.8
6/30/2008	Deep	CVMP	9.6	9.2	9.2	9.4	10.1	7.4	3.6	3.1
8/28/2008	Deep	CVMP	10.6	10.6	10.3	9.9	9.9	9.6	9.6	8.6
9/8/2008	Deep	CVMP	10.8	10.9	10.9	10.3	9.9	9.6	9.6	9.6
9/9/2008	Deep	CVMP	9.5	9.1	9.6	9.6	9.6	9.6	9.6	9.6
9/30/2008	Deep	CVMP	9.5	9.4	9.5	9.5	9.5	9.5	9.2	8.8
10/21/2008	Deep	CVMP	8.2	8.2	8.2	8.1	8.1	8.1	8.0	7.1
1/28/2009	Deep	CVMP	14.0	12.2	11.3	10.5	9.5	7.8	4.0	2.4
6/5/2010	Deep	CVMP	9.7	9.7	9.7	9.68	9.66	9.27	8.4	--
8/8/2011	Inlet	CVMP	7.0	--	--	--	--	--	--	--
8/8/2011	Deep	CVMP	9.1	9.19	9.27	9	8.47	7.87	2	1.67
8/29/2011	Inlet	CVMP	2.29	--	--	--	--	--	--	--
8/29/2011	Deep	CVMP	9.27	9.26	9.24	9.2	9.17	8.15	1.11	1.05
8/29/2011	Outlet	CVMP	8.94	9.1	8.6	8	2.02	--	--	--
5/17/2012	Inlet	CVMP	9.31	9.26	9.52	--	--	--	--	--
5/17/2012	Deep	CVMP	9.03	9.05	9.07	9.01	14.8	8.88	7.68	7.6
5/17/2012	Outlet	CVMP	9.12	9.25	9.23	9.23	8.2	--	--	--
7/5/2012	Inlet	CVMP	7.68	7.71	7.68	7.33	--	--	--	--
7/5/2012	Deep	CVMP	7.91	8.34	8	7.8	6.46	3.27	2.3	2.2

Load Allocations



Load Reduction



Source	Existing Load (kg/yr)	Existing Load (lb/yr)	Percentage of total Load
Fernan Creek	1600	3570	
Fernan Lake Road	60	132	
Septic	50	110	
Internal Cycling	200	440	
French Gulch	8	17	
Fernan Village Lawns/gardens			
Fernan Village Stormwater			
Camp Sites			
Other			
Recreation			
Precipitation			