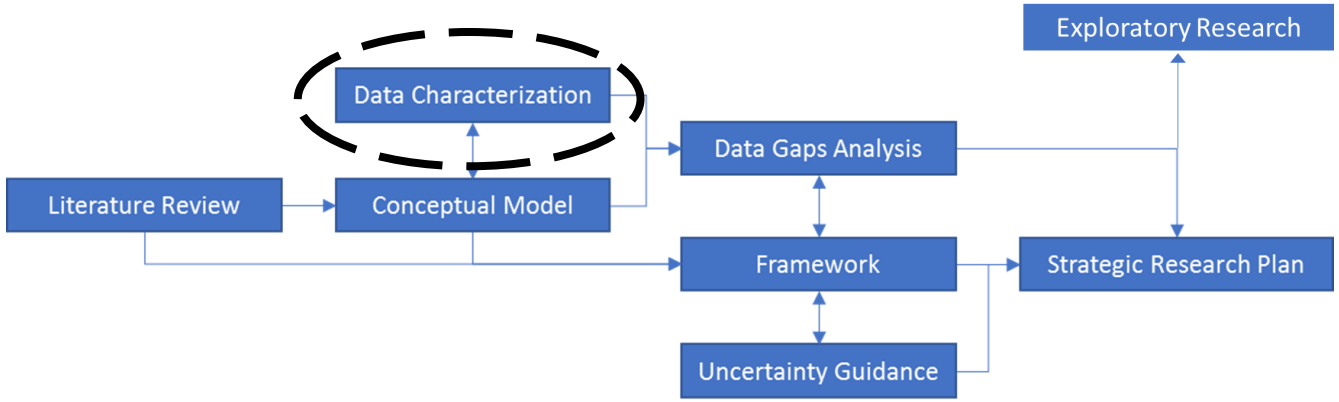
Utah Lake Water Quality Study
Science Panel Meeting
February 8, 2019
Salt Lake City, UT

Data Review and Analysis Planning

Utah Lake Nutrient Criteria Development Technical Support

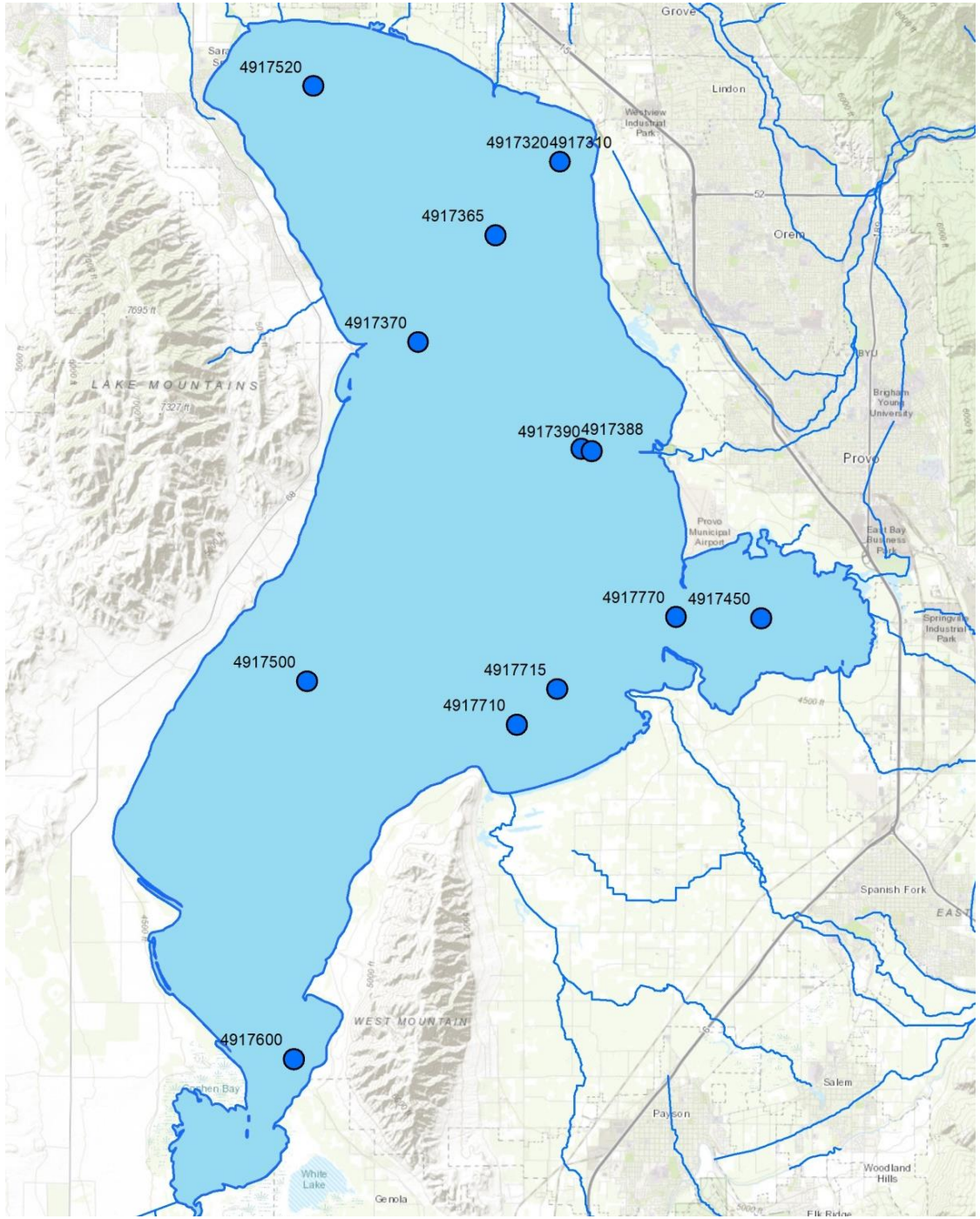
UTAH DEPARTMENT of ENVIRONMENTAL QUALITY

Objective



- Review existing data
- Review analyses
- Begin discussing desired additional analysis – support analysis planning

Active Open Water Sites



Open Water Data Types

Data Type	Compiled	In Progress, not Compiled
Water Chemistry	1978 to Current • Field • Chemistry • Chlorophyll • Profiles	BYU ▪ May 2017 to Nov 2018 WFWQC ▪ 2015 to Current DWQ • Mar 2018 to Nov 2018
Lake Elevation	• Average Daily Elevation – 2004 to Current • Average Monthly Elevation – 1932 to Current • Hourly Elevation – 2002,2003,2005,2006 • Sub-hourly (5 minute) – 2007 (June to August) • Elevation and storage rating curve	
Synoptic Sonde Deployment	Multiple synoptic events	
EXO Sondes (Buoy)	August 2016 to Current • Seasonal deployment at 3 locations	
Sediment		WFWQC
Macro-invertebrate	June 2016 to November 2016 • 26 open water locations	WFWQC, USU?
Phytoplankton	1995 to Nov 2018	
Zooplankton	2014 to 2016 • Many locations	WFWQC?
Vegetation Monitoring	Not available	USU?
Macrophytes and Phragmites	Not available	USU?
Fish Sampling	Unknown	USU, JSRIP, DWR?
HAB	2014, 2016 to current • Taxonomic ID • Toxin test strips • Toxin lab analysis	DWQ

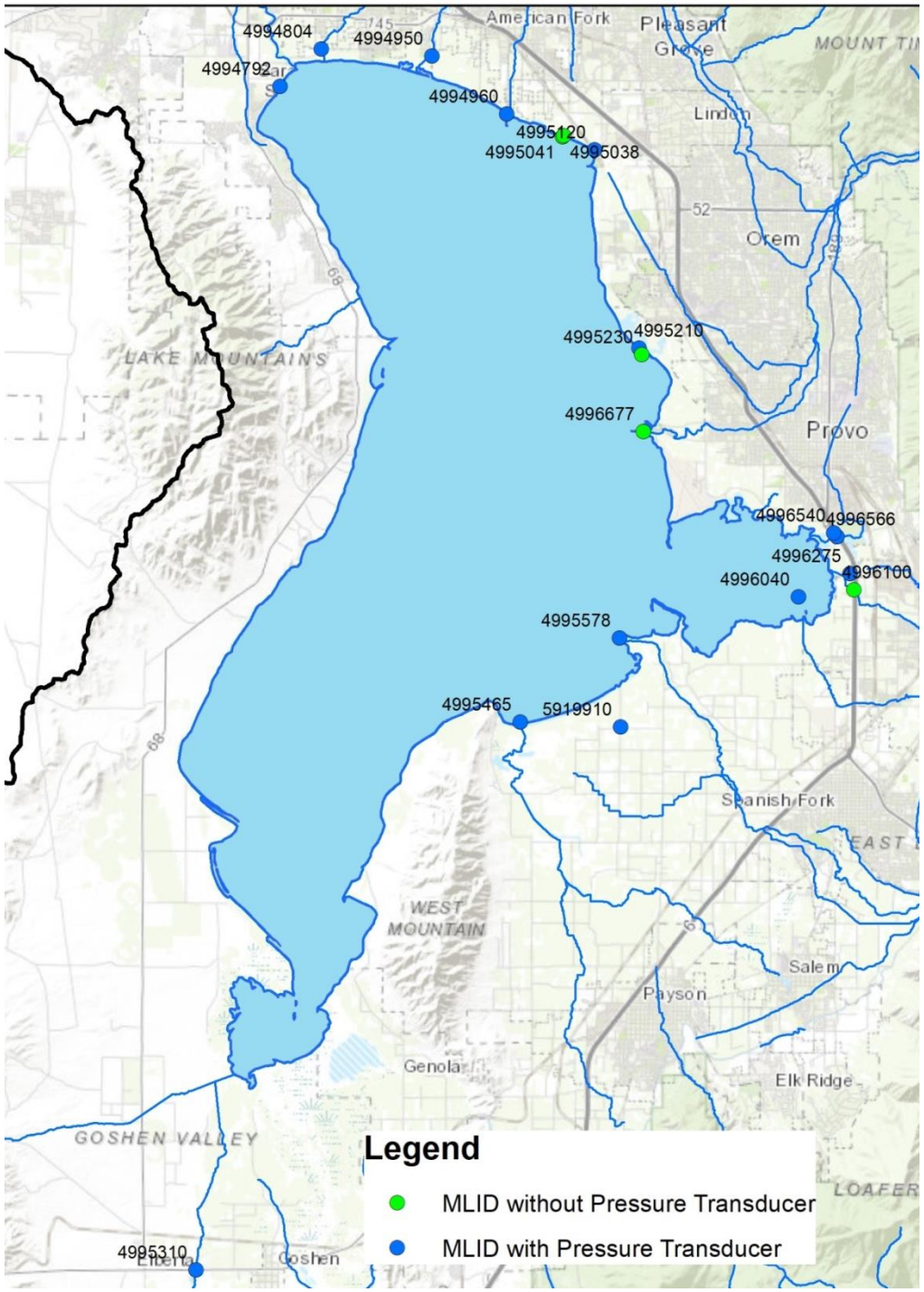
Lake Chemistry Site Visits (n)

		Year																										
Monitoring Location ID	Monitoring Location Name	1978	1989	1990	1991	1993	1994	1995	1997	1999	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
4917330	UTAH LAKE 5MI N/NW OF LINCOLN BEACH/ 1 MI OFFSHORE			2	9																							
4917340	UTAH LAKE W OF PROVO BOAT HARBOR/6 MI N OF LINCOLN BEACH #08			3	9		1	4																				
4917365	Utah Lake 2 miles west of Vineyard																										7	8
4917370	UTAH LAKE 1 MI EAST OF PELICAN POINT		2	3	17				2	4	4	2	3	2	6	8	8	3	8	4	5	6	11	4	4	3	7	8
4917390	UTAH LAKE 1 MI WEST OF PROVO BOAT HARBOR		2	3	9	1			2	4	4	2	3	4	6	8	6	3	9	6	6	7	8	3	7	6	7	8
4917400	UTAH LAKE 1.5 MI NW OF PROVO BOAT HARBOR #16			2	9																							
4917410	UTAH LAKE 1 MI NE OF PELICAN POINT #10			2	9																							
4917420	UTAH LAKE 1 MI SE OF PELICAN POINT #09			2	9																							
4917433	Utah Lake SP @ Marina																									2		
4917450	UTAH LAKE AT MIDDLE OF PROVO BAY																	3	5	4	3	6	6	1	2		7	8
4917470	UTAH LAKE AT MIXING ZONE-WLA																					2						
4917500	UTAH LAKE 3 MI WNW OF LINCOLN BEACH		2	6	8				1	4	4	4	3	2	6	8	8	3	9	4	5	6	11	5	5	4	7	8
4917530	UTAH LAKE 0.7 MI EAST OF PELICAN POINT		2																									
4917600	UTAH LAKE GOSHEN BAY SOUTHWEST END																	3	5	3	3	4	6	2	2		7	8
4917620	UTAH LAKE GOSHEN BAY MIDWAY OFF MAIN POINT ON E.SHORE		1	2	14	1				2																		
4917700	UTAH LAKE 2.5 MI NE OF LINCOLN POINT #02			3	9												2											
4917710	UTAH LAKE 1 MI NE OF LINCOLN POINT #03			3	9																						7	8
4917715	Utah Lake 1 mile southeast of Bird Island																										7	8
4917770	UTAH LAKE OUTSIDE ENTRANCE TO PROVO BAY	1	1	6	18	1		3		2				1	4	8	6	1	5	3	5	4	6	4	4	3	7	8
4917300	UTAH LAKE 300 FT OFFSHORE FROM GENEVA STEEL	1	1	1																								
4917510	UTAH LAKE 4 MI E OF SARATOGA SPRINGS #11			2	8																							
4917310	UTAH LAKE 0.5 MI W OF GENEVA DISCHARGE #15-A			4	16	2	1	4	2	4	4	2	3	3	8	6	8	3	5	4	3	5	11	4	5	3	7	8
4917320	UTAH LAKE 0.5 MI W OF GENEVA DISCHARGE #15-B (4917310 Duplicate)			4	16			1	1	1						1	1		5	3	3	5	7	4	5	3	7	8
4917380	UTAH LAKE 0.5 MI S OF AMERICAN FORK BOAT HARBOR #14			2	9																							
4917520	UTAH LAKE 2 MI E OF SARATOGA SPRINGS #12			2	8	1			2	4	4	4	3	2	8	7	8	3	5	4	3	5	11	5	4	3	7	8

Lake Chemistry Parameter Observations (n)

Characteristic Name	1978	1989	1990	1991	1993	1994	1995	1997	1999	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Ammonia-nitrogen	2	11	87	186	7	2	14	22	25	20	23	15	14	38	46	47	22	56	35	36	50	79	32	38	27	168	168
Biochemical oxygen demand, standard conditions	7				1		3																				
Calcium carbonate	7	11	88	184	1	2	3	4	5	2	3	2	12	19	4	5	1										
Carbonaceous biochemical oxygen demand, standard conditions																					4					84	84
Chemical oxygen demand	7	11	1																								
Chlorophyll a																		45			4						
Chlorophyll a, corrected for pheophytin																			27	27	36						
Chlorophyll a, uncorrected for pheophytin		7	78	149		2	7	12	13	10	10	10	12	19	23	24	22										
Depth, data-logger (ported)										35	50	31	18	76	106	74	78	264	82	99	90	131	68	121	117	851	566
Depth, Secchi disk depth		6	70	101	5		7	10	11	10	10	10	6	20	25	18	21	46	41	27	35	179	91	156	104	935	614
Inorganic nitrogen (nitrate and nitrite)	6			187	6	2	12	22	25	20	23	15	14	38	46	47	22	56	34	36	54	79	40	38	27	168	168
Kjeldahl nitrogen	7	11	67	186		2															4						
Nitrate	7	11	88																								
Nitrite	1	11	88																								
Nitrogen																		56	34	36	50	79	32	45	52	168	168
Organic carbon	7	11																								168	168
Organic Nitrogen																	22										
Orthophosphate	7	11																									
Phosphate-phosphorus	2	11	140	372	12	4	24	21	50	39	37	30	28	76	92	94	44	112	69	72	100	156	64	76	54	168	168
Specific conductance	11	21	88	185	7	2	15	22	25	55	65	51	37	134	156	115	100	321	117	133	134	202	91	156	144	1018	614
Total dissolved solids	7	11	17		1	2	3	4	5	2	3	10	12	19	4	5	22	45	28	27	40	64	22	35	21	83	83
Total fixed solids				168	4		7	12	13	9	18	10					22										
Total suspended solids	6	11	80	78	5	2	7	12	13	9	18	10	12	19	20	24	22	45	28	27	40	64	30	35	21	83	83
Total volatile solids			21	183	5		7	12	13	9	18	10					22		27	18	40		30	35	21	83	83
Turbidity	7	11	2		1	2	3	4	5	2	3	2	12	19	4	5	9					24				83	83

Active Tributary Sites

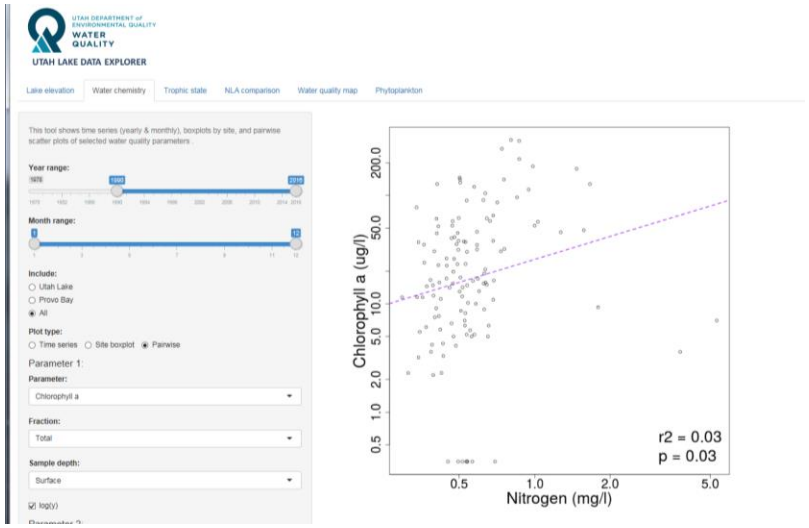


Tributary Data Types

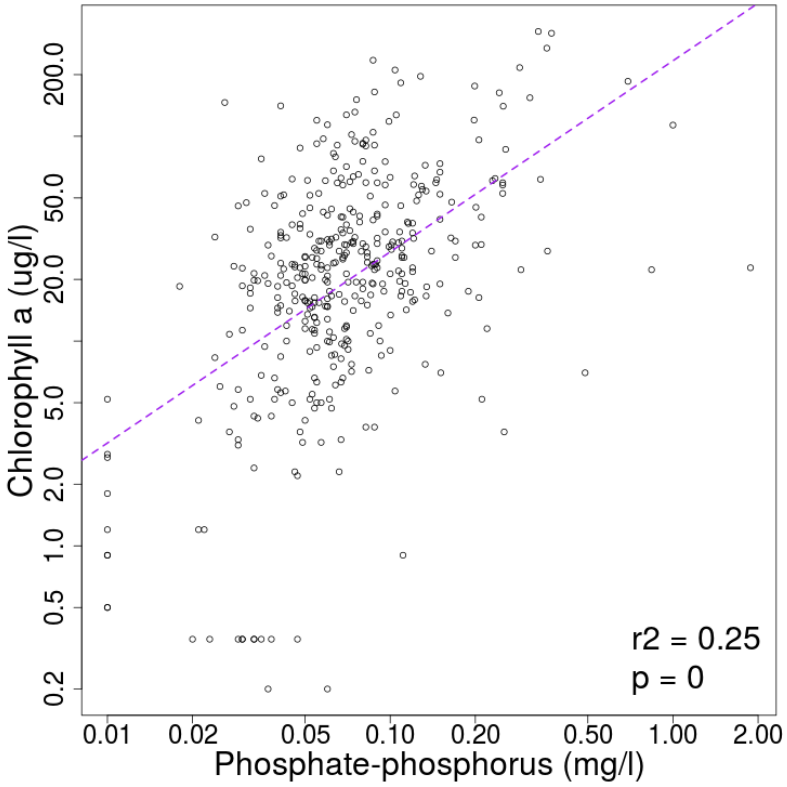
Data Type	Compiled	In Progress, not Compiled
Water Chemistry	1978 to Current • Field • Chemistry • Chlorophyll	WFWQC • 2015 to current DWQ • Mar 2018 to Nov 2018
Flow-USGS	Active • Provo River • Hobble Creek Inactive • Spanish Fork River (thru 1988) Watershed Stations • Spanish Fork River • American Fork River • Current Creek	
Pressure Transducer	November 2017 to current • Tickville Wash • Dry Creek Saratoga • American Fork River • Spring Creek Lehi • Powell Slough • Mill Race north • Mill Race south • Spring Creek Springville • Dry Creek • Spanish Fork River • Benjamin Slough	
Discharge Monitoring Report	2005 to current	
Monthly Operating Report	In Progress	

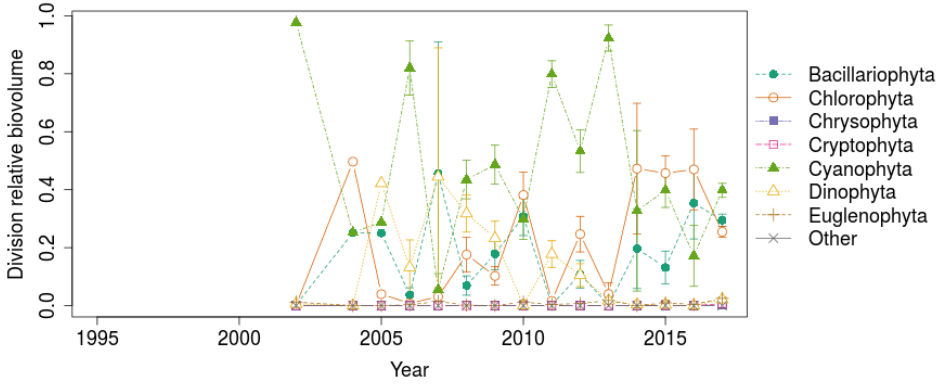
Analyses to date - Explorer

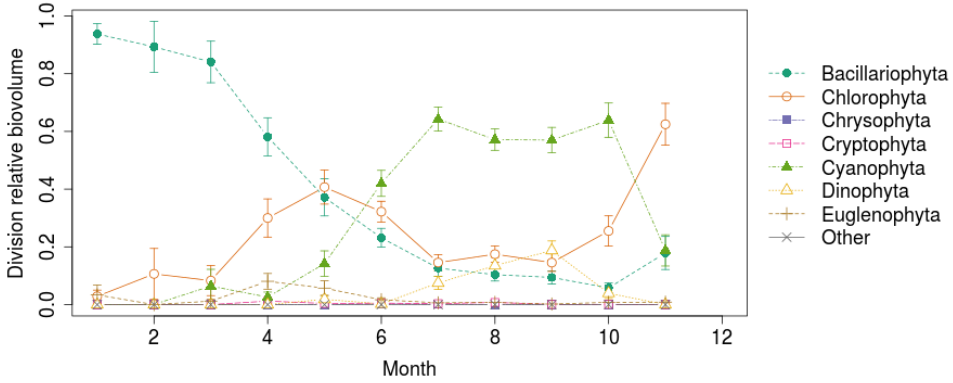
- Jake did his work:
  - Water chemistry, TSI – time series, pairwise, maps
  - Phytoplankton – Time series, maps,



Analyses to date - Explorer







Let's talk analysis needs/desires

- What would you like to see done?
- Are there analyses you would like to do that you need help with or want data preparation help with?
  - Analyses that might change research priorities (near or far term) – based on existing data.

Let's talk analysis needs/desires

- E.g. (see handout – working content/charge)
  - Diatom dynamics over time
  - Multivariate nutrient-phytoplankton
  - Seasonal succession/nutrient relationships
  - Seasonal nutrient/chlorophyll
  - Zooplankton dynamics
  - Inflow – response measures

Next Steps

- Tt working to draft an analysis plan for your review – laying out analysis effort
- Draft by next meeting
- Discuss at next meeting
- Finalize and execute (iterating feedback)