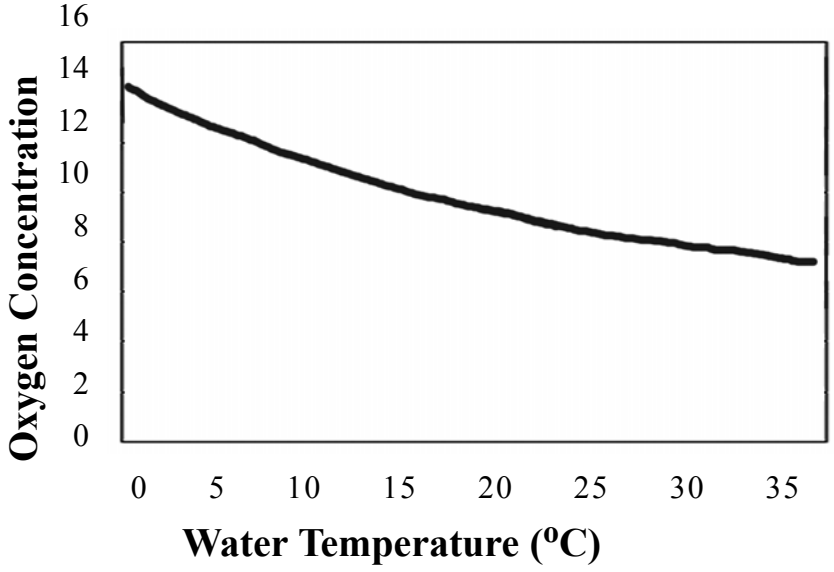
Activity Extension

Effect of Temperature on Dissolved Oxygen Concentration s

The data below show the maximum amount of dissolved oxygen the water can hold at dfferent temperatures. This is called the "saturation concentration" of oxygen.

Temperature (°C)	Dissolved Oxygen (mg/l)	Temperature (°C)	Dissolved Oxygen (mg/l)	Temperature (°C)	Dissolved Oxygen (mg/l)
0	14.2	12	10.4	24	8.2
1	13.8	13	10.2	25	8.1
2	13.4	14	10.0	26	8.0
3	13.0	15	9.8	27	7.9
4	12.7	16	9.6	28	7.7
5	12.4	17	9.4	29	7.6
6	12.1	18	9.2	30	7.5
7	11.8	19	9.0	31	7.4
8	11.5	20	8.8	32	7.3
9	11.1	21	8.7	33	7.2
10	10.9	22	8.5	34	7.1
11	10.7	23	8.4	35	7.0

Have your students use this information to create a graph showing the "saturation concentrations" of water as temperature changes. See the example graph below



Activity Extension

Changes in Temperature and Dissolved Oxygen Throughout a Year

The table on the next page contains temperature and dissolved oxygen concentrations measured at the same site in a stream throughout an entire year. The site has slow moving water, and aquatic plants grow in the soft sediments of the stream from spring through fall. The first column of DO measurements were taken at 4:00 p.m. and the second column of DO measurements were taken at 4:00 a.m.

Have your students graph temperature and the first set of dissolved oxygen versus time.

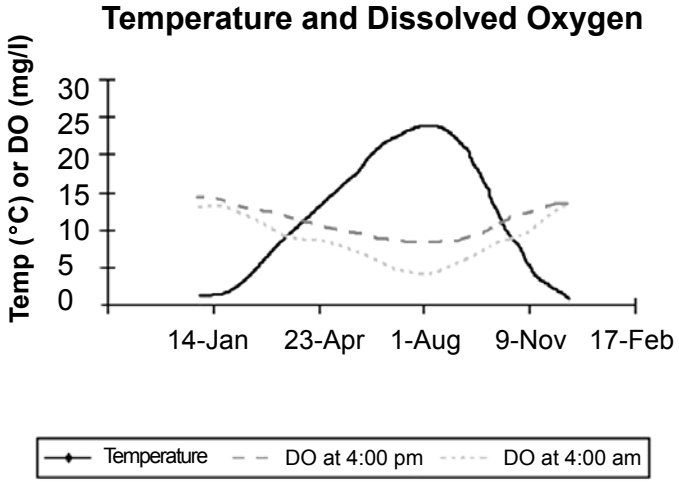
How do temperature and dissolved oxygen change throughout the year?

Temperature is highest in summer, while DO is lowest in summer. This is because saturation concentration of dissolved oxygen decreases as the water temperature increases (see graph below).

Now have your students add the second set of dissolved oxygen data to the graph. Tell them the samples were collected at 4:00 a.m.

Why was the dissolved oxygen lower at 4:00 a.m. than at 4:00 p.m.?

The plants in the water consume oxygen at night (due to metabolic respiration), but cannot produce oxygen from photosynthesis at night when there is not light. Therefore DO can be substantially lower in water at one time of day than another.



Activity Extension, Continued

Day of year	Date	Temp. °C	Dissolved Oxygen	
			mg/l at 4:00 pm	mg/l at 4:00 am
1	1-Jan	1	13.8	13.0
15	15-Jan	1	13.8	13.0
32	1-Feb	2	13.4	12.5
46	15-Feb	3	13.0	11.3
61	1-Mar	5	12.4	10.4
75	15-Mar	7	11.8	9.5
92	1-Apr	10	10.9	9.0
106	15-Apr	12	10.4	8.5
122	1-May	14	10.0	8.0
136	15-May	16	9.6	7.5
153	1-Jun	18	9.2	6.9
167	15-Jun	20	8.8	5.6
183	1-Jul	22	8.5	4.5
197	15-Jul	23	8.4	4.0
214	1-Aug	24	8.2	3.8
228	15-Aug	24	8.2	4.0
245	1-Sep	22	8.5	5.0
259	15-Sep	19	9.2	7.0
275	1-Oct	15	9.8	7.8
289	15-Oct	10	10.9	9.0
306	1-Nov	7	11.8	9.5
320	15-Nov	4	12.7	10.7
336	1-Dec	2	13.4	12.5
350	15-Dec	1	13.8	13.0