Dissolved Oxygen Concentrations in Horse Creek

From 1972 to 1991, the Florida Department of Environmental Regulation (the precursor to the Florida Department of Environmental Protection) collected 140 ambient water quality samples for dissolved oxygen in Horse Creek at the bridge on State Road 64, at the crossing under Goose Pond Road, and at the bridge on State Road 70. This time period begins before mining in any part of the basin and ends after the initiation of mining in the very upper part of the basin by W. R. Grace but before large-scale mining at the Fort Green Mine.

Horse Creek at State Road 64

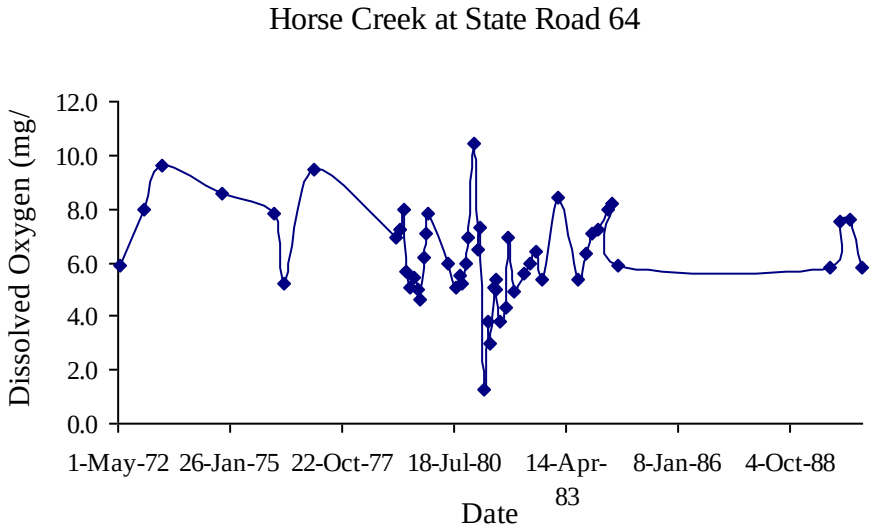
Fifty three dissolved oxygen samples were collected between May 15, 1972 and July 10, 1990.

Count:	53
Minimum:	1.3
25th percentile:	5.2
Median:	6
Mean:	6.3
75th percentile:	7.3
Maximum:	10.4

A stem and leaf plot of the dissolved oxygen data shows a fairly bell-shaped distribution with the median and mean close together.

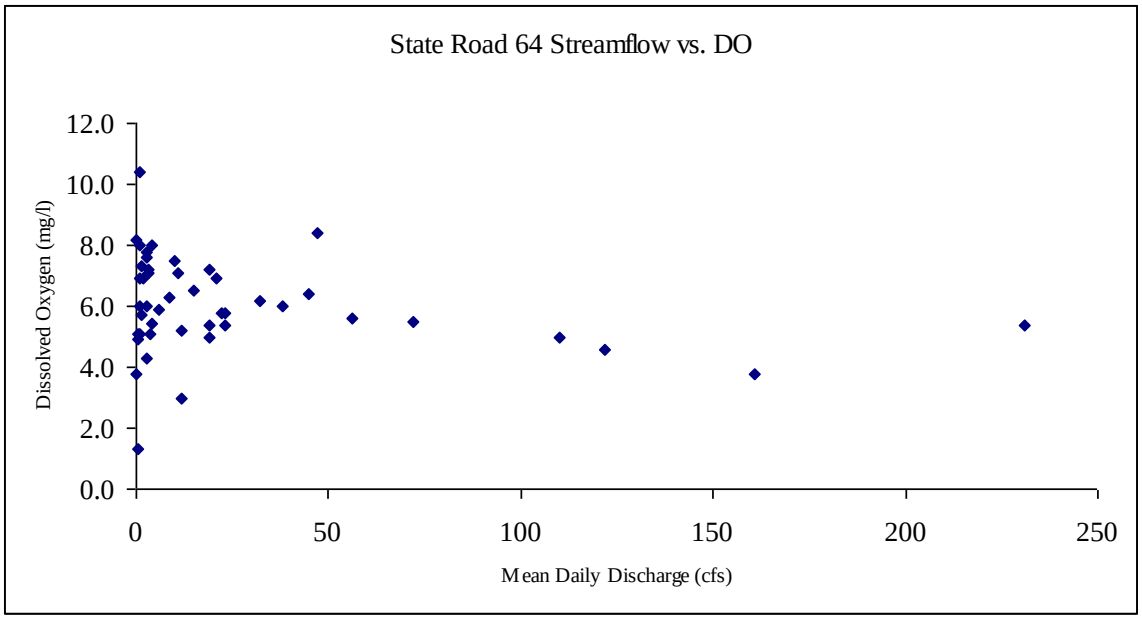
1 | 3 = 1.3 mg/l	1	3
	2	
	3	0 8 8
	4	3 6 9
	5	0 0 1 1 1 2 2 4 4 4 5 5 6 7 8 8 9 9
	6	0 0 0 2 3 4 5 9 9 9
	7	1 1 2 2 3 5 6 8 8
	8	0 0 0 2 4 6
	9	5 6
10 | 4 = 10.4 mg/l	10	4

There appears to be no overall trend over the period of record. A time series plot of the data:



Within the year there appears to be no strong summer/winter effect in the data. The winter mean dissolved oxygen concentration was 5.9 mg/l (15 events) and the mean summer dissolved oxygen concentration was 7.0 mg/l (18 events). There was no significant difference between these means at a 95% confidence interval.

There is no strong correlation between dissolved oxygen and streamflow:



Horse Creek at Goose Pond Road

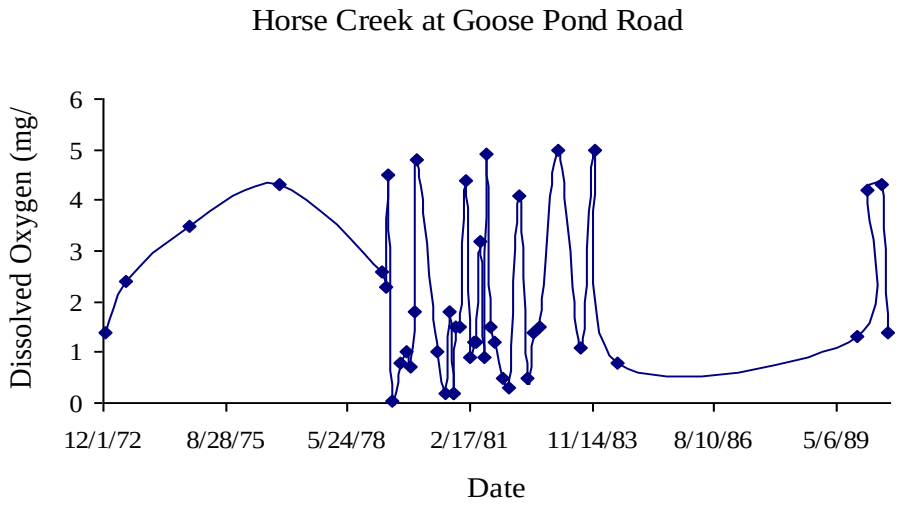
Forty-three dissolved oxygen readings were recorded between December 12, 1972 and July 5, 1990.

Count:	43
Minimum:	0.05
25th percentile:	0.9
Median:	1.4
Mean:	2.0
75th percentile:	3.4
Maximum:	5

A stem-and-leaf plot of the data shows a somewhat skewed distribution with then median value less than the mean.

0 | 1 = 0.1 mg/l	0	1 2 2 2 3 5 5 7 8 8 9 9
	1	0 0 1 2 2 2 3 4 4 4 5 5 5 5 8 8
	2	3 4 6
	3	2 5
	4	1 2 3 3 4 5 8 9
5 | 0 = 5.0 mg/l	5	0 0

A time series plot shows no overall trend in the data over time.



There is a significant summer/winter effect in the data with the summer dissolved oxygen concentration (1.9 mg/l mean based on 14 values) significantly lower than the mean winter value of 2.9 mg/l (based on 14 values).

Horse Creek at State Road 70

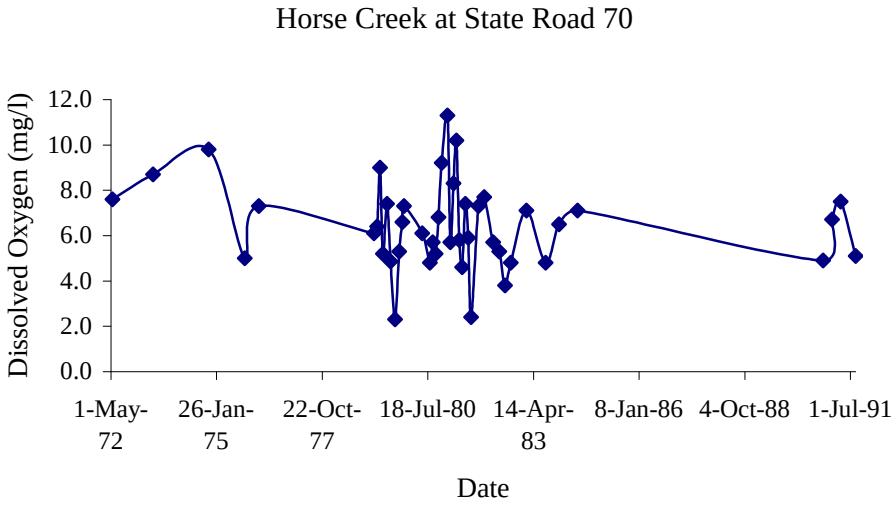
Forty-four dissolved oxygen readings were recorded between May 15, 1972 and August 21, 1991.

Count:	44
Minimum:	2.3
25th percentile:	5.2
Median:	6.3
Mean:	6.4
75th percentile:	7.4
Maximum:	11.3

A stem-and-leaf plot of the data shows a mound-shaped distribution with the median and mean values being essentially the same.

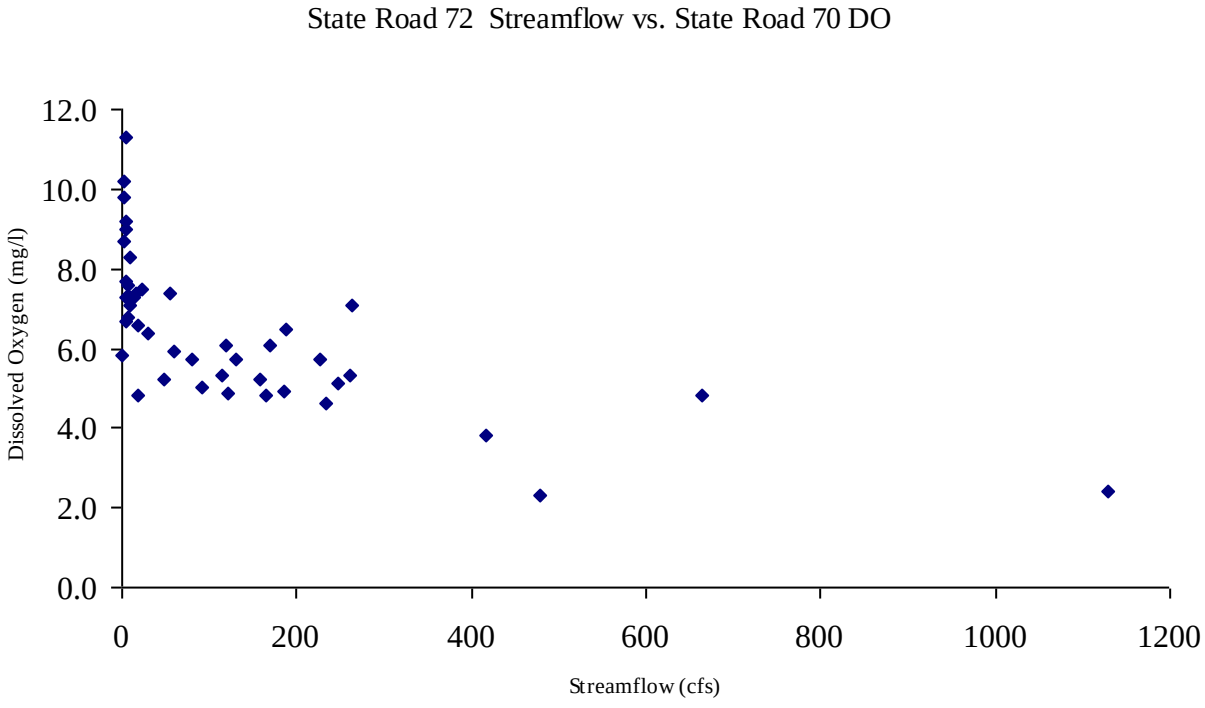
2 | 3 = 2.3 mg/l	2	3 4
	3	8
	4	6 8 8 8 9 9
	5	0 1 2 2 3 3 7 7 8 9
	6	1 1 4 5 6 7 8
	7	1 1 3 3 3 4 4 5 6 7
	8	3 7
	9	0 2 8
	10	2
11| 3 = 11.3 mg/l	11	3

A time series plot shows no overall trend in the data over time.



There is a significant summer/winter effect in the data with the summer dissolved oxygen concentration (5.9 mg/l mean based on 15 values) significantly lower than the mean winter value of 7.6 mg/l (based on 12 values).

There is no long-term flow measurement at State Road 70, but the State Road 70 dissolved oxygen data was plotted against the streamflow data from State Road 72. State Road 72 is about four miles south of State Road 70 and two tributaries (Brandy Branch and Buzzard Roost Branch) conflue with Horse Creek in that stretch. The State Road 72 data is being mentioned only because of the very strong inverse relationship between dissolved oxygen concentrations at State Road 70 and streamflow at State Road 72 (43% of the behavior in dissolved oxygen is "explained" by streamflow at State Road 72).



Summary

Dissolved oxygen concentrations in Florida streams are usually interpreted in light of the State Water quality standard of 5.0 mg/l. That is a anthropogenic standard and there is no guarantee that any stream even in its most pristine state in Florida has or will meet that standard at any given time. Looking synpotically at the data, the Horse Creek at State Road 64 and State Road 70 stations, dissolved oxygen concentrations are generally between 4.0 and 9.0 mg/l. There is some seasonality to the data, but no trend over the period of record. Each station has periods where dissolved oxygen concentrations have been below 5.0 mg/l and there is no reason to expect that to stop.

The Goose Pond Road station has much lower dissolved oxygen concentrations than the other stations. It is a rarity for the station to meet the State Water Quality standard. There was no overall trend in the data over the period of record, but there was a fairly strong seasonal component. The depressed dissolved oxygen concentrations at Goose Pond Road persist for some distance downstream (and though not considered in this report, Brushy Creek, a major tributary to Horse Creek in that part of the Basin also has lower concentrations in the historical FDER sampling). A significant portion of the Horse Creek Basin has not, is, not, and will not in the future, "meet" the Water Quality Standard. This portion of the basin is also usually held up as the most pristine, most aesthetic, and most ecologically valuable portion of the basin.