THE EFFECTS OF CRUDE ON DISSOLVED OXYGEN LEVELS[1]

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Crude oil spills occurs quite frequently in aquatic environment; however, little is known of the full impact of such spills on fish and wildlife resources. The literature contains conflicting reports as to the effect of crude oil on dissolved oxygen levels. Brown and Reid (1951, cited by Nelson-Smith 1968) reported that oil films a few millimeters thick had little, if any effect on the rate of exygen absorption by underlying water, even in stagnant conditions. Zobell (1962) reported, however, that it is not uncommon to find anaerobic conditions in localized areas subjected to continuous or excessive oil pollution.

This study was conducted to determine the effects of crude oil spills on dissolved oxygen levels in water. Two types of crude oil collected from Louisiana offshore wells were used. One oil was considered to be a light crude oil since it was composed of 56.36% naphtha, a highly volatile fraction, while the other oil was considered to be a heavy crude oil since it only contained 16.56% naphtha. The oil was applied to the water in 36 metal tanks on July 10, 1972. Nine treatments were used with four tanks per treatment. Concentrations of oil were 10, 20, 40, and 80 parts per thousand (ppt) by volume for both types of oil. A no oil treatment, which served as a control, was also used.

Dissolved oxygen levels of the water were measured at monthly intervals. Because of the oil film on the water, water was obtained with a 60 ml plastic disposable syringe with a long needle, which permitted the sample to be obtained with very little disturbance to the oil film on the surface of the water. All oiled as well as control tanks were sampled with the disposable syringe.

An analysis of variance was used to detect possible differences among treatments. Dunnett's Test was used to compare the various treatments with the control (Steel and Torrie 1960).

Dissolved oxygen levels were lower for all treatments than for the control (Table 1). As the oil concentrations increased, the dissolved oxygen levels decreased. The dissolved oxygen level was lower for the heavy oil than for the light oil, at equal concentrations. Oxygen levels were still lower for all treatments than for the control 8 months after initial oil application.

Solubility of oxygen in water increases as water temperature decreases; thus, dissolved oxygen levels were higher during the winter months.

The film of oil on the water apparently prevented a free atmosphere to water transfer of oxygen in the test tanks.

A dissolved oxygen deficiency may be severe after an oil spill on natural waters and cause a drastic reduction of equatic animal life, By eliminating equatic organisms, the food chain would be disrupted thus affecting many wildlife species. However, with a certain amount of wave action or water currents, owygen loss would probably be minimized.

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Table 1. Mean dissolved oxygen in tanks after oil treatments[a]

Treatment	Month After Treatment[b] Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Mean
	ppm								
Light Oil (10 ppt)	3.50c	5.50d	7.25c	6.50c	7.50	11.50	8.75	7.25	7.22c
Light Oil (20 ppt)	1.75c	3.50c	6.50c	4.75c	5.25c	10.75	7.50	6.00c	5.75c
Light Oil (40 ppt)	.50c	.75c	2.75c	3.25c	5.25c	6.00c	5.75c	4.75c	3.63c
Light Oil (80 ppt)	.00c	.00c	.25c	1.00c	1.00c	3.50c	2.00c	2.00c	1.22c
Heavy Oil (10 ppt)	1.50c	4.50c	7.75d	3.50c	4.00c	8.25c	7.00	5.25c	5.22c
Heavy Oil (20 ppt)	.25c	.50c	3.75c	3.25c	4.25c	6.50c	5.25c	5.50c	3.66c
Heavy Oil (40 ppt)	.25c	.00c	.00c	.75c	1.00c	3.75c	2.25c	2.50c	1.31c
Heavy Oil (80 ppt)	.00c	.00c	.00c	.00c	.00c	1.00c	.75c	.50c	.28c
Control (0 ppt)	7.00	7.75	10.00	9.25	8.25	12.25	9.50	9.25	9.16
Mean	1 64	2.50	4.25	3.58	4.06	7.06	5.42	4.78	4.16

aEach treatment had four replications

bTreatment was made in July

cHighly significant (P 0.01)

dSigificant (P 0.05)

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BOBWHITE NESTING SUCCESS ON TWO SELECTED AREAS WITH DIFFERENT POPULATION DENSITIES[1]

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ABSTRACT

Bobwhite nesting success data was collected during a five year (1967-71) study on an area with a high population density (2 + quail/acre) and a three year (1969-71) study on an area with an "average" density (4 acres/quail). Despite the differences in population density and the intensity of habitat management, the season nesting success on both areas averaged approximately the same, 17.5 percent on the high density area (based on 1,412 nests studied) and 20.8 percent on the "average" density area (based on 313 nests studied).

Bobwhite quail (*Colinus virginianus*) populations in excess of one bird per acre have been reported in the literature (Kellogg et al. 1970, 1972). The literature is void, however, of any studies of quail nesting success for populations with fall densities of 1 to 3 quail per acre as Kellogg found. In fact, only a few intensive studies have been madeof bobwhite nesting success at lower

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