Factors Affecting the Distribution and Harvest of River Otters in Louisiana

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Abstract: Data from a trapper survey in Louisiana for the 1980-81 season were used to estimate river otter (*Lutra canadensis*) harvest for each parish, and the data were compared in a step-wise regression procedure in 53 noncoastal parishes with independent variables thought to affect otter harvest. Of the factors tested, those most responsible for variation in the number of otters harvested were the amount of forested and nonforested wetlands, number of trapping licenses sold, and acreage of cotton in 1980. Otter occurrence was indexed in 6 parishes by otter latrine sites in transects along selected water bodies during summer 1981 and winter 1981-82. Latrine sites occurred along 18.9% and 20.3% of the survey lines during the summer and winter surveys, respectively. Most latrine sites were observed along streams with abundant fish activity and low human disturbance.

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The river otter occurs throughout Louisiana, and a mail questionnaire to trappers following the 1980–81 trapping season disclosed that otters were taken in 62 of the state's 64 parishes. However, the density of otters varies considerably in different sections of the state, and approximately 80% of the annual harvest is from 11 coastal parishes (Ensminger and Linscombe 1980). The coastal parishes contain vast areas of coastal marshland that is considered to be ideal habitat and probably supports the greatest density of otters. Nevertheless, the survey showed considerable variation in otter harvests among parishes and disclosed that the otter harvest in certain parishes outside the coastal region was comparable to that of the coastal parishes.

River otters spend most of their time in water and are seldom found far from an aquatic environment (Lowery 1974). Consequently, the otter density in a parish is

no doubt related to the amount of wetland habitat in the parish. However, other factors may also affect otter density in a parish.

A knowledge of factors affecting otter abundance in an area is extremely important in management of the species. Only with a complete understanding of these factors can efforts be made to control factors limiting the species or promote those favorable to the species. The objectives of this study were to relate the annual harvest of otters by parish in 53 noncoastal parishes to selected environmental factors that may affect otters and to evaluate the relationship of habitat conditions to otter occurrence.

We are grateful for the assistance of Vernon L. Wright in statistical analysis of the data.

Study Methods

Otter Harvest and Environmental Factors

The Louisiana Department of Wildlife and Fisheries (1982) surveyed all licensed trappers following the 1980–81 season and determined the otter harvest per parish. The otter harvest from each of the 53 parishes north of the coastal region was tested with 18 selected environmental factors within each parish to determine if a correlation existed between these variables and the reported take of otters. A stepwise regression analysis was employed whereby the coefficient of determination was maximized while only those variables with significant effects on otter harvest were retained in the regression equation (Draper and Smith 1981, Barr et al. 1976). Significance levels were established at the 95% level of probability.

Correlation coefficients between the 18 variables tested suggested that some variables were too strongly correlated with others to assume independence. These variables were removed and the final analysis was conducted with 8 independent variables tested against the reported harvest of otter by parish. Independent variables tested included human population, number of licenses sold; and amount (ha) of cotton and soybeans in 1980, deciduous upland forests, pine forests, forested wetlands, and nonforested wetlands (Table 1).

Field Surveys of Local Occurrence

Field surveys of otters were conducted in 6 upland Louisiana parishes during the summer of 1981 and the winter of 1981–82 to evaluate habitat use and factors affecting local occurrence. Parishes selected were in different physiographic regions of the state north of the coastal zone. Habitats surveyed bordered lakes, rivers, and streams; both swampy and dry shorelines were included. When possible, equal replications of each habitat were sampled. The presence of river otters in each habitat type were determined by the presence of a latrine site, a method utilized by MacDonald et al. (1978). Counts of latrine sites were conducted along survey lines, 400-m long and 0–5 m from the water's edge. The number of survey lines in any parish ranged from 20 to 26. Survey lines were designated on topographic maps (scale: 1 to 20,000) prior to their establishment in the field. Alternative routes were

Table 1. Correlation coefficients (R)[a] among reported otter harvest and selected environmental variables within noncoastal parishes ($N = 53$) in Louisiana during the 1980–81 trapping season.

Variables	HP	NL	C8	S8	DF	PF	FW	Nonforested wetlands
Otter harvest[b]	0.094	0.363	−0.272	0.036	−0.045	−0.094	0.380	0.554
Human population (HP)[c]		0.265	−0.073	−0.061	0.148	−0.003	−0.141	0.265
Number of licenses (NL)[d]			0.046	−0.028	0.303	0.413	−0.048	0.378
Cotton–1980 (C8)[e]				0.207	0.112	−0.288	−0.049	−0.118
Soybeans–1980 (S8)[e]					0.202	−0.440	0.303	−0.053
Deciduous upland forest (DF)[f]						0.223	−0.275	−0.064
Pine forest (PF)[f]							−0.405	−0.024
Forest wetlands (FW)[f]								0.223

[a]Least significant R at 1% level = 0.351; 5% level = 0.271.
[b]From survey of licensed trappers.
[c]From U.S. Department of Commerce (1980).
[d]From trapper's license sales records.
[e]From Louisiana Cooperative Extension Service (1981).
[f]From U.S. Geological Survey (1972).

Table 2. Habitat types surveyed in 6 upland Louisiana parishes during summer 1981 and winter 1981–82.

Parish	Number of Lines Surveyed	Habitat types		
		Lakes	Streams	Rivers
Washington	24	5	11	8
Jefferson Davis	20	4	8	8
St. Landry	25	7	13	5
Concordia	24	8	8	8
Caldwell	24	11	7	6
Union	26	8	9	9
Totals	143	43	56	44

established in the field if the original route was unacceptable because of impassibility or high residential development.

Habitat type, land use, shoreline elevation, water turbidity, dominant vegetation types, fish activity, and human disturbance were evaluated during the study. Water turbidity was determined with a Jackson turbidometer and categorized as low (<30 ppm), moderate (30–60 ppm), or high (>60 ppm). Fish activity was designated as low or high, based upon the amount of fish activity observed in water adjacent to survey lines. Low, moderate, and high values for human disturbance were designated according to the following criteria: no person seen during the survey = low; 1–3 people = moderate; 4 or more people = high.

Aerial photographs were examined to determine the amount of forested land and cropland surrounding each survey line. A dot grid was placed over an area of 1 km^2 on the aerial photographs, centered over each survey line, and percentages of forested land and cropland within the 1-km^2 area were determined. Forested land was categorized as 0–33%, 34–66%, and 66–100%, while cropland categories were 0%, 1–25%, and 26–100%, so that near equal numbers of survey lines occurred in each category.

In some of the 6 upland study parishes, the requirements for suitability of study sites were not entirely met. For this reason, some parishes had more replications of 1 habitat type than of another. A total of 143 survey lines were examined in the 6 upland parishes during summer and winter surveys. More survey lines were established along small streams than along lakes or large streams because small streams comprised a substantially larger proportion of water body types in most parishes (Table 2).

Results and Discussion

Otter Harvest and Environmental Factors

Previous reports of the status of otters have usually been based on evidence provided by trappers (MacDonald and Mason 1976). Otter status is often expressed as the number of animals taken in 1 trapping season, and trappers are more likely to

Table 3. Best 4-variable model from stepwise regression procedure with otter harvest noncoastal parishes ($N = 53$) in 1980–81 as the dependent variable.

Variables	*B* Value	*F*	Probability
Licenses	0.0961	4.62	0.0366
Cotton–1980	−0.0034	4.47	0.0398
Forested wetlands	0.0017	7.49	0.0087
Non-forested wetlands	0.0112	9.53	0.0034

trap those areas they know to contain high otter populations. Therefore, catch records may only indicate areas of greatest otter abundance. However, in Louisiana, many otters are taken in traps set for other species (Edwards 1983), and the otter take reported by trappers may serve as an indication of local otter abundance.

A "best" model obtained from tests of data from the 53 noncoastal Louisiana parishes contained 4 variables (Table 3). The 4 variables, which accounted for 46.8% of the variation in otter harvest, were nonforested wetlands, number of licenses sold, amount of cotton in 1980, and forested wetlands. All variables except the amount of cotton in 1980 showed a positive correlation with the otter harvest per parish.

The value of wetlands to otter is well known. Ensminger and Linscombe (1980) reported that most otters in the state occur in the marshes and swamps of southern Louisiana. Our analysis indicates that forested and nonforested wetlands in upland parish, although smaller in size than those along the Louisiana coast, are also very important for otter production and were strongly related ($P < 0.01$) to the otter harvest.

The number otter harvested was correlated ($P < 0.05$) with the number of licenses sold per parish during the 1980–81 season. A high density and value of furbearing animals provides incentive for local residents to trap and, therefore, attracts more trappers (Erickson and Sampson 1978). In Louisiana, a trapping license permits the licensee to trap all species. Very few individuals trap only for otters and most otters are taken in traps set for other species. Consequently, the number of otters taken was related to the number of trappers and the density and value of other furbearers such as nutria (*Myocastor coypus*) (Edwards 1983).

Several possible causes for the negative correlation between the number of otters harvested and the acreage of cotton in 1980 were evaluated. Northeastern Louisiana is the major cotton-producing area of the state, and according to Walker (1977), the widespread use of toxaphene and other pesticides on cotton caused extensive fish mortalities during 1974. Toxaphene is very toxic to fish and, therefore, may have been available to otters in their food (Beck 1977). Otters may feed on sick fish or poisoned carrion and accumulate toxaphene in their tissues. Stickel (1973) stated that the greatest population reduction caused by environmental contamination would probably be sustained by a species such as the river otter, a fisheater which is relatively scarce and has a low reproductive rate. Rue (1981) said that the

worst enemy of otters is the poison ingested with contaminated fish, which may explain the low otter catch in areas with an abundance of cotton. However, according to Graves et al. (1981), the use of toxaphene decreased rapidly after 1975, and their study indicated that, by 1979, residues of organochlorine insecticides were practically nonexistent in fish collected from a major northeastern Louisiana watershed. Nevertheless, if the otter population in this area were reduced by poisoning, several years may be required for it to recover.

In Sweden, Erlinge (1978) examined game records and found that the number of European otter (*Lutra lutra*) killed annually declined after 1950, indicating a significant decrease over the years. He stated the possible causes for this population decline might include destruction of habitat and killing otters in fish traps. Habitat alteration by land clearing and stream channelization for cotton farming in Louisiana was also considered as a possible cause for the negative correlation between otter harvest and acreage of cotton. Land clearing and stream channelization are also common practices for soybean farming; hwoever, we were unable to detect a relationship between otter harvest and the amount of land planted to soybeans. This would suggest that something other than habitat alteration was responsible for the negative relationship of otter harvest to acreage of cotton. Habitat conditions within a parish vary widely, and small amounts of high quality habitat may support a good population of otters in a parish where a large portion of the habitat has been seriously altered.

Field Survey of Local Occurrence

Otter scats were observed along 27 of 143 lines in the 6 upland study parishes during the summer survey, yielding a frequency of 18.9% (Table 4). The highest frequency of occurrence of otter sign was from Union Parish, where scat was found along 11 of the 26 survey lines (42.3%). The lowest frequency of occurrence was from Concordia Parish, where only 2 of 24 lines (8.3%) contained otter scat. Otter scats were observed along 29 of 143 (20.3%) lines during the winter survey in the upland study parishes. The highest index was again from Union Parish, where 9 of 26 survey lines contained scat (34.6%). Concordia Parish continued to yield the lowest index, with only 1 of 24 lines having otter scat (4.2%).

Table 4. Percent occurrence of survey lines with otter scat in 6 upland Louisiana parishes during summer 1981 and winter 1981–82.

Parish	Number of Lines Surveyed	No. Lines with Scat		Percent Occurrence	
		Summer	Winter	Summer	Winter
Washington	24	4	6	16.7	25.7
Jefferson Davis	20	2	4	10.0	20.0
St. Landry	25	5	5	20.0	20.0
Concordia	24	2	1	8.3	4.2
Caldwell	24	3	4	12.5	16.7
Union	26	11	9	42.3	34.6
Totals	143	27	29	18.9	20.3

Only 8% of the lakes sampled contained a latrine site, while 24% and 25% of large and small streams, respectively, revealed otter scat. One possible reason for the difference is that many of the lakes sampled were in areas with high human disturbance. Also, otters prefer feeding in shallow water near shore (Sheldon and Toll 1964), and streams may have provided more of this habitat.

In areas with greater than 25% cropland, only 10% of the survey lines had otter scat, whereas 24% of the lines in areas with less than 25% cropland contained scat. The amount of otter scat was similar along lines in areas with different percentages of forested land. Twenty-five percent of the survey lines along low shorelines contained scat; in moderate shoreline areas, 14% of lines had scat; and 20% of lines in high shoreline areas contained scat.

In heavy fish activity areas, 32% of the survey lines contained otter scat, while in light activity areas only 10% of the lines had scat. These results indicate that otters were possibly attracted to areas containing high fish populations. Holcombe (1980) found fish to be the major food of otters in Louisiana. Yeager (1938) surveyed otter trappers in the delta hardwood region of Mississippi and concluded that the ideal habitat for otters was a deep-water swamp adjacent to a log-filled, fish-producing lake.

The number of lines with latrine sites was inversely related to the degree of human disturbance. In areas with little human disturbance, 25% of the survey lines contained scat; in moderately disturbed areas, 14% of the lines had scat; while in heavily disturbed areas, only 5% of the lines contained scat. Our data support the contention of Lowery (1936), that the river otter is very secretive and avoids areas frequented by humans.

Note that the above observations are not independent of one another. Therefore, it was not possible to recognize the extent to which each environmental factor affected the presence of otter latrine sites.

Conclusions

Analysis of the otter harvest by parish in 53 noncoastal parishes in Louisiana revealed 4 independent factors significantly related to the variation in harvest. Factors displaying a positive effect on the number of otters harvested were the amount of forested and nonforested wetlands and the number of trapping licenses sold. The acreage of cotton in 1980 showed a negative effect on the number otters harvested.

The presence of otters was determined in selected habitat types in 6 noncoastal Louisiana parishes by the presence of latrine sites along standardized survey routes. Surveys were conducted during the summer of 1981 and the winter of 1981–82. During the summer survey, otter scats occurred along 27 of 143 survey lines (18.9%). In the winter, 29 of the 143 lines contained otter scat (20.3%). Most otter sign was observed along streams with abundant fish activity and low human disturbance. A negative relationship was found between the amount of cropland along the survey routes and the presence of otter scat.

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