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A SURVEY OF FURBEARER RESOURCES OF THE ATCHAFALAYA RIVER FLOOD PLAIN IN LOUISIANA

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ABSTRACT

Fur trappers in the area of the Atchafalaya River flood plain were interviewed following the 1971-72 season. Fur catch information from two portions of the flood plain, the swamp region and the marsh region, were compared; and the total fur catch was computed for the swamp region. Mean harvest values were computed and expressed as animals caught per trap-night per square mile per trapper. Differences between mean harvest values from the two regions were not significant for muskrat (*Ondatra zibethicus*), nutria (*Myocastor coypus*), and otter (*Lutra canadensis*). Mink (*Mustela vison*) and raccoon (*Procyon lotor*) harvest means were significantly higher in the swamp region than in the marsh region.

Harvest data were also obtained for different vegetative types within the swamp region. Three species (nutria, mink, and raccoon) each comprised an important portion of the total reported catch in this region and made up a large portion of the total reported income. In the marsh region, only the nutria comprised greater than ten percent of the total reported catch and income.

The mean net income of swamp region trappers was $1464.54, while the mean net income of marsh region trappers was $1198.77. During the 1971-1972 season, approximately 34 percent of all mink and 25 percent of all raccoons harvested in Louisiana were obtained in the swamp region of the Atchafalaya River flood plain, and the computed total value of the 1971-1972 fur harvest from this region was $172,000.

INTRODUCTION

The Atchafalaya River Basin is a 1,300 square mile flood plain, and comprises the second largest southern river swamp in the United States. Many revenue-producing activities operated in the area during the time of this investigation, such as oil and gas production, navigation, commercial fishing, trapping, agriculture, timber production, and recreation. The total gross production of all types of activities in the Basin in 1970 exceeded $177 million, according to the Governor's Commission on the Atchafalaya Basin (1972). In addition to commercial activities, the Basin comprised an important portion of an extensive Mississippi River flood control system operated by the U.S. Army Corps of Engineers.

The topography of the Basin was changing at an alarmingly rapid rate, as a result of silt deposition and man's activity, and the public began a cry to "save the Basin". Because of the diverse interests and types of land use, controversies developed regarding proposed plans of action for the area. Such controversies could only be settled after first assessing the importance of each type of activity in the area, and second, deciding upon plans of action which were compatible with the activities deemed most important, and which minimize damage to other interests. One of the major objectives of this study was to obtain data on the economic importance of one commercial activity, fur animal trapping, in the swamp. The study was also conducted to provide information on the relative importance of the various habitat types within the swamp to trapping operations.

In addition to the need for specific information concerning the economic importance of trapping in the Atchafalaya River flood plain, information is needed on the fur harvest of swamp areas in general. Coastal marsh areas are generally regarded as regions of optimum fur production, and several studies of furbearer trapping have been conducted in such areas (Verlander 1941, O'Neil 1949, Wilson 1967, Palmisano 1971, Palmisano 1972). However, published information is lacking on fur production in swamp areas. Another major objective of this study was to obtain fur harvest data from a swamp area, and from a coastal marsh area, and to compare the two regions in fur production.

DESCRIPTION OF STUDY AREAS

Furbearer data which are included in this paper were obtained from areas roughly bordering the Atchafalaya River, and no trapping grounds which were considered were located farther than 20 miles from the River. Trappers who were interviewed trapped in two main regions which will be identified as the swamp region and the marsh region.

The swamp region was the area of primary concern and was bordered by U.S. Highway 190 on the north, U.S. Highway 90 on the south, and the floodway protection levees on the east and west. The marsh region was the marsh area extending from U.S. Highway 90 southward to the Gulf of Mexico. Marone Point and Lake Penchant were the westernmost and easternmost points considered, respectively.

The lower two-thirds of the swamp region were inundated annually by overbank flooding of the Atchafalaya River. The flood period generally extended from February to June, and the low water period usually occurred from September to November.

The swamp region was divided into three primary overstory vegetative types: cottonwood-willow-sycamore, bottomland hardwoods, and cypress-tupelo (Tabberer pers. comm.). The total area of each type is presented in Table 1. The dominant trees of the cottonwood-willow-sycamore vegetative type were cottonwood, *Populus deltoides*; black willow, *Salix nigra*; sandbar willow, *Salix interior;* and sycamore, *Platanus occidentalis*.

Numerous trees comprised the bottomland hardwoods type, and species composition and density varied from area to area. Among the more common dominant trees which comprised this vegetative type were: Drummond red mapel, *Acer rubrum* var. *Drummondii;* water hickory, *Carya aquatica*; hackberry, *Celtis laevigata*; ash, *Fraxinus* sp.; sweetgum, *Liquidambar styraciflua;* oak, *Quercus* sp.; and American elm, *Ulmus americana.* Common sub-dominant trees and shrubs included boxelder, *Acer negundo*; roughleaf dogwood, *Cornus drummondii*; waxmyrtle, *Myrica cerifera*; and elderberry, *Sambucus canadensis.*

The cypress-tupelo vegetative type consisted primarily of baldcypress, *Taxodium distichum*; and tupelogum, *Nyssa aquatica.* Pumpkin ash and Drummond red maple were also commonly found in cypress-tupelo areas. The most common sub-dominant species in this type was buttonbush, *Cephalanthus occidentalis*, plus a wide variety of emergent, floating, and aquatic plants.

The marsh region was comprised mostly of low growing vegetation consisting of grasses, sedges and forbes. The Louisiana coastal marsh has been divided into four vegetative types: saline, brackish, intermediate, and fresh (Penfound and Hathaway 1938). Only two of these types, fresh and brackish, were utilized by trappers who were interviewed. The coastal region has been further subdivided into nine hydrologic units (Chabreck 1972), and all trapping grounds in the marsh region were located in three of these units.

Most of the marsh trappers interviewed trapped fresh marsh areas in hydrologic unit 6 and in the western quarter of hydrologic unit 5 as delineated by Chabreck (1972). Some of the more important plant species in this region according to Chabreck (1972) were maidencane, *Panicum hemitomon*; bulltongue, *Sagittaria lancifolia*; yellow cowpea, *Vigna luteola*; cattail, *Typha* sp.; switchgrass, *Panicum virgatum*; elephant ear, *Colocasia esculenta*; and spikerush, *Eleocharis* sp. Two marsh region trappers trapped brackish marsh areas in hydrologic unit 7. The major plant species of this area, according to Chabreck (1972), were saltmeadow cordgrass, *Spartina patens*, soft rush, *Juncus effusus*; and Olney threesquare, *Scirpus olneyi.*

STUDY PROCEDURES

A total of 53 trappers were interviewed from March, 1972, through August, 1972, and the information obtained during each interview was recorded on a five-page questionnaire. Over 100 pieces of information were obtained from each trapper concerning general aspects of trapping as well as specific information regarding the 1971-1972 season. In addition to the questionnaires, all trappers were asked to mark their trapping grounds on quadrangle maps. Individual questionnaires and trapping areas were labeled with corresponding numbers, and harvest data were related to particular areas in this manner.

Names of trappers were obtained from trapping license receipts of the Louisiana Wild Life and Fisheries Commission and from trappers and other persons interviewed.

The marsh region was not the area of primary concern in this study, and no attempt was made to estimate the number of trappers in that region.

Trapper usage indices were calculated for the three vegetative types in the swamp region by dividing the percent of total land trapped by all swamp region trappers interviewed by the percent of total land area in the region.

No information was obtained during this study concerning the vegetative type preferred by marsh region trappers. These trappers were confined to the land which they leased, and could not annually choose areas which appeared to have good furbearer populations.

All calculations except those concerning land area were made using figures

Table 1. Trapper utilization of overstory vegetative types in the Atchafalaya River swamp region, 1971-1972 season.

Vegetative type	Land area in swamp region	Percent of total land area in swamp region	Total land areaa trapped by persons interviewed	Percent of total land area trapped by persons interviewed	Trapper usage index[b]
Bottomland hardwoods	435.71	47.2	26.65	19.9	.42
Cottonwood-willow-sycamore	101.02	11.0	11.04	8.3	.75
Cypress-tupelo	385.15	41.8	95.85	71.8	1.72
All types	921.88	100.0	133.54	100.0	1.00

aExpressed in square miles.

bCalculated for each vegetative type by dividing the percent of total land area trapped by persons interviewed, by the percent of total land area in swamp region. Values greater than one indicate a preference for the vegetative type.

taken directly from trapper questionnaires. Surface areas of trapping grounds were computed using the method described by Chabreck (1972). This method involved weighing map segments of the different trapping grounds on a Mettler balance, and comparing these weights to the weights of sections of known area taken from the same maps.

Most fur harvest data are expressed in current literature as animals harvested per square mile. In this study, however, an attempt was made to express fur harvest in a manner which would be most indicative of the relative abundance of animals in the study regions. The animals per square mile expression should not be used when comparing relative abundances of animals on two areas. Animals per square mile figures are obtained by dividing the total number of animals harvested on an area, by the total number of square miles trapped. This calculation fails to consider two factors which definitely influence the catch: the number of trappers responsible for the catch, and the effort expended by individual trappers. Other problems concerning the animals per square mile expression result from the exaggerated effects of extensive trappers on this expression. Trappers working large areas of land generally caught fewer animals per square mile than trappers working smaller areas. Results of extensive trappers, however, had a much greater effect on the animals per square mile expression than harvests by intensive trappers, and the expression is thus not very realistic.

The harvest expression used included every variable affecting the catch which could be quantified. The expression, animals caught per trap-night per square mile per trapper, was computed for each trapper by dividing the number of animals harvested by the product of the trap-nights and the square miles trapped. These figures were added and the sum was divided by the number of trappers considered, to obtain an average harvest value for a particular area. For convenience, the harvest data were expressed as animals caught per 1,000 trap-nights per square mile per trapper.

Trapper selection for certain species is a variable which can affect the harvest. This variable could not be quantified and, therefore, could not be included in the animals caught per trap-night per square mile per trapper expression. The effects of trapper selection were considered separately for each species.

Trapping ground overlap was another factor considered when evaluating the animals per trap-night per square mile per trapper figures. Trapping ground over lap refers to instances in which particular segments of land were trapped by more than one trapper. The efforts of two trappers on one segment of land would theoretically reduce the number of harvestable animals on the area to a greater estent than the efforts of one trapper. This could possibly result in reduced catches by each of the trappers. Interviewed trappers with overlapping trapping grounds were more prevalent in the swamp region than in the marsh region. We assumed that trapping ground overlap by trappers not interviewed was similar to that of trappers interviewed and was also more prevalent in the swamp region. If trapping ground overlap did reduce the average cathces in the two study areas, the swamp region trappers suffered the greater reduction in catch.

RESULTS AND DISCUSSION

Swamp and marsh region harvest comparisons

Muskrat. The mean number of muskrats caught per 1,000 trap-nights per square mile per trapper was higher for marsh region trappers than for swamp region trappers (Table 2). The analysis of variance, however, indicated that this difference was not significant ($P>0.05$) and resulted from the wide variation in the catch among trappers. Trapper selection for muskrats was probably greater among marsh trappers, and trapping ground overlap was more prevalent in the swamp region.

When considering the apparent lack of difference between the two regions, it must be remembered that the majority of the marsh trappers interviewed trapped in areas of fresh marsh. Fresh marshes contained the lowest muskrat population densities of the four types surveyed by Palmisano (1972).

Nutria. The mean nutria harvest value was higher for marsh region trappers than for swamp region trappers (Table 2), but the analysis of variance indicated that this difference was not significant ($P>0.05$). Trapper selection for nutria was much higher in the marsh region than in the swamp region. Many marsh trappers who were interviewed trapped strictly for nutria, and took other animals only by chance in nutria sets. Nutria signs were not so readily visible in the swamp region, and selectively trapping large numbers of nutria was more difficult.

These results were surprising, and we expected that nutria harvest would have been significantly higher in the marsh region. Fresh marshes contained numerous important nutria food plants, and Palmisano (1971) noted that peak nutria production generally occurred in fresh or intermediate marshes. Plants which were found to be relatively abundant in both regions of the Atchafalaya Basin, and which were reported to be important nutria foods (Gainey 1949, Atwood 1950, Swank and Petrides 1954, Milne and Quay 1966) included *Sagittaria latifolia, Sagittaria lancifolia, Alternanthera philoxeroides, Potamogeton* sp., and *Pontedaria cordata.*

Mink. The mean number of mink caught per 1,000 trap-nights per square mile per trapper was much higher in the swamp region than in the marsh region (Table 2). The analysis of variance indicated that this difference between harvest means from the two regions was significant ($P<.05$). The two harvest means were not directly comparable, however, because of unequal trapper selectivity and trapping ground overlap. Atchafalaya Basin trappers were highly selective for mink and raccoon, and the same type of baited set was used for each species.

St. Amant (1959) stated that the best mink producing areas in Louisiana were the cypress-tupelo swamps of south Louisiana and the fresh and brackish marsh types. If mink were more abundant in the swamp region than in the marsh region, then the numerous den sites and the tremendous crayfish population of the swamp were factors which probably contributed to the difference.

Table 2. Number of animals caught per 1,000 trap-nights per square mile per trapper by Atchafalaya River flood plain trappers, 1971-1972 season.

Species	Trappers reporting	Mean number caught	Standard deviation
	Swamp Region		
Muskrat	28	2.48	5.47
Nutria	28	37.27	94.97
Mink	31	6.58	11.07
Raccoon	31	16.56	21.55
Otter	31	.14	.29
	Marsh Region		
Muskrat	22	7.13	14.05
Nutria	22	95.79	193.00
Mink	22	.64	1.30
Raccoon	22	3.54	6.42
Otter	22	.14	.30

Table 3. Number of animals caught per 1,000 trap-nights per square mile per trapper by selected[a] swamp region trappers, 1971-1972 season.

Species	Trappers reporting	Mean number caught
	Cypress-tupelo swamp	
Muskrat	14	4.61
Nutria	14	65.10
Mink	17	7.06
Raccoon	17	10.76
Otter	17	.10
	Bottomland hardwoods	
Muskrat	6	.69
Nutria	6	13.66
Mink	6	13.27
Raccoon	6	50.41
Otter	6	.43

aTable considers only trappers whose entire trapping areas fell within single overstory vegetative types.

Raccoon. The mean number of raccoons caught per 1,000 trap-nights per square mile per trapper was much greater in the swamp region than in the marsh region (Table 2). The analysis of variance indicated that this difference between harvest means from the two regions was highly significant ($P<0.01$). The two means were not directly comparable, however, because of unequal trapper selectivity and trapping ground overlap.

Trees are important components of good raccoon habitat (Johnson 1970), and the swamp region certainly provided better habitat than the marsh region with respect to trees. The swamp also contained an abundance of important raccoon foods such as fruits, acorns, and crayfish, which are perhaps not found as readily in the marsh. However, deep spring flooding in the swamp region probably had a damaging effect on raccoon populations.

Otter. The mean number of otters caught per trap-night per square mile per trapper was nearly identical in the two study regions (Table 2). An analysis of variance was conducted and no significant difference was found between the harvest means from the two areas. Because of the baited sets which were frequently used in the swamp region, trapper selection for otters was possibly greater in the swamp than in the marsh region.

Opossum and beaver. Sufficient data were not obtained on the opossum (*Didelphis virginiana*) or the beaver (*Castor canadensis*) to warrant swamp and marsh region comparisons.

Swamp region harvest data

The cypress-tupelo areas were preferred by trappers (Table 1) and, although that type made up 41.8 percent of the swamp region, 71.8 percent of the trappers interviewed trapped there. The bottomland hardwoods and cottonwood-willow-sycamore areas were not trapped in proportion to their availability, as indicated by the trapper usage indices.

Mean numbers of animals caught per 1,000 trap-nights per square mile per trapper were calculated for swamp region trappers whose trapping areas fell within either the cypress-tupelo swamp or the bottomland hardwoods swamp

(Table 3). Muskrat and nutria harvest means were higher in cypress-tupelo areas, while mink, raccoon and otter harvest means were higher in bottomland hardwoods areas. Analyses of variance were not conducted using these figures because of the small bottomland hardwoods sample size.

Few fur production figures are reported for river swamp areas, and for this reason an effort was made to project the total harvest on a 15.45 square mile area of cypress-tupelo swamp in the Atchafalaya River flood plain. Since mose fur harvest data are expressed in current literature as animals per square mile, the harvest on the cypress-tupelo area was presented in this manner for comparative purposes (Table 4). Harvest projections were based on the total number of persons known to be trapping the area, and on the average number of animals caught per trapper in cypress-tupelo swamp areas. Harvest figures varied from 1.17 otters per square mile to 218.12 nutria per square mile.

Table 4. Reported harvest and projected total harvest of furbearers on a 15.45 square mile cypress-tupelo swamp area in the Atchafalaya River flood plain, 1971-1972 season.

Species	Reported animals harvested	Reported animals harvested per square mile	Projected total harvest[a]	Projected harvest per square mile[a]
Muskrat	354	22.91	418	27.06
Nutria	2826	182.91	3370	218.12
Mink	584	37.80	718	46.47
Raccoon	715	46.28	973	62.98
Otter	14	.91	18	1.17

aAdjusted for trappers not interviewed.

Table 5. Percent species composition of the catches[a] of Atchafalaya River flood plain trappers, 1971-1972 season.

Region	Total reported harvest[b]	Species						
		Muskrat	Nutria[c]	Mink	Raccoon[c]	Otter	Opossum	Beaver
					Percent			
Swamp Region	19,788	3.2	47.3	13.9	34.2	0.3	1.1	Tr.
Marsh Region	25,408	6.3	88.3	0.8	4.4	0.2	0.0	0.0

aTable includes only animals which were sold.
bExpressed as number of animals.
cIncludes animals trapped or shot.

Table 6. Percentages of total reported trapping income derived from the sale of each furbearer species by Atchafalaya River flood plain trappers, 1971-1972 season.

Region	Total reported income ($)	Species						
		Muskrat	Nutria[a]	Mink	Raccoon[a]	Otter	Opossum[a]	Beaver
					Percent			
Swamp Region	56,717.79	1.3	36.2	20.1	39.0	2.9	0.5	Tr.
Marsh Region	43,788.07	5.3	83.4	1.7	5.9	3.7	0.0	0.0

aIncludes income derived from the sale of both meat and pelts.

Species composition of harvest

Three species (nutria, raccoon, and mink) comprised important portions of the catch in the swamp region and were responsible for sizeable percentages of the total reported income (Tables 5 and 6). However, in the marsh region the nutria was by far the most important species, comprising 88.3 percent of the reported catch. Marsh trappers derived 83.4 percent of their reported income from the sale of nutria meat and pelts. The muskrat and otter were animals of only minor importance to Atchafalaya River flood plain trappers, and the opossum and beaver were of virtually no importance.

Trapping economics

Trapping expenses. Trapping expenses were much larger in the marsh region on an average than in the swamp region (Table 7). One of the major reasons for this difference concerned land use fees. None of the swamp region trappers interviewed paid for trapping rights, but 68.2 percent of the marsh region trappers did pay land use fees.

The equipment expenses of swamp region and marsh region trappers differed by over $300. All trappers were asked three questions about each item of equipment used: first, the initial cost of the item; second, the depreciation value (the number of years that the item could be used); third, the proportion of the total use of the item devoted to trapping. The yearly cost was obtained for each item of equipment by multiplying the initial cost by the proportion allowed to trapping, and then dividing this product by the depreciation value (expressed in years). The mean yearly cost of all equipment for swamp region and marsh region trappers was $144.71 and $466.70, respectively. Other expenses included fuel, bait, paid help, and medical expenses resulting from injuries sustained while trapping.

Trapping income

The mean gross income of marsh region trappers was slightly higher than the mean gross income of swamp region trappers (Table 7). Swamp trappers had a higher mean net income than marsh trappers who were interviewed, but the analysis of variance indicated that the difference between net incomes from the two regions was not significant ($P<0.05$).

Table 7. Mean trapping expenses and incomes for Atchafalaya River flood plain trappers, 1971-1972 season.

Region	Trappers reporting	Annual expenses	Gross income	Net income
		Dollars		
Swamp Region	31	365.06	1829.60	1464.54
Marsh Region	22	791.60	1990.37	1198.77

Table 8. Comparison of total fur harvests in Louisiana and in the Atchafalaya River swamp region, 1971-1972 season.

Species	Total state harvest[a][b]	Projected[c] total harvest in swamp region	Percentage of total state harvest from the swamp region
Muskrat	326,513	1,904	.5
Nutria	1,286,622	28,397	2.2
Mink	24,299	8,324	34.2
Raccoon	80,632	20,522	25.4
Otter	5,440	194	3.5
Opossum	8,310	822	9.8
Beaver	126	3	2.3

aExpressed as number of animals.
bInformation supplied by R. Hunter, Louisiana Wild Life and Fisheries Commission (pers. comm.).
cProjection is based on the average catch per trapper interviewed, and on the estimated 94 swamp region trappers.

Total Atchafalaya Basin fur production

The projected total 1971-1972 fur harvest in the Atchafalaya River swamp region was compared with the total Louisiana harvest (Table 8). The swamp region projections were based on the average catch per trapper interviewed, and on the estimated total number of swamp region trappers. The number of licensed trappers in Louisiana was 2,761 during this period, and the estimated number of trappers in the swamp region was 94 or 3.4 percent of the statewide total. Approximately 34 percent of all mink and 25 percent of all raccoons harvested in Louisiana were obtained in the Atchafalaya River swamp region. The percentages of other furbearers obtained in the swamp were not particularly high.

The total value of the 1971-1972 swamp region fur harvest was estimated using the mean gross income per trapper and the estimated total number of swamp region trappers. A projected $172,000 worth of furbearer pelts and meat were obtained in the Atchafalaya swamp region during the 1971-1972 season.

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SOME ASPECTS OF REPRODUCTION AND AGE STRUCTURES IN THE BLACK BEAR IN NORTH CAROLINA

by

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ABSTRACT

Ages were assigned to 151 North Carolina black bears (*Ursus americanus*) by canine cementum annuli count. Canine teeth collected during the 1969, 1970 and 1971 hunting seasons revealed average ages of 5.17, 4.73 and 4.82 years, respectively. The average age increased in the coastal area but decreased in the mountain region. Ages ranged from 0.75 to 22.75 years. Yearlings, 1.75, represented 29 percent of the kill with a high incidence of males. Forty-eight female reproductive tracts indicated corpora lutea counts of 1.00, 2.71 and 2.81 per pregnant female over the 1969 to 1971 period. Active corpora lutea were found in 80 percent of the 3.75 year old females. Female breeding age ranged from 2.5 to 17.5 years. The sex ratio was established at 106 males:100 females. Embryonic development was noted in only one instance. Egg migration between the horns of the uterus was noted in one instance.

INTRODUCTION

There is limited data available on age structures and reproduction in the black bear. Stickley's (1961) study in Virginia revealed reproductive information on 38