THE PAST AND PRESENT STATUS OF THE ALLIGATOR IN FLORIDA

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Abstract: Available information concerning the past and present alligator (*Alligator mississippiensis*) populations in Florida are summarized. Population status is described on the basis of past harvest records, complaint rates, population surveys and opinions of hunters, buyers, and biologists. Based on these data it appears probable that the alligator's past population status was somewhat less serious than previously supposed and the future of the alligator appears secure.

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The American alligator occurs in wetland habitats from coastal North Carolina to Texas, and the Mississippi River drainage into southeastern Oklahoma and southern Arkansas (Joanen 1974).

In Florida, the alligator suffered a population decline which became most apparent during the 1960's (Hines et al. 1968). It was included in the U.S. Fish and Wildlife Service 1966 listing of endangered species and eventually came under the protection of the Endangered Species Act of 1973.

The extent of the decline and subsequent increase has been the subject of some controversy. This paper attempts to summarize data which provide insight into the past and present status of the alligator in Florida.

METHODS

Literature concerning past alligator populations in Florida was reviewed. Particularly valuable data on harvest during the 1800's were found in Kersey (1975). In addition, interviews were held with hunters and buyers that operated in Florida during the 1950's and 1960's. Much of the actual harvest data from 1965 to 1971 were taken from detailed purchase records of 1 buyer. Some harvest information for the period 1954 to 1961 was taken from Florida Game and Fresh Water Fish Commission (GFC) files. A chi square test was run on the 1965 to 1971 harvest data to determine if there were significant differences in the size class distribution between years.

Since the demand for certain size classes impacted price, buyers were questioned closely concerning market conditions during specific time periods.

Alligator surveys have been run by the GFC sporadically since 1954 and on a regular basis since 1974. Most of these surveys have been night counts run along predetermined routes. Recent work (Woodward and Marion 1978) has identified some major sources of variability in this technique. So even though interpretation of these surveys must be made with some degree of caution, these counts still represent minimum numbers. These data were also supplemented by other population assessments such as nest counts and subjective judgments of population status on study areas with which GFC personnel were familiar.

The number of alligator complaints received by the GFC were reviewed as well as the number of attacks on people. We recognize that these parameters are affected by the number of people present but undoubtedly are also related to population status of the alligator.

Available habitat and its probable status and the laws relating to development of wetlands were reviewed.

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RESULTS

Past Populations

Populations of alligators in Florida before man's activities became so apparent were undoubtedly great (Simpson 1920, Holt and Sutton 1926, Romans 1962).

As early as 1800, alligator hides were being bought in the Miami area at $7.00 per hide for 6 foot (1.8m) hides (Kersey 1975). Yearly harvests during the 1800's are unknown, but Kersey (1975) examined many ledgers of hide buyers who were buying mostly from the Indians from 1870 untill 1930 and estimated that during the 1800's 1 buyer in the Big Cypress was buying 5,000 per month. In 1 instance, a single trapper contracted to deliver 5,000 hides to a Paris leather firm.

The price and harvest fluctuated from 1900 to 1929. Kersey reported that in 1912 tanneries stopped the purchase of alligator hides, probably resulting in a temporary lessening of pressure on populations. But Allen and Neill (1949) reported an annual take of 190,000 skins in 1929.

The reported harvest dropped to 6,800 skings by 1943 and then increased to 23,000 in 1947 (Allen and Neill 1949) (Fig. 1). In 1943 the alligator was afforded protection by state

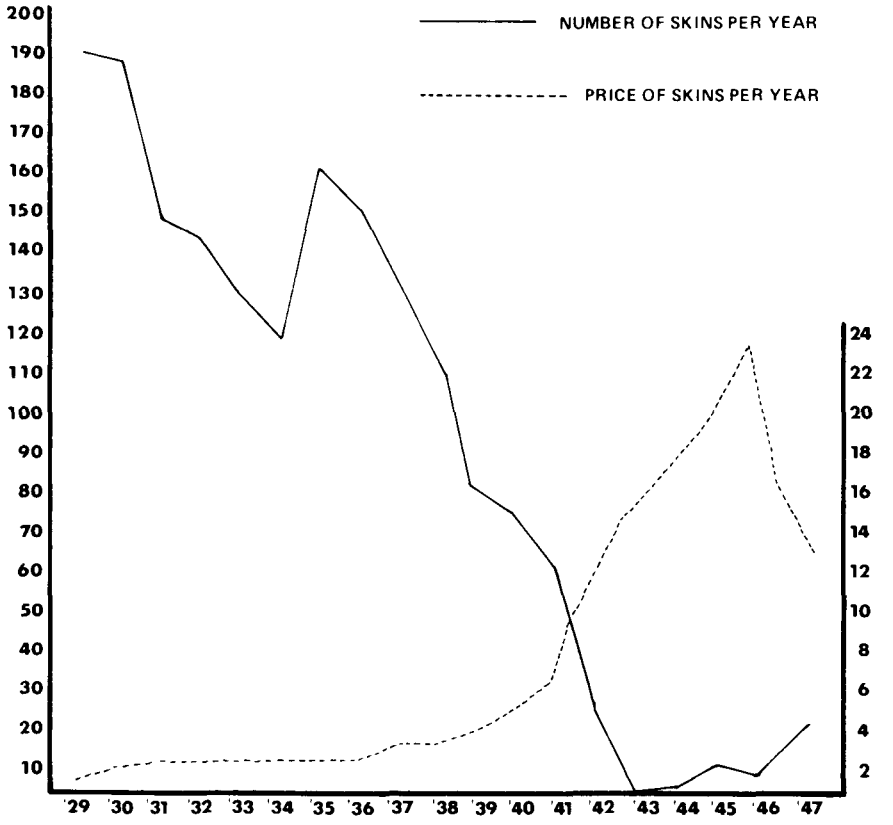

Fig. 1. The relationship between harvest rate and the price paid for a seven-foot hide; from hide dealer reports data in Allen and Neill, 1949.

statute for the first time when the breeding season was closed and the taking of animals under 4 feet (1.2m) was prohibited.

Allen and Neill believed the increased protection was responsible for a population recovery and subsequent increase in harvest. However, the possible effects of World War II taking potential hunters into the Army during the 1942 to 1945 period and the reliability of their information was not discussed by Allen and Neill.

Recent Harvest

In 1954, a 6 foot (1.8m) size limit was imposed and the GFC attempted to keep harvest records until 1961. These data cannot be used to determine trends in harvest or popultion status accurately because of incomplete reporting. But, based on review of reports and correspondence the general concensus in Florida during the late 1950's and early 1960's was that alligator populations were declining, and the season was closed in 1962.

It was also during the 1950's and 60's that additional drainage occurred and the development of marsh vehicles (airboats and marsh buggys) was perfected, thus negating some of the natural protection offered by large wetland areas.

From 1962 until 1970 illegal harvest of alligators continued. By 1965 the price had risen to a maximum of $7.00 per foot ($22.96/m), but most buyers were paying considerably less ($5.00 to $5.50/ft.). The size of the illegal hrvest from 1962 to 1970-71 is difficult to quantify since all of the activity during this period was illegal, but we documented 72,378 alligator hides purchased out of Florida from 1965 to 1971 by one buyer, and the 1970-71 records are known to be incomplete (Table 1). Other confiscated

TABLE 1. Documented number of illegal hides bought out of Florida by one buyer 1965 to 1971.

Year	Number of Hides
1965	4,931
1966	9,820
1967	17,033
1968	13,518
1969	15,674
1970[a]	11,262
1971[a]	140

[a]Known incomplete records

records (GFC files) indicate at least 9,000 other hides moved out of Florida in 1967. Based on the above information and numerous conversations with other buyers and hunters, it is probable that from 1965-1971, 140,000 hides moved out of Florida.

The Lacy Act was amended in 1969 and in force by January 1970. This amendment provided conservation agencies with a law to control interstate movement of alligator hides for the first time. During 1970 movement of alligator hides out of Florida was reduced and by 1971 virtually stopped (Chris Plott, Plott Hide & Fur, personal communication).

Size Distribution

There are many factors which may affect size distribution of the harvest and limit its use for determining popultion status. Such factors include, differential prices for different size of hides, ease of taking smaller sizes, and regulations placed on the taking of

alligators. However, with constant regulations, the composition of the harvest between years probably remained stable, unless particularly high prices were paid for specific size classes some years, or unless certain size classes were being overharvested and disappearing from the population.

Records of sizes of alligators taken by licensed hunters were kept by GFC Regional Managers from 1954 to 1962. These records were based on reports filed by hunters. Even though these data do not represent the true statewide kill, they probably represent a good sample of the size composition of the kill. There were undoubtedly some animals taken under the legal 6 foot (1.8m) size limit. But, major changes in the size composition of the population being harvested should be evident if they occurred. These data do not indicate any size classes were disappearing from the population at a disproportionate rate during the 1954 to 1962 period with 8 foot (2.4m) and above animals consistently making up in excess of 40% of the harvest (Fig. 2).

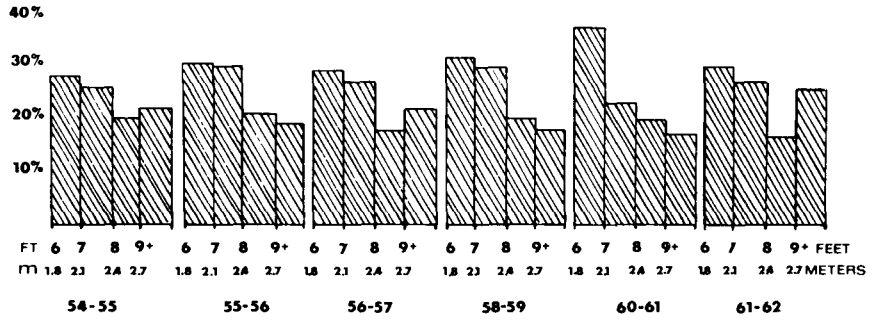

Fig. 2. Size composition of legal alligator harvest in Florida from 1954-1962.

The size composition of the illegal harvest from 1965 to 1971 was also examine for changes. We know there was an increased demand for smaller alligators for the Japanese market and that by 1970 the demand for larger aligators was not as great (Chris Plott, Plott Hide & Fur, personal communication). This precludes use of these data for explaining population status precisely, but the data are of value in that they may grossly represent general population status.

Both the size of the harvest and size composition of the 1965-71 harvest indicated a relatively large and productive population. Large numbers of 7 foot + (2.1m) animals (sexually mature) were being harvested during the period, but comparisons of size composition of the harvest between years does not indicate that any size classes were declining (Table 2). A chi square test ($p<.05$) comparing rate of harvest of adults, subadults and immatures did reveal differences in age (size) distribution between years. But, further examination of the data indicate the differences are probably the result of a very large sample size and unknown factors and no trends are evident (Table 3).

Size distribution of recent harvest resulting from Florida's nuisance alligator harvest program cannot be compared with either set of data presented thus far because of the program's bias toward removing large problem animals. However, up to 17% of the alligators harvested in 1977 were 10 feet (3.2m) or above (Hines & Woodward, unpublished data, Wildlife Research Laboratory, Gainesville, FL). Data generated by the same program during 1978 indicated that 12.5% of the statewide harvest of 1,840 animals was 10 feet (3.2m) and above. Even though no precise conclusions can be made in regard to these data is evident that very large alligators are presently common throughout Florida.

TABLE 2. Size class distribution of illegal alligator harvest, 1965 to 1970[a].

Year	2' (.61m)	3' (.92m)	4' (1.2m)	5' (1.5m)	6' (1.83m)	7' J(2.1m)	8' (2.7m)	9' (2.7m)	10' (3.0m)	11' (3.4m)	12' (3.7m)	13' (4.0m)
1965	338	1742	964	701	492	377	179	72	51	13	1	1
	7%	35%	18.5%	14.5%	11%	8%	3.5%	1.5%	1%	.5%	-	-
1966	1012	4043	1873	1157	815	596	276	86	49	7	6	-
	10%	41%	18%	11.5%	9%	5%	3%	1%	1%	1%	1%	-
1967	813	2946	1779	838	671	613	323	110	66	36	9	4
	11%	30%	23.5%	11e	9%	8%	4%	1.5%	1%	1%	1%	1%
1968	766	5112	2830	1151	890	499	253	80	37	14	9	-
	7%	43.5%	23%	9.5%	7%	4%	2%	1%	1%	1%	1%	-
1969	564	6220	3851	2092	1280	837	361	148	85	25	11	3
	4%	40%	24%	12.5%	8%	6%	2e	1%	1e	1%	1%	1%
1970	248	4029	2879	1473	836	341	180	34	-	-	-	-
	3%	39%∓	38∓	14%	8%	3%	2%	1%	-	-	-	-

[a]Taken from the records of one buyer.

TABLE 3. Age class distribution of alligators illegally harvested in Florida.

Year	Adult 6'+(1.8m)	Subadult 4-5'(1.2-1.5m)	Immature 0-3'(0-.9m)
1965	694	2157	2080
	14.07%	43.74%	42.18%
1966	930	3845	5055
	9.46%	39.11%	51.42%
1967	1161	3288	3759
	14.14%	40.06%	45.80%
1968	892	4871	5878
	7.66%	41.48%	50.49%
1969	1480	6784	7223
	9.56%	46.64%	43.80%
1970	555	518	4297
	5.53%	51.67%	42.80%

Alligator Surveys

Population surveys in the Everglades in 1967 and 1968 indicated that even though substantial poaching was occurring, very dense populations of alligators still occurred in some areas. Hines et al. (1968) ran night surveys and found maximum alligator densities during the dry season in the Everglades as high as 9.3 animals per km of canal. Thompson (personal communication) surveyed the perimeter canal of Loxahatchee Refuge in 1967 and sighted 1,234 alligators along 91.7 km of canal or 13.5 alligators per km in May 1967.

From 1968 until 1974 little population survey work was done in Florida, but during this period the general concensus was that the alligator population was increasing. This is substantiated by an increasing number of people complaining about nuisance alligators. By 1972 Colonel Brantley Goodson estimated that there were 4,000 alligator complaints received by the GFC. By 1977, this estimate of complaints had more than doubled. Schemnitz (1974) reported that complaints received in Ft. Lauderdale office of the GFC

increased from 17 in 1969 to 174 in 1972. Part of this increase could have been the result of an expanding human population in Florida, but a rapidly expanding alligator population undoubtedly was also responsible.

Results of night light counts since 1974 indicate a long-term statewide increase except for 1978 when high water was known to have lowered counts (Fig. 3). Mean counts on comparable survey lines increased from 3.2 alligators per km in 1974 to 8.1 km in 1977. The 1978 mean was 6.5 animals per km (Fig. 3).

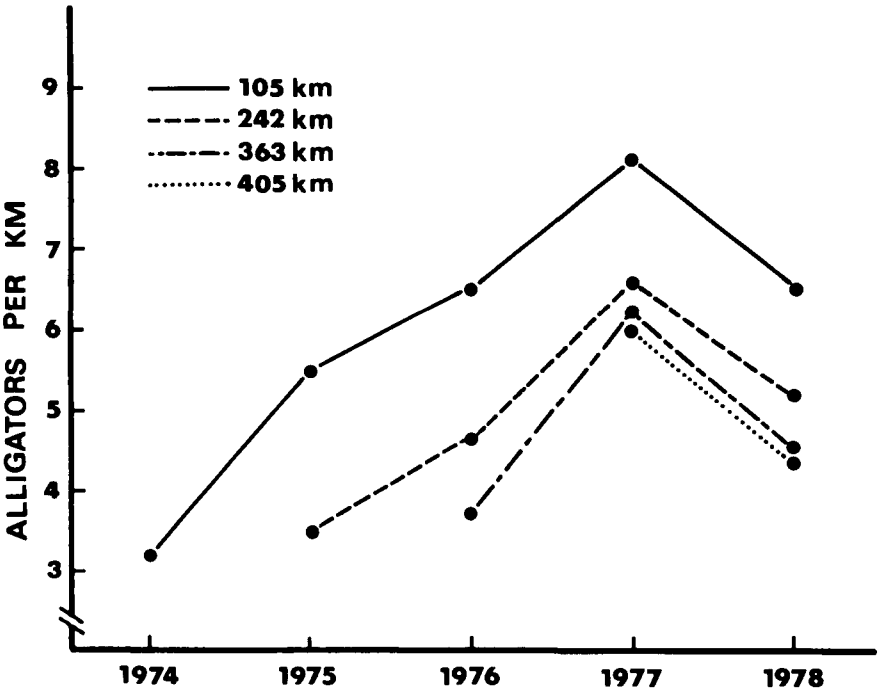

Fig. 3. Alligators sighted along comparable transects in Florida.

In view of the documented effects of water level and temperature on night counts (Woodward and Marion 1978) wide confidence limits must be placed on these data. Howvever, these counts represent minimum numbers along survey routes.

Additional insight into population status can be gained by examining alligator data gathered on Orange Lake by GFC biologists from 1975 to 1979. Orange Lake is a 4330 ha marsh-rimmed lake in southern Alachua County, Florida. Alligator populations are dense but there are other north and central Florida lakes where surveys have indicated higher populations (Lake Griffin 43.4 alligators/km of shoreline). A count around the perimeter of the lake run on the night of 18 September 1977 totaled 1,300 alligators. None of the deep marsh, which at that time covered in excess of 730 ha was counted. During the 1977 nesting season, 40 nests were monitored and approximately 50 were documented to have occurred on Orange Lake. During 1978, 47 nsts were monitored, and during 1979, 91 nests were documented.

Alligator Attacks

Hines and Keenlyne (1976) listed 16 attacks from 1948 until 1975, 5 of which occurred in 1975. By the fall of 1977, 14 additional attacks had occurred (GFC files). It is probable that the increased frequency of alligator attacks in recent years is due to alligator and human population increases as well as increased average size of alligators.

Habitat

Accurate determinations of the amount of the available wetlands in Florida are still not available. Shaw and Fredine (1956) listed 8,321,680 ha of swampland in Florida in 1850. Schortemeyer (1972) estimated that this had been reduced by 32% in 1965. Brooks (1974) reported that the large agricultural area south of Lake Okeechobee was drained beginning in 1906. Development and drainage have affected large areas of south Florida alligator habitat, a prime example of such habitat loss being the 24,300 ha north of Conservation Area III in the Everglades. This was prime alligator habitat as late as 1954 but has been virtually destroyed by water management drainage. In addition fresh marsh habitats in the Everglades have been altered via water management schemes resulting in severe water level fluctuations that have negatively impacted alligator populations (Hines et al. 1968, Schortemeyer personal communication.).

In spite of significant decreases in available alligator habitat, large amounts of productive habitat remain. Furthermore, it appears that because of government protection and/or the nature of certain types of wetland areas that much of it will remain as good alligator habitat for the foreseeable future.

There are a miminum of 1,194,364 ha of alligator habitat of varying quality that are presently under government protection. The bulk of these lands are in south Florida where human population has grown at the most rapid rate. These lands include state controlled areas, National Park Service lands, and U.S. Fish and Wildlife Service refuges (Table 4).

Chamberlain (1960) estimated that there were 11,137 km^2 of inland waters in Florida. Much of this is made up of the numerous lakes in central Florida. These areas remain much the same as in 1960 and they provide some of the best alligator habitat in Florida. Lake Griffin at Leesburg, Florida is representative of this habitat type, and densities of 43.4 alligators per km of shoreline have been recorded during night counts on this lake. Also, Lake Griffin has a dense human population around a large portion of the shoreline.

Other types of alligator habitat which are abundant in Florida include flatwoods (cypress ponds and fresh marshes), coastal marshes and rivers. Also, man-made wetlands (canals, etc.) provide some habitat.

Wetlands development is under strict scrutiny in Florida more than ever before. A minimum of 7 state of federal regulations now control development in and around wetland areas. While these do not preclude destruction of alligator habitat, it probably is more difficult than ever before.

DISCUSSION

There were at one time tremendous numbers of alligators and they have been commerically hunted beginning as early as 1800. This exploitation was not controlled by law for approximately 143 years and only poorly controlled until 1969 (26 more years). Populations were being reduced during the early to mid-1960's, but there are no data available which would substantiate that alligators should have been classified as endangered. Dense populations still occurred in some areas, and the rapid resurgence of the population and common occurrence of large (3.2m and above) animals indicate that a widespread residual population was present all along.

TABLE 4. Alligator habitat under government protection in Florida.

Area	Estimated Alligator Habitat (ha)
Everglades National Park	599,400
National Wildlife Refuges	68,910
Fakahatchee Strand	4,050
Big Cypress Area[a]	69,255
Everglades Wildlife Management Area	293,741
J.W. Corbett Wildlife Management Area	22,680
Holey Land and Rotenberger Tract	23,976
Bull Creek Wildlife Management Area	4,212
Apalachicola	61,965
Water Catchment Basin, West Palm Beach	4,860
Ocala	8,546
Osceola National Forest	2,673
Avon Park	12,150
Lower Apalachicola Environmentally Endangered Lands	12,150
Tosohatchee State Preserve	4,455
Myakka State Preserve	4,050
Jonathan Dickenson State Park	405
Hillsborough State Park	405
Paynes Prairie State Preserve	3,645
Wacasassa State Preserve	8,100
	1,194,364

[a]Purchase is presently underway

Alligators in Florida probably can withstand high levels of harvest but cannot maintain stable populations with the largely unrestricted pressure that they suffered during the 1960's. Such unrestricted pressure was brought on by more accessible habitat, better wetlands transportation and ineffective laws.

Early habitat destruction in Florida probably impacted alligator populations to a greater extent at that time than did hunting. But, Florida wetlands (particularly lakes) will remain much as they are now in regard to providing alligator habitat and it is unlikely that habitat destruction will have serious impacts on populations in the future. Instead the effectiveness with which we affect man's tolerance to living in close proximity to alligators may be the important consideration. Continuous human population increases will bring additional pressures for radical alligator control measures. These pressures can be countered by increasing public awareness of the ecological value of alligators and a rational management program that allows for controlled harvest of this renewable resource.

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