

# Migratory Bird Depredation Permits Issued to Southeast Aquaculture Facilities

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*Abstract:* This paper summarizes the issuance of federal depredation permits to commercial aquaculture facilities in the Southeast Region by the U.S. Fish and Wildlife Service from 1989 to 1996. Data were evaluated from 1,103 depredation permits issued to individual aquaculture facilities allowing lethal take of fish-eating birds. The take of 21 species of birds comprised of waders, fliers, and swimmers was permitted. In the 9 states where permits were authorized, the number of facilities receiving permits increased from 54 in 1989 to 228 in 1996. The number of birds allowed in the take increased from 7,401 in 1989 to 28,991 in 1996. Sixty percent of the birds permitted for take at aquaculture facilities were reported taken. The double-crested cormorant (*Phalacrocorax auritus*) was the species most often requested for taking ( $N = 70,888$ ). Most depredation permits were issued to aquaculture sites in Mississippi ( $N = 459$ ) and Arkansas ( $N = 448$ ). We conclude that the trend in permit issuance reflects the increased number of commercial aquaculture facilities in the Southeast, increased awareness of the problem and increases in some fish-eating bird populations such as the double-crested cormorant.

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Aquaculture is defined as growing aquatic organisms (e.g., plants, invertebrates, and finfish) under controlled conditions (Price and Nickum 1995). In North America, approximately 30 species of aquatic organisms are cultivated (Price and Nickum 1995). Growth of aquaculture has been rapid since the mid 1980s. The value of aquaculture in the United States in 1993 was \$875 million dollars (Price and Nickum 1995) not including the public sector (i.e., aquaculture production in federal, state, and tribal

hatcheries). Catfish (*Ictalurus punctatus*) account for about half of the monetary value of aquaculture in the United States (Broussard 1990). The number of commercial catfish farm operators in Mississippi, Arkansas, Alabama, and Louisiana, totaled 899 in 1996.

Common avian predators at aquaculture sites in the Southeast are wading birds (e.g., egrets, herons, and ibis), fliers (e.g., gulls, kingfishers, and terns) and swimmers (e.g., cormorants, anhingas, pelicans, and mergansers). Fish-eating birds became a problem in the Southeast in the mid 1980s (Stickley and Andrews 1989). Wading birds such as great blue herons (*Ardea herodias*) and great egrets (*Casmerodius albus*) present problems. These birds have learned to plunge dive and fish like pelicans, a change in behavior that has presented even more challenges in solving the problem of predation (Morey and Smits 1987). Flying birds rank lowest in terms of the number of depredation permits issued. Their numbers and impacts, except under very local situations, are not noteworthy.

Most depredation permits are issued for swimmers, than for either waders or fliers, with more than half of the permits issued for 1 particular swimmer, the double-crested cormorant. Roosts of this species usually contain 1,000 to 10,000 individuals in the Delta Region of Mississippi. Nationally, cormorant populations have increased an average of 5.5%/year from 1966 to 1993 (Peterjohn et al. 1994). In the mid-South, increases in cormorant populations parallel similar growth in the commercial catfish industry (Jackson and Jackson 1995). Losses from cormorants in the Delta Region have been projected at \$2 million dollars annually (Glahn and Stickley 1995). In 1988 a questionnaire to 281 catfish growers in Mississippi revealed that 57% of the Mississippi Delta growers considered cormorants to be a problem at their farms (Stickley and Andrews 1989). In Arkansas, estimates of annual losses of baitfish alone (i.e., minnows and shiners) from wading birds are in excess of \$100,000/year (Hoy 1994).

The U. S. Department of Agriculture's Animal Damage Control (ADC) group at Mississippi State University has been conducting research and field tests since 1988 to alleviate the problems of bird depredation at aquaculture facilities (Glahn and Stickley 1995). As a group, ADC provides technical advice, research, development of management plans and recommendations, and directs damage control. A variety of nonlethal devices are available to discourage birds from frequenting aquaculture facilities. In addition to exclusion and barrier mechanisms, there are visual and pyrotechnic tools. In 1986, federal responsibility for dealing with animal damage control problems, including depredation by migratory birds, was transferred to the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) from the U.S. Fish and Wildlife Service (USFWS) (Trapp et al. 1995).

In this paper we summarize the increase in issuance of federal depredation permits to aquaculture facilities within the Southeast by the USFWS. The study was done to examine the increased issuance of depredation permits and to have data readily available to respond to inquiries from state, private, and other groups interested in aquaculture depredation by fish-eating birds.

**Methods**

For purposes of this study, data were collected from the 10 states comprising the Southeast Region of the USFWS (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee), Puerto Rico, and the U.S. Virgin Islands. Data were obtained from 1989 through 1996 from a national USFWS database used by each of the 7 regional offices. The database holds federal wildlife permit data for 14 types of federal permits that allow the handling and possession of migratory birds protected by the Migratory Bird Treaty Act of 1918 (i.e., taxidermy, scientific collecting, wildlife rehabilitation, and falconry). Data are entered as permits issued and renewed, and as reports from permit holders that are received documenting permitted activity. While the data obtained can be summarized for annual review and scrutiny, they cannot be readily examined over a period of years. To review trends over time, a separate tally of annual data was made and summarized.

**Results**

Depredation permits were issued in 9 states between 1989 and 1996 (Table 1). No aquaculture depredation permit was issued in Kentucky, Puerto Rico, or the Virgin Islands. An increase from 54 facilities to 228 facilities reflects a fourfold rise in permits issued over the 8-year period. Mississippi was issued the most permits ( $N = 459$ ) followed by Arkansas ( $N = 448$ ) and Louisiana ( $N = 50$ ).

During 1989 to 1995, 105,554 fish-eating birds of 21 species were authorized to be taken, with 63,715 (60%) actually reported as taken (Table 2). This percentage was rather consistent over the years sampled, suggesting that a level of effort by the fish farm operator is achieved relative to the time and effort it takes to keep them away. The number authorized in 1996 ( $N = 28,991$ ) was 3.9 times the number authorized in 1989 ( $N = 7,401$ ). We believe there are 3 reasons for the increase. First, awareness of the problem and of control methods has increased among aquaculture facility

**Table 1.** Number of aquaculture facilities by state that received a federal depredation permit to take  $\geq 1$  species of migratory bird in the Southeastern Region of the U. S. Fish and Wildlife Service, 1989 to 1996.

| State       | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|-------------|------|------|------|------|------|------|------|------|
| Alabama     | 1    | 2    | 2    | 3    | 5    | 9    | 10   | 10   |
| Arkansas    | 23   | 40   | 52   | 57   | 60   | 63   | 78   | 75   |
| Florida     | 0    | 0    | 0    | 0    | 2    | 2    | 4    | 6    |
| Georgia     | 0    | 1    | 4    | 4    | 3    | 4    | 4    | 4    |
| Louisiana   | 2    | 5    | 7    | 6    | 6    | 6    | 8    | 10   |
| Mississippi | 28   | 41   | 49   | 47   | 52   | 57   | 79   | 106  |
| N. Carolina | 0    | 1    | 2    | 5    | 10   | 8    | 9    | 11   |
| S. Carolina | 0    | 0    | 0    | 2    | 1    | 2    | 4    | 4    |
| Tennessee   | 0    | 0    | 0    | 1    | 2    | 1    | 1    | 2    |
| Total       | 54   | 90   | 116  | 125  | 141  | 152  | 197  | 228  |

**Table 2.** Number of migratory birds authorized for taking and number reported taken in the southeastern United States.

| Year  | Authorized | N<br>reported<br>taken | % taken |
|-------|------------|------------------------|---------|
| 1989  | 7,401      | 3,601                  | 49      |
| 1990  | 12,024     | 6,731                  | 56      |
| 1991  | 15,610     | 7,777                  | 50      |
| 1992  | 14,001     | 8,502                  | 61      |
| 1993  | 15,464     | 9,980                  | 65      |
| 1994  | 18,569     | 12,498                 | 67      |
| 1995  | 22,475     | 14,626                 | 65      |
| 1996  | 28,991     | a                      |         |
| Total | 134,535    | 63,715                 | 60      |

<sup>a</sup>Data not yet available.

owners due largely to ADC and State Extension Office outreach and education efforts, and those of fish farm and aquaculture organizations. Second, the number of aquaculture facilities has increased. Third, the number of birds at aquaculture sites, especially double-crested cormorants, has increased.

Permits to take double-crested cormorants were requested most frequently (54% of all requests). In 1989, 3,143 cormorants were authorized compared to 16,485 in 1996. The average number of cormorants authorized and taken each year through 1995 was  $\bar{x} = 7,793 \pm 2,938$  and  $\bar{x} = 5,032 \pm 2,004$ , respectively (Table 3). Five species are most frequently requested for lethal control at aquaculture sites (Table 4). The "other" category consists of less troublesome or less numerous species, primarily

**Table 3.** Number of double-crested cormorants (*Phalacrocorax auritus*) authorized for taking and the number reported taken in the southeastern United States.

| Year  | Authorized | N<br>reported<br>taken | % taken |
|-------|------------|------------------------|---------|
| 1989  | 3,143      | 1,825                  | 58      |
| 1990  | 5,738      | 3,797                  | 66      |
| 1991  | 7,479      | 4,312                  | 58      |
| 1992  | 7,398      | 4,925                  | 66      |
| 1993  | 8,428      | 5,581                  | 66      |
| 1994  | 10,098     | 6,990                  | 69      |
| 1995  | 12,264     | 7,795                  | 63      |
| 1996  | 16,485     | a                      |         |
| Total | 71,033     | 35,225                 | 65      |

<sup>a</sup>Data not yet available.

**Table 4.** Number of aquaculture facilities that received federal depredation permits by take species, 1989 to 1996, in the southeastern United States.

| Species  | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|--|------|------|------|------|------|------|------|------|
| Double-crested cormorant<br>( <i>Phalacrocorax auritus</i> )   | 50   | 87   | 112  | 118  | 131  | 149  | 186  | 215  |
| Great blue heron ( <i>Ardea herodias</i> )                     | 43   | 75   | 92   | 95   | 120  | 130  | 159  | 192  |
| Great egret ( <i>Casmerodus albus</i> )                        | 38   | 58   | 62   | 69   | 75   | 90   | 124  | 151  |
| Snowy egret ( <i>Egretta thula</i> )                           | 10   | 20   | 22   | 24   | 32   | 35   | 47   | 57   |
| American white pelican<br>( <i>Pelecanus erythrorhynchos</i> ) | 1    | 4    | 6    | 2    | 13   | 16   | 28   | 41   |
| Other  | 32   | 52   | 70   | 42   | 40   | 49   | 61   | 62   |

gulls, herons, and grebes. The number of species routinely allowed for taking by federal permit was reduced from 21 to 11 after 1992, based on a reevaluation by the state fish and wildlife agencies. We believe there should be closer monitoring of the less frequent or abundant species, and that they should be handled on a case-by-case basis.

## Discussion

The Migratory Bird Treaty Act of 1918 provides protection to migratory birds, including fish-eating birds (USFWS 1995; 16 U.S.C. 703–712; Ch. 128; July 13, 1918; 40 Stat. 755, as amended). Regardless, it was not until 1972 that 6 species of cormorants were protected under federal law (Trapp et al. 1995). Regulations implementing the Migratory Bird Treaty Act are published in the Code of Federal Regulations (Title 50, Wildlife and Fisheries. 1995. U.S. Government Printing Office, Washington, D.C. 732 pp). Procedures specifically relating to the issuance of permits for the control of depredating birds are in Section 21.41 of Title 50. An entire section is devoted to the control of depredating birds (Part 21, Subpart D of Title 50 of the Code). The section discusses permit requirements, applicant procedures, additional permit conditions, and the tenure of the permit. The regulations clearly state that a permit is required to take or kill migratory nongame birds. No permit is required to merely scare or herd migratory birds that are causing depredation problems unless the birds are federally threatened or endangered.

Georgia and South Carolina require aquaculture owners to obtain a state permit prior to obtaining a federal permit. The remaining state agencies are involved from a policy standpoint by communicating with the federal permit office in Atlanta, Georgia. Objectives of depredation permit issuance are to provide immediate short-term relief to aquaculturists from economic losses, to provide aquaculturists time to construct and employ existing or newly developed technology, and to provide adequate protection to both migratory birds and aquaculturists until long-term solutions are developed.

## Management Implications

Development of a draft environmental assessment (EA) regarding the double-crested cormorant and proposed regulations by the USFWS were underway in 1996 to reduce economic losses. One alternative recommendation in the draft EA is to develop a Depredation Order that would allow unlimited take of cormorants at commercial aquaculture facilities. The document is to be available for public comment in 1996. Similar depredation orders are presently in effect for purple gallinules (*Ionornis martinica*) in Louisiana rice crops and for red-winged blackbirds (*Agelaius phoeniceus*) and brown-headed cowbirds (*Molothrus ater*) when committing economic losses or when constituting a health hazard.

The USFWS is developing a national database to improve the efficiency, consistency, and knowledge base concerning permit issuance. The USFWS is committed to working with USDA/APHIS/ADC, U.S. Geological Survey Biological Resources Division, state agencies, commercial and private aquaculturists, law enforcement officials, and the conservation community to reduce impacts of fish-eating birds at aquaculture facilities and at other sites where depredating birds are a problem.

New technologies are needed to reduce the economic impact at aquaculture facilities. Data are also lacking on the impacts on lakes and reservoirs where cormorants and other fish-eating birds may be competing with sport fishing. Some research exists (Nettleship and Duffy 1995), but more is needed. Close cooperation among the responsible agencies mentioned above is essential. We need better information on seasonal distribution and abundance of fish-eating birds, their economic impacts, and the comparative effectiveness of removing limited numbers of fish-eating birds from areas. Regarding double-crested cormorants, Dolbeer (1991) concluded there is no apparent focal point of cormorant nesting in the northern U.S. or Canada that is a source of wintering birds in the Lower Mississippi Valley. His analysis of 5,589 band recoveries showed overlap and mixing of wintering populations of cormorants from a variety of breeding areas. This implies that large scale control programs on the breeding grounds would be difficult.

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