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EVALUATION OF OFF-ROAD VEHICLE USE ON
CHINCOTEAGUE NATIONAL WILDLIFE REFUGE

1980

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Fish and Wildlife Service

Chincoteague National Wildlife Refuge

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ABSTRACT

This report is a three year summary of an evaluation of off-road vehicle use on Chincoteague National Wildlife Refuge in compliance with Executive Orders 11644 and 11989 and Fish and Wildlife Service Policy Update #8. Executive Order 11989 amends Executive Order 11644, which established policies and procedures for operation of off-road vehicles on federal lands. Fish and Wildlife Service Policy Update #8 outlines Service policy and guidelines for implementing Executive Order 11644. Chincoteague Refuge allows off-road vehicle access in a 4.6 mile section of beach which is managed by special regulations. This study consisted of a review of: Executive Orders 11644 and 11989, FWS policy and special regulations; off-road vehicle visitation figures and violations; off-road vehicle permit operation costs and fee revenue data; a literature search on off-road vehicle impact studies; historical use; and field research into impacts upon wildlife and habitat.

Results of this study indicate that special regulations which govern off-road vehicle access on Chincoteague Refuge need to be amended in order to be in compliance with Executive Order 11644, Executive Order 11989, and FWS Policy Update #8. Significant adverse impacts are occurring due to off-road vehicle travel.

- (1) Off-road vehicle travel along the access corridor to Tom's Cove bay beach is resulting in the destruction of salt marsh vegetation (Spartina alterniflora). The vehicle access corridor was sandy beach previously, however, erosion within the last 5 years has transformed this section of beach into intertidal sand flat. Vehicles must now travel through the Spartina at high tide for access to the bay beach. The destruction of Spartina by vehicles is occurring and revegetation is not occurring because of continuous impacting.

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- (2) Beach habitat that is preferred by least terns for nesting is disrupted to such an extent that nesting is not possible. The southern one-half mile of ocean beach is preferred tern nesting habitat due to its wide sandy shelly substrate, and its proximal location to the ocean, the inlet and Tom's Cove bay. The beach provides a nesting substrate while the proximal waters afford local feeding and loafing areas. A temporary ten acre enclosure was constructed within this southern one-half mile of preferred nesting habitat and attracted a breeding colony of least terns in all three years of study. In 1979, the 186 nesting pairs of least terns within the enclosure represented 22% of the entire state of Virginia's least tern nesting pairs documented in 1977. Although the enclosure was effective in attracting a nesting colony in all 3 years, the daily inspection and maintenance costs of the fence was not cost or manpower efficient. Therefore, due to the significance of Chincoteague Refuge as a tern nesting area, this southern one-half mile of preferred least tern nesting habitat should be closed to off-road vehicle access during the breeding season.

It is proposed that off-road vehicle special regulations be amended as follows:

- (1) Enforce a permanent closure of Tom's Cove bay beach to off-road vehicle travel. This would eliminate the destruction of salt marsh vegetation in that area.
- (2) Enforce a seasonal closure (April 1 to August 1, annually) of the southern one-half mile of refuge ocean beach to vehicular travel. This would eliminate the disturbance of preferred least tern nesting habitat during the breeding season.

The closure of these two areas of wildlife and habitat disturbance will result in the permanent loss of 1.1 miles and a summer season loss of .5 mile of the total 4.6 miles open to off-road vehicle travel.

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The 42 vehicle carrying capacity within the off-road-vehicle zone was based on allowing one vehicle per 500 feet. In 1976, an original 4 miles of beach was open but accretion has expanded the area to 4.6 miles. Under the reasoning of 1 vehicle per 500 feet, the proposed closure of 1.6 miles would reduce the number of vehicles allowed on the beach at one time to 32. A reduction of 10 vehicles would increase the present congestion problem on summer weekends with off-road vehicles waiting for access to the beach. It is recommended that the 42 vehicle quota be maintained. If problems of safety, littering or law enforcement occur due to beach congestion, a solution can be resolved by a management decision to reduce the number of vehicles to 32.

An efficient method of effecting the proposed closures is to cable the boundaries and to sign the area explaining the closure.

A pedestrian access route should be designated around the proposed closed tern nesting area boundary so that fishing privileges at Fishing Point are available with only a short walking distance from off-road vehicle travel routes.

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Introduction

The Chincoteague National Wildlife Refuge (CNWR) allows off-road vehicle (ORV) travel in a 4.6 mile section of beach which is managed by special regulations. ORV travel on the refuge beach has increased from 1,873 visits in 1969 to 11,327 visits in 1979. This study monitored the effects of off-road vehicle use on Chincoteague Refuge in compliance with Executive Orders 11644 and 11989 and Fish and Wildlife Service Policy Update #8. In this summary report (1978-1980), ORV management is reviewed, operation costs are examined, impacts are evaluated and the need to amend special regulations governing ORV's is identified.

Methods

A literature search collected available studies related to ORV's and other public recreational uses and associated impacts. Fish and Wildlife Service (FWS) and National Park Service (NPS) files were reviewed for ORV historical use patterns, visitation figures and violations. Administrative officers of respective agencies provided ORV permit operations cost and fee revenue data.

Field research encompassed the examination of 16 miles of refuge beach divided into 3 recreational usage-zones which represent distinct areas of recreational activities. The location of the usage-zones are identified in Map A.

Zone 1 - North beach area - the northern 10 miles of refuge beach that is not open to ORV traffic but is open to foot traffic.

Zone 2 - Pedestrian access beach area - a two mile stretch of beach which is readily accessible to foot traffic and contains the majority of pedestrian summer recreational activities. It is not open to vehicular travel.

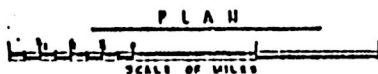
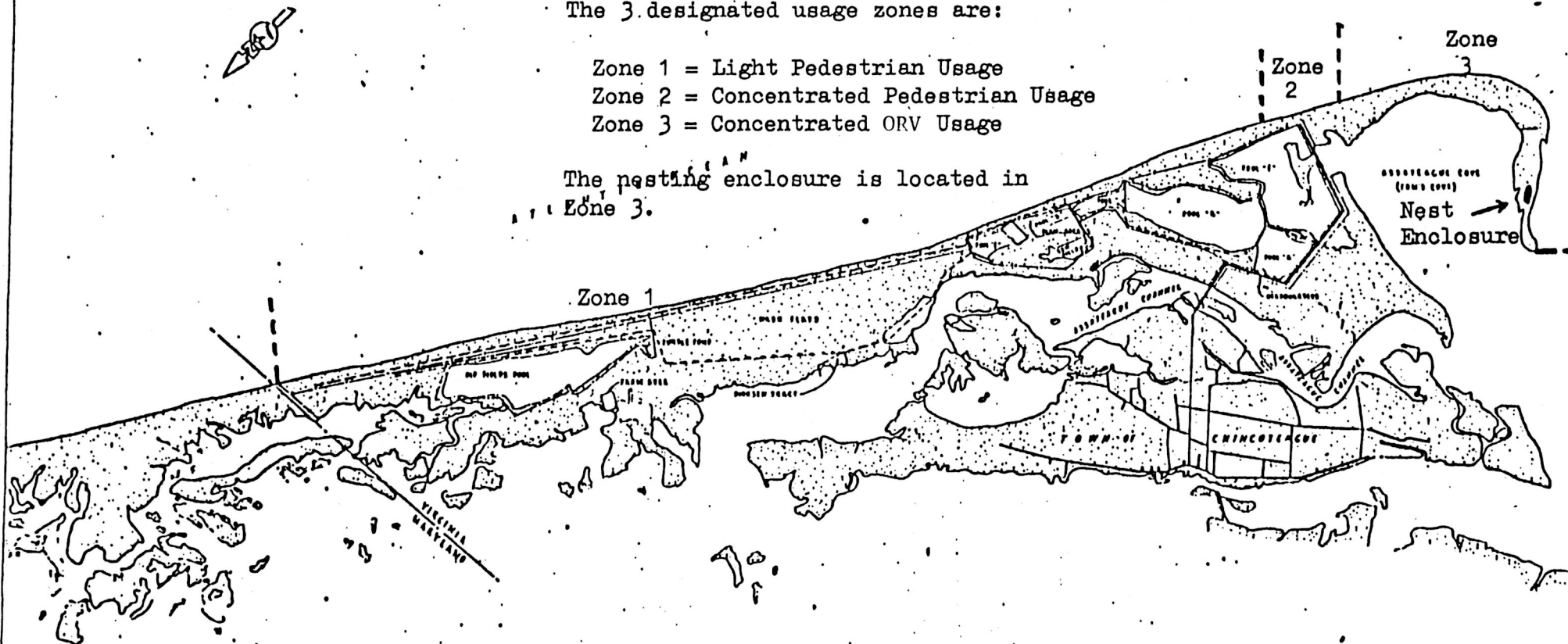
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Map A. Chincoteague National Wildlife Refuge, Chincoteague, VA

The 3 designated usage zones are:

- Zone 1 = Light Pedestrian Usage
- Zone 2 = Concentrated Pedestrian Usage
- Zone 3 = Concentrated ORV Usage

The nesting enclosure is located in Zone 3.



DATE	REVISION	BY
UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE BUREAU OF SPORT FISHERIES AND WILDLIFE DIVISION OF FISH AND WILDLIFE		
COUNTY	CHINCOTEAGUE	
STATE	VIRGINIA	
BIOLOGICAL MAP		
PROJECT	CHINCOTEAGUE	
DATE	1964	1964
BY	W. A. VA-365-210	SHEET 1 OF 1

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Zone 3 - ORV usage area - the southern 4.6 mile stretch of beach open to ORV traffic and foot traffic.

The purpose in establishing the usage zones was to evaluate ORV impacts compared to pedestrian use impacts and natural forces.

Additional areas of research included field investigations into impacts upon wildlife and habitat and a review of the pros and cons of ORV travel on Chincoteague Refuge. Detailed field data that supports the basis of recommendations made in this study are referenced in the Literature Cited section.

Executive Orders 11644 and 11989

Executive Order 11644 (Appendix A) established policies and procedures to ensure that the use of off-road vehicles on public lands are controlled and directed so as to protect the resources of those lands, to promote the safety of all users on those lands, and to minimize conflicts among the various uses of those lands. Regulations governing off-road vehicles shall be in accordance with the following:

- (1) Areas and trails shall be located to minimize damage to soil, watershed, vegetation, or other resources of the public lands.
- (2) Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats.
- (3) Areas and trails shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.
- (4) Areas and trails shall not be located in officially designated Wilderness Areas or Primitive Areas.

Executive Order 11989 (Appendix B) amended Executive Order 11644 with a "Special Protection of the Public Lands" clause which states that whenever a respective agency head shall determine that the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat of particular areas or trails of the public lands, the areas of trails shall immediately be closed to the type of off-road vehicle causing such effects, until such time as it is determined that such adverse effects have been eliminated and that measures have been implemented to prevent future recurrence.

FWS Policy On Off-Road Vehicles

On units where the use of off-road vehicles occur, an annual on-site review shall be conducted to assure adherence to Policy Update No. 8 (Policy and Guidelines for Implementing Executive Order 11644 Concerning Control of Off-Road Vehicles on Bureau Lands). The review shall evaluate ORV access to determine that such access is compatible with refuge objectives. It shall also evaluate the probable impacts of ORV's on wildlife and the habitat. A research program is not generally conducted for evaluating impacts upon wildlife and habitat. However, due to special considerations of public access at CNWR, intraservice research studies were conducted in addition to outside agency studies being contracted.

Historical Use

After the establishment of CNWR in 1943, ORV use was continued due to historical use of the area. Prior to opening of the refuge to the public via the Assateague bridge in November, 1962, ORV's were the only land transportation that could be used because only the sandy beach area was open for vehicle travel. At this time the entire 16 miles of refuge beach was open to vehicles. Restriction of ORV traffic was first enacted in 1963 with the construction of the northern refuge boundary fence, thus preventing the crossing of vehicles from Maryland. Upon completion of the boundary fence, only the southern 5 miles of refuge beach remained open to ORV traffic. Beach buggy rentals were available by the hour or the day during the summer of 1964, a sign of the growing interest in off-road vehicles as a recreational activity on the refuge beach. In

1965, the restriction of ORV travel was extended 1 mile to the south leaving only the southern 4 miles of beach open to vehicular traffic. In 1976, further restrictions were enforced: an ORV permit fee was inaugurated; vehicle standards were set; a 42 vehicle quota was initiated; and travel regulations were established. ORV policies have continued with minor changes through 1980.

Special Regulations

Special regulations govern ORV travel on CNWR and are presented in Appendix C, Operation of Oversand Vehicles on Assateague Island National Seashore. The primary regulations are:

1. A special permit is required.
2. An inspection of vehicles is conducted to insure proper equipment.
3. Speed limit on the beach is 25 mph.
4. A 42 vehicle limit is enforced.
5. Access is only to the southern 4.6 miles of beach.
6. Travel is restricted to the beach surface.
7. There is a special recreational use fee for ORV's.

Visitation

ORV travel has increased from 1,873 visits in 1969 to 11,564 visits in 1978, a 6-fold increase within 10 years. The 42 vehicle quota regulates numbers of vehicles on the beach at one time.

Table I presents annual public visitation and off-road vehicle statistics from 1969 through 1980 (1974 totals not available for ORV visitation).

Table II presents annual, monthly and average daily visitation by ORV's from 1969 through 1980 (1974 totals for ORV visitation not available).

TABLE I
Chincoteague National Wildlife Refuge's Annual Totals
For Public Visitation and Off-Road Vehicles
For 1969-1980 (excluding ORV total for 1974).

YEAR	PUBLIC VISITATION	% INCREASE OR DECREASE OVER PREVIOUS YEAR	ORV VISITATION	% INCREASE OR DECREASE OVER PREVIOUS YEAR
1969	642,137	Increased 27%	1,873	-
1970	824,287	Increased 28%	2,207	Increased 18%
1971	729,737	Decreased 11%	2,712	Increased 23%
1972	890,607	Increased 22%	2,451	Decreased 10%
1973	1,054,595	Increased 18%	2,486	Increased 1%
1974	1,085,045	Increased 3%	No Total	-
1975	1,108,501	Increased 2%	3,888	Increased 56% over last 2 years.
1976	1,118,328	Increased 1%	5,173	Increased 33%
1977	1,185,424	Increased 6%	6,620	Increased 28%
1978	1,259,609	Increased 6%	11,564	Increased 75%
1979	1,156,315	Decreased 9%	11,327	Decreased 2%
1980	1,311,584	Increased 13%	12,993	Increased 15%

TABLE II
Chincoteague National Wildlife Refuge off-road vehicle statistics
1969-1980 (excluding 1974). Monthly, annual and average daily visits (in parenthesis) for Tom's Cove Hook area.

Month	1969	1970	1971	1972	1973	1975	1976	1977	1978	1979	1980
January	62 (2)	62 (2)	62 (2)	62 (2)	38 (1)	124 (4)	155 (5)	186 (6)	248 (8)	136 (4)	190 (6)
February	56 (2)	56 (2)	56 (2)	56 (2)	44 (2)	112 (4)	145 (5)	168 (6)	145 (5)	105 (4)	177 (6)
March	62 (2)	62 (2)	62 (2)	62 (2)	60 (2)	155 (5)	186 (6)	248 (6)	218 (7)	241 (8)	92 (3)
April	120 (4)	120 (4)	150 (5)	150 (5)	200 (7)	180 (6)	210 (7)	300 (10)	464 (15)	452 (15)	492 (16)
May	124 (4)	155 (5)	155 (5)	155 (5)	400 (13)	248 (8)	372 (12)	465 (15)	693 (22)	704 (23)	1425 (46)
June	361 (12)	256 (8)	870 (29)	330 (11)	200 (7)	450 (15)	600 (20)	1110 (37)	1535 (51)	1738 (58)	1483 (49)
July	361 (12)	687 (22)	496 (16)	682 (22)	410 (13)	868 (28)	1236 (40)	1235 (40)	2948 (95)	2887 (93)	2542 (82)
August	361 (12)	413 (13)	465 (15)	558 (18)	384 (12)	899 (29)	1236 (40)	1232 (40)	2850 (92)	2495 (80)	4598 (143)
September	120 (4)	150 (5)	150 (5)	150 (5)	375 (13)	360 (12)	480 (16)	620 (20)	1240 (41)	1377 (46)	1489 (50)
October	124 (4)	124 (4)	124 (4)	124 (4)	200 (7)	248 (8)	248 (8)	515 (17)	687 (22)	705 (23)	110 (4)
November	60 (2)	60 (2)	60 (2)	60 (2)	100 (3)	120 (4)	150 (5)	311 (11)	366 (12)	383 (12)	220 (7)
December	62 (2)	62 (2)	62 (2)	62 (2)	75 (2)	124 (4)	155 (5)	200 (6)	170 (5)	104 (3)	175 (6)
Totals	1873	2207	2712	2451	2486	3888	5173	6620	11564	11327	12993

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Violations

Violations of special regulations by ORV's on Chincoteague Refuge have not resulted in significant problems of human safety, sand dune protection, habitat disruption or wildlife disturbance. Voluntary compliance with special regulations was important as well as a significant law enforcement effort being effective. The major extent of property damage has been to personal vehicles that have sustained water damage. One vehicle rolled over due to mechanical failure in the steering cable. However, there have been no serious injuries as a result of ORV traffic (personal communication with NPS District Ranger).

The following citations have been issued:

<u>VIOLATION</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>
Failure to obtain ORV Permit	18	11	19
Driving on dunes	2	10	4
Equipment violation	2	0	5
Careless driving	3	0	0
False information on ORV permit	0	0	1
ORV violations issued	24	21	29
Total Refuge Violations issued	260	268	291

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Permit Operation Costs and Fee Revenue Data

The NPS serves as a FWS agent and is primarily responsible for ORV permit administration on the refuge. NPS inspects vehicles, issues permits, collects permit fees and enforces ORV regulations. Fee revenues are transferred to FWS.

NPS funds are programmed and spent on a functional basis within specific accounts and are posted on a seashore (MD and VA) basis. Therefore, it is difficult to identify NPS off-road vehicle permit operation costs on the refuge portion (VA) of the Seashore. Table III shows very rough estimates for NPS off-road vehicle permit operation costs on Chincoteague Refuge for FY1978, FY1979, and projected FY1980. Table IV shows NPS collected ORV fee revenue data and FWS disbursements to NPS for ORV operation costs.

Over the last 3 years (1978-1980), ORV permit costs have totalled roughly \$85,120 while ORV permit revenues have totalled \$30,053.

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TABLE III. Estimated National Park Service Off-Road Vehicle Permit Operation Costs on Chincoteague Refuge for FY1978, FY1979 and Projected FY1980.

	FY 1978	FY 1979	PROJECTED FY 1980
Off-road Vehicle Permit Operation Costs	Administration- 16105 Enforcement- 550 Other-Supplies 9990 and equipment	Administration- 17620 Enforcement- 390 Other-Supplies 8490 and equipment	Administration- 19045 Enforcement- 600 Other-Supplies 12330 and equipment
	Total: \$26,645	Total: \$26,500	Total: \$31,975
Total (\$) Virginia District Operating Expenses	\$206,420	\$217,732	\$250,046

TABLE IV. National Park Service Off-Road Vehicle Fee Revenues and Fish & Wildlife Service Disbursements to National Park Service for Operation Costs.

	FY1978	FY1979	FY1980
NPS Collected ORV Permit Fees	\$4,020	\$7,160	\$18,873
FWS Disbursement to NPS for ORV Operation Costs	\$2,000 (approx.)	\$0	\$6,000
ORV Permit Fee Per Vehicle	\$5.00	\$5.00	\$15.00/year or \$10.00 for 7 day permit.

Research Contract Studies

Research studies were contracted to investigate public use impacts, primarily ORV travel. The initial contract study began in 1978.

Author & title of study:

Steiner, A.J. and S.P. Leatherman. 1979. A Preliminary Study Of The Environmental Effects of Recreational Usage On Dune And Beach Ecosystems Of Assateague Island. UM-NPSCRU Report #44, Amherst, MA.

Duration of Study:

June - August, 1978.

Cost of Study: \$10,000 (shared jointly by FWS & NPS)

Following the completion of the UM-NPSCRU study, Assistant Secretary Herbst indicated that an additional 2 year research study would be contracted. The second contract study began in 1979.

Author & title of study: Applied Biology, Inc. 1980. Assateague Island Ecological Investigations. Atlanta, GA

Duration of Study:

August 1979 - May 1980.

Cost: \$25,000 (shared jointly by FWS & NPS)

A 1980-1981 study is presently being formulated:

Author & title of study: Department of Environmental Science,
University of Virginia, Charlottesville, VA. Frequency
Spectrum of Oceanic Overwash Events on Assateague Island
National Seashore: Implications of Natural Disturbances
for Habitat and Community Development.

Duration of Study:

October, 1980 - December 1981

Cost: \$25,000 (shared jointly by FWS & NPS)

Since 1978, the FWS and NPS have jointly funded research studies totaling \$60,000 to investigate ORV impacts on Assateague Island.

Pros and Cons of ORV Travel

ORV travel is a primary recreational endeavor for approximately 1% of the total annual refuge visitation. Vehicle travel is used to gain access to prime fishing areas along the south beach and Tom's Cove inlet, shell collecting, sunbathing, and recreational driving. On summer weekends and holidays there is commonly a closure of beach travel because of the 42 vehicle quota. ORV enthusiasts have waited in line for up to 3 hours in order to gain access to the beach. A local 4WD enthusiast complained that there is "total mismanagement" because of the long delays. Chincoteague town officials have recommended that the ORV quota be increased to accommodate the increased visitation. A local corporation has requested a special permit to transport fishermen (by vehicle) to the ORV fishing zone under a concession operation.

On the other hand, several conservation groups have opposed vehicular travel on the refuge beach. These organizations have complained that ORV travel is responsible for adverse impacts such as: the destruction of salt marsh in Tom's Cove bay; disturbance to nesting shorebirds; endangers other visitors; and causes destruction of dunes and vegetative cover. They also feel that the inefficient gas guzzling 4WD (average 8 miles per gallon) is a negative attempt at energy conservation and provides a recreational opportunity for only a limited number of visitors.

Problems are thus created by the perceived conflicts between ORV's and special interest organizations. In order to evaluate these conflicts, field research into off-road vehicle and pedestrian impacts upon wildlife and habitat was conducted.

ORV Impacts Upon Wildlife

In order to analyze ORV impacts upon wildlife, species that commonly occur on the beach were studied. These include: nesting shorebirds (terns, skimmers, plovers, etc.); ghost crabs (Ocypode quadrata); peregrine falcon (Falco peregrinus), loggerhead sea turtle (Caretta caretta caretta); and others.

Nesting Shorebird Impacts

Historically, least terns (Sterna albifrons), common terns (Sterna hirundo) and black skimmers (Rynchops nigra) occupied a large inter-specific nesting colony on the southern tip of Tom's Cove (1972 was the last documented nesting colony). The south tip of Tom's Cove is preferred tern nesting habitat due to its wide shelly sandy substrate, and its proximal location to the ocean, the inlet and Tom's Cove bay. In 1978, concern was expressed as to the availability of preferred nesting sites for terns and skimmers on the south beach due to the large number of ORV's present, 11,564 in 1978.

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Previous years records (FWS & NPS files) showed that colonially nesting shorebirds will successfully nest in a heavily utilized public use area if an exclosure is constructed around the nesting birds. The exclosure limits vehicular and pedestrian intrusions.

In an effort to reestablish the breeding status of the tern and skimmer colony, a temporary ten acre exclosure was constructed on the southern tip of Tom's Cove ocean beach. Generally, an exclosure is constructed around a nesting colony after it has established nesting activities. The exclosure used on Chincoteague Refuge was unique, in that it was constructed prior to the arrival of terns in the spring. The purpose being to attract terns to its protected interior at a predesignated site. It was most important that the exclosure be constructed in preferred nesting habitat.

The primary objectives of the exclosure were: (1) to describe and assess public recreational and natural impacts upon colonial nesting shorebirds; (2) to experiment with shorebird attractants and nest protection devices; (3) to provide recommendations for the development of beach management policies aimed at protecting colonial nesting shorebirds. The exclosure was constructed on April 1 and dismantled on August 1, annually. See Map A for location of the exclosure within the ORV zone.

In 1978, a colony of 10 least tern pairs was attracted to the barbed wire exclosure and produced a total of 34 eggs in 19 nests. Egg predation by red fox (Vulpes fulva) accounted for 79% destruction of the colony's nesting and renesting efforts. Seven least tern young were produced.

In 1979, the exclosure was upgraded with an electric fence to protect nests from fox predation. The increased protection resulted in the attraction of 5 species and the identification of 236 nests: least tern (186 nests and 250 young produced), common tern (36 nests and 65 produced), piping plover (Charadrius melodus) (9 nests and 10 produced),

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American oystercatcher (Haematopus palliatus) (4 nests and 2 produced) and willet (Catoptrophorus semipalmatus) (1 nest and 0 produced).

In 1980, the electrified exclosure was reconstructed. Thirty-six least tern nests containing 60 eggs were identified and as many as 60 pairs were observed within the exclosure in mid-May. By the end of May, egg predation by fish crows (Corvus ossifragus) and to a lesser extent by fox, caused abandonment of the exclosure. Twenty pairs of common terns nested south of the exclosure. Egg predation by fish crows also caused abandonment of this colony.

The exclosure was effective in attracting a large nesting colony of terns (the first colony since 1972) because it provided a protected habitat. The exclosure prevented intrusions by vehicles and pedestrians and thus prevented human disturbances to nesting birds. Predation was the limiting factor to tern production in 2 of the 3 years. It was documented that the exclosure draws the attention of predators causing prey search to be concentrated inside (Britton, 1978).

The electrified exclosure is a manpower consuming operation which requires daily attention to monitor intrusions as well as maintenance of the fence. The electrified exclosure is not an efficient long-term solution for protecting preferred tern nesting habitat from public use disturbance.

Significance of Chincoteague Refuge as a Tern Nesting Area

The mid-Atlantic barrier islands provide preferred nesting habitat for terns and skimmers and support breeding colonies. In Virginia, seabirds (includes terns and skimmers) nest almost exclusively (81%) on barrier island beaches (Erwin, 1980). Using aerial and ground-based methods, the FWS contracted the Coastal Waterbird Colonies survey in Virginia in 1977; there were identified 16 least tern colonies (839 nesting pairs), 22 common tern colonies (3556 nesting pairs) and 19 black skimmer colonies

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(2687 nesting pairs) (Erwin, 1979). On Chincoteague Refuge in 1979, the 186 nesting pairs of least terns within the electrified enclosure represented 22% of the entire state of Virginia's nesting pairs documented in 1977. Therefore, due to the significance of Chincoteague Refuge as a tern nesting area, preferred nesting habitat should be protected during the breeding seasons. The protection should include predator management as well as public use restrictions.

Impacts Upon Other Shorebird Populations

Weekly shorebird censuses were conducted by Manomet Bird Observatory researchers in 1978 and compared to previous years' population numbers. The species that were censused are those that primarily utilized the beach habitat, and included the royal tern (Sterna maxima), Forster's tern (Sterna forsteri), caspian tern (Sterna caspia), black tern (Chlidonias niger), gull-billed tern (Gelochelidon nilotica) and roseate tern (Sterna dougallii).

Populations of royal tern and Forster's tern showed the greatest numbers ever recorded on the refuge. The black tern population was the largest since 1972. The caspian, gull-billed and roseate terns were similar in numbers as in previous years. No adverse impacts were apparent by these shorebird population numbers.

Impacts Upon Shorebird Food Supply

ORV restrictions prohibit vehicle usage on over 98% of the tidal flats available to shorebirds and hence impact on the food supply was minimal in terms of available feeding area and the total food supply. Laughing gulls (Larus atricilla) and herring gulls (Larus argentatus) congregated in large numbers to feed on the trash food items left on the beach by the users in Zones 2 and 3.

Impacts Upon the Ghost Crab

Exposed beaches, such as Assateague Island, have few invertebrate inhabitants because only the most specialized creatures can live in sand where heavy surf is present. However, it is important to monitor beach food-web species because they are a main food source of the aggregation of shorebirds and other forms of wildlife that forage on the beach. The food-web species found most abundant on the refuge beach include the mole crab (Emerita talpoida) and ghost crab. Ghost crabs utilize the beach area susceptible to impacts from ORV's and pedestrians. Therefore, due to its habitat, the ghost crab was determined to be the primary species which would provide a good environmental barometer for detecting detrimental effects of ORV and pedestrian beach use.

Ghost Crab Burrow Survey

A survey of ghost crab burrows was conducted on the ocean front beach. The survey was conducted to provide data as an index to relative abundance and to determine if any significant difference in ghost crab populations existed among the use-zones. One-tenth acre plots were scribed in the beach sand. The plot center was situated above high tide mark so that the plot perimeter extended approximately one foot seaward of the high tide line. Plots were spaced one-half mile apart. Twenty-nine tenth acre plots were examined in 1978, 1979 and 1980, and compared to a 1973 survey.

The three usage zones contained the following mean number of burrows per .1 acre:

<u>Location</u>	<u>Mean # Burrows/ .1 acre</u>			
	<u>1980</u>	<u>1979</u>	<u>1978</u>	<u>1973</u>
North Beach (Zone 1)	123	32	114	83
Pedestrian Access (Zone 2)	62	36	7	75
ORV Access Area (Zone 3)	2	2	9	25

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In 1973, 1978 and 1980 the highest burrow density per plot area was recorded in the low intensity use-area of Zone 1. In 1979, the highest burrow density was recorded in Zone 2, a high intensity pedestrian use-zone. The lowest burrow density found throughout the 4 surveys was in Zone 3, the off-road vehicle zone.

Burrow density throughout all zones displayed a variable clustered distribution, i.e. burrows were not uniformly distributed in respective zones. ORV impacts appear to adversely impact the ghost crab by suppressing their population. Natural factors that impact ghost crab populations were not analyzed.

Impacts Upon Loggerhead Sea Turtle Nesting

The CNWR conducted an 11 year loggerhead sea turtle egg transplant program in an attempt to reestablish the species at this northernmost edge of the breeding range. However, natural nesting by loggerheads has not occurred in significant numbers to ascertain impacts caused by ORV travel..

Impacts Upon the Peregrine Falcon

Assateague Island is a major resting and feeding area for peregrine falcons during their autumn migration. Dr. Prescott Ward (Aberdeen Proving Grounds) trapped and banded 142 peregrines on Assateague Island in 1979. Peregrines utilize the beach surface as a rest area and for search of prey items. Due to the vast expanse of beach and mud flats available to the peregrines, ORV impacts were not documented.

Impacts Upon Other Wildlife

Other wildlife species that commonly occur on the beach include sika (Cervus nippon) and white-tailed deer (Odocoileus virginiaus), raccoon (Procyon lotor), red fox, and the Chincoteague ponies (Equus caballus). No major impacts by ORV's were observed on these species.

Impacts Upon Habitat

Beach Surface

Beach surface studies were conducted by the Marine Science Consortium (Wallops Island, VA) along transects in each of the 3 usage-zones. The physical structure of the beach surface was examined and included seine and sorting characteristics of sand particles. Drexler (1978) reported that there existed a recognizable variation in both the grain size and the sorting of sand particles in the ORV traffic area as compared to the non-ORV areas. A winnowing and/or pulverizing effect appeared to be occurring. This resulted in smaller lighter weight sand particles which are more susceptible to erosion from wind and water.

The aesthetic appearance of the beach surface was deteriorated due to the numerous tire tracks present during high visitation periods.

Drift Lines

Beach vegetative cover on Assateague above the high tide line (the upper beach) is not over 1%. Beach pioneers occur occasionally. These pioneers survive in the shelter of driftwood or small dunes which build up along the upper beach. The beach habitat is very unstable; species are continually covered and uncovered by shifting sand, and subjected to wind-driven salt spray resulting in few mature individuals (Higgins, 1969).

No significant driftlines were found during the course of this study on the refuge beach. There were minor driftlines occurring; however, tidal overwash and winter storms damaged and destroyed a substantial portion of these. For this reason, effects of ORV's on driftlines could not be measured.

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Dunes and Vegetative Cover

ORV restrictions prohibit travel by vehicles into dune and vegetated areas. Therefore, investigations were concentrated on impacts occurring in the area in front of the dunes. Drexler (1978) reported that travel is resulting in a cut-slope effect at the base of the dunes. This increases the gradient and the instability of the dunes.

Goettle (1971) reported that use of Assateague beach by vehicles could potentially accelerate erosion in some future storms. Other studies in various locations have documented that ORV travel accelerates erosion. The erosion is of two kinds: 1. direct mechanical abrasion by the vehicles themselves, and 2. accelerated removal of sand by natural agents, mainly wind and water (Geologic Society of America, 1977).

Salt Marsh

ORV travel along the access corridor to Tom's Cove bay beach is resulting in the destruction of salt marsh vegetation (Spartina alterniflora). The vehicle access corridor was sandy beach previously, however, erosion within the last 5 years has transformed this section of beach into intertidal sand flat. Vehicles must now travel through the Spartina at high tide for access to the bay beach. The destruction of Spartina by vehicles is occurring and revegetation is not occurring because of continuous impacting.

Relative Importance of ORV Impacts Upon the Habitat

The major cause of habitat alteration was attributed to natural forces. Storms, wind, high tides and floods caused significant erosion of the beach surface, destroyed drift lines, and caused beach overwash with associated vegetation die-off and dune truncation. ORV's are responsible for slight mechanical erosion of the beach surface.

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There is significant destruction of salt marsh vegetation by ORV travel in the Tom's Cove bay area.

Pedestrian Impacts

Indiscriminate pedestrian travel across the dunes destroyed vegetative cover and associated wind erosion created pathways in areas adjacent to main parking lots where boardwalks or clay crossovers do not exist.

Results

Public recreational use is a significant management objective of FWS, and it is the responsibility of the Service to provide public outdoor recreation in designated areas. However, it is the responsibility of refuge management to protect the wildlife and habitat resource. The results of this study indicate that the special regulations which govern ORV access on CNWR need to be amended to further protect the resource and to be in compliance with E.O. 11644, E.O. 11989 and FWS Policy Update #8. Significant adverse impacts are occurring due to ORV travel: (1) salt marsh along Tom's Cove bay is being destroyed; (2) habitat preferred by nesting terns is disrupted to such an extent that nesting is not possible.

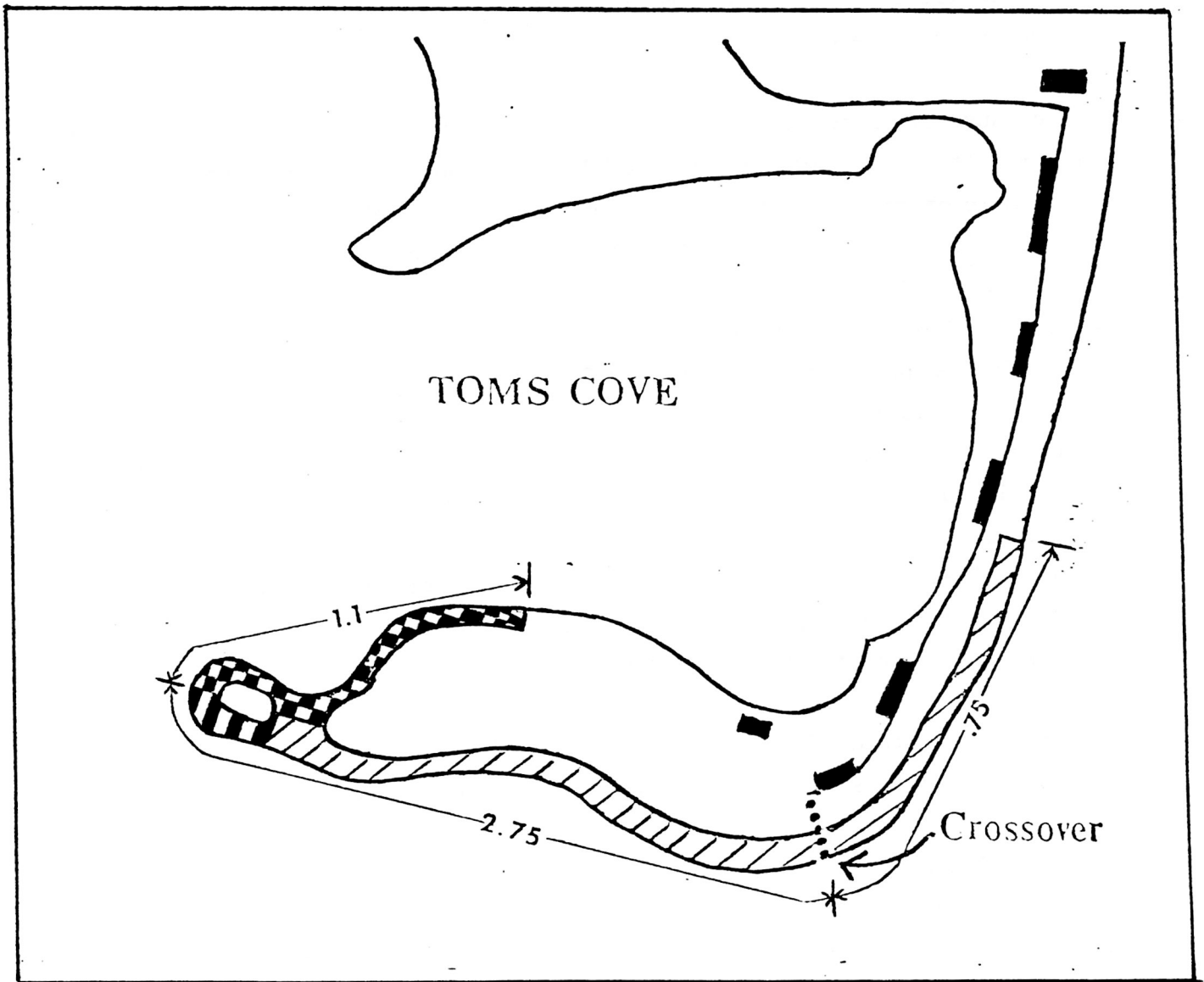
Proposal to Amend ORV Regulations

On the basis of information gathered, to be in compliance with Executive Order 11644 and 11989 and FWS Policy Update #8, it is proposed that Chincoteague Refuge ORV regulations be amended, as follows, to prevent further adverse impacts and to protect the resource (refer to Map B):

1. Enforce a permanent closure of Tom's Cove bay beach to ORV travel. This would eliminate the destruction of salt marsh vegetation in that area.

Map B. Proposed Closures to Off-Road Vehicle Access on CNWR

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Off-Road Vehicle Access Year-Round



Closure to Off-Road Vehicles Permanently



Closure to Off-Road Vehicles During Shorebird Nesting Season
(April 1 - August 1, annually)

2. Enforce a seasonal closure (April 1 to August 1, annually) of the southern one-half mile of refuge ocean beach to ORV travel. This would eliminate the disturbance of preferred nesting habitat during the breeding season.

The closure of these two areas of wildlife and habitat disturbance will result in the permanent loss of 1.1 miles and a summer season loss of .5 mile of the total 4.6 miles open to off-road vehicle travel. The 42 vehicle carrying capacity within the off-road vehicle zone was based on allowing one vehicle per 500 feet. In 1976 an original 4 miles of beach was open but accretion has expanded the area to 4.6 miles. Under the reasoning of 1 vehicle per 500 feet, the proposed closure of 1.6 miles would reduce the number of vehicles allowed on the beach at one time to 32. A reduction of 10 vehicles would increase the present congestion problem on summer weekends with off-road vehicles waiting for access to the beach. It is recommended that the 42 vehicle quota be maintained. If problems of safety, littering or law enforcement occur due to beach congestion, a solution can be resolved by a management decision to reduce the number of vehicles to 32.

An efficient method of effecting the proposed closures is to cable the boundaries and to sign the area explaining the closure.

A pedestrian access route should be designated around the proposed closed tern nesting area boundary so that fishing privileges at Fishing Point are available with only a short walking distance from off-road vehicle travel routes.

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APPENDICES

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Use of Off-Road Vehicles on the Public Lands

An estimated 5 million off-road recreational vehicles—motorcycles, minibikes, trail bikes, snowmobiles, dune-buggies, all-terrain vehicles, and others—are in use in the United States today, and their popularity continues to increase rapidly. The widespread use of such vehicles on the public lands—often for legitimate purposes but also in frequent conflict with wise land and resource management practices, environmental values, and other types of recreational activity—has demonstrated the need for a unified Federal policy toward the use of such vehicles on the public lands.

NOW, THEREFORE, by virtue of the authority vested in me as President of the United States by the Constitution of the United States and in furtherance of the purpose and policy of the National Environmental Policy Act of 1969 (42 U.S.C. 4321), it is hereby ordered as follows:

SECTION 1. Purpose. It is the purpose of this order to establish policies and provide for procedures that will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.

SEC. 2. Definitions. As used in this order, the term:

(1) "public lands" means (A) all lands under the custody and control of the Secretary of the Interior and the Secretary of Agriculture, except Indian lands, (B) lands under the custody and control of the Tennessee Valley Authority that are situated in western Kentucky and Tennessee and are designated as "Land Between the Lakes," and (C) lands under the custody and control of the Secretary of Defense;

(2) "respective agency head" means the Secretary of the Interior, the Secretary of Defense, the Secretary of Agriculture, and the Board of Directors of the Tennessee Valley Authority, with respect to public lands under the custody and control of each;

(3) "off-road vehicle" means any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain; except that such term excludes (A) any registered motorboat, (B) any military, fire, emergency, or law enforcement vehicle when used for emergency purposes, and (C) any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, license, or contract; and

(4) "official use" means use by an employee, agent, or designated representative of the Federal Government or one of its contractors in the course of his employment, agency, or representation.

SEC. 3. Zones of Use. (a) Each respective agency head shall develop and issue regulations and administrative instructions, within six months of the date of this order, to provide for administrative designation of the specific areas and trails on public lands on which the use of off-road vehicles may be permitted, and areas in which the use of off-road vehicles may not be permitted, and set a date by which such designation of all public lands shall be completed. Those regulations shall direct that the designation of such areas and trails will be based upon the protection of the resources of the public lands, promotion of the safety of all users of those lands, and minimization of conflicts among the various uses of those lands. The regulations shall further require that the designation of such areas and trails shall be in accordance with the following—

(1) Areas and trails shall be located to minimize damage to soil, watershed, vegetation, or other resources of the public lands.

(2) Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats.

(3) Areas and trails shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.

(4) Areas and trails shall not be located in officially designated Wilderness Areas or Primitive Areas. Areas and trails shall be located in areas of the National Park system, Natural Areas, or National Wildlife Refuges and Game Ranges only if the respective agency head determines that off-road vehicle use in such locations will not adversely affect their natural, aesthetic, or scenic values.

(b) The respective agency head shall ensure adequate opportunity for public participation in the promulgation of such regulations and in the designation of areas and trails under this section.

(c) The limitations on off-road vehicle use imposed under this section shall not apply to official use.

Sec. 4. Operating Conditions. Each respective agency head shall develop and publish, within one year of the date of this order, regulations prescribing operating conditions for off-road vehicles on the public lands. These regulations shall be directed at protecting resource values, preserving public health, safety, and welfare, and minimizing use conflicts.

Sec. 5. Public Information. The respective agency head shall ensure that areas and trails where off-road vehicle use is permitted are well marked and shall provide for the publication and distribution of information, including maps, describing such areas and trails and explaining the conditions on vehicle use. He shall seek cooperation of relevant State agencies in the dissemination of this information.

Sec. 6. Enforcement. The respective agency head shall, where authorized by law, prescribe appropriate penalties for violation of regulations adopted pursuant to this order, and shall establish procedures for the enforcement of those regulations. To the extent permitted by law, he may enter into agreements with State or local governmental agencies for cooperative enforcement of laws and regulations relating to off-road vehicle use.

Sec. 7. Consultation. Before issuing the regulations or administrative instructions required by this order or designating areas or trails as required by this order and those regulations and administrative instructions, the Secretary of the Interior shall, as appropriate, consult with the Atomic Energy Commission.

Sec. 8. Monitoring of Effects and Review. (a) The respective agency head shall monitor the effects of the use of off-road vehicles on lands under their jurisdiction. On the basis of the information gathered, they shall from time to time amend or rescind designations of areas or other actions taken pursuant to this order as necessary to further the policy of this order.

(b) The Council on Environmental Quality shall maintain a continuing review of the implementation of this order.



THE WHITE HOUSE,
February 8, 1972.

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Appendix B.

EXECUTIVE ORDER 11989

Off-Road Vehicles on Public Lands

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in order to clarify agency authority to define zones of use by off-road vehicles on public lands, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*), Executive Order No. 11644 of February 8, 1972, is hereby amended as follows:

SECTION 1. Clause (B) of Section 2(3) of Executive Order No. 11644, setting forth an exclusion from the definition of off-road vehicles, is amended to read "(B) any fire, military, emergency or law enforcement vehicle when used for emergency purposes, and any combat or combat support vehicle when used for national defense purposes, and".

SEC. 2. Add the following new Section to Executive Order No. 11644:

"SEC. 9. *Special Protection of the Public Lands.* (a) Notwithstanding the provisions of Section 3 of this Order, the respective agency head shall, whenever he determines that the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources of particular areas or trails of the public lands, immediately close such areas or trails to the type of off-road vehicle causing such effects, until such time as he determines that such adverse effects have been eliminated and that measures have been implemented to prevent future recurrence.

"(b) Each respective agency head is authorized to adopt the policy that portions of the public lands within his jurisdiction shall be closed to use by off-road vehicles except those areas or trails which are suitable and specifically designated as open to such use pursuant to Section 3 of this Order."

JIMMY CARTER

THE WHITE HOUSE,
May 24, 1977

Appendix C.



OPERATION
OF
OVERSAND VEHICLES
ON
ASSATEAGUE ISLAND NATIONAL SEASHORE
U.S. DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE
ASSATEAGUE ISLAND NATIONAL SEASHORE
ROUTE 2, BOX 294
BERLIN, MD. 21811

U.S. FISH AND WILDLIFE SERVICE
CHINCOTEAGUE NATIONAL WILDLIFE
REFUGE, P.O. BOX 62
CHINCOTEAGUE, VA. 23336



