A preliminary survey of dune trampling at Cumberland Island National Seashore

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ABSTRACT

Track count transects across the dune line at Cumberland Island National Seashore were used to evaluate human and wildlife use of the dunes. Sampling areas near maintained trails and boardwalks had the highest human use. Most human use occurred in the first 2 or 3 transects (0 to 35 meters) away from the trail. In control areas away from official trails, human use was 0% to 5% of the total large mammal use. White-tailed deer were the most frequent users of the dunes island-wide. Horse use was largely confined to Dungeness and Stafford.

INTRODUCTION

In many seashore parks and protected areas, visitor trampling of dunes is a serious resources management problem. Park visitors may cut trails through both vegetated and unvegetated areas, and may initiate "blowouts" and other forms of erosion (Liddle and Grieg-Smith 1975, Valentine and Dolan 1979, McAtee and Drawe 1980, 1981). At Cumberland Island National Seashore, park staff discourage visitors from using dune and inter-dune areas and signs ask the visitors to "Please stay off the dunes." Visitors do wander out across the dunes, however, and may occasionally participate in activities such as "dune sliding."

The purpose of this survey was to investigate three visitor use areas (Dungeness, Seacamp and Stafford), and determine:

1) Which areas had the greatest evidence of human use away from official crossovers and boardwalks;
2) How much dune use could be attributed to the larger wildlife species, rather than to humans; and
3) If there were vulnerable areas, where an increase in visitation might result in trampling damage or dune erosion.

at three sites: from Dungeness crossover north (see maps in Hillestad et al 1975), at a site just north of Dungeness from Seacamp boardwalk south, at a site north of Seacamp, and in a control area between Dungeness and Seacamp. Five-meter wide track count transects were placed at 0, 40, 80, 120, 160, and 200 meters. Each transect ran from east to west, situated perpendicular to the crest of the secondary (or high) dune line. In each transect, the number of deer, horse, and human tracks was counted. Counts were completed eight times for the entire sequence and nine times for Dungeness. Each count was initiated 24 hours after the end of a rain. Accessory information included the position of the tracks on the slope, distance from forest vegetation (or open interior field), the slope of the dune where the track crossed, and the intersection of the track with the slope.

In spring 1985, the sampling method was revised, with sampling areas established north of Dungeness crossover, south of Seacamp boardwalk, and south of Stafford foot trail crossover. These sample sites included 5-meter wide transects at 5 (to 10), 35 (to 40, etc.), 65, 95, 195, and 295 meters. A control area was established between Dungeness and Seacamp and 10 transects were run, 100 meters apart. Control transect #1 was located 100 meters north of the southernmost deer exclosure. Control transect #6 was located 20 meters south of Nightengale trail crossing. Humans, horses, deer, turkeys, raccoons, hogs and dogs were

the southernmost deer exclosure. Control transect #6 was located 20 meters south of Nightengale trail crossing. Humans, horses, deer, turkeys, raccoons, hogs and dogs were counted. Track locations were classified as east face, west face, or dune crest. Track angles were classified as 0-30° (parallel with the dune crest), 31-60°, and 61-90° (perpendicular to the dune crest). To avoid leaving markers, distances between lines were paced. All sites were sampled seven times, except Seacamp and Dungeness, which had eight sample periods. Sampling was conducted every two or three days in late March 1985, which is a heavy visitation period, particularly for campers. Weather was not a factor in selecting sampling times, which were coordinated with boat schedules (boat and non-boat days). Four samples were taken in the morning and four in the afternoon. In both spring and summer, transects extended from the eastern toe of the secondary (or back dune) to the western edge.

RESULTS

The summer survey found the greatest frequency of human tracks (actually, sets of tracks) at Dungeness and Seacamp transects (Tables 1, 2, 3). Horses were more frequent users of the Dungeness dunes, whereas deer were more frequent users of Seacamp. In all other sample areas, including the control, deer were, by far, the most frequent users. In samples not directly adjoining Seacamp or Dungeness, there were 33 human, 21 horse and 429 deer tracks.

During summer, human use was concentrated within 80 meters of the Dungeness crossover (143 total tracks per transect, from 120-200 meters). Human use at Seacamp was more scattered. However, the number of times at least one human track was recorded per sample period was 11 for the three transects closest to the crossover (from 0-80 meters) and two for more distant transects.

In the spring sample, human tracks were most frequent at Stafford, while Dungeness, with few human tracks, was little different from the control (Tables 4, 5). In all samples, deer tracks were more common than human tracks. At Dungeness and in the control sample, horse tracks were also more frequent than human tracks. Turkey tracks were most frequent at Dungeness and the control area. Raccoon tracks were most frequent at Dungeness, perhaps due to proximity to the marsh.

Human use at Dungeness, Seacamp and Stafford was generally concentrated in the first two transects, that is, within 35 meters of the trail or boardwalk. This was especially noticeable at Stafford, where 148 of 172 tracks (86%) were in the first two transects (Table 4).

In spring, human tracks -- as opposed to horse and deer -- were highest at Stafford, when they varied from 7-40% (of the total for horses, humans, and deer) for sample areas near official trails and boardwalks. Control samples and those near developed sites, varied from 0-16% human

tracks. Deer use was common in all sample areas, varying from 1.46-4.31 tracks per transect per day. Horse tracks were most common at Dungeness and Stafford, which may be due to horses using trails and open dune areas to move from the inter-dune grasslands to more interior fields and lawns.

DISCUSSION

Island-wide, deer are probably the most important users of the dune system, compared to other large mammals. Away from official trails and boardwalks, human use is sporadic and represents a low percentage (5% or less of the large mammal use) of dune use, and a much lower percentage of total mammal use.

Humans weigh more, on the average, than deer, but are smaller than horses. Field observations indicate that horse tracks are the last to disappear when sand is blowing across the dunes. Although this study did not quantify the relative impact of the different species, it is likely that in the dunes around Dungeness, horses cause greater disturbance than do humans.

Human impacts are most important at Seacamp and Stafford. The lack of a boardwalk at Stafford, as well as less frequent contact between visitors and park staff, may encourage people to walk off the trail onto the dunes. Many of the tracks at Stafford were on or around a dune crest that provides a clear view of the inter-dune area and the

beach. Thus, vista seeking may be an important motive for off-trail travel. Sunbathers also occasionally use the dunes in this area.

In terms of dune erosion, the most important problem to investigate island-wide, is not human trampling, but herbivore impacts. There is presently a browse line in the oaks behind the dune, extending from Dungeness to Stafford. Aside from the Dungeness and Stafford crossovers and nearby areas, horse use is largely restricted to the lower edge of the dune line on the east side where it adjoins the inter-dune meadows. Deer, by contrast, frequently travel over the dunes, or utilize trails along the west side, against the live oak canopy. Thus, deer are the species most likely to interfere with dune-forming and dune-stabilizing processes.

Monitoring of human impacts is most critical in the Stafford area, where an increase or change in visitor use might result in greater human use of the dunes. At the present time, photo points along the trail and of nearby dunes are probably adequate for monitoring. Vegetation cover transects could also be valuable. If visitation increases at Stafford, placing signs on the dunes might reduce trampling slightly. A boardwalk will confine visitors, but this also traps sand, changing the structure of the dune line. At present, a small sign to the right of the high point on the trail crossing the dunes, would serve

to discourage use.

Of the two sampling schemes, the one used in the spring is potentially faster, is accurate enough for general monitoring, and could be easily employed by park staff to quantify changes of human and wildlife dune use.

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TABLE 1: Total summer track counts for Dungeness and near Dungeness

Dungeness (9 sample periods)

DISTANCE	HUMAN	HORSE	DEER
0	11	30	24
40	11	43	28
80	19	59	28
120	--	46	24
160	3	33	21
200	3	28	44
TOTAL	47	239	169

Near Dungeness (8 sample periods)

DISTANCE	HUMAN	HORSE	DEER
0	--	2	33
40	--	2	36
80	--	5	39
120	--	--	43
160	--	--	35
TOTAL	0	9	186

TABLE 2: Total summer trackcounts for Seacamp and near Seacamp.

Seacamp (8 sample periods)

DISTANCE	HUMAN	HORSE	DEER
0	5	--	18
40	8	--	8
80	7	--	9
120	5	--	8
160	--	5	15
200	18	5	12
TOTAL	43	239	70

Near Seacamp (8 sample periods)

DISTANCE	HUMAN	HORSE	DEER
0	4	--	21
40	6	--	22
80	6	--	28
120	7	--	44
160	6	--	40
TOTAL	29	0	155

TABLE 3: Total summer track counts for control area between Seacamp and Dungeness

Control (8 sample periods)

DISTANCE	HUMAN	HORSE	DEER
0	--	4	21
40	--	4	13
80	--	4	21
120	--	--	12
160	4	--	21
TOTAL	4	12	88

TABLE 4: Total spring track counts for samples at developed sites.

Dungeness (8 sample periods)

DISTANCE	HUMAN	HORSE	DEER	TURKEY	RACOON
5	8	44	14	36	9
35	6	16	19	36	21
65	--	14	11	17	22
95	1	14	20	15	33
195	1	1	47	12	16
295	--	3	30	30	41
TOTAL	16	82	141	146	142

Seacamp (8 sample periods)

DISTANCE	HUMAN	HORSE	DEER	TURKEY	RACOON
5	15	12	16	2	19
35	3	--	24	5	28
65	--	--	19	9	28
95	3	--	19	8	8
195	2	--	16	10	4
295	2	1	19	22	5
TOTAL	25	13	113	55	92

Stafford (8 sample periods)

DISTANCE	HUMAN	HORSE	DEER	TURKEY	RACOON
5	105	27	6	--	6
35	43	18	16	1	18
65	8	5	37	1	3
95	7	6	14	2	12
195	3	10	42	2	12
295	6	14	66	3	18
TOTAL	172	80	181	9	69

TABLE 5: Total spring track counts for the control area.

(7 sample periods)

DISTANCE	HUMAN	HORSE	DEER	TURKEY	RACOON
100	2	7	29	18	6
200	--	4	32	11	13
300	1	10	27	9	6
400	3	--	35	16	1
500	--	--	16	17	2
600	6	5	15	11	2
700	--	--	9	24	--
800	--	3	18	22	4
900	--	2	18	23	7
1000	--	--	10	35	7
TOTAL	13	31	209	186	48

TABLE 6: Tracks per transect per day during summer.

	STUDY SITE				
SOURCE	SEACAMP	NEAR SEACAMP	DUNGENESS	NEAR DUNGENESS	CONTROL
Human	.90	.73	.87	.00	.10
Horse	.10	.00	4.43	.03	.30
Deer	1.46	3.88	3.13	4.65	2.20
TOTAL	2.46	4.61	8.43	4.68	2.60
% human (vs. horse and deer)	37%	16%	10%	0%	4%

TABLE 7: Tracks per transect per day during spring.

	STUDY SITE			
SOURCE	STAFFORD	SEACAMP	DUNGENESS	CONTROL
Human	4.10	.52	.33	.19
Horse	1.90	.27	1.71	.44
Deer	4.31	2.35	2.94	2.99
Turkey	.21	1.15	3.04	2.66
Racoon	1.64	1.92	2.96	.69
TOTAL	12.17	6.21	10.98	6.96
ANIMAL ONLY	8.07	5.69	10.65	5.67
% human (vs. all human, horse, deer)	37%	8%	3%	3%
TOTAL	10.31	3.14	4.98	3.62
% human (vs. horse and deer)	40%	17%	7%	5%