

**FIELD SURVEY FOR SLICKSPOT PEPPERGRASS (*LEPIDIUM PAPILLIFERUM*)
ON THE ORCHARD TRAINING AREA, IDAHO**

by

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December 2003

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Report prepared for
State of Idaho, Military Division
Task Order No. 001-FY-03

ABSTRACT

Slickspot peppergrass (*Lepidium papilliferum*) is an annual or biennial forb endemic to southwestern Idaho that has been proposed for federal listing under the Endangered Species Act. Several of the largest, highest quality populations known occur within the Orchard Training Area, used by the Idaho Army National Guard for military training purposes, and located approximately 15 miles south of Boise, Idaho. Although much of the Orchard Training Area has been surveyed for slickspot peppergrass in the past, several unsurveyed or inadequately surveyed parcels remain. In 2003, the Idaho Army National Guard contracted with the Idaho Conservation Data Center to conduct a field survey for slickspot peppergrass in one of these unsurveyed areas, covering roughly 4,570 acres, northeast of Christmas Mountain. We found two subpopulations of slickspot peppergrass. The largest encompassed approximately 650 acres. Our survey tallied 192 occupied slickspot microsites and approximately 11,000 plants in the subpopulation. The second subpopulation, located approximately 0.7 mile further north, consisted of a solitary occupied slickspot with about 300 plants. The majority (57%) of plants tallied in 2003 were non-reproductive rosettes. Slightly less than half (44%) of all occupied slickspots contained between 10 and 50 plants. Cattle disturbance was recorded within the majority (61%) of all slickspot microsites encountered, and the majority (59%) of those occupied by slickspot peppergrass as well. Nearly all (98%) slickspots had some level of weed invasion, with approximately half (52%) averaging greater than 10 weed plants/sq. ft. All slickspots with slickspot peppergrass were surrounded by unburned vegetation. Results of our survey further highlight the importance of the Orchard Training Area as an important conservation center for slickspot peppergrass. In addition, we opportunistically discovered three colonies of the rare lichen woven-spore lichen (*Texosporium sancti-jacobi*) during the field investigation.

ACKNOWLEDGMENTS

Funding for this project was provided by the Idaho Army National Guard, longtime supporters of slickspot peppergrass conservation. Idaho Army National Guard biologists Dana Quinney and Jay Weaver spent part of a day showing us the location and access to the study area. Excellent field assistance was provided by several Idaho Conservation Data Center biologists, including Luana McCauley, Cyndi Coulter, Kirsten Severud, Cindy Robertson, and Chris Murphy. This project could not have been completed without their dedicated help.

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INTRODUCTION

Slickspot peppergrass (*Lepidium papilliferum*) is a small annual or biennial plant species endemic to the sagebrush-steppe ecosystem of southwestern Idaho. It is restricted to small-scale, sparsely vegetated, visually distinct, edaphically influenced openings within the sagebrush matrix. These microsite openings are commonly referred to as slickspots. Slickspot peppergrass has been a high priority conservation concern for public land managers in southwestern Idaho for many years. The primary reason for the decline of slickspot peppergrass over the years has been the extensive and accelerating loss of sagebrush-steppe habitat, and the diminished ecological quality of most of what remains of this ecosystem in southwestern Idaho. The species continuing conservation decline led the U.S. Fish and Wildlife Service to propose listing slickspot peppergrass under the Endangered Species Act in 1999 (U.S. Fish and Wildlife Service 1999). In 2002, it was proposed to be listed as Endangered (U.S. Fish and Wildlife Service 2002).

Many small- and large-scale field inventories for slickspot peppergrass have been conducted in recent years (e.g., Mancuso 2000; Mancuso et al. 2002; Popovitch 2001; United States Air Force 2003). Over the past decade, biologists with the Idaho Army National Guard (IDANG) have surveyed most of the potentially suitable habitat for slickspot peppergrass within the Orchard Training Area (OTA) one or more times (D. Quinney, IDANG Environmental Management Office, pers. comm.). The OTA is located on Bureau of Land Management property used for military training since 1953. The OTA contains some of the largest blocks of unburned, relatively intact sagebrush-steppe remaining in the western Snake River Plain (Rust 2002). The northern part of the OTA also supports several of the largest known extant populations of slickspot peppergrass (Idaho Conservation Data Center 2003). This combination of relatively large populations and good condition habitat make the OTA a key area for the long-term conservation of slickspot peppergrass.

In late 2002, IDANG biologists discovered a new slickspot peppergrass population located approximately halfway between two previously known occurrences on the OTA. At the time they made their discovery, slickspot peppergrass was found in a few slickspots scattered over approximately one acre. In 2003, the IDANG contracted with the Idaho Department of Fish and Game, Idaho Conservation Data Center (IDCDC) to conduct a thorough field survey to delineate the extent of this new population, estimate the abundance of slickspot peppergrass, and assess habitat conditions.

STUDY AREA

The OTA is located about 15 miles south of Boise, in southeastern Ada County. Our 2003 survey study area is located in the northeastern segment of the OTA and encompassed approximately 4,570 acres. Roads delineate the boundaries of the study area. Standifer Road formed the northern, and Range Road the southern perimeters of the study area; while "Patch Road" formed the eastern, and "Higgins-Figgins Road" the western boundaries (Appendix 1). Most of the study area is roadless, but a few firebreak or fire access roads traversed its southern part. The study area is characterized by gently rolling or sloping terrain with a series of low ridges and associated shallow basins. Scattered small rocky knolls and a few minor drainage bottoms provided additional topography. Elevation within the study area ranged from 3,080 feet in the north to 3,300 feet along its southern edge.

The study area landscape supports a mix of unburned, burned, and mosaic burn vegetation. Most of the central and western portions of the study area are unburned and support stands of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with some basin big sagebrush (*A. tridentata* ssp. *tridentata*) intermixed in places. Patches of rabbitbrush (*Chrysothamnus* spp.) with only a few associated sagebrush shrubs occur in areas that burned a decade or more ago. More recently burned areas containing few if any shrubs are most common in the eastern portion of the study area.

Sandberg's bluegrass (*Poa secunda*) is the most common native bunchgrass throughout the study area. Another native bunchgrass, squirreltail (*Sitanion hystrix*), is widespread, but usually occurs at low cover. Other bunchgrasses such as basin wild rye (*Elymus cinereus*) and Thurber's needlegrass (*Stipa thurberiana*) are much more sporadic and rare overall. Cheatgrass (*Bromus tectorum*), an introduced annual, is typically the dominant grass in burned habitats. Native forbs are sparse in both unburned and burned sections, rarely having more than trace cover except on some of the rocky knolls. By far, the most widespread and common forb is bur buttercup (*Ranunculus testiculatus*), a small, introduced annual. It is abundant in many areas, especially where bare ground is prevalent. It tends to have substantially less cover in areas with high microbiotic crust cover.

The survey study area was identified by IDANG biologists prior to the initiation of our field investigation. The study area was selected for several reasons, including: (1) the discovery of slickspot peppergrass by IDANG biologists in the southwestern section of the study area in late 2002; (2) the known or suspected occurrence of additional suitable slickspot peppergrass habitat, including a large block of unburned sagebrush habitat in the core of the study area; (3) the fact that the study area represented a portion of the OTA that had not received a systematic inventory for slickspot peppergrass in the past; and (4) the location of the study area between two previously documented slickspot peppergrass occurrences found within the OTA.

METHODS

Field survey work was conducted between June 3 and June 25, 2003. We had access to the entire study area except for a small area located about 0.5 mile south of the intersection of Standifer and Patch roads. This area was being used by military training personnel during the time of our survey.

To document the extent and abundance of slickspot peppergrass within the survey area we walked a series of transects throughout the study area. Transects were chosen to provide full geographic coverage of the study area, but were more concentrated in areas supporting unburned sagebrush habitat compared to burned, annual grassland-dominated vegetation. Transects varied in length from approximately 0.5 to a little over 2.0 miles in length. They averaged approximately 75 acres in size, but ranged between 27 and 175 acres. The location of each transect was mapped as a polygon on the USGS 7.5' Christmas Mountain quadrangle. A map of the transects and their associated acreages are in Appendix 2.

All transects started from a road, and most also ended at a road. However, several ended at predetermined geographic features such as a low ridge. A transect azimuth was used to guide field personnel from the start of the transect to its end point. In nearly all cases, this azimuth was close to one of the four cardinal directions. The majority of

transects were surveyed by three people, but ranged from one to four individuals. Field personnel walked approximately parallel, equidistant transect lines separated by 25 m. We stopped at each slickspot microsite encountered along the transect to record the following information on our data sheets:

- Slickspot peppergrass abundance – a count or estimate of the number of slickspot peppergrass plants associated with the slickspot, or alternatively, one of the following abundance classes: <10, 10-50, 51-100, 101-500, >500 plants.
- Percentage of reproductive plants – a count or ocular estimate of the percentage of slickspot peppergrass plants with flowers or fruits.
- Size – placing the slickspot microsite into one of three size categories: small (<2 m²), medium (2-10 m²), or large (>10 m²). Slickspot size represented an estimate of the slickspot's area. Slickspot edge contributed by vegetated (non-slickspot) lobes intruding into the slickspot were not counted when making the measurement. As a result, most measurements reflect a more or less oblong shape.
- Livestock – the number of livestock hoof prints and droppings in the slickspot based on one of the following abundance classes: 0, 1-10, 11-25, >25.
- Weeds – the number of individual invasive weed plants in the slickspot based on one of the following abundance classes: 0, <10/ft², 10-25/ft², >25/ft².

Slickspot size, slickspot peppergrass, and livestock disturbance information was collected at each slickspot microsite encountered. Weed disturbance information was collected at each microsite by selected personnel, but tallied at only every fifth slickspot, or not all by others. This was done to conserve time spent at each slickspot by less experienced personnel.

In addition, fire history information associated with each slickspot was recorded by selected field personnel. This entailed recording one of four possible fire history scores that best described the habitat adjacent to the slickspot microsite. The four fire history scores included: (1) unburned – characterized by intact sagebrush vegetation, (2) burned – characterized by annual grassland-dominated vegetation, (3) mosaic burn – characterized by a patchy mix of unburned and burned vegetation, and (4) rabbitbrush – formerly burned habitat characterized by vegetation having a shrub layer dominated by rabbitbrush.

To document the location of slickspot peppergrass, GPS coordinates were recorded at selected occupied slickspot microsites along each transect route. Coordinates were obtained at the first slickspot along the transect having slickspot peppergrass. Additional coordinates were recorded at subsequent occupied microsites located more than roughly 40-50 m from the previous nearest GPS reading. This protocol provided GPS coordinates for only a subset of occupied slickspots, but fully captured the overall distribution of slickspot peppergrass within the study area.

RESULTS

Our survey found slickspot peppergrass to be more abundant and extensive within the study area than previously known. The new slickspot peppergrass occurrence documented by our survey is referenced in the IDCDC data base as “Northeast of Christmas Mountain” (071). The Element Occurrence Record for the new occurrence summarizes location, population, habitat, and other conservation information, and also includes a location map (Appendix 3). The occurrence is comprised of two subpopulations separated by approximately 0.7 mile. The southern subpopulation contains over 99% of the occurrence and covers approximately 650 acres. The northern subpopulation consists of a solitary occupied slickspot.

We surveyed 27 transects covering a total of approximately 2,015 acres, or approximately 44% of the entire study area. The majority of unsurveyed acreage was located in the northeastern and southeastern corners of the study area. These areas were largely characterized by burned or mosaic burn habitat. A total of 2,198 slickspot microsites were sampled during the survey. Of these, 193 (9%) were occupied by slickspot peppergrass.

We recorded GPS coordinates and mapped the location for 83 of the 193 (43%) slickspots microsites containing slickspot peppergrass (Appendix 4). Slickspot peppergrass abundance, livestock disturbance, and weed disturbance information associated with the GPS coordinates is included in Appendix 4. Using our GPS coordinates, it would be possible to revisit all or a subset of the individual slickspots in the future and make comparisons to the 2003 dataset. All of the slickspot microsite data we collected during the survey has been compiled in a series of tables in Appendix 5. Copies of our 2003 field survey data sheets are in Appendix 6.

Lepidium papilliferum

A total of approximately 11,124 slickspot peppergrass plants were tallied during our survey. The majority (57%) of plants were non-reproductive rosettes. These rosettes ranged in size from approximately 1 to over 6 cm in diameter, with many appearing to be in the 2-3 cm range. The size of rosette plants commonly varied within a given slickspot. Of the 27 transects, 14 (52%) had one or more slickspots occupied by slickspot peppergrass. The number of plants per slickspot ranged from a one in several cases to over 500 plants in one instance. Slightly less than half (44%) of all occupied slickspots contained between 10 and 50 plants. The vast majority of reproductive plants appeared to be annuals, but small numbers of large biennial individuals were observed at many occupied slickspots.

Many occupied slickspots had the actual number of counted/estimated slickspot peppergrass plants recorded on the data sheet. In other cases, an estimate was provided using one of five abundance classes: <10, 10-50, 51-100, 101-500, and >500 plants/ slickspot. For tallying purposes, the abundance class mid-point (5, 25, 75, or 300 plants/slickspot) was used to assign a count of slickspot peppergrass plants in a slickspot. Table 1 summarizes slickspot peppergrass abundance information tallied for all 27 transects.

Table 1. Slickspot peppergrass abundance information. Percentages are in parentheses.

# of slickspot peppergrass			Slickspot peppergrass by abundance class				
Total	repro.	rosette	<10	10-50	51-100	101-500	>500
11,124	4,821 (43)	6,303 (57)	49 (25)	84 (44)	31 (16)	28 (15)	1 (<1)

Slickspot size

A majority (65%) of the 2,198 slickspot microsites tallied during the survey were classified as medium size (2-10 m²). Only 16% of slickspots were in the large (>10 m²) size class, but they accounted for 33% of all slickspots occupied by slickspot peppergrass. In contrast, small sized (<2 m²) slickspots accounted for only 8% of occupied microsites, even though they represented 19% of all slickspots encountered. Overall, slickspots were widespread, but tended to have a patchy distribution, being locally common in some areas, but sparse or absent in others. Slickspots were usually common in areas supporting slickspot peppergrass. The very northwestern and southwestern portions of the study area seemed to have the lowest overall slickspot density. Table 2 provides a summary of the slickspot size information collected during the field survey.

Table 2. Slickspot microsite size information. Percentages are in parentheses. Slickspot size classes are explained in the text.

# of slickspots				# of slickspots with slickspot peppergrass			
total	small	medium	large	total	small	medium	large
2198	407 (19)	1438 (65)	353 (16)	193	15 (8)	114 (59)	64 (33)

Livestock disturbance

Livestock disturbance was recorded within the majority (61%) of slickspot microsites we encountered. It was also recorded in the majority (59%) of slickspots occupied by slickspot peppergrass. All the livestock disturbance we observed was from cattle; none from sheep or horses. During the survey, we occasionally encountered cattle in the northern half of the study area. No large areas were completely free of cattle disturbance evidence. Hoof prints were the most common cattle-related slickspot disturbance. Prints varied from less than 1 to over 5 cm deep. Some hoof print marks were made under dry conditions, but in many cases, print depth indicated the disturbance occurred when slickspots were wet. In most cases, cattle droppings were dry on the outside, and some were obviously greater than a year old.

Livestock disturbance class scores tended to be relatively consistent over a particular transect section, but often switched between the lower and higher classes at some point along the transect length. Tables 3 and 4 summarize livestock disturbance information tallied during our survey.

Table 3. Slickspot microsite livestock disturbance information. Percentages are in parentheses. Disturbance classes are explained in the text.

# of slickspots		Slickspot livestock disturbance class			
total	with livestock sign	0	1-10	11-25	>25
2198	1337 (61)	861 (39)	818 (37)	273 (13)	246 (11)

Table 4. Livestock disturbance class information for slickspot microsites occupied by slickspot peppergrass. Percentages are in parentheses. Disturbance classes are explained in the text.

# of slickspots with slickspot peppergrass	Slickspot livestock disturbance class			
	0	1-10	11-25	>25
193	80 (41)	71 (37)	21 (11)	21 (11)

Weed disturbance

Weed disturbance data were collected at slightly over one-half (56%) of the slickspot microsites sampled during the survey. Nearly all (98%) of these slickspot microsites had some level of weed disturbance, including those occupied by slickspot peppergrass. The most common slickspot weed in areas of unburned habitat was consistently bur buttercup. Other weedy species such as clasping peppergrass (*Lepidium perfoliatum*), tumbleweed (*Salsola iberica*), knotweed (*Polygonum aviculare*), and cheatgrass were usually uncommon or absent from slickspots located in unburned portions of the study area. In burned areas, clasping peppergrass was often the dominant slickspot weed.

The majority (63%) of slickspots occupied by slickspot peppergrass had a density class of 1-10 weed plants/sq.ft. Only 5% had a weed density >25 weed plants/sq.ft. Tables 5 and 6 summarize weed disturbance information tallied during our survey.

Table 5. Slickspot weed disturbance information. Percentages are in parentheses. Disturbance classes are explained in the text.

# of slickspots			Slickspot weed disturbance class			
Total	with weed data	with weed disturbance	0	1-10	11-25	>25
2198	1225 (56)	1204 (98)	21 (1)	573 (47)	500 (41)	131 (11)

Table 6. Weed disturbance class information for slickspot microsites occupied by slickspot peppergrass. Percentages are in parentheses. Disturbance classes are explained in the text.

# of slickspot microsites with Slickspot peppergrass and weed data	Slickspot weed disturbance class			
	0	1-10	11-25	>25
166	3	104	50	9

	(2)	(63)	(30)	(5)
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Fire history

Fire history information was collected at slightly over half (54%) of all slickspot microsites. Vegetation immediately surrounding the slickspots was unburned in the majority of cases. Unburned vegetation was recorded at each of the 102 slickspots occupied by slickspot peppergrass that had fire history information. Table 7 summarizes fire disturbance information tallied during our survey.

Table 7. Slickspot microsite fire history information. Percentages are in parentheses. Fire history classes are explained in the text.

# of slickspot microsites with fire history data	Fire history classes			
	unburned	burned	mosaic burn	rabbitbrush
1177	812 (69)	203 (17)	106 (9)	56 (5)

Texosporium sancti-jacobi

We discovered three colonies of the rare woven-spore lichen (*Texosporium sancti-jacobi*) during our field survey. All of the colonies were small, the largest covering an area approximately 50² m and containing 10 or so thalli. This new occurrence has been mapped, and location, population, habitat, and other conservation information summarized in its Element Occurrence Record (Appendix 7).

Our discovery of woven-spore lichen was opportunistic and incidental during our field survey. We made no attempt to delineate its full extent and abundance within the study area. Woven-spore lichen does not appear to be common within the study area, although additional, scattered colonies likely occur in patches of high quality habitat.

DISCUSSION

We found slickspot peppergrass restricted to a core area in roughly the center of the study area. The most dense concentration of occupied slickspots was located in the northern half of section 36 and the immediately adjacent southern strip of section 25 (T1S R2E). This shallow, basin-like area supported a large block of more-or-less intact sagebrush-steppe vegetation. Slickspot microsite density varied, but they were a regular part of the landscape in most portions of this core area. Occupied slickspots became more scattered and less common extending away from this core area. More degraded habitat conditions may explain, at least in part, the lack of slickspot peppergrass in areas to the north, east, and south of the core area.

The new occurrence is juxtaposed between three previously documented slickspot peppergrass occurrences. It is located approximately 1.5 miles west of the West of Orchard (027) occurrence, 0.5 mile east of the North of Christmas Mountain (028) occurrence, and 1.0 mile northeast of the Christmas Mountain (053) occurrence. Other known occurrences on the OTA and adjacent BLM land are located 3 or more miles further north or east.

Our survey supports the notion that intact sagebrush-steppe vegetation is important for slickspot peppergrass. Several of our survey transects were dominated by or passed through areas of post-fire, early seral vegetation. Slickspot peppergrass was never found in these burned and degraded areas, although slickspot microsites were sometimes common. Wildfire is the most serious potential threat to the new occurrence.

Tank and possibly other military training vehicle tracks were widespread, and in some places locally common within the study area. Most of the tracks appeared to be relatively old, based on the size of vegetation regrowth along the pathways. Track paths were observed within the core area containing slickspot peppergrass and portions of a few occupied slickspots appeared to have been impacted by vehicle activity in the past. Survey results should help OTA resource managers avoid or minimize military training disturbances to occupied slickspot peppergrass habitat in the area we surveyed.

Extensive sagebrush-steppe habitat loss and degradation has occurred along the western Snake River Plain during the past century. Slickspot peppergrass occurrences in the OTA represent what were likely once a considerably more extensive and less fragmented metapopulation. Today, the OTA contains some of the largest and highest quality extant slickspot peppergrass occurrences remaining. The newly discovered North of Christmas Mountain occurrence further highlights the northern section of the OTA as an important conservation center for slickspot peppergrass. To a large degree, the long-term conservation of this species is linked to its conservation in the OTA.

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Appendix 1

Slickspot peppergrass survey study area.

Appendix 2

Slickspot peppergrass survey transects.

Approximate acreages for slickspot peppergrass 2003 survey transect polygons.

<u>Polygon</u>	<u>Acreage</u>
1	133
2	124
3	46
4	50
5	175
6	165
7	162
8	119
9	121
10	112
11	75
12	62
13	41
14	52
15-17	157
18	83
19	85
20	57
21	53
22	44
23	53
24	53
25	47
26	27
27	29

Appendix 3

Element Occurrence Record and location map for the slickspot peppergrass Northeast of Christmas Mountain (071) occurrence.

Appendix 4

Mapped GPS coordinates and associated field data for slickspot microsites occupied by slickspot peppergrass.

Appendix 5

Slickspot peppergrass survey field data.

Appendix 6

Copies of slickspot peppergrass field data sheets.

Appendix 7

Element Occurrence Record and location map for the woven-spore lichen Northeast of Christmas Mountain (023) occurrence.