GENERAL FLORISTIC SURVEY OF GRAND TETON NATIONAL PARK AND VICINITY, WYOMING

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INTRODUCTION

A broad-scale floristic inventory of all vascular plants was proposed for Grand Teton National Park and the John D. Rockefeller Jr. Memorial Parkway (JDR) primarily to document the extant flora in remote backcountry areas. The Teton Mountains are floristically important because of the unique habitats which they contain, because their relatively undisturbed (human disturbance) condition, and because of their proximity to the Yellowstone Plateau, a floristically unique area of Wyoming. Many studies have explored these lands for purposes of vegetation characterization (Cogan et al. 2005, McCloskey 2006) though an explicit and complete plant inventory parkwide had never been undertaken.

We first examined the vascular plant specimen holdings of the Rocky Mountain Herbarium (RM) to assess spatially where the previous records were obtained. It was observed that some townships (36 square miles) within the Park had as little as 8 voucher collections and one partial township (8 square miles) had zero vouchers. This information again reinforced our focus on backcountry areas; we also chose to collect in frontcountry areas to document sampling introduced plants and for completeness. This report serves as the final product of this project yet the full species list is not included for space limitations.

METHODS

A landscape-scale floristic inventory was conducted on Grand Teton National Park and the JDR, wholly within Teton County, Wyoming. The collection localities were often reached by hiking long distances from the trailhead. When the desired habitat was reached, geographic coordinates were recorded, then all vascular plants exhibiting fruits or flowers were From such a starting point, we collected. continued along the collecting path and collecting was designed to encompass the bulk of nearby plant habitats, often with a distant plant habitat as target. Target habitats were often chosen because of the high likelihood of rare or unusual plants they might contain (Hartman and Nelson 2005). Examples of target habitats in the project area were: alpine elevations, limestone substrates, neoglacial deposits, montane ponds, thermal areas, and wetlands. In the meander search/collecting path method described here, the highest number habitats are thought to be encountered for the unit time in the field.

About half of the collecting paths were in frontcountry areas or along trails. When covering these areas, an ample representation of introduced plants along with the native flora was expected. Nearly all of the rest of the collecting routes were off-trail in areas infrequently or never visited by humans.

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Collected plants were pressed and dried for scientific vouchering and they were identified by Dave Scott at the Rocky Mountain Herbarium, Laramie, WY. The herbarium correct is conducive environment to identifications due to the availability of authenticated specimens and other taxonomic resources easily referenced there. Identifications for the families Apiaceae and Caryophyllaceae were verified by Ron Hartman, specialist in both families for western North American taxa. B. Ernie Nelson, RM manager verified all other important collections: 1) Wyoming Natural Diversity Database (WYNDD) sensitive species, 2) Teton County records (plants first documented in Teton County) and, 3) some taxa first

Each voucher includes associated scientific name and authority, plant habitat information, collector, date, (often) GPS coordinates, elevation, and land ownership fields. This information was produced for specimen labels in a Microsoft Access database and was conveyed to Grand Teton National Park, Science and Resource Management personnel upon completion.

documented in the Park under this project.

RESULTS

Overall, floristic diversity was captured by the high number of specimens collected across the Park and JDR in two field seasons during summers 2006 and 2007. Figure 1 illustrates the spatial extent of collections by displaying the 277 collection localities. The total number of herbarium quality collections was 5851 vouchers. As expected, multiple collections of certain taxa were obtained and for these common plants a better understanding of their distribution was attained. The total number of species documented was 869, and 912 taxa (includes subspecies/variety taxonomic level) were documented. A full set of vouchers now reside at the RM (on loan from the Park) for all taxa reported here. The USDA PLANTS database (Version 15 May 2008) was considered the taxonomic authority for the species list. As well as a full list of vascular plants collected, new populations of WYNDD taxa were revealed and newly documented WYNDD taxa previously unknown to the area were collected. Likewise, contributions of this study are 20 County records, and introduced species locations. A synopsis of these results follows.



Figure 1. Collection localities from the floristic inventory of Grand Teton National Park and John D. Rockefeller Jr. Memorial Parkway. The diamond symbol indicates each locality; 277 unique GPS coordinates were recorded. Taxa either currently or historically tracked by WYNDD numbered 44 species (Table 1). The 2003 list was considered because it represented WYNDD species of conservation concern at the time we started this project. Further, the 2007 WYNDD list was produced using data from this project prior to its publication. Subsequently, it is useful to take into account both lists as they provide a context to judge species trajectories through time. Nine WYNDD taxa we collected were previously unknown to Grand Teton National Park or the JDR (Table 1).

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Scientific name	Common name	2003 list	2007 list	2007 Heritage Rank	New to GRTE
Agrostis mertensii	Northern bentgrass	listed	listed	G5/S2	x
Antennaria aromatica	Aromatic pussytoes	potential concern	potential concern	G3G4/S3	
Aquilegia formosa	Crimson columbine	listed	listed	G5T5/SH	
Aspidotis densa	Pod-fern	listed	listed	G5/S1	
Asplenium trichomanes-	Green spleenwort	listed	listed	G4S2	
ramosum				0.02	
Astragalus shultziorum	Shultz's milkvetch	potential	potential	G3S3	
Astragalus terminalis	Railhead milkvetch	listed	listed	G3/S1	
Athvrium americanum	American alpine lady fern	listed	listed	G4G5T4T5/S2	
Botrychium minganense	Mingan moonwort	listed	listed	G4/S1	x
Botrychium multifidum	Leathery grape-fern	listed	deleted	G5/S3	
Carex cusickii	Cusick's sedge	listed	listed	G5/S2	
<i>Carex echinata</i> ssp. <i>echinata</i>	Little prickly sedge	listed	listed	G5/S1	
Carex incurviformis var. danaensis	Incurved sedge	listed	listed	G4G5T3/S2	x
Carex lentalea	Bristly-stalk sedge	listed	listed	G5/S2	
Carex limosa	Mud sedge	listed	listed	G5/S2	x
Carex livida	Livid sedge	listed	listed	G5/S2	x
Carex proposita	Smoky Mountain Sedge	listed	listed	G4/SH	x
Descurainia pinnata ssp.	Payson's tansymustard	listed	listed	G5T3?/S2	A
paysonii				C2/02	
Draba crassa	Thick-leaf Whitlow-grass	potential	potential	G3/S3	
		concern	concern	G 15050 /GO	
Draba fladnizensis var.	White arctic whitlow-grass	listed	listed	G41213/S2	
pattersonii	Tractick and trac	1 1	1 1	05/62	
Drosera anglica	Warm anning a snillarnah	listed	listed	G5/52	
thermalis	warm springs spikerusn	Instea	Instea	G51213Q/S2	
Gentianonsis simpler	Hiker's gentian	listed	listed	G5/S1	v
Gymnocarnium disjunctum	Oak fern	listed	listed	G5/S2	A
Huperzia haleakalae	Fir clubmoss	listed	listed	G4G5/S1	
huncus filiformis	Thread rush	listed	listed	G5/S2	
Kelloggia galioides	Milk kelloggia	listed	listed	G5/S1	
Lesquerella carinata var	Keeled bladderpod	listed	listed	G3G4T3T4/S2	
carinata	Recied bladderpod	instea	instea	05041514/52	
Lesquerella paysonii	Payson's bladderpod	potential	potential	G3/S3	
		concern	concern		
Listera convallarioides	Broad-leaved twayblade	listed	listed	G5/S2	
Luzula glabrata var. hitchcockii	Smooth wood-rush	listed	listed	G5T4/S1	
Minuartia macrantha [Minuartia filiorum]	House's stitchwort	listed	listed	G3G4/S1	
Myriophyllum verticillatum	Whorled water-milfoil	listed	listed	G5/S1	x
Parnassia kotzebuei	Kotzebuei grass-of-parnassus	listed	listed	G5/S2	
Porterella carnosula	Western porterella	listed	listed	G4S1	
Sanicula graveolens	Sierra sanicle	listed	listed	G4G5/S2	x
Scirpus americanus	American bulrush	listed	listed	G5/S2	
Spirodela polyrhiza	Common water-flaxseed	listed	listed	G5/S1	
Stellaria crispa	Crimped stitchwort	listed	listed	G5/S1	
Utricularia minor	Lesser bladderwort	listed	listed	G5/S2	
Viola orbiculata	Western rough-leaved violet	listed	deleted	G5/S2	
Viola renifolia	Kidney leaf white violet	listed	listed	G5T5/S1	
Xeronhyllum tenax	Western beargrass	listed	listed	G4G5/S1	

Table 1. Sensitive taxa tracked by Wyoming Natural Diversity Database (WYNDD) and encountered during the inventory. Taxa shown according to WYNDD Wyoming Plant and Animal Species of Concern list 2003 version (Keinath, et al.) and 2007 Wyoming Plant Species of Concern list (Heidel 2007).

Heritage Rank: WYNDD uses a standardized ranking system originally developed by The Nature Conservancy and its network of natural heritage programs (now coordinated by NatureServe [Arlington Virginia]) to indicate the probability of extinction, at both the global and state scales, of each plant and animal taxon. The following letters denote the spatial scale at which a taxon's status is scored:

 \mathbf{G} = Global rank: refers to the range-wide probability of extinction for a species

 \mathbf{T} = Trinomial rank: refers to the range-wide probability of extinction for a subspecies or variety

S = State rank: refers to probability of extinction from WY for a given taxon

These letters are each followed by a numeric, 1-5 score:

 $\mathbf{1}$ = Critically imperiled because of extreme rarity (often <5 extant occurrences) or because some factor makes it highly vulnerable to extinction

2 = Imperiled because of rarity (often 6-20 extant occurrences) or because of factors making it vulnerable to extinction

3 = Rare or local throughout its range or found locally in a restricted range (often 21-100 known occurrences)

4 = Apparently secure, although it may be quite rare in parts of its range, especially at the periphery

5 = Demonstrably secure, although it may be rare in parts of its range, especially at the periphery

Some 81 taxa were collected on Grand Teton National park or the JDR which had not been previously documented. This number includes the 9 WYNDD taxa mentioned above.

DISCUSSION

Two State records were collected in Grand Teton National Park. One, *Achillea ptarmica* is an introduced cultivar found to be naturalized in irrigation ditches near the historical Whitegrass Ranch. These plants were found to be flowering in late summer (August) at only this single locality thus we recommended here that a more complete inventory of this species be carried out. This rhizomatous perennial indeed has potential to spread from the current habitat of irrigation ditches to natural riparian corridors.

A second species new to Wyoming is the native sedge, *Carex atrosquama*. It is not surprising to document this species because it has been collected in nearby Colorado, Idaho, Montana, and Utah. Western Wyoming, however, may be the eastern extent of this species' distribution. Habitat recorded for *Carex atrosquama* was a montane area in the lower South Fork of Granite Canyon. Though this is the first collection of this species in Wyoming, it may be more common than the lack of records indicate because sedges are often cryptic and repeatedly get overlooked.

Introduced plants comprised only 7.5% of the total taxa documented here. In fact most were already known from the Park, but we assert 9 new introduced taxa now documented due to this inventory. A few insidious species were: *Linaria vulgaris, Cirsium arvense,* and *Carduus nutans*, where the first two were often observed in montane backcountry areas. These two species probably represent the most invasive weeds in backcountry areas. Less invasive introduced

taxa commonly observed in backcountry areas were: *Poa annua* on trails, *Crepis tectorum* in scoured streambeds, moist meadows or burned areas. Also, *Phleum pratense* was seen in a diversity of backcountry habitats and *Cerastium fontanum* ssp. *vulgare* was collected in remote riparian areas.

A biodiversity hotspot was observed near the Huckleberry Hot Springs in the JDR. Several native plants were exclusively collected there, though a significant suite of introduced plants were also found at that locality. The introduced species appear to be associated with walking paths adjacent the springs and should be controlled in the future, given their proximity to the thermal springs habitat that does provide for native biodiversity. Related to this topic is the exceptional native plant diversity of the JDR wetlands in general. Several species were only collected in these habitats and these areas display affinities to the flora of the Yellowstone Plateau (to the north), which is different than much of the flora of Grand Teton National Park.

LITERATURE CITED

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