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APPENDIX A

NOTES ON UNUSUAL ASPECTS OF THE PRESENCE OF TUFTED HAIRGRASS (*DESCHAMPSIA CESPITOSA*) IN THE UPPER CLARK FORK RIVER VALLEY

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Distribution
Tufted hairgrass (*Deschampsia cespitosa*) is a common, native, cool season, perennial bunchgrass found in mountain and prairie grassland communities throughout the northern hemisphere (Munshower 1998). It is found in open bogs, wet meadows, streambanks, and prairie sites, as well as in the spruce/fir zone of higher elevations. It is adapted to a wide range of soils textures, including moderately saline and alkaline sites (Stubbendieck and others 1992).

Thompson and Hansen (2001, 2002) describe a tufted hairgrass (*Deschampsia cespitosa*) habitat type in the grassland regions of southeastern Alberta and southwestern Saskatchewan in moist basin sites where drought conditions on glaciated topography have brought about accumulations of alkali salts. These stands of tufted hairgrass (*Deschampsia cespitosa*) occur in strictly herbaceous communities in association with such alkaline tolerant species as inland saltgrass (*Distichlis spicata*), foxtail barley (*Hordeum jubatum*), and Baltic rush (*Juncus balticus*). Closer to the Upper Clark Fork River, similar stands of tufted hairgrass (*Deschampsia cespitosa*) (some nearly monospecific) occur in the Ninepipes-Kicking Horse area of the Flathead Indian Reservation in western Montana on glaciated prairie pothole topography. However, these occurrences of tufted hairgrass (*Deschampsia cespitosa*) differ in sites from those along the Upper Clark Fork River. Occurrence of tufted hairgrass (*Deschampsia cespitosa*) along the Upper Clark Fork River is unique in our experience by its riverine setting and by having tree or shrub species associated.

Mueggler and Stewart (1980) describe high elevation habitat types (above 6,000 ft) having tufted hairgrass (*Deschampsia cespitosa*) co-dominant with sedges or other grasses on moist southwestern Montana mountain slopes and northwestern Montana wet meadows in high valley bottoms. Kovalchik (1987) describes a tufted hairgrass (*Deschampsia cespitosa*) plant association for central Oregon that closely resembles the types described by Mueggler and Stewart (1980). In no case does any other worker in the region describe a naturally occurring community with tufted hairgrass (*Deschampsia cespitosa*) in a situation similar to the Upper Clark Fork River Valley.

Habitat—Tufted hairgrass (*Deschampsia cespitosa*) is extraordinary in its range of tolerance of several habitat variables. In light of this very broad ecological amplitude, it should not be surprising to find that the species is quite plastic in its responses to different phenological and environmental situations. It has been reported that a population of tufted hairgrass (*Deschampsia cespitosa*) growing on mine tailings has developed such a need for trace metals, that this population is not present on uncontaminated sites (Bonneau 2000). Tufted hairgrass (*Deschampsia cespitosa*) invades disturbed sites and is moderately aggressive on mesic, mid to higher elevation acid mine sites (Munshower 1998).

Elevation—Tufted hairgrass (*Deschampsia cespitosa*) occurs at elevations in North America ranging from sea level to over 14,100 ft (Walsh 1995). Hitchcock and others (1969) state that the species occurs in the Pacific Northwest from alpine ridges to moist prairies and coastal marshes.

Moisture—Along the moisture gradient, tufted hairgrass (*Deschampsia cespitosa*) is found on sites that range from saturated habitats along the edges of marshes and bogs, to moist areas along drainage ditches and the bottoms of prairie draws, to dry slopes at the higher elevations (Walsh 1995).

Soil Type—Tufted hairgrass (*Deschampsia cespitosa*) grows on a variety of soil types and textures. It is found on sandy loam, sandy clayey loam, silty loam, loam, loamy clay, and clay. It is found on gravel in Alaska, Michigan, and Utah. It occurs on granitic material in Idaho and Wyoming. It is found on peat in British Columbia and on calcareous seeps in Illinois. It grows on pumice in Oregon and on volcanic soils in Wyoming (Walsh 1995).

Soil Chemistry—Tufted hairgrass (*Deschampsia cespitosa*) is adapted to cool, acid sites, but is also found on somewhat alkaline soils. It has been found on soils varying from pH 3.3 on mine tailings in Ontario to pH 8.4 in central Idaho. It generally grows best in soils with pH 5.2 to 5.5. It can also tolerate saline conditions of salt marshes along the Oregon coast. Some populations of tufted hairgrass (*Deschampsia cespitosa*) have adapted to mine spoils with elevated levels of heavy metals (Walsh 1995). Many ecotypes of this species have varying genetic composition expressing specific metal and environmental tolerances (Munshower 1998).

Grazing Response—Tufted hairgrass (*Deschampsia cespitosa*) is a palatable forage grass for livestock and wildlife ungulates. The cover and abundance of the species will decrease under heavy grazing pressure (Hansen and others 1988, Tannas 1997, Bonneau 2000). The species is often found on disturbed sites and has been successfully used to revegetate high elevation mined sites (Hansen and others 1995; Hansen and others 1988).

We have no reported comparable occurrence of tufted hairgrass (*Deschampsia cespitosa*) elsewhere in the region to help explain its ecological position on the Upper Clark Fork River floodplain. Scientists at the University of Montana reported a strong positive correlation between tufted hairgrass (*Deschampsia cespitosa*) and the presence of tailings in the soil surface horizon (Riparian and Wetland Research Program 1998). In light of this obvious relationship and a lack of analytical inquiry into the nature of the physiological processes at work, we can only say that tufted hairgrass (*Deschampsia cespitosa*) enjoys an unexplained competitive advantage over other species on these sites where this particular suite of mine tailings has created chemical conditions phytotoxic to the normal vegetation community of the valley. Certainly, the species tolerance of acidic conditions (Walsh 1995) gives us one possible explanation.

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