The Behaviour and Effects of Prescribed Fire on Herbaceous and Woody Plants in Northern Reed-Bentgrass Meadows

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ABSTRACT: Fire was prescribed as a treatment for two grazing areas for bison in the Slave River Lowlands in the Northwest Territories. An 800 ha burn was carried out in early May 1991 at the Hanging Ice Ranch (HIBR) to reduce accumulated herbaceous material (thatch) to improve pasture prior to the release of bison into the fenced range. In 1992 another fire was ignited late May to reduce herbaceous thatch and to top kill willow and other woody plant species that were encroaching in a 4000 ha meadow at Little Rat Lake (LRL). The behaviour and effects of fire on plant growth were studied at representative treatment and control sites. Weather conditions at the time of experimental burns were warmer and drier at HIBR in 1991 than at LRL in 1992. Ambient temperature was
21-22.5°C and relative humidity was 17-21% compared to 8.5°C and 36% at LRL. Fire intensity (I) ranged from 360 kw/m to 7280 kw/m in 1991 and was related to surface fuel depth after burn (cm) by the equation $Y = 10.55 - 0.9819 * \ln I$.

Burning stimulated growth of bent-reed grass (*Calamagrostic* spp). Net above ground primary production (NAGP) was approximately twice the production achieved in an unburned control site at HIBR. Under drier soil conditions at LRL, the difference between control and treatment sites in growth of this grass was evident early in the growing season, but NAGP was only slightly higher in the treatment area at the end of the growing season. Sedges (primarily *Carex atherodes*), responded less favourably to spring burning. At HIBR, sedge NAGP was slightly improved by burning, while at LRL sedges were negatively impacted by burning. Evidence from other studies indicates that the positive response to fire seen in bent-reed grass was likely due to warmer soil conditions during the growing season resulting from a reduction in accumulated plant litter. At LRL burning achieved a 76% kill of willow stems (*Salix* spp.). these plants responded vigourously during the subsequent growing season, during which live stem density increased three-fold from 0.53/m^2at ground level after the burn, to 1.61/m^2 at the end of the growing season in September. In the adjacent control site stem density increased 1.5 times during the same period, from 0.80 to 1.21/m^2.

The reduction of herbaceous thatch by burning in the spring improved the quality of forage in the meadows for bison by effecting a reduction in poorly digestible plant litter. However, negative effects included an increase in NAGP of baltic rush (Juncus balticus) and a reduction in sedge production in the

dry meadow at LRL and an increase in shrub stem density. Further treatments with fire will be necessary to negate compensatory responses of woody plants and to cause mortality, but consideration must be given to mitigating negative impacts on herbaceous forage species.

PRESCRIBED BURNING IN SANDHILLS ASPEN HABITAT[6]

Herbert G. L. Troester[7]

ABSTRACT: Aspen encroachment on the sandhills grasslands of J. Clark Salyer National Wildlife Refuge in North Dakota has been considerable over the last 55 years. The extent of aspen encroachment on the grasslands as a result of fire exclusion was dramatized by comparing slide copies of August 11, 1938, aerial black and white photographs obtained from the Soil Conservation Service to aerial slides taken during prescribed burns conducted on September 2 and 3, 1992. About 2,640 ac (1,069 ha) were burned, using aerial helitorch and ground ignition. Objectives of the burn included fuels reduction, rejuvenation of native grasses and control of the spread of aspen and brush species, including snowberry, for the benefit of grassland dependent wildlife species. The conduct of the prescribed fire and an incidental escape is discussed. Post burn wildlife response was observed.

INTRODUCTION AND HISTORICAL PERSPECTIVE

J. Clark Salyer National Wildlife Refuge lies along the Souris River in North Dakota from the Manitoba border south for about 45 miles (72 km) encompassing 58,700 ac (23,765 ha). About 12,000 ac (4,858 ha) at the south end of the refuge are sandhills habitat. The alluvial sand is related to the Glacial Lake Souris littoral zone (Larson et al, 1992).

The refuge was established in 1935. Aerial photography from August 11, 1938, obtained from the Soil Conservation Service,

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[6]A paper presented at the *Interior West Fire Council: Managing Fire Dependent Ecosystems: Options & Technologies*, October 27-29, 1992, Yellowknife, Northwest Territories.

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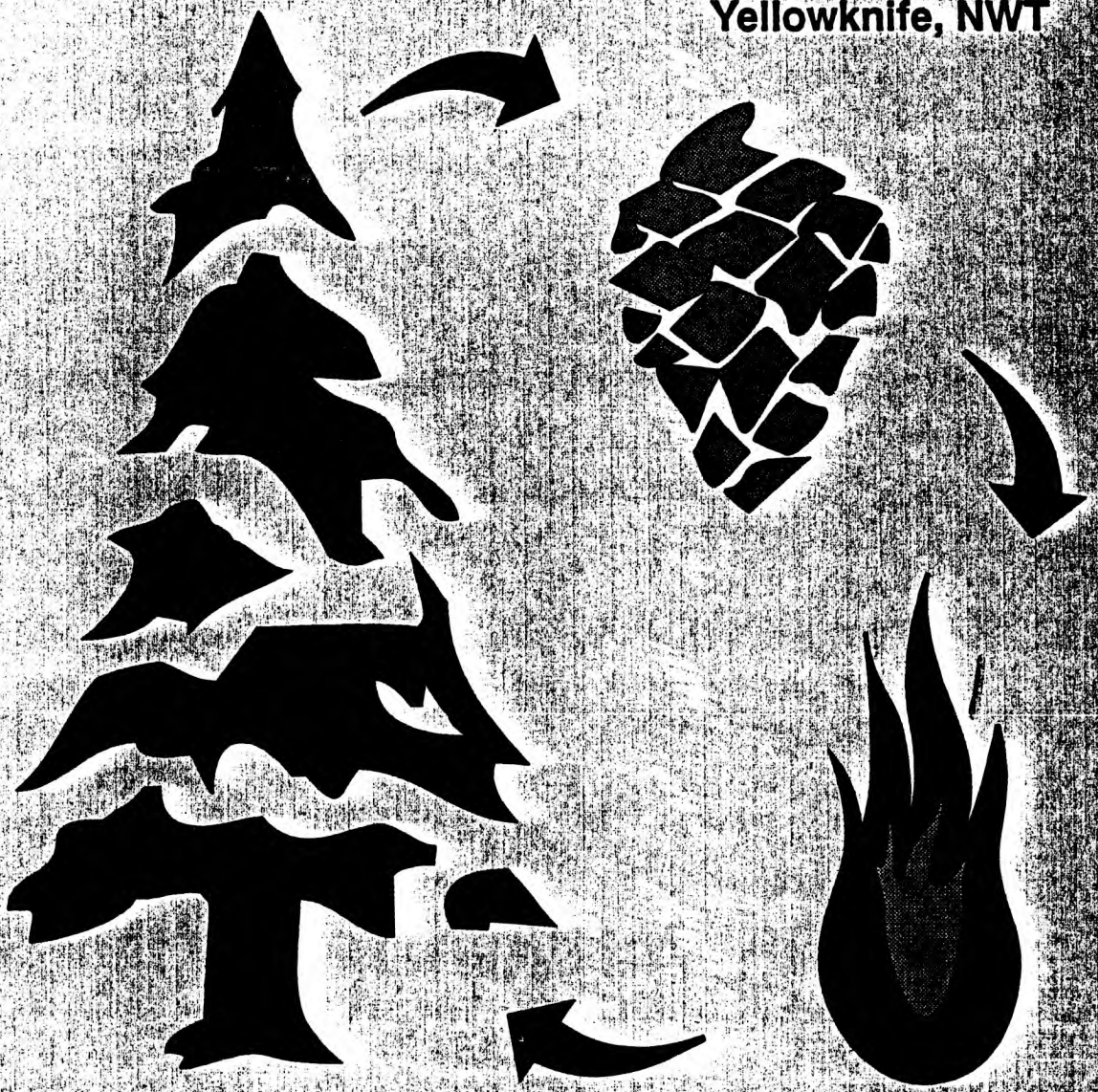

THEME: MANAGING FIRE DEPENDENT ECOSYSTEMS