CATTAIL CONTROL THROUGH PRESCRIBED FIRE

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PURPOSE: Many freshwater emergent wetlands on National Wildlife Refuges (NWR) have been modified by past land use and management. Modifications include installation of levees, ditches, diversion channels, wells, and water control structures to manipulate the flow and direction of surface and ground waters within and outside NWR boundaries. However, when prolonged flooding occurs at depths less than the long-term tolerance level of emergent plants, dense monotypic stands of flood-tolerant species such as cattail (*Typha* spp.) can dominate, eventually eliminating other native plant species and open water areas. Fire has been used as a management tool to control vegetation stands and reduce litter accumulation.

GOALS:

- Improve prescribed fire planning for cattail control by quantifying the effects of fire in relationship to wetland biotic and abiotic conditions.
- Provide predictive, testable models of cattail response to fire application for guiding habitat decision – making at Refuges throughout the Regions.

APPROACH: This multi-refuge study will improve fire planning by investigating and quantifying the effects of fire between cattail autecology, hydrology, soil properties, and prescribed fire on NWRs of the Northeast (Region 5) and Upper Midwest (Region 3). The study aims to facilitate development of long-term monitoring protocols and establishment of an adaptive management process to examine the use of fire in wetland management on NWRs to control cattail in emergent marshes. This study began in 2006 with a projected end date in 2009.

DESCRIPTION:

Study design: Randomized experimental design – 6 randomly-placed quadrats within each of a pair of wetlands at each of 5 refuges are used as experimental units for the application of fire treatments over a 2-year period. Following dewatering and a period of drying, each study wetland is randomly assigned 1 of the treatments, either a growing-season or dormant-season burn, and the remaining treatment is applied to the other.

Monitoring: Response data on biotic and abiotic conditions are collected and measured 3 times in 6 randomly-placed quadrats: 1) prior to the fire treatment, 2) immediately following the treatment, and 3) 1 year after the fire treatment. Data on hydrological, soil, sediment, vegetation, and fire responses are measured in subplots of each quadrat.

L. R. Anderson, USFWS

Prescribed burn in Pool 8 at Agassiz NWR, 22 Aug. 2006; flame lengths reached >9 m.

ADAPTIVE MANAGEMENT: The fire study provides the first important components of a multi-refuge framework for adaptive control of cattail. Under adaptive management, uncertainty about cattail response to management would be captured in a set of models, each one expressing a plausible hypothesis about the effect of management. The models would predict a management outcome for each possible action taken and under each combination of biotic and abiotic conditions of the wetland. The relative degree of confidence in each model determines the best action to take, and these 'weights of evidence' on models are adjusted by comparing model predictions to monitoring data. It is this repeated adjustment of confidence measures that causes adaptation to what constitutes 'best treatment' for a given wetland condition.

A fully adaptive approach to cattail control on refuges will require that uncertainty about decision-making is adequately portrayed in a set of models, and that these models generate predictions managers are able to measure that relate to specific control objectives. A means of initially assigning and subsequently adjusting model confidence weights is also required; implying the need for a plan to collect monitoring data and to periodically assess models against the data. The focus of adaptive management is based on best decision-making, whereas the focus of a management experiment, like the fire study, is on the return of information expected to lead to better decision-making. The results of this study will provide information that is needed to build an adaptive management framework for controlling cattails.