

**DETERMINATION OF LOSS OR DEGRADATION OF WETLAND HABITATS IN NORTHERN NEW ENGLAND UTILIZING REMOTE SENSING (CONDITION AND CHANGE ANALYSIS):
REFINEMENT OF METHODOLOGY, APPLICATION TO STUDY SITES IN NEW HAMPSHIRE AND PUBLICATION OF RESULTS**

Principle Investigators: Dr. Larry G. Ward, Dr. Arthur Mathieson, and Dr. David M. Burdick, University of New Hampshire

Descriptors: Tidal wetlands, remote sensing, marsh loss and degradation

Research Objectives:

In order to address the need to document present conditions of tidal wetlands in northern New England, as well as document changes in the conditions, the following objectives were addressed:

- Create an aerial photographic data base to establish the conditions of the marshes through time for the last half century.
- Adopt and refine a methodology utilizing aerial photography to detect losses and changes in tidal marshes (marsh condition and change analysis).
- Apply the methodology to determine present conditions of selected marsh systems on the Squamscott River with respect to degradation (boundary changes, marsh fragmentation, increase in interior ponding, or presence of invasive species).
- Determine changes and trends of these parameters during the last several decades (1950's to 1990's).
- Present the information in a format useful to managers and planners.

Principal Findings and Significance:

A major goal in undertaking this project was the establishment of an archive of aerial photographs of tidal marshes along the Squamscott River, as well as at other selected marsh sites in the Great Bay/Piscataqua River Estuary and along New Hampshire's open ocean coast. The photographs cover a time period from earlier in this century (1940's) to present. This extensive data base allowed assessment of the present conditions of the tidal wetlands of New Hampshire, as well as documentation of changes in the conditions of the marshes over the last century. In addition, other photographs were identified which will be studied in subsequent research of tidal marshes of the northern New England area.

A second major goal of this project was to refine a method utilizing remote sensing to determine the present health, as well as changes in the conditions over various time periods (years to decades) utilizing commonly available computer hardware and software. The successful development of this methodology (describe in the methods section) has made possible the ability to scale, correct and enhance images, conduct image analyses using the Marsh Surface Condition Index, and display the results.

Finally, this methodology was applied to selected tidal marshes (ten) along the Squamscott River. The results of these analyses show that many of the marshes in the lower Squamscott River have undergone some degree of deterioration. These changes are likely due to anthropogenic effects (e.g. tidal restrictions), as well as natural processes (e.g. sea level rise). In contrast, most of the marshes

in the upper Squamscott appear to be stable, with little evidence of marsh degradation except where major man-made changes have taken place.