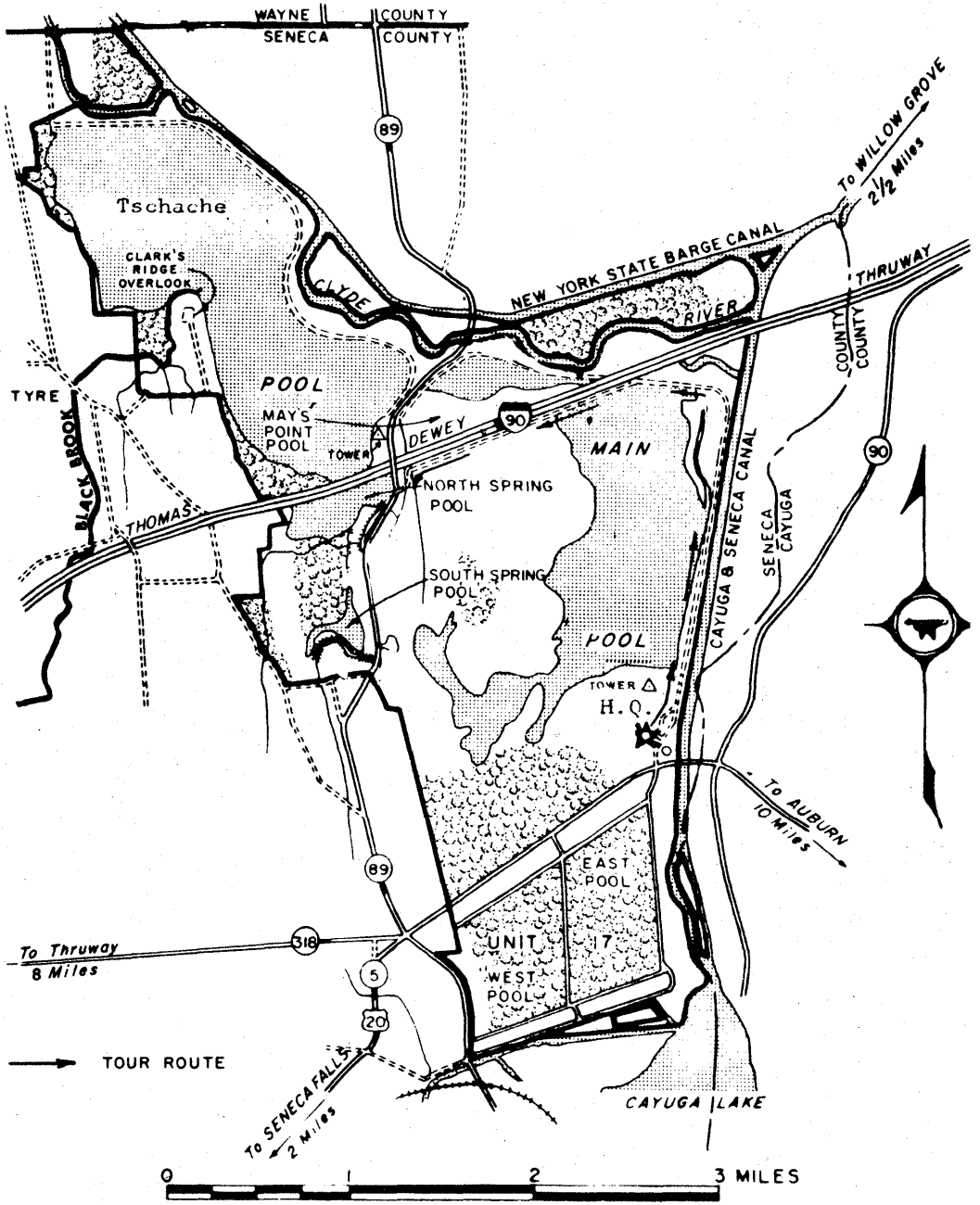
MONTEZUMA NATIONAL WILDLIFE REFUGE

SENECA COUNTY, NEW YORK



RESOURCE MANAGEMENT ADAPTATIONS AT MONTEZUMA NATIONAL WILDLIFE REFUGE AND THEIR IMPLICATION FOR SEASONAL SHOREBIRD USE AND SHOREBIRD VIEWING OPPORTUNITIES

WILLIAM HEGGE

Montezuma National Wildlife Refuge has been in existence for 45 years. Today, the Refuge hosts over 270,000 human visitors each year. This was not the case as recently as ten years ago, and even less so before then. It is likely that diverse opinions exist among this group of visitors as to what we do in order to accomplish the objectives established for the Refuge.

In most cases, the objectives established for National Wildlife Refuges are broad and variable. In fact, this is generally true because unlike most state wildlife areas, the National Wildlife Refuge System is funded by general tax revenues. This provision requires that National Wildlife Refuges provide an array of wildlife recreation opportunities to the general public which are compatible with the objectives established for each refuge. Normally, wildlife habitat conditions will dictate the extent to which wildlife recreation opportunities can be maintained. In other words, compatibility between wildlife recreation activities and refuge habitat maintenance objectives is necessary to insure that the ecologic values of the refuge are not compromised.

For nearly the first 25 or 30 years of the Refuge's existence, the issue of compatibility was less of a consideration because public use was relatively limited and wildlife interests were poorly defined. As public interest in wildlife resources has evolved, so has public-use policy on National Wildlife Refuges. In essence, public uses that are compatible with refuge purposes are now encouraged and viewed as important avenues for educating the public about wildlife.

Serving the growing interests of visitors engaging in wildlife observation has certainly been an important part of the program at Montezuma National Wildlife Refuge. Interpretive programs have been devoted almost exclusively to perpetuating an understanding of management objectives and refuge purposes. Nevertheless, Refuge efforts have occasionally been deficient in informing the public about programs and changes in programs. A case in point is the reduced level of shorebird viewing opportunities that has resulted from the implementation of several interrelated management practices.

Several problems were recognized in 1979 which forced a reevaluation of the water management program and subsequent availability

of shorebird habitat. Progressive natural and man-induced processes collectively created problems which, if ignored, could have had potentially catastrophic consequences for the impounded marsh ecosystem. These problems, which required us to discontinue the traditional spring-summer water level drawdowns, resulted from the interaction of: (1) impoundment eutrophication, (2) infiltration by Purple Loosestrife *(Lythrum salicaria),* (3) the presence of avian disease organisms (i.e., botulism), and (4) an undependable Refuge water supply.·

Until just recently overall peak shorebird numbers and species diversity trends have remained relatively constant on the Refuge. Figure 1, in part, depicts this trend in peak shorebird numbers from 1972 to 1982. Figure 1, a quarterly comparison of peak shorebird populations with water elevations in two primary Refuge impoundments, graphically displays the relationship between complete and partial water level drawdowns and shorebird use from 1973 to 1978. The 1980 drawdown in the May's Point Pool was initiated for dike maintenance purposes, in contrast to drawdown for habitat management during prior years.

Aside from those quarters that exhibit no data, there is a positive correlation between complete or partial water drawdowns and the incidence of peak shorebird use within these impoundments. The cyclical rise and fall of shorebird populations on the Refuge has obviously been due to the presence or absence of shallow water-mudflat interfaces at critical seasons of each year. Beginning in 1980, however, elevated and more stable water levels were instituted within all Refuge pools. Subsequently, shorebird use and viewing opportunities were profoundly affected. The trend line since 1980 would support this conclusion.

In order to grasp the collective impact of this dilemma, a general understanding of the independent conditions now influencing Refuge management decisions is necessary. In its basic sense, eutrophication can be described as the natural enrichment, over time, of inland freshwater lakes and impoundments with sediments and nutrients, thus causing those waters to gradually fill in. Refuge impoundments have been undergoing this process for 45 years, resulting in diminished water storage in refuge pools. As in many managed waterfowl marsh impoundments, water storage was never a serious design consideration when the Refuge dikes were constructed. This factor and the later construction of the New York State Thruway aggravated this condition at Montezuma.

Comparison of the spillway crest elevations and those elevations

of early mudflat exposure for the Main and May's Point Pools is graphically illustrated in Figure 1. This indicates, on average, the limited range at which water depths can presently be adjusted before mudflats are exposed. May's Point Pool, in actuality, reflects an artificially expanded range of water elevations due to the installation of stoplogs above the concrete spillway crest. This modification was employed to provide water coverage over the entire May's Point Pool basin because a greater rate of sedimentation had occurred, and, by blocking gas-exchange pathways to put stress on the invasive Purple Loosestrife plant community. Essentially, the eutrophication process has severely reduced pool-storage capacities, to the extent that any drawdown of water levels during the growing season is a risk because stored water is inadequate for reflooding purposes.

The traditional purpose of spring and summer water-level drawdowns has been to "recharge" the aquatic ecosystems by promoting the growth of emergent plants such as bulrushes, cattails, spike rushes sedges, etc., as well as accelerating the decomposition of accumulated detritus. A secondary stated objective was to enhance shorebird viewing opportunities. It was during a succession of such impoundment drawdowns that the alien and undesirable Purple Loosestrife became established. During the period from 1960 through 1977, periodic drawdowns provided a moist, rich, and otherwise ideal seedbed for the germination of Purple Loosestrife seeds. Mature plants within and bordering Refuge impoundments produced seed on the magnitude of approximately 100,000 per plant per year (Rawinski, 1982). As a result, Purple Loosestrife flourished to such an extent that by 1977 it occupied nearly 35 percent of the area previously supporting other, more desirable, emergent aquatic vegetation.

The origins of this management problem at Montezuma can be traced to the mid-1950's when Purple Loosestrife was not universally recognized as a potentially serious problem. In 1959, Smith noted that drawdowns in pool areas surrounded by this species would result in an invasion of loosestrife with which we could not cope (Smith, 1959). This prediction would have been totally fulfilled had we maintained the traditional drawdown regimen. Dr. Lee Marsh, Chairman of the Botany Department at SUNY at Oswego and an international expert on cattail morphology and behavior, was similarly warning during the 1950's and 1960's that major problems were building on the Refuge (Marsh, 1980-82).

The occurrence of disease organisms within Refuge marshes additionally narrowed our management options with respect to water-level drawdowns. As in most shallow marshes, ecological conditions

conducive to the development of botulism occur during warm, dry seasons in response to the prolonged exposure of mudflats that have heavy loads of organic matter. The decomposition/oxidation of accumulated organic matter within these soils typically provides the anaerobic environment necessary for the growth and toxin-production of the botulism bacterium, a common inhabitant of such soils. This was very evident in 1978 when low water-levels and drought conditions in summer and early fall interacted to produce ecological conditions conducive to the outbreak of botulism; approximately 300 birds are known to have perished during that incident. Because of the inaccessibility of much of the marsh, it is likely that total mortality was two to three times greater than the actual count.

Perhaps the most basic factor influencing the decision to alter the Refuge water regimen was a recognition of the seasonal and ephemeral nature of the Refuge's primary water source—Black Brook. Nearly 75 percent of all the water that circulates (albeit slowly) through the three major impoundments (Tschache, May's Point, and Main Pools) is derived from this stream (Map 1). Understandably then, the frequency and volume of flow within the Black Brook watershed determines, in large measure, the adequacy and constancy of water available for refuge purposes.

Under no circumstances has Black Brook historically been a perennial stream. During the last 40 years, however, major land use shifts and stream channelization in the brook and its watershed have produced significant changes. For instance, the frequency of flow in the brook has been reduced and peak seasonal volumes of water flowing into the Refuge increased. In terms of water supply, we now tolerate what can only be described as a feast (late fall to early spring) or famine (summer and early fall) situation. This problem is compounded by the fact that two of the three major impoundments are each 1,300 acres in size.

Table I quantifies the major land-use alterations and developments in the watershed over the past 40 years, alterations which have contributed to the present flow regime in Black Brook.

Table I

Watershed Land Use and Drainage Developments, Cool, 1980

Pastureland	Cropland	Black Brook - Main Channel	
1938 – 23%	1938 – 51%	Total Length	– 58,000 ft.
1980 – 2%	1980 – 73%	Length Channelized	– 38,000 ft.
-21%	+22%	% Channelized	66 %

The end result of these developments, and certainly several others, has been to cause water in the brook to move with greater velocity through the watershed; without them, water flows would be less erratic and exhibit reduced peak discharges.

There is certainly no guarantee that a botulism outbreak would occur or Purple Loosestrife would expand in the event water levels were lowered—for whatever reason. The probability of their occurrence, however, is sufficiently high to warrant the avoidance of water level drawdowns for at least the near future. On the other hand, one might argue that without drawdowns we are encouraging the development of senescent-degenerative aquatic ecosystems.

Although drawdowns have not recently been implemented, empirical evidence suggests that the aquatic ecosystems are not at equilibrium but in various locations undergoing positive dynamic changes each year. For example, Purple Loosestrife stands have visibly regressed in the Main and May's Point Pools; concurrently, cattails have become reestablished into some zones previously occupied by Purple Loosestrife; and Sago Pondweed *(Potomageton pectinatus),* a desirable submergent, has flourished in the Main Pool. This latter occurrence, while beneficial to waterfowl, also provides habitat for insects and fish which are important to grebes, Great Blue Herons, and other waterbirds.

In the long run, the maintenance of diverse wildlife habitats at Montezuma National Wildlife Refuge will depend upon our attempts to understand the motivations of those who actively enjoy wildlife, as much as our efforts to comprehend and adapt to the physical resources we manage. Conversely then, it is also the public's responsibility to understand the resource manager's rationale for decisions which ultimately influence public use opportunities. These mutually supportive obligations, in the final analysis, are then absolute prerequisites to the successful achievement of wildlife management objectives.

Montezuma National Wildlife Refuge, Seneca Falls, New York 13148

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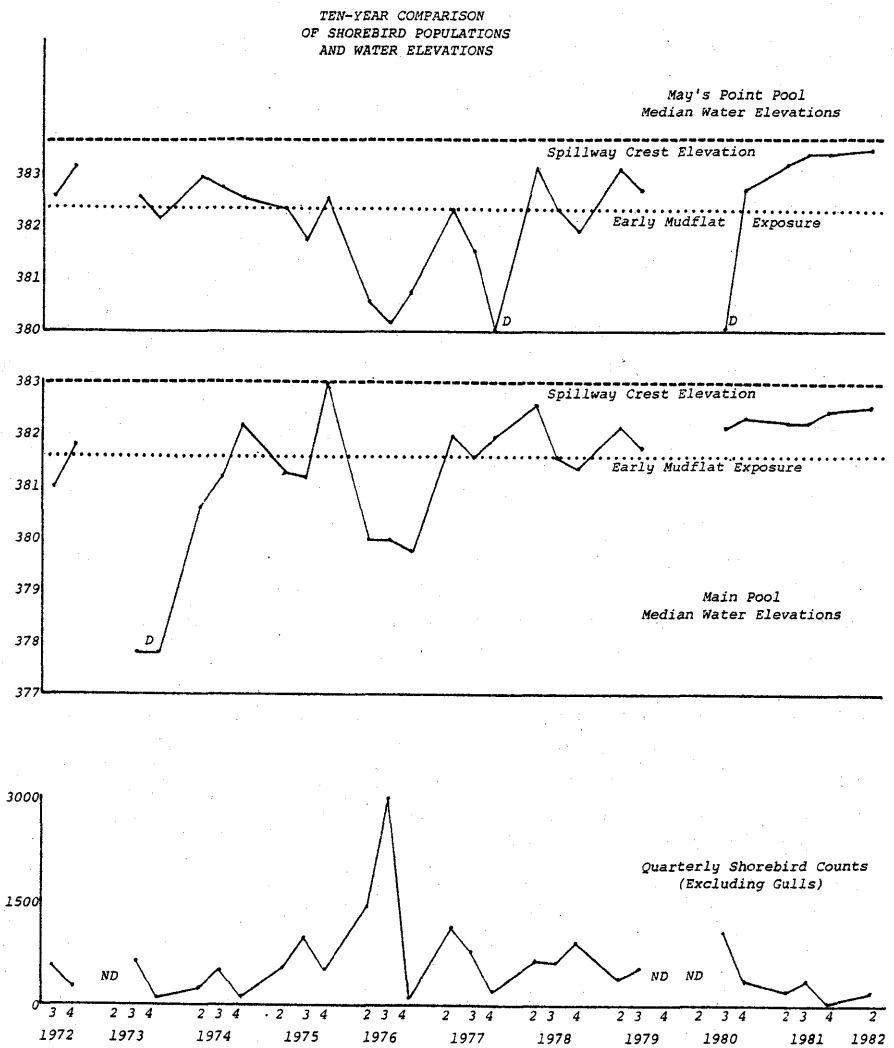
Figure 1


TEN-YEAR COMPARISON
OF SHOREBIRD POPULATIONS
AND WATER ELEVATIONS
May's Point Pool
Median Water Elevations
Spillway Crest Elevation
Early Mudflat Exposure
383
382
381
380
D
D
Spillway Crest Elevation
Early Mudflat Exposure
383
382
381
380
379
378
377
D
Main Pool
Median Water Elevations
3000
1500
0
Quarterly Shorebird Counts
(Excluding Gulls)
ND
ND ND
3 4 2 3 4 2 3 4 2 3 4 2 3 4 2 3 4 2 3 4 2 3 4 2 3 4 2 3 4 2
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982