

HERBIVORY BY RESIDENT GEESE: THE LOSS AND RECOVERY OF WILD RICE ALONG THE TIDAL PATUXENT RIVER

A National Estuarine Research Reserve Site



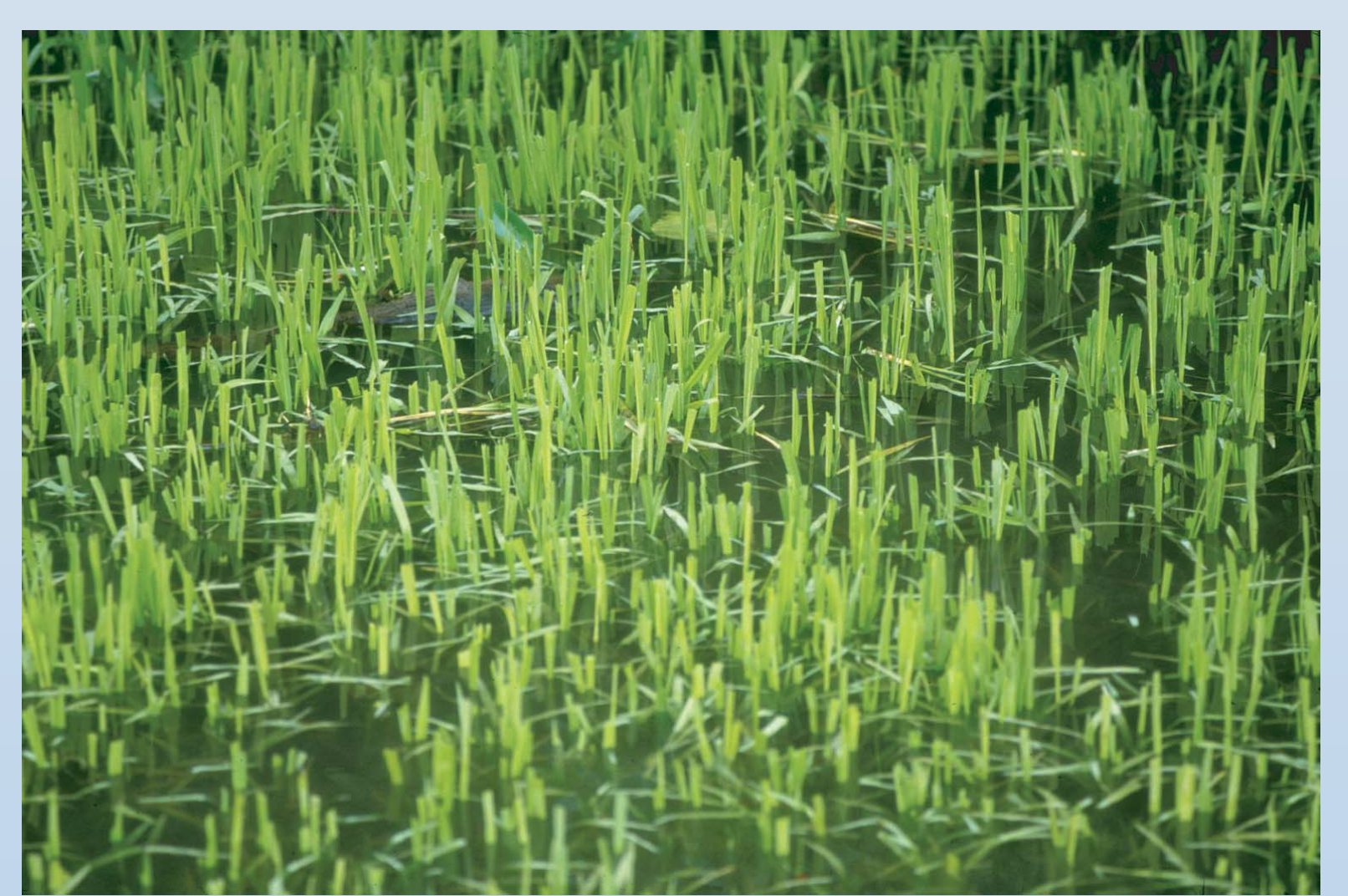
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TOO MANY GEESE LEADS TO DECLINE OF WILD RICE

Well known for a fall spectacle of maturing wild rice (*Zizania aquatica*) and migrant waterbirds, the tidal freshwater marshes of the Patuxent River experienced a major decline of wild rice in the decade of the 1990s. Experiments with exclosures in 1999 and 2000 linked the decline to severe herbivory by an overabundance of resident (non-migrant) Canada geese (*Branta canadensis*). Problems with nuisance geese have been well known in residential and urban areas for over 40 years, but it was not until the decade of the 1990s that numbers of geese reached an unprecedented 1 million birds in the Atlantic Flyway and about 100,000 birds in the state of Maryland. It was during this decade that grazing by geese on the Patuxent marshes reduced wild rice, the signature emergent plant in these fresh-tidal marshes, from extensive river-bordering stands to isolated patches. The result was to leave many lower, inter-tidal areas devoid of vegetation, providing the opportunity for establishment of less desirable species.

Rice is especially vulnerable to grazing by geese during a long period of early growth, from germination in April through emergence from the water column (floating leaf stage) in mid May and June. This period coincides with the nesting and brood rearing period of geese, an energetically and thus resource demanding time when adults must acquire nutrients for eggs, and juveniles feed voraciously to achieve adult size in about 10 weeks. Adult geese uproot germinating rice plants as soon as they appear and flightless goslings extensively browse foliage of developing plants as they move along the river border in creches (large groups) in May and June. As an annual plant, each crop of rice arises solely from viable seed, most of which is produced in the previous year. Thus direct mortality of plants or even heavy damage from grazing that prevents flowering and seeding can quickly lead to complete loss of plants in a local area. Areas denuded of rice are slow to return without a nearby source of seed.



Grazed Rice

Leaves grazed by geese were cut straight across and this scar was retained throughout the growing season. Repeated grazing would eliminate the plants. Rice grazed once could mature and flower, but would achieve only half the height and robustness of ungrazed plants.

Effects of Exclosure

Exclosure studies revealed the devastating effect of goose grazing on the survival of rice along the Patuxent River. By late summer, study plots revealed a marked contrast of maturing rice inside exclosures with virtually no survival outside (note control plot stake with no rice!). Larger plots produced the same contrast anywhere geese had access.

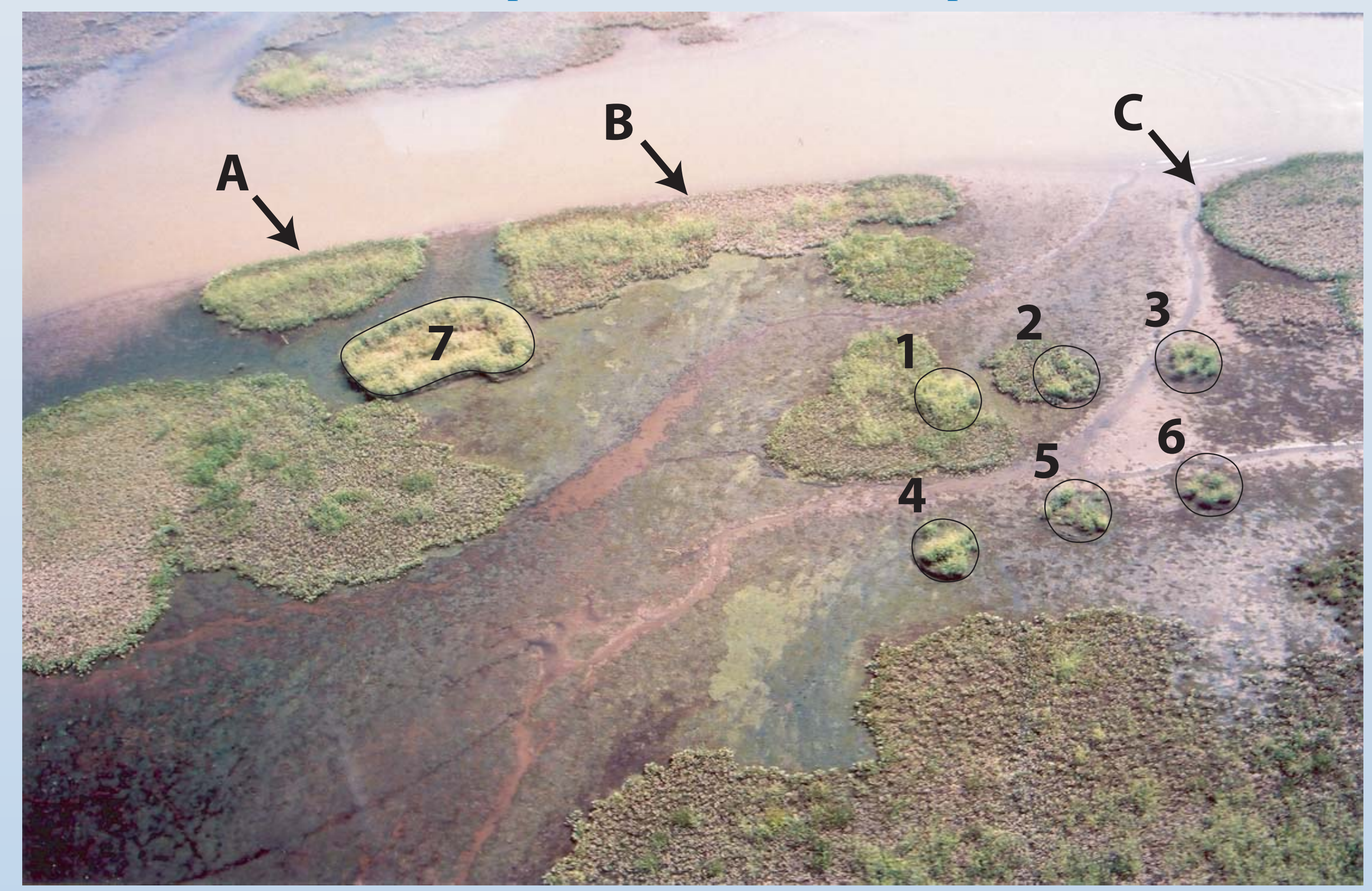


THE IMPORTANCE OF WILD RICE

Wild rice is one of the most valuable of all wildlife food plants and in the Chesapeake Bay region it plays a critical nutritional role for numerous fall migrating waterbirds. Sora rails (*Porzana carolina*), bobolinks (*Dolichonyx oryzivorus*), and red-winged blackbirds (*Agelaius phoeniceus*) traditionally have had strong ecological ties to wild rice. Soras formerly were so abundant in the Patuxent wild rice marshes that the area became one of the most famous rail hunting grounds in the region. Thousands of soras aggregate in these marshes for an extended fall stopover to fatten before continuing migration. In this way the migratory fitness of soras and other waterbirds is intrinsically linked to wild rice. With the decline of rice, the status of these birds is placed at risk. If less desirable plants colonize the areas formerly occupied by rice, then the utility of these marshes to migratory birds may be greatly diminished for an unknown period into the future.

Wild rice also is special because it is uncommon. In the Chesapeake Bay region, extensive stands of wild rice occur only in a narrow zone in the very upper reaches of estuaries. These fresh tidal marshes have unique physical qualities that favor the perpetuation of seeded annual plants like wild rice. It is clear that the food value of these wild rice marshes is outstanding and of critical value to migratory birds. Because of these qualities, fresh tidal marshes deserve the highest priority management concern and protection.

Marsh denuded by grazing geese (2000 photo) numbers indicate planted plots; letters are position locators to bottom photo.



Extensive recovery of rice (light green) following removal of geese.



TWO PROACTIVE MANAGEMENT ACTIONS RESTORE RICE TO THE PATUXENT MARSHES:

- 1) Extensive Use of Protective Fencing and Planting of Rice
- 2) Major Reduction of Geese by September Hunting

Once geese were identified as the cause of the decline of rice on the Patuxent, we began experimenting with the use of fencing to both protect natural stands of rice and small planted plots. Both proved highly successful and the effort was rapidly expanded on a larger scale. Large linear river-bordering rice stands were fenced and seeded plots were joined to enlarge restored areas of rice, especially on denuded mud flats. To supply large amounts of seed for planting, panicles were bagged with Tyvek material to capture rice as it matured. Many gallons of seed were stored over winter in refrigerators for seeding in the spring. Over a 4-year period we used 6 km (almost 4 miles) of fencing in this effort.

We also recognized that any management imperative to restore rice to its former prominence on the river would require reduction in the grazing pressure on rice. To this end, a collaborative goose reduction plan was drafted with consensus of local land and state waterfowl managers. The plan focused on adding of goose eggs to limit recruitment of young and use of Maryland's September resident goose season as the instrument to reduce numbers of geese.

The hunting program was highly successful with over 1,800 geese harvested by hunters over a 5-year period. The success of this public hunt hinged on the cooperation of local jurisdictional land owners to allow access to areas where geese were concentrated, many of which were formerly non-hunted. In addition the hunt was managed by park personnel to ensure maximum public participation and effective harvest of geese.

Major support for this work came through grants from the Chesapeake Bay National Estuarine Research Reserve, a program administered by NOAA and the Maryland Department of Natural Resources.



Restoration Techniques: Fencing and planting

Fencing was used to protect rice from goose grazing and rice panicles were bagged to efficiently collect seed for planting (above). Rice grew luxuriantly inside fencing anywhere we placed it, e.g., at our boat landing and in large plots planted on mud flats (below). Without fencing, no river-bordering rice was able to survive the grazing pressure from geese.

