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Evidence of widespread destruction of submersed aquatic vegetation (SAV) from clam dredging in Chincoteague Bay, Virginia

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by

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Introduction

Beds of submerged aquatic vegetation (SAV) are important natural resources which are critical habitats for life stages of many commercially and recreationally important species of fish, crabs and shellfish in Virginia. SAV is comprised of rooted flowering plants which have historically grown throughout the Chesapeake Bay and Eastern Shore coastal lagoons in subtidal areas where water depths are less than 6 feet (Orth and Moore 1983). The presence of SAV in an area is indicative of water quality conditions which are low in nutrient enrichment and turbidity (Dennison et al. 1993). Given this relationship between water quality and growth, SAV have been chosen as an indicator species with which improvements in water quality conditions in the Chesapeake Bay and coastal lagoon systems are assessed (Chesapeake Bay Executive Council, 1992).

SAV nearly disappeared from Virginia's coastal lagoons and lower Chesapeake Bay regions in the 1930's attributable in part to an infestation of disease. Subsequent re-growth in the lower bay was reversed in the 1970's as decades long deteriorations in water quality, combined with large inputs of sediments and nutrients from Tropical Storm Agnes reduced SAV to only 10% of their historic abundance (Orth and Moore 1984). In Virginia's coastal lagoons only Chincoteague Bay has experienced any subsequent recovery. Figure 1 shows the recent regrowth of SAV in Chincoteague and other northern coastal bays over the past 11 years as determined from annual aerial surveys.

Each year the distribution and abundance of SAV in the Chesapeake Bay and Virginia's coastal lagoons are mapped by VIMS scientists from aerial photography which is flown specifically for that purpose (Orth et al. 1996). Although a principal objective is to monitor area wide changes in SAV abundance, the photography is of such a scale and quality that impacts to SAV from dredging operation or boat scars are readily apparent (see accompanying photographs). Beginning in 1995 a few circular dredge scars were observed in SAV beds in the Virginia portion of Chincoteague Bay. These scars appeared to increase in number and size in 1996 and 1997, prompting us to alert officials at VMRC as to the increasingly significant impacts to the only remaining SAV populations along Virginia's Eastern Shore.

The objective of this report is to provide a summary of the field and laboratory analyses of impacts of the dredge scars to SAV in Chincoteague Bay, Va. for the Commission.

Field Observations

On August 21, 1997, Dr. Ken Moore of VIMS, accompanied by Jim Wesson and Mike Barnett of VMRC, visited several locations in Chincoteague Bay where the dredging scars were observed on the aerial photography. Observation were made both from the boat in water depths of 2 to 4 feet and Ken Moore and Mike Barnett made underwater observations as well. There was essentially no SAV vegetation found within the dredged circles, which ranged to over 100 ft. in diameter. This was in stark comparison to unimpacted areas immediately outside the scars where the vegetation was very dense and appeared quite healthy. Vegetation adjacent to the scars consisted principally of eelgrass (Zostera marina), a valuable, saltwater tolerant SAV species which may be found along the Atlantic coast of the U.S. From New England to North Carolina.

Sediments within the dredged scars were very sandy with an abundance of broken clam shells and relic oyster shells scattered throughout. Outside of the scars the sediments were much softer with a surface layer of fine sands and organic matter observed between the SAV shoots. Apparently the dredging had completed disrupted the sediments changing them from organic rich sands to coarse sands and broken shell and had removed nearly all the SAV vegetation, as well.

Laboratory Analyses of Photography

Black and white aerial SAV photography taken of Chincoteague annually since 1990 from an altitude of 12,000 ft. (1 in. equals 2,000 ft.) was reviewed for the presence of circular dredge scars. All dredge scars were counted and their diameters measured by micrometer. The two accompanying photographs taken in May of 1997 illustrate typical dredge scars (identified by arrows). The SAV beds can be identified by their darker tones as compared to unvegetated bottom. Individual scars first observed in 1995 and again in 1996 were compared to the photography made in subsequent years to determine if any recovery could be observed.

No circular dredging scars were observed in SAV aerial photography prior to 1995. In photography taken in May of 1995 a total of 10 circular clam dredge scars averaging approximately 29 m (95 ft) in diameter were counted. These impacted approximately 1.6 acres of SAV vegetation resulting in apparent loss of nearly all vegetation within the dredged circles (Fig. 2).

In photography taken in July of 1996 an additional 23 circular dredged areas within SAV beds were evident. These were somewhat larger, averaging approximately 44 m (145 ft) in diameter. The 1995 dredged areas demonstrated little change in appearance and all were evident in 1996. Newly dredged SAV bottom in 1996 was estimated to be approximately 7.4 acres (Fig. 2).

Aerial photography taken in May 1997 reveals an additional, approximate 208 dredged areas within SAV beds. These dredged areas range in size from 36 m (119 ft) to 84 m (277 ft) at different sites. Many are as large as 120 m (396 ft) in diameter. Because some large areas have been overlapped with many circular dredged sets, the precise number of circles is difficult to determine. The number of dredged circles estimated is a conservative count, the actual number of new sets of gear in SAV beds in 1997 may be as high as 300. All circular dredged areas first observed in 1995 and 1996 are still evident, with little change in 1997. Total additional area of SAV dredged in 1997 was approximately 302 acres (Fig. 2). These data indicate that as of 1997 approximately 6.3% of the 4912 acres of SAV (1996 data) mapped in the Virginia portion of Chincoteague Bay was impacted by the circular clam dredging, with most of the dredging occurring in 1997.

Research conducted at VIMS by Dr. Ken Moore and Dr. Bob Orth a number of years ago investigating the impacts of one meter wide boat prop scars on eelgrass beds, suggested a recovery time of at least 3 to 5 years in these narrow propeller cuts (Orth and Moore 1981). Because of the size of the dredging scars in Chincoteague Bay and the massive degree of sediment disruption, the recovery period for each scar in Chincoteague Bay is unknown, but it is likely to exceed 5 years. There is little evidence, so far, of recover of 1995 scars by 1997.

Conclusions

The destruction of SAV in Chincoteague Bay has been determined to be a significant impact to this resource over the past several years with no evidence of recovery. The impacts appear to be accelerating with over 300 acres destroyed in 1997 alone. At the present time SAV in Chincoteague Bay represents the only vegetation present along Virginia's Eastern Shore. Currently restoration efforts are ongoing for the transplantation back into some areas where SAV historically had been found in the Chesapeake Bay and lower Eastern Shore. Although there is no evidence that the areas of SAV which have been destroyed in Chincoteague Bay are recovering, we are hopeful that the areas which have been lost will, in time, regrow naturally. There appears no other choice, as complete transplantation of over 300 acres would be extremely expensive, possibly into the millions of dollars. It is imperative that no further impacts to this resource be allowed.

Literature Cited

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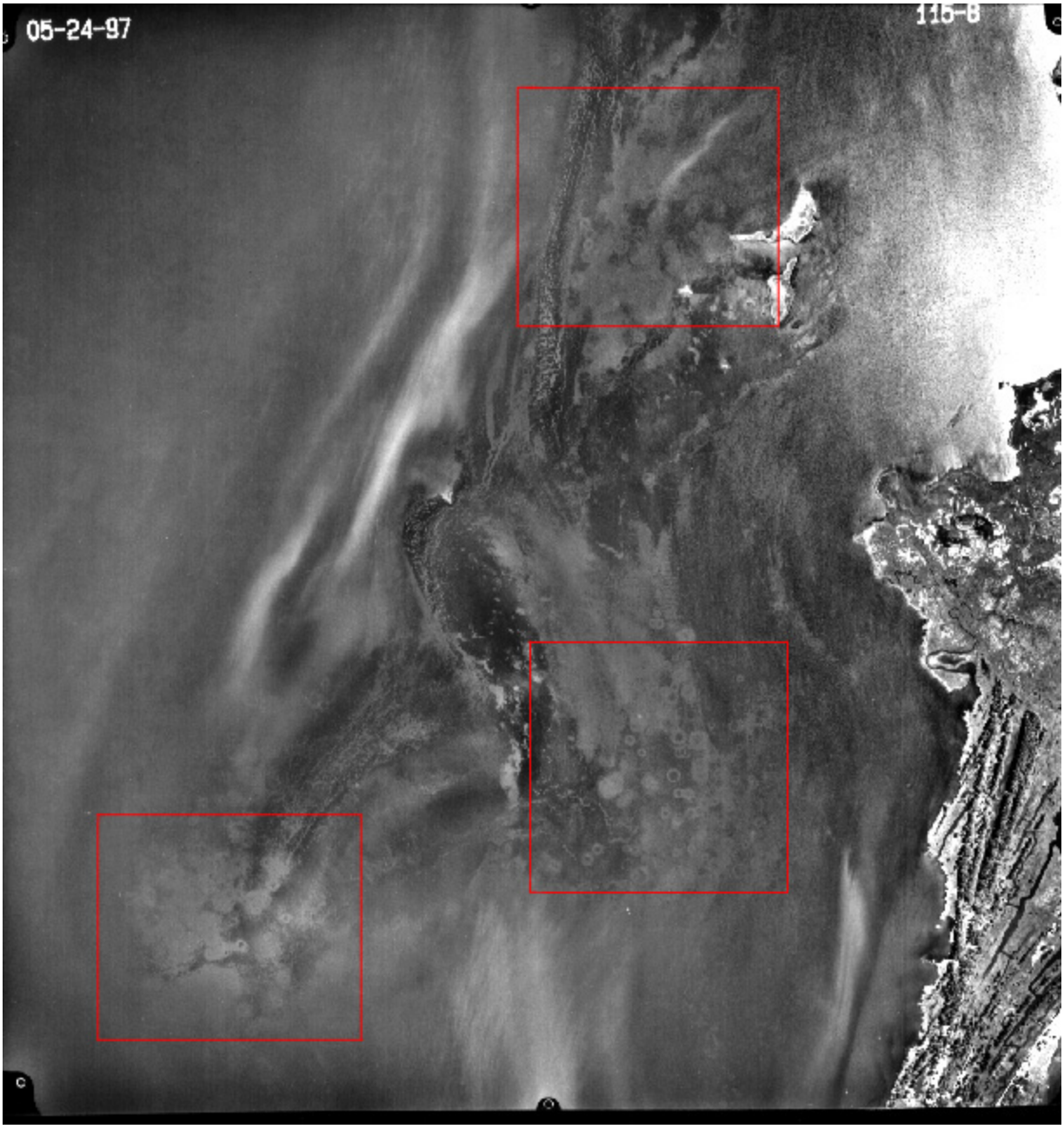
Photographs

1:24,000 Scale Aerial Photography Documenting Circular Dredge Scars

SAV Photo 115-8, taken 5/24/97



SAV Photo 116-8, taken 5/24/97

Figures

Figure 1.

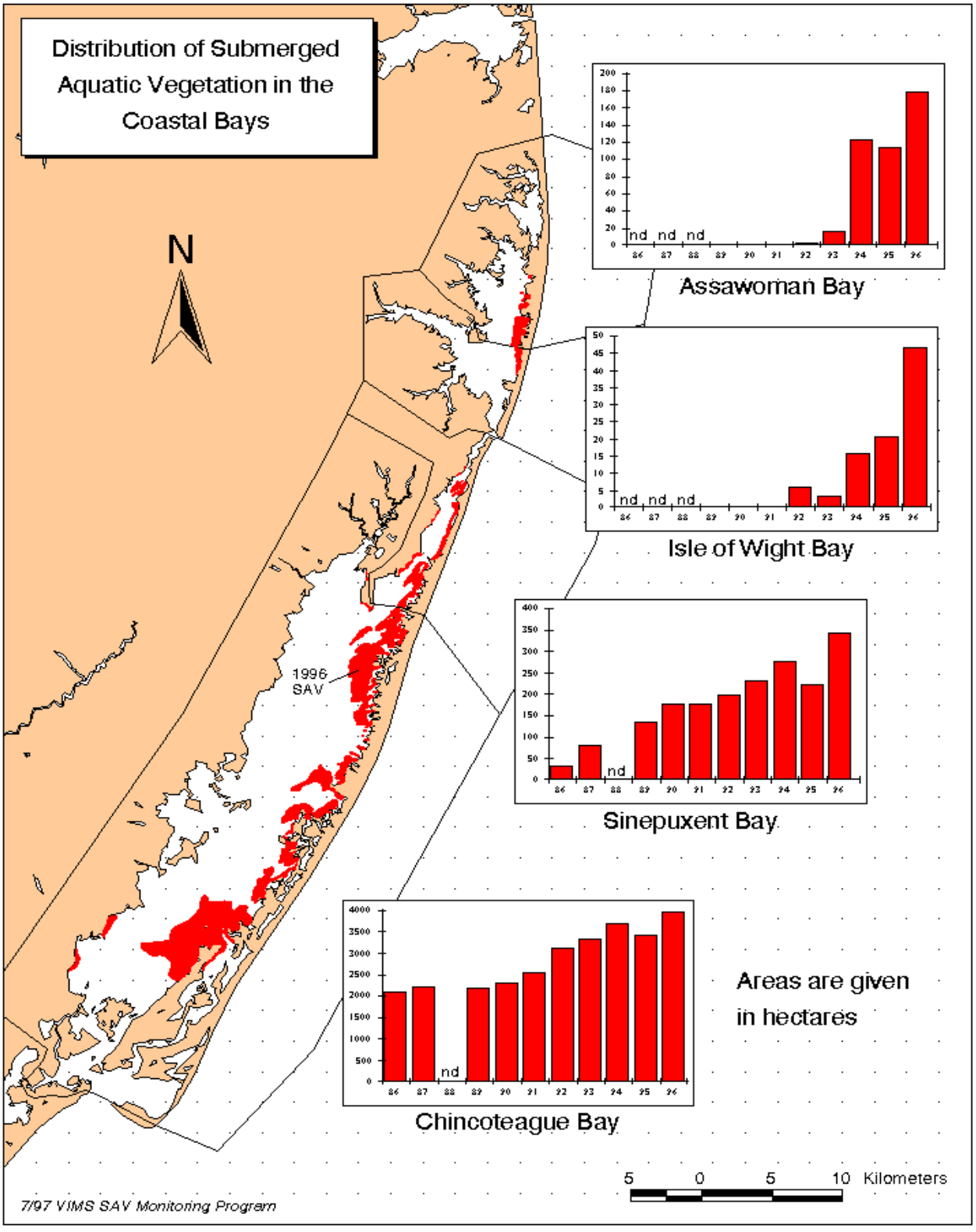


Figure 2. Chincoteague Bay, Virginia Clam Dredging Scars in SAV Beds