2008 Cove Point Marsh Community Monitoring Report

submitted by

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Purpose of Study

This year's plant community monitoring at Cove Point Marsh was done to determine how much, if any, the 10 communities/associations identified by Brent Steury[1] in 1997 had changed since last year's breach in the barrier dune. The resulting inlet has allowed a daily tidal flow of high salinity (17 ppt as measured by refractometer on 9/16/08 and corroborated by the chesapeakebay.net website[2]) bay water into much of what was a non-tidal, fresh marsh system (average salinity = 2.8 ppt as reported by Steury[3]), when Steury surveyed it eleven years ago. It was surmised that this sudden and relatively long-lived influx of salt water would change the make-up of at least some of the plant communities in this wetland. To determine the validity of this premise, a re-survey of Steury's original 10 plots was performed.

The suspicion is that the breaching of this barrier dune by storms has been going on for 100's of years. Presumably, on most occasions, the breach would repair itself in a relatively short period of time (weeks or months). The influx of fresh water from streams and rainwater would then lower the salinities fairly quickly, thus not causing any significant long-term change to the species composition of the existing plant communities. For some reason, this breaching incident has already lasted nearly 2 years now and shows no signs of repairing itself, despite recent efforts (See PHOTO 1) involving the installation of snow fences.

Study Methodology

There was an attempt made to re-locate all of Steury's 10 original study plots, which he marked with rebar stakes. To accomplish this, a scanned digital version of the USGS topo map Steury used to mark his plots was georeferenced and placed in a Trimble GeoXT mapping grade GPS receiver (accuracy ±3 feet) using ESRI's ArcPad software package. As the approximate plot locations were approached, a careful search was initiated to find the old rebar markers.

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[1] Brent W. Steury, "Vascular Plant Community Characterizations for Cove Point Marsh" (Summary and Field Forms from Field Season 1997 submitted to Cove Point Natural Heritage Trust, 1997), 3-6.
[2] http://mddnr.chesapeakebay.net/bay_cond/bay_cond.cfm?param=sal&station=CB44
[3] Brent W. Steury, "Annotated List of Vascular Plants from a Nontidal Barrier Wetland along the Chesapeake Bay in Calvert County, Maryland", *Castanea* 64, No. 2 (June 1999):188.

Unfortunately, civilian GPS use was in its infancy in 1997 and apparently was not used to position the original plot locations on the map. Also weather effects and tall vegetation may have conspired to make finding the markers difficult. In spite of this, rebar for Plots 4, 9, and 10 were re-located. In some cases, the markers were a considerable distance from their locations as shown on the map. Again, this is understandable, due to the lack of landmarks and GPS coordinates at that time. For plots where markers were not found, every effort was made to match the location to the description given by Steury.

Once a suitable location was selected, the center of each plot was located with the GPS (See Site Map) and photographed from multiple angles (See plot forms for photo compass directions). One observation point was done at the plot center and the Maryland Natural Heritage Program's "Vegetation Inventory Form" was completed for each of the 10 plots. All Vegetation Inventory Forms and a CD with Plot Photos and an ESRI shape file for plot center locations will accompany this report.

For this project, the plots were circular and the areas were dependent on the type of community being sampled; 100 m^2 (radius = 5.64 m) for herbaceous, 225 m^2 (radius = 8.46 m) for shrub communities, and 400 m^2 (radius = 11.28 m) for forested plots. Distances for the desired radii were determined with a Haglöf DME 201 plot measuring system. It should be noted that Steury's original plots were much larger than those used in today's community assessment methodology. He also used multiple observation points for each plot. The salinity measurements mentioned throughout this report were determined with an Extech RF20 refractometer.

Results

This survey was performed on September 3, 16, 17, & 18 of 2008. As expected, most of the plant communities had changed significantly, since 1997. The general trend was that fresh water plant species had been replaced by species with a higher salinity tolerance. The exceptions were Plots 2, 8, and 10, which had only minor changes in their composition. Plot 2 was a Red Maple Swamp that was located above the influence of the recent salt water influx. Plot 8 (on the barrier dune) and Plot 10 (on the old sandy Titanium mine site) were upland plots that were too high to be affected by the tidal influx. The other study plots will be discussed briefly below:

Plot 1 - This plot was originally classified as a "*Fraxinus profunda* Swamp Forest". This community no longer exists! Now about 90% of the trees are dead standing or dying (See PHOTO 2), presumably from salt water intrusion. The salinity was measured in nearby ponded water at 14 ppt, which is much too high to support this fresh water community. It should be noted, however, that many of the trees also had beaver signs, ranging from girdling to being fell outright by gnawing. It was unclear from this work as to which factor was responsible for the death of the trees, but it could well be a combination of the two. The community is now dominated by *Aster subulatus* and *Phragmites australis*.

Plot 3 - This community was and still is dominated by *Typha angustifolia*. The difference was in the associated species and salinity measurements. Steury mentioned fresh species such as *Lycopus americanus*, *Strophostyles helvula*, *Parthenocissus quinquefolia*, and *Sphagnum* sp., which could not even begin to exist at this location now. Refractometer measurements from a nearby pool of left-over tidal water indicated a salinity of 17 ppt. Steury also mentioned in his report that *Typha angustifolia* was the dominant plant of the entire marsh area! Now there are only scattered individuals throughout the wetland.

Plot 4 - In Steury's original description, this plot was in a very slightly brackish (<6 ppt) pond and the bottom was 80% covered with *Ruppia maritima*. Now it is part of the general tidal bay/creek that resulted from the breach in the barrier dune (See PHOTO 3). Only a few plant fragments of possible *Ruppia maritima* were found during this study. Due to the lateness in the growing season in which the current sampling occurred (9/16/08), it is possible that this population of *R. maritima* was experiencing its characteristic late summer/fall die back. Because of this, it is not possible to say whether this community is still extant. *R. maritima* is known for its tolerance to a wide variety of salinities, so the sudden influx of salt water from the breach should not have adversely affected this community.

Plot 5 - This community was described by Steury as an "*Eleocharis olivacea* tussock flat" with *Pluchea odorata* also being common. Today there are still small open tidal pools that resemble his description (See PHOTO 4). The big difference is that the dominant plant is now a mat of the more halophytic *Eleocharis parvula*. This is undoubtedly a consequence of the recent influx of salt water. Also there were a few plants of *Spartina alterniflora* beginning to colonize the flats. This halophytic plant was not mentioned in any of Steury's original descriptions for this marsh. *Leptochloa fascicularis* was still present, but the other State Rare, Threatened, or Endangered (RTE) species, *Fuirena pumila* was not seen. Once again, the salinity was the same as the open bay water (17 ppt).

Plot 6 - This community was described as a "*Decodon verticillatus*/*Osmunda regalis* Marsh". Both of these species and almost all of the others listed by Steury for this plot are fresh water marsh species. The salinity of water nearest to this plot was measured by refractometer and found to be 14 ppt, even this far back in the marsh. While this salinity is somewhat lower than the rest of the wetland, it is still much too salty to sustain anything resembling the community that was originally described. During this visit, the dominant plant was a thicket of *Aster subulatus* (See PHOTO 5), with only a few other species noted. A few plants of *Decodon verticillatus* and *Osmunda regalis* were seen about 100 meters towards the higher uplands to the south, but none were even remotely near the plot location.

Plot 7 - This plot was located in what was originally described as a "*Clethra alnifolia* Shrubland Swamp." Even though the plot location was close enough to the uplands that it was still fresh (0 ppt refractometer reading), it may be receiving more frequent inundation of salt water during storm events than before the breach occurred.

Many of the same species noted by Steury were still present, but a large percentage of the woody vegetation was either dead standing or dying (See PHOTO 6). Some of the dead/dying trees in the general vicinity were *Pinus taeda*, suggesting a slightly drier regime in past years. As noted previously, beaver activity could also be contributing to the woody plant die off.

This same fresh water species composition existed for quite a distance towards the open marsh. Even though the dominant plants are still fresh water species (*Echinochloa walteri* followed by *Leersia oryzoides*), there were some brackish species that are starting to become established, such as *Pluchea odorata* and *Aster subulatus*.

Plot 9 - This community was previously described as being dominated by *Phragmites australis*. At the recommendation of Steury, this and other populations of *Phragmites australis* at this site were herbicided in subsequent years via aerial spraying. The results in this plot seem to be favorable, as only a small percentage of the area is now populated by *Phragmites australis*. The dominant plant now is the ubiquitous *Aster subulatus*, which can only be described as invasive in this marsh system. A representative view of this plot can be seen in PHOTO 7.

Conclusions & Recommendations

In 1997, Steury reported the dominant plant in the entire marsh system to be *Typha angustifolia*. Now this is only a minor component of the marsh and has been replaced largely by extensive 1.5 meter-high thickets of *Aster subulatus*. Presently, it appears to be outcompeting most other species trying to gain a foothold in this ecosystem. This species may only be a transitional phase in the ongoing process of succession from a non-tidal fresh marsh to a brackish tidal marsh system. *Phragmites australis* is probably the second most abundant species in the marsh, forming thick rings around the periphery. Only further monitoring of the marsh will reveal what the climax communities will look like.

If the breach is repaired, either naturally or by man's intervention, the transition back to a fresh marsh will begin. It is suspected that this process will happen fairly quickly, as it has probably been repeated many times in the geologic past. Whether the original communities that Steury described will return or not remains to be seen. The herbaceous communities should revert back to something resembling their former composition rather quickly, but it will take many years for the woody species to reach their former abundance and size. We should remember that nature is always in a state of flux and that few communities will exist unchanged for any long periods of time.

At least some of the RTE species were not seen this year in their former plot locations. It is likely that they may not be seen again, as long as the current brackish environment prevails. Other new RTE species, however, may establish themselves in the new ecosystem created by the salt water influx. One such species, the Slender Seapurslane (*Sesuvium maritimum*), currently ranked an S1 in Maryland, was found in the vicinity of Plot 5 during this study. It should be noted, nevertheless, that the current high-salinity brackish marsh ecosystem generally has much less diversity as compared to the former fresh/oligohaline marsh conditions that Steury described in 1997.

It is recommended that ongoing plant community monitoring should be conducted at the Cove Point Marsh Site, regardless of whether the breach is repaired. The new brackish communities do not appear to have reached their final development yet, and if the breach is closed, there is sure to be a rapid metamorphosis in species composition again.

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