COW PEN CREEK AND DARK HEAD COV E
SAV MONITORING REPORT
LOCKHEED MARTIN MIDDLE RIVER COMPLEX
2323 EASTERN BOULE VARD
MIDDLE

ACRONYMS AND ABBREVIATIONS

BRF	Biological Resources Facility
cm	centimeter(s)
DNR	Department of Natural Resources
Lockheed Martin	Lockheed Martin Corporation
m	meter(s)
m^2	square meter(s)
MDE	Maryland Department of the Environment
MRC	Middle River Complex
SAV	submerged aquatic vegetation
Tetra Tech	Tetra Tech, Inc.
USACE	United States Army Corps of Engineers
VIMS	Virginia Institute of Marine Science

SAV Restoration Activities (2017–2018) – Starting in August 2017, several existing V. americana beds in Middle River and its tributaries were monitored to assess the maturation of the seedpods. Reproductive shoots showed evidence of maturity by mid-August, at which point teams conducted multiple days of harvesting to collect seedpods. Seedpods were transferred to a cooler on the boat filled with river water where they were kept until the conclusion of each collection day. Seed pods were transported to Tetra Tech's Biological Resources Facility (BRF) in Owings Mills, Maryland. The BRF is equipped with a tank (2017-2018) ng

assessed quadrat locations. Depth ranged from zero meters at the bulkhead on Dark Head Cove to approximately four meters at the five-meter survey point. Results indicate that SAV was not well established within the transects in Dark Head Cove.

Five transects were surveyed in Cow Pen Creek, extending from bank to bank and consisting of 10 survey points across each transect equidistant apart, as per the work plan. The shallower depths and substrate in Cow Pen Creek were much more conducive to SAV establishment as compared to Dark Head Cove. Plant counts per square meter are shown in Table 2. SAV in Cow Pen Creek was more established. Higher numbers of SAV were counted in survey points near the banks as compared to survey points in the middle of Cow Pen Creek, likely due in part to the shallower water depths near the banks. Three species of SAV were 9 Tw [(as co)1 (m)9 (1 (ecim)8 (pa.06 0 a0 Td >

- achieving a 10–15% rake cover (density) in Cow Pen Creek and 5–10% rake cover (density) in Dark Head Cove (not completed during the 2018 or 2019 monitoring event) by 2022
- implementing a robust post-seeding monitoring program using divers (in 2018 and 2019) and boat-accessible rake surveys (2020–2022) (Tetra Tech, 2017)

to 2018. In 2018, three species of SAV were noted: the planted wild celery (Vallisneria americana), milfoil (Myriophyllum spicatum), and sago pondweed (Stuckenia pectinata), while in 2019 only two species were noted: the wild celery and horned pondweed (Zannichellia palustris). In addition to plants growing from planted seed, it appears that some natural recruitment of other SAV species is occurring in Cow Pen Creek based on the presence of

SECTION 3
CONCLUSIONS AND RECOMMENDATIONS

No objectives for plant density were established for the 2018 and 2019 diver-based surveys. However, the survey does provide data relevant to number of seedlings established after the dredging operations. Compared to 2018 observations, SAV has been substantially reduced in Cow Pen Creek. As anticipated, water depths and substrate in Dark Head Cove may not be conducive to SAV growth and establishment (Batiuk et al., 2000).

The 2019 results also indicate that SAV is reduced in areas in and around the monitoring locations. Visual assessments of SAV in other parts of Dark Head Cove indicate substantially reduced bed sizes and smaller pllomts o9ialimanbr.-1 (p)1 (Tw -4.235 een)1.15n[1 (r)

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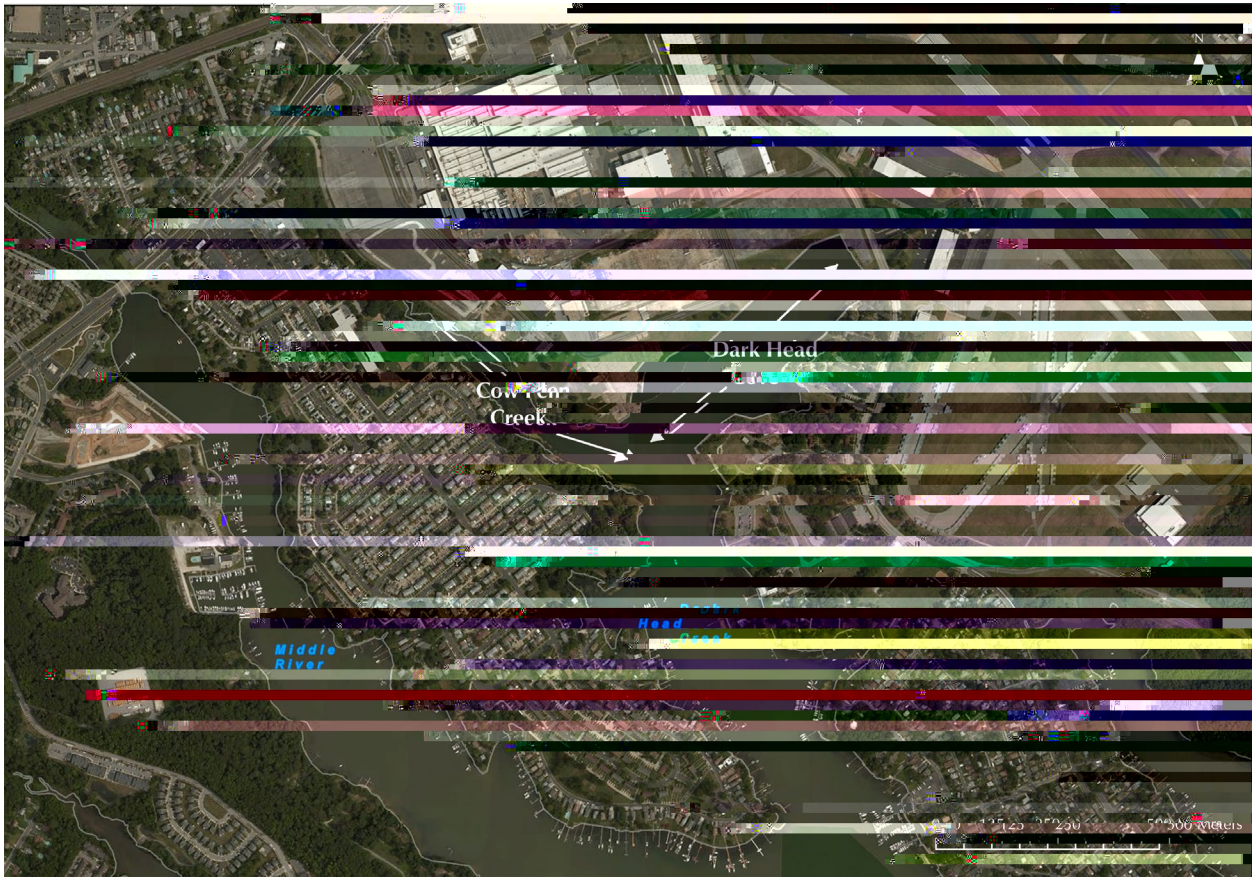
Tetra Tech. 2017. Cow Pen Creek and Dark Head Cove SAV Restoration and Monitoring Work Plan, Lockheed Martin Middle River Complex.

FIGURES

1:



3:

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SPECIES	% COMPOSITION
Ceratophyllum demersum (coontail)	49%
Myriophyllum spicatum (Eurasian milfoil)	42%
Vallisneria americana (wild celery)	4%
Stuckenia pectinata (sago pondweed)	2%
Potamogeton crispus (curly pondweed)	2%

a –Transect 9CPC had two species including