SAV Workgroup – Submerged Aquatic Vegetation Water Quality and Habitat-Based Requirements and Restoration Targets

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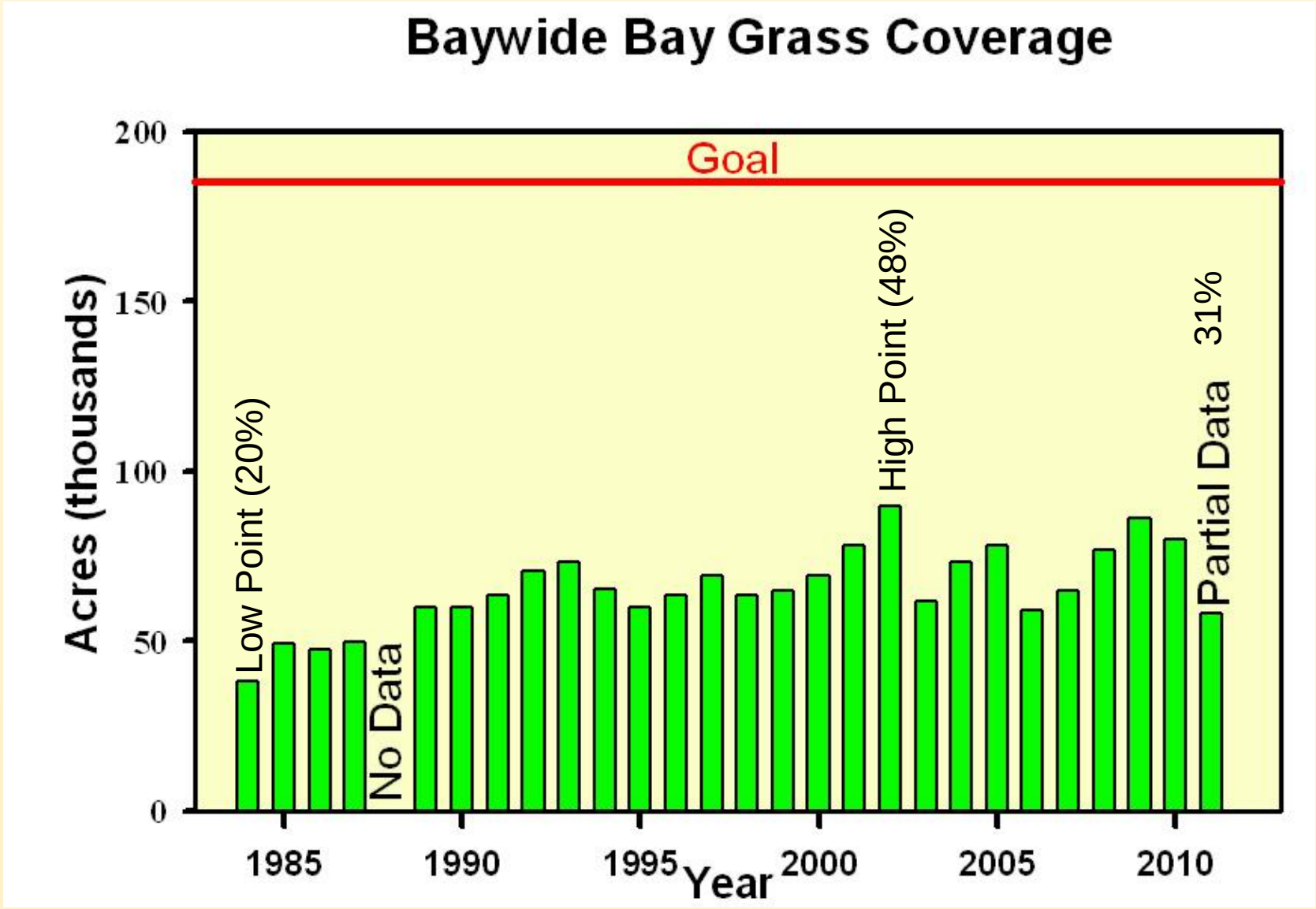
Brief Background On SAV Workgroup

- The workgroup pre-dates the Bay Program
  - The loss of SAV in the 1970s was one of the driving factors in the formation of the Bay Program
- Baywide SAV goal of 185,000 acres
- Primarily achieved through water quality improvements
- *Strategy to Accelerate the Protection and Restoration of Submerged Aquatic Vegetation in the Chesapeake Bay* called for 1,000 acres of **DIRECT** restoration to augment or “kick-start” recovery

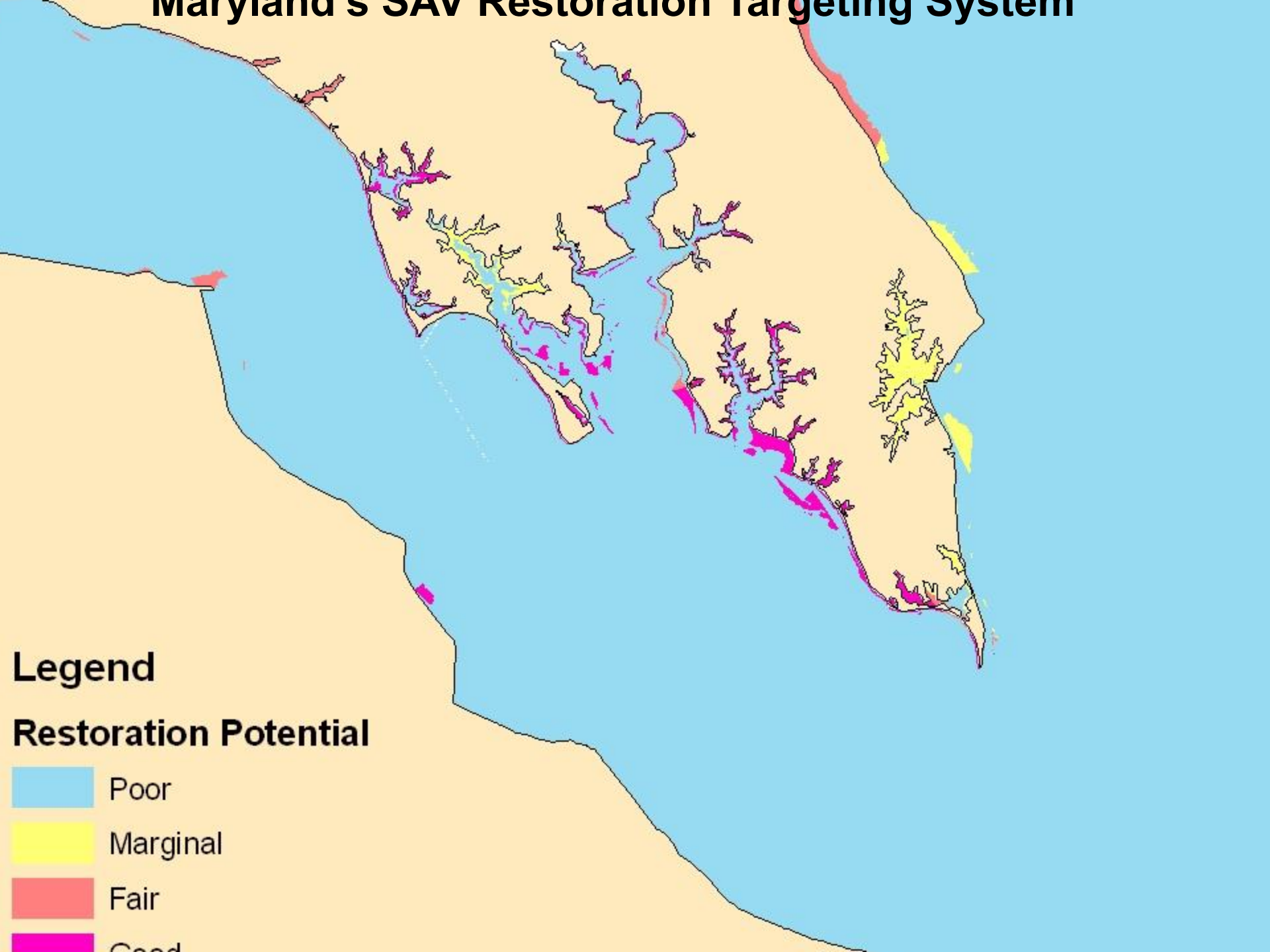
Brief indirect restoration results



Brief direct restoration programmatic results

- **We met 15% of our direct restoration goal (~150 acres) from 2003 to 2008**
  - **No long-term survival in most areas**
  - **Good survival in the Potomac, 2004 to 2010**
  - **Some excellent long-term survival in areas from plantings prior to the 2003 to 2008 time**
    - **James and York Rivers, 1990s to present**
    - **Long Creek (near mouth of Back River, MD), 1998 to present**
    - **Shallow Creek (near mouth of Patapsco River), 1999 to present**

Maryland's SAV Restoration Targeting System



The SAV workgroup has been in a reflective mode

- Which conveniently coincided with funding drying up
- Requested a STAC review of direct restoration
- Using the results of the STAC review to revise Strategy and establish research agenda

Results from STAC review

- **Operationally successful**
  - **Acres planted commensurate with funding**
- **Functionally UNsuccessful**
  - **Majority of planted areas did not persist**
    - **Exceptions in the James, York and Potomac Rivers**
- **Programmatically a mixed bag**
  - **A tremendous amount of knowledge was gained**
  - **Some adaptive management applied**
  - **Room for improvement in AM.**

Workgroup Priorities

- **Continue aerial survey**
  - Critical data across the Bay Program community
    - Key for regulatory issues (construction permits, fisheries, aquaculture)
    - WQ criteria assessment
  - Track progress toward the 185,000 acre SAV goal
  - Workgroup review results/methodology of survey as needed
  - Work with EPA/CBP for the next 5 year funding cycle
- **Finalize updated Strategy**
  - Incorporate findings of STAC panel into Strategy
- **Develop new research agenda**
  - Base agenda on STAC report, other ID'ed needs
  - Develop tracking tools to monitor research efforts

Priorities Continued

- **Plant/seed 20 acres/year as in the current draft of the Strategy**
  - Targeted to address specific issues
    - Improving site selection for restoration
    - Recruit limited areas
    - Habitat suitability

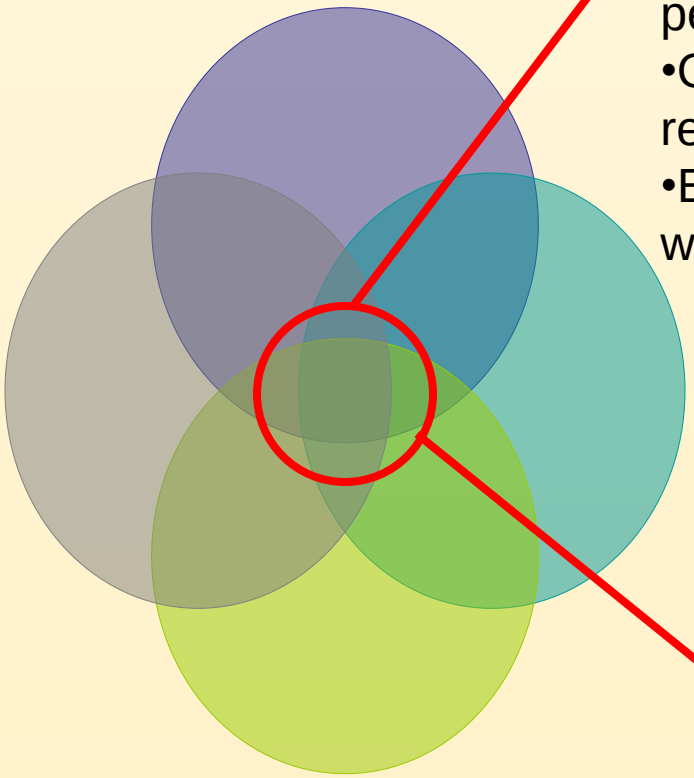
- **Seek funding to address limitations to current habitat requirements (TSIII)**
  - Been 12 years since TSII, there has been a huge amount of new research, hypotheses generated and the flaws in the old habitat requirements have been identified.
  - Impact of extreme events on SAV species
  - Multiple stressors impact on SAV
  - Climate change impacts
    - “Seagrasses are a vital part of the solution to climate change and can store up to twice as much carbon as the world's temperate and tropical forests, new research indicates.”
    - Susquehanna Flats alone could store 2 million metric tons of carbon over time

Technical Synthesis III

Estimated budget of $100K

- SAV Restoration
  - SAV habitat requirements (light, sediments, waves)
  - Habitat criteria for established versus restored SAV beds
  - Feedbacks and resilience of SAV populations (genetics) and communities
  - Large versus small scale restoration
  - Shoreline hardening effects on SAV
- Global change
  - Temperature
  - Sea level rise and shoreline erosion
  - CO2 levels
  - Precipitation (variable river flow) and global dimming (incident light)
- Valuation of ecosystem services provided by SAV in Chesapeake Bay
- Future research directions in support of SAV restoration and management

Research Agenda framework



"SWEET SPOT" provides;

- Understanding why beds persist over time
- Opportunities for direct restoration OR
- Explains the end of life as we know it

This drives the ecosystem services that SAV can provide

To break it out into specific research topics

- Multiple Stressors/Facilitators
  - SAV community had made a stab at this with the “Percent Light at Leaf” model which incorporated multiple water quality parameters
  - What are other synergistic parameters?
    - e.g. Temperature/turbidity/DO on eelgrass
    - Shoreline/watershed impacts
    - Freshets (increase turbidity, but can encourage germination (Ailstock))

- Extreme events
  - Most of our habitat requirements have dealt with chronic water quality conditions during the growing season
  - Develop thresholds for intensity and duration of extreme events
    - How fresh is too fresh for how long
    - Change “fresh” to “salty”, “hot”, “cold”, “turbid”
  - Can we predict or assign a probability to an extreme event?
  - Time-lags between the event and the biological response?
  - Critical periods (i.e TS Agnes in June, TS Lee in September)
- Influence of Global Change on these stressors (all the above; chronic, multiple and acute)
    - Heat bad for eelgrass, good for others?
    - Who is favored with inundation?

From the above, we hope to get to refined habitat requirements for SAV

- Explain observed patterns in abundance and communities
- Use in siting restoration projects
  - Physical habitat
  - Water quality
  - Difference between “Persistence habitat requirements” and “Restoration habitat requirements”
  - Influence of seed banks
  - Successional processes in restored beds

- Quantify the ecosystem services provided by SAV (not part of the review conclusions)
  - TMDL implications
  - Fisheries/wildlife benefits
  - Biogeochemical Processes
    - What happens to the biogeochemistry of an area when you gain (e. g. The Flats) or lose (Tangier Sound) SAV

Alignment with other WGs, GITs etc

- Protect and Restore Water Quality GIT
  - Water clarity criteria
  - Impact of WQ on SAV
- STAR modeling team
  - “SAV act weird” was a quote from yesterday’s modeling meeting
- Wetland Action Team
  - Black Duck E. O. outcome
    - Duck food plantings, some pilot work underway in Blackwater NWR
  - Opportunities for joint restoration?
- TMDL attainment (water clarity)
  - EPA and States
- Sustainable Fisheries?

Spatial Considerations

- Space is a critical consideration, but hard to convey succinctly
  - In the last decade
    - Tidal Fresh and Oligohaline areas have been doing well in terms of natural recovery
      - Seems to be trigger by reductions in TN (fall line and WWTP)
    - Mesohaline areas have been tanking
      - Degrading water clarity
    - Polyhaline has been bouncing around at low levels
      - Cycles of heat/water quality stress followed by recovery

Next Steps (short-term)

- Workgroup activities
  - Finish Strategy revisions, send up the chain
- Action needed on the GIT/Bay Program level
  - Help identify funding and other support available for Technical Synthesis III
  - Comment on and approve Strategy update

Next Steps (long term)

- Update restoration targeting models using results of STAC review and TSIII effort
  - Incorporate new HRs
  - Better utilize shallow water WQ monitoring information