Outcome: Continually increase habitat to support sustainable migratory fish populations in the Chesapeake Bay watershed's freshwater rivers and streams. By 2025, restore historical fish migration routes by opening 1,000 additional stream miles to fish passage. Restoration success will be indicated by the consistent presence of alewife, blueback herring, American shad, hickory shad, American eel and brook trout, to be monitored in accordance with available agency resources and collaboratively developed methods.
Long-term Target: Open an additional 1000 miles by 2025. This target has been exceeded through fish passage efforts completed by the work group. Since fish passage is still restricted in many watersheds by dams and road crossings, the workgroup will continue opening stream miles at the rate specified in the Bay Program agreement and bi-yearly work plans (132 miles of habitat every two years).
Two-year Target: Open an additional 132 miles by 2020

Factor	Current Efforts	Gap	Actions **(critical in bold)**	Metrics	Expected Response and Application	Learn/Adapt
What is impacting our ability to achieve our outcome?	*What current efforts are addressing this factor*	*What further efforts or information are needed to fully address this factor?*	*What actions are essential (to help fill this gap) to achieve our outcome?*	*What will we measure or observe to determine progress in filling identified gap?*	*How and when do we expect these actions to address the identified gap? How might that affect our work going forward?*	*What did we learn from taking this action? How will this lesson impact our work?*
Local Legislative Engagement: Policy maker understanding of the ancillary benefits of dam removal	The workgroup has established relationships with state dam safety programs to coordinate dam removal.	*Additional coordination in MD and VA needs to occur so fish passage experts are working closely with dam safety offices to target potential dam removal projects at high risk dams.*	1.3 - Coordinate dam removal activities with the state Dam Safety Programs	Improvement in the number of dam safety programs that highlight dam removal as an option for end of utility and life cycle planning	Likely a long-term improvement that will make dam removal easier over time but have few immediate benefits. Dam safety programs are largely unstaffed and devote the vast majority of their time to critical dam safety inspections.	
Landowner Engagement: Dam owner understanding of the ancillary	The workgroup continues conducting outreach to dam owners on the benefits of dam removal through	*The workgroup lacks outreach professionals. The workgroup would benefit from the*	1.2 - Continue dam removal activities in the Chesapeake Bay	The increased number of dam owners willing to remove their dams	In the longer term, more high priority dam removals on public/private land will occur. A "waitlist" of	

Factor	Current Efforts	Gap	Actions **(critical in bold)**	Metrics	Expected Response and Application	Learn/Adapt
benefits of dam removal	workshops and outreach materials.	*assistance of the Bay Program in developing high quality outreach materials to mail to dam owners.*	1.7 - Consult with the Chesapeake Bay Program Communications Workgroup to develop communications products		possible dam removal projects could be generated.	
Landowner Engagement: Dam owner willingness to remove dams	The workgroup continues outreach to dam owners on the benefits of dam removal through brochures and workshops. The Workgroup is also investigating various incentive programs for dam removal including possible mitigation banking.	*The workgroup lacks outreach professionals. The workgroup would benefit from the assistance of the Bay Program in developing high quality outreach materials to mail to dam owners.*	1.2 - Continue dam removal activities in the Chesapeake Bay 1.3- Coordinate dam removal activities with the state Dam Safety Programs 1.7 - Consult with the Chesapeake Bay Program Communications Workgroup to develop communications products	The increased number of dam owners willing to remove their dams	In the longer term, more high priority dam removals on public/private land will occur. A "waitlist" of possible dam removal projects could be generated. A shift in focus to culvert projects is also expected pending small numbers of viable dam removal projects	
Use Conflict: Limited financial resources: With the average cost of stream barrier removal in Maryland, Pennsylvania, and Virginia hovering	The workgroup has completed the Chesapeake Bay Fish Passage Prioritization Tool which priorities dam removal projects. The workgroup	*Road crossings need to be assessed to determine the severity of each potential barrier and associated fish passage benefits. This assessment will*	3.1- Continue using the Chesapeake Bay Fish Passage Tool to implement high priority dam removal, culvert and fish passage projects	Number of road crossings assessed in the fish passage prioritization tool	Will be an ongoing effort of the workgroup taking place over the next 4-5 years. Culvert rankings will be developed to guide road crossing	

Factor	Current Efforts	Gap	Actions **(critical in bold)**	Metrics	Expected Response and Application	Learn/Adapt
around $200,000, the Fish Passage Workgroup needs increased financial resources to continue to remove dams and improve fish passage at road crossings.	currently uses the ranking to guide our dam removal efforts and strategically invest public funds. Limited culvert data has been added to this tool; however, the vast majority of road crossings have not been assessed to determine whether or not it represents a fish barrier.	*determine the most severe barriers and will allow the workgroup to better align limited financial resources with the best projects to meet the fish passage outcome.*	1.4 - Continue road/stream crossing assessments, project development and project implementation 2.5- Conduct target species monitoring (+/- and relative abundance) at road culverts in VA 2.6-Continue to develop environmental DNA (eDNA) tool to detect shad. Continue sampling for river herring and apply river herring eDNA analysis to determine priority fish passage projects and develop habitat use models 2.1- Monitor NOAA funded dam removal projects for the presence/absence of target fish species (Tier I monitoring) 2.2- Conduct Tier II monitoring on select dam removals (Currently, the Patapsco River monitoring is the		projects and strategically invest public funding for improved fish passage	

Factor	Current Efforts	Gap	Actions **(critical in bold)**	Metrics	Expected Response and Application	Learn/Adapt
			only river designated as a Tier II site by NOAA)			
			2.3 - Conduct target species monitoring of select dam removals in VA (+/- and relative abundance)			
			2.4 - Conduct target species counts at technical fishways in VA			
Habitat Condition: Populations of targeted fish species- particularly river herring, shad and American eel-have declined nationwide	There are many reasons for declining populations including habitat conditions, water quality, bycatch, climate change including possible changes in migratory patterns and spawning areas, overfishing, and others. The workgroup does not see these factors directly influencing whether the mileage goal outcome is met but instead as factors influencing the overall recovery of the target species. As such, no work plan action has been identified.	*Information related to bycatch and possible changes due to climate changes have not been well documented. The workgroup continues to review data and research produced by climate change professionals to assess any potential impacts to fish distribution in various watersheds.*	NA	NA	Long term effort including hosting workshops and seminars and collaboration with different groups to increase understanding within the workgroup. This will allow workgroup members to better understand the factors affecting target species.	

Factor	Current Efforts	Gap	Actions **(critical in bold)**	Metrics	Expected Response and Application	Learn/Adapt

WORK PLAN ACTIONS					
Action #	**Description**	**Performance Target(s)**	**Responsible Party (or Parties)**	**Geographic Location**	**Expected Timeline**
Management Approach 1: During the period 2011-2025, restore historical fish migratory routes by opening 1,000 additional stream miles, with restoration success indicated by the presence of alewife, blueback herring, American shad, hickory shad, American eel and/or brook trout.					
1.1	Continue dam removal activities in the Chesapeake Bay	Complete removal of the Bloede Dam (monitoring phase). Complete a feasibility/design study for Daniels Dam	Maryland Department of Natural Resources (MD DNR), National Oceanographic and Atmospheric Administration (NOAA), US Fish and Wildlife Service (USFWS), American Rivers	Ilchester, MD	May-21
1.2	Continue dam removal activities in the Chesapeake Bay	Various dam removal planning, design and implementation projects - many projects are in a feasibility study phase where there are no	Fish Passage Workgroup	Varies	Varies

		immediate milestones during 2020-2021. Continue outreach to dam owners on the benefits of dam removal through brochures and workshops.			
1.3	Coordinate dam removal activities with the state dam safety programs	Establish or continue relationships with state dam safety programs. Have dam safety programs acknowledge dam removal as an option for end of utility and life cycle planning.	Fish Passage Workgroup	Entire Chesapeake Bay region	Varies
1.4	Continue road/stream crossing assessments, project development and project implementation	Over 165,000 road/stream crossing are present in the Chesapeake Bay watershed. High priority road/stream crossings will be assessed for fish passage and climate resilience. High priority fish passage projects will be implemented using fish friendly designs.	Fish Passage Workgroup	Entire Chesapeake Bay region	Varies
1.5	Develop Fish Friendly Road-Stream Crossing Design Guidance	Complete the final guidance document and distribute the document to regulatory and design professionals for implementation	Fish Passage Workgroup	State of Maryland	2021
1.6	Develop Dam Removal Mitigation Crediting Guidance for future mitigation projects to incentivize future dam removal projects	Complete the final guidance document and distribute the document to regulatory and dam removal practitioners for implementation	Fish Passage Workgroup	State of Maryland	2021
1.7	Consult with the Chesapeake Bay Program Communications Workgroup to develop communications products	Coordinate closely with the CBP Communications workgroup when developing communication products to ensure consistent messaging and that best practices are used.	Fish Passage Workgroup	Chesapeake Bay watershed	Ongoing
Management Approach 2: Document return of fish to opened stream reaches by establishing the presence or absence of target species at a select number of projects within the Chesapeake Bay watershed.					
2.1	Monitor NOAA funded dam removal projects for the presence/absence of target fish species (Tier I monitoring)	All NOAA funded dam removals will be monitored for Tier I metrics.	NOAA, funding recipients	At dam removal sites	Ongoing
2.2	Conduct Tier II monitoring on select dam removals (Currently, the Patapsco River monitoring is	Conduct Tier II monitoring on the Patapsco River.	NOAA, American Rivers, MD DNR,	Patapsco River near Ellicott City, MD	Ongoing through 2023

	the only river designated as a Tier II site by NOAA).		University of Maryland Baltimore County (UMBC), US Geological Survey (USGS), MGS, USFWS		
2.3	Conduct target species monitoring of select dam removals in VA (+/- and relative abundance)	Boat electrofishing upstream of Harvell Dam removal on the Appomattox River and Embrey Dam removal on the Rappahannock River.	Virginia Department of Game and Inland Fisheries	Appomattox River in Petersburg, VA and Rappahannock River near Fredericksburg, VA	Ongoing and continued availability of funding for fish passage technician crew.
2.4	Conduct target species counts at technical fishways in VA	Continue annual American shad count at Boshers Vertical Slot Fishway. Establishing electronic herring run count at Walkers Dam Denil fishway.	VDGIF	Boshers Dam in Henrico County on James River near Richmond, VA. Walkers Dam in New Kent Count on Chickahominy River near Lanexa, VA.	Ongoing and continued availability of funding for fish passage technician crew.
2.5	Conduct target species monitoring (+/- and relative abundance) at road culverts in VA	Continue annual backpack electrofishing at Claiborne Run nature-like fishway (herring).	VDGIF	Rappahannock tributary: Claiborne Run in Stafford County, VA	One more of five consecutive years dependent on time availability of limited fish passage crew.
2.6	Continue to develop environmental DNA (eDNA) tool to detect shad. Continue sampling	Develop and test tools for shad. Use river herring tools already developed (completed task in previous fish passage work plan).	Smithsonian Environmental Research	Frozen samples collected in Patapsco River;	Ongoing

	for river herring and apply river herring eDNA analysis to determine priority fish passage projects and develop habitat use models		Center, University of Maryland Center for Environmental Science	if funded, expand to entire Chesapeake Bay	
Management Approach 3: Use the Chesapeake Bay Fish Passage Tool that was completed by the workgroup to implement high priority dam removal and fish passage projects.					
3.1	Continue using the Chesapeake Bay Fish Passage Tool to implement high priority dam removal, culvert and fish passage projects.	Continue to conduct culvert and bridge assessments in areas with anadromous species and brook trout to determine extent of fish blockages due to road and rail infrastructure. Add information to the Chesapeake Fish Passage Tool.	USFWS, NOAA, Maryland, Virginia and Pennsylvania, American Rivers, TNC	Entire Chesapeake Bay region	Ongoing