HUC8s with strong diadromous presence
Dams blocking passage of diadromous fish and wild brook trout in the Rapidan-Upper Rappahannock and Rivanna drainages

<table>
<thead>
<tr>
<th>CFPPP Unique ID</th>
<th>Dam Name</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFPPP_336</td>
<td>Unknown</td>
<td>38.31997384</td>
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<tr>
<td>VA_301</td>
<td>Sugar Hollow Dam</td>
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<tr>
<td>VA_362</td>
<td>Blue Ridge School Dam</td>
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<td>VA_367</td>
<td>Twin Lakes Dam #2</td>
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<tr>
<td>VA_368</td>
<td>Twin Lakes Dam #1</td>
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<tr>
<td>VA_369</td>
<td>Twin Lakes Dam #3</td>
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<tr>
<td>VA_370</td>
<td>Greene Mountain Lake Dam</td>
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<tr>
<td>VA_371</td>
<td>Wildwood Valley Lake Dam</td>
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<tr>
<td>VA_888</td>
<td>Wilsdorf Dam</td>
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</tr>
<tr>
<td>VA_908</td>
<td>Allens Dam</td>
<td>38.27462321</td>
<td>-78.51810484</td>
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<tr>
<td>VA_913</td>
<td>Chisholm Dam Upper Farm</td>
<td>38.13645596</td>
<td>-78.73824695</td>
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<tr>
<td>VA_VA07918</td>
<td>Poplar Lake Dam</td>
<td>38.25615913</td>
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<tr>
<td>CFPPP_735</td>
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<tr>
<td>CFPPP_883</td>
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<td>38.27020957</td>
<td>-78.4369656</td>
</tr>
</tbody>
</table>
ACFHP Header

Home | About Us | Priority Habitats | Our Work | Get Involved | Search

Large photo

Enhancing, preserving, and protecting Atlantic diadromous, estuarine, and coastal fish habitats
<table>
<thead>
<tr>
<th>Photo with text over it</th>
<th>Photo with text over it</th>
<th>Photo with text over it</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Connecting the headwaters to the continental shelf’</td>
<td>‘Connecting people with fish habitat’</td>
<td>‘Connecting partners’</td>
</tr>
<tr>
<td>If you hover your mouse on the photo to options should show up: ‘On the ground projects’ and ‘Science and data’</td>
<td>If you hover your mouse on the photo to options should show up: ‘Outreach and communication’ and ‘Get involved’</td>
<td>If you hover your mouse on the photo to options should show up: ‘Our Team’ and ‘The National Partnership’</td>
</tr>
</tbody>
</table>
ACFHP is a coastwide partnership of fish habitat resource managers, scientists, and communications professionals from 33 different state, federal, tribal and non-governmental agencies who have established a commitment to work together for the benefit of aquatic resources.
Contact
1050 N. Highland St.
Suite 200 A – N
Arlington, VA 22201
Phone (703) 842 0740
Email lhavel@asmfc.org

Quick Links
Latest News
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Species Habitat Matrix Database
Meetings

Social Media
(can click logos to go to each account)
Dr. Lisa Havel, Coordinator
Lisa began working with the Partnership in 2014 after graduating with her PhD in marine science from the University of Texas at Austin. Originally from Connecticut, Lisa attended the University of Miami as an undergraduate majoring in marine biology. She has conducted research on the Great Barrier Reef, South Texas coast, Florida Keys, and in the Gulf of Maine. In her spare time, she enjoys flying planes, SCUBA diving, traveling, and hanging out with her French bulldog, Bruiser.
Partners
ACFHP is a coastwide partnership of fish habitat resource managers, scientists, and communications professionals from 33 different state, federal, tribal and non-governmental agencies who have established a commitment to work together for the benefit of aquatic resources.

View our current Memorandum of Understanding.

*Add logos for all partners and the links to their websites*
Committees

Steering Committee
The ACFHP Steering Committee is a self-directed group of individuals interested in achieving the Partnership’s vision. It is the decision-making body of ACFHP and provides oversight responsibility for all ACFHP activities.

Members
List current members and contact info

Meetings
List upcoming and past meetings with links to agendas, materials, presentations

Science & Data Committee
The Science and Data Committee guides and carries out ACFHP’s Science and Data initiatives.

Members
List current members and contact info

Meetings
List upcoming and past meetings with links to agendas, materials, presentations

Outreach & Communication Committee
The Outreach and Communications Committee guides and carries out ACFHP’s Outreach and Communications initiatives.

Members
List current members and contact info
Contact
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Thriving, healthy waterways and robust fish populations are vital to the well-being of our society. They provide clean water and sustainable fisheries. They also are essential for less tangible reasons, as anyone who has fished wild waters or canoed a tranquil stream can attest. Unfortunately, in many waters around the country, fish and the habitats on which they depend are in decline.

The ACFHP region has a range of fish habitats that are critical to coastal fisheries. These habitats represent areas where fishes forage, seek refuge, grow, or spawn. ACFHP has selected three to four priority fish habitats within each subregion to receive heightened attention and support.
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Submerged aquatic vegetation (SAV) refers to rooted, vascular plants that live below the water’s surface in large meadows or small patches in coastal and estuarine waters. SAV can be further classified by the range of salinity of the waters in which they are found. SAV is a priority habitat in all four ACFHP subregions.
SAV on the Atlantic Coast

Tidal fresh and oligohaline plant species are generally found in areas where salinity ranges from 0.5 to 5.0. Examples include *Vallisneria americana*, wild celery and *Ceratophyllum demersum*, coontail.

Mesohaline and polyhaline plant species are generally found in areas where salinity ranges from 5 to 30. Examples include *Zostera marina*, eelgrass and *Ruppia maritima*, widgeon grass.

Why SAV is Important

Through photosynthesis, SAV removes excess CO₂ and adds oxygen to the water. According to the Blue Carbon Initiative, SAV covers 17.7 – 60 Mha worldwide. This is only 0.2% of the ocean floor, yet SAV sequesters approximately 10% of carbon (as sediments) each year¹. In fact, they’re twice more effective at storing carbon than terrestrial forests by acreage.

SAV roots also stabilize sediments and absorb excess nutrients. Their stabilizing properties also reduce shoreline erosion, benefitting not only estuarine communities, but coastal property owners. SAV improves water quality and provides food and habitat for many species, especially juveniles. Overall, SAV contributes to healthy fisheries and ecosystems.

Unfortunately, SAV is one of the most rapidly declining habitats around the world, with up to 7% loss in area annually due to human activities².

Threats to SAV

ACFHP has determined the following are the greatest threats to SAV in at least one subregion:

- Dredging and coastal maintenance
- Water quality degradation and eutrophication
- Vessel operation impacts
- Sedimentation
- Containment of water and sediments
- Invasive species and disease
- Climate change

These bullet points could be displayed in a more interesting way: maybe little icons next to each threat that carries throughout the website?
<table>
<thead>
<tr>
<th>Our Funded and Endorsed Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>On the Ground Projects</td>
</tr>
<tr>
<td>- Thumbnail photos and titles of each project that you can click to take you to the project page (or factsheet)</td>
</tr>
<tr>
<td>Science &amp; Data Projects</td>
</tr>
<tr>
<td>- Titles of each project that you can click to take you to the project page (or document)</td>
</tr>
<tr>
<td>Outreach &amp; Communication Projects</td>
</tr>
<tr>
<td>- Titles of each project that you can click to take you to the project page (or document)</td>
</tr>
</tbody>
</table>
The issues that ACFHP addresses are complex, and tackling them is important for the conservation of Atlantic fish habitats. We do so through on-the-ground conservation, science and data, and outreach and communications projects along the coast.
Get Involved
There are a variety of ways to help us achieve our mission. If you’re interested in conserving fish habitat along the Atlantic coast, see below for ways you can make a difference!
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Oyster Reef Restoration: A Historical Perspective

By January Murray
Habitat Restoration & Enhancement Unit Leader
May 17th, 2018
35 Project Deployments (2008 to 2017)

• 2 Oyster Mitigations: Jekyll Island Boat Ramp & Overlook Park
• 3 Oyster Enhancements: Jointer Creek x2 & Oyster Creek
• 2 Fish Enhancements: Joe’s Cut & Troupe Creek Inshore Reefs
• 10 Oyster Restorations:
  o Bellville Ramp, Altamaha Island, Gaddis Memorial Reef, Skidaway River, Overlook Park x2, Florida Passage, Oatland Island x2, & Jove Creek
• 4 Oyster Maintenance Sites:
  o FL Passage, Oatland Island, Jove Creek, & Joe’s Cut
• 14 Oyster Test Plot Sites:
  • Overlook Park x2, LCP x5, Jove Creek, Joe’s Cut x2, Timmons River, Van Dyke Creek, DNR Dock, & Back River Bridge
Oyster Shell Recycling Centers

- 7 Recycling Centers
- Volunteer Deposits
- DNR Pick Up’s at Local Roasts
- Shells Bagged & Stored for Restoration & Enhancement Projects
- Volunteers Help Construct Reef each Spring
Bellville Restoration 2008: Oak Bundles

Materials Deployed at

GADNR's Oyster Restoration Site:

Bellville Boat Ramp (2008)
Jekyll Island Mitigation 2009: Historical FADs

Materials Deployed at

GADNR's Oyster Restoration Site:

Jekyll Island Boat Ramp (2009)
Materials Deployed at

GADNR's Oyster Restoration Site:

Plantation Creek (2010)
also known as the
Gabe Gaddis Memorial Reef
Skidaway River Restoration 2010: Bags

Materials Deployed at

GADNR's Oyster Restoration Site:

Skidaway River (2010)
Jointer Creek Enhancement 2012: Bags, Bundles, & Gabions

Materials Deployed at

GADNR's Oyster Enhancement Site:

Jointer Creek Harvest Area (2012) "Operation Shell Drop"
Materials Deployed at
GADNR's Oyster Restoration Site:
Overlook Park (2013-2015)
Overlook Park Restoration 2013 - 2016:
Site Overview

2013 Restoration Materials

2014 Bundles

2015 Test Plot Balls

2016 Restoration Materials: 100 Balls

3 Months Post Deployment
Overlook Park Restoration 2015 - 2016:
Bags, Bundles, Spat Sticks, & Oyster Balls

Test Ball: 10 Months/Bundle: 23 Months
Bundle: 28 Months/Coated SS: 15 Months

Test Plot Balls:
15 Months
Overlook Park Restoration 2016 - 2017: Bundles & Oyster Balls

Test Plot Balls: 20 Months

Bundle: 33 Months

Restoration Balls: 8 Months
FL Passage Restoration 2013-2014: Bags

Materials Deployed at

GADNR's Oyster Restoration Site:

Florida Passage (2013)
Materials Deployed at

GADNR's Oyster Restoration Site:

Florida Passage
(2016) Maintenance
Materials Deployed at
GADNR's Oyster Enhancement Site:
Oyster Creek Harvest Area (2014)
Oatland Island Restoration 2014 -2015: Bags

Materials Deployed at

GADNR's Oyster Restoration Site:

Oatland Island (2014-2015)
Joe’s Cut IAR 2014 - 2016: Bags & FADs
Joe’s Cut IAR 2014 - 2016: FAD Designs

Intermediate FAD Design 23 Months

Historical FAD Design (1990’s)

New FAD Design 4 Months

08/01/2016
Joe’s Cut IAR 2014 - 2017: FAD Designs

- Intermediate FAD Design 35 Months
- Historical FAD Design (1990’s)
- New FAD Design 16 Months
Jove Creek IAR Restoration 2017: Bags

Mobile Staging Area

Mudflat Pre-Deployment

Deployment
Jove Creek IAR Restoration 2017: Bags

Immediately Post Deployment

2 Months Post Deployment

7 Months Post Deployment

Historical FAD Design
Back River Bridge Test Plots 2017: Bags

FJ Torras Causeway

Back River Bridge Fishing Pier

Immediately Post Deployment

Test Plots

Project Signage

TP2

TP3: 7 Months

TP4: 7 Months
Hab in the MAB: Characterizing black sea bass habitat in the Mid-Atlantic Bight

• MAFMC awarded $250,000 to ACFHP via the National Fish Habitat Fund to manage a research project focused on Mid-Atlantic habitat and fisheries productivity

• ACFHP selected Dr. Brad Stevens (Univ. MD - Eastern Shore) to improve our understanding of the relationship between BSB abundance and habitat characteristics
  • Determine the preference of BSB for particular habitats by assessing their abundance, size structure, and feeding ecology within natural and artificial reefs
  • Improve the understanding, and other habitat characteristics of natural and artificial reefs
  • Determine if reduced fragmentation and increased connectivity of habitats increases fish recruitment
Hab in the MAB: Characterizing black sea bass habitat in the Mid-Atlantic Bight

- Completed two years of sampling, 2018 will be 3rd & final year
  - Video surveys
  - Quadrat surveys
  - Stable isotope analysis

Video abundance survey on artificial reef from GoPro footage
Hab in the MAB: Characterizing black sea bass habitat in the Mid-Atlantic Bight

- Sampling 4 shipwrecks & nearby open bottom
- Will sample natural habitat in 2018

Study sites
Hab in the MAB: Characterizing black sea bass habitat in the Mid-Atlantic Bight

• Created experimental corridor between two artificial habitats to understand connectivity
Southeast Mapping Project

Kat Hoenke, Jennifer Walters, Jessica Graham,
SARP
Scenarios

• Northern diadromous (green)
  Unit: NHD Catchment
• Estuarine: Northern and Southern
  Unit: 1 square km hexagon
• Southern coastal (yellow)
  Unit: 10 minute squares
## Diadromous Scenario

Many recommended metrics included calculating percent of reaches within a catchment. However, a catchment only represents one reach, so metrics were changed to reflect this. (They wanted all these metrics of % of reaches in catchment but a catchment is one reach).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement</th>
<th>Metric</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-point source pollution</td>
<td>% agriculture in catchment</td>
<td>10 points if ranked in top 25% for least amount of agriculture</td>
<td>Cropscape USDA</td>
</tr>
<tr>
<td>Riparian Buffers</td>
<td>% of floodplain area with natural landcover</td>
<td>10 points if catchment is ranked top 25% for natural coverage</td>
<td>100 year floodplain dataset from FATHOM as boundary.</td>
</tr>
<tr>
<td>Potential for species access</td>
<td># of downstream dams = 0</td>
<td>10 points if number = 0</td>
<td>SEACAP</td>
</tr>
<tr>
<td>Number of Species</td>
<td>Number of species in downstream network</td>
<td>10 points if the polygon ranks in the top 25%</td>
<td>SEACAP</td>
</tr>
<tr>
<td>Water Usage</td>
<td>Volume all reservoirs (NID_STORA in NID) per unit area of watershed (cubic meters/square km)</td>
<td>10 points if catchment is ranked in top 25% for lowest volume.</td>
<td>EPA StreamCat</td>
</tr>
<tr>
<td>Fragmentation</td>
<td>Density of road crossings and dams in catchment</td>
<td>10 points if catchment ranks in top 25% for least among of points</td>
<td>SARP SE Aquatic Barrier Inventory</td>
</tr>
<tr>
<td>Sturgeon Critical Habitat</td>
<td>Presence of critical habitat</td>
<td>10 points if on critical habitat</td>
<td>NOAA</td>
</tr>
<tr>
<td>Impervious Surface</td>
<td>% impervious surface above catchment</td>
<td>10 points if catchment is ranked top 25% for least amount of impervious</td>
<td>EPA streamCat</td>
</tr>
<tr>
<td>Point Source Pollution</td>
<td>Density of NPDES and TRI sites in catchment</td>
<td>10 points if catchment is ranked top 25% for least amount of sites</td>
<td>EPA StreamCat</td>
</tr>
</tbody>
</table>
Metrics Examples

Volume/sqkm of storage in watershed above catchment
Final Score

Red = Higher priority.
Example

• Northeast Cape Fear River, NC
• 5 anadromous species downstream

Angola Bay Gameland – Not touching Cape Fear River. Could be expanded?
Estuarine Scenario
## Estuarine Scenario

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement</th>
<th>Metric</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seagrass and oyster reef habitat</td>
<td>% of polygon covered by habitat</td>
<td>10 points if the polygon ranks in top 25%</td>
<td>TNC SABMA</td>
</tr>
<tr>
<td>Wetland habitat</td>
<td>% of polygon covered by wetlands</td>
<td>10 points if the polygon ranks in the top 25%</td>
<td>National Wetlands Inventory</td>
</tr>
<tr>
<td>Estuarine – Marsh Water edge (Northern scenario only)</td>
<td>Average edge score by polygon</td>
<td>10 points if the polygon ranks in the top 25%</td>
<td>SALCC water veg edge scored raster</td>
</tr>
<tr>
<td>Proximity to protected habitat</td>
<td>Distance to HAPCs</td>
<td>10 points if the polygon is within ½ km of inlet</td>
<td>Marine cadastre</td>
</tr>
<tr>
<td>Proximity to development</td>
<td>Distance from marinas and ports</td>
<td>10 points if the polygon ranks in the top 25% farthest from ports.</td>
<td>State specific</td>
</tr>
<tr>
<td>Water Quality</td>
<td>% of polygon covered by 303d listed areas.</td>
<td>10 points if the polygon ranks in the top 25%</td>
<td>EPA 303D areas</td>
</tr>
<tr>
<td>Hardened shoreline</td>
<td>Length of hardened shoreline in polygon</td>
<td>10 points if the polygon ranks in the top 25%</td>
<td>SABMA supplemented with state data</td>
</tr>
<tr>
<td>Habitat fragmentation</td>
<td>Linear feet of causeway within polygon</td>
<td>10 points if the polygon ranks in the top 25%</td>
<td>Tiger roads 2017 and intersected tidal wetlands from NWI</td>
</tr>
</tbody>
</table>
Metrics Examples
Causeways

- Causeways were more difficult to analyze.
- Combined tidal wetlands and river/estuary water polygons.
- Clipped roads by wetlands/estuary.
- May have some false positives.
Hardened Shoreline

Combined state datasets for hardened shoreline.
Final Score

Northern and Southern Scenarios.
Warm colors = higher priority
Final Score

• High scores concentrated around undeveloped marsh land containing oyster/seagrass/wetland habitat

Purple = Seagrass
Green = marsh
Checkered = Oyster
Final Score

• Areas of high priority:
  • Roanoke Island, NC
  • Elizabeth River, NC
  • Copahee Sound, SC
  • Blackbeard Creek, GA
  • Mosquito Lagoon, FL
Considerations

• Not many 303D listed areas. Need a metric for water quality. Could use:
  • % agriculture above catchment containing polygons
  • #NPDES +TRI sites in catchment containing polygons.
  • Excludes deep water.
  • Unless model of dissolved oxygen or other is available?

• Deep water is ranking high due to lack of hardened shoreline, further from ports/marinas and lack of wetland habitat. Suggest subsetting the analysis to exclude deep water.

• Remove already protected areas
• Re-rank after changes made above.

See lower ranking inlet (yellow) due to these factors
### Southern Coastal Scenario

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement</th>
<th>Metric</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to protected habitat</td>
<td>Presence of HAPC</td>
<td>Protect area if it falls on HAPC</td>
<td>Marine Cadastre</td>
</tr>
</tbody>
</table>
Southern Coastal Scenario

- Purple are HAPCs listed as “corals reefs & hard bottom” only.
- Yellow is the unified reef map. There is a sliver of yellow that is not encompassed by the HAPCs (red arrow).
- We allotted 10 points for 10 minute squares that intersected the HAPCS or the additional unified reef map.
Sandbar Oyster Company Inc.

Inception and Development of Oyster Catcher™ and Related Products

Niels Lindquist
UNC Institute of Marine Sciences
CEO, Sandbar Oyster Company
Morehead City, North Carolina

David Cessna
“Clammerhead”
Commercial Shellfish Harvester
VP, Sandbar Oyster Company
Smyrna, North Carolina

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Cliona celata
boring sponge
High Salinity Intertidal

Low Salinity Subtidal

Oyster Safe Zones
ECOSYSTEM SERVICES

Food
Biogenic Habitat Engineer
Shoreline Protection
Enhanced Water Quality
Carbon Sequestration
OYSTERS: THE WORLD’S MOST VALUABLE WATER CROP

85% Decline Worldwide

SHELLFISH REEFS AT RISK
A Global Analysis of Problems and Solutions

The Nature Conservancy
Materials for Oyster Reef Foundations and Cultch Planting
IMAGINE... turning cloth... into oyster reefs!
Oyster Catcher™
Products for Aquaculture, Habitat Restoration & Living Shorelines

2015 Pilot Project funded by the UNC Office of Technology Development

© Copyright All Rights Reserved
Oyster Catcher™ - structurally versatile & biodegradable

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UNC makes no endorsements of products derived from licensed UNC technologies.
“Oyster Highway”

6000 Oyster Catcher™ patties seeded with live oysters will be moved from the lower region of the estuary to create brood stock reefs in the mid-estuary.

Intertidal seeding area

reef development sites

concrete rubble reef: no oysters due to a lack of larval delivery

present spatial limit of oysters
Bushel basket of Oyster Catcher™ Tufts – an oyster shell substitute
Oyster Catcher™ tufts made with dyed cement. Oysters shed from the cement/fiber cloth substrate typically have a small piece of the substrate embedded in their bottom valve near the hinge. This embedded Oyster Catcher™ chip acts as physical branding that can be used to uniquely identify and track oysters.
Oysters growing free on bottom on Sandbar Oyster Company’s intertidal shellfish lease in the Newport River, North Carolina, a high energy site tamed with Oyster Catcher™ reefs.
vulnerability to sea-level rise