



FISH HABITAT CONSERVATION AREA MAPPING AND PRIORITIZATION PROJECT

**A prioritization of Atlantic coastal, estuarine,
and diadromous fish habitats for conservation**

USER GUIDE

**Developed by the Atlantic Coastal Fish Habitat Partnership,
in collaboration with the Southeast Aquatic Resources Partnership
and The Nature Conservancy**

Making The



Connection

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I. BACKGROUND

The Atlantic Coastal Fish Habitat Partnership (ACFHP or Partnership) worked with the Southeast Aquatic Resources Partnership (SARP) and The Nature Conservancy (TNC) to spatially prioritize fish habitat conservation (restoration and protection) sites through GIS mapping and analyses for the Atlantic region of the U.S. from Maine to Florida. We first assessed the geography from North Carolina through the Florida Keys (Southeast Mapping Project). The next year, we assessed the geography from Maine through Virginia (Northeast Mapping Project).

ACFHP will use the habitat prioritization to objectively evaluate on-the-ground restoration project proposals submitted to the Partnership. ACFHP, its partners, and stakeholders can use the results to better identify locations in need of fish habitat restoration. The data are classified into 1) “Areas of Excellent Fish Habitat” that could benefit from land and watershed protection and expansion by restoring adjacent areas, 2) “Restoration Opportunity Areas” that would most benefit from restoration, and 3) “Degraded Areas of Opportunity” that are experiencing a great deal of threats (see *How to Interpret the Maps* for details).

NOTE: This prioritization tool is not intended to be used as guidance for regulatory purposes (see Caveats). The purpose of this prioritization is to help ACFHP identify priority habitats within our geography to spatially determine which locations are optimal for diadromous, estuarine, and coastal fish habitat conservation based on guidance provided by the ACFHP Steering Committee and Science and Data Committee.

a. SCOPE

We conducted eight separate analyses to address ACFHP’s priority habitats within each of our four subregions (Table 1).

Table 1. Geographic regions and ACFHP priority habits covered by the eight spatial analyses.

Mapping Project	ACFHP subregion	ACFHP Priority Habitat	Analysis
Northeast	North Atlantic	Riverine bottom	North Atlantic Diadromous
		SAV	North Atlantic Estuarine
		Marine and estuarine shellfish beds	
	Mid-Atlantic (Cape Cod to NC drainages)	Riverine bottom	Mid-Atlantic Diadromous
		SAV	Mid-Atlantic Estuarine
		Marine and estuarine shellfish beds	
		Tidal vegetation	
Southeast	Mid-Atlantic (NC-drainages to Cape Hatteras) and South Atlantic	Riverine bottom	South Atlantic Diadromous
		SAV	South Atlantic Estuarine
		Marine and estuarine shellfish beds	
		Tidal vegetation	
	South Florida	SAV	South Florida Estuarine
		Tidal vegetation	
		Coral and live/hard bottom	South Florida Coastal

i. Diadromous Fish Habitat Analysis

We used catchments from the National Hydrography Dataset (NHD) Plus (v2.1) as the unit of analysis for the diadromous fish habitat conservation scenarios.¹ The North and Mid-Atlantic Diadromous Analyses are comprised of the NHD catchments with current and historical alosine fish species occurrence based on results of the TNC's Fish Habitat Decision Support Tool Alosine Prioritization and expert opinion.² The South Atlantic Diadromous Analysis is comprised of the NHD catchments located within watersheds that harbor diadromous fishes based on the results of TNC's Fish Habitat Decision Support Tool Alosine Prioritization², the Southeast Aquatic Connectivity Assessment Program results, as well as expert knowledge from the ACFHP Steering Committee.

ii. Estuarine Fish Habitat Analysis

We used a grid of 1 km² hexagons as the unit of analysis for the four estuarine analyses (North Atlantic, Mid-Atlantic, South Atlantic, and South Florida). In the North and Mid-Atlantic, depth contours were used as cutoffs for the large bays and seaward extent of the analyses. The 60' depth contour was selected for the North Atlantic, and the 35' depth contour was selected for the Mid-Atlantic as the deepest extent of habitat-building shellfish in those subregions: blue mussel in the North Atlantic and Eastern oyster in the Mid-Atlantic.

On the seaward side in the South Atlantic and South Florida analyses, the extent of the hexagons is defined by the open water between mainland and barrier island shorelines. Most South Atlantic and South Florida waters have barrier islands that serve as natural boundaries for the analysis. For locations without barrier islands, including Florida Bay, Biscayne Bay, and the Gulf of Mexico, hexagons that intersected polygons with these waterbody names in the North American Water Dataset (Esri) were included.

b. VARIABLES, MEASUREMENTS, METRICS, AND SCORING

The specific variables (indicators being addressed), measurements (specific data used to assess the variable), and metrics (thresholds) used in each analysis can be found in Tables 2 and 3 on page 3. Regional experts chose variables and measurements that covered the entire analysis area and were limited in redundancy (e.g. if impervious surface was included, urban development was not, see *Caveats* for more details). We chose metrics either based on published literature (e.g. impervious surface), or with a consistent cutoff of the top or bottom 25% of catchments/hexagons, depending on the variable. We subjectively chose the 25% cutoff for consistency. Moving forward, if information is published that provides a more substantiated cutoff, we will consider updating the analyses. To ensure consistency, we chose metrics for the Northeast Mapping Project largely based on the previously completed Southeast Mapping Project where possible. Most variables, measurements, and metrics were either the same or very similar between the Northeast and Southeast analyses; refer to the final report for details on differences.

¹ United States Geological Survey. 2015. *National Hydrography Dataset Plus (NHDPlus v2.1)*. <https://www.epa.gov/waterdata/nhdplus-national-data>

² Martin, E.H. 2015. *Atlantic Coast Whole System Diadromous Fish Prioritization*. The Nature Conservancy. https://www.atlanticfishhabitat.org/wp-content/uploads/2019/12/TNC_AtlanticCoastAlosinePrioritization.pdf

The diadromous analyses had eight separate variables (Table 2), and the estuarine analyses had seven (South Florida) or eight (North, Mid-, and South Atlantic) separate variables (Table 3).

We awarded 10 points to each catchment or hexagon per variable if it met the criterion for that metric. For all diadromous and estuarine analyses, we calculated scores by adding up all of the points each catchment (diadromous) or hexagon (estuarine) received (Figure 1). Except for the South Florida Estuarine Analysis (maximum possible score = 70), each analysis had a maximum possible score of 80.

The goal of the South Florida Coastal Analysis was to identify coastal areas south of Cape Canaveral that contained shallow coral habitat, a priority habitat for ACFHP's South Florida subregion. The ACFHP Science and Data Committee decided that all coral habitat was in need of conservation, regardless of quality, due to the slow growth and immediate threats to South Florida reefs (including bleaching, pollution, and disease). Because coral reef restoration is expensive, incapable of replicating the diversity of natural reefs, and already has a multitude of organizations focused solely on these efforts, ACFHP thought it was best to communicate that these reefs are in trouble and encourage conservation of all identified reefs. To identify priority coral habitat, we combined the Unified Reef Map from the Florida Fish and Wildlife Conservation Commission with coral reef and hard bottom Habitat Area of Particular Concern (HAPC) designations.

The South Florida Coastal Analysis was not scored like the diadromous and estuarine analyses; instead, coral extent and HAPC designations were mapped.

Table 2. Metrics for the Diadromous Fish Habitat Analyses

Variable	Measurement	Metric	Databasin Label*
Impervious surface	% impervious surface in upstream drainage area	10 points if \leq (NE) or $<$ (SE) 5% cumulative impervious surface [†]	ImprvPoints (N, M); Impervious_Score (S)
Point source pollution	Density of sites in catchment**	10 points if catchment is ranked in the lowest 25% for pollution (least polluted)	PtSourcePoints(N, M); PointSource_Score (S)
Non-point source pollution	% of catchment covered by non-point source pollution**	10 points if the catchment is ranked in the lowest 25% for pollution (least polluted)	nonPointSourcePoints (N, M); Ag_Score (S)
Riparian buffers	% of floodplain area with natural land cover	10 points if the catchment is ranked in the top 25% for natural coverage	araNaturalPoints (N, M); Buffer_Score (S)
Potential for species access	Diadromous species presence & ocean access	10 points if catchment had an anadromous species present AND was on a network with zero dams downstream to the ocean	potentialAnadromousPoints (N, M); SpeciesAccess_Score (S)
Flow alteration	Volume of all upstream storage	10 points if the catchment is ranked in the lowest 25% for volume	flowAltRank (N, M); Usage_Score (S)
Local fragmentation	Density of road crossings + dams in catchment	10 points if the catchment is ranked in the lowest 25% for fragmentation (lowest number of crossings and dams)	fragmentPoints (N, M); Fragmentation_Score (S)
ESA critical habitat	Atlantic salmon and sturgeon critical habitat designation	10 points if the catchment is designated Atlantic sturgeon or Atlantic salmon critical habitat	esaPoints (N, M); Sturgeon_Score (S)

*N = North Atlantic Diadromous Analysis, M = Mid-Atlantic Diadromous Analysis, S = South Atlantic Diadromous Analysis.

[†]Only three catchments were exactly 5% in the Southeast.

**The metric for the North and Mid-Atlantic analyses vary from the South Atlantic analysis. Details can be found in the final report.

Table 3. Variables, Measurements, and Metrics for the Estuarine Analyses

Variable	Measurement	Metric	Databasin Label*
Seagrass and oyster reef habitat	% of polygon covered by seagrass or oyster reef	10 points if the polygon ranked in the top 25% for areal coverage	savOysPoints (N, M); SeagrassOysterScore (S, F)
Wetland habitat	% of polygon covered by wetlands	10 points if the polygon ranked in the top 25% for coverage	wetlandsPoints (N, M); WetlandsScore (S, F)
Water-vegetation edge†	Length of estuarine-marshwater edge in the polygon	10 points if the polygon ranked in the top 25% for length	estWetEdgePoints (N, M); MarshVegEdgeScore (S)
Proximity to protected habitat**	Distance to a protected area	10 points if the polygon is within 1/2 km of a protected area	protectedDistPoints (N, M); HAPScore (S, F)
Proximity to development	Distance from marinas and ports	10 points for the 25% of polygons farthest from marinas and ports	portDistPoints (N, M); DistPortsScore (S); DistToPortsScore (F)
Water quality**	303(d) sites	10 points for the 25% of polygons least associated with 303(d) sites	waterQual303dPoints (N, M); F303DScore (S); F303dScore (F)
Hardened shoreline	Length of hardened shoreline within the polygon	10 points for the 25% of polygons with the least amount of hardened shoreline	hardShorePoints (N, M); ShorelineScore (S, F)
Habitat fragmentation	Linear ft. of causeway within a polygon	10 points if the polygon has 0 ft. of causeways	causewayPoints (N, M); CausewayScore (S, F)

*N = North Atlantic Estuarine Analysis, M = Mid-Atlantic Estuarine Analysis, S = South Atlantic Estuarine Analysis, F = South Florida Estuarine Analysis.

†This metric was not included in the South Florida Estuarine Analysis.

**The metric for the Northeast Project (North and Mid-Atlantic analyses) is different than the Southeast Project (South Atlantic and South Florida analyses). Details can be found in the final report.

Hexagon Scoring Process

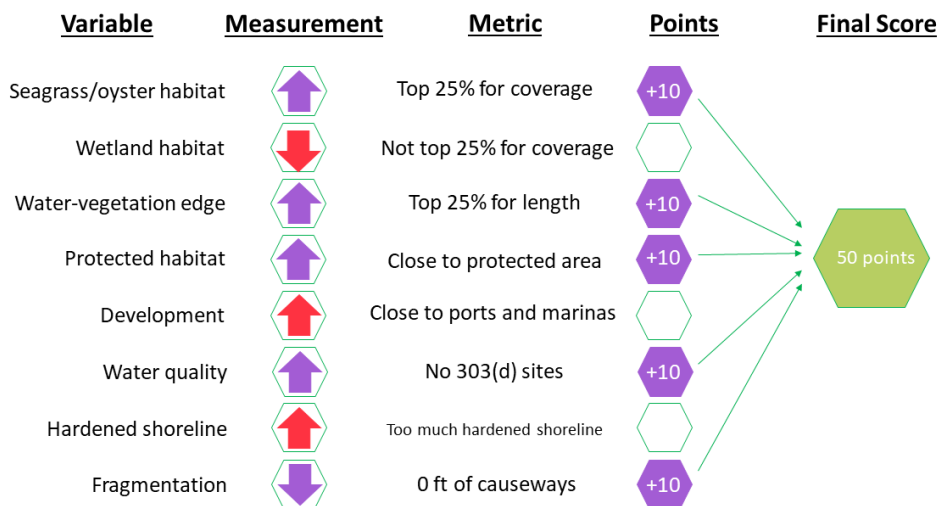


Figure 1. Example of how an estuarine hexagon was scored.

c. CAVEATS

This project was ACFHP's first attempt at spatially prioritizing areas for diadromous, estuarine, and coastal fish habitat conservation. It is meant to provide a high-level understanding of conservation opportunities for resource managers, ACFHP, and other stakeholders to identify areas that are best suited for fish habitat conservation. While it incorporates best available regional datasets, it is important to recognize that it does not incorporate local-scale information or context that is critical to understand before taking any conservation actions (to access the datasets used in the analyses, see the [final report](#)). Also, some datasets are updated in sections as new data becomes available, and thus might not all be collected at the same time (e.g. the wetlands data is updated on a rolling basis). Thus, these results should be used as a starting point to help inform and guide fish habitat conservation planning. It is not intended to provide a definitive "answer" and should not be used as the sole factor in any decision-making process. We encourage users to explore more current or refined datasets, or more localized assessments (e.g. work is underway for a Chesapeake Bay Assessment, as well as a Northeast Regional Habitat Assessment) for their specific area if it is available. Further, these analyses focus on the conservation of ACFHP priority habitats, and do not necessarily reflect the need for conservation of other fish habitats, the overall ecosystem, or other entities.

Though a variety of variables were included in these analyses, we did not include all variables that affect fish habitat. Some variables were not included in the analysis due to mixed effects or lack of spatial coverage. For example, we left sea level rise and sea surface temperature projections out because these changes would affect our priority habitats differently. Sea level rise might create an opportunity for SAV expansion, but drown tidal vegetation. Fish presence and fishing data were not included because sampling methods were inconsistent across our study area, and were unavailable in many of the shallow water habitats. For these reasons, we do not recommend selecting areas for protection (e.g. Special Management Zones, Marine Protected Areas, Wildlife Management Areas) based solely on these results. Finally, spatial comparisons should only be made within each of the eight analyses, and not across them, because of the different variables and metrics used.

2. HOW TO INTERPRET THE MAPS

The following scores are a general guideline for how to interpret the results, but can be adjusted based on your own criteria, interpretation, and goals. The following interpretation of the results (Table 4 and below) should be used when describing projects being proposed to ACFHP for funding.

Table 4. Suggested conservation actions based on final score.

Score	ACFHP Designation	Recommended Action
Above 60	Area of excellent fish habitat	Protection
20 - 60	Restoration opportunity area	Restoration
Below 20	Degraded areas of opportunity	No action

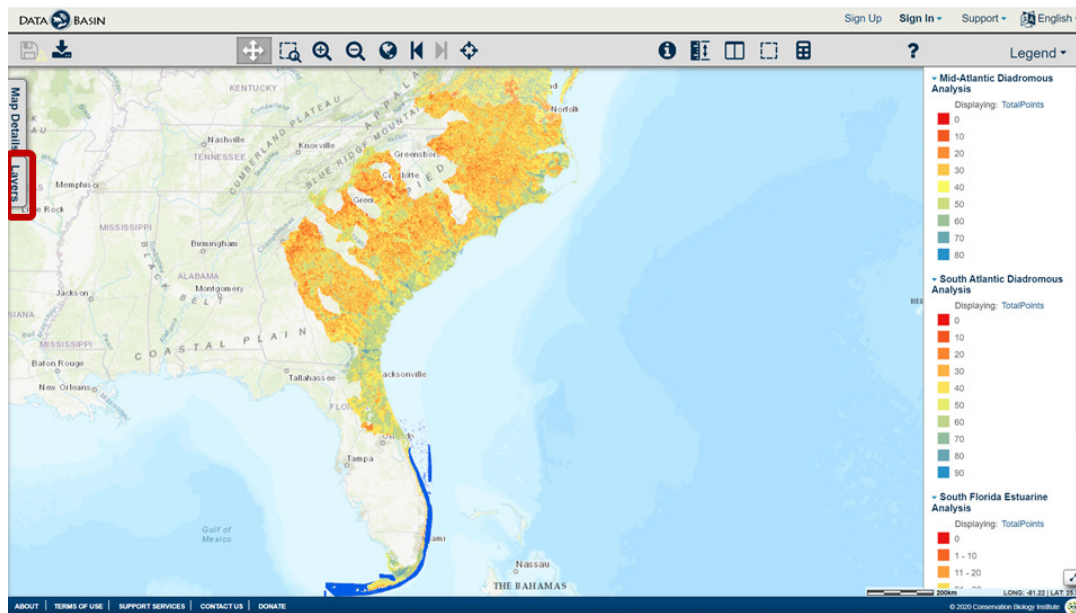
We designated catchments or hexagons with higher scores (>60) as “Areas of Excellent Fish Habitat.” It is unlikely that much improvement is needed to ensure availability or quality of fish habitat at these sites because they are in good condition and face few threats. Therefore maintaining the current condition is the primary conservation action. These areas might be a good candidate for protection. “Restoration Opportunity Areas” fall in the middle of the score range (20 - 60) – these are areas that are doing well in some respects, but the sites can be improved upon. It is likely that a restoration project, especially one that targets the variables that did not contribute points towards the final score, would have a big impact here. If, for example, an estuarine marsh hexagon scores fairly well, but doesn’t receive points for wetland habitats, then wetland restoration activities could be undertaken to improve its overall score and, by extension, increase available fish habitat. “Degraded Areas of Opportunity” received few points (<20), and face many challenges to fish habitat conservation based on the variables included in the analysis. A restoration project, unless it is large in scale or targets many of the variables in the analysis (e.g. reduction of impervious surface or sewage system infrastructure), will not likely increase availability or quality of fish habitat as much as one in a restoration opportunity area. ACFHP does not, however, intend for readers to interpret a grade <20 as an ACFHP recommendation that no action(s) should ever be taken in these areas.

It is helpful to determine why a catchment/hexagon received the final score that it did, and you can do so by viewing the raw data for each variable in the interactive GIS tool [Databasin](#). To learn how, see *How to Access the Maps* below.

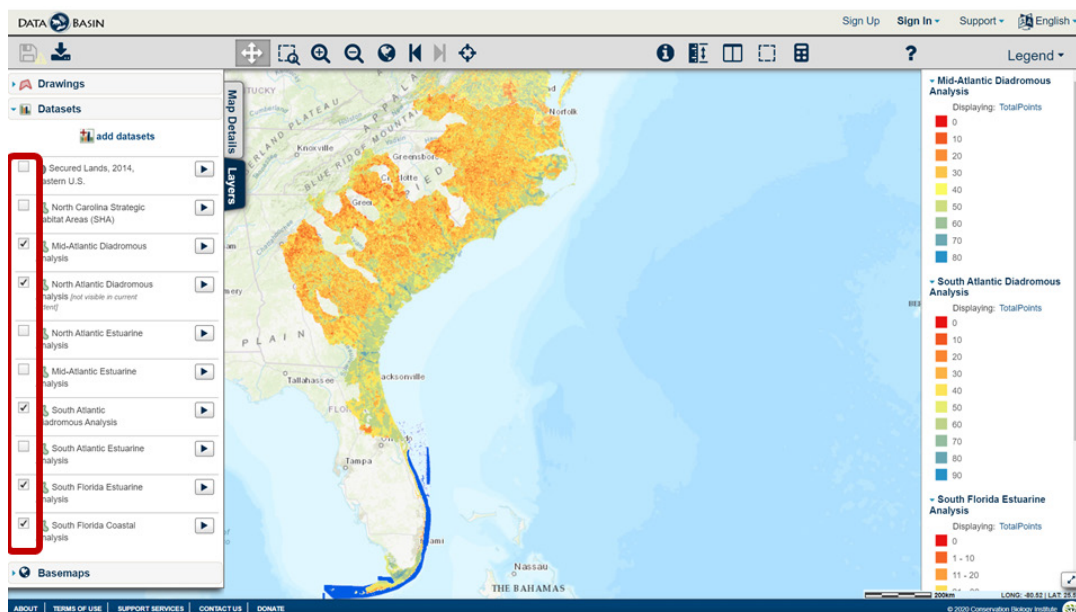
3. HOW TO ACCESS THE MAPS

We encourage you to explore the results in this tool, and let us know how you're applying the results. For questions, to provide feedback, or discuss the possibility of contributing data for future updates, please contact Lisa Havel, ACFHP Coordinator (LHavel@asmfc.org).

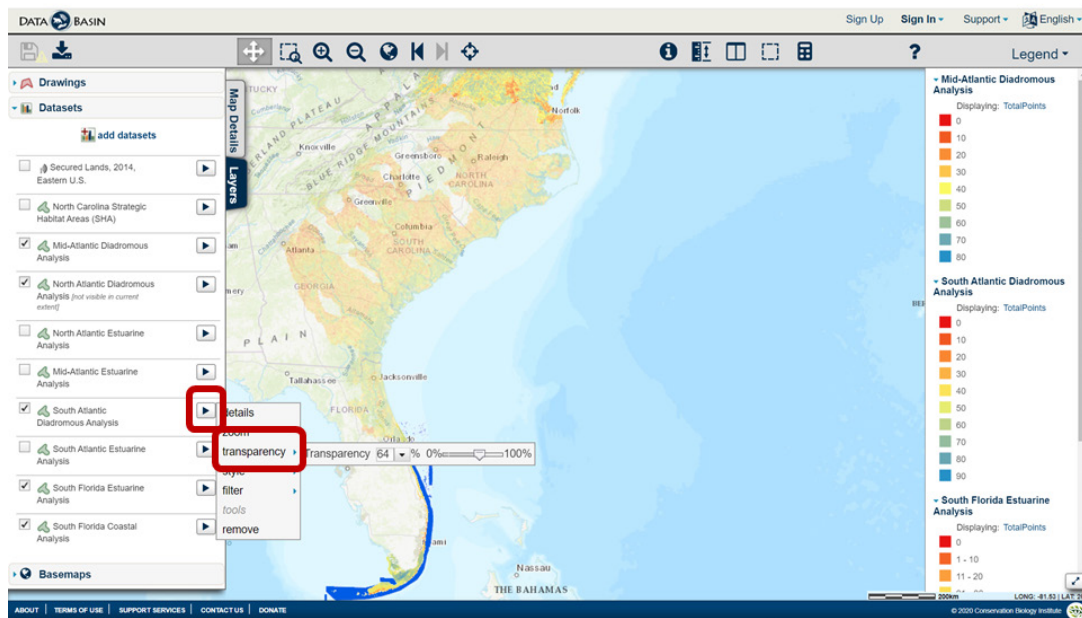
1. The maps can be accessed at the following link: <https://databasin.org/maps/e8327d587c1a4eb583cf9a007361dc8c/active>
2. To access individual analyses, click the **Layers** tab on the left.



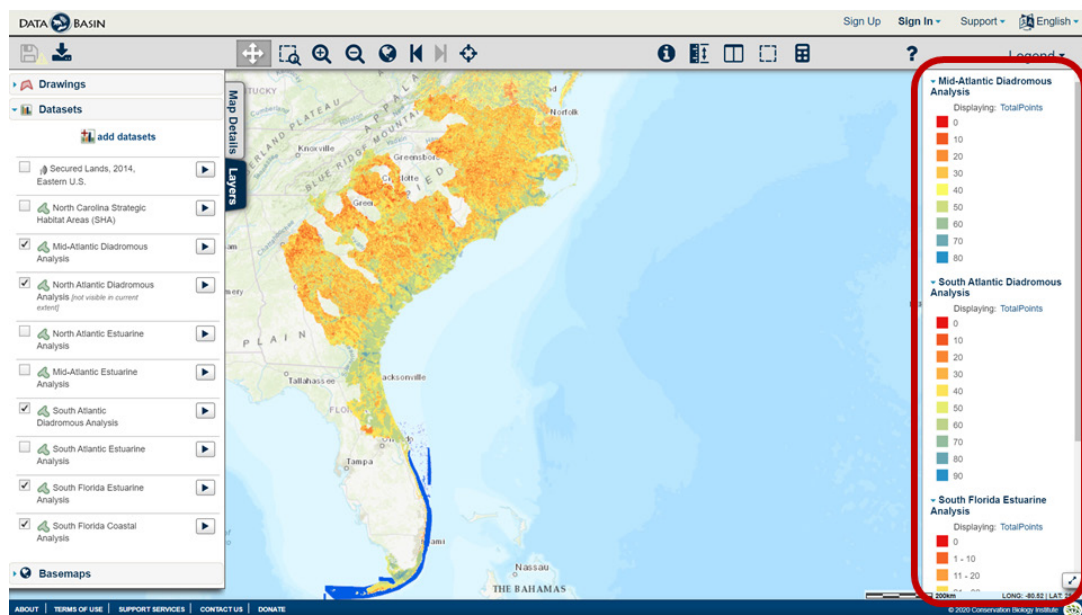
3. Check the box(es) next to the analysis (analyses) you'd like to view. Note – there are some additional datasets, like **Secured Lands**, for you to view as well.



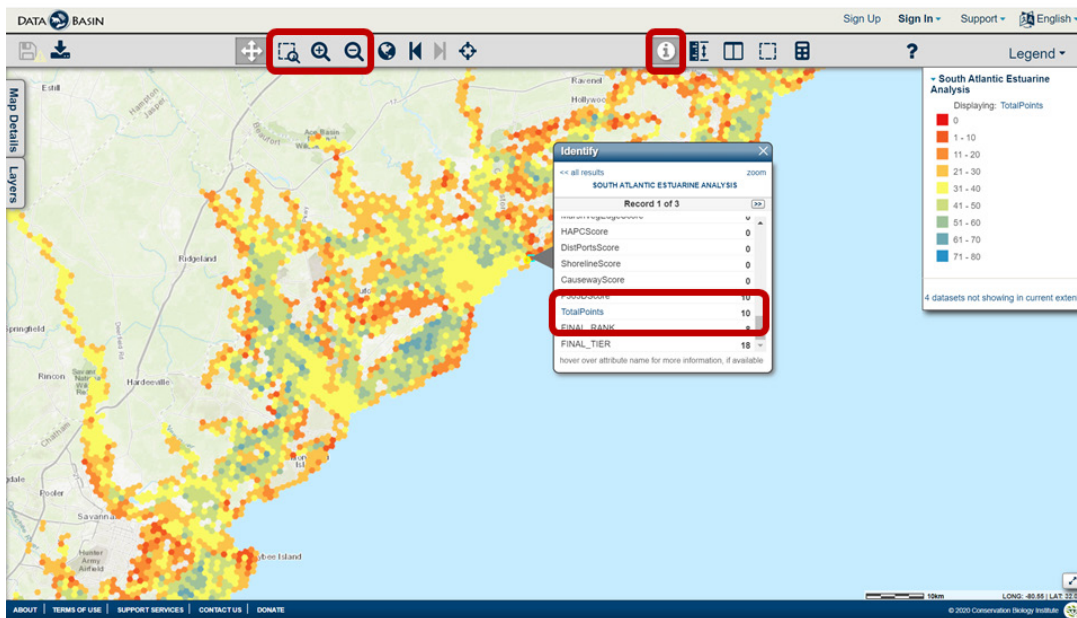
4. To change the transparency of the map, click on the **play** button to the right of the dataset name, and hover your mouse over transparency. Then move the sliding scale to get the transparency you like.



5. The map legend(s) are on the right side.



6. You can zoom into or away from a particular catchment or hexagon (using the magnifying glasses on the top toolbar). To view the raw data, click on the **Identify** button (an 'i' with a circle around it) on the top toolbar, and then click on the catchment or hexagon of your choice.
- a. To determine the score of a catchment or hexagon, scroll to the bottom of the list. You will see the variables followed by the word **score** (0 or 10 to the right). The total score is labelled **TotalPoints** towards the bottom of the list.



7. For more details on how to use Databasin, view our [how-to video](#), or you can click on the resources under the **Get Started** tab in the top toolbar of the www.databasin.org homepage.

The screenshot shows the Data Basin homepage. The top navigation bar includes 'Get Started', 'Explore', 'Create', 'Community', and 'Workspace'. The 'Get Started' tab is highlighted. The main content area features a large image of a tiger's face and text describing Data Basin as a science-based mapping and analysis platform. Below this, there are sections for 'Explore Data Basin Guides & Case Studies...' and 'Explore Data Basin Mapping Tools...'. The 'Gateways' section is also visible, featuring a landscape image and text about curated spatial data.