Forecasting the potential effects of invasive catfishes in the Chesapeake Bay watershed: a GIS-based vulnerability assessment

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Sustainable Fisheries Goal Implementation Team
Executive Committee Meeting
December 3, 2013

Chesapeake Bay Program
A Watershed Partnership

Virginia Commonwealth University
VCU

Invasive Catfish Data Portal

- *Rationale*: Given the limited resources for surveillance and control measures related to invasive fishes, build a **decision support tool** to identify high-risk + high-value watersheds for protection or mitigation measures.

- *Objectives*: 1.) use existing data from a wide range of sources to create a high resolution (1:24,000) GIS-based spatial model of watersheds that are vulnerable (high-risk) to catfish expansion within the decade; 2.) identify ecologically important aquatic resources and critical habitats that are especially vulnerable to invasive species expansion; 3.) create an interactive, web-based data portal that is accessible to managers and decision-makers and supports real-time updates as new data become available.

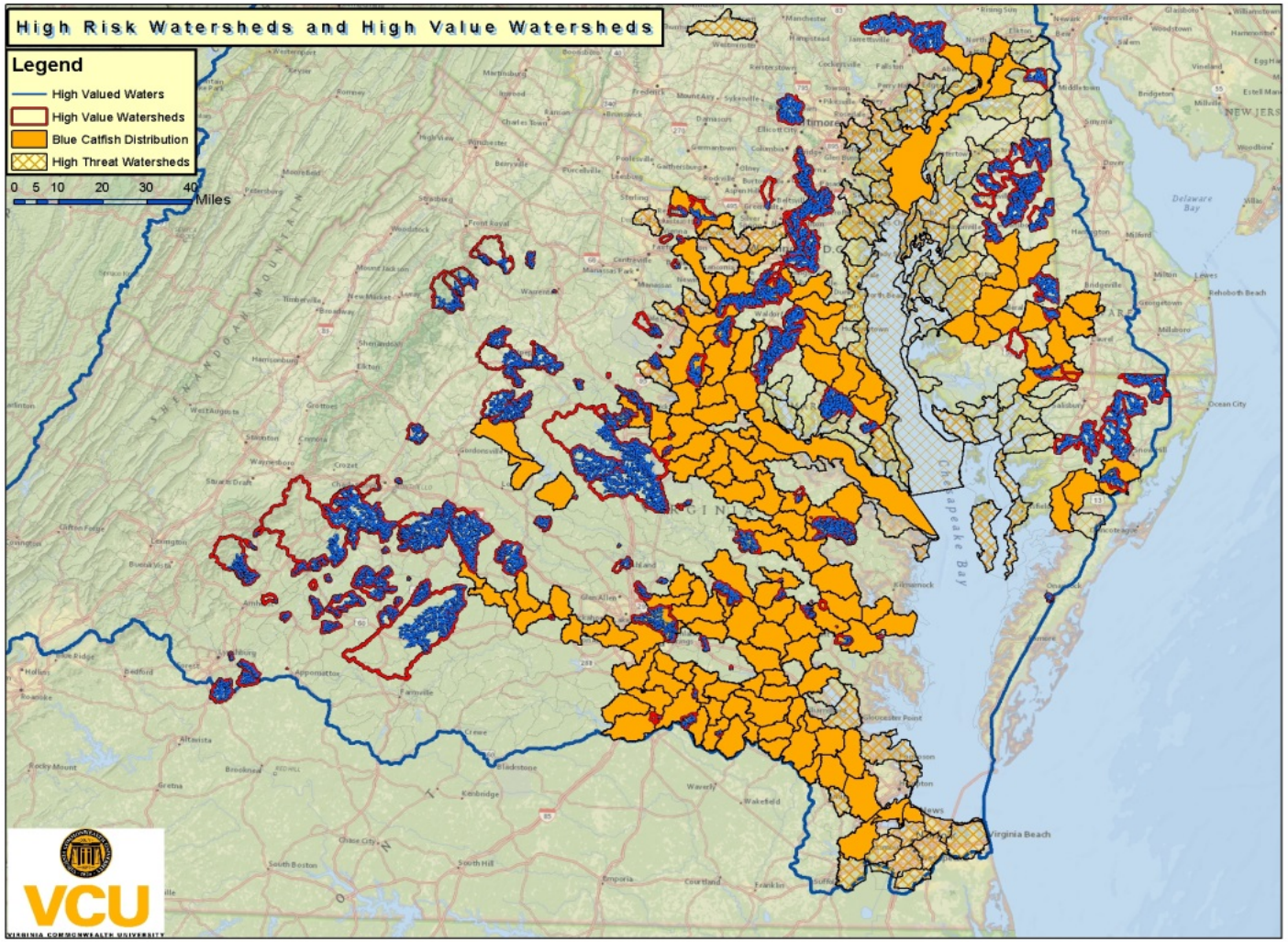
Invasive Catfish Data Portal

- *GIS Model Input Variables (and data sources):*
  - *Current distribution (point occurrences) of blue catfish and flathead catfish in the Chesapeake basin **below** Conowingo Dam (VIMS, MDNR, VDGIF, VCU)*
  - *Chesapeake Bay water quality, including surface salinity data, since 1985 (NCBO)*
  - *Public access locations, including ramps and marinas (NCBO, MDNR VDGIF, VCZMP)*
  - *Locations and descriptions of in-stream impediments (dams) for all Chesapeake Bay tributaries and their prioritization for fish passage (TNC)*
  - *Anadromous fish habitat delineations (TNC, ASMFC)*
  - *Watersheds (12-digit HUCS) with occurrences of ecologically significant aquatic resources and habitats (MBSS in Maryland, INSTAR in Virginia)*

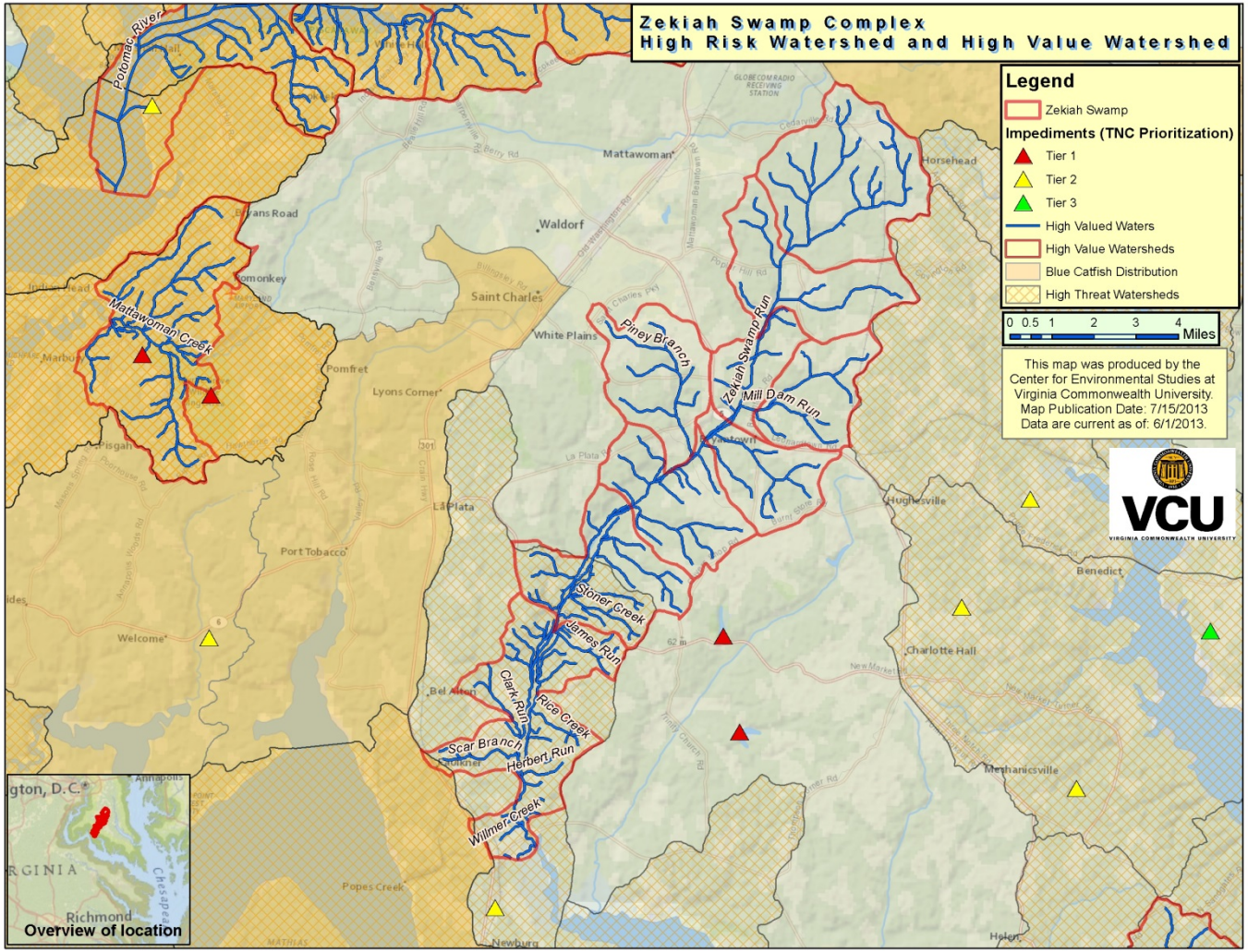
Invasive Catfish Data Portal

- *Preliminary Findings*
  - *Expansion of blue catfish is ongoing, is likely to be spatially significant, and may eventually include much of the upper and middle Chesapeake Bay estuary and many Maryland tributaries*
  - *Although a freshwater species in its native range, blue catfish in Chesapeake Bay have demonstrated an unexpectedly high salinity tolerance--up to 17 ppt—and are extreme habitat and trophic generalists*
  - *Flathead catfish are currently limited to several Chesapeake Bay tributaries and the upper bay; expansion will likely be less dramatic, will be confined to lower-salinity habitats, but may be exacerbated by unauthorized angler introductions into novel habitats*
  - *Preliminary model runs have identified approximately 25 catchments in Maryland and Virginia that meet our criteria (high-risk + high-value) for targeted surveillance or protection measures*
  - *The strategic retention of existing impediments, including some of those prioritized for fish passage, should be considered as one tactic to limit catfish expansion into high-value watersheds*

Examples of model outputs (products) available from the data portal



GIS-based analysis (data layers) showing high-risk + high value watersheds (12-digit HUCs) for possible invasive catfish surveillance and control measures



Zekiah Swamp in Maryland as a high-risk + high-value catchment and a good candidate for protection or control measures. Other candidates include the Marshyhope in Maryland and Dragon Run in Virginia

Invasive catfish data portal

- *Potential relevance*
  - The Catfish Data Portal, when completed and published online, would provide managers with direct access to current information on catfish (and other invasives) distributions and the most current results of GIS-based products (e.g. maps) showing prioritized opportunities for surveillance, protection, or control efforts. It would also allow members of the Task Force to share new data as it becomes available
  - Current GIS risk models should be improved by the addition of more and better agency information on ecologically or economically important aquatic resources and critical habitats in the region, especially in estuarine locations