



The National Nonindigenous Aquatic Species Program

The U.S. Geological Survey (USGS) Nonindigenous Aquatic Species (NAS) Program monitors, analyzes, and records sightings of non-native (introduced) aquatic species throughout the United States. The program is based at the USGS Southeast Ecological Science Center in Gainesville, Florida.

The initiative to maintain scientific information on nationwide occurrences of non-native aquatic species began with the Aquatic Nuisance Species Task Force, a group created by Congress in 1990 to address the need for this type of information by natural resource managers. Since then, the NAS program has maintained the database as a clearinghouse of information for confirmed sightings of non-native aquatic species throughout the Nation. The program also produces email alerts, maps, summary graphs, publications, and other information products to support natural resource managers.

The NAS Database in a Nutshell

The NAS database includes records of aquatic vertebrates and invertebrates occurring outside of their native range. It is freely accessible at a public website (<http://nas.er.usgs.gov>), where users can query the database to view current distributions.

The NAS database encompasses aquatic ecosystems (wetlands, lakes, rivers, estuaries, and coastlines) throughout the U.S. and its territories. The database contains records of more than 1,100 species dating back to the year 1850, and new records are continuously added by NAS program staff. The database also offers a searchable reference database on non-native aquatic species, factsheets on individual species, distribution maps, and new location notices.

Maps produced from the database are widely used in scientific talks, publications, and web pages, as well as by television, internet, and printed news outlets.



Management & Policy Uses

Risk Analysis

- The U.S. Army Corps of Engineers used NAS to examine the risk of non-native species introduction across watershed connections to help prioritize which connections to sever and which to monitor.
- The U.S. Forest Service used the database to identify infested source waters, thereby lowering the risk of unintentionally spreading non-native species while airdropping water drawn from natural sources, such as lakes and ponds, to fight fires.

Monitoring and Prevention

- Data and alerts are used by natural resource agencies to determine where to focus monitoring efforts.
- Federal and nongovernmental partners have prepared field guides for early detection of invasive marine fishes.
- Ecological modelers use NAS data in predictive modeling to show possible distributions of species in future invasions.
- South Carolina State planners used pathway analysis to determine where to direct their public education as an intervention for decreasing new invasions.

Management and Planning

- Occurrence data supports national assessments of aquatic invasions and regional management of non-native aquatic species.
- Reports from NAS have been used to document the range expansion of invasive species throughout a region of concern.

Federal Policymaking

- Data and reports from NAS have been used to make decisions about Lacey Act listings.
- NAS provides information for Congressional testimonies.

NAS Specimen Records

Each specimen record documents a non-native aquatic species in a particular location at a point in time. The specimen may not have survived or reproduced after the sighting, however, the record provides documentation of the event, allowing researchers to analyze trends and pathways in introductions. All specimen records include the location, date, and identity of the non-native aquatic species. Other details, such as photos or museum specimens (in cases where the organism was caught), are available for some records. To the extent possible, the database includes the best available information on the population status of each species, documenting whether it has failed or established a self-sustaining wild population. The database also distinguishes between non-native species that are transplants, meaning they are native to a different part of the U.S., and exotics which originate from other countries.

Records are compiled from published materials, such as books, journal articles, and technical reports, as well as records and reports from federal and state fish and wildlife agencies, museum holdings, and university researchers. Fishermen, boaters, and divers, and other members of the general public also submit reports of sightings.

To ensure the integrity of the data, the identity and reported location of each species is verified by NAS program staff before each new specimen record is entered into the database. Supporting documentation, such as collection information, photos, supporting academic literature, or a first-hand account, is attached to the specimen record.

Specimen Information

Pterygoplichthys disjunctivus
(vermiculated sailfin catfish)
Fishes
Exotic to United States

Collection Info
HUC Maps
Point Maps
Fact Sheet

Specimen ID	261221
Group	Fishes
Genus	Pterygoplichthys
Species	disjunctivus
Common Name	vermiculated sailfin catfish
State	CO
County	Costilla
Locality	Smith Lake (Reservoir), 4 mi S of Blanca
HUC8 Name	Alamosa-Trinchera
HUC8 Number	13010002

Map

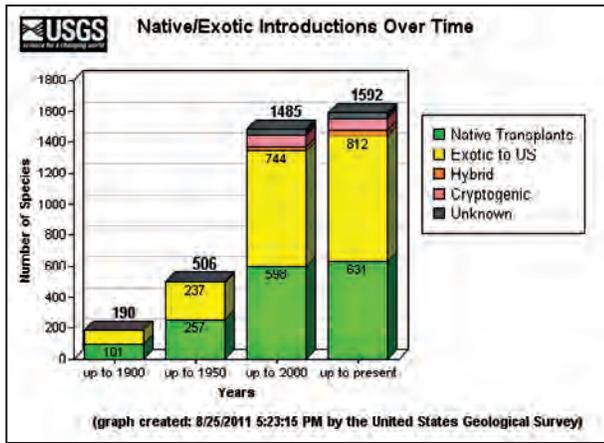
This specimen record provides details about a single introduction of the vermiculated sailfin catfish, including a map of the location.

Queries and Searches

Users can select text-based search to type in a genus, species or common name, or browse all occurrences within a broader taxonomic group, such as frogs, mammals, or fishes. Specimen records can also be queried according to geographic criteria, including:

- State
- County
- Major drainage area—2-digit Hydrologic Unit Code (HUC)
- Drainage—6-digit HUC
- Watershed—8-digit HUC
- Using advanced text searches, users can filter results by additional criteria, such as year, freshwater or marine environments, introduction pathway, and exotic or transplant categories.

Images	Group	Family	Scientific Name	Common Name	More Info	Native Habitat	Exotic / Native Transplant
	Fishes	Cyprinidae	<i>Cyprinus carpio</i>	river carp/carp	Collection info HUC Maps Point Maps Fact Sheet	Freshwater	Native
	Fishes	Cyprinidae	<i>Notemigonus crysoleucas</i>	golden shiner	Collection info HUC Maps Point Maps Fact Sheet	Freshwater	Native
	Fishes	Cyprinidae	<i>Ctenopharyngodon idella</i>	grass carp	Collection info HUC Maps Point Maps Fact Sheet	Freshwater	Exotic
	Fishes	Cyprinidae	<i>Hypoclinemus molitrix</i>	silver carp	Collection info HUC Maps Point Maps Fact Sheet	Freshwater	Exotic
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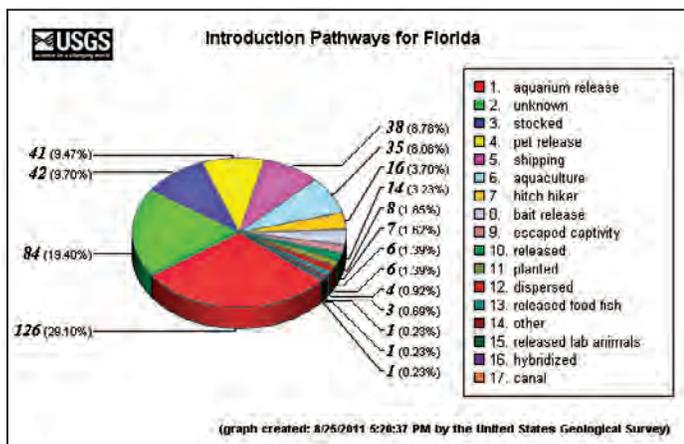
This bar graph compares transplants with exotics, including the categories of hybrids, cryptogenic, or unknown origins.

Assessing Trends in Introductions

The NAS database also includes summary graphs to show key facts and trends, such as origins of non-native aquatic species, as well as pathways and environments where they have been introduced. The graphs can include all species in the U.S. or by individual state. They also can be displayed by taxonomic groups (fishes, mollusks, crustaceans, reptiles, and amphibians).

Types of graphs currently available include:

- Introductions over time
- Introductions by taxonomic group
- Native transplants versus foreign (exotics)
- Introductions by pathway
- Continent of origin of exotic species



Pie charts, such as this one for Florida, categorized non-native aquatic occurrences by their introduction pathways.

Interpreting Point Maps

Each individual specimen record includes an online map displaying the location of the occurrence to the finest scale possible. Point maps show all records for a given species. Some records (particularly early dates) have imprecise locations, therefore NAS uses a point distribution system to enable all records to be georeferenced by latitude and longitude (lat-long). Each record's lat-long accuracy is designated by one of three categories, which are indicated by shape on the map:

- Accurate – Lat-long is reasonably close to described location, such as “mouth of Smith Creek.”
- Approximate – Lat-long is in the general vicinity of the collection, such as “a pond in Gainesville, Florida.”
- △ Centroid – Lat-long is calculated based on the center of a polygon, such as with county- or drainage-level records.



This point map shows the results of a query for bighead carp. Colors indicate population status.

Watch for New Introductions!

The NAS Alert System is designed to notify registered users of new occurrences based on geographic area, species, or broad taxonomic categories.

- **State Watches** track sightings by State.
- **Group Watches** include categories of fish, amphibians, reptiles, mollusk, crustaceans, and other species.
- **Species Watches** create single-species alerts.

To register to receive alerts, visit the NAS homepage at <http://nas.er.usgs.gov>. Alerts are triggered for any recent occurrence not previously been reported in a given country, state, county, drainage system, or bioregion.

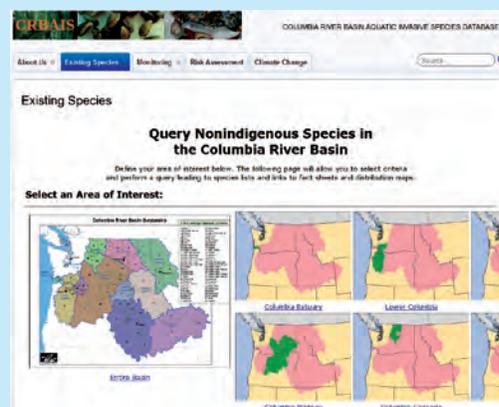


Report Sightings!

The public plays a significant role in the invasive species issue by acting as “early detectors” of new invasions. Users can locate the waters where a non-native species was seen, accurately report the geographic coordinates using an online map, and upload a photo for NAS program staff to verify the species identity. This online tool has been a very effective for reporting new invasions. A recent analysis of the NAS Alert System showed that approximately two-thirds of the alerts generated in the past 5 years have come from personal communication through this volunteer reporting mechanism. Reports can be submitted online at: <http://nas.er.usgs.gov/SightingReport.aspx>.

Partnerships

The NAS program works closely with state agencies and develops special tools with partnerships, such as integrated reporting and filtered website views. Working with the Smithsonian Environmental Research Center (SERC), NAS has helped to create an integrated data system called NISbase (www.NISbase.org) that links SERC invasive marine species data with NAS invasive freshwater species data. Through other partnerships, NAS offers custom, regional views of the database that allow managers to focus on a specific area of interest. Two examples of this include the National Oceanic and Atmospheric Administration (NOAA) Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS) and a regional view of the Columbia River that NAS provides as part of a consortium of state, federal and nongovernmental partners. NAS is also a member of the Global Invasive Species Information Network (GISIN) and Global Biodiversity Information Facility (GBIF), and provides data to these larger networks as well as other invasive species databases. Data analysis, time series maps, and detailed regional maps can be designed for special projects.



For More Information

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Potential partners can contact NAS for more information about custom maps and other tools.

Visit NAS online at: <http://nas.er.usgs.gov>

Suggested Citation:
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