

CHARACTERISTIC SPECIES
OF
FLORIDA SPRINGS, SPRING RUNS, AND SINKHOLES

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The following text introduces a set of downloadable Microsoft Excel tables funded by the Wildlife Foundation of Florida's Protect Florida Springs Program. They are available to the public on the Florida Springs Institute website at <http://floridaspringsinstitute.org>.

These tables were developed to orient interpreters and educators to the springs-associated species of greatest interest and importance. They provide their correctly spelled current scientific names, common names, and notes about why and how their roles in these ecosystems should be explained.

Our intent was not to provide a comprehensive inventory of the plants and animals that occur in Florida springs systems, but rather to focus on the most common and charismatic species. We have endeavored to include the most abundant, visible, and/or important organisms, as well as those that are particularly colorful or attractive, those with especially interesting stories, and those that are of special conservation concern, including listed species and invasive exotics. We have made a special effort to include species illustrative of the degradation of our springs and the management that will be necessary to restore them.

The objective was to provide information relevant to the biodiversity of the ecosystems flowing into, through, and out of the Floridan aquifer. We have therefore included aquatic cave biota, but excluded species more closely associated with surface water seepages than with waters moving into/through/from deeper limestone cavities.

Species that occasionally occur in springs systems, but are more common in other habitats, have generally been excluded. Exceptions have been made in a few cases involving those that are especially ubiquitous or conspicuous and/or involved in springs-related stories, like fish that sometimes invade springs in great numbers or those that used to be much more abundant in them. In order to emphasize the organisms most closely associated with springs, we have attempted to exclude species that do not customarily reach upstream from calcareous streams into the spring runs that flow into them.

Species that the Florida Natural Areas Inventory (FNAI) gives low global rankings (higher G numbers) due to greater abundance in a variety of habitats elsewhere are not always included, even if their high state ranks (lower S numbers) are based on them being rare and/or restricted to one or a few sites in Florida.

To facilitate download into user databases, notes have been edited to fit into a standard Excel table cell. This little bit of information is intended only to provide guidance as to reasons the species might merit highlighting in an educational effort aimed at K-12 students, introductory college classes, tourists/recreationists, community leaders, or local Audubon or Florida Native Plant Society chapters. Those preparing such programs will need to do further research in order to understand the issues involved.

We have not specifically mentioned excessive groundwater withdrawals or surface water runoff contaminated with toxins and fertilizers as threats to any one of these organisms because these impacts threaten virtually *all* of them. Interpreters and educators should emphasize this throughout their programs.

Information specifically relevant to Silver Springs is over-represented here because that system is exceptionally well documented. Many of the things we know have taken place there have occurred in other springs as well, but interpreters should seek to confirm the offsite applicability of information presented as pertaining to a specific spring.

Those utilizing these tables are strongly encouraged to read Stephen J. Walsh's *Freshwater Macrofauna of Florida Karst Habitats* at http://water.usgs.gov/ogw/karst/kigconference/sjw_freshwater.htm for context.

The URLs link to pictures selected to give educators a general idea what the organism looks like and help artists decide whether it might fit their designs. Giving preference to photographs that suggest what a visitor might see/learn in the springs environment, we have generally chosen the most colorful (known/guessed not to be photoshopped) photo we could find via a quick Internet search. Other information presented on these websites may or may not be useful and/or reliable. The pictures are not necessarily the best available photos. Those developing identification manuals, flyers, interpretive panels, etc. will need to search further to find good images for their specific purposes. It is important to remember that many otherwise plain-looking organisms develop bright colors when in reproductive condition. Some of the pictures show this coloration, whereas others do not. Some of these images are copyrighted. It is the user's responsibility to secure appropriate permission from the photo owners before reproducing them.

This information was developed by e-mailing and interviewing scientists and naturalists and reviewing both published and "grey" literature, as well as online sources. Many people contributed to this effort. Bill Bibby managed the FWC contract very supportively. Katie Conner helped locate references. Dave Almquist and Dale Jackson contributed much valuable information from the Florida Natural Areas Inventory database. Dana Bryan, Rob Mattson, and Paul Moler also shared particularly extensive

materials and/or detailed reviews/explanations. Others who provided information, photos, suggestions, and/or other assistance included Alice Bard, Brack Barker, Andrea Boliek, Noel Burkhead, Linda Bystrak, Pete Colverson, Dana Denson, Shirley Denton, Jim Dinsmore, Kevin Enge, Dick Franz, David Hall, Colette Jacono, Howard Jelks, Bob Knight, Robin Lewis, Chris Lockhart, Merrilee Malwitz-Jipson, Sandra Marraffino, Peter Meylan, Eric Munscher, Eric Nagid, Al Ogden, Carl Petrick, Buford Pruitt, Herb Reichelt, Scott Savery, Kent Smith, Jim Stevenson, Eric Suarez, Jacqui Sulek, Katie Tripp, Melisa Tucker, Peg Urban, Steve Walsh, Gary Warren, Jeff Wilcox, David Wiles, Susan Woods, and Danny Young. Marc Dick took me kayaking so I could see springs organisms up close in real life. And my parents took me on a glass-bottomed boat ride at Silver Springs 50+ years ago, which gave me the perspective to see the alarming difference between what our springs were then and what they are now.

Some of the information in these tables conflicts with that from other information sources, including online databases provided by prominent organizations. Educators should be extremely cautious about presuming that we have left out equally important species or included erroneous information. Repetition of habitat/management misinformation is a rampant problem in conservation databases, which are usually hurriedly assembled by junior staffers who copy readily accessible material from other websites without taking time to confirm its validity. Even information from the most reliable websites often neglects consideration of data from recent, unpublished, and/or non-digital sources. Descriptions of the habitat preferences of springs organisms are particularly fraught with false conclusions, because some species that are easily seen in clear spring waters actually use less observable habitats more often. One of the purposes of this project was to clear up such confusion. These tables have been carefully prepared by an ecologist with over 40 years experience gathering, evaluating, and synthesizing information about Florida ecosystems. Dozens of Florida's most experienced springs-oriented scientific experts and field naturalists reviewed and helped refine them. They thus summarize our state-of-the-art understanding about noteworthy springs species.

There is a great deal of variability in the species composition of the biotic communities of Florida springs, however, especially across watersheds and, particularly the Gulf-Atlantic drainage divide. Springs scientists therefore have widely diverse perspectives and thus few will agree with every species choice in these tables. Unfortunately, clarifying species range/distribution/abundance was beyond the scope of this project. Interpreters should consult local experts to determine which species best characterize a particular spring.

Common names are not standardized and those in the tables are the author's choices as to the most useful names for interpretive purposes. Since preferences vary, no parts of these names have been capitalized; users will need to edit them to suit their own standards for name capitalization.

The style in which the notes are written is also the author's. Some reviewers wanted them written in rigidly scientific style, whereas others felt they should be in language easily accessible to the layman. The author has taken an intermediate course and attempted to use concise wording that will be clear and comfortable for the primary target audience:

educators and interpreters with some scientific background who are accustomed to explaining things to non-professionals. It will be up to these people to decide if/how to properly convey the technical details to their audiences.

These tables will need to be revised periodically. If, after carefully reviewing the caveats above, you feel confident that you have information that supersedes what is presented here, please forward it to the Florida Springs Institute to be considered when this database is updated.