

What is Low-Cost Side Scan Sonar Habitat Mapping?

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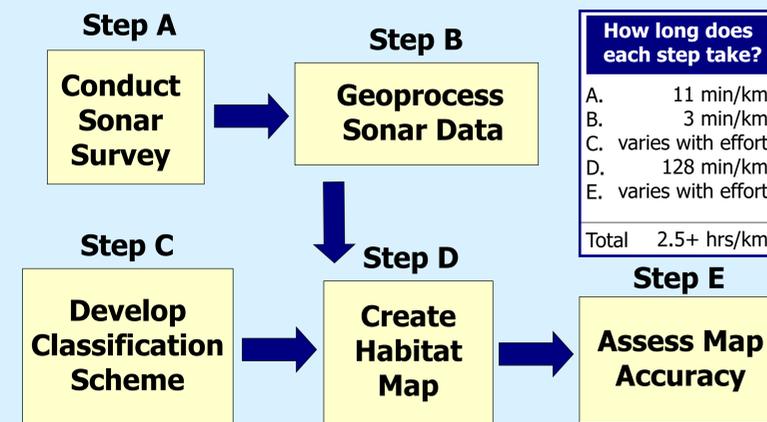
A Low-Cost Remote Sensing Technique is Needed for Waterscape Research in Navigable Systems

- Producing detailed, landscape level habitat maps of turbid, non-wadeable systems is costly or impossible using traditional methods
- Side scan sonar is an active remote sensing device that uses reflected sound to produce images of underwater features
- The inexpensive Humminbird® Side Imaging system (\$2000-2700) generates high resolution imagery and employs a small, adjustable transducer
- Over the last 5 years we have pursued the development of a complete method for mapping with the SI system, incorporating several complementary objectives (listed below)
- Our work has focused on streams and rivers of Georgia and Florida

Objectives of this Initiative

- Develop approaches for field sonar surveys
- Develop techniques for georeferencing and transformation (ie. geoprocessing) of sonar imagery for use in a GIS
- Produce detailed maps of instream habitat features (eg. substrates, LWD, depth) via image interpretation and manual digitization
- Evaluate/validate the techniques and map accuracies through field studies
- Develop and offer the tools, products, and training to interested professionals
- Continue testing and developing new applications of low-cost sonar habitat mapping

The Process of Sonar Habitat Mapping



What Do I Need to Get Started?

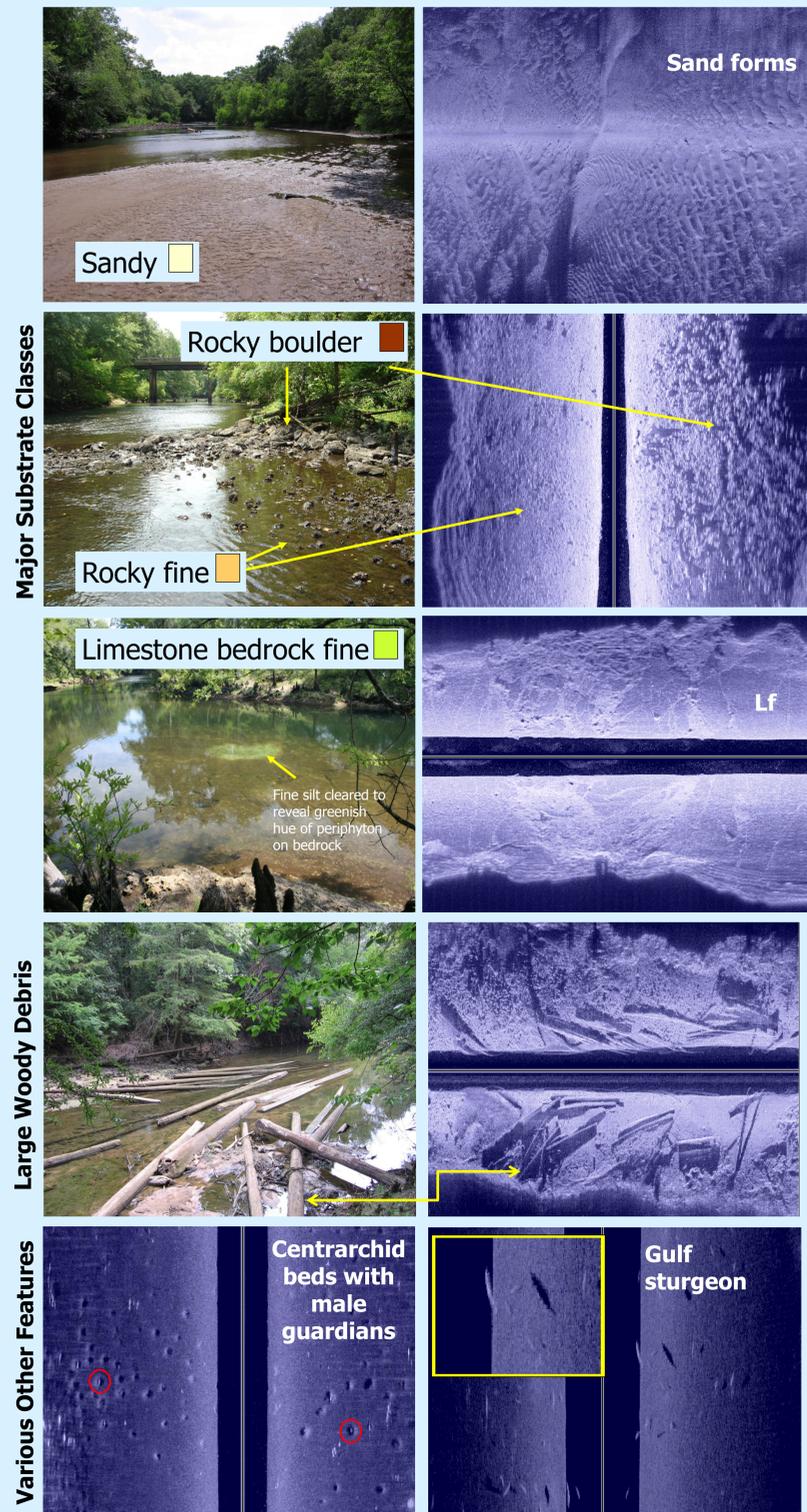
Hardware

- Humminbird SI system-creates images
- GPS (~\$200)- provides coordinates, captures detailed track/depth log
- Seiko S057 Interval timer (\$90)- aids in capture of consecutive images

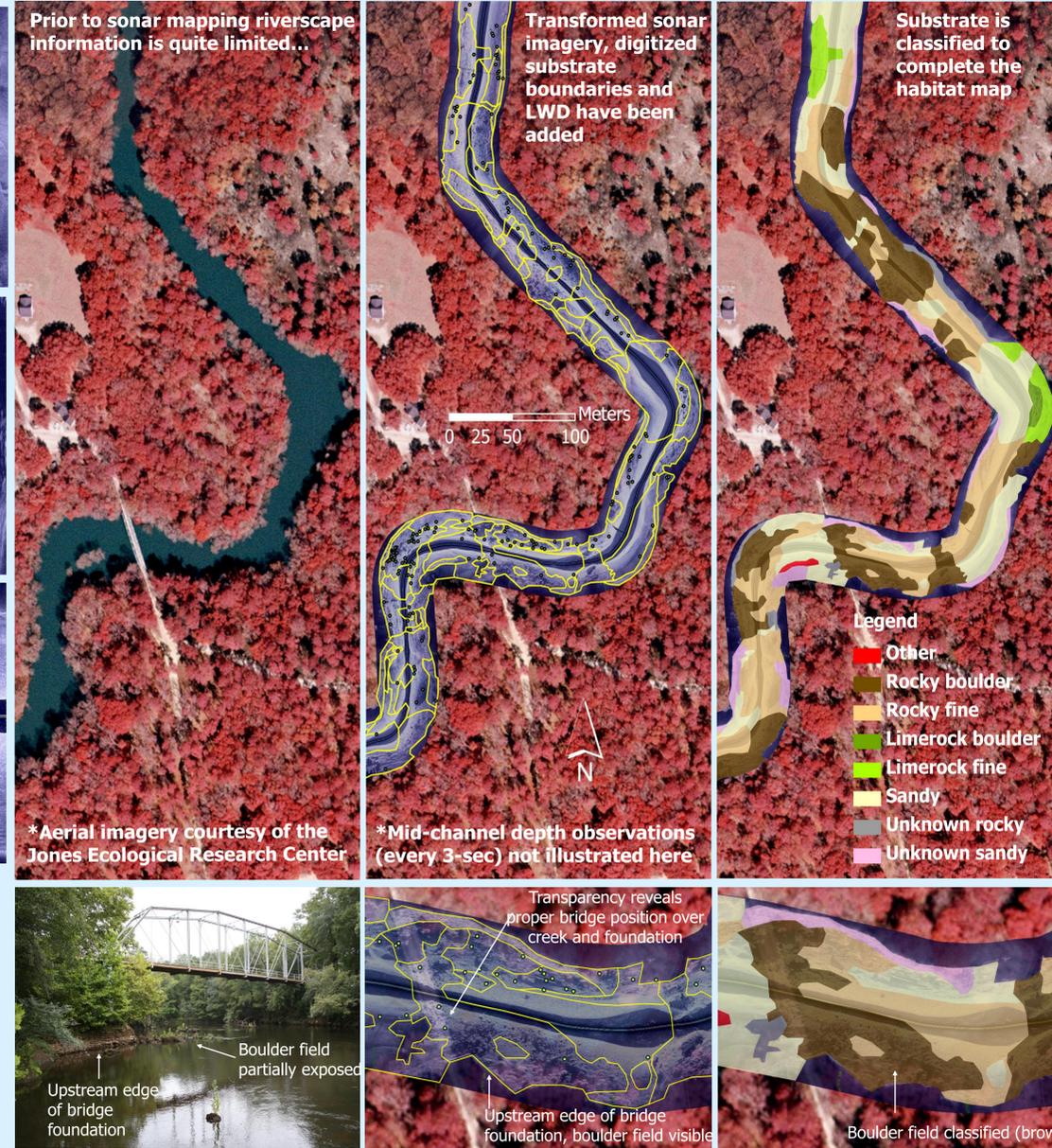
Software & Training

- ArcGIS ArcView level 9.2+, or 10.0- image geoprocessing and map production
- Irfanview & ET Geowizards- freeware used during geoprocessing
- Sonar processing tools- VBA scripts created by Thom Litts and delivered in a GIS project (provided freely at your request)
- A copy of our "Sonar Imagery Geoprocessing Workbook"
- Method training offered in workshop format, soon delivered as a free, web available "Guide to Low-Cost Sonar Habitat Mapping"

A Variety of Habitat Features Are Revealed



The Evolution of a Habitat Map



Validation/Accuracy Assessment Studies

- Kaeser, A. J., and T. L. Litts. 2008. An assessment of deadhead logs and large woody debris using side scan sonar and field surveys in streams of Southwest Georgia. *Fisheries* 33:589-597.
- Kaeser, A. J., and T. L. Litts. 2010. A novel technique for mapping habitat in navigable streams using low-cost side scan sonar. *Fisheries* 35:163-174.
- Kaeser, A. J., T. L. Litts, and T. W. Tracy. *In review*. Using low-cost side scan sonar to map habitat throughout the lower Flint River, Georgia, USA. *River Research and Applications*.



Applications are Widespread & Diverse

- Organism-habitat research in systems and at scales not previously feasible
- Studies of individual habitat use and behavioral patterns (eg. via radiotelemetry), identification/quantification/prediction of critical habitat (eg. sturgeon spawning habitat)
- Landuse associations with in-stream habitat (eg. patterns of LWD distribution with respect to riparian landuse)
- Monitoring habitat change over time (eg. sediment redistribution)
- Similar applications in lakes and reservoirs possible (eg. littoral zone mapping)
- Habitat map layers can be viewed in Google Earth and on smart phones

The Future of this Initiative

- To demonstrate the utility of low-cost sonar mapping we are applying the method in ongoing studies of turtle, fish, and freshwater mussel habitat use and availability, and time-lapse detection of changes in substrate deposition
- To receive email announcements of new training products, or make inquiries contact Adam at adam_kaeser@fws.gov

***Affordability, speed, flexibility, ease of training, and access to software are key traits of low-cost sonar habitat mapping. The future is now for waterscape research.**

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