

GOALS

The three overall goals for Lake Annie installation are similar to that of the earlier GLEON installations.

- First, the main goal of the project is to enable the Lake Annie station at Archbold to automatically download, archive, and publish Lake Annie sensor network data, using technologies that conform to emerging standards.
- Second to provide access to the legacy datasets for Lake Annie in formats compatible with new standards.
- Third goal is to make these data more accessible to Archbold staff, Evelyn Gaiser PI, the GLEON community, Archbold research collaborators, state and federal agencies, students and visiting classes, and to the general public.

Achieving these three overarching goals will enable scientists to more easily gain access to the data and will enable the new automated Lake Annie data sets to be compatible with the monthly legacy datasets and with other data sets coming on-line through the GLEON. Along with the technological goals, come goals for informing and training Archbold Biological Station staff and PI collaborator Evelyn Gaiser from Florida International University FIU, in ways that improve understanding of the IM system and in ways that support the long-term goals of the GLEON.

We outline below a more detailed set of goals (with lots of notes that may pertain to future decisions):

Pre GLEON buoy deployment meeting:

- a. Deploy mooring system
- b. Deploy wireless on water tower at Station and to lake. Make sure wireless communications established.
- c. Have computer network ready including dedicated server with mySQL installed (this is temporary solution for Archbold) and send GLEON the network setup details.
- d. Acquire archboldgleon domain to host web site pages as temporary solution to allow us to cope with transition to new Archbold web design
- e. Clean out the old structure (pipe and aluminum box casing) where we will locate a new pressure transducer at the dock
- f. Send list of instrumentation (buoy etc instruments we have ordered, existing automated weather station instruments, wireless info) to GLEON as excel file checklist so GLEON can review, help define metadata, and ask feedback questions etc.
- g. Send draft Archbold/GLEON goals to GLEON for comment
- h. Make sure all buoy and wireless components are delivered on time

During GLEON buoy deployment meeting

- i. Provide input to GLEON to help them refine and complete the Archbold GLEON metadata including automated QA/QC (range step, repeatability etc) procedures.
 - i. We want to use standard GLEON defaults for e.g. sampling rate aggregation span etc).
 - ii. Eventually we will want the flexibility to exert local (Archbold) control with a (GLEON provided) interface to change settings for particular sampling requirements etc. If CR 1000 settings are changed what domino effects does that have on IM side?
 - iii. GLEON collaborators should be allowed to make specific requests for GLEON-wide coordinated observations. Do NOT want outside control (off site investigators) to be able to change settings remotely – would have to be a specific request to Archbold for review first.
- j. Enter metadata for all new instrumentation into Archbold metadata catalogue as well as GLEON forms.

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- k. GLEON completes and loads program into CR 1000 for buoy, and CR 206 for pressure transducer at dock
- l. Build, add all instruments, and deploy buoy at Lake Annie and pressure transducer at the dock
- m. Have DAT files for lake stage data from CR206 streaming to buoy CR1000
- n. Have buoy DAT files streaming via wireless to Loggernet on computer at Station (2.8 miles away) to water tower and from there to Archbold GLEON server
- o. Our weather station is not at the Lake, it is 2.8 miles away. “Divert” the required subset of separate Archbold automated main station weather data (which also streams via wireless into Loggernet on same computer) and from there send this “required” weather data to the Archbold GLEON server and GLEON IM system.
- p. GLEON to install all data information management IM software, tools including e.g. Data Turbine onto Archbold GLEON server running mySQL and have all IM features that are required up and running. Installation of all supporting technologies from open sources including Inca – a system health monitoring tool This is a temporary solution until GLEON can help us migrate to our MS SQL server (see longer term goals). Have all basic GLEON IM tools running.
- q. Integrate lake level data (lake stage) from pressure gauge to be newly installed at dock, and correct all datastreams fro stage (msl).
- r. Decide who is responsible (GLEON, Archbold, combination who?) for basic QA/QC – for both the real time streaming data and more systematic e.g. monthly checking. Are there GLEON QA/QC protocols established? This is a major concern for Archbold. What to do about QA/QC beyond the normal automated e.g. range, step functions. If streaming real time data onto web site what to do about limited QA/QC – flagging likely problems. Can users only download data that are fully QA/QC'd etc?
- s. Write up Archbold’s GLEON data access policy (we want, at a minimum to meet or exceed all GLEON standards). Specify data access for outreach purpose and determine how data will be served to the general public. All data belong to Archbold but our vision is data to be available to:
 - i. All bona fide GLEON and Archbold collaborator/users, after consultation with PI (Gaiser) and/or Archbold staff, using Internet accessible database via password access.
 - ii. We want to be able, down the road, to share basic data with state agencies on a systematic basis (these may be aggregated data rather than raw datasets). These data may also be available eventually via agency web sites to the public.
 - iii. Public access to view and manipulate basic (probably aggregated) datasets via Internet tools.
 - iv. Have more restricted data access for 1982-current monthly legacy data until planned publications are complete.
- t. Develop pages for Archbold GLEON on Archbold website.
 - i. GLEON provide tools for Archbold web site for users and public to view, and manipulate these data, and access, and download (after permissions)? Is this a short term or a much longer term goal? Should we either
 - 1. Access directly the graph generating software in the IM on the Archbold GLEON server.
 - 2. Have the server periodically generate data graphs that are uploaded to the Archbold web site.
 - ii. To what extent will there be access/visibility directly on GLEON web site for Archbold data?
 - 1. Is the Archbold web site to be a mirror of what will be served eventually on a GLEON web site?

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2. Do we just link straight to GLEON eventually for Internet tools and manipulating data rather than every site having to operate their own web pages and tools?
 3. Do we have to wait until GLEON web site is ready? When?
 4. It would be simplest (maybe best option long-term) for Archbold to have our web pages describing Lake Annie and with access for data downloads and then have GLEON hosting all the tools for manipulating and viewing data?
- u. Plan for how we will automate streaming data to GLEON web site (can GLEON harvest systematically from our FTP site like NOAA MADIS does for our weather data? Long-term want to be able to stream directly from MS SQL server.
 - v. ? Clarify back-up protocols and data archival for DAT files and for data files. Are Archbold's current procedures adequate? Are data only backed up at Archbold or on GLEON servers too?
 - w. Train
 - i. Teach staff about the technology and how it works
 - ii. Train local staff to change configuration
 - iii. How to troubleshoot when things go wrong
 - iv. Training for Archbold and FIU staff for maintenance and calibration for buoy and sensors etc. Revise Archbold's current SOP for monthly lake visits to include buoy maintenance requirements
 - v. GLEON provide documentation and training for Archbold staff for network, system administration, and IM side of process.
 - x. Document
 - i. Document all required technologies and how they work together
 - ii. Document system configuration and maintenance
 - iii. Update the Lake Annie pages on the GLEON web site
 - iv. Update the Lake Annie pages on the Archbold web site
 - y. Test
 - i. Continuous operation
 - ii. When individual components shutdown
 - iii. System reboot
 - z. Evaluate
 - i. Identify the decision points in designing the system and the choices made
 - ii. Identify how the unique installation at Lake Annie is a subset of the total available technologies and how the uniqueness of the project reflects the unique combinations of expertise brought to the project.
 - iii. Assess the installation process, for example: did we have the right tools; were we and the site adequately prepared; does everyone understand responsibilities and process for long-term maintenance?

Long-term goals to discuss?

- a. First key long-term goal for Archbold. How do we integrate new datastreams with the legacy monthly datasets for Lake Annie (some go back to 1931, most date monthly from 1982 – 2007/current). Need to consider integrating legacy and continuing data derived from agency monitoring as well as Archbold collected data. . Need to prepare legacy data: they exist as worksheets in excel files, some metadata described. Archbold would definitely like to have these uploaded to the GLEON IM database. These ABS data are pretty well described (SOP etc) although not yet entered into Archbold metadatabase. They include:
 - i. Archbold monthly limnology data – 1982 – current. We intend to continue to collect these long-term monthly data (will act as cross-reference for new streaming datasets, we have to collect physical water samples and

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- plankton tows, and these allow us examine long-term trends using an established standard protocol).
- ii. Lake level (various sources back to 1931) USGS, WMD and Archbold
 - iii. UF Lakewatch water quality data, quarterly since 2000 – current
 - iv. SWFWMD – water quality data – 1/4ly since 2005.
 - v. DEP biotic vegetation and invertebrate data - intermittent 3 repeats since 1995.
 - vi. Phytoplankton and zooplankton monthly surveys – Gaiser since 2006
 - vii. DOC monthly - Gaiser since 2006
- b. Second key goal for Archbold will be for GLEON to migrate data and whole IM from mySQL to our MS SQL server.
 - c. Integrating and aggregating data to distribute to federal and state agencies (largely USGS, SWFWMD, DEP)
 - d. How to coordinate Lake Annie GLEON with NEON – SEEON lake efforts.
 - e. As well as GLEON, look to continue to develop a regional network of users for these data. Put on a workshop at Archbold (a repeat of the 2005 Lake Annie workshop) to summarize progress, explain new installation, and encourage research, education and agency-monitoring uses.
 - i. faculty in Florida and elsewhere familiar with Lake Annie who may like to use real time lake data in research and classes (e.g. Mark Brennan UF , Mark Bush (FIT) Dan Canfield (UF) Tom Crisman (USF) Evelyn Gaiser (FIU) , John Schalles (Creighton) , SEEON team, Bob Ulanowicz (UM retired)
 - ii. Agencies including hydrologists and data managers from USGS and SWFWMD, and Highlands County Natural Resources.
 - f. Develop a module to use Lake Annie datasets to reach out and contribute to the science curriculum for FL K-12 students – meet FL’s Sunshine State Standards. (We have done this extensively with our scrub research programs at Archbold and host 2,000-3,000 3-5th grade students annually). Explore outside support and funding e.g. can we seek a supplement/other funding to host a summer student at Archbold specifically to help with developing science education curriculum. How to link this to models at/for other GLEON sites?