

Standard Operating Procedure #1: Pre-Season Preparation

Version 1.2 (2021)

In Water Quality Monitoring Protocol for Inland Lakes: Great Lakes Inventory and Monitoring Network

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Revision History Log

The following table lists all edits and amendments to this document since the original publication date. Information entered in the log must be complete and concise. Users of this standard operating procedure will promptly notify the project manager and/or the Great Lakes Network (GLKN) data manager about recommended and required changes. The project manager must review and incorporate all changes, complete the revision history log, and change the date and version number on the title page and in the header of the document file. For complete instructions, please refer to Revising the Protocol, SOP #13.

Previous Version #	Revision Date	Author (with title and affiliation)	Location in Document and Concise Description of Revision	Reason for Change	New Version #
1.0	5/01/2015	David VanderMeulen, GLKN	updated the NPS contact author, minor edits to Table 2, updated the web link for obtaining a Research and Collecting Permit, added references to GLKN and park Safety Plans, fixed a handful of grammatical errors throughout	To clarify and update SOP based on changes that have occurred since Version 1.0 was published in 2008	1.1
1.1	3/2021	Alexander Egan, Aquatic Ecologist, GLKN	Minor grammatical changes; updated website links for IRMA.	To clarify and update SOP based on changes that have occurred since Version 1.1 was published in 2015	1.2
Add rows as needed for each change or set of changes tied to an updated version number					

Acknowledgements

We relied upon documents by O’Ney (2005) and the U.S. Geological Survey (USGS 2005) for guidance in writing this standard operating procedure.

1.0 Introduction

Prior to the field season, many preparations must be completed to ensure sampling can be undertaken according to schedule. The field season for sampling inland lakes of the Great Lakes Inventory and Monitoring Network (network) parks is generally from May through October. All details for the season need to be planned well in advance. Field preparations should begin in January to allow enough time for ordering new supplies and equipment, if necessary. Table 1 provides a checklist and general guidance for activities conducted prior to sampling. Many of these activities are discussed in more detail in other SOPs.

Table 1. Checklist of activities to be conducted prior to sampling inland lakes.

√	Activity	Description
	Prepare calendar of planned field trips	Includes sampling dates, locations, personnel
	Review sampling methods to determine if revision is needed	Check web reference to see if method has been updated from version currently used
	Review checklists of equipment and supplies required; prepare list of items to be ordered	Check each Standard Operating Procedure for detailed equipment lists; check expiration dates of reagents, standards, and other chemicals
	Order supplies	Includes calibration standards, pre-cleaned bottles for sample collection (if not provided by the contract analytical laboratory), sample preservation solutions
	Clean and test equipment; charge or replace batteries as needed	Includes multiparameter sonde, integrated sampling tube, Van Dorn, back-up instruments, ropes, thermometers, camera, GPS unit, cell phone or radio
	Ensure the latest versions of software are being used	Includes multiparameter sonde, data-logger, computer
	Prepare equipment blanks	Must be done annually
	Obtain permission for site access, if necessary	
	Confirm current park research and collection permits	
	Check field vehicle and boat for safety equipment and supplies	Includes safety data sheets, flares, flashlight, gloves, extra sampling bottles, etc.
	Schedule boat training, if necessary	
	Update field folder	Include maps, site information, field forms, sampling procedures
	Prepare headers on field data forms, chain of custody forms, analytical service request forms, bottle labels	Header information should be cross-checked with metadata to permit entry into NPSTORET
	Review sample collection, processing, and documentation information	Includes methods, lab codes, bottle type, and sample collection and processing procedures; sample shipment; quality control samples. (SOPs #6 and #7)
	Make travel reservations and arrangements as needed	
	Provide supervisor with schedule	

1.1 Read the Entire Protocol

Periodically read through the entire protocol, including all standard operating procedures (SOPs). Be sure to understand the purpose for which the various types of data will be collected and review the SOPs for the types of measurements and samples needed. Be alert for portions of the protocol or SOPs that may be in need of revision and bring these sections to the attention of the appropriate supervisor.

1.2 Prepare Calendar of Planned Field Sampling

Well in advance of the field season, prepare a calendar of sampling dates for the entire season. Allow for the possibility of bad weather days, when sampling may have to be postponed. Include the location of sampling, dates, parameters to be measured, personnel, and any additional relevant notes (Table 2).

Table 2. Example of calendar of planned field sampling.

Location	Sampling Dates	WQ Variables	Personnel	Notes
Indiana Dunes	1–5 May	core suite, chl a, TP, TN, NO ₂ +NO ₃ -N, NH ₄ -N,	park biotechs	
Indiana Dunes	1–5 July	core suite, chl a, TP, TN, NO ₂ +NO ₃ -N, NH ₄ -N, alk, cations, anions, DOC	park biotechs	include advanced suite; collect bottom water sample for analysis of TP/TN if lakes are stratified
Indiana Dunes	1–5 Sep.	core suite, chl a, TP, TN, NO ₂ +NO ₃ -N, NH ₄ -N,	park biotechs	
Voyageurs	10–25 June	core suite, chl a, TP, TN, NO ₂ +NO ₃ -N, NH ₄ -N, DOC	LeDuc, park biotech	
Voyageurs	15–30 July	core suite, chl a, TP, TN, NO ₂ +NO ₃ -N, NH ₄ -N, alk, cations, anions, DOC	LeDuc, park biotech	include advance suite; collect bottom water sample for analysis of TP/TN if lakes are stratified
Voyageurs	15–30 Aug.	core suite, chl a, TP, TN, NO ₂ +NO ₃ -N, NH ₄ -N, DOC	LeDuc, park biotech	

1.3 Review Checklists of Equipment and Supplies

Checklists help ensure that equipment and supplies will be ordered on time, data collection activities will be completed appropriately, and data quality objectives will be met. Review the detailed equipment lists that are included with each standard operating procedure (Table 3). Pay attention to expiration dates on reagents, calibration standards, and all other chemicals. Prepare a list of equipment and supplies that must be ordered and present it to the project manager.

Table 3. Checklists of equipment and supplies for monitoring water quality of inland lakes.

Checklist	Location
Safety equipment checklist	SOP #2
Decontamination equipment and supplies	SOP #5
Field supplies and equipment checklist	SOP #6
Laboratory equipment and supplies	SOP #7

1.4 Confirm/Apply/Renew Research and Collecting Permits

For sampling stations located within park boundaries, a Research and Collecting Permit must be obtained before any work can be done. To renew or apply for the permit, go to the following website:

<https://irma.nps.gov/rprs/>

Follow the directions for renewing an existing permit, or if your project is not already in the system, then follow the directions to apply for a new permit. Work with the research coordinator at each park.

1.5 Review Sample Collection, Processing, and Documentation

Conduct a thorough review of “Field Measurements and Water Sample Collection” (SOP #6) and “Processing Water Samples and Analytical Laboratory Requirements” (SOP #7).

Check with the project leader to determine current contract analytical laboratory information. Contact the laboratory to verify lab codes and procedures. Obtain copies of Analytical Services Request (ASR) and Chain of Custody (COC) Forms.

1.6 Update Field and Office Binders

Field binders should contain reference information specific to each sampling station, including maps, photos, previous data, field forms, and summaries of sampling and quality assurance/quality control (QA/QC) procedures. The office binder should contain reference information relevant to general field sampling procedures, including QA/QC reminders, copies of all SOPs relating to safety, decontamination, sample collection and processing, copies of equipment instructions and

troubleshooting, calibration logs, Safety Data Sheets (SDSs), and Chain of Custody (COC) forms. The field binder should be taken along on each sampling trip.

Each year, prior to the sampling season, the field binder for each monitoring site should be reviewed and the following information updated as needed:

- *Location of lake level gage or benchmark (if one is present).*
- *Location of sample-collection sites.* Review field notes for any indication that the location for sample collection may need revision. Update protocol if necessary.
- *Name of landowner, tenant, or other responsible party.* If the sampling station is located on private land, ownership may change. Verify.
- *Current copy of research and collection permit (if site located within NPS boundaries).* Check dates on permit. Renew/apply as described above.
- *Site access instructions (for example, call owner or site operator before arrival at site, obtain key to unlock security gate).* Confirm contact person, procedure, and phone numbers.
- *Photographs to document site conditions.* Take new digital photograph annually.
- *Maps to site (state and local).* Review map for accuracy; update if necessary.
- *Review previously collected chemical, physical, and biological data.* A summary of previously collected data or copies of previous field data sheets should be in the field folder so that water column profiles and Secchi data can be compared to previous surveys. Familiarity with previously collected data is a critical quality assurance (QA) element for early detection of possible instrument malfunction.
- *Summaries of field procedures, QA/QC procedures, instrument stabilization criteria, etc.* Prepare brief outlines reminding field personnel of routine procedures, including all changes from the previous year.

Each year, prior to the sampling season, the office binder should be reviewed and the following information updated as needed:

- *Safety information (SOP #2).* Verify/update “Medical Information Form for Field Personnel” and “Emergency Contact Form”.
- *Sampling schedule and instructions.* Ensure the following information from SOP #6 (Field Measurements and Water Sample Collection) is included in the office binder: laboratory analyses to be requested and associated codes, when to collect samples, bottle types needed for each analytical schedule, preservation requirements, quality control sample requirements, and shipping instructions. Verify information is correct and report and reconcile any discrepancies to supervisor.

- *Decontamination procedures (SOP #5).* Ensure that the most recent information on presence of exotic species and need for decontamination of equipment has been incorporated into the Hazard Analysis and Critical Control Plan (HACCP) for each park. Update office binder with the latest information. If the order of lakes to be sampled must change due to new infestations, be sure sampling schedule is updated.
- *Analytical service request forms, data collection field forms, chain of custody forms, sample bottle labels.* Prepare as much of the field forms as possible in advance. For each station, complete the header information, including the project ID, station ID and station name and other required metadata for NPSTORET. Place enough blank field forms in office folder to last entire field season.
- *Ensure that copies of the current field procedures are included in the office folder.* Include calibration and maintenance procedures specific to the instruments to be used.

1.7 Clean and Test Equipment

Clean and test all sampling equipment, including multiparameter sonde, temperature sensors, Van Dorn and integrated tube samplers, camera, GPS units, and any back-up meters. Check calibration of metered ropes to ensure accurate depth measures. Start each new field season with fresh batteries and replace spares in field tool kit. Ensure the latest versions of software are loaded onto the multi-probe, data-logger, and computer.

1.8 Vehicle, Boat, and Safety Gear

Check maintenance schedule of field vehicle and arrange maintenance, if needed. Check boats and vehicle for safety equipment such as SDS sheets, flares, spare tire, triangles, cones, first aid kit. Prepare a list of supplies needed and present list to supervisor. If using a trailer, ensure that tail-lights are in working order. Check that field tool kit is complete and replace tools, as needed.

1.9 Training and Safety

Keep current with training and the laboratory requirements associated with your data collection activities. New technicians will need basic skills training, including classroom instruction, hands-on training, and pilot-testing of equipment. Continuing field staff should attend refresher training and review network and park safety plans annually. If boat training is needed, be sure to schedule the training with the park early in the season. Initial and periodic refresher courses in basic first aid and CPR are required.

1.10 Field Reconnaissance

Make field reconnaissance trips, if possible. Visit the sampling sites to be sure that conditions have not changed from the previous year. Note conditions that could affect sampling operations, such as the seasonal high or low water levels, or site access peculiarities. In parks where lakes are accessible via roads, ensure all roads are passable and landing areas are accessible. In cases where lakes are not accessible via roads, communicate with park backcountry staff to learn of potential trail closings or other hindrances to sampling. When boats or canoes will be kept at certain lakes for the season, work with park staff to get the boats/canoes on site, hidden (if necessary), and secure.

1.11 Travel Arrangements

Make travel arrangements. Because hotel and campground reservations may be difficult to impossible to obtain at certain times of year, it is important to review the sampling schedule and plan ahead. Submit park housing requests well in advance of the sampling season.

1.12 Communicate with Supervisor

Ensure the project manager is informed of supply needs, problems with instruments, changes in sampling schedule, changes in sampling site conditions, and other needs that may have an impact on the project budget, data collection, schedule, or sampling design.

1.13 Equipment Blanks

An equipment blank should be conducted annually at each park where sampling is scheduled, at least four weeks prior to using the equipment in the field to ensure adequate time for analysis and review of results. Equipment blanks should be collected in a designated clean area of the sample processing laboratory. The blank consists of deionized water that is passed sequentially through each component of the sample collection and processing equipment. Equipment blanks should also be conducted when a new cleaning procedure is instituted and when new equipment will be used for the first time.

Procedure

- Fill the integrated sampling tube or Van Dorn with deionized water (DIW).
- Dispense water from integrating tube or Van Dorn into cubitainer or carboy.
- From cubitainer or carboy, dispense water directly into appropriate analyte bottles, or filter first, according to instructions for each analyte (SOP #7).
- Preserve samples according to instructions for each analyte in SOP #7.

If the equipment-blank data indicate that the equipment does not introduce contaminants that will bias study results, sampling can proceed. If the equipment-blank data indicate unacceptable

concentrations of analytes of interest, the cause must be identified, and the equipment or cleaning procedures must be changed or modified before sampling can proceed.

1.14 Literature Cited

O’Ney, S.E. 2005. Standard operating procedure #2: Pre-season activities, Version 1.0. *In* Regulatory water quality monitoring protocol, Version 1.0, Appendix E. National Park Service, Greater Yellowstone Network, Bozeman, Montana.

USGS. 2005. National field manual for the collection of water-quality data: U.S. Geological Survey Techniques for Water-Resources Investigations, book 9, chaps. A1–A9.