

Cumberland Piedmont Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure 1

Training of Field Personnel—Version 2.0

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Summary

This standard operating procedure (SOP) outlines the procedures for the training of field personnel in foliar injury monitoring.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
May 2020	Johnathan Jernigan	Substantial revision to add details on personnel requirements, the training materials available, and which crew members need to complete these trainings	V1.0 was very general. We were relying on USFS training materials/procedures at that publication date rather than providing our own.	2.0

Procedures

Personnel Requirements

Foliar injury sampling requires an overall project leader and additional staff as outlined in Table 1. The project leader (who also serves as a crew leader) oversees and directs project operations (including training of the QA/QC observer) and crew members who will assist the crew leader (but will not make foliar injury determinations). A typical crew consists of one crew leader and at least one crew member, though on some occasions the crew leader conducts sampling without assistance, such as cases where a park does not have anyone available to assist and sampling can be safely carried out alone. The crew leader and QA/QC observer are required to have expertise in ozone injury sampling methods. The crew members are responsible for assisting the crew leader or QA/QC observer with data collection but are not required to have expertise in foliar injury sampling.

Table 1. Tasks and personnel needed for foliar injury assessment fieldwork.

Task	Personnel required
Foliar Injury Survey Initiation	CUPN Program Manager or project lead
Review and sign JHA annually	All field personnel
Foliar Injury Surveys, including one QA/QC visit per season	Crew leader and one QA/QC observer, each of which will have one or two field crew members assisting

To ensure high data quality, the crew leader and QA/QC observer will be thoroughly familiar with this SOP; SOP 2 *Pre-Sampling—Version 2.0* (CUPN 2024a), which deals with pre-sampling and training exercises; and SOP 4 *Sampling—Version 2.0* (CUPN 2024b), which deals with field sampling. **The overall project leader will be a permanent staff member. The QA/QC person can be any qualified person.** For example, if the regional expert or someone with similar experience identifying ozone-caused injury wished to assist as a QA/QC person, they could participate.

Transient personnel (e.g., student interns, short-term or seasonal employees, and volunteers,) serve as project crew members (i.e., field assistants). While review of SOP 4 (CUPN 2024b) for crew members is encouraged, it is not essential because the tasks assigned to crew members can be easily taught and rehearsed during a pre-sampling “training” meeting prior to start of fieldwork. In this meeting, the project leader or crew leader also reviews member roles, steps in the sampling process, the protocol’s safety Job Hazard Analysis (JHA), and the use of any telecommunications methods that will be used in the field. Prior to conducting field sampling each year, all field personnel involved must **read and sign** the related JHA. That JHA is included in the training materials directory discussed in the section that follows.

Training of Crew Leaders and QA/QC Observers

In the month prior to field sampling, both the crew leader and the QA/QC observer review all materials contained in the “Training” folder located in the Ozone and Foliar Injury protocol folder on

the CUPN server (Z:\Vital_Signs\Vital_Signs_Prj\Ozone\Admin\Training\Ozone Foliar Injury Training Materials). A screen capture of the “Training” folder is shown in Figure 1. That folder contains four files and one subfolder. The subfolder contains training slides for assessing severity of foliar injury. These objects are numbered zero through four, indicating the order in which they should be completed. These objects are:

1. 0_JHA_2013_Ozone_and_Foliar_Injury.docx – The JHA for ozone foliar injury field work. This document must be read and signed by all field members each year.
2. 1_Smith_PPT_2005_Ozone_Training_Presentation.ppt – This is a slideshow of the foliar injury training session developed by the U.S. Forest Service (USFS). It covers background information on ozone, site selection, species selection, diagnosing injury, and preparing vouchers.
3. 2_Smith_2004_Review_of_Ozone_Injury_Symptoms.ppt – This is another USFS slideshow that focuses on the identification of foliar injury using several common bioindicator species.
4. 3_2008_Supplemental_Species_ID_PDF.pdf – This document provides an aid for the identification of supplemental species used in the training by the USFS. It also includes images of foliar injury for official bioindicator species.
5. 4_Severity_Assessment_Exercises – This folder contains images of plant leaves for several species showing varying levels of ozone injury. The images were developed by the USFS to use in training exercises along with an answer key to evaluate the trainee. The objective is to be able to look at an image of a leaf and be able to estimate the correct injury severity index for that leaf.

Additionally, identification of the genera and species that are ozone sensitive should be conducted by the crew leader and QA/QC observer to help enhance these observers’ ability to identify those plants in the field. The reference materials listed above are useful in this task, but other plant guides may be used, especially when those guides have color plates available.

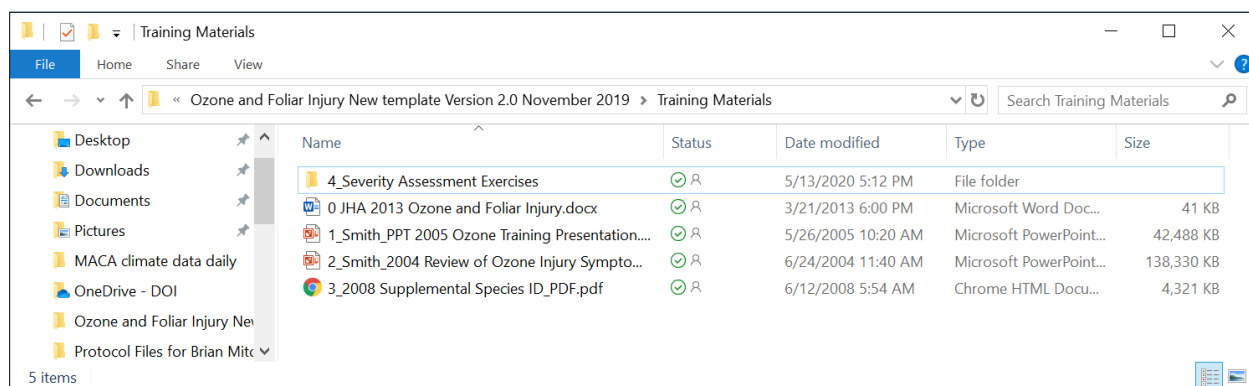


Figure 1. Screen capture of training folder and its contents.

The crew leader and the QA/QC observer thoroughly review items 1–3 in the list above, while keeping in mind some of the material presented is specific only to the USFS protocol (USFS 2008) and does not necessarily represent the goals of the CUPN protocol. A few specific things presented include discussions of split plots and state-level estimates of injury, neither of which are facets of the CUPN protocol. The presentations are still very informative and relevant because they include discussions of species identification, what ozone injury looks like on each species, as well as many other topics relevant to the CUPN protocol.

The crew leader and the QA/QC observer also review the contents of the severity assessment exercise subfolder. Reviewing each image for each plant type available will help “calibrate” the leader’s and observer’s measurement of injury severity once in the field.

The crew leader and the QA/QC observer will certify they have completed all of the above training prior to any sampling being completed. This certification will be done by digitally signing the certification form located in the protocol’s “Training” subfolder on the CUPN server.

Literature Cited

- Cumberland Piedmont Network. 2024a. Ozone and Foliar Injury Monitoring. Pre-sampling—Version 2.0. Standard Operating Procedure. NPS/CUPN/SOP—2. Cumberland Piedmont Network, Mammoth Cave, Kentucky. Available at: irma.nps.gov/DataStore/Reference/Profile/2302026 (last accessed January 2024).
- Cumberland Piedmont Network. 2024b. Ozone and Foliar Injury Monitoring. Sampling—Version 2.0. Standard Operating Procedure. NPS/CUPN/SOP—4. Cumberland Piedmont Network, Mammoth Cave, Kentucky. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2302028> (last accessed January 2024).
- United States Forest Service. 2008. Phase 3 Field Guide—Section 9. Ozone Bioindicator Plants (east). Southern Research Station. Knoxville, Tennessee. 49pp.