Introduction

Purpose of Document:

This is a Requirements definition Document for a mobile friendly website to collect data for NCARs ozone bioindicator gardens. The purpose of the Ozone Garden project is to help gather data and educate the public about the impact of ozone on the environment using ozone sensitive plants from gardens across the country. Users include professional and citizen scientists willing to collect data on ozone damage to be used at ozone gardens across the nation. This document describes the In-scope goals, stretch goals, non-functional objectives, and models the functional objectives with use case models.

Project Summary:

Project Name:	NCAR Ozone Data Collection Website
Project Sponsors:	Danica Lombardozzi, Becca Hathaway
Project Manager:	Kara Wallace
Tech Lead:	Michael Whitlock

Background:

Ozone is a pollutant created in the atmosphere from UV rays. The levels of ozone in different areas can be measured and its impact can be seen on several different species of ozone sensitive plants. Data has been gathered from several ozone gardens across the country. These gardens are specifically created so that we can see what the effects of different ozone levels are on the environment. This website is meant to be a tool for both professional and amateur scientists to collect and enter data from these gardens so that the effects of ozone pollution can be catalogued and studied. The website will contain a way to visualize data from different gardens, enter data, and educate on ozone effects and how to diagnose them in the different ozone sensitive plants.

Functional Objectives:

1. High Priority
    a. The website will be converted into a mobile friendly version following the “Umbrella theme”
    b. The website will implement the ozone leaf analysis training provided
    c. The website will include information on ozone bioindicator gardens
    d. The website will implement a login system to differentiate between ozone “experts” and “citizen scientists”(like a registered user option and a guest option on websites)
    e. The website will support data collection for a broader range of plants species at ozone gardens.
2. Medium Priority

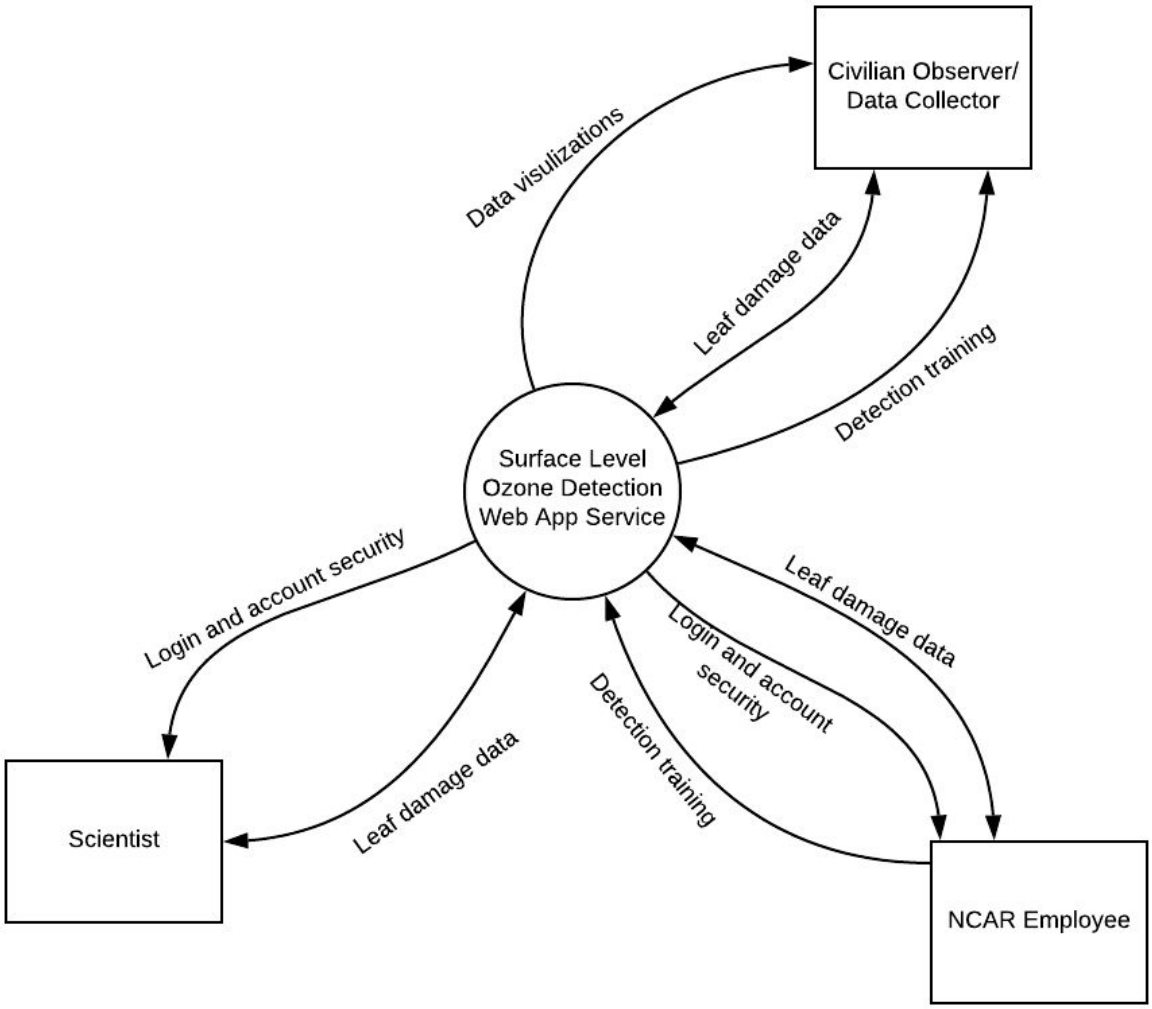
a. The website will have data visualization capabilities that allows garden visitors to see the progression of injury on different plants at the garden and comparing across garden sites in the network
b. The website will allow for an option to upload leaf photos to a photo repository. Ideally categorized by the damage(to allow for future machine learning capabilities based on the pictures and their data)
c. The website will show the nearest real time ozone monitor's ozone concentration
d. The website will contain an option to download ozone data to the user in an easy to use manner

Non-Functional Objectives

3. Reliability
    a. The website should be operational as long as the NCAR server and deployer is up
4. Usability
    a. Any user (new and old) should be able to easily navigate the website upon entrance.
    b. The website should have the same functionality over both desktop and mobile
5. Performance
    a. The website should be able to load quickly
        i. Programming team will ensure that website assets (pictures, diagrams, etc.) will be not large enough to exceed desired load time
6. Security
    a. User passwords should be encrypted
    b. Data submitted by users should be securely routed to NCAR database
    c. User connection to website should be secure (HTTPS over HTTP)
7. Supportability
    a. The website should be viewable on all major browsers (Safari, Internet Explorer, Microsoft Edge, Google Chrome, Mozilla Firefox, etc.) for both desktop and mobile.
    b. The website should support major screen resolutions for desktops.
    c. The website should be mobile friendly for all major device screen resolutions
8. Documentation
    a. The team should outline the architecture of the website for the sponsors
    b. The code should be well commented to briefly indicate what each chunk does
9. Interfaces
    a. The website should be integrated with:
        i. MySQL database to store collected data and user information
        ii. NCAR host servers
10. Accessibility
    a. The website will follow ADA website compliance guidelines
        i. Accessibility will be testing using Bureau of Internet Accessibility's free graded report

b. Adult approval for individuals under 13

Context Model



System Externals

- Civilian Observer/ Data Collector:
    - A civilian will be able to receive training on how to accurately detect surface level ozone damage on leaves in designated ozone gardens
    - A civilian will be able to view/download data as well as input data into the system
    - A civilian will be able to receive data visualizations on surface level ozone damage
- Scientist:
    - A scientist will have an account and thus the service will provide a login to secure account information as well as have a tag to show data collection is from an accredited scientist.
    - A scientist will be able to view/download data as well as input data into the system
- NCAR Employee:

- An NCAR employee will be able to add and update information to detection training
- An NCAR employee will be able to Input and receive leaf damage data

Use Case Models

Login

- Description: A user on the website will be defaulted to a guest visitor, but there is the ability to login for official data takers and the like.
- Actors: Guest User, User with authorization from NCAR
- Preconditions: Default mode is to assume the User is a guest
- Basic Flow:
    1. A user who wishes to login can do so at a button
    2. A pop up or separate screen that allows them to input their login information appears and they enter their login information
        a. If this information is correct and authorized they will then be logged in, and now have any additional access to the website, or data they collect will be marked with that user
        b. A user that tries to login but has no account will be directed to get an account made directly through NCAR, or given the ability to create their own account (if we think people are going to visit these gardens multiple times without being an official scientist).
- Alternate Flows: There should be an ability for a user to reset their password in case they forget.
- Exception Flows: Incorrect logins will be told to try a different username/password, and if a user forgot to input a field they will be asked to fill all fields out.
- Post Conditions: If they have logged in the website should take that into account for anything that should show in addition, or when they record their own data on the garden.

Educational Material:

- Description: A user should be able to easily access information on the gardens and how to identify ozone damage, emphasized to be read and understood before going through the data collection step.
- Actors: Logged in Users, Guest Users (First Time), Guest Users, (Returning)
- Preconditions: If a user is logged in, it is before this step begins.
- Basic Flow:
    1. A user is presented with the educational material directly below any headers/videos on the website, and is placed before the data collection section. It might also be presented after clicking a link to a separate webpage that has the educational material on it

2. The user can then read through the material, seeing images and text to explain what to look for, with certain game like tests or other methods to encourage learning the material
    a. Once a user has read through the entire material and answered all the questions they move onto the data collection step
    b. However a user can at any point continue on, or ignore the training at any step to move onto the data collection

- Alternate Flows: Logged in users will either not be shown the learning material on the home page, or not shown it when going to the data collection step (if it is on another page). Users have the choice to scroll past the learning material, or to skip the learning material.
- Exception Flows: If there are any quiz like sections and the user fails such a quiz, we should alert them to possibly go back and read through the material, give them explanations to each answer, but in the end not block them from continuing to the data collection step
- Post Conditions: The user is able to proceed to the data collection step.

Data Collection:

- Description: A user should be able to choose the garden they are in, the plant they are observing, and the severity of 10 leaves on those plants. Other data collection steps, or varieties, might be available given request or time.
- Actors: Logged in User, Guest User, Database
- Preconditions: If a user is logged in, it is before this step begins.
- Basic Flow:
    1. A user will choose the garden they are recording data at
    2. They will choose a type of plant they want to check for ozone damage on (changes based on the garden that they chose, as each has different plants)
    3. They will have 10 fields to input an accepted integer of damage (scale provided above, and described in the training material)
        a. If a user is logged in they might receive an email of confirmation, and their data submission will be marked by their login/email
        b. Guest submissions are marked as guest and the user obviously won't receive any kind of email verification
- Alternate Flows: A user trying to choose the drop down for plant type will find it is blank, until they have chosen a garden location. Or will see every plant name, with the garden they are present at.
- Exception: If a user submits the collection page without filling in garden location, or plant type, we will deny the submission and request that they fill in any missing fields. If we require that they fill in all 10 fields of plant damage severity and they haven't filled in all 10, we will deny the submission and request that they fill everything out.
- Post Conditions: Their submission will be recorded and sent to the database, and users will be given a thank you screen or other message indicating that their submission was

successful. They might also be presented with other information, or links, that they might visit next with relevance to the ozone garden and NCAR's mission.