



Finding Nature in Your Neighborhood

A Field Mapping Protocol for Community Based
Assessment of Greenspace Access



Finding Nature in Your Neighborhood

*A Field Mapping Protocol for Community
Based Assessment of Greenspace Access*



Introduction	8
What Is EpiCollect?	10
Getting Started	11
EpiCollect for Android	12
EpiCollect for iPhone	19
In the Field	25
GreenAccess Field Guide Checklist	27
GreenAccess Cheat Sheet	28
Post-Collection Data Analysis	30
EpiCollect Project Administration	32



WELCOME!

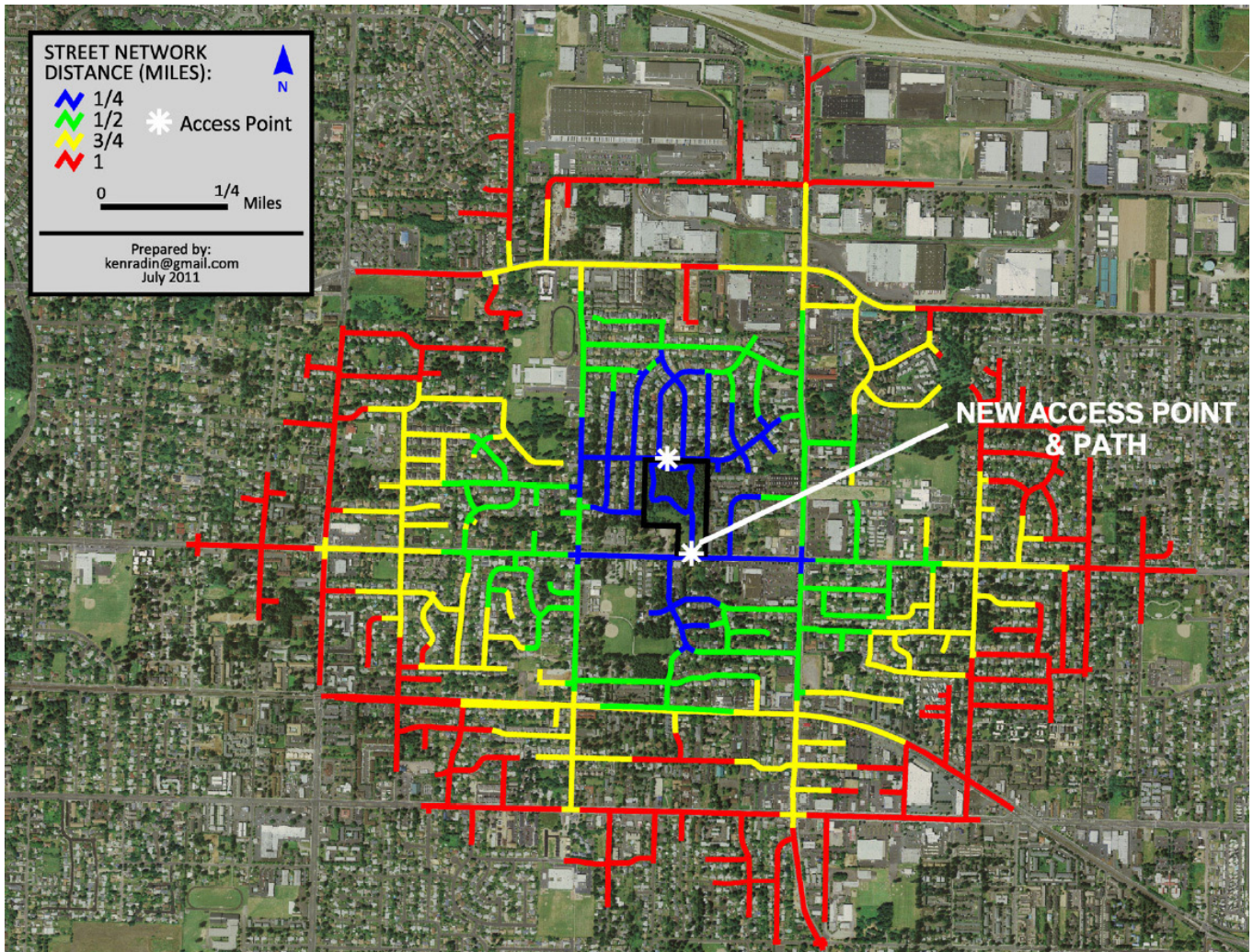
Introduction

The ability to assess the proximity of parks and green spaces and determine population service areas in a GIS (Geographic Information System) requires accurate access point data. Accurate access point data can be used to map nearest walking distances to a given greenspace along the walkable street or trail network. Nearest walking distances can be used to calculate greenspace service areas and the demographic characteristics of the population served. This information can in turn be used by local governments, community organizations, and residents to prioritize access improvements, especially for underserved populations (see map to right).

Most available access point data have been derived using a semi-automated process within a GIS by intersecting walkable street and trail network data with open space polygon data. While cheaper than field mapping, this approach is error prone. Field data collection is often more accurate and detailed but also more costly and labor intensive. However, new smart phone technologies that allow users to geo-locate using cell phone towers have reduced some of the costs of field data collection and created the opportunity to enlist local residents in field-based mapping of access points and assessment of open space access in their communities.

The Audubon Society of Portland and PSU Capstone students developed the Greenspace Access Point Field Mapping Protocol during the summer of 2013. The protocol was developed as a tool for a community-based approach to inventorying open space access points and to generate more accurate information on open space access in the Portland-Metro region.





Walking distances from park access points can be used to define service areas and determine populations served.



What Is EpiCollect?

EpiCollect is a technology-based data collection and geographic location tagging tool developed by the Imperial College of London for use by field researchers. It allows the data collector to use cell phones, tablets and other electronic devices to take notes and pictures, and capture GPS coordinates. Data can be collected remotely and then later synchronized to an online server accessible to researchers. Data are grouped together by project, which allows a wider audience than just field researchers to track data collection, map data patterns, and see a project's progress in real time.

The software can be adapted to a wide variety of projects: wildlife and plant surveys and public health surveys are a few common uses for this versatile software. A quick and efficient way of collecting GPS-based data in the field, EpiCollect can also be used for personal projects. It's free, easy to use, and is available for most platforms via iTunes or Google Play.

One of the key features of EpiCollect is the ability to collect data to a local device and then upload them at a later time. You don't have to be in within cell phone service or connected to wi-fi to collect data. This manual offers a general explanation of how to install the EpiCollect application, as well as how specifically to use EpiCollect for the greenspace access point mapping project developed by Portland State University and Portland's Audubon Society. The EpiCollect website has an excellent tutorial for those interested in creating other projects for organizational or personal use. Please see *www.epicollect.net* for further details.

As this data-collection tool is a project-based application, the unique web interface allows anyone in possession of the unique project URL and interest in the data to view entries online. Data can also be viewed and sorted in Google Earth and/or Google Maps.

Epicollect is available for a wide range of Android and Apple devices and platforms. A list of the verified and tested devices can be found at: <http://www.epicollect.net/instructions/handsets.html>. While this list is not exhaustive, our team has found that most devices will run the software with little or no problem. Please note; however, that screen images may differ on your device from those pictured in this manual. EpiCollect is a free application and can be downloaded and installed from either the Android Market (Google Play) or the Apple App Store.



Getting Started

In order to complete an access point assessment of a greenspace using EpiCollect, follow the steps below.

Step 1: Download the EpiCollect application for iPhone or Android

Step 2: Download your organization's EpiCollect GreenAccess form

Step 3: Learn How to Collect Green Space Access Points

Step 4: Review Field Data Collection Protocol and Tools

Step 5: Prepare and Satisfy Field Work Prep Requirements

Step 6: Collect Data in the Field

Step 7: Upload Data to Database(s) and Perform Data Analysis



EpiCollect for Android

When you open the EpiCollect app, you will see the screen at left.

Before you can do anything else, you will need to select a project.

To select a project, tap the menu button on your device.

This will give you the option to load a project or delete a project.

Loading a Project

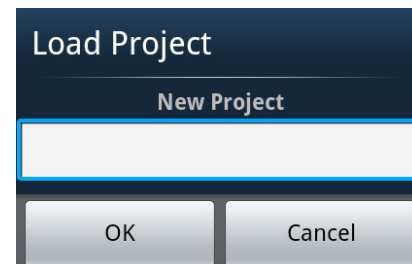
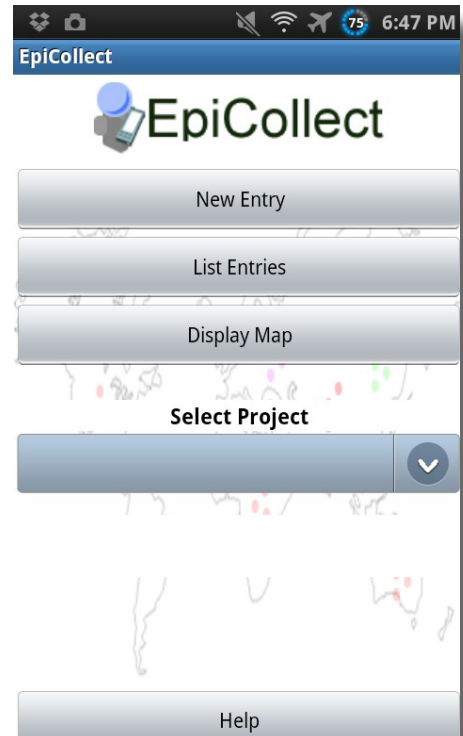
Select the “Load Project” option.

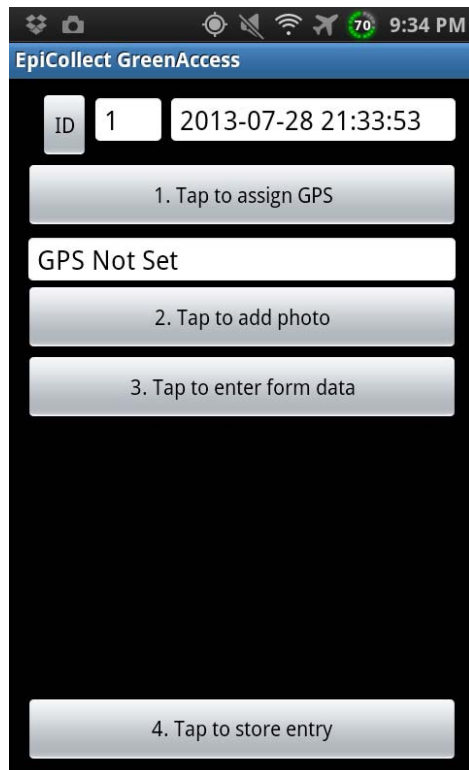
Enter in the name of the EpiCollect form that your organization is currently using. The name is case sensitive. Once you have entered the project name, select “OK.”

Note that now there is a name in the blue box under “Select Project.” If you load more than one project, and you want to switch projects, click the down arrow to open a menu where you can select the name of the project you would like to access.

Below the name of the selected project is the URL for the web site where the data you collect and sync can be found.

To create an entry, select the “New Entry” button.





Recording Location

Stand *exactly* at the access point you want to record and tap the “Tap to assign GPS” button. Recording the *precise locations* of access points is the primary goal of the GreenAccess project. *Be sure you are standing at the access point* when you assign the GPS coordinates in EpiCollect. Better accuracy in the field means better data, and conclusions, later!

Photographing Access Points

Once your coordinates are set, tap the “Tap to add photo” button. This will turn on your device’s camera. To take a photo, turn the device 90 degrees *counterclockwise*, as though you’re taking a picture of a landscape. The picture cannot be rotated after it has been taken; taking it in landscape mode now will prevent it from being turned sidewise later.

For GreenAccess, take the photo of the access point *facing in* toward the greenspace. If that’s not possible, then take the photo from inside the greenspace, facing out. If the photo is facing out, make a note of it by entering “Photo Out” in the Photo Notes entry field when entering data.

After taking a photo, don’t forget to select “Save.” Once saved, the photo will appear on the entry screen.

The next step is to enter the form data. Tap the “Tap to enter form data” button, and you will be taken to the GreenAccess form.



Entering Form Data

The first field on the form is the “Photo Notes” field, where you can make notes about the photo that you just took. If you took your photo from inside the greenspace, facing out, then this is where you would make a note of it by typing “photo out.”

Categorizing Access Points

The next field is the “Access Point Category,” where you are able to indicate whether the access point is formal access, open access, or informal access.

Formal Access is a path, gate, or an opening which has been intentionally created by the custodians of the greenspace in order to allow public entry.

Open Access is where a person may enter the greenspace unobstructed anywhere along an edge of a greenspace, such as where the grassy edge of a park meets the sidewalk.

The screenshot shows the EpiCollect GreenAccess mobile application interface. At the top, the status bar displays signal strength, 3G connectivity, battery level, and the time 12:51. The app title is "EpiCollect GreenAccess". The form consists of several sections:

- Photo Notes:** A text input field with a vertical cursor.
- Access Point Category:** Three radio button options: "Formal access", "Open access", and "Informal access".
- Pedestrian Access is Restricted:** A radio button option with "Yes" next to it.
- Accessible to Persons with Limited Mobility:** A radio button option with "Yes" next to it.
- Access Point Comments:** A text input field.
- Surveyor Name:** A text input field.
- Confirm:** A large button at the bottom of the form.

 The bottom of the screen shows standard Android navigation icons: back, home, recent apps, and a menu icon.

Formal Access



Open Access



Informal Access is a point where people have worn or broken through grass, bushes, fences, or other barriers which would otherwise prevent entry.

Informal Access



EpiCollect GreenAccess


ID 1 2013-07-28 21:33:53

1. GPS assigned - tap again to update

GPS Set - Accuracy 15.0m

2. Photo added - tap to change

3. Form data entered - tap to view or edit



4. Tap to store entry

Restricted Pedestrian Access

The next field is where you can indicate if an access point is not accessible to pedestrians. If an access point is blocked by a locked gate, temporary closure, or signage, then check “Yes” for this field. If the access point is open to pedestrians, but closed to bikes, cars, or other modes of transportation, do not check “Yes” for this field. For this project, we are concerned with pedestrian access.

Restricted Pedestrian Access



Accessibility to Persons with Limited Mobility

To assess whether an access point is accessible to persons with limited mobility, there are several factors that must be considered.

If the access point is level with the walkable street and trail network, is wide enough for a wheelchair to get through, and the surface is paved, then it is accessible.

If the access point is not level with the walkable street and trail network, then the access point must have a ramp or a curb cut to be considered accessible.

If the access point appears accessible to persons with limited mobility, then check “Yes” for this field.

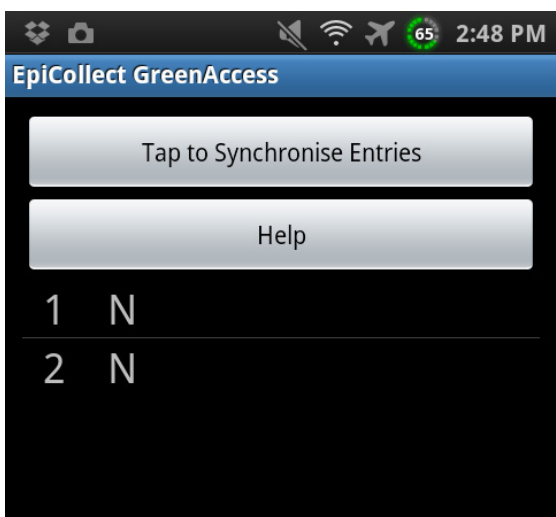
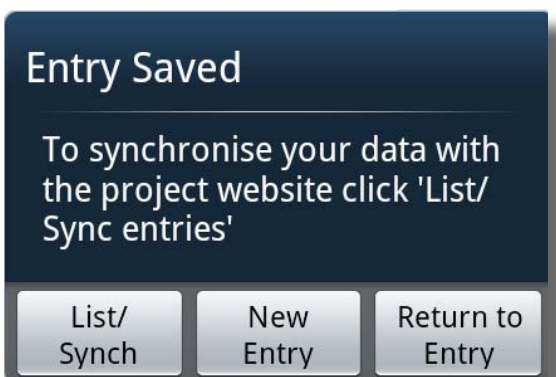
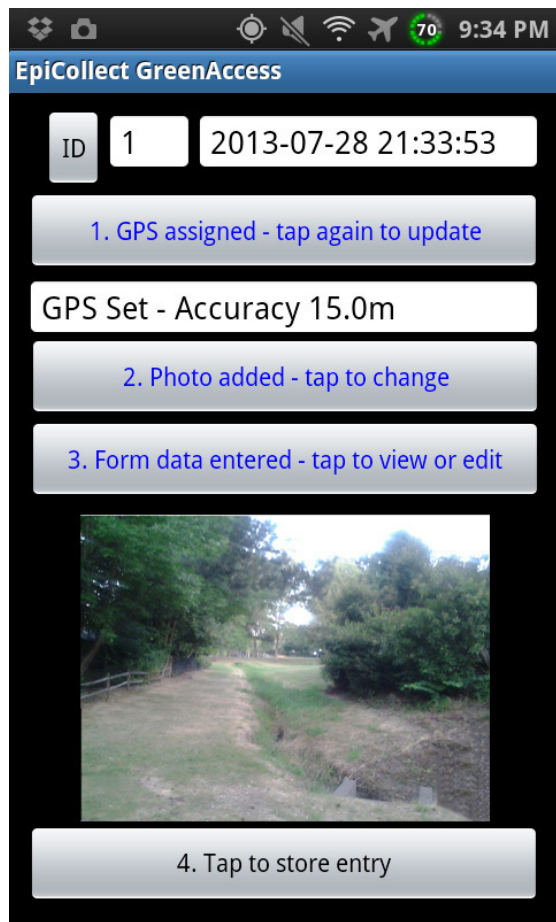
Additional Comments

Use the “Access Point Comments” field to note: 1) how pedestrian access is restricted, 2) how access is restricted for a person with limited mobility, 3) safety or security issues, 4) potential conflicts between recreational users, such as bikes and pedestrians, 5) potential impacts to environmentally sensitive areas, such as an informal trail through a nature preserve. Try to keep comments brief.

Surveyor Name

Enter your first and last name under “Surveyor Name.” You need only to do this at the first access point you record. For other access points you record on the same day, leave this field blank.





Saving the Entry

Once you have entered all of the form data, select “confirm.” You will be taken back to the entry screen, which will now look like this:

Now, you should tap the “Tap to store entry” button. Once you do that, the “Entry Saved” window will appear:

Editing Your Entry

If you want to go back and look at or edit the entry you just made, select “Return to Entry.”

Making a New Entry

To log another access point, select “New Entry.” You will be taken to a new entry screen, where you can begin recording the next access point.

Listing and Synchronizing Your Entries

To look at all or your entries, or to synch your entries, select “List/Synch.” When you select “List/Synch,” you will be taken to this screen.

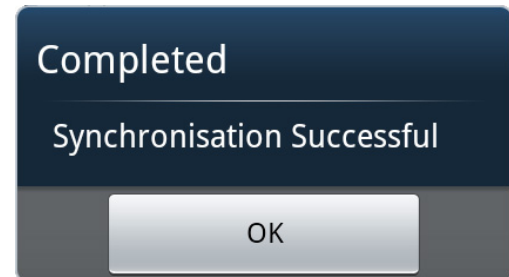
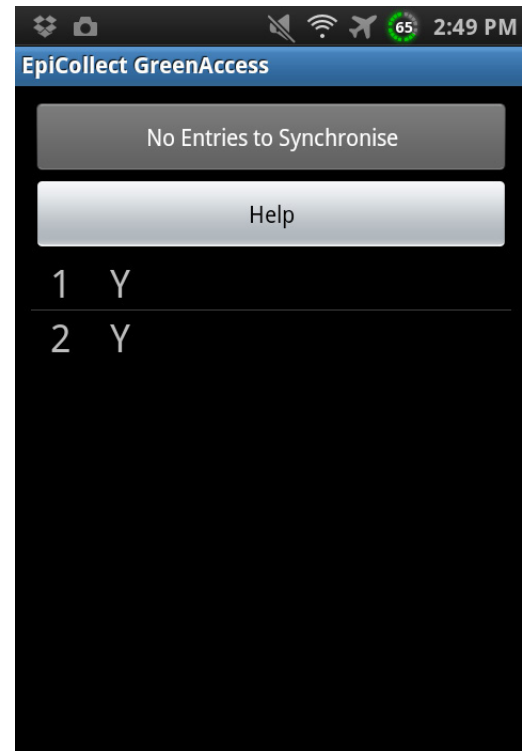
Entries which have not been synchronized will have an “N” next to them. If you want to look at or edit an entry that has not been synchronized, tap the entry.



Once you have synchronized your entries, you will not be able to edit them. Your organization will be able to edit entries via the EpiCollect website; if there is something you think needs to be changed, contact your project administrator.

To synchronize your entries, select the “Tap to Synchronise Entries” button. If synchronization is successful, entries that have been synchronized will have a “Y” next to them.

Once you have synchronized your entries, you can view them at: <http://epicollectserver.appspot.com/project.html?name=GreenAccess>





EpiCollect for iPhone

Loading a Project

When you open the EpiCollect app, you will see a screen that looks like the screen at left.

Before you can do anything else, you will need to load a project. To load a project, open the “Settings” menu.

Tap the box under “User Email” and enter your e-mail address.

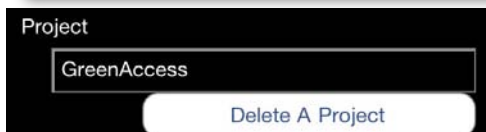
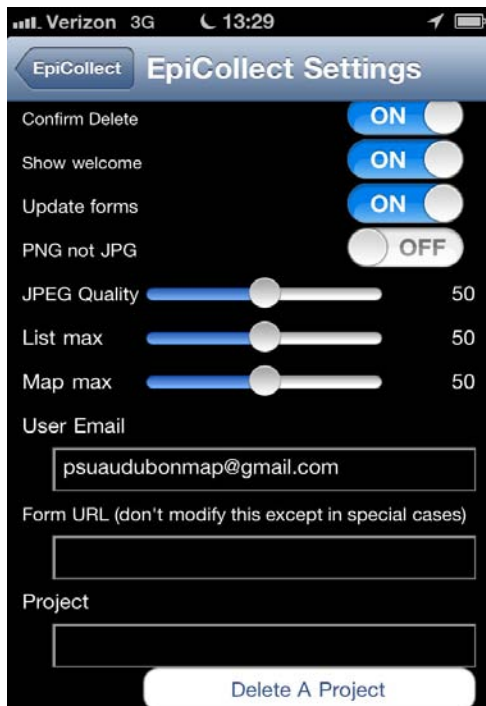
Tap the box under the word “Project” to select a project. This window will open:

Select new, and enter in the name of the GreenAccess form that your organization is currently using. The form name is case sensitive.

Select “OK” to download the project form. When downloaded, the Form URL will appear in the box above the project name.

Once the form is downloaded, you will be notified that the download is complete. Select “OK”.

Now, press the EpiCollect button at the top of the settings screen to return to the main screen.



EpiCollect



Making an Entry

To make an entry, open the “New Entry” menu.

Recording the Location

On this form, you will first see the entry time, and the entry status.

Below that, you will see your location, in latitude and longitude.

Stand *exactly* at the access point, then tap the “Tap to use your current location” button to record your current location as the location of the access point. Recording the *precise locations* of access points is the primary goal of the GreenAccess project. *Be sure you are standing at the access point* when you assign the GPS coordinates in EpiCollect. Better accuracy in the field means better data, and conclusions, later!

Photographing Access Points

Once your coordinates are set, tap the camera button at the bottom of your screen. This will turn on your device’s camera.

To take a photo, turn the device 90 degrees *counterclockwise*, as though you’re taking a picture of a landscape. The picture cannot be rotated after it has been taken; taking it in landscape mode now will prevent it from being turned sidewise later.

For GreenAccess, take the photo of the access point *facing in* toward the greenspace. If that’s not possible, then take the photo from inside the greenspace, facing out. If the photo is facing out, make a note of it by entering “Photo Out” in the Photo Notes entry field when entering data.



Verizon 14:11

EpiCollect **New Entry**

Entry Time Jul 30, 2013, 14:11:47

Entry Status New

Location lat 45.511987, long -122.647841

Tap to use your current location

Photo

Photo Notes

Access Point Category

Formal access

Informal access

Open access

Pedestrian Access is Restricted

Yes

Accessible to Persons with Limited Mobility

Yes

Access Point Comments

Surveyor Name

Save

Making an Entry

The “Photo Notes” field is where you can make notes about the photo that you just took. If you took your photo from inside the greenspace, facing out, then this is where you would make a note of it by typing “photo out.”

Categorizing Access Points

The next field is the “Access Point Category.” Here is where you indicate whether the access point is a formal access point, open access, or informal access.

Formal Access is like a path, a gate, or an opening which has been created by the custodians of the greenspace in order to allow entry.

Formal Access



Open Access is where a person may enter the greenspace unobstructed anywhere along an edge of a greenspace. An example of this kind of access point is where the grass of a park meets the sidewalk.

Open Access



Informal Access is a point where people have worn through or broken through grass, bushes, fences, or other barriers which would otherwise prevent entry.

Informal Access



Restricted Pedestrian Access

The next field is where you can indicate if an access point is not accessible to pedestrians. If an access point is blocked by a locked gate, temporary closure, or signage, then check “Yes” for this field. If the access point is open to pedestrians, but closed to bikes, cars, or other modes of transportation, do not check “Yes” for this field. For this project, we are concerned with pedestrian access.

Restricted Pedestrian Access





Accessibility to Persons with Limited Mobility

To assess whether an access point is accessible to persons with limited mobility, there are several factors that must be considered.

If the access point is level with the walkable street and trail network, is wide enough for a wheelchair to get through, and the surface is paved, then it is accessible.

If the access point is not level with the walkable street and trail network, then the access point must have a ramp or a curb cut to be considered accessible.

If the access point appears accessible to persons with limited mobility, then check “Yes” for this field.

Additional Comments

Use the “Access Point Comments” field to note 1) how pedestrian access is restricted, 2) how access is restricted for a person with limited mobility, 3) safety or security issues, 4) potential conflicts between recreational users, such as bikes and pedestrians, 5) potential impacts to environmentally sensitive areas, such as an informal trail through a nature preserve. Try to keep comments brief.

Surveyor Name

Enter your first and last name under “Surveyor Name.” You need only to do this at the first access point you record. For other access points you record on the same day, leave this field blank.

 A screenshot of a mobile application interface. At the top, it says "Access Point Comments". Below that is a large grey rectangular text input field. Underneath the text field is a label "Surveyor Name" followed by a smaller rectangular text input field. At the bottom of the screen, there is a blue bar containing three icons: a trash can, a camera, and a blue button labeled "Save".


Saving, Listing and Syncing Entries

Saving Your Entry

Once you have entered all of the form data, tap the “save” button at the bottom of your screen.

Listing/Syncing Your Entries

To list, edit, and sync your entries, go back to the main EpiCollect screen.

Tap the “List Entries” button. You will be taken to the entries screen.

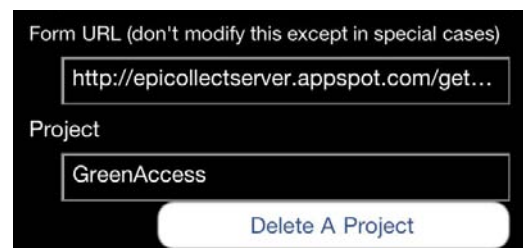
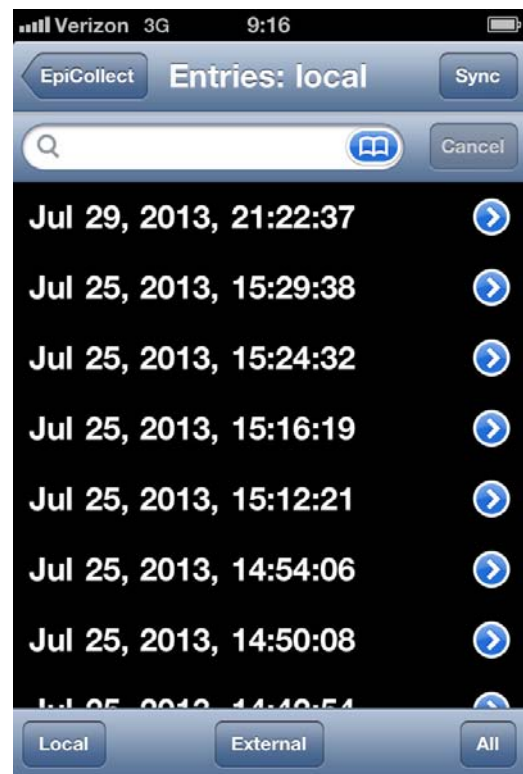
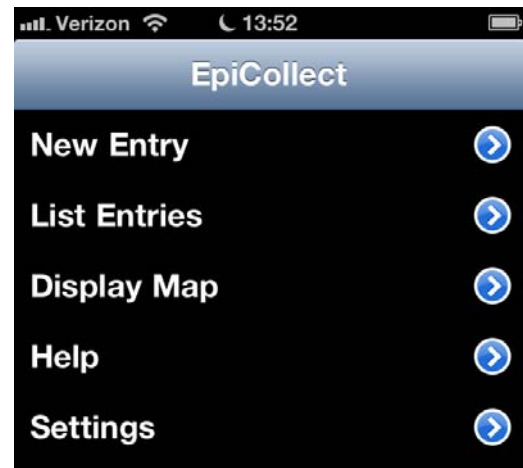
Editing Past Entries

To edit a past entry, tap that entry to go to the data form for that entry. Once you have synced your entries, you will not be able to edit them from your device. If you believe that an entry that has already been synced needs to be changed, contact your project administrator, so that the entry can be changed on the website.

Synchronizing Your Entries

Entries which have not been synchronized will have text below them telling you that they have not been synchronized. To synchronize your entries, tap the “Sync” button. If synchronization is successful, the heading at the top of the screen will say “Sync complete,” and there will no longer be any text below the entries.

Once you have synchronized your entries, you can view them at: <http://epicollectserver.appspot.com/project.html?name=GreenAccess>



In the Field

Once you've downloaded your organization's EpiCollect project, it is important to review the following:

- A copy of this training manual
- A satellite map of greenspace geographical features
- A GoogleMaps street network map
- The Field Cheat Sheet
- The Field Guide Checklist
- The project database on EpiCollect's website

Please carefully consider this manual prior to collecting data, and be sure to contact your project administrator if you have any questions. In the Appendices, you will find a Field Cheat Sheet and a Field Guide Checklist.

Plan Your Route

Before you set out on your green space survey, plan your route and time with your survey partner. It is advisable that volunteers to take on consistent roles for the duration of the survey. Volunteers should initiate their survey at a corner of the assigned green space and proceed around its perimeters by walking in a clockwise direction, which reduces the risk of data duplication. A phone-based mapping application – such as Google Maps – can help you navigate the street network surrounding the greenspace. An aerial map as found on Google Earth, Google Maps, or Bing can provide you with additional geographic or topographic landmarks that can be useful in survey time management and to orientate possible access points.

The organization's staff, especially in cases of unofficial greenspace surveys, may provide maps for you. Maps of official parks and natural areas can be found by conducting a web search on such Internet engines as Google and Bing.

Using Maps

Satellite and street network maps will assist you in your assessment of the location of access points that connect a green space to the street network. Once you've planned



your route, you will survey the perimeter of a designated green space. Moving in a clockwise direction, pay attention to where and how streets, paths, trails, or other pedestrian thoroughfares connect with the green space. Some greenspaces do not have many intersecting streets or formal access points, so it is important to carefully observe where pedestrians can walk into a greenspace from the street network.

Pre-Survey Check List

After you've read and considered this manual, you are ready to go into the field and begin your survey. In the field, you'll need these materials:

- A smartphone (iPhone or Android) with Epicollect's GreenAccess form
- The Field Cheat Sheet
- The Field Guide Checklist
- Aerial and satellite maps of the greenspace
- A binder or folder to keep maps and materials organized
- A time tracking device
- Weather appropriate clothing, comfortable footwear, and a bottle of water/snacks



GreenAccess Field Guide Checklist

Pre-Survey

- Download Epicollect application onto iPhone or Android smartphone
- Download your organization's EpiCollect GreenAccess form onto smartphone
- Read "A Guide to Mapping Green Spaces"
- Prepare two maps of green space area: satellite and street network map
- Plan route with time and green space area in mind
- Obtain Field Cheat Sheet
- Obtain a binder or folder for material/map organization
- Obtain a time tracking device
- Remember weather-appropriate clothing, comfortable footwear, and water/snacks

Conducting the Survey

- Begin survey at green space site corner
- Begin to track the time
- Walk along site perimeters in clockwise direction
- Reference maps for street and landmark guidance
- Once your team has identified an access point, enter data onto the EpiCollect form

Survey Entries

- Tap for GPS location
- Take photo of access point
- Provide any necessary photo notes
- Select one access point category
- If applicable, select Yes if point is Pedestrian Restricted
- If applicable, select Yes if point is accessible to Persons with Limited Mobility
- Provide additional comments, if necessary
- Provide one daily entry of surveyor's last name
- Synchronize data entries post day's surveys

Post-Survey

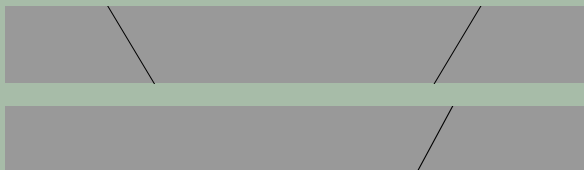
- Upload data entries onto Google Maps, Google Earth and ArcGIS



GreenAccess Field Guide

1. LOCATION

Stand at the access point and tap location bar to get current GPS Location.



2. TAKE A PHOTO

Turn device 90 degrees counter clockwise.



3. PHOTO NOTES

Note if you take the photo facing out of the greenspace and type “photo out” in the Photo Notes text field.

4. ACCESS CATEGORY

Select only one category to describe...

Formal access



Informal access



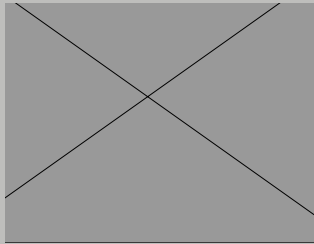
Open access



5. PEDESTRIAN ACCESS RESTRICTED

Select Yes if access is prohibited by...

- Locked gate



- Temporary closure



- Signage



6. ACCESSIBILITY

Select “Yes” if a ramp or curb cut allows those with limited mobility access.



7. ACCESS POINT COMMENTS

- How pedestrian access is restricted
- How access for people with limited mobility is restricted
- Safety/security issues
- Conflicts between users, such as cyclists and pedestrians
- Impacts to environmentally sensitive areas, such as an informal trail through a nature preserve

8. SURVEYOR NAME

Enter your full name on the first form you fill out, then skip this field for the remainder of the day.

9. SAVE ENTRIES

10. SYNC ENTRIES



Post-Collection GIS Data Analysis

After field data collection is complete, you will want to transfer the data to a usable GIS format. The instructions below describe how to export the data from an online EpiCollect project to Google Maps or ArcGIS.

Load Points in Google Earth

- Go to project page
< <http://epicollectserver.appspot.com/project.html?name=GreenAccess>>
- Click Show Map
- Above the map click Google Earth
- Click where it says “Click here (or the icon) to view data in Google Earth” to download the .kml file which can then be opened by clicking (or double clicking) the file
- Ignore the Access the KML Feed option unless you need to see the points being added in near real-time

CSV to ArcMap

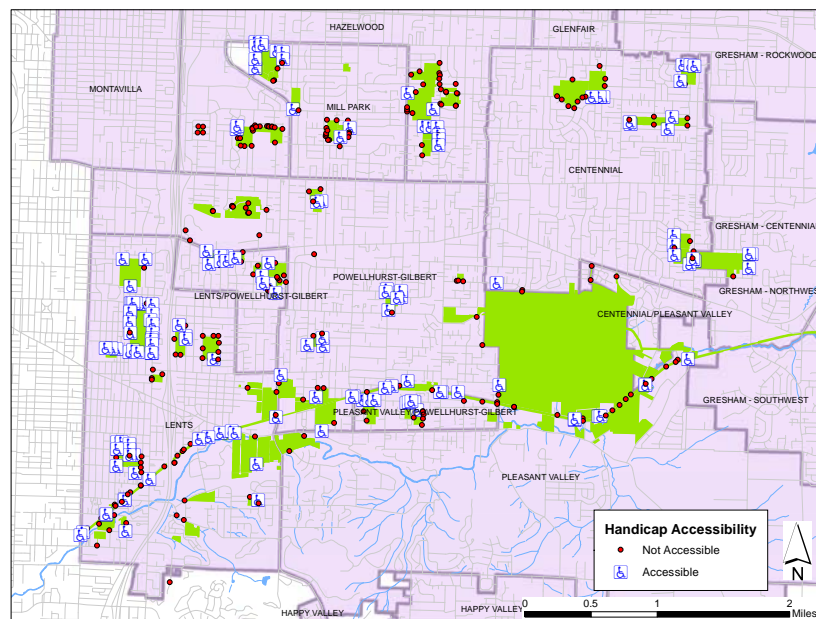
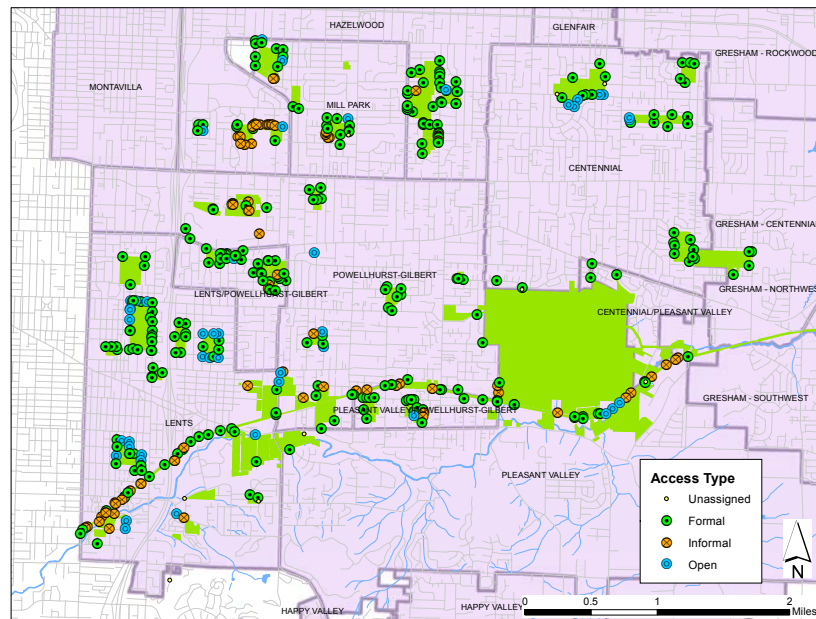
- Download CSV from EpiCollect project page data
- Rename file with appropriate title
- Add CSV file to your map
- Right-click on its name and click on “Display XY Data”
- “X Field” should default to “longitude” and “Y Field” should default to “latitude”
“Z Field” should be changed from “<None>” to altitude. Coordinate system defaults to State Plane Oregon North
- Click the “Edit” button and choose “Geographic Coordinate Systems” WGS 1984
Click OK, then OK again to plot your points
- On the Table of Contents, select the “List by Drawing Order” option
- Right click on the layer you have created and choose Data->Export. This will create a new shapefile
- Add the new layer to the map and remove the CSV file

Important Notes

In order to reduce problems with projections it is recommended that you first load data in the projection you will be working in the most. For most applications in the state of Oregon this would mean loading a shapefile from RLIS to ensure that NAD_1983_HARN_StatePlane_Oregon_North_FIPS_3601_Feet_Intl is used.



At the time this guide was written, the tool included with ArcMap 10.1 to convert KMZ files to Layers was found to be unsatisfactory as attribute data would be lost. Various other tools purporting to convert KMZ to SHP were evaluated and found to be deficient as well. Should the quality of these tools improve in the future, it would be appropriate to reconsider using the KMZ files in ArcMap rather than the CSV files as described here.



Maps illustrate access points collected using EpiCollect in ArcGIS with select attributes.



EpiCollect Project Administration

EpiCollect administration can only be performed by the administrator account which set up the project. This section describes the additional functionality that is added when the user is logged into this account using the EpiCollect login interface.

Project Administration

- Ability to Create/Edit Project Form
- Ability to Update Homepage description and picture

View Data

- Ability to Add Entry, Edit Entry, or Remove Entry

To login as administrator, perform the following steps:

1. Navigate to the EpiCollect Project website.
 - a. Use the standard navigation link:
`www.epicollect.net/project.html?name={Replace_with_ProjectName}`
2. On the project website click on 'Login' at the bottom on the website
 - a. Login using the Project Owner gmail account with password
 - b. Select and allow the development server access to the Google account.

This presents the Project Administration section, which contains the following options:

Create or Edit Project Form

This function will allow the administrator to change the survey form that was created for the project.

Update Homepage Description and Picture

This function will allow the administrator to change the project homepage description and picture/icon. The website homepage is what the visitor/user sees upfront.

Change/Edit Project Form

Caution: Make sure that all volunteers have synced their data prior to making changes to the form. When making changes to an active project, unintended consequences or data loss may result.

1. Click on 'Create or Edit Project Form'
2. This will bring up the Form Builder interface. This is a Drag and drop interface.



Instructions on the Form Elements, Form (preview), and Form Details can be found at www.epicollect.net/instructions/FormBuilder.html

3. Change the form as desired.
4. To save the current form click on 'Finished – Save Form!' button
5. To discard the form changes and return to the Home menu click on the 'Back to project home' icon at the top left of the screen.
6. **Note:** All changes will be discarded and not saved.

Change Homepage Description and/or Homepage Image

1. Click on 'Update Homepage description and picture'
2. This will bring up the current description a prompt for a new description along with the current picture. This page will also give the option to upload the a project image or to simply remove the current image.
3. To make changes: Click the 'Save Changes' button. To discard changes: Click the 'Revert to saved version' button.

EpiCollect Administration also allows for the data to be added, edited or removed from the tables. This ability is granted only to the Project Administrator/Owner. This is an additional menu item line in the Browse Project Data within View Data section.

Edit, Add, or Remove Data

1. Click on the 'Browse Project Data' within the 'View Data' section
2. This will bring up the standard Database Entries interface.

To Add an Entry

Click on the Add Entry menu item on the web page.

You'll be presented with a pop-up Add/Edit entry page. This will allow you to enter the entry details, entry image and location. Follow the prompts as presented and click on 'Save' to save the data or 'Cancel' to close the pop-up.

To Edit an Entry

Highlight the entry and Click on the Edit Entry menu item on the web page.

You'll be presented with a popup Add/edit entry page. This will allow you to change the entry details, entry image and Location. Follow the prompts as presented and click on 'Save' to save the data or 'Cancel' to close the popup.

To Remove an Entry

Highlight the Entry and Click on the Remove Entry menu item on the web page. This will remove the highlighted entry from the database. Please note the action is permanent.



PRODUCED BY
James Bryant
Mark Cordell
Garry Deihl
Abel Gebrezgi
Tamara Layden
Thomas Arenas Marshall
Kathryn Newman
Amy Pitts-Lore
Leah Sobieck

DESIGNED AND EDITED BY
Amy Pitts-Lore

IN ASSOCIATION WITH
Jim Labbe, Audubon Society of Portland
Meg Merrick, Ph.D., Institute of Portland Metropolitan Studies, PSU
August 2013

*Special thanks to Josh Darling from Portland Parks & Recreation
for helping with base data and project development.*

