

GPS, Data Collection, and Data Management

Tina Mudd
Noxious Weed Programs
Coordinator
775-353-3670
tmudd@agri.nv.gov

Jamie Greer
Noxious Weed Programs Assistant
Coordinator
775-353-3640
jgreer@agri.nv.gov



Nevada Department of Agriculture
405 S. 21st Street
Sparks, NV 89431



What is GPS?

- The Global Positioning System (GPS)
- 24 satellite-based navigation system
- Satellites circle the Earth twice a day and transmit signal information to Earth.
- GPS receivers use triangulation to calculate the user's exact location from the transmitted signals.



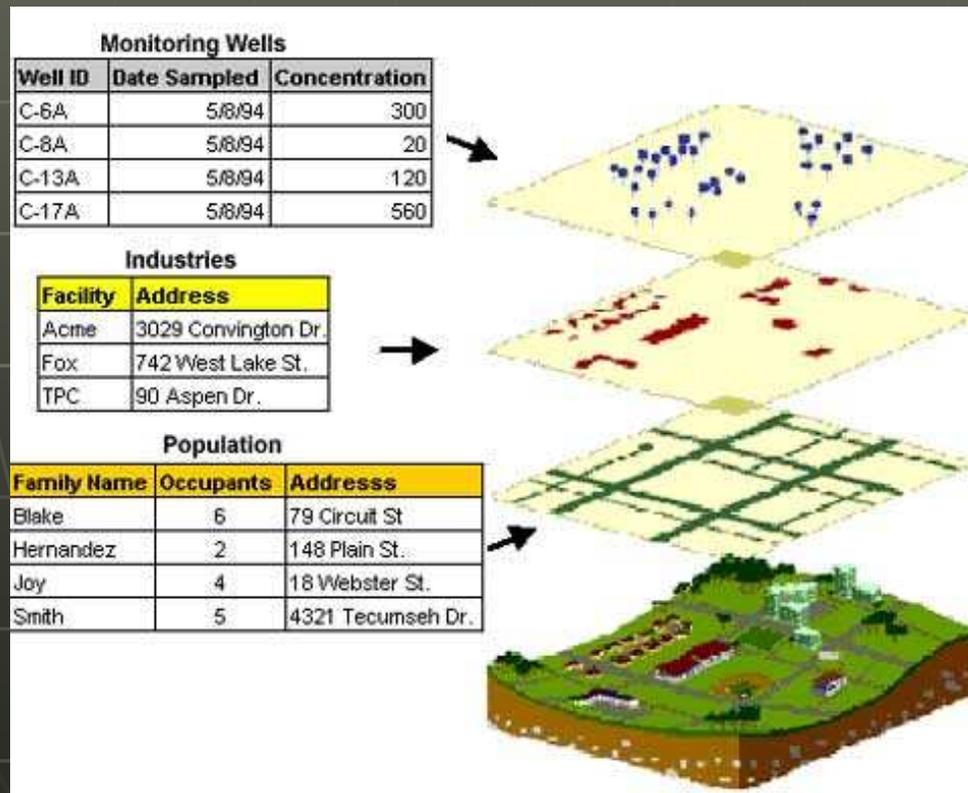
Why use GPS?

- Collect data on the fly!
- Develop multi-year data systems for tracking and monitoring field work
- Create maps and visually show areas of interest and work progress
- Know exactly where you are and where you have been



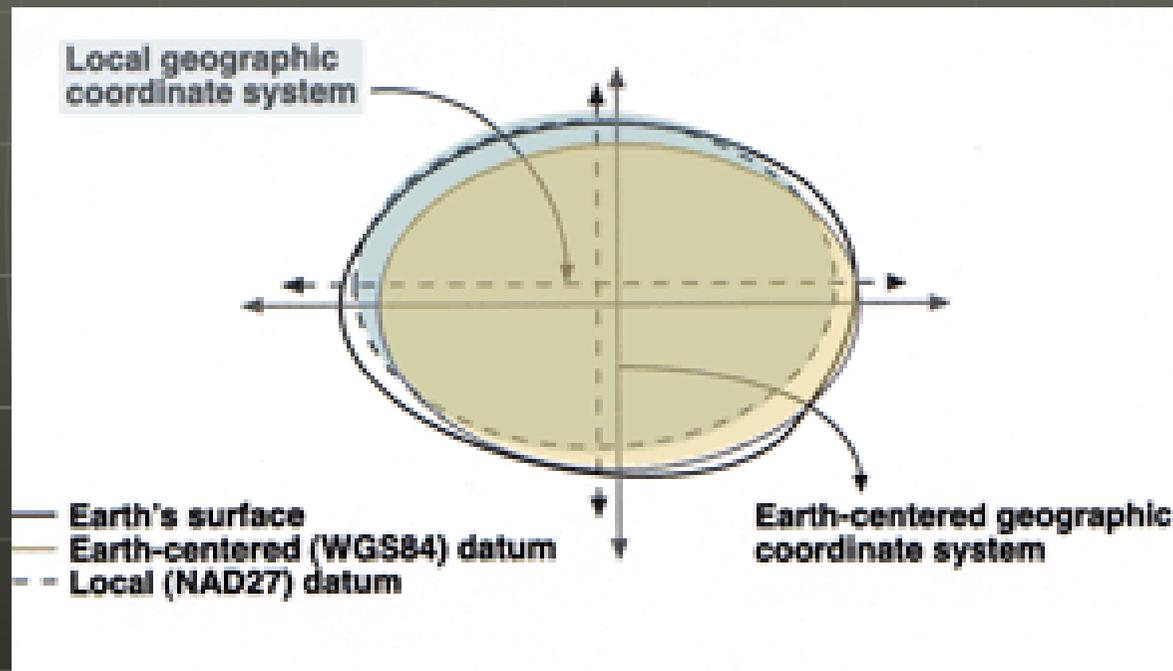
GPS RELATED TERMS:

- GIS: Geographical Information System that uses computer software to compile, manipulate, analyze and display data to positions on the Earth's surface. GPS data is added to GIS systems to make maps!



GPS RELATED TERMS:

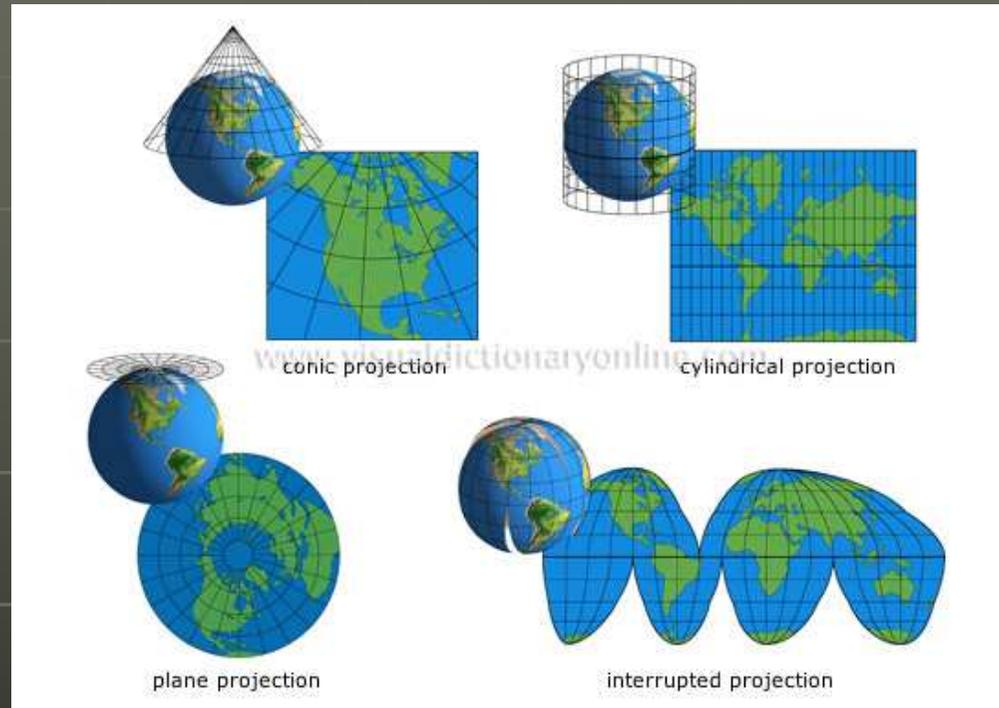
- Geographic Coordinate System: uses the Earth as a spheroid to pin point location based on latitude and longitude. You must specify your coordinate system you want to collect your data in using your GPS unit.



- Datum: defines the position of the spheroid relative to the center of the earth (examples = NAD27, NAD83, WGS84)

GPS RELATED TERMS:

- Projection: method of representing the surface of a sphere on a plane. (examples = planar, cylindrical, equidistant)



- You must specify the coordinate system, datum, and projection you use to collect your data. If not your data may not be able to be displayed on a map through GIS software.
- The Nevada Department of Agriculture asks that you use: decimal degrees and NAD83!

GPS UNITS

“Mapping” Units



- Trimble and Leica brands
- <math>< 5\text{ m}</math> accuracy
- \$2500 - \$7500
- capability to store more data in a data dictionary
- larger units

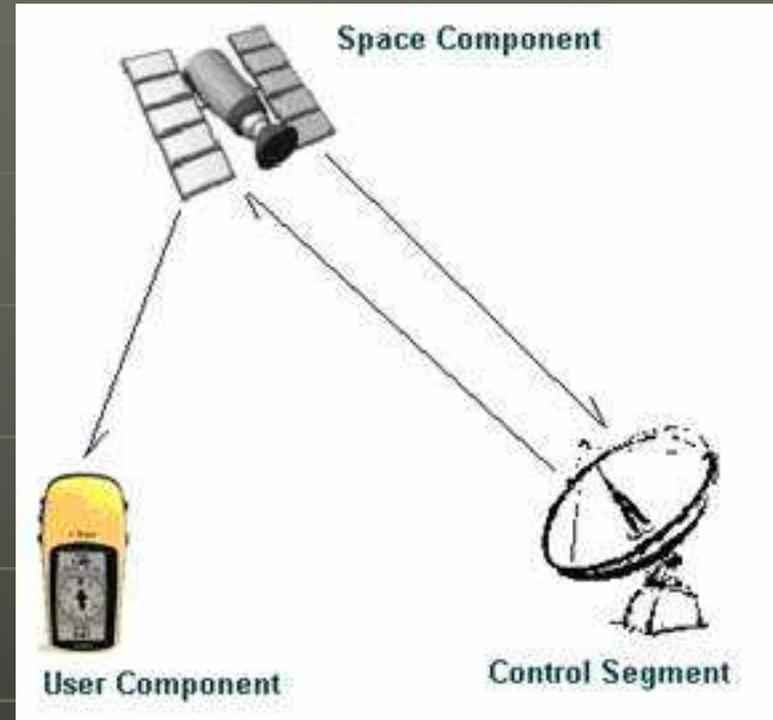
“Recreational” Units



- Garmin and Magellan brands
- about 15 m accuracy and <math>< 3\text{ m}</math> accuracy with WAAS
- \$200 - \$1000
- capability to store metadata as comments
- small handheld units

GPS ACCURACY

- GPS units must “see” 3 satellites to calculate a 2D position. With 4+ satellites 3D position is calculated.
- MORE SATELLITES = MORE ACCURACY
- On average, Garmin GPS Units are accurate to within 15 meters.
- GPS receivers with WASS (Wide Area Augmentation System) have accuracy < 3 m



* Accuracy will decrease if there are objects that block the signals from being transmitted *

Mapping Protocols

- The Nevada Weed Mapping Standards and the Lake Tahoe Basin Weed Coordinating Group Mapping Protocol serve as guides to what you need in order to provide good, useful data.



* Make sure at a minimum you record on data collection sheets the following:

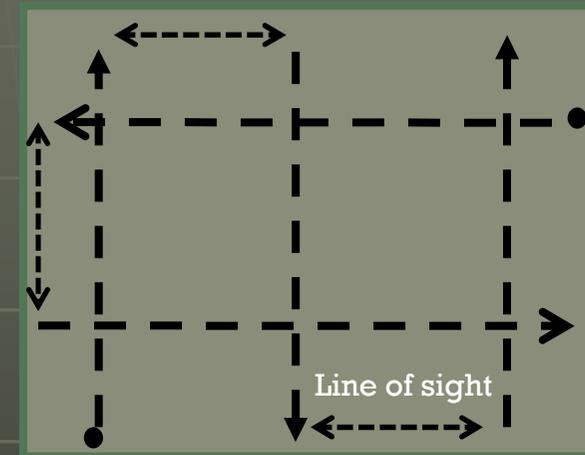
- Date
- Plant Common Name
- Plant Code
- Latitude & Longitude
- Size of infestation
- Plant Density

Data Collection Techniques: Surveying and Monitoring Methods

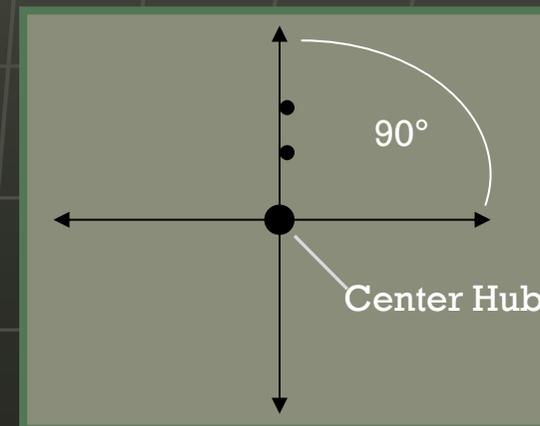
**IMPORTANT TO USE BOTH GPS
AND DATA COLLECTION SHEETS!**



Grid Surveying



Transect Line Data Collection/ Monitoring



Data Collection Techniques: Using GPS

TRACKS – Use to trace the path of your work or to outline a larger area. Tracks your location based on specified intervals.

- Useful when you are doing work such as spraying to know the area you traveled while applying chemicals

WAYPOINTS – use for single plants or infestations less than 20' x 20'. Marks your location with a single point.

- Easy to use when surveying large area and you come across new small infestations.

AREA CALCULATION – Use to calculate an area when an infestation is larger than 20' X 20'.

- Valuable in order to get the specific infestation size and to track the infestations size through time.

Garmin Oregon GPS Data Collection

1. When collecting data bring your GPS unit, data collection sheet, and field materials needed.
2. When you get to your location turn on your GPS unit for it to accumulate satellite connections

FIRST SCREEN



Battery Power

Always bring an extra set while in the field

Strength of Satellite Reception

If they are orange the GPS unit is not getting reception to the satellites. Press the bars to see specific satellite connections and accuracy of the GPS unit

Main Menu Navigation

Use arrows to navigate to needed tools

Garmin Oregon GPS Data Collection: PRIMARY GPS SET UP

* Before collection make sure the GPS is in the correct format

STEP 1:

On Main Screen scroll to and press SET UP



STEP 2:

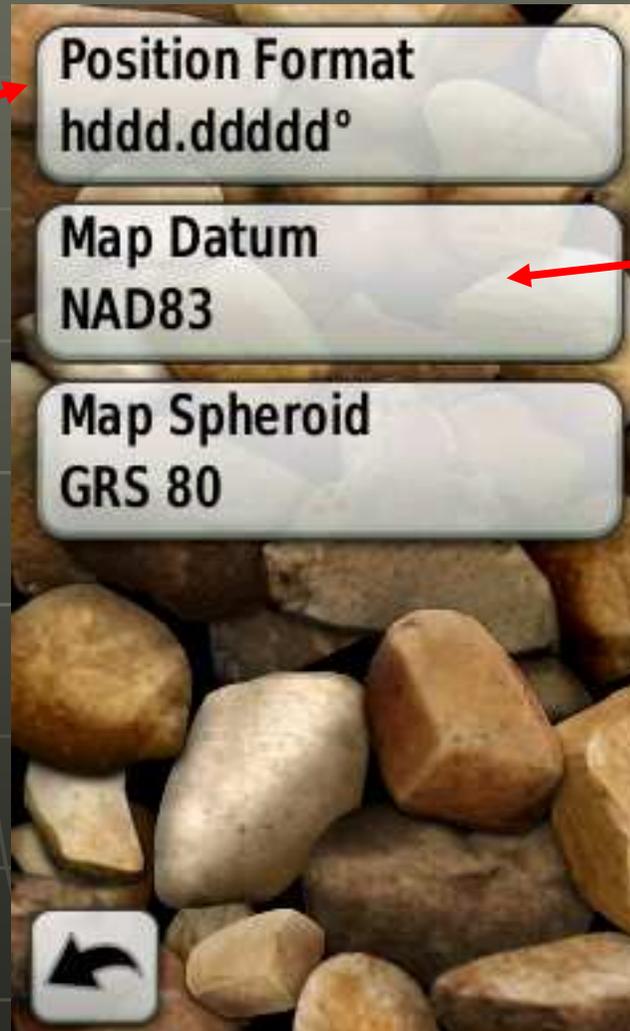
Scroll and press the POSITION FORMAT ICON



Garmin Oregon GPS Data Collection: PRIMARY GPS SET UP

STEP 3:

Specify the **coordinate system** that you want to collect your data with. (Decimal Degrees is recommended)



STEP 4:

Specify the **datum** that you will collect your data in (NAD83 is recommended)

Garmin Oregon GPS Data Collection: PRIMARY GPS SET UP

STEP 5: Go back to main menu and press SET UP again

STEP 6:
Press the
SYSTEM
icon



STEP 7:
Press "GPS"
and select
the WAAS
mode. If not
enough
satellites are
available the
GPS will
automatically
go to DEMO
MODE

Garmin Oregon GPS Data Collection: USE OF TRACKS

- Records location and paths on specified intervals
- Uploads as polygons or lines in GIS mapping software



STEP 1:

On Main
Screen
scroll to
and
press
SET UP



Garmin Oregon GPS Data Collection: USE OF TRACKS

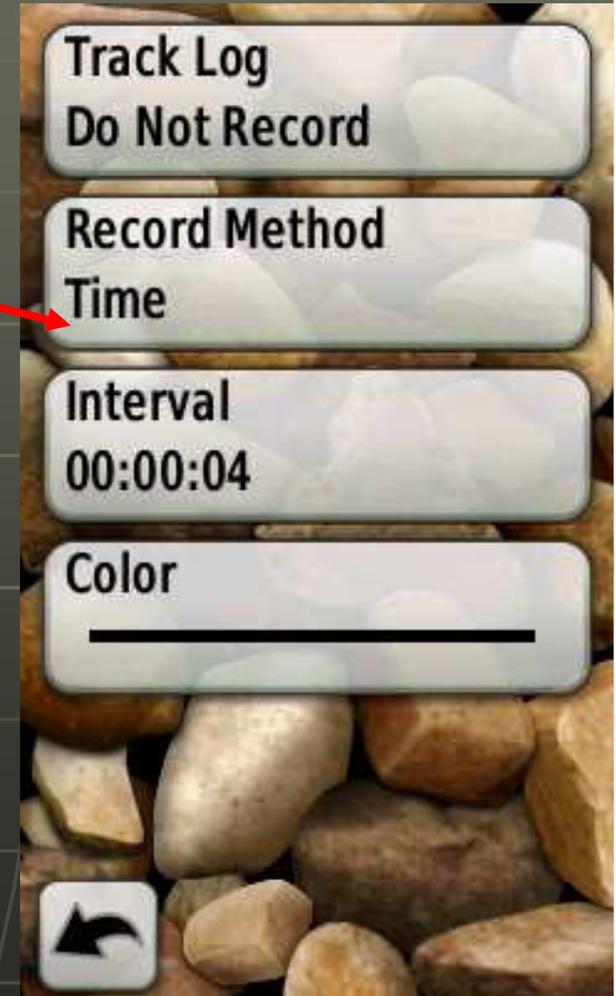
STEP 2:

Press the
TRACKS
button



STEP 3:

Press
Record
Method



Garmin Oregon GPS Data Collection: USE OF TRACKS

STEP 4:

- Set the track recording method. If doing on the ground field work, time is recommended. Press time to set tracks to record by time.



STEP 5:

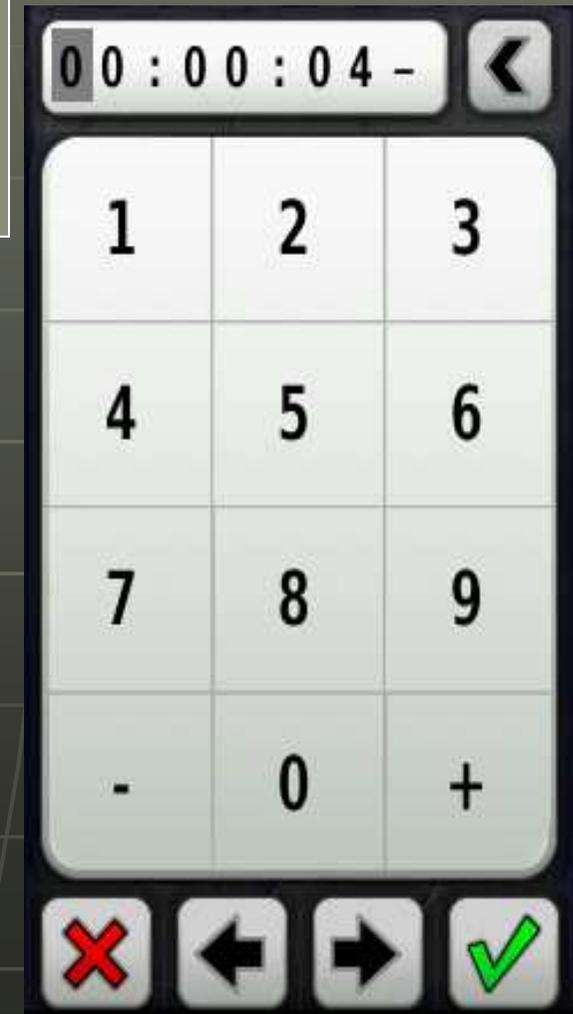
- Press **Interval** to set your time interval according to your collection methods.



Garmin Oregon GPS Data Collection: USE OF TRACKS

General Track Recording Time Intervals:

- Helicopter = 2 sec.
- Car or ATV = 5 sec.
- Walking = 8 seconds



Garmin Oregon GPS Data Collection: USE OF TRACKS

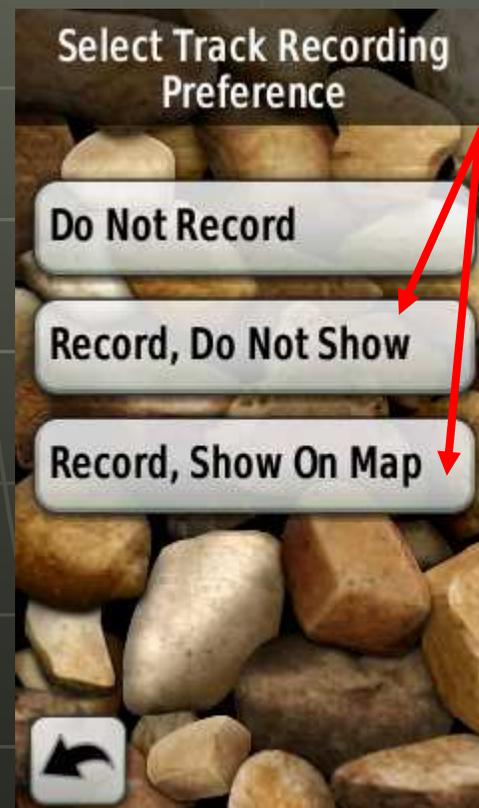
STEP 6:

Turn on tracks to record by pressing "Track Log"



STEP 7:

Press either of the "Record..." icons. Tracks will begin recording.



STEP 8:

Once done with track go back to track log and select "DO NOT RECORD" tracks will save by date.

Garmin Oregon GPS Data Collection: USE OF TRACKS

To view track, change name, or look at old tracks go to
"Track Manager" from main menu screen.



Garmin Oregon GPS Data Collection: USE OF WAYPOINTS

- A single point location normally used for infestations less than 20' x 20'. Comments can be recorded with corresponding waypoints in your GPS.
- You can collect waypoints while tracks are recording!



Garmin Oregon GPS Data Collection: USE OF WAYPOINTS

MARK AND RECORD YOUR WAYPOINT

STEP 1:
Press the
MARK
WAYPOINT
ICON on
the main
menu



Your current location
was successfully marked
as waypoint

009

Save

Save and Edit

STEP 2:
Save waypoint
or press SAVE
AND EDIT to
specify name
and add
comments to
your waypoint



Garmin Oregon GPS Data Collection: USE OF WAYPOINTS

MARK AND RECORD YOUR WAYPOINT

STEP 3:

Change the name of your waypoint by pressing CHANGE NAME.

It is recommended to name your waypoints by the plant species followed by number of waypoint for that species. (ex: YST1)



STEP 4:

Add comments to your waypoint of certain data parameters (May include size of infestation, plant density, identification confidence, phenology, disturbance, treatment, ect.)

* Refer to NV Weed Mapping Standards document *

Garmin Oregon GPS Data Collection: USE OF WAYPOINTS

EDITING AND VIEWING WAYPOINTS

STEP 1:
From main menu,
scroll to
and press
WAYPOINT
MANAGER



STEP 2:
All your
recorded
waypoints
will be
displayed.
Choose the
waypoint
you wish to
view or edit.

Garmin Oregon GPS Data Collection: USE OF WAYPOINTS

EDITING AND VIEWING WAYPOINTS



STEP 3:

Perform any edits you need. Remember the ✓ saves your edits



STEP 3:

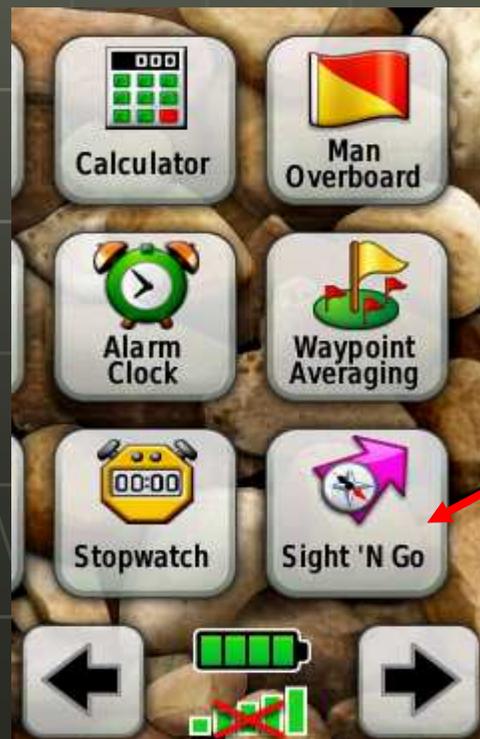
To view your waypoint press VIEW MAP. On map press GO and GPS gives you the path to it



Garmin Oregon GPS Data Collection: USE OF WAYPOINTS

SIGHT N' GO FEATURE

- Use to mark a waypoint that is out of reach (i.e. over a canyon, across the river, ect.) or far away.
- Projects the location of a waypoint based on measurements you specify.



STEP 1:

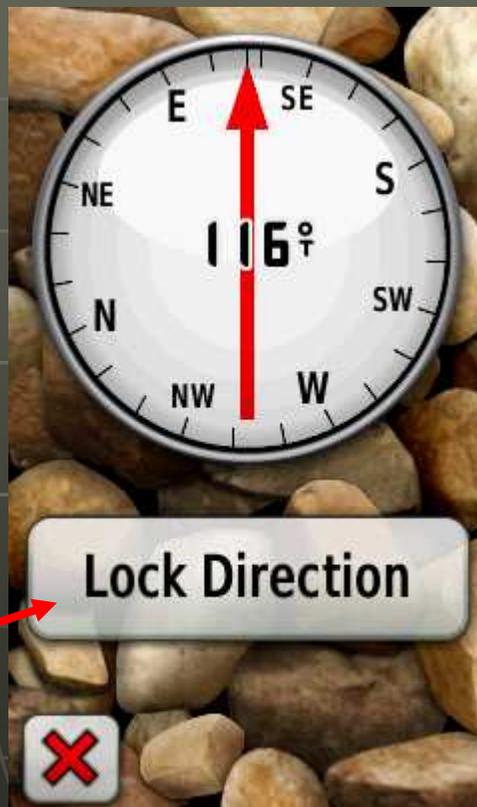
From main menu select the SIGHT 'N GO tool

Garmin Oregon GPS Data Collection: USE OF WAYPOINTS

SIGHT N' GO FEATURE

STEP 2:

Point the top of your GPS unit to the location of your waypoint and press LOCK DIRECTION



STEP 3:

Select PROJECT WAYPOINT



Garmin Oregon GPS Data Collection: USE OF WAYPOINTS

SIGHT N' GO FEATURE



STEP 4:

Select the units that you want to use to estimate the distance of your waypoint in, enter the distance, and save your waypoint. Edit the waypoint with same steps for other waypoints.

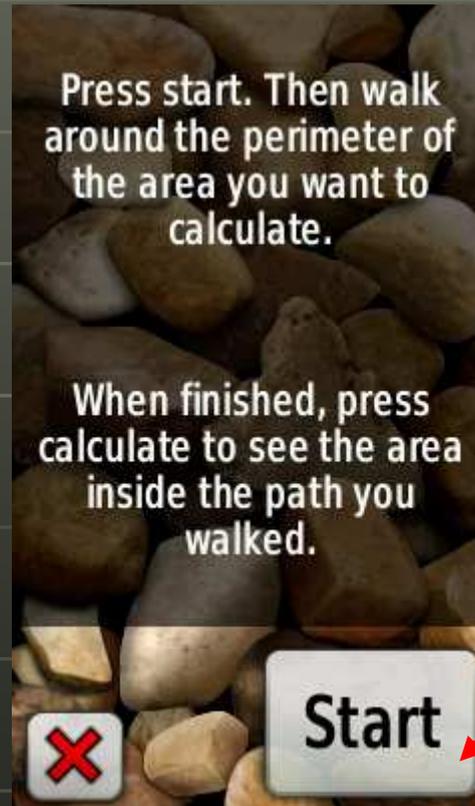
Garmin Oregon GPS Data Collection:

AREA CALCULATION

- Use to mark a polygon or larger infestation
- Calculates the area of your polygon and displays it for you on the GPS



STEP 1:
From the main menu select the AREA CALCULATION TOOL



STEP 2:
When you are at the corner or edge of the infestation area select START

Garmin Oregon GPS Data Collection:

AREA CALCULATION

STEP 3:

Walk the perimeter of the infestation or other desired area.



STEP 4:
Once you have walked the perimeter select **CALCULATE**



STEP 5:
Area will be displayed. Press **SAVE TRACK** to keep area data

Garmin Oregon GPS Data Collection:

AREA CALCULATION



STEP 5:

Press OK to verify saved track. To view the area and track, go to Track Manager from main menu, select your track, and select VIEW MAP. (Area will be displayed on map with start and end points.)

Garmin Oregon GPS Data Collection

THINGS TO KEEP IN MIND

- All tracks and waypoints saved will remain in your GPS until you clean out the GPS unit.
- When you upload your GPS data it will be grouped by the date that you collected the data
- Always keep a field data sheet as back up and future reference
- It is essential to clearly and methodologically name or label your waypoints and tracks so that when they are uploaded you remember what the data is.

ANY QUESTIONS?



Jamie Greer

Noxious Weed Programs Assistant
Nevada Department of Agriculture
775-353-3640
jgreer@agri.nv.gov

Tina Mudd

Noxious Weed Programs Coordinator
Nevada Department of Agriculture
775-353-3670
tmudd@agri.nv.gov

PLEASE FEEL FREE TO CONTACT US
AT ANYTIME