1.01a *Invasive Plant Species Mapping*
1.01b *Invasive Plant Species Monitoring*

last updated: 01/14/2016

Invasive species mapping and monitoring surveys coincide, occur annually and are conducted concurrently. As such, the survey protocols for both are combined below. Targeted species include: **perennial pepperweed** (*Lepidium latifolium* L.), **squarrose knapweed** (*Centaurea virgata* Lam.), **salt cedar** (*Tamarix ramosissima* Ledeb.) and **Russian olive** (*Elaeagnus angustifolia*). Squarrose knapweed it targeted within the dry-scrub habitat within the Refuge while the remaining three species are targeted within wetland habitats. Any other invasive species such as cocklebur (*Xanthium spp.*) are reported and treated when encountered. We utilize the utilized the Refuge Lands GIS (RLGIS) geodatabase to record confirmed locations of all target species.

This protocol is broken into several portions:

1. Certifications
    - State Certifications Required
    - Completing Certifications
    - Certification Testing
2. MSDS Sheets and Job Hazard Analysis Forms
    - Safety Material Data Sheets (MSDS)
    - Job Hazard Analysis Forms (JHAs)
3. PPE Equipment, Chemical Mixing and Application
    - Location
    - PPE Items
4. Prepping for Data Collection in the Field
    - Create and prep the '*Invasive Species GIS Map*' for the current year
    - Loading current year's map onto the Trimbles
    - Create an Excel Sheet for Tracking Grid Completion.
    - Create blank field Datasheets for the current year
5. Data Collection – Datasheets
    - Datasheets
    - Species Identification
    - Locating New Sites
    - Data Collection- datasheets
6. Data Collection -Trimble use for Invasive Species Field Mapping
    - Things to know about Trimbles before heading into the field
    - Prior to heading into the field
    - Using a Trimble in the field to map current Invasive Species Locations
7. Verifying and importing new data into the Existing RLGIS Invasive Species Geodatabase

Certifications: This refers to individual certifications/licenses which are different from the Refuge's State Pesticide Permit. Ask the Refuge manager about how to handle test scheduling and payments. If there are any questions about this process you can call UT Dept. of Agriculture; Pesticide Applicator Licensing – check their website for the most up-to-date contact information.

1. **State Certifications Required:**
    a. Non-Commercial Applicator License
    b. Right-of-way
2. **Completing Certifications**: Currently good for 3-years, a temporary license is issued immediately upon passing both tests.
    a. The most current **Test Prep Materials** are available online at: http://ag.utah.gov/pesticide-applicators-licensing/39-pesticides/222-pesticide-exam-study-guides.html. These will be two 'books' you will need to study: 1) the General Exam Book and 2) The Right-of-Way book. Both study material guides/certifications will each have their own test administered.

       Hard copies may be available in the office, but if you decide to use them, **be sure they are the most up-to-date version**.
    b. **Fees**: There are two separate fees that need to be paid.
        i. The **first fee** is to the Utah Dept. of Agriculture (***this should be paid prior*** *to the taking the test as you will be required to show proof of payment –also lack of payment means even if you pass you will not be issued a license*). This can be paid by going to http://webapp.ag.utah.gov/generalOnlinePayments and selecting the '**Non-Commercial Applicator License Exam'** and following the prompts.
        ii. The **second fee** is to the testing center where you take your test. At this time, the **Tooele** testing center cannot take credit card payments and the **fees must be paid in cash or check**.
3. **Certification Testing:**
    a. **Locations**:
        i. There is a testing center located in Tooele.
        ii. A full list of testing centers can be found here: http://ag.utah.gov/pesticides/39-pesticides/399-testing-centers.html.
    b. **Scheduling**: These are typically run by college students working at a general testing center. These testing sites are **not** specialized testing locations just for pesticide applicator testing.
        i. The list provided above with have the most up-to-date contact information and guidance on scheduling tests.
        ii. When you schedule a test, they may not be clear on what you need to take. **Make sure** they set you up to take **both** the general non-commercial applicator test **and** the right-of-way test. **THEY ARE TWO SEPARATE TESTS.**
        iii. When scheduling your test, don't forget to inquire as to the amount of the testing fees and to notify the Refuge manager of the amount so it can be arranged for prior to the testing day.
        iv. On **test day**, **do not forget** to take a **copy of the receipt** for payment of the **fee** discussed in step **2bi** and your **testing fee**.

1.01a *Invasive Plant Species Mapping*
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MSDS Sheets and Job Hazard Analysis Forms: These are both located on the bottom shelf of the bookshelf outside the Refuge Manager's office.

1. **Material Safety Data Sheets (MSDS)** :
    a. **MSDS** for all chemicals utilized within these surveys are found in the MSDS binders. These sheets will each have their own designated information for PPE and how to treat accidental exposure. This information is available for you to reference in addition to the protocol below.
2. **Job Hazard Analysis (JHA)**:
    a. JHAs outline safety guidelines for activities performed while completing these surveys. **You are responsible for ensuring you follow all safety guidelines**. The Refuge manager will go over JHAs with you when you start working at the Refuge. JHAs are available for you to reference, at any time, in addition to the protocol below.

PPE Equipment, Chemical Mixing and Application: The following details chemical treatment and application by species. The Refuge manager may choose change chemicals between years in an effort to improve effectiveness; therefore it is important you confirm that you are to use the following chemical instructions **prior** to preparing these mixes or applying them in the field.

1. **Personal Protective Equipment (PPE): ALWAYS USE PROPER PPE EQUIPMENT WHEN HANDLING OR WORKING WITH CHEMICALS.**
    a. **LOCATION**: **PPE Equipment is located in two areas** on the Refuge. Some **PPE Equipment will be available to you in the Pesticide building** where the chemicals are stored. Other equipment will be located in the **PPE cabinets in the inner room of the maintenance building**. If you cannot find the equipment you need, ask, do not go without. Some equipment you will provide yourself (i.e. long-sleeve shirts and pants.

    b. **PPE Items**: This list is includes PPE only for chemical mixing and handling of chemicals during application**. Additional PPE** may be required depending upon other equipment used during the application process (*i.e. driving an ATV requires a helmet – see JHAs).*

i. **Chemical Mixing**	ii. **Chemical Application**
– Face guard	– Face guard
– Non-absorbent nitrile gloves	– Non-absorbent nitrile gloves
– Non-absorbent rubber boots	– Non-absorbent rubber boots
– Non-absorbent apron	– Non-absorbent apron
– Long-sleeve shirt	– Long-sleeve shirt
– Pants (not shorts)	– Pants (not shorts)

2. **Chemical Mixing**: Below are mixing guidelines used in previous seasons of invasive species treatment, **always** read/refer to a chemicals label and safety mixing guidelines in addition to these instructions.
    a. **Mixing Guidelines**
        i. Always wear proper PPE!
        ii. Always pour chemicals into the measuring container over a 'catch pan'.
        iii. Poor chemicals into proper receptacles outside on the concrete slab.
        iv. Always add approx. 1/3 of the required water volume **prior** to adding any chemicals.
        v. Add proper amount of Chemical
        vi. Add proper amount of surfactant
        vii. Add proper amount of highlighter/dye.
        viii. Close lid/s on spraying equipment and agitate.
        ix. Rinse slab if needed and turn off water.
        x. Make sure all lids have been placed back on the chemical containers.
    b. **Chemicals mixing by species**
        i. **KNAPWEED**: Treated in mid-June while in bloom.
        Chemical: Aminopyralid
        Brand Name/s: Milestone
        Surfactant: Agrispread
        Dye: Highlighter
        Solution Mixture / 3-Gallons Water: 0.84-oz Milestone, 1.4-oz Agrispread, 1.0-oz Highlighter

        ii. **PEPPERWEED**: Treated in June/July while in bloom.
        Chemical: chlorsulfron
        Brand Name/s: Alligare
        Surfactant: Freeway
        Dye: Highlighter
        Solution Mixture / 3-Gallons Water: 0.36-oz Alligare, 0.72-oz Freeway, 1.5-oz Highlighter

        iii. **TAMARISK/RUSSIAN OLIVE**: Treated in mid-Sept to Early Oct. prior to fall dormancy.

        Foliar Treatment: Apply to the entire 'leafy' portion of the tree.
        Chemical: Isopropylamine salt of Imazapyr
        Brand Name/s: Imazapyr
        Surfactant: LI-700
        Dye: Highlighter
        Solution Mixture / 3-Gallons Water: 7.67-oz Imazapyr, 0.96-oz LI-700, 1.0-oz Highlighter
        Solution Mixture / 25-Gallons Water: 64.0-oz Imazapyr, 8.0-oz LI-700, 8.0-oz Highlighter

        Stump Treatment: Apply a concentrated solution to the cambium layer of a freshly cut stump surface. Use a hand sprayer or spray bottle to apply; will not need large quantities.
        Chemical: Isopropylamine salt of Imazapyr
        Brand Name/s: Imazapyr 2-SL
        Surfactant: LI-700

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Dye: Highlighter

Solution Mixture / 1-Quart Water: 2-quarts Imazapyr (66.6% solution).

Prepping for Data Collection in the Field: This step is vital in ensuring that data that is collected is usable and that it can be incorporated into the larger existing **RLGIS Invasive Species geodatabase**. It will also help the 'project lead' keep track of which areas have been search and areas that have not been searched when working with a group of multiple individuals.

1. **Create and prep the '*Invasive Species GIS Map*' for the current year**.
    a. The easiest way to do this is to open the ***'Invasive Species GIS Map'*** from the previous year and save it under a new name for the current year **but** you can create the current year's map from scratch if you prefer.

    b. Once the previous year's ***'Invasive Species GIS Map'*** or the '**New Map**' is opened, save it under a **NEW** name at the following location: ***I:\GIS DATA and MAPS\Maps\Plant_maps\Invasive Species***.
        i. **If starting from the previous year's Map**, compare the shapefiles in this map to the list in **step 1c;** delete any 'extra' shapefiles that are included in the Map but not in the list and then **goto step 1f**.
        ii. **If starting from a 'New Map'**, ADD all of the layers and shapefiles listed in **step 1c**.

    c. Verify all of the following layers/shapefiles have been added to this year's ***'Invasive Species GIS Map'***.
        i. Areal image:
            - **Fhs2006naip_cir.tif** (*I:\ GIS Data and Maps \Imagery)*
        ii. Shapefiles:
            - **Management _Units.shp** (*I:\ GIS Data and Maps \Shape_files\Units)*
            - **FWSBoundry** (*I:\GIS DATA and MAPS\Geodatabases\FHS_Base.gdb*)
            - **Invasive_Plant_Mgmt_Pt** (*I:\GIS DATA and MAPS\v2.0 RLGIS databases\ResourceManagement.gdb*)
            - **2014 Pepperweed Grid*** (I:\GIS DATA and MAPS\Shape_files\plants\2014\Mapping files\Files From Timbles\2014 Invasive Trimble 1\2014 Avocet Pepperweed Grid.shp)
            **only if searching Avocet Unit that year.*

    d. **Import the Symbology** for Existing Invasive Species geodatabase*
        i. In the map's 'Table of Contents' (TOC) located on the left side of the map, right click on 'Invasive_Plant_Mgmt_Pt'.
        ii. Select 'Properties'; a new window will open.
        iii. In the new window, click on the 'Symbology' tab at the top.
        iv. Click the 'Import' button at the top right of the opened Symbology tab

v. Click on the **yellow folder** button to navigate to: *I:\GIS DATA and MAPS\v2.0 RLGIS databases\Invasive Symbology Layer Files*
vi. Click on '**Invasive Plant Management Point.lyr** 'and click 'Add'
vii. Click '**Ok'**.

viii. In the window that opens with dropdown options, make sure the dropdown selection matches the label above the dropdown menu.
ix. Click 'Ok'.

* *Once the entire process of importing the current year's data into the existing geodatabase is complete (post data collection),* ***this Symbology layer will need to be updated and re-saved*** *with the newest year's new data points.*

e. **Adjust the 'Symbology'** of the other layers as needed (i.e. make 'Management Units clear with a black outline).
   i. In the map's 'Table of Contents' (TOC), right click on the shapefile you wish to change.
   ii. Select 'Properties'; a new window will open.
   iii. Click on the 'Symbology' tab at the top.
   iv. Adjust symbol to desired color/etc.
      - For **one** color for all points/lines/polygons click on '**Features→ single symbo**l' in the TOC of the pop –up window. Then **click on the square** with the current symbol icon to open up the '**Symbol Selector'** window. Choose which '**Fill'** and '**Outline Color'** you want and then click '**OK'** and then click '**OK'** again.
      - For **several** different colors for all points/lines/polygons based upon a selected attribute, click on '**Categories→ Unique Values'** in the TOC of the pop –up window. Then, in the right side of the pop-up window, select the feature/**'Field'** you want to base your categories on (*i.e. Common Name 1*), then choose the '**Color Ramp'**. Then click '**Ok'**.

      To edit each of the newly assigned symbol/fields, go to the main TOC in the Map and double click on each newly assigned symbol one at a time. A new window will open allowing you to choose the size, color and outline of each symbol.

f. If you are searching all of Avocet Unit this year, you will need to make sure the **'2014 Pepperweed Grid'** shapefile is turned on (the shapefile is 'checked') and then add the "**ID**" '**Label'**.
   i. If not searching Avocet, go to **step 1g**.
   ii. If searching Avocet
      - Make sure the shapefile is 'checked'.
      - In the TOC, right-click on the **'2014 Pepperweed Grid'** shapefile and select '**Properties'**.

- Select the '**Labels**' tab at the top of the pop-up window.
- Make sure the box in the upper left corner of the pop-up window is 'checked'.
- Next to '**Label Field**', select '**ID'** from the drop down menu.
- You can use the 'Text Symbol' options below to format the labels text if desired.
- Click '**OK'**.

g. If you wish to place a grid over the entire refuge to track areas completed
   - Add the '**Refuge Grid Shapefile'** (I:\GIS DATA and MAPS\Shape_files\refugegrid_30.shp) and follow the instructions in **step 1f** to add Grid IDs.

h. Make sure the '**Editor Toolbar'** is available.
   i. At the very top of the Map, left-click '**Customize'** and place your mouse above '**Toolbars'**. A list will appear to the right, make sure there is a checkmark next to 'Editor'. If there is not, click on it. If there is, use your mouse to click elsewhere on the screen to exit the list.

i. Make sure the '**RLGIS Toolbar'** is available.
   i. At the very top of the Map, left-click '**Customize'** and place your mouse above '**Toolbars'**. A list will appear to the right, make sure there is a checkmark next to 'Editor'. If there is not, click on it. If there is, use your mouse to click elsewhere on the screen to exit the list.

j. In the upper left corner, select '**File'**→ '**Save'** and re-save the map with all the new changes.

k. Create **new** shapefiles that will be used on the Trimble to record the current year's invasive species locations.
   i. In the Map you just created, look for the <u>icon</u> that has a **yellow filing cabinet** on it. Click it once and a window should appear on the right side of the map.
   ii. Within the new window, navigate to: ***I:\GIS DATA and MAPS\Shape_files\plants***.
   iii. Right-click on the 'plants' folder and create a **new folder** for the **current year**.
   iv. Right-click on the folder you just created and create a new folder for the empty '**PreField**' shapefiles you are about to create.
   v. Right-click on the new 'PreField' folder and select' **New'** → '**Shapefile'.**
   vi. You will need to name the shapefile you are creating, name it <u>according to the Trimble it will be loaded onto</u> (*i.e. 2015_Invasives_T1*). **<u>Each Trimble that will be used will need its OWN shapefiles with UNIQUE names.</u>** All Refuge Trimbles have already been assigned a unique simple number which is located on the back of the Trimble (1,2,3…etc.)
   vii. Select '**Point'** from the dropdown menu.
   viii. Click on the '**Edit**' button → 'Geographic Coordinate Systems' → 'North American'→ 'NAD 1983'.
   ix. Click '**Ok'** and then click '**OK'** again.
   x. If a grey box appears, click 'OK'.

xi. The new shapefile will now appear in the **'*Invasive Species GIS Map*'**.
xii. Repeat **steps 1kiii-1kxi** until you have created a new shapefile for each Trimble you may use in the field.

l. Identify the highest UniqueID that has been used in the '**RLGIS Invasive Species Point'** shapefile located in the RLGIS databse.
   i. Right-click on the '**Invasive Species Plant Management Point'** shapefile.
   ii. Select → **'Open Attribute Table'**
   iii. Once the table opens, at the bottom of the table you will see a number (ex> **0 out of 5793**).
   iv. Note the value on the **RIGHT**. **Record this number where you can find it for later steps.**
   v. Close out the table using the '**X'** in the upper right corner.

m. Add a '**Unique ID**' field to each of the **new** shapefiles created in **steps 1ki-1kxii**.
   i. In the TOC, right-click on the first of the 'new' shapefiles you just created and select 'open attribute table'.
   ii. Once the table opens, in the upper left corner there is a white icon with a black down arrow, click on the arrow and select **'Add Field'.**
   iii. Next to **Name** type: **PointID** (It is important you use this exact naming convention for each shapefile.)
   iv. Next to **Type** select: **Short Integer** and click '**OK'**.
   v. In the upper left corner there is a white icon with a black down arrow, click on the arrow and select **'Add Field'.**
   vi. Next to **Name** type: **Species** (It is important you use this exact naming convention for each shapefile.)
   vii. Next to **Type** select: **Text**
   viii. Double click in the white box next to **Length** and type 80.
   ix. Click 'OK'.
   x. Repeat **steps 1mi-1mvii** for all of the 'New' shapefiles created.

n. Import the Symbology for the **New** shapefiles (This is a very important step, do not forget!)
   x. In the TOC located on the left side of the map, the first of the '**new'** shapefiles you just created.
   xi. Select '**Properties'**; a new window will open.
   xii. In the new window, click on the '**Symbology'** tab at the top.
   xiii. Click the 'Import' button at the top right of the opened Symbology tab
   xiv. Click on the **yellow folder** button to navigate to: ***I:\GIS DATA and MAPS\Shape_files\plants***
   xv. Click on **'InvasiveSpecies_Field_Symbols'** and click '**Add'**
   xvi. Click '**Ok'**.

xvii. In the window that opens with dropdown options, make sure the top dropdown selection = **Species**.
i. Click '**Ok'** and then click '**OK'** again.

2. **Loading <u>current</u> year's map onto the Trimbles**.

a. Open the <u>current</u> year's ***'Invasive Species GIS Map'*** in ArcMap.

i. On a computer with GIS, open ArcMap.
ii. Once ArcMap opens a box will appear with options. On the left-hand side of the box, under ***'Existing Maps***'select '***Browse for more...***'
iii. Navigate to: ***I:\GIS DATA and MAPS\Maps\Plant_maps\Invasive Species***.
iv. Select the <u>current</u> year's ***'Invasive Species GIS Map'.***

b. Export **ArcMap** ***'Invasive Species GIS Map'*** Map to an **ArcPad** ***'Invasive Species GIS Map'*** formatted Map.

i. Make sure the '**ArcPad Data Manager'** toolbar is accessible. If it appears on the main screen, go to **step 2-b-iii**, if it is not go to **step 2-b-ii**.
ii. Add the toolbar to the main screen by going to '**Customize'** → '**Toolbars'** → and click on **'ArcPad Data Manager'**.

If the icons on the **'ArcPad Data Manager' are greyed out, you will need to active the toolbar by going to **'Customize'→ 'Extensions'->** and checking the box by **'ArcPad Data Manager'.***

iii. Click on the icon that looks like a Trimble with an arrow pointing to the **right**.
iv. You are <u>not</u> checking out an RLGIS shapefile database for this, click '***No***'.
v. In the window that appears, the middle column is titled '**Actions**'; click in that column next to the first of the '**new' shapefiles** (i.e. *2015_Invasives_T1*) and select '***Export as background data***' → '***Make Editable*****' *.**

****You can click and drag a column divider to expand a column to see the entire name.***

vi. In the middle column titled '**Actions**'; click in that column next to the **management unit** shapefile and select '***Export as background data***' → '***Make Read Only*****' *.**
vii. Repeat **step 2-b-vi** for the **refuge boundary** shapefile.
viii. Repeat **step 2-b-vi** for the **Invasive_Plant_Mgmt_Pt** shapefile (this will have all the historical treated sites).
ix. Repeat **step 2-b-vi** for **any/all grid shapefiles you will need** and click '***Next***'.
x. Do not do anything in this screen except click ***'Next'***.

xi. In the middle **right** of the pop-up box, there is an icon that looks like a **folder**. Click on this icon and navigate to '***I:\GIS DATA and MAPS\All Trimble Check In Out*** 'and save the **ArcPad '*Invasive Species GIS Map'*** formatted Map.

xii. In this window, in the lower **right** section, there is a **white box** with '***Map Name***' to its left. In this box **name the map**; chose something short but clear **and make sure to indicate which Trimble it should be loaded onto** (*i.e. 2015_InvasiveSpecies_T1)*.

xiii. Click ***'Next***'.

xiv. On the new screen, click ***'Finish'.***

xv. A **report** will appear letting you know if everything transferred. Click ***'Ok***'.

xvi. Repeat **steps 2-b-iii to 2-b-xv** for **each** of the Trimble will use for mapping. **Each time you will use a different 'new' shapefile in step 2-b-v** (*i.e. 2015_Invasives_T2, etc…)*

xvii. Once you have done this for all of the 'new' shapefiles, you can now close out of ArcMap.

c. **Connect Trimble to Computer**.

i. If you still have ArcPad open on your Trimble, close the program by tapping on the upper left icon (Trimble in a circle) and selecting ***'exit'***.

ii. Make sure the proper connecting cable is plugged into the computer. For the **2000 series** it will be a charging cradle, for the **6000 series** it will be a USB cord.

iii. On your computer, go to '**Start**' → '**All Programs'** → '**Windows Mobile Device Center'**. If a white pop-up window appears asking about setting up the Trimble, exit out of the window.

iv. Once '**Windows Mobile Device Center'** is opened, with your Trimble still turned on, attached it to its charger or USB cable (see step 4-b-ii). On the Trimble screen a pop-up box will appear letting you know it is connecting. It will also say '**Connecting'** on the '**Windows Mobile Device Center'** screen in the lower left corner**.** Once it is connected, the pop-up box on the Trimble will disappear and the '**Windows Mobile Device Center'** screen will say '**Connected**'* in the lower left corner. If a white pop-up window appears asking about setting up the Trimble, exit out of the window.

***If it does not connect, repeat the step a couple more times. If it still doesn't want to work, you may need to re-start your computer. That will usually allow it to connect*.**

v. Repeat **steps 2-c-i thru 2-c-iv** for each Trimble that will be used. **Make sure you load the correct ArcPad '*Invasive Species GIS Map'* onto the correct Trimble!**

d. **Move ArcPad *'Invasive Species GIS Map'* formatted Map onto Trimble device.**

   i. Once connected (***step 2-c***), select '***Connect without setting up your device***'.
   ii. Select '***File Management***'→ '***Browse the contents of your device***'.
   iii. In the pop-up box that opens, double click the disk icon in the box on the right and navigate to '***My Documents***'. Leave that window open.
   iv. On your computer, click '**Start**'→'**Computer'** to open a **'new file window'**.
   v. In that **'new file window'**, navigate to where you just saved the **ArcPad *'Invasive Species GIS Map'*** from **step 2b,** right–click on the file and select **'copy'**.
   vi. Move to the '***My Documents***' file in the '**Windows Mobile Device Center'** screen. Right click in the '**My Documents'** and **paste** the file you just copied.
   vii. A pop-up window will appear with a 'status bar' indicating the progress of the transfer. Once that box closes the transfer is complete.
   viii. The map should now be loaded onto the Trimble. Close the '**Windows Mobile Device Center'** window and remove the Trimble from the cradle or cable.

e. Repeat **steps 2-d-i thru 2-d-viii** for each Trimble that will be used. **Make sure you load the correct ArcPad *'Invasive Species GIS Map'* onto the correct Trimble!**

3. **Create an Excel Sheet for Tracking Grid Completion.**

   a. If searching **Avocet Unit**, or using the **Refuge Grid**, create an excel spreadsheet with all of the targeted grid-IDs so that each grid can be checked off as it is completed.

4. **Create blank field Datasheets for the current year**. It is very important that the datasheets created have unique ID values already written in them, especially if more than one person is mapping at a time.

   a. Open the datasheet Excel sheet from the previous year (*I:\BIOLOGY PROGRAM\INVENTORY and MONITORING PLAN (IMP)_ISIs and SOPs\Initial Survey Instructions (ISIs)\1.01a and 1.01b Invasive Plant Species Mapping and Monitoring\Archived*)
   b. Once the Excel sheet opens, at the bottom left, **click** on the **black arrow** with the line to the **right** of it (it will be the one on furthest right of all four arrow icons).
   c. This should show you the 'Tab' with the highest values. Write down the highest value where you can access it again, *i.e. 8739*).
   d. Click on the leftmost black arrow in the bottom left corner to return to the right tab (which should have the lowest values).
   e. Double-click directly on that Tab to rename and type in the value you wrote down in **step 3c** but add 1 (*i.e. 8740)*.
   f. Click somewhere in the excel form to exit the Tab.

g. Click in the box with the lowest established Assigned Obj. ID and type in the number you placed in the Tab.
h. Add sequential values until you reach the bottom of the page.
i. In the Tab, and the final highest value as part of the Tab's title. This will be your new 'high' value.
j. Click on the next Tab and repeat **steps 3e-3j** until you have fill out all the Tabs.
k. Print of the datasheets and place in a folder where all mapping personnel have access.
l. Place another folder next to it for 'completed' data sheets.

1.01a *Invasive Plant Species Mapping*
1.01b *Invasive Plant Species Monitoring*

last updated: 01/14/2016

Data Collection-datasheets: Data collection is very for all species with an extra step for squarrose knap weed. Both GPS coordinates **and** patch data are collected at the same time. Instructions on how to use a Trimble in the field to **record** data are available in the "***Trimble Use for Invasive Species Mapping"*** section.

What to Take into the Field: Do not take completed datasheets back out into the field as they can be lost or destroyed.

- **Trimble**
- **Clipboard** (I recommend the grey one with the compartment to prevent loss of completed datasheets.)
- **Pens/Pencils** (Take more than one; another reason the grey clipboards are handy.)
- **Multiple Blank Datasheets**
- **Water!!**
- **PPE**
- **Charged Radio**

1. **Datasheets**:
   a. Do **not** forget to fill in the '**Mapper'** at the top of the page as well as the '**Trimble ID**'* and on the left column and the '**Date'***. This data is very useful if there are any questions later in the compilation process.

   ****You can fill it in once and then draw a line down through each subsequent row as you complete it so long as it is clear who did the mapping, with which Trimble, and when.***

2. **Species Identification.** This varies from species to species and depends upon growth stage.
   a. **Squarrose knapweed:** This species found in the scrub habitat areas of the Refuge. It is very important that you try and identify this species with and without blooms as well as in rosette form. (You will not search out rosettes specifically, but you should check around for and treat any that are found near flowering plants). **A guide to knapweeds and identification can be found at**: *I:\BIOLOGY PROGRAM\INVENTORY and MONITORING PLAN (IMP)_ISIs and SOPs\Initial Survey Instructions (ISIs)\1.01a and 1.01b Invasive Plant Species Mapping and Monitoring.*

   b. **Perennial pepperweed:** This species is easily identifiable when flowering and is found in the wetland habitats; commonly growing along waterways and edges of water bodies. **A guide to identifying perennial pepperweed** is available at: *I:\BIOLOGY PROGRAM\INVENTORY and MONITORING PLAN (IMP)_ISIs and SOPs\Initial Survey Instructions (ISIs)\1.01a and 1.01b Invasive Plant Species Mapping and Monitoring.*

   c. **Tamarisk (salt cedar):** Tamarisk is a distinctive woody species that can be found growing throughout the wetland habitats on the Refuge. **A guide to identifying tamarisk** is available at: *I:\BIOLOGY PROGRAM\INVENTORY and MONITORING PLAN (IMP)_ISIs and SOPs\Initial Survey Instructions (ISIs)\1.01a and 1.01b Invasive Plant Species Mapping and Monitoring.*

d. **Russian olive:** Russian olive trees are currently growing near and around the housing area and serve as a wind break. <u>These trees are not to be treated</u>! We are targeting the Russian olive trees that are **growing in the wetland habitats** within the management unit boundaries. **A guide to identifying Russian olive trees** is available at: *I:\BIOLOGY PROGRAM\INVENTORY and MONITORING PLAN (IMP)_ISIs and SOPs\Initial Survey Instructions (ISIs)\1.01a and 1.01b Invasive Plant Species Mapping and Monitoring.*

3. **Locating New Invasive Sites.** Depending on which species you are searching for will determine how you go about locating patches/individuals.
   a. **Search methods:** Below are some of the most common search methods. You may end up using any combination of these. Ask the Refuge manager for guidance if you are unsure of where to search or how to go about searching.
      i. **Targeted** – There are two types of targeted searches: 1) targeted areas (i.e. management units, upland habitats, or tops of 'plateaus') and 2) sites of infestation from previous years that need to be revisited.
      ii. **Roads** – This is often utilized when mapping pepperweed in the non-priority management units for that year (this is usually determined by the Refuge manager). When using this method you drive all drivable roads in looking for the target species.
      iii. **Search Pattern-** When searching a large area it is recommended you have some method to your searching. For the upland shrub (knapweed) searched, driving or walking line transects helps to ensure no areas are missed. For pepperweed sometime the search pattern is based around accessible roads, waterways or a grid overlay.
      iv. **Mapping using a Grid Overlay-** When mapping using a grid overlay, you will search one entire grid before moving onto another. This allows for a systematic tracking of which areas have been searched and which have not. This is valuable when you multiple people are mapping and helps reduce missed areas of time lost due to different people re-searching areas that have already been completed.

4. **Data Collection- Datasheets**:
   a. Once a live patch/individual of a targeted species is located, the **date** needs to be recorded as does the '**Species Code'**.

      i. Place a **check** in the box if the site is treated at the time it is located. If not, leave it blank until the site is treated.
      ii. Estimate a **radius** for the area the patch covers.
         - For pepperweed patches this is usually in feet but can be smaller in cases of a single plant. Even if it is a single plant, the **<u>radius should be recorded in feet</u>**.
         - For squarrose knapweed, the patch size can be very tiny (0.01 ft) or larger if there are several patched close together that you include within the same radius. Even if it is a single plant, the **<u>radius should be recorded in feet</u>**.

iii. For **squarrose knapweed <u>only</u>** count the number of plants* within each radius.
   - 1 plant = 1 basal rosette.
   - These plants can grow very closely together, especially on larger plants it can be hard to tell, but do your best.

iv. Within the radius, estimate the **% Cover*** : If you had an aerial view, this is the percentage of the area within the **diameter** you determined that it 'covered' by the targeted vegetation.
   - **% Cover is not the same as dense/sparse.**

v. Within the area that is covered, determine if the plant growth is dense or sparse.

vi. If the identified species is **tamarisk or Russian olive**, **<u>AND</u>** the individual is **over 6-ft tall**; foliar treatment will not suffice. You should place a checkmark in the far right column for that row. **<u>This location will need to be revisited</u>** later, the tree manually cut down and the stump treatment method applied (see **step 2biii**.)

b. **<u>PRIOR to treatment</u>, GPS coordinate needs to be recorded.**

   i. Move to the middle of the patch or next to the individual and record the location in your Trimble (s***ee the*** "***Trimble Use for Invasive Species Mapping"*** *section for further details.*)

   ii. **<u>Make sure when you record the location in the Trimble that you assign it the ID number that matches the 'Assigned Object ID #</u>**' from the row you just used to recorded the data for this site in steps 4ai- 4av.

c. Once **<u>all data is collected</u>**, treatment of the site can commence.

Data Collection -Trimble use for Invasive Species Field Mapping.
These instructions assume that the current year's ArcPad Invasive Map have already been uploaded to the Trimble
(see 'Prepping for Data Collection in the Field' sections 'Create and prep the 'Invasive Species GIS Map' for the current year' and 'Loading current year's map onto the Trimbles').

1) **THINGS TO KNOW ABOUT THE TRIMBLE BEFORE HEADING INTO THE FIELD:**
   a) Trimble screens will go into a 'Power Saver' mode when left idle for a couple of minutes. When this occurs, the screen will turn gray. To view the map, simply tap the green power button once quickly. They are not OFF when in this mode. Do not place them back on their charger without properly turning them OFF or they will not charge properly for the next use.
   b) Sometimes the Trimble can accidently be 'Locked'. When this happens, nothing will happen when you tap the screen to execute a command. To 'Unlock' the Trimble, tap the small lock icon located in the upper right hand of the screen directly below the clock. Once you have tapped the lock (it can be fickle), a pop-up screen will appear asking if you want to unlock the Trimble. Select 'Yes'.

2) **PRIOR TO HEADING INTO THE FIELD**
   a) **Turn on the Trimble.**
      i. Turn on the unit to be used by tapping the green power button toward the bottom of the Trimble unit. Depending on the unit series (2000 or 6000), the boot up process may take a few minutes.

   b) **Check the Battery Level.**
      i. Check the battery level by looking at the battery icon in the upper right corner of the screen. Make sure the battery has 3-4 vertical bars showing.
         - If there **are less than 3 bars** and you are planning on using the Trimble for a long period that day, consider switching to another Trimble unit with more battery life if available and make sure to turn off the current unit***** (see below for proper instructions to ensure the unit is turned off and not sleeping) and place the unit on its correct charging port.

         - **If you see a red '!'** within the battery icon, this Trimble has very low battery life and is not going to be usable in the field at this time and you will need to switch to another Trimble unit. When this happens, make sure to turn off the current unit***** and place the current unit on its correct charging port, this unit will not be useable in the field for several hours.

****If the unit is not turned off properly prior to charging, the unit may not charge properly causing a further delay prior to it being usable in the field.***

c) **Open ArcPad and Navigate to the correct current Year's Invasive Map.**

i. Open ArcPad.

- For the **2000 series**: Use the attached stylus to tap on the ***'Start'*** button located in the upper left corner of the screen – a drop down menu should appear. From the menu, tap on the ***'ArcPad'*** icon to open the program. Wait for the program to open completely.
- For the **6000 series**: Use the stylus to tap on the ***'Windows'*** icon located in the lower left corner of the startup screen – this should send you to anther screen with several program icons available. Use your stylus to scroll down the screen by dragging the tip from the lower portion of the screen to the upper portion. Continue to scroll down until you see the ***'ArcPad'*** icon appear. Tap on the '***ArcPad'*** icon to open the program. Wait for the program to open completely.

ii. Choose the current Year's Invasive Map.

- Once the program opens, a screen with 4-options will appear. Tap on the ***'Choose Map to Open'*** option.
- A new screen will appear with a list of Maps currently uploaded to the Trimble in use. Use the stylus to move the 'Up/Down' and 'Left/Right' scroll bars until you can see the complete file name under the '***folder***' column. Look for the current year's invasive map (*you should have been provided the map name by the person who uploads the map to the Trimble*). Tap on that map and make sure its row is now highlighted a **dark blue**.
- In the lower left corner you will see a circular **green** '**ok**' button. Tap this button to open the highlighted map.
- The current year's invasive map will open. **NOTE**: the Trimble's GPS function does NOT turn itself on automatically when a project map is opened. Instructions for turning this function on will be included later in this tutorial.

d) **Verify Current Year's Invasive Map Loaded Properly**. Once the current year's map has opened, it is important to verify that all the layers have loaded properly.

i. Ensure that all necessary layers that should have been included are loaded, **and** that all layers that you need to be able to perform editing functions within *(i.e. adding new GPS point coordinates)* were loaded with the editing feature enabled within ArcPad.

- In the top toolbar, tap on the  icon. A second toolbar will appear underneath the top toolbar.
- On the second toolbar, tap on the  icon. This will open a screen with a 'Table of Contents' showing all of the layers loaded into the current Map. Make sure that all of the layers you will need have been loaded into the Trimble. The person who transferred the project onto the Trimble from ArcMap can give you a list of which layers should be listed.*

- The header row for the 'Table of Contents' includes a column labeled using this icon:  . If there is a check mark in a box underneath this icon, that indicates that the layer that is checked was imported with the editing function enabled. <u>All</u> of the layers used to map new invasive species should have this box checked. The person who transferred the project onto the Trimble from ArcMap can give you a list of which layers should be editable.*

  If a layer is missing or is not showing up as editable when it should be, let the person who handled the original transfer know of the issue. You may not be able to use this Trimble in the field to map invasives until the issue if rectified.

- Once everything has been verified as having been loaded into ArcPad correctly, tap on the circular **green** '**ok**' button in the lower left hand corner to exit out of the 'Table of Contents'.

3) **<u>USING A TRIMBLE IN THE FIELD TO MAP CURRENT INVASIVE SPECIES LOCATIONS</u>**

a) **Ensure the Trimble is on and the correct map is loaded.**
   i. See instructions under '*PRIOR TO HEADING OUT INTO THE FIELD*' portion of this manual.

b) **Turn on the GPS function and make sure satellites acquire properly.**
   i. <u>Turn on the GPS Function</u> - Do this **outside*** <u>prior</u> to heading into the field. That way if there are any problems are right by the office for assistance and/or to switch out Trimble units if necessary.
   Turning this feature on before heading outside will cause the battery to drain quickly as it tried to search for satellites from within the building.

   - In the top toolbar, tap on the  icon. A second toolbar will appear underneath the top toolbar.

   - On the second toolbar, tap on the  icon. It should (temporarily) turn blue and a **red** box should appear at the bottom of the screen with the words '**No Fix**'.

     If this does <u>not</u> happen, tap on the black down arrow located immediately below the  icon. A dropdown menu should appear.

   - Within the drop down menu, look for the heading '*GPS Active*' with  icon to its left. If there is <u>not</u> a **red** box outline around the icon, tap <u>once</u> on the '*GPS Active*' heading. The dropdown menu should disappear and a **red** box should appear at the bottom of the screen with the words '**No Fix**'. If there <u>is</u> a **red** box outline around the icon, the the GPS function has already been turned on.

ii. Acquiring Satellites and Current Position.
- Once the GPS function has been turned on, it will immediately start trying to acquire satellite signal. You must be outside and should not be too near buildings for this to work successfully.
- While it is trying to acquire the satellites, the **red** box with the words '**No Fix**' will continue to stay red. Additionally, you will get a white pop-up window that appears periodically with the message "*No current position fix at this time.*"
- Once the GPS has a strong enough signal, the **red** box with the words '**No Fix**' will turn **green** and the pop-up box will stop appearing. You can tap the small 'x' in the upper right corner of the **green** box to make it disappear so that you can better see the underlying map.
- **You may lose signal on occasion in the field**, especially when in a car. When this happens the pop-up box will reappear and keep appearing until you get a strong enough signal.
- **Be careful when using the Trimble in a vehicle**. The vehicle may be moving faster than the Trimble is re-acquiring your current position. This can cause a 'lag' effect that can cause you to overshoot your destination.

c) **Viewing the full extent of the map loaded on the Trimble.**
i. Zoom out to see the full map that has been loaded.
ii. In the top toolbar, tap on the  icon. A second toolbar will appear .
iii. Tap on the **black** arrow directly under the icon second from the left.
iv. Select the '*Zoom to Full Extent*' option.
v. The icon above the black arrow will now change to  .
vi. Tap the icon once to view the full extent of the map loaded to the Trimble.

d) **How to adjust your view of the underlying map to a certain area.**
i. Zooming in/out to a specific area. *****
- In the top toolbar, tap on the  icon. A second toolbar will appear
- Tap on the **black** arrow directly under the left most icon.
- Tap on the option that you want, either '*Zoom In*' or '*Zoom Out*'.
- The icon above the black arrow will now change to either  or  ******.
- Use your stylus to draw a square around the area you want to zoom to. Do this by placing the tip of the stylus to the top left of the area and then (while keeping continuous contact) dragging the stylus in a downward diagonal to your right.
- The size of the box will impact the magnitude of the zoom. A small box will zoom the image further in or out than a larger box. *

Keep in mind that once the GPS function is turned on and has acquired satellites, current Trimble settings will not allow you to zoom into an area that does not include your current position.
****If the icon you need is already the one that appears above the black arrow, then all you need to do is tap the icon prior to using your stylus on the screen.***

ii. How to 'Pan' (*move the screen without zooming*)
- In the top toolbar, tap on the  icon. A second toolbar will appear
- Tap on the **black** arrow directly under the left most icon.
- Tap on the 'Pan' option.
- The icon above the black arrow will now change to  .
- Tap the screen to 'grab' it and without lifting the stylus, drag the image to the desired location.

iii. Going back to your previous zoom extent.
- This function can be used if you unintentionally zoom too far in or out, or if you accidentally move the underlying image so that it is no longer where you need it to be.
- In the top toolbar, tap on the  icon. A second toolbar will appear underneath the top toolbar.
- Tap on the **black** arrow directly under the third icon from the left.
- Select the 'Go Back to Previous Extent' option.
- The icon above the black arrow should now look like  .
- Tap that icon once to go back one 'move'. You can tap the icon more than once if needed.

e) **Navigating to a location.**

i. Knowing which way is north.
- The map in the Trimble is loaded so that when looking at the map, 'North' is always at the top of the Trimble (furthest from the 'power' button'). The underlying map does not reorient itself when you move around. In other words, if you have the top of the Trimble pointed east, north on the map will still be at the top of the Trimble. If confused, reorient the Trimble so the the top of the Trimble is pointed north (towards Harrison and Gadwall unit).

f) **Knowing where you are on the map.**

i. Understanding the **red** circle.
- Once the Trimble has acquired a GPS signal, a **red** circle will appear on the map. This circle indicates where you are in relation to the map.
- The Trimble settings are currently set so that you cannot zoom into an area of the map that does not include your **red** circle.
- As you move around in the field, the Trimble unit will automatically adjust the underlying map so that your **red** circle, and subsequently, the current area you where are located is always in view.
- Be aware that your '*level of zoom*' can impact how close you look to a designated spot. If you are zoomed way out, you may look like you are at a target location when in fact you may be several meters away. If you are zoomed in too close, every slight move will cause your **red** circle to 'jump' a distance on the screen. Subsequently, as you appear to get closer to a target, you may have to slowly zoom in more and more until you find that 'sweet spot' that lets you know you are where you should be without causing the **red** circle to jump all over the screen.

g) **Adding a new 'Point' to mark a current invasive species plant/patch.**

i. Make sure the recorded Feature is set to 'Point' *.

- In the top toolbar, tap on the  icon. A second toolbar will appear.
- Tap on the **black** arrow under the third icon from the left.
- Tap on the 'Point' option.
- The third icon from the left should now be .

If you are only recording point features, this should only have to be done once, at the beginning of each mapping session.

ii. Mapping a new Invasive Species Point Feature.

- Navigate to where you are holding the Trimble as close to the center of the target plant/patch as possible.
- In the top toolbar, tap on the  icon. A second toolbar will appear.
- In second toolbar you will see a selection of 'Points' – one for each editable layer (i.e. invasive species layer) that has been uploaded. **Make sure you know which color indicates which species!** The individual that prepared the map and uploaded it can provide you with that information.
- Tap on the 'Point' whose color corresponds to the species you are mapping. A new window should open with a 'Text Box' titled *ID* at the top of the screen.
- A keyboard will also appear at the bottom of the screen.
- Use your style to tap once inside the box.
- Next, use your stylus to type in the '**Assigned Object Id**' that will match the correct field data recorded on the field (paper) datasheet. The 'Assigned Object Id' will already be pre-filled on the form. Do your best to **not** duplicate points or ID numbers in the Trimble.
- Once the 'Assigned Object ID' has been entered correctly, tap on the circular **green** '**ok**' button in the lower left hand corner to exit back to the map. The data will be saved. Repeat as needed for each new plant/patch.
- **If you have accidently recorded a point**, simple tap the **red** circle with an 'x' located in the lower left corner of the pop-up screen to exit without saving the point.

h) **Erasing an incorrectly recorded Feature.**

i. Select the feature that needs to be removed.

- Navigate to and zoom into the feature you need to remove.
- In the top toolbar, tap on the  icon. A second toolbar will appear.
- Tap on the **black** arrow under the second icon from the **left**.
- Tap on the 'Select' icon ().
- The icon above the black arrow should now look like  .
- Use your stylus to tap and 'select' the feature that needs to be removed.

ii. Navigate to the Editing tool needed.

- In the top toolbar, tap on the  icon. A second toolbar will appear.
- Tap on the **black** arrow under the second icon from the right ().
- Tap '**Delete Selected**'.
- The feature in question should now be removed.

i) **Correcting the 'Assigned Object Id' of a Feature.**

i. Select the feature that needs to be updated.

- Navigate to and zoom into the feature you need to remove.
- In the top toolbar, tap on the  icon. A second toolbar will appear.
- Tap on the **black** arrow under the second icon from the **left**.
- Tap on the 'Select' icon ().
- The icon above the black arrow should now look like  .
- Use your stylus to tap and 'select' the feature that needs to be updated.

ii. Navigate to the Editing tool needed.

- In the top toolbar, tap on the  icon. A second toolbar will appear.
- Tap on the **black** arrow under the second icon from the right ().
- Tap '**Feature Properties**'.
- The 'Assigned Object Id' window should now open.
- Tap inside the 'Feature Id' box on the right hand side.
- Tap the delete key on the keyboard (the little **black** arrow facing to the left) until all characters that need to be erased are erased.
- Use the stylus and keyboard to type in the correct information.
- Tap on the circular **green** '**ok**' button in the lower left hand corner to exit back to the map. The corrected data will be saved.

j) **Closing out of ArcPad at the end of the Day***

****This must be done in order to ensure the data collected during the day is properly saved.***

i. Close out of ArcPad

- Tap the  icon in the upper left corner.
- Tap '**Exit**'.
- If it asks if you want to save changes, select 'Yes'.
- You may see several processing bars flash across the screen – that is okay.
- ArcPad is now closed down.

k) **Turning the Trimbles OFF* and placing them to Charge.**

The Trimble may be in 'Power Saver' mode with screens grayed out – THAT DOES NOT MEAN THEY ARE OFF. Do <u>NOT</u> plug them in to charge while in 'Power Saver' mode. The GPS will continue to try and acquire satellites which will drain the battery as fast or faster than it can charge. This results in it Trimble not being usable (i.e. having enough battery charge) the next time it is needed in the field.

i. <u>Make sure the Trimble is not in 'Power Saver' Mode.</u>
   - If the screen is on and you can see the map it is not in 'Power Saver' Mode.
   - If the screen is gray, tap the button once quickly. <u>It is better to accidently turn it back ON and have to wait to turn it back OFF than it is to plug it in while in 'Power Save' Mode.</u>
   - Once the screen is visible, turn OFF the unit.

ii. <u>Turn OFF the Trimble Unit.</u>
   - Press and hold down the **green** power button at the bottom of the Trimble.
   - A new screen will appear with 4 or 5-buttons to choose from.
   - Tap the 'Shutdown' button.
   - The unit will shut off.

iii. <u>Place the Unit on the correct charger</u>.
   - The 2000 series Trimbles are placed on the cradle chargers.
     1. Insert the top of the Trimble under the 'hooks' at the top of the cradle and **gently** push the unit down at the bottom so that it locks into the base.
     2. The light at the lower right corner of the cradle should light up. If it does not, remove the Trimble unit and try again.
     3. The light will turn green once the unit is fully charged.
   - The 6000 series Trimbles are charged using charger cables.

Verifying and Importing New Invasive Species Data into the Existing RLGIS Invasive Species Geodatabase

Instructions where written for Arcpad 10 and ArcMap 10.1

1) MOVING NEW DATA FROM TRIMBLE UNITS INTO ARCMAP

a. Turn on the Trimble and allow it to boot up fully (do not open any programs).

b. While the Trimble is booting up, on your computer, open 'Windows Mobile Device Center'.
   i. Click on start Menu
   ii. Click on 'All Programs'
   iii. Click on 'Windows Mobile Device Center'.
   iv. A new window should open for this program.
   (*if a 'DO More' registration window appear, close that window by clicking on the 'X' in the upper right hand corner.)*

c. Once the Trimble has completed booting up, connect it to the computer using its proper connection cable/cradle for that Trimble model.
   i. After a few seconds you should see 'Connecting' appear in green in the lower left corner of the main 'Windows Mobile Device Center' window.
   (*If after 30 seconds this does not happen, disconnect and reconnect the Trimble.)*

   ii. *Click on the 'Connect without setting up your device' option.*
   iii. *Click 'File Management' → 'Browse the contents of your device'.*
   A new window should open.

   iv. *In the new window, double click on the hard drive icon that should appear in the right portion of the window.*

v. *From the folders that open, click: 'My Documents'.*
*This should open a list of **all** Maps currently loaded onto that Trimble device.*
vi. Right click on the folder that has that year's data* (*i.e. '2015_Invasives_T2'*) and select 'Copy'.
* ***If you are only wanting to import one select type of data, i.e. knapweed only, you will need to open that folder, i.e. '2015_Invasives_T2, and then select and copy only the files with the file name you are looking for, i.e. 'Knapweed_T2'. There should be 7 files with the same name; you must copy and paste all of them. This is easiest to accomplish using the 'View--> List' option for that file window.***

d. On your main computer, click on 'Start' → Computer and then navigate to the folder you will be using to store that years invasive species raw 'Post Field Work' data.
i. Once that folder is open, right click→ 'Paste' to copy the data onto your computer.

e. Repeat a-d will for each Trimble unit that use utilized to collect invasive species data.

2) CLEANING AND VERIFYING DATA PRIOR TO ADDING TO MAIN INVASIVE DATABASE

a. Located all datasheets for the data you are preparing to enter.
i. Separate out knapweed datasheets from the Pepperweed/Tamarisk/Russian Olive datasheets.
ii. By category (*i.e. knapweed vs Pepperweed, etc.*) put the datasheets into order by '**ID number'**.
iii. There may be gaps in the datasheets. Make note of range of used #'s **and** missing #'s. *ideally*, the points previously imported will all have matching point ID information on these sheets.

b. Review datasheets and compare to imported shapefiles
i. KNAPWEED
- For knapweed, review all knapweed sheets. Make note of range of used #'s, **and** missing #'s. Pay attention to which Trimble was used for the point creation.
- In ArcMap, one-by-one, right click on each of the knapweed shapefiles and select 'Open Attribute Table'. A new window will open.

  In this window, there will be tabs at the bottom for each attribute table opened. Click on these tabs to move between tables.

- Review each table looking for duplicate #'s, missing #'s and 'extra' #'s (*i.e. numbers that don't fall within the # ranges from the knapweed data sheets*).
- Compare this list to the datasheets and try and account for/explain any errors. Examples to look for include –

1. Is a duplicate number a 'True Duplicate' or is a number immediately before or after the duplicate missing? If a number is missing right before or after, it is likely a typo. Review the relative point position in GIS and then correct the most logical point of the duplicates to the missing ID.
2. Is a duplicate # a 'True Duplicate' or a typo for a missing #? Look at your list of duplicates and your list of missing ID's. Could a typo account for one of the missing #'s? *I.e. If you have two '3475's could one of those have been your missing '4475' or maybe a '3485'?* Use relative position of the points in GIS to help resolve.
3. Are the 'extra #s' actually typos that could be accounted for by the list of 'missing #'s"?

ii. PEPPERWEED / TAMARISK / RUSSIAN OLIVE / ALL OTHERS

- For all these species, review all related field datasheets. Make note of range of used #'s, **and** missing #'s. Pay attention to which Trimble was used for the point creation.
- Locate and highlight on the datasheets all non-pepperweed points (*i.e. tamarisk and Russian olive*).
- Make/print of a list of all Tamarisk/Russian Olive Points included within the tamarisk mapping files.
    1. Open <u>TWO</u> individual Excel windows.
    2. Save one window two a temp working folder or your desktop, title is 'list of tamarisk points'.
    3. In the <u>second</u> Excel window, you will open an existing file. 'File' → 'Open'.
    4. In the dropdown box located next to the 'File Name' box at the bottom of the window, select '**All Files**'.
    5. Navigate to where you have saved copies of the current year's tamarisk files. (I:\GIS DATA and MAPS\Shape_files\plants).
    6. For the first Trimble used to map, click on the Tamarisk_T1.**dbf** file (Do **not** save any changes to the .dbf files! Just 'X' out and select 'No' when asked if you want to save changes or else you will impact your actual source shapefile.)
    7. Once it opens in Excel, left-click on the 'A' located above the list of ID numbers.
    8. Once the column is highlighted, right-click and select 'Copy'.
    9. Now go back to the <u>first</u> Excel window. Left-click on the 'A' column, then right-click and select 'Paste'.
    10. Repeat steps 1-9 for each tamarisk file. You will paste each additional list in subsequent columns on the first Excel sheet. I.e. Tamarisk_T2 should be pasted in column B, etc.
    11. Once all lists have been copied to the first datasheet, save and print the list.

12. Use this list to compare to all the field datasheets to be sure that the points were saved in the correct place. Make a list of all errors. A list of errors you might see include:
    - Tamarisk listed on the field datasheet but wasn't saved in any of the Tamarisk files.
    - A point saved in the Tamarisk file that isn't listed as Tamarisk on the datasheet (i.e. it was actually a pepperweed point saved to the wrong shapefile.)

- Address Errors where Tamarisk/Russian Olive Points were not saved in the Tamarisk shapefiles.

1. Make a list of all Tamarisk//Russian Olive points listed on the datasheets that did not have a corresponding point saved in a Tamarisk shapefile.
2. In ArcMap, one-by-one, right click on each of the pepperweed shapefiles and select 'Open Attribute Table'. A new window will open.

   In this window, there will be tabs at the bottom for each attribute table opened. Click on these tabs to move between tables.

3. Check each of the pepperweed shapefiles attribute tables to see if any of the corresponding IDs were incorrectly saved in a pepperweed shapefile. Make note of which ID was saved in which shapefile. Once you have completed the comparisons, if did locate any of the points saved in the incorrect shapefile, you will need to extract these points from the pepperweed shapefiles.
4. To extract the points, open the 'Attribute Table' that corresponds to the pepperweed shapefile that has tamarisk (or Russian olive) points incorrectly saved within it. (<u>If you have points incorrectly saved in more than one pepperweed shapefile you will need to repeat these steps for each shapefile.)</u>
5. Once the 'Attribute Table' is open, left-click on the white icon in the upper left corner of the Table's window, the click on 'Select By Attribute'. A new window will open.
6. In the <u>new</u> window, double-click on the "ID" listed in the upper white box. You will see "ID" appear in the bottom white box.
7. Left-click on the 'Get Unique Values' button under the middle box.
8. Left-click on the '=' sign <u>once</u>. An equal sign should appear in the bottom box: "ID" =
9. Now in the middle window, click on the <u>first</u> of the point IDs that belongs in the Tamarisk file. Click 'Apply'.

10. If there is more than one point within this shapefile, you will need to go to the dropdown menu at the top of this window and select 'Add to Current Selection'.
11. In the bottom box, highlight the ID number you have already selected and then in the middle box, click on the next point ID and click 'Apply'. Repeat until all Tamarisk points located within this shapefile are selected. Then click the close button.
12. In the ArcMap 'Table of Contents', right click on the shapefile that you are currently selecting points within and then select 'Data' → 'Export Data'. A new window will open.
13. Make sure the dropdown menu at the top is set to 'Selected Features' and choose the file location that matches the rest of the invasive species files for the source Trimble. Choose a short descriptive file name (*i.e. Add_Tamarisk_T3)* and click 'Okay'. A new shapefile will be created and will automatically appear in your ArcMap.
14. Next, go to the Editor Toolbar and click on 'Editor' and select 'Start Editing'. A new window will appear.
15. Select the name of the 'source' shapefile from which you have selected the points and click 'Okay'.
16. Go back to the attribute table where the points were originally selected. If they are not still selected, select them again using steps 5-11.
17. In the 'Attribute Table' that contains the selected points, right-click on gray box to the very left of one of the selected points then click 'Delete Selected'. All the Tamarisk points should now be removed from the Pepperweed shapefile.
18. Got to the Editor Toolbar and click on 'Editor' to select 'Stop Editing'. A window will appear asking if you want to save edits, choose 'Yes'.
19. Repeat steps 2-18 as needed for other shapefiles.

- Address Errors where non-Tamarisk Point was saved in the Tamarisk shapefiles.
    1. Follow the steps listed above, under the heading '*Address Errors where Tamarisk*/Russian Olive *Points were not saved in the Tamarisk shapefiles'* only you will be copying the pepperweed points **from the tamarisk shapefiles** and **creating new pepperweed** shapefiles.
    2. Make sure to delete the non-tamarisk points from the tamarisk source shapefiles.

- Once all corrections and subsequent new shapefiles are made, you will need to merge all 'like' shapefiles together. *i.e. all pepperweed shapefiles together and all tamarisk/Russian olive shapefiles together.*

3) MERGE INVASIVE SPECIES FILES FROM CURRENT YEAR'S DATA PRIOR TO ADDING TO INVASIVE GEODATABASE

a. Merge all 'like' shapefiles.
   i. Open 'Arc Toolbox' by clicking on the red toolbox icon in the 'Standard' toolbar. A new window will open.
   ii. In the 'Arc Toolbox' window, select 'Data Management Tools' → 'General'
   iii. Create a new 'Merged' Invasive Shapefiles that includes all the current year's data.
      - Double click on 'Merge'. A new window will open.
      - In the new window there is a dropdown bar. One at a time, click on each of the invasive species files you need to merge. This will be the current year's shapefiles only; **do not** include the existing Invasive species geodatabase layer!
      - Next to the 'Output Dataset' box, click on the folder icon.
      - A new window will open. Use this window to navigate to where you want the new shapefiles to be stored.
      - Once the destination is selected, in the 'Name' box choose the name you wish to use and then click, 'Save'. This will close this window.
      - In the 'Merge' window, click 'Ok'.
      - The computer will now create a new shapefiles and will automatically import it into the Map you are working in.
   iv. Add a **Year** Field to the existing merged shapefile.
      - This is vital to ensure you can easily identify this year's data once it is imported into the main geodatabase. You will need to be able to do this in order to enter the data.

THIS SECTION STILL NEEDS TO BE COMPLETED- CONTACT JO ANN DULLUM IF YOU NEED ASSISTANCE.

4) VERIFYING THAT RECORDED POINTS AND POINT DATA MATCH

a. In this section you will compare the points recorded into the shapefiles with the data collected on the datasheets by matching the '**Assigned Object ID'** column on the completed datasheets to the **'PointID'** assigned to each point recorded in the shapefiles you just merged.
b. Compare and identify any missing data points.

5) MERGING INVASIVE SPECIES DATA COLLECTED THIS YEAR INTO THE INVASIVE GEODATABASE

a. This will be done using the RLGIS toolbar.

THIS SECTION STILL NEEDS TO BE COMPLETED- CONTACT JO ANN DULLUM IF YOU NEED ASSISTANCE.

6) ADD THE DATA FOR THE CURRENT YEAR'S DATA POINTS YOU JUST MERGED INTO THE GEODATABASE

a. This will be done using the 'Editing Toolbar' on the 'Invasive_Plant_Mgmt_Pt' shapefile after all the data has been merged.

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