Appendix ES-2

Tutorial: Operating the OANRP Database

Overview

The Oahu Army Natural Resources Program Database (OANRP Database) is a multi-level database, coordinating diverse data from rare plant observations, reintroductions, rare snail monitoring, plant nursery propagation, and weed/ungulate management. The database files are developed with Microsoft Access. It is recommended that Access software versions 2007-2016 be used.

The database allows the Army staff to know which plant individual has been collected, matured, or died thus providing a better understanding of the genetic diversity that remains for any given rare species that the Army must manage. Using this database, the Army maintains consistent tracking and reporting for its managed rare species.

The OANRP Database is based upon the criteria established by the Hawaii Rare Plant Restoration Group (HRPRG). As part of the Makua and Oahu Implementation Plans, the Army Propagation database has been a 15 year effort in developing and coordinating the collection, propagation, management, and tracking of rare species.

The following appendix will briefly cover the database requirements and database procedures. Only important search criteria will be discussed. Most data fields are self-explanatory. This tutorial will be a guide to the database reports presented in previous OANRP status updates.

Several database reports may take a several minutes to compile within the database, thus pdf versions of the three major database reports (Population Unit Status, Threat Control Summary, and Genetic Storage Summary) have been created and may be found in the database reports subdirectory. Therefore, running the database may not be necessary unless more information is needed beyond the pdf version of the reports provided. Data provided is as of June 30, 2016.

Modification to the data and/or structure of the database is prohibited. The database version provided is read-only. It is intended for Implementation Team and collaborating agencies only. Distribution of the database structure and/or data is prohibited without the consent by the Oahu Army Natural Resources Program.

Questions may be directed to:
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Oahu Army Natural Resources Program
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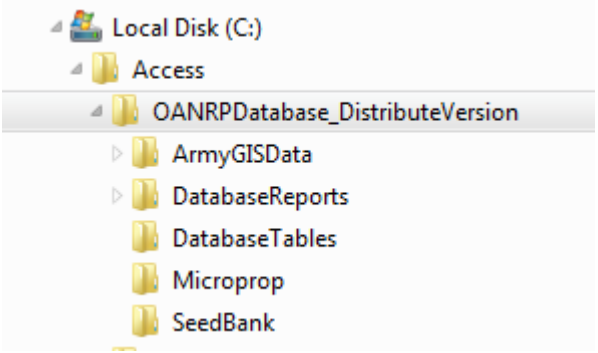
I. Database Settings

Setting Database Directories and Security Warning

Database directories

The database must be placed under the following directories. Copy the following directories and data files from the data disc to the C: drive. Database path and GIS files must be within the following directories. All subdirectories should be under **C:**



Descriptions of the files within each subdirectory are as follows under C:\Access\OANRPDatabase_DistributeVersion:

OANRPDatabase_DV.mdb

Front-End database file what most database users see, the database file manages the data forms, queries and reports. Data used in the OANRP Database is kept in the back-end data file (OANRPDataTables_DV.mdb) located in the database tables subdirectory. Forms are locked and may only be used for viewing purposes.

C:\Access\OANRPDatabase_DistributeVersion\ArmyGISData\

GIS shapefiles depicting the rare plant sites, managed areas, and fence lines.

C:\Access\OANRPDatabase_DistributeVersion\DatabaseTables\OANRPDataTables_DV.mdb

Back-End database file containing data for the Front-End database file.

C:\Access\OANRPDatabase_DistributeVersion \Microprop\Microprop.mdb

Lyon Arboretum Micropropagation Database. Contact Nellie Sugii for more information.

C:\Access\OANRPDatabase_DistributeVersion \SeedBank\SeedBankDatabase.mdb

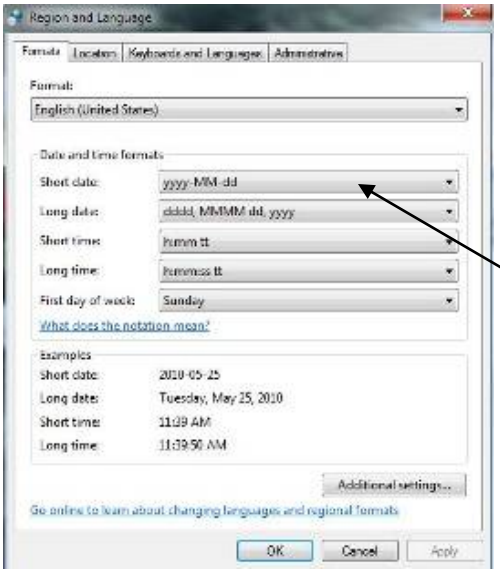
Army SeedLab Database. Contact Lauren Weisenberger for more information.

C:\Access\ OANRPDatabase_DistributeVersion \TaxaDatabaseReports

Population Unit Status, Threat Control Summary, and Genetic Storage Summary PDF reports for each IP taxa.

Setting Default Date Format

The default date format for most computers is normally set to mm/dd/yy. The format can be confusing and not sort properly for Access database records. Although, not required, the date format for computers using this Access database should be changed to yyyy-mm-dd. Examples assume you are using Windows 10.



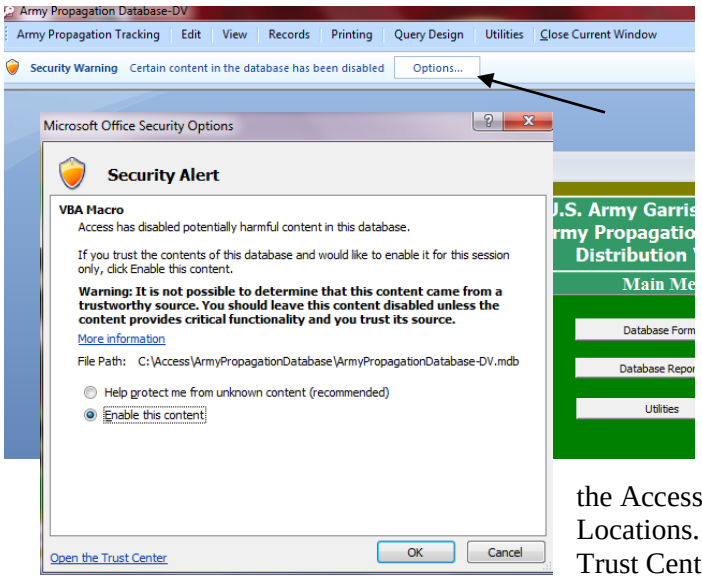
- Open Regional and Language Options by RIGHT clicking the **Start** button, clicking **Control Panel**, clicking **Clock, Language, and Region**, and then clicking **Region.** Under the Formats, change the **Short Date** to **yyyy-MM-dd.**

Change to yyyy-MM-dd

Security Warning

Security features in Microsoft Access 2007, 2010, and 2013 automatically disables any executable content. The Access database with customized, buttons, commands, etc. will have a warning and not work unless the following is set within your computer.

To help you manage how executable content behaves on your computer, Office Access 2007-2016 database content must be enabled when the Security Warning appears.



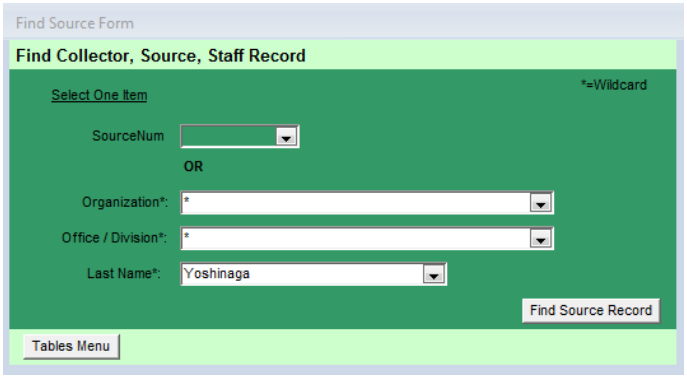
After opening the OANRPDatabase_DV.mdb file in Microsoft Access, click on Options when it appears at the top of your screen.

A window stating Security Alert will appear. Click on the button to select Enable this content, and click OK. Enabling the content will allow the database functions to operate.

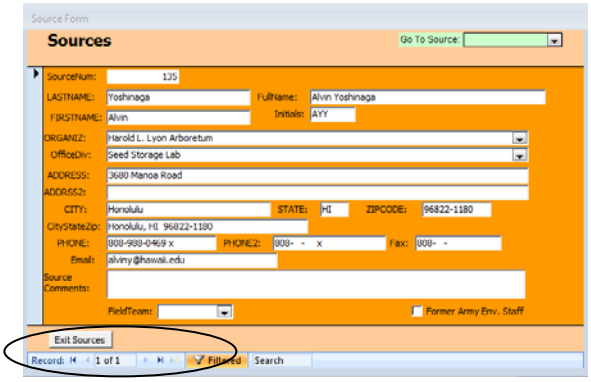
Enabling content will have to be done every time the database file is opened. You may avoid having this Security Warning appear if the Access subdirectory is added to the Trust Center Locations. Contact Roy Kam if you need to establish a Trust Center Location.

Data Search Methods

Most data form and report sections start with a Find Form. These Find Forms have drop downs that allow you to find an existing record. In the adjacent example, locating the Sources record for Alvin Yoshinaga.

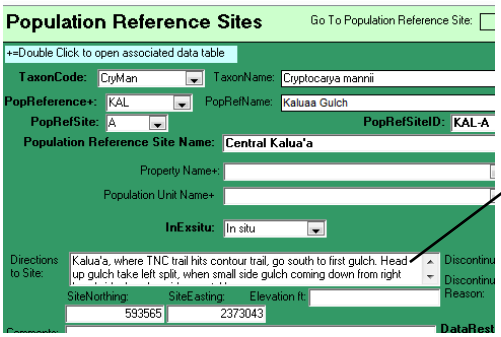


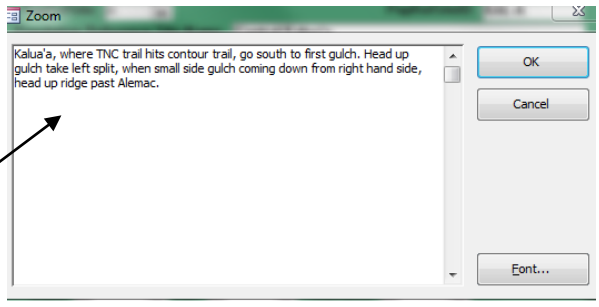
Using the * (asterisk), in a Find Form represents a wild card. Such as Organization *= Search for all Sources with any Organization. In this case, we will just search for the Last Name = Yoshinaga.



On the bottom of each Data entry form (such as the Sources Form), there are a set of Navigation buttons. These buttons allow you to go to the previous or next record. Pressing the tab or enter keys moves from one data field to another.

Short cuts: *Shift + F2* in any text field (within a data entry form or datasheet) will bring up the Zoom window. The Zoom window will allow you to view the complete text entered in that data field. See example below.





II. Main Menu

Open the **OARNPDatabase_DV.mdb** either by double clicking the file, creating a shortcut on your desktop, or by opening MS Access and opening the file. The database will open to the Main Menu.

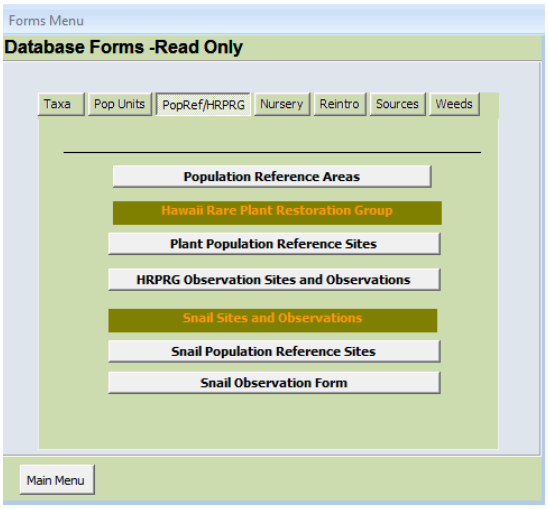
The database is broken up into 2 parts, Database Forms and Database Reports. We will primarily cover the Database reports. Database Forms are self-explanatory and is only for viewing purposes. The forms are provided for detailed review of individual observations. Only pertinent data fields will be discussed in detail.

III. Database Forms

The **Database Forms menu** is broken up into several sections. They are Taxa, Pop Units, PopRef/HRPRG, Reintro, Sources, and Weeds.

Most buttons under each tab will open a "Find" form that will allow you to find an existing database record.

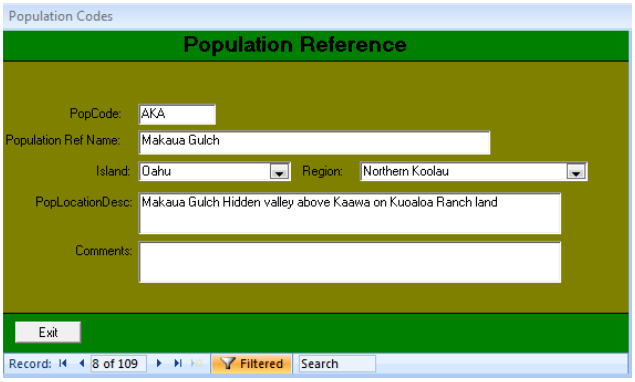
For the purpose of this tutorial, we will discuss forms of the PopRef/HRPRG tab with comprise of the Population Reference and Population Reference Sites. All other sections are supplemental and self-explanatory.



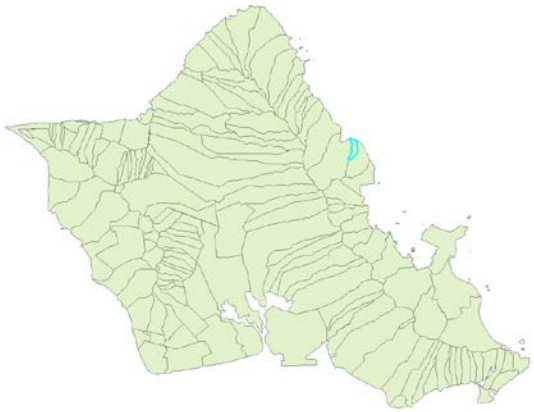
PopRef, Sites, and Observations

Population information is broken up into three sections, Population Reference Areas (PopRef), Population Reference Sites (PopRefSite) and Observations. Both In situ and Reintro observations will be covered in this section.

Population Reference Areas (PopRef)



Population Reference, also known as PopRef for short, is a boundary system that allows a consistent identification of plant or animal populations. The PopRef is normally valleys, summits, ahupuaa, bogs, or areas that biologists have continuously acknowledged within observations from past decades.

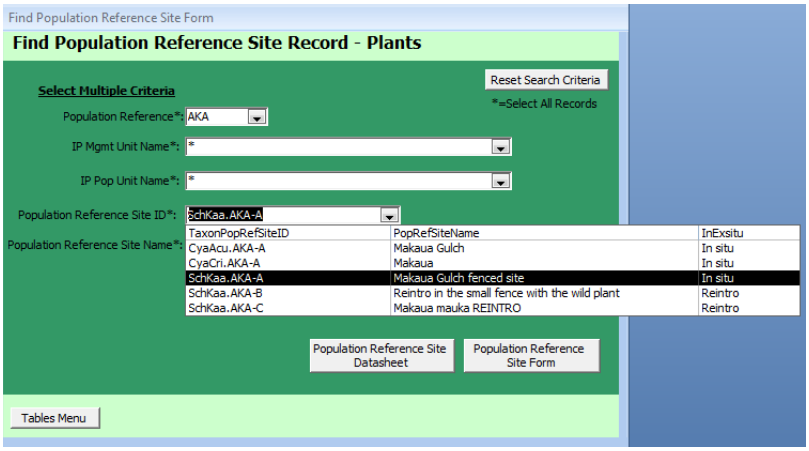


It should be noted that the Population Reference is not necessarily the name for any given population. It is only used as an identifier to compile different plant or animal populations within a given area. For example: Makaua on the Windward Koolau of Oahu (highlighted in blue). The GIS boundary is based upon Makaua's ahupuaa as AKA's PopRef. But a plant population within Makaua PopRef, its population name may be named something different like a puu, or other landmark within Makaua.

Population Reference Site (PopRefSite)

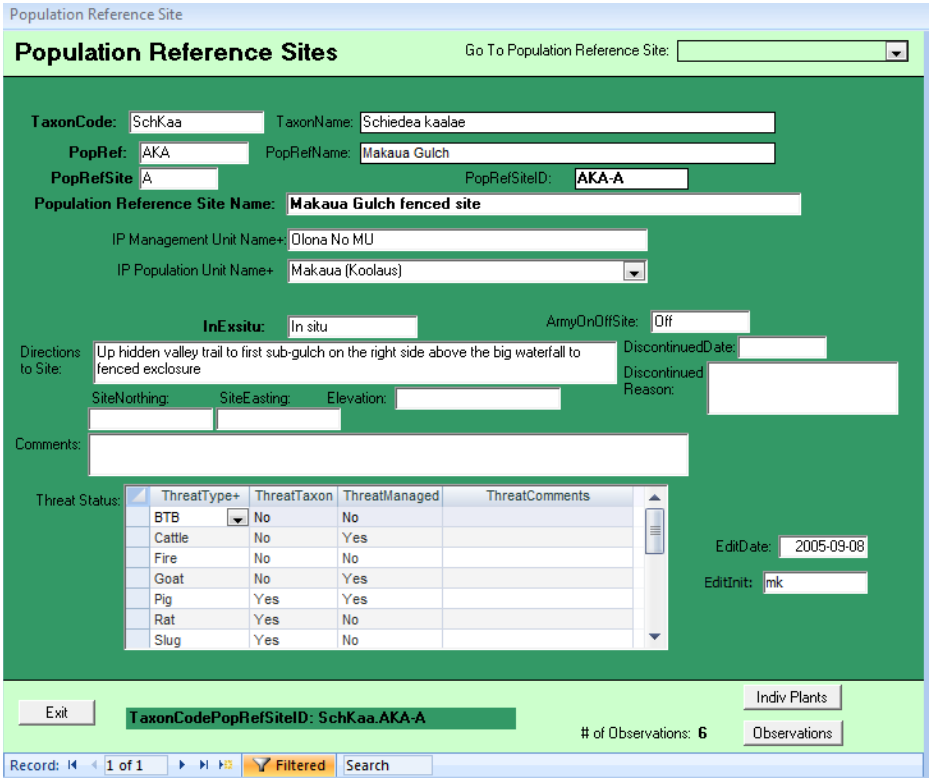
The Population Reference Site (PopRefSite) is the primary data table in establishing plant or animal population sites. The PopRefSite identifies the Population Name, whether it is In situ, Ex situ or Reintro, and provides directions to the site, etc. The PopRefSite is only site information; observation information from various surveys is kept in the observation section discussed later.

Determining what is a population or Population Reference Site is always very difficult and can vary by taxon. Normally populations are determined by the botanist in the field. Population determination criteria normally used is topography, distance from one population to another (Army normally uses 1000 ft. buffer distance), genetic dispersal, geographic features (streams, veg. type changes), etc.



To view an existing PopRefSite record, from the menu click on the Population Reference Sites button, a Find Population Reference Site Record form will appear and select AKA under the PopRef drop down as in the example. From that, you could also see all of the AKA Populations under the Population Reference Site ID Drop down. Select SchKaa.AKA-A.

Within the PopRefSite record, **TaxonCode, PopRef, and PopRefSite (Site Letter)** are kept. All three data fields build the TaxonCodePopRefSiteID (aka PopRefSiteID or PopRef Code). The PopRefSiteID is found on the bottom of the form in this case SchKaa.AKA-A. The PopRefSiteID is the unique key field that provides consistent population identification. The format of the PopRefSiteID is always TaxonCode**.**PopRef-SiteLetter.



Population Reference Site Name (PopRefSiteName) is the name used to identify the population. It is normally be a brief descriptive name. Detailed directions or descriptions are entered in the Directions to Site field.

IP Management Unit Name: Management Unit commonly known from.

IP Population Unit Name (PopUnit): The PopUnit is used when several PopRefSites need to be tracked together. Such as a taxon with several sites throughout the Northern Waianae Mountains, Northern Waianae could be used as a PopUnit Name.

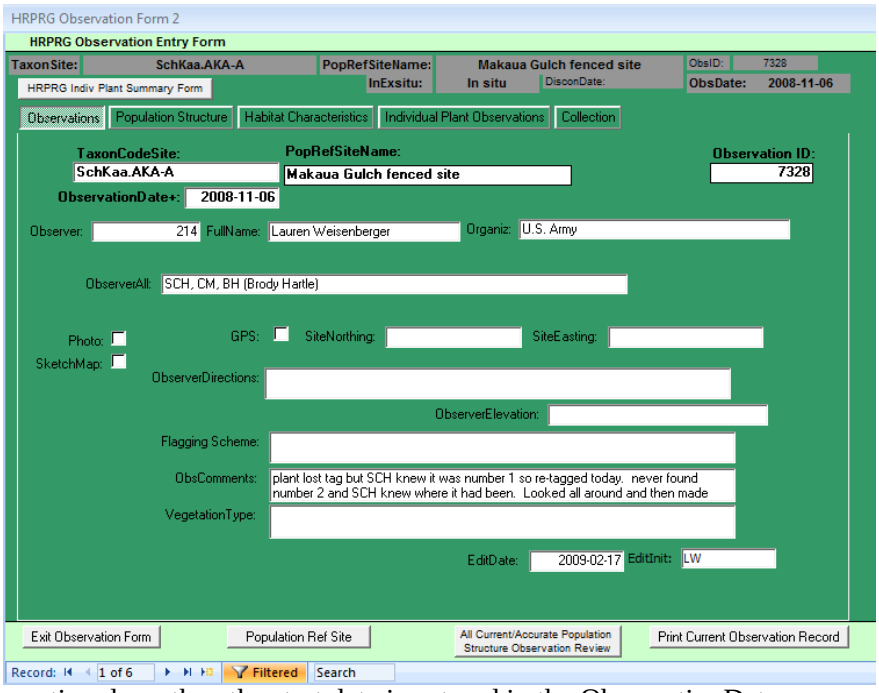
InExsitu: Identifies whether the PopRefSite is a naturally occurring wild (In situ), or Reintroduction (Reintro), etc.

Directions to Site: Detailed directions to locate the population.

Threat Control Status: What the threat control is being conducted (Yes, No, Partial)

Observations

Clicking the Observations button on the bottom of the PopRefSite Form will open up the corresponding Observations.

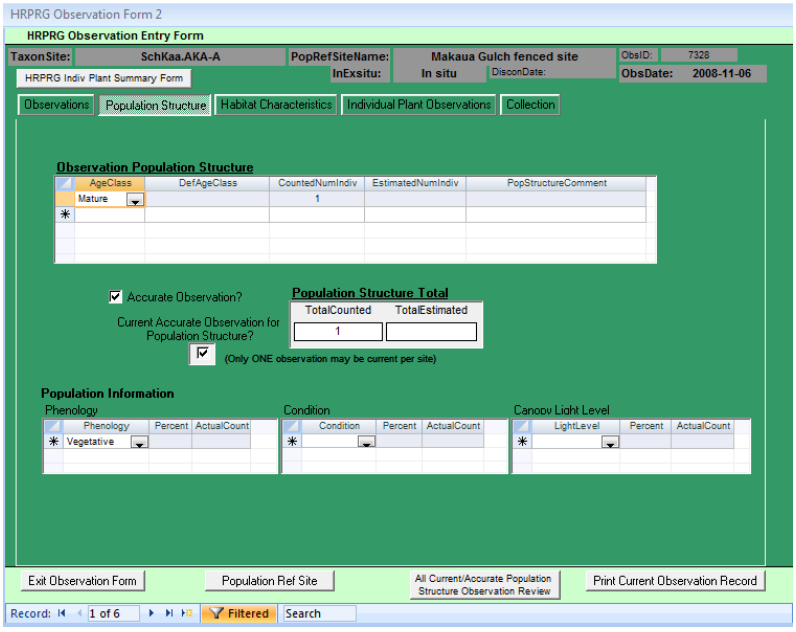


ObservationDate: Observations of the Population Reference Site are entered by the ObservationDate. Observation Date is normally the day that the Population Site was surveyed. If the individual(s) were not found during the survey, the observation date and record is still be filled out. If the survey took several observation days, then the start date is entered in the ObservationDate.

Observer Directions may be entered if it is different from the PopRefSite Directions. Observer Directions may be a different route or situation that would represent the directions for that survey day.

Population Structure

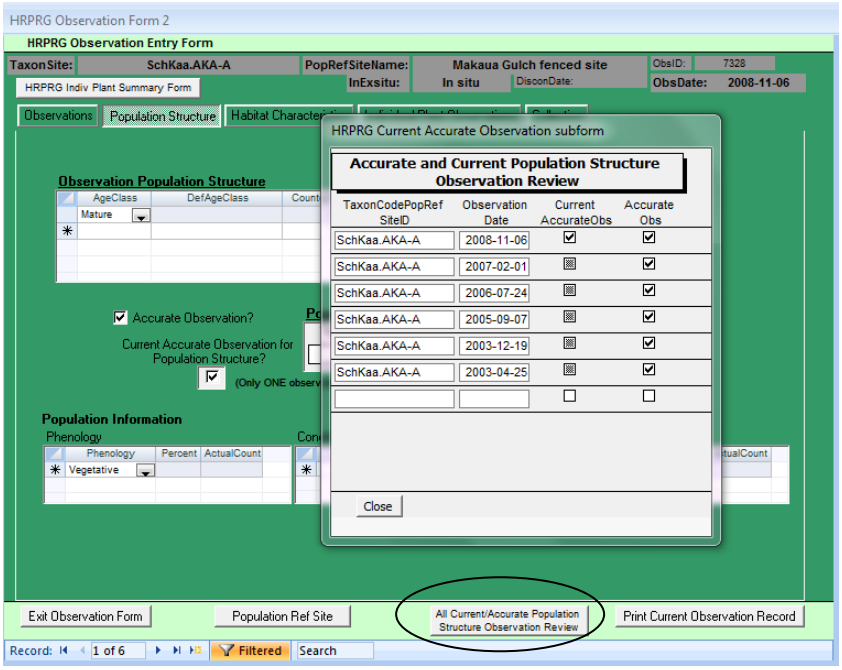
The Population Structure should are always entered for any observations, even if the number of plants observed are incomplete (not all plants observed).



Age Class always is required, where **CountedNumIndiv** (Counted Number of Individuals) is considered a more accurate count of the number of plants. **EstimatedNumIndiv** (Estimated Number of Individuals) may be entered only when the CountedNumIndiv is not entered. EstimatedNumIndiv is used when the number of plants is numerous. EstimatedNumIndiv should not be entered when the number of plants can be counted.

EstimatedNumIndiv may not be a number range, if a range such as 100-200 is provided, the conservative number 100 is entered, and 100-200 may be entered in the PopStructureComment.

Accurate Observation is checked off when the Population Structure's Age Classes and CountedNumIndiv/ EstimateNumIndiv contain an accurate and representative count of the PopRefSite population. Many observations over different survey dates may have the Accurate Observation checked off.

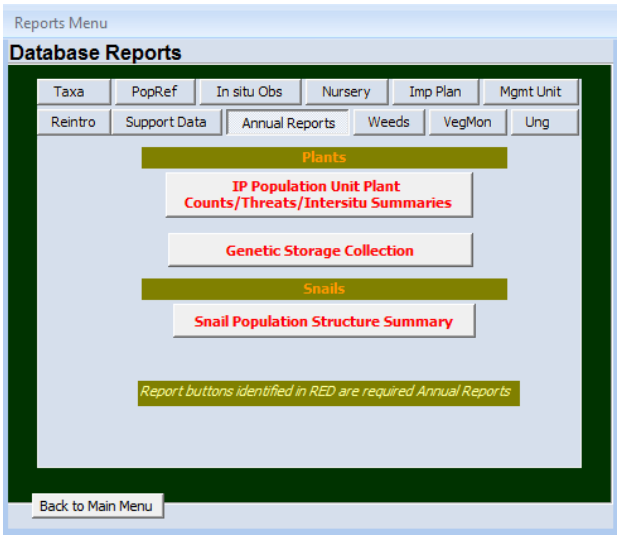


As opposed to the Accurate Observation check box, the **Current Accurate Observation** check off box may only have one observation checked. The Current Accurate represents the population structure that is considered both current and accurate. The most recent observation may not always be the Current Accurate observation, thus the Current Accurate is used to identify the proper Population Structure numbers that currently represents the population in reports and queries.

Clicking on the button on the bottom "All Current/Accurate PopStruc Obs Review" will pull up a review form to show all observations for the site and which ones were Accurate, and which one is tagged as the Current/Accurate.

IV. Database Reports

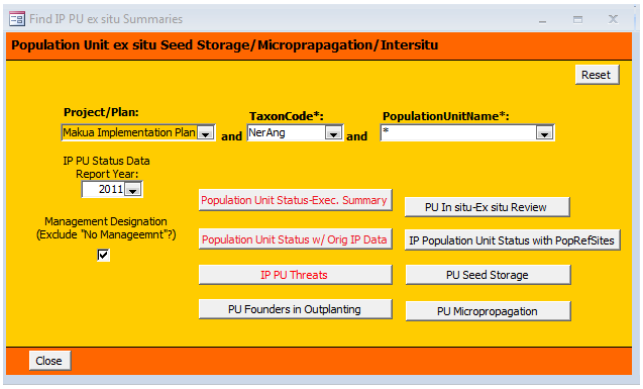
Starting from the Main Menu, click on the Database Reports button. The Database Reports menu provides reports for various sections of the database.



Similar to the Database Entries, clicking on a button within the Database Reports will open a Find Form that will assist in selecting data records for the report.

For the purpose of this document, we will cover the reports normally generated for the Year-End Annual report.

There are three sections consisting of four reports that are normally printed annually. The sections are IP Populations, Genetic Storage, and Snail Population as shown in the figure to the right.



Taxon Status and Threat Summaries

Under the IP Population Unit button, the menu has threat reports (in red) Exec. Summary, Taxon Status (Population Unit Status) and the Threat Summary (IP PU Threats). Buttons with red text will signify it is a report used in the year-end annual report. Project/Plan and Report Year must be selected for the reports to run. In the Report Year Field, select 2012. Report Year is defined below under Total Mature, Immature and Seedling 2012.

Executive Summary

The Executive Summary database report combines data derived from the Taxon Status Summary Report, Genetic Summary Report and Threat Summary. See below for further details.

Makua Implementation Plan - Executive Summary - Plants

# of Stable IP Population Units: 45 of 101

= Ungulate Threat to Taxon within Population Unit
No Shading = Absence of Ungulate threat to Taxon within Population Unit

Plant Taxon	Target # Matures	Population Unit Name	Total Current Mat.+Imm.	Total Current Mature	Total Current Immature	Total Current Seedling	# Plants in 2015	# Plant in Original Report	% Completed Genetic Storage Requirement	% of Plants Protected from Ungulates	PU Met Goal?	# PU Met Goal
Neraudia angulata	100											
		Kaluakauila	124	100	24	1	134	0	N/A	100%	Yes	
		Makua	75	68	7	13	126	29	44%	100%	No	
		Manuwai	207	110	97	14	199	12	80%	100%	Yes	
		Waianae Kai Mauka	13	11	2	0	16	46	61%	100%	No	
		Neraudia angulata Total:	419	289	130	28	475	87				2 of 4

Taxon Status Summary

Population Unit Status - Makua Implementation Plan

Action Area: In

TaxonName: Cyanea grimesiana subsp. obatae — Target # of Matures: 100 — # MFS PU Met Goal: 2 of 4

Population Unit Name	Management Designation	Total Mature Original IP	Total Imm Original IP	Total Seedling Original IP	Total Mature 2015	Total Immature 2015	Total Seedling 2015	Total Mature Current	Total Immature Current	Total Seedling Current	Wild Mature Current	Wild Immature Current	Wild Seedling Current	Outplanted Mature Current	Outplanted Immature Current	Outplanted Seedling Current	PU LastObs Date	Population Trend Notes
Pahole to West Makaleha	Manage for stability	22	24	0	75	36	0	75	36	0	6	11	0	69	25	0	2015-08-31	No monitoring in the last year
In Total:		22	24	0	75	36	0	75	36	0	6	11	0	69	25	0		

Action Area: Out

TaxonName: Cyanea grimesiana subsp. obatae — Target # of Matures: 100 — # MFS PU Met Goal: 2 of 4

Population Unit Name	Management Designation	Total Mature Original IP	Total Imm Original IP	Total Seedling Original IP	Total Mature 2015	Total Immature 2015	Total Seedling 2015	Total Mature Current	Total Immature Current	Total Seedling Current	Wild Mature Current	Wild Immature Current	Wild Seedling Current	Outplanted Mature Current	Outplanted Immature Current	Outplanted Seedling Current	PU LastObs Date	Population Trend Notes
Kaluaa	Manage for stability	0	0	0	128	22	1	124	17	0	2	1	0	122	16	0	2016-04-07	Some plants died this year
Makaha	Genetic Storage				4	18	0	13	56	0	0	0	0	13	56	0	2016-02-09	More plants were outplanted
North branch of South Ekahanui	Manage reintroduction for stability	5	0	0	83	66	0	82	65	0	0	0	0	82	65	0	2016-05-11	A couple plants died
Palikea (South Palawai)	Manage for stability	3	60	0	108	36	1	120	19	1	7	7	0	113	12	1	2015-10-14	Some more plants matured at the outplanting
Out Total:		8	60	0	323	142	2	339	157	1	9	8	0	330	149	1		
Total for Taxon:		30	84	0	398	178	2	414	193	1	15	19	0	399	174	1		

The Taxon Status Summary, shown above, displays the current status of the wild and outplanted plants for each PU next to the totals from the previous year for comparison. The report also depicts the original IP Totals for the different age classes. The PUs are grouped into those with plants that are located inside the MIP or OIP AA (In) and PUs where all plants are outside of both AAs (Out).

Population Unit Name: Groupings of Population Reference Sites. Only PUs designated to be 'Manage for Stability' (MFS), 'Manage Reintroduction for Stability/Storage,' or 'Genetic Storage' (GS) are shown in the table. Other PUs with 'No Management' designations are not managed and will not be reported. "No Management" PUs may be shown by not checking the "Exclude No Management" box on the report menu.

Management Designation: For PUs with naturally occurring (*in situ*) plants remaining, the designation is either 'Manage for Stability' or 'Genetic Storage'. Some MFS PUs will be augmented with outplantings to reach stability goals. When reintroductions alone will be used to reach stability, the designation is 'Manage Reintroduction for Stability.' When a reintroduction will be used for producing propagules for genetic storage, the designation is 'Manage Reintroduction for Storage'.

Total Original IP Mature, Immature, Seedling: These first three columns display the original population numbers as noted in the first Implementation Plan reports of MIP (2005) and OIP (2008). When no numbers are displayed, the PU was not known at the time of the IPs

Total Mature, Immature and Seedling (Year): This displays the **SUM** of the number of *wild and outplanted* mature, immature plants and seedlings from the previous year's report. These numbers should be compared to those in the next three columns to see the change observed over the last year.

Total Current Mature, Immature, Seedling: The **SUM** of the *current* numbers of *wild and outplanted* individuals in each PU. This number will be used to determine if each PU has reached stability goals. These three columns can be compared with the previous columns to see the change observed over the last year.

Wild Current Mature, Immature, Seedling: These set of three columns display the most up to date population estimates of the wild (in situ) plants in each PU. These numbers are generated from OANRP monitoring data, data from the Oahu Plant Extinction Prevention Program (OPEP) and Oahu NARS staff. The estimates may have changed from last year if estimates were revised after new monitoring data was taken or if the PUs have been split or merged since the last reporting period. The most recent estimate is used for all PUs, but some have not been monitored in several years. Several PU have not been visited yet by OANRP and no plants are listed in the population estimates. As these sites are monitored, estimates will be revised.

Outplanted Current Mature, Immature, Seedling: The last set of three columns display the numbers of individuals OANRP and partner agencies have outplanted into each PU. This includes augmentations of in situ sites, reintroductions into nearby sites and introductions into new areas.

PU LastObs Date: Last Observation Date of the most recent Population Reference Site observed within a PU. Where thorough monitoring was done, the estimates were updated. Although, there are sites that may have been observed more recently, but a complete monitoring was not done.

Population Trend Notes: Comments on the general population trend of each PU is given here. This may include notes on whether the PU was monitored in the last year, a brief discussion of the changes in population numbers from the previous estimates, and some explanation of whether the change is due to new plants being discovered in the same site, a new site being found, reintroductions or augmentations that increased the numbers or fluctuations in the numbers of wild plants. In some cases where the numbers have not changed, NRS has monitored the PU and observed no change. When the PU has not been monitored, the same estimate from the previous year is repeated.

Threat Control Summary

Threat Control Summary **Makua Implementation Plan**

Action Area: In

TaxonName: Alectryon macrococcus var. macrococcus

PopulationUnitName	ManagementDesignation	# Mature Plants	Ungulates Managed	Weeds Managed	Rats Managed	Slugs Managed	Fire Managed
Kahanahaiki to Keawapilau	Manage for stability	1	Yes	Partial 0%	No	No	No
Makua	Manage for stability	6	Partial 100%	No	No	No	No
South Mohiakea	Genetic Storage	2	Yes	No	No	No	No
West Makaleha	Genetic Storage	13	No	No	No	No	No

Action Area: Out

TaxonName: Alectryon macrococcus var. macrococcus

PopulationUnitName	ManagementDesignation	# Mature Plants	Ungulates Managed	Weeds Managed	Rats Managed	Slugs Managed	Fire Managed
Central Kaluaa to Central Waieli	Manage for stability	3	Partial 0%	Partial 0%	No	No	No
Makaha	Manage for stability	29	Yes	Partial 97%	No	No	No
Waianae Kai	Genetic Storage	0	No	No	No	No	No

= Threat to Taxon within Population Unit
No Shading = Absence of threat to Taxon within Population Unit
Ungulate Managed = Culmination of Cattle, Goats, and Pig threats
Yes=All PopRefSites within Population Unit have threat controlled
No=All PopRefSites within Population Unit have no threat control
Partial%=Percent of mature plants in Population Unit that have threat controlled
Partial 100%= All PopRefSites within Population Unit have threat partially controlled
Partial 0%= Threat partially controlled, but no mature plants

The Threat Control Summary summarizes the threat status for each Taxon Population Unit. Yes, No or Partial is used to indicate the level of threat management. Partial management has additional percentage based upon the number of mature plants being protected.

Population Unit Name: Groupings of Population Reference Sites. Only PUs designated to be 'Manage for Stability' (MFS), 'Manage Reintroduction for Stability/Storage,' or 'Genetic Storage' (GS) are shown in the table.

Management Designation: Designations for PUs with ongoing management are listed. Population Units that are MFS are the first priority for complete threat control. PUs that are managed in order to secure genetic storage collections receive the management needed for collection (ungulate and rodent control) as a priority but may be a lower priority for other threat control.

 # Mature Plants: Number of Mature Plants within the Population Unit.

Threat Columns: The six most common threats are listed in the next columns. To indicate if the threat is noted at each PU, a shaded box is used. If the threat is not present at that PU, it is not shaded.

Threat control is defined as:
Yes = All sites within the PU have the threat controlled
No = All sites within the PU have no threat control
Partial %= Percent of mature plants in Population Unit that have threat controlled
Partial 100%= All PopRefSites within Population Unit have threat partially controlled
Partial (with no %) = All PopRefSites within Population Unit have threat partially controlled and only immature plants have been observed.

Ungulates: This threat is indicated if pigs, goats or cattle have been observed at any sites within the PU. This threat is controlled (Yes) if a fence has been completed and all ungulates removed from the site. Most PUs are threatened by pigs, but others are threatened by goats and cattle as well. The same type of fence is used to control for all three types of ungulates on Oahu. Partial indicates that the threat is controlled for some but not all plants in the PU.

Weeds: This threat is indicated at all PUs for all IP taxa. This threat is controlled if weed control has been conducted in the vicinity of the sites for each PU. If only some of the sites have had weed control, 'Partial' is used.

Rats: This threat is indicated for any PUs where damage from rodents has been confirmed by OANRP staff. This includes fruit predation and damage to stems or any part of the plant. The threat is controlled if the PU is protected by snap traps and bait stations. For some taxa, rats are not known to be a threat, but the sites are within rat control areas for other taxa so the threat is considered controlled. In these cases, the box is not shaded but control is 'Yes' or 'Partial.' Partial indicates that the threat is fully controlled over part of the PU.

Slugs: This threat is indicated for several IP taxa as confirmed by OANRP staff. Currently, slug control is conducted under an Experimental Use Permit from Hawaii State Department of Agriculture, which permits the use of Sluggo® around the recruiting seedlings of *Cyanea superba* subsp. *superba* in Kahanahaiki Gulch on Makua Military Reservation. Until the label is changed to allow for application in a forest setting, all applications must be conducted under this permit. Partial indicates that the threat is fully controlled over part of the PU.

Fire: This threat is indicated for PUs that occur on Army lands within the high fire threat area of the Makua AA, and some PUs within the Schofield West Range AA and Kahuku Training Area that have been threatened by fire within the last ten years. Similarly, PUs that are not on Army land were included if there is a history of fires in that area. This includes the PUs below the Honouliuli Contour Trail, the gulches above Waialua where the 2007 fire burned including Puulu, Kihakapu, Palikea, Kaimuhole, Alaiheihe, Manuwai, Kaomoku iki, Kaomoku nui and Kaawa and PUs in the Puu Palikea area that were threatened by the Nanakuli fire. Threat control conducted by OANRP includes removing fuel from the area with pesticides, marking the site with Seibert Stakes for water drops, and installing fuel-breaks in fallow agricultural areas along roads. 'Partial' means that the threat has been partially controlled to the whole PU, not that some plants are fully protected. Firebreaks and other control measures only partially block the threat of fire which could make it into the PU from other unprotected directions.

Genetic Storage Summary

Genetic Storage Summary Makua Implementation Plan

Population Unit Name	Management Designation	# of Potential Founders			Partial Storage Status				Storage Goals				Storage Goals Met	
		Current Mature	Current Imm.	Dead and Repres.	# Plants >= 10 in SeedLab	# Plants >= 10 Est Viable in SeedLab	# Plants >=1 Microprop	# Plants >=1 Army Nursery	# Plants >= 50 in SeedLab	# Plants >= 50 Est. Viable in SeedLab	# Plants >=3 in Microprop	# Plants >=3 Army Nursery	# Plants that Met Goal	% Completed Genetic Storage Requirement
Action Area: In														
Neraudia angulata														
Kapuna	Genetic Storage	0	0	2	2	2	0	2	2	0	0	2	2	100%
Makua	Manage for stability	21	4	33	2	2	0	36	1	0	0	22	22	44%
Punapohaku	Genetic Storage	4	0	0	0	0	0	4	0	0	0	4	4	100%
Action Area: Out														
Neraudia angulata														
Halona	Genetic Storage	4	10	17	0	0	0	9	0	0	0	8	8	38%
Leeward Puu Kaua	Genetic Storage	9	0	0	0	0	0	1	0	0	0	1	1	11%
Makaha	Manage for stability (backup site)	3	8	12	2	1	0	15	1	0	0	14	14	93%
Manuwai	Manage for stability	0	3	2	0	0	0	4	0	0	0	4	4	100%
Waianae Kai Makai	Genetic Storage	13	0	0	0	0	0	8	0	0	0	8	8	62%
Waianae Kai Mauka	Manage for stability	7	2	9	0	0	0	11	0	0	0	11	11	69%

Total Current Mature	Total Current Imm.	Total Dead and Repres.	Total # Plants w/ >=10 Seeds in SeedLab	Total # Plants w/ >=10 Est Viable Seeds in SeedLab	Total # Plants w/ >=1 Microprop	Total # Plants w/ >=1 Army Nursery	Total # Plants w/ >=50 Seeds in SeedLab	Total # Plants w/ >=50 Est Viable Seeds in SeedLab	Total # Plants w/ >=3 in Microprop	Total # Plants w/ >=3 Army Nursery	Total # Plants that Met Goal
61	27	75	6	5	0	90	4	0	0	74	74

The Genetic Storage Summary estimates of seeds remaining in genetic storage have been changed this year to account for the expected viability of the stored collections. The viability rates of a sample of most collections are measured prior to storage. These rates are used to estimate the number of viable seeds in the rest of the stored collection. If the product of (the total number of seeds stored) and (the initial percentage of viable seeds) is >50, that founder is considered secured in genetic storage. If each collection of a species is not tested, the initial viability is determined from the mean viability of (preference in descending order):

1. other founders in that collection
2. that founder from other collections
3. all founders in that population reference site
4. all founders of that species

Number (#) of Potential Founders: These first columns list the current number of live *in situ* immature and mature plants in each PU. These plants have been collected from already, or may be collected from in the future. The number of dead plants from which collections were made in the past is also included to show the total number of plants that could potentially be represented in genetic storage for each PU since collections began. Immature plants are included as founders for all taxa, but they can only serve as founders for some. For example, for *Hibiscus brackenridgei* subsp. *mokuleianus*, cuttings can be taken from immature plants for propagation. In comparison, for *Sanicula mariversa*, cuttings cannot be taken and seed is the only propagule used in collecting for genetic storage. Therefore, including immature plants in the number of potential founders for *S. mariversa* gives an over-estimate. The 'Manage reintroduction for stability/storage' PUs have no potential founders. The genetic storage status of the founder stock used for these reintroductions is listed under the source PU.

Partial Storage Status and Storage Goals: To meet the IP genetic storage goal for each PU for taxa with seed storage as the preferred genetic storage method, at least 50 seeds must be stored from 50 plants. This year, the number of seeds needed for each plant (50) accounts for the original viability (Estimate Viability) of seed collections. In order to show intermediate progress, this column displays the number individual plants that have collections of >10 seeds in storage. For taxa where vegetative collections will be used to meet storage goals, a minimum of three clones per plant in either the Lyon Micropropagation Lab, the Army nurseries or the State's Pahole Mid-elevation Nursery is required to meet stability goals. Plants with one or more representatives in either the Lyon Micropropagation Lab or a nursery are considered to partially meet storage goals. The number of plants that have met this goal at each location is displayed.

 # Plants that Met Goal: This column displays the total number of plants in each PU that have met the IP genetic storage goals. As discussed above, a plant is considered to meet the storage goal if it has 50 seeds in storage or three clones in micropropagation or three in a nursery. For some PUs, the number of founders has increased in the last year; therefore, it is feasible that NRS could be farther from reaching collection goals than last year. Also, as seeds age in storage, plants are outplanted, or explants contaminated, this number will drop. In other PUs where collections have been happening for many years, the number of founders represented in genetic storage may exceed the number of plants currently extant in each PU. In some cases, plants that are being grown for reintroductions are also being counted for genetic storage. These plants will eventually leave the greenhouse and the genetic storage goals will be met by retaining clones of all available founders or by securing seeds in storage. This column does not show the total number of seeds in storage; in some cases thousands of seeds have been collected from one plant.

% Completed Genetic Storage Requirement: Describes the percent of Founder Plants that have met Genetic Storage goals. Genetic storage of at least 50 seeds each from 50 individuals, or at least three clones each in propagation from 50 individuals, is required for each PU. If there are fewer than 50 founders for a PU, genetic storage is required from all available founders. For example, if there are at least 50 seeds from five individuals, or at least three clones in propagation from five individuals, then listed in the tables is 10%.

See Taxon Status Summary above for details on In/Out Action Area, Population Units, and Management Designation.

Snail Population Status Summary

Number of Snails Counted

Population Reference Site	Management Designation	Total Snails	Date of Survey	Size Classes				Threat Control				
				Large	Medium	Small	Unk	Ungulate	Weed	Rat	Euglandina rosea	Jackson's Chameleon
Achatinella mustelina												
ESU: A	**Pahole to Kahanahaiki**											
MMR-A Kahanahaiki Exclosure	Manage for stability	224	2016-05-17	111	96	17	0	Yes	Yes	Yes	Yes	No
MMR-O Giant Olopua	Manage for stability	0	2015-12-07	0	0	0	0	Yes	No	Yes	No	No
PAH-B Pahole Exclosure	Manage for stability	61	2015-02-04	37	14	10	0	Yes	Yes	Yes	Yes	No
	ESU Total:	285		148	110	27	0					

*=Total Snails were Trans Located or Reintroduced

= Threat to Taxon at Population Reference Site

No Shading = Absence of threat to Taxon at Population Reference Site

Yes=Threat is being controlled at PopRefSite

No=Threat is not being controlled at PopRefSite

Partial=Threat is being partially controlled at PopRefSite

Size Class Definitions

SizeClass	DefSizeClass
Large	>18 mm
Medium	8-18 mm
Small	< 8 mm

Table shows the number of snails, size classes, and threats to the snails in the ESU sites. Yes = threat is being controlled; In some cases the threat may be present but not actively preying on A. mustelina.

The Snail Population Status Summary describes the current population size and threat control. Size Classes varies by snail taxon and definitions are listed on the lower left corner of the report. Threat Control consists of Yes, No, or Partial. Partial is where only some of the threat is being controlled at the site.

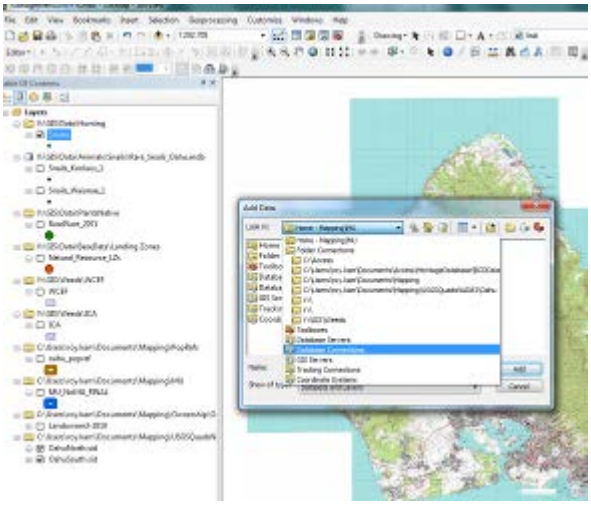
Population Reference Site: The first column lists the population reference code for each field site. This consists of a three-letter abbreviation for the gulch or area name. For example, MMR stands for Makua Military Reservation. Next, a letter code is applied in alphabetic order according to the order of population discovery. This coding system allows NRS to track each field site as a unique entity. This code is also linked to the Army Natural Resource geodatabase. In addition, the "common name" for the site is listed as this name is often easier to remember than the population reference code.

Management Designation: In the next column, the management designation is listed for each field site. The tables used in this report only display the sites chosen for MFS, where NRS is actively conducting management. These sites are generally the most robust sites in terms of snail numbers, habitat quality, and manageability. Other field sites where NRS has observed snails are tracked in the database but under the designation 'no management.' In general, these sites include only a few snails in degraded habitat where management is logistically challenging. The combined total for sites designated as MFS should be a minimum of 300 total snails in order to meet stability requirements.

Population Numbers: The most current and most accurate monitoring data from each field site are used to populate the 'total snails' observed column and the numbers reported by 'size class' columns. In some cases, complete monitoring has not been conducted within this reporting period because of staff time constraints, therefore, older data are used.

Threat Control: It is assumed that ungulate, weed, rat and Euglandina threats are problems at all the managed sites. If this is not true of a site, special discussion in the text will be included. If a threat is being managed at all in the vicinity of A. mustelina or affecting the habitat occupied by *A. mustelina* a "Yes" designation is assigned. The "No" designation is assigned when there is no ongoing threat control at the field site.

Linking Access Database Query into ArcGIS –Distribution Database Version

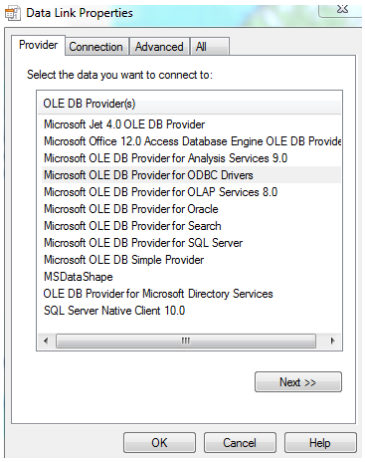


There may be times that information found in the Access database is needed in a GIS map. The following shows you how to link a query from Access into an ArcGIS project. The Population Reference Site query will be used as an example. Note there are several steps needed to bring in an Access Database query. If you don't feel comfortable in doing this, contact Roy Kam (rkam@hawaii.edu) and he will walk you through.

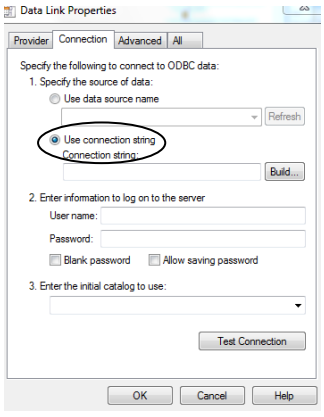
In your ArcGIS Project, make sure you have the Rare Plants or Rare Snails shapefile (or whatever shapefile you are linking) as one of your layers.

Click on the Add Button, and choose *Database Connections*. If you do not have Database Connections listed (versions ArcGIS 10.3 and up), you will need to add it before you start. Go to ArcCatalog>Customize (Tab)>Customize Mode>Under the Commands Tab, select ArcCatalog (left column) and on the right chose Add OLE DB Connection. Drag Add OLE DB Connection from the Commands list onto the toolbar in ArcCatalog.

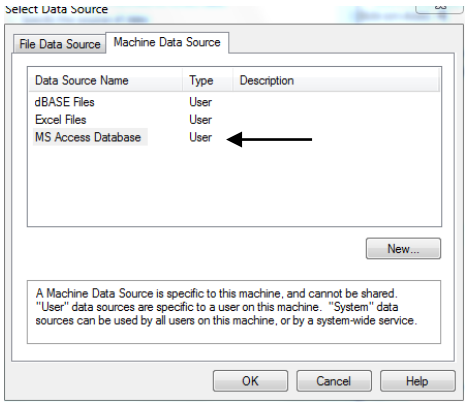
Then select *Add OLE Database Connection*, and click on Add.



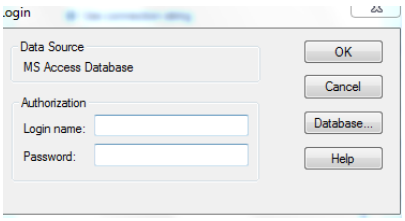
A Data Link Properties window will appear. Select *Microsoft OLE DB Provider for ODBC Drivers*.



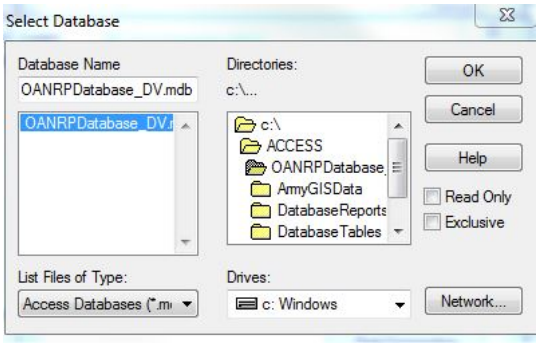
Then in the Data Link Properties window, select the *Connection tab*. Under the Connection Tab, select *Use Connection String* and click on the button *Build*.



In the Select Data Source window, select the *Machine Data Source* tab, and select *MS Access Database then* click *OK*.

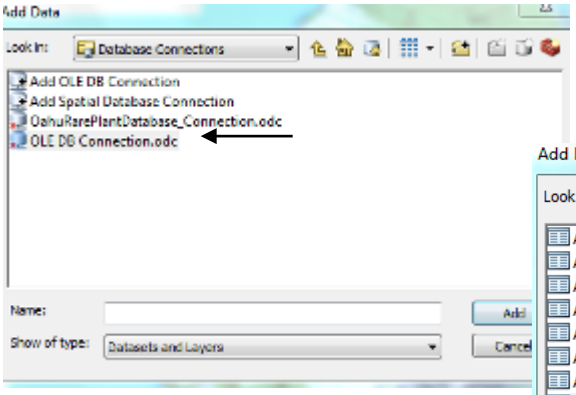


In the Login Window, Click on the *Database* button (leave Login Name and Password blank).

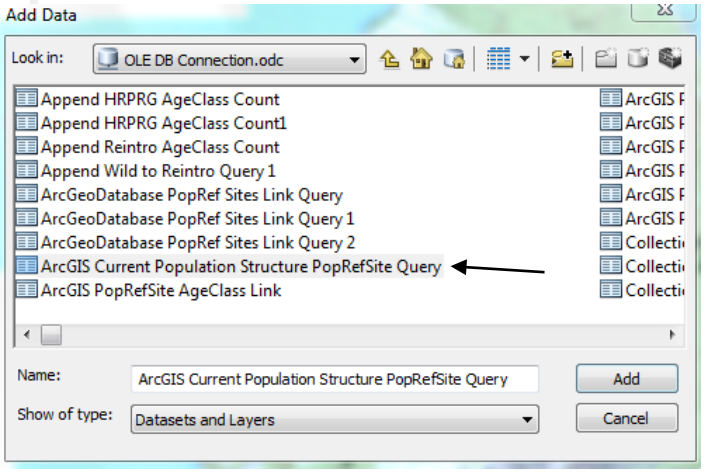


In the Select Database window, change the Drives to C: and browse to C:\Access\OANRPDatabase_DistributeVersion\ OANRPDatabase_DV.mdb

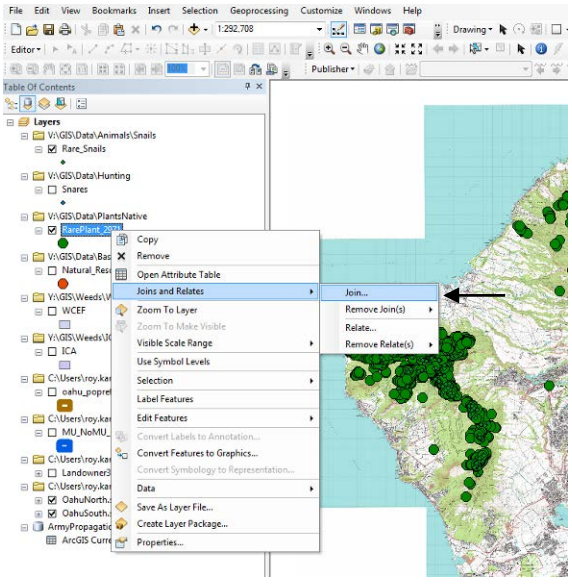
Click Ok to close the windows, until you are back at the Add Data window. You will now see a new OLE DB Connection.odc listed.



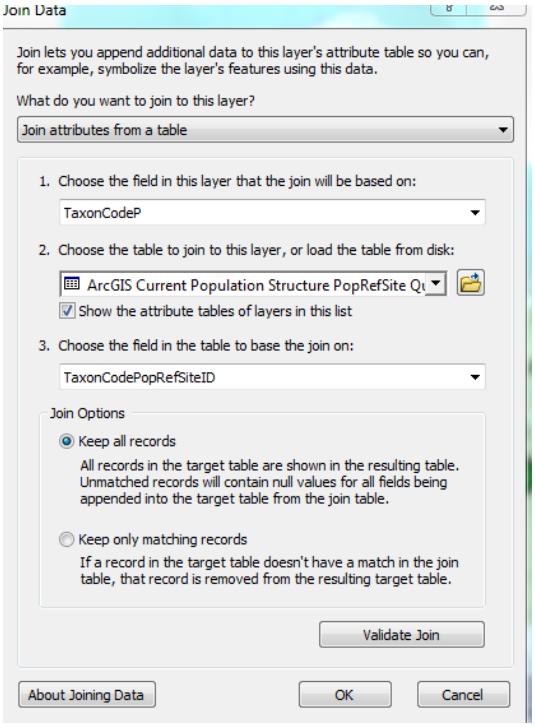
Double click on the OLE DB Connection.odc. The window will then open the Access Database and list all tables and queries.



Browse through the list until you find *ArcGIS Current Population Structure PopRefSite Query*. This query in the Access Database lists all of the Rare Plants and Rare Snails with their current Population Structure and whether the site is In situ or Ex situ. Click Add. The query will now appear as a Layer in your map project.



Go to the shapefile, right click and select Join under the Joins and Relates.



The last procedure is to join the Rare Plant shapefile with the Access Query. Select TaxonCodeP from the Rare Plant GIS Shapefile, and TaxonCodePopRefSiteID from the Access database query. The data will now appear together in the Snare shapefile attribute table.

Attribute Table from ArcGIS. Example of Rare Plant shapefile joined to Access Database Query.

Rare Plants GIS Shapefile table data → Access Database data

RarePlants

OBJ	ID	SPECIES	POPULATION	TaxonCodeP	LOCATION	SOU	FULL_SCIEN	X	Y	NATU	Statu	TaxonCode	PopRefName
1	0	AleMacMac	SBW-A	AleMacMac.SBW-A	Mohiakea gulch	JL	Alectryon macrococcus macrococcus	590515.562	2376426.50004	Yes	E	AleMacMac	Schofield Barracks Mil
2	0	AleMacMac	SBW-C	AleMacMac.SBW-C	Puu Kumakalii	JL	Alectryon macrococcus macrococcus	590981.875	2375960.25005	Yes	E	AleMacMac	Schofield Barracks Mil
3	0	AleMacMac	SBW-D	AleMacMac.SBW-D	Puu Kumakalii	JL	Alectryon macrococcus macrococcus	591323.250	2375402.75002	Yes	E	AleMacMac	Schofield Barracks Mil
4	0	SchTri	ALA-C	SchTri.ALA-C	Kaala	JL	Schiedea trinervis	589030.703	2378443.74343	Yes	E	SchTri	Mt. Kaala NAR
5	0	SchTri	SBW-G	SchTri.SBW-G	Puu Kalena	JL	Schiedea trinervis	589641.375	2376627.49997	Yes	E	SchTri	Schofield Barracks Mil
6	0	CyaAcu	ALA-B	CyaAcu.ALA-B	Kaala	JL	Cyanea acuminata	589083.312	2378560.75002	Yes	E	CyaAcu	Mt. Kaala NAR
7	0	CyaGriOba	SBW-A	CyaGriOba.SBW-A	Kaala 2400'	JL	Cyanea grimesiana obatae	590057.000	2378433.99994	Yes	E	CyaGriOba	Schofield Barracks Mil
8	0	CyaCal	NA	CyaCal.ALA-A	Kaala	JL	Cyanea calycina	588965.812	2378293.99994		E	CyaCal	Mt. Kaala NAR
9	0	CyaCal	NA	CyaCal.ALA-A	Kaala	JL	Cyanea calycina	588996.187	2378697.74996		E	CyaCal	Mt. Kaala NAR
10	0	CyaCal	NA	CyaCal.ALA-A	Kaala	JL	Cyanea calycina	589218.125	2378491.00001		E	CyaCal	Mt. Kaala NAR
11	0	CyaCal	NA	CyaCal.SBW-A	Kaala	JL	Cyanea calycina	589493.687	2377636.75002	Yes	E	CyaCal	Schofield Barracks Mil
12	0	CyaCal	NA	CyaCal.SBW-A	Kaala	JL	Cyanea calycina	589268.312	2377825.24999	Yes	E	CyaCal	Schofield Barracks Mil
13	0	CyaCal	SBW-A	CyaCal.SBW-A	Kaala	JL	Cyanea calycina	588881.999	2378048.50004	Yes	E	CyaCal	Schofield Barracks Mil
14	0	CyaCal	SBW-C	CyaCal.SBW-C	Puu Kalena 2300'	JL	Cyanea calycina	590479.812	2376867.99994	Yes	E	CyaCal	Schofield Barracks Mil
15	0	CyaCal	SBW-C	CyaCal.SBW-C	Puu Kalena 2800'	JL	Cyanea calycina	590307.312	2376571.74996	Yes	E	CyaCal	Schofield Barracks Mil

Access Database data joined query

RarePlants

PopRefName	FedStat	TaxonCodePopRefSit	PopRefSiteName	InExsitu	ObservationDate	AccObs	CurAccObs	Immature	Large	Mature	Medium
Schofield Barracks Milita	E	AleMacMac.SBW-A	Mohiakea	In situ	2013-05-20	Yes	Yes	<Null>	<Null>	2	<Null>
Schofield Barracks Milita	E	AleMacMac.SBW-C	North of Puukumakali (Dead)	In situ	2012-04-04	Yes	Yes	0	<Null>	0	<Null>
Schofield Barracks Milita	E	AleMacMac.SBW-D	Southeast of Puukumakalii	In situ	2012-06-27	Yes	Yes	0	<Null>	0	<Null>
Mt. Kaala NAR	E	SchTri.ALA-C	Lower 2 Poles Ridge	In situ	2002-10-23	Yes	Yes	5	<Null>	5	<Null>
Schofield Barracks Milita	E	SchTri.SBW-G	Kalena, in notch	In situ	2007-08-20	Yes	Yes	0	<Null>	0	<Null>
Mt. Kaala NAR	E	CyaAcu.ALA-B	Kaala, one gulch N of Alstri ridge	In situ	2008-03-13	Yes	Yes	<Null>	<Null>	19	<Null>
Schofield Barracks Milita	E	CyaGriOba.SBW-A	North Haleauau	In situ	2005-10-03	Yes	Yes	0	<Null>	0	<Null>
Mt. Kaala NAR	E	CyaCal.ALA-A	Kaala	In situ	2013-06-06	Yes	Yes	<Null>	<Null>	3	<Null>
Mt. Kaala NAR	E	CyaCal.ALA-A	Kaala	In situ	2013-06-06	Yes	Yes	<Null>	<Null>	3	<Null>
Mt. Kaala NAR	E	CyaCal.ALA-A	Kaala	In situ	2013-06-06	Yes	Yes	<Null>	<Null>	3	<Null>
Schofield Barracks Milita	E	CyaCal.SBW-A	North Haleauau, Below ALA-O populati	In situ	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
Schofield Barracks Milita	E	CyaCal.SBW-A	North Haleauau, Below ALA-O populati	In situ	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
Schofield Barracks Milita	E	CyaCal.SBW-A	North Haleauau, Below ALA-O populati	In situ	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
Schofield Barracks Milita	E	CyaCal.SBW-C	Kaala-Kalena	In situ	2006-10-25	Yes	Yes	<Null>	<Null>	1	<Null>
Schofield Barracks Milita	E	CyaCal.SBW-C	Kaala-Kalena	In situ	2006-10-25	Yes	Yes	<Null>	<Null>	1	<Null>
<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>