Western Monarch and Milkweed Occurrence Database Metadata

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Title

Western Monarch and Milkweed Occurrence Database

Origin

This database was developed by the Xerces Society, in partnership with Idaho Department of Fish and Game (IDFG), Washington Department of Fish and Wildlife (WDFW), and U.S. Fish and Wildlife Service (USFWS).

Time Period

This database contains recorded occurrences between May 19, 1900 and the present day.

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Keywords

Asclepias, *Danaus*, *plexippus*, milkweed, monarch

Geographic Extent

AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY

Abstract

These data are a compilation of milkweed (genus *Asclepias*) and monarch butterfly (*Danaus plexippus*) occurrences and specimen records from across the western United States (AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY), for all time periods available. Information that can be found in the database includes life stage (monarch), phenology (milkweed), observer information, locality of occurrence, population counts, estimates of positional accuracy, and source information.

Purpose

The primary purposes for which this database was created are:

1. The geographic coordinates were used to convert the information into a spatial vector layer that was then used to create a presence/absence raster layer and used as an input for the USFWS/Xerces Society Western Milkweed and Monarch Breeding Habitat Suitability Model (2015). This model is intended to help the USFWS and partners better understand the distribution of key breeding areas for the declining western population of monarch butterflies and to prioritize areas for habitat restoration and monitoring activities in the western United States. This model is currently being updated with 2016 field data and will be available in spring of 2017.

2. To improve upon an existing Xerces Society and US Fish and Wildlife Service western milkweed and monarch database and to share this information through a website intended to be used by biologists, land managers, policy makers, citizens, etc. to learn about western monarch and milkweed biology and phenology and inform restoration and conservation efforts.

Background

In recent decades, the monarch butterfly (*Danaus plexippus)* has been severely impacted by a variety of threats, including loss of its larval host plant, milkweed, due to increased herbicide use, conversion of natural lands, insecticide use, loss of overwintering habitat, and climate change. The eastern population, which overwinters in Mexico, has shown a population decline of roughly 80% over the last 20 years. Similarly, the smaller western population, which overwinters in sites along the California coast, has decreased in number by approximately 74% since 1997.

In an effort to understand the reasons for this swift decline, the Xerces Society has partnered with the Idaho Department of Fish and Game (IDFG), the Washington Department of Fish and Wildlife (WDFW), and the U.S. Fish and Wildlife Service to better understand where monarchs and milkweeds occur in the West.

Significant data gaps for the western population of monarchs have been identified regarding migratory pathways and summer breeding locations. This limits the ability of the Xerces Society and its partners to identify priority areas for monarch habitat restoration and enhancement projects, and also makes it difficult to prioritize milkweed and monarch surveys. To address these data gaps, a team of biologists and GIS analysts from the USFWS and the Xerces Society have produced a preliminary set of spatial models to help identify migratory pathways and suitable breeding habitat for western monarchs. This database builds upon that effort. It is a comprehensive and up to date collection of monarch and milkweed occurrences across the western United States. It is the consolidation of consortium datasets, privately held collections, and federally collected field surveys. The data have been aggregated and manipulated in such a way as to yield a product that can be used effectively by researchers studying monarch breeding and habitat.

Data Providers

A full list of data providers is available on the Western Monarch Milkweed Mapper website, available at https://www.monarchmilkweedmapper.org/about/references/.

Data Reliability

The quality of data that went into this database is as variable as the data sources themselves, and often hard to determine. Although some of the datasets going into this collection have been professionally vetted, the collection as a whole has not. There are fields in the database that have been included to help the end-user better understand the limitations of each record, or make assumptions about its reliability. Where the data came from, when it was collected, how coordinates were derived and any location remarks provide clues to the reliability of a record. Caution should be exercised when attempting to use this database for any type of analysis.

Data Usage

Appropriate uses of this dataset include gaining a general understanding of:

- where milkweed exists, or where it existed at one time
- where monarchs have been known to occur (i.e. geographic extent)
- the range of specific milkweed varieties

If the coordinates are used to create a spatial dataset, the Accuracy Code should be used to determine the appropriate scale at which the data can reliably be used. The entire dataset may be used at a landscape level, however only the highest accuracy records should be used at a local scale.

Data Access

The Xerces Society abides by the original providers' use limitations, where they exist. This information is captured in the database and users are expected to abide by the provider's terms. A public version of this database is accessible through the Western Monarch Milkweed Mapper website (www.monarchmilkweedmapper.org).

Data Compilation

The database upon which this website is built is the result of many years of data collection efforts. The Xerces Society first began compiling western monarch and milkweed records via an online survey in 2012, which grew to several thousand records with the addition of specimen records from online herbaria. In 2015, Xerces partnered with the Pacific Region of the US Fish and Wildlife Service to expand the database through additional record gathering and targeted field surveys completed by US Fish and Wildlife Service staff. In 2016, the partnership grew to include Idaho Dept. of Fish and Game (IDFG) and Washington Dept. of Fish and Wildlife (WDFW). Extensive field surveys during 2016 were completed by staff of US Fish and Wildlife, IDFG, WDFW, and Xerces (through funding by the National Fish and Wildlife Foundation). Due to these efforts as well as the contributions of many other researchers and citizen scientists, the original database has grown to house over 40,000 (and growing) occurrence records of western milkweeds and monarchs, pulled from a wide variety of sources. You can see a full list of data providers and references on the Western Monarch Milkweed Mapper website: www.monarchmilkweedmapper.org/about/references.

In late 2016 the existing Access database was moved to a custom-built online database to improve data sharing and to continue gathering data via Western Monarch Milkweed Mapper users, our associated Monarch SOS app, and biologists and researchers across the West. It is the most comprehensive dataset of milkweed and monarch occurrences in the country. The data collected from these efforts are being used to improve our collective understanding of where and when monarchs breed, where milkweed grows, and how we can best advance western monarch conservation.

The full database is freely available to researchers and the public. ***(Note that some records which are considered sensitive or have other data sharing restrictions may not be included in the download.)*** Many of the data have been manipulated in order to be useful for the purposes for which the database was intended. For a full description of processing methods prior to 2016, see the USFWS' metadata document available through data.gov.

Accuracy

Positional accuracy of occurrences is highly variable, dependent upon the era of data collection, method for obtaining coordinates (if known), and the recorded precision. Users are encouraged to use the GeoreferenceSource field to get a sense of accuracy for an individual occurrence. The CoordinateAccuracy field values were adapted from the Bureau of Land Management's system for assessing the accuracy of features. They provide the end user with some level of confidence pertaining to the true location of an occurrence; this

was a requirement of the milkweed suitability model. Data were by the Xerces Society and USFWS. These are subjective and are only estimates of accuracy in most cases. Where available, the LocationRemarks, LocReview, and GeoreferencedBy fields also provide clues about the reliability of the stated coordinates.

Description of Fields

This table lists and describes the full set of attributes in the database. Type Codes: A= Autonumber, T=Text, D=Date, N=Number, M=Memo.

Field	Type	Description
Compilation	T	Changes made to the input data to conform to compilation process (date format, splitting fields...)
DataRemark	T	Comments on data errors, omissions, problems, etc.
ConsortiumDatabase	T	Name of the online database holding aggregated data, i.e. GBIF, SEINet, BISON
ConsortiumUniqueID	T	Unique ID of the dataset as provided in the online database
OriginalSource	T	Original source of the record, standardized values. If aggregated from other sources, the original source is cited, if known.
MilkweedObservationID	A	Unique ID - autopopulated
MonarchObservationID	A	Unique ID - autopopulated
CatalogNum	T	An identifier (preferably unique) for the record within the data set or collection. Often a museum catalog reference ID.
CollectionNum	T	A number unique to the specimen (does not include museum specimen #s) *does not conform to Darwin Core
Sharing_Code	T	A code (usually the abbreviation of data source i.e. USFWS) that links to a table in the database describing data sharing permissions
Link	T	URL link to specific data sharing policies for a group, organization, or database
DataType	T	Type of occurrence, i.e. human observation, voucher, live specimen, photo
SurveyType	T	Identify the survey protocol, sample method, etc... i.e. "Xerces Online Milkweed Survey"
Location	M	Description of location where observation occurred
ObserverName	T	A list (concatenated and separated) of names of people, groups, or organizations responsible for recording the original Occurrence. The primary collector or observer should be listed first.
RecordDate_vtbm	T	Verbatim date of occurrence; lots of variation in format, so starting with text and converting to standard after compiling
DateIdentified	D	Full date of occurrence record
RecordYear	N	Year of the collection/observation
State	T	State where collection/observation occurred; abbreviated is standard; records with no value were calculated using GIS
County	T	County where collection/observation occurred
NearestCity	T	Nearest city to occurrence

Field	Type	Description
Locality	T	Brief description of location in relationship to a nearby landmark. Example: Located 0.2 miles north of trail junction on Black Butte. Use if no GPS coordinates are available.
HabitatType	M	A category or description of the habitat in which the event occurred. Categories include: Agricultural (grain/vegetable), Agricultural (orchard/vineyard), Desert, Forest, Garden, Grassland, Invaded, Irrigation ditch, Montane, Pasture/Hay, Railroad, Riparian, Roadside, Shrubland, Urban Area, Utility Corridor, Wetland, Other
HabitatAssociation	M	Association with a specific manmade or natural feature or process i.e. roadside, fence, irrigation ditch etc..
ManagementActions	M	A management action observed at the location of the event.
Threats	M	A threat to habitat…i.e. herbicide application, pesticide application, mowing etc..
Latitude	N	Latitude, assumed WGS84 if no other information
Longitude	N	Longitude, assumed WGS84 if no other information
DataProjection	T	Type of projection used for coordinates given
Datum	T	Datum used for coordinates given
GeoreferenceSource	T	How coordinates were derived, i.e. GPS, topographic map, county centroid, etc. This information is useful for gauging positional accuracy.
CoordinateAccuracy	T	Location accuracy code, standardized
		GPS1- Precision w/n 3ft or less (.9 m)
		GPS2- Precision w/n 30ft or less (9.1 m)
		GPS3- Precision w/n 300ft or less (91.4 m)
		MAN1- Manuscripted to w/n 150ft of actual location (45.7 m)
		MAN2- Manuscripted to w/n 300ft of actual location (91.4 m)
		MAN3- Manuscripted to w/n 1/8 mile of actual location (201.1 m)
		MAN4- Manuscripted to w/n 1/4 mile of actual location (402.3 m)
		MAN5- Manuscripted to w/n 1/2 mile of actual location (804.7m)
		MAN6- Manuscripted to w/n 1 mile of actual location
		MAN7- Precision of manuscripted location cannot be determined
		TR10-Legal description to the 1/64 section (w/n 10 acres)
		TR40-Legal description to the 1/16 section (w/n 40 acres) aka quarter quarter section
		TR160- Legal description to the Â¼ section (w/n 160 acres) aka quarter section
		TR320-Legal description to the Â½ section (w/n 320 acres)
		TR640-Legal description to the section (w/n 640 acres)
		VAGUE- Occurrence documented in vague descriptions
		VAGUE-CITY- Occurrence documented by city name
		VAGUE-COUNTY- Coordinates represent county centroid
		OBSCURED-Coordinates intentionally degraded to protect privacy
		UNKNOWN-record has not been properly assessed for accuracy

Field	Type	Description
LocationRemarks	T	Notes about accuracy, quality of locational information
LocReview	T	Review of location and assigned accuracy code. Satisfied, not yet determined, unable to determine (not enough info), not reviewed, can be georeferenced
GeoreferencedBy	T	Name or initials of person who georeferenced the record (if applicable)
Genus	T	Genus name
SpeciesSubSpecies	T	Species name
MWStructure	T	Structure of the plant population: scattered, clumped, linear (more than 3 longer than wide)
PatchSize_m2	T	Patch size of the population in square meters where structure is linear or clumped
AvgHeight_in	N	Average height of plants in the patch in inches
PlantCount	T	Number of plants in patch (complete count or estimate); use for single stalk milkweed forms
StemCount	T	Number of plants in patch (complete count or estimate); use for bushy milkweed forms
Phenology	T	Phenology (life stage) of plants observed; standardized values
Planted	T	A yes or no question. Was the milkweed planted, such as in a garden or restoration area?
CountMethod	T	Complete stem count, estimate using transect &/or m2 plots, optical estimate, or other
RipePods	T	Number of plants in patch with mature pods (complete count, visual estimate, or survey derived estimate)
Comments	M	Special notes about the population of milkweed. Any other remarks that need to be captured. May include quality of vegetation where observation occurred; other plant species/communities found at site, etc.
FemaleMonarchCount	N	Total number of adult female monarchs observed.
MaleMonarchCount	N	Total number of adult male monarchs observed
TotalMonarchCount	N	Number of adults, larvae, pupae or eggs; set as string type due to range of responses
BehaviorNotes	M	Type of behavior observed, such as nectaring, roosting, feeding
AdultCount	T	Adult count; set as string type due to range of responses
EggCount	N	Egg count; set as string type due to range of responses
LarvaeCount	N	Larvae count; set as string type due to range of responses
Pupae Count	N	Pupae count; set as string type due to range of responses
PupaeSubstrate	T	Brief description of what the pupae was found on (e.g., milkweed stem, fence post, etc.)
Reared	T	A yes no question. Is this a monarch that was reared?
ObservationTime	N	Time of observation
TimeSpentObserving	N	Amount of time spent observing in the field
NectarFamilyUsed	T	List any plant species that was seen being used for nectaring (Family)

Field	Type	Description
NectarGenusSpeciesUsed	T	List any plant genus and/or species that was seen being used for nectaring. Format as (Genus,Species; Genus,Species; Genus,Species; etc.)
Temperature (F)	T	Temperature in Fahrenheit, at time of observation
WindSpeed	T	Approximate, or range, of wind speed when observed
Precipitation	T	Intensity of precipitation, if any
CloudCover (%)	T	Percent cloud cover while observed
Comments	M	Special notes about the monarch observation

Progress

Data gathered through the Western Monarch Milkweed Mapper and the associated Monarch SOS app will continue to be added to the occurrence database for the foreseeable future. Data submitted using a batch upload template will be added to the database quarterly.

Date Currency

Publication Date: February 21, 2017 (but continuously updated via online submissions)

Data Distribution

A public version of the data will be accessible at www.monarchmilkweedmapper.org.

Data Citation

If data are extracted from this database for use in publications or other projects, the data should be cited as follows:

Western Monarch and Milkweed Occurrence Database. 2017. Data accessed from the Western Monarch Milkweed Mapper, a project by the Xerces Society, U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, and Washington Department of Fish and Wildlife. Available: www.monarchmilkweedmapper.org. Accessed: [DATE].

Distribution Liability

The Xerces Society and its partners assume no responsibility for the accuracy, reliability, or completeness of these data. These data are provided as is.

Ownership and Authority

The Xerces Society and its partners do not claim ownership of the original source data or datasets from providers outside the Xerces Society. The Xerces Society and its partners abide by the original providers' use limitations, where they exist.

Project Contact

Candace Fallon, Senior Conservation Biologist
Endangered Species Program
The Xerces Society for Invertebrate Conservation
628 NE Broadway St, Suite 200
Portland, OR 97232
(503) 232-6639, ext. 118
candace.fallon@xerces.org