

Planning for monarch butterfly conservation on roadsides:



Developing a statewide milkweed species distribution model for Arizona

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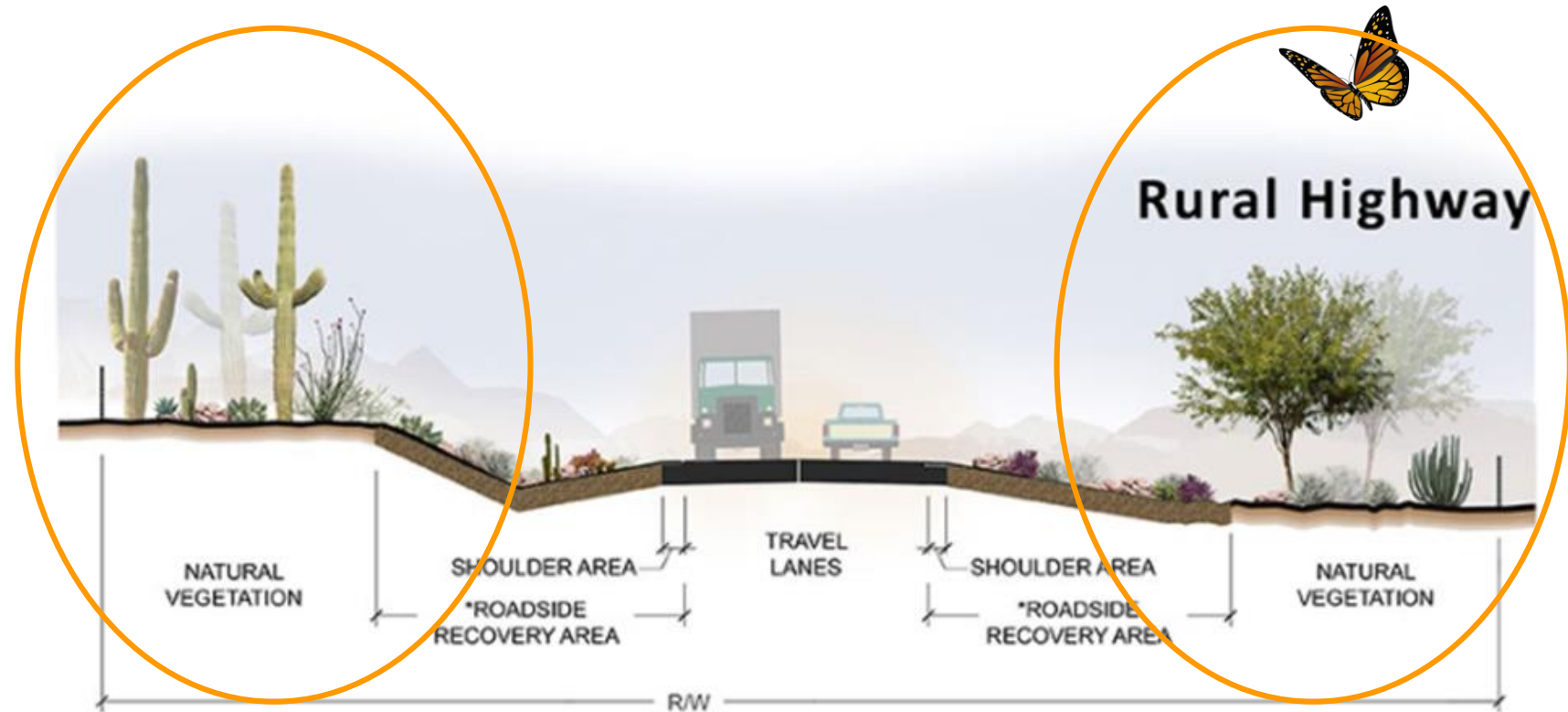
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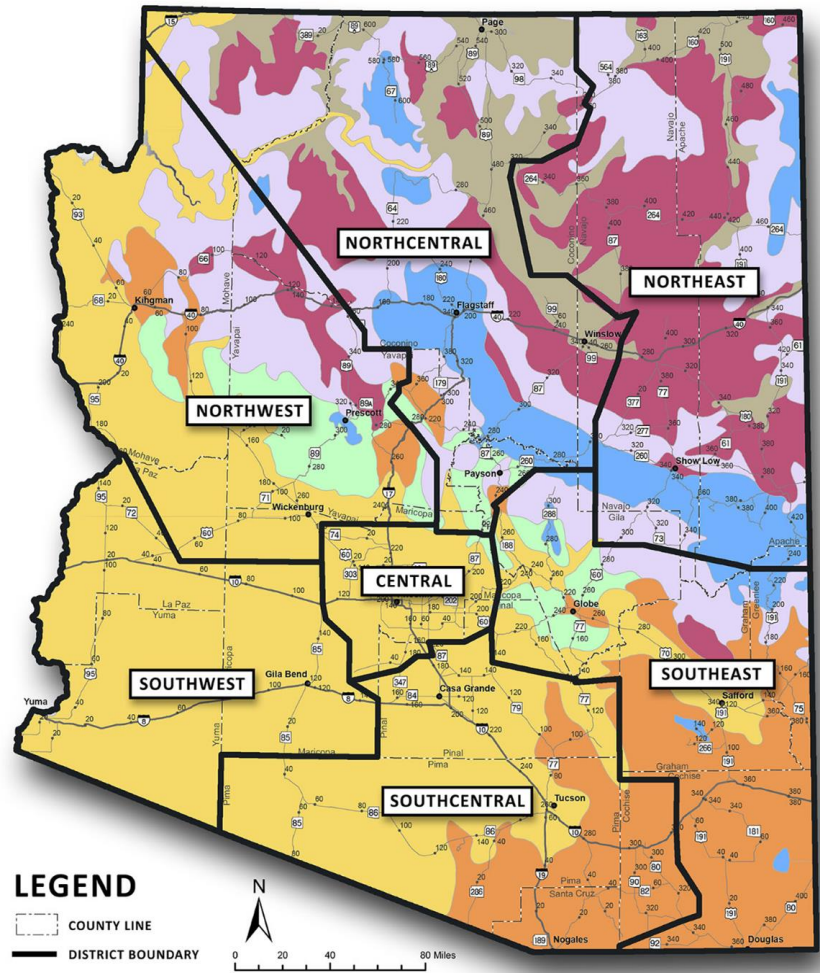
Planning for roadside monarch conservation in Arizona

Goals

- Estimate habitat within highway system
 - Where?
 - How much?
- Where could it be enhanced?
- Which conservation actions make sense?



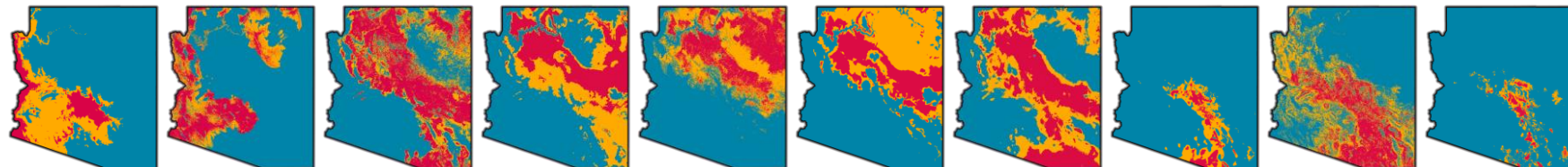
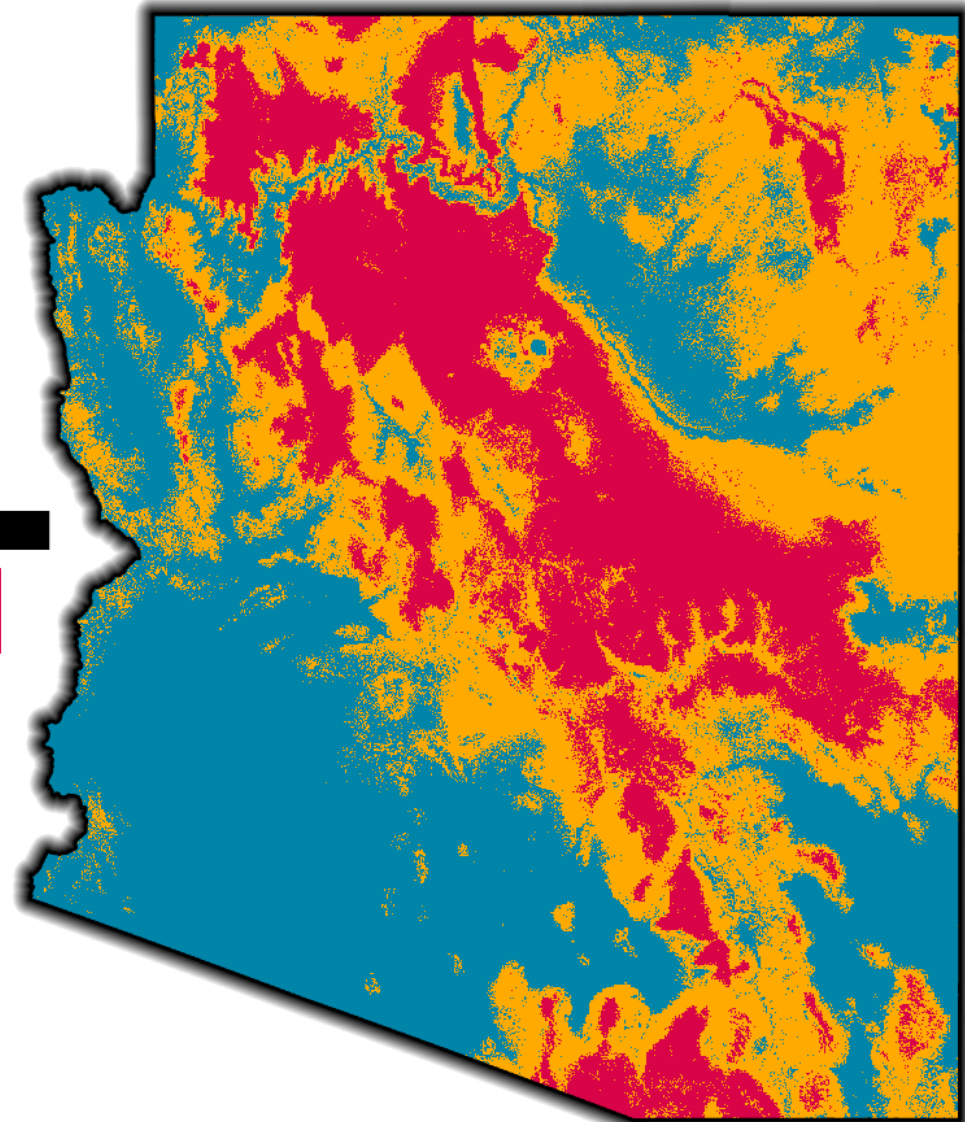
ADOT VEGETATION MANAGEMENT BIOZONES



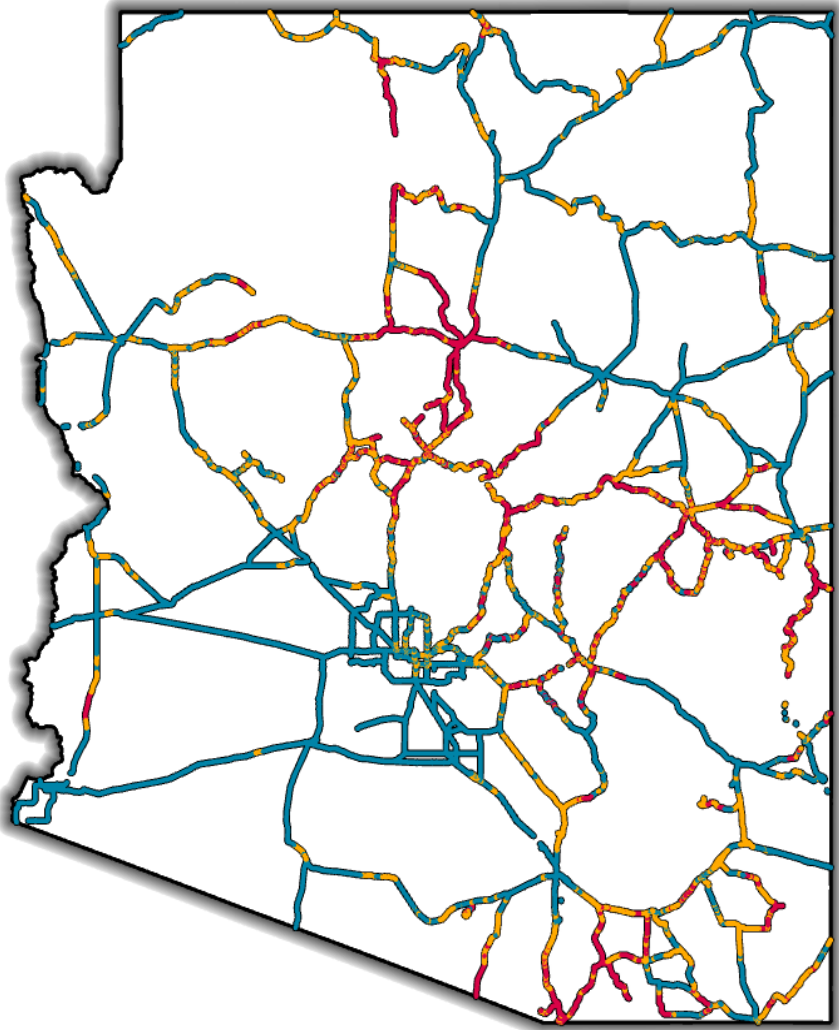
CONIFER FOREST	GREAT BASIN CONIFER WOODLAND	CHAPARRAL	PLAINS AND GREAT BASIN GRASSLAND	SEMIDESERT GRASSLAND AND CHIHUAHUAN DESERTSCRUB	GREAT BASIN DESERTSCRUB	SONORAN AND MOHAVE DESERTSCRUB

Milkweed Suitability Modeling

- Individual species models developed for the 10 selected milkweed species
- Statewide model was then developed by taking a cell by cell average of the ten species models



ROW Modeling



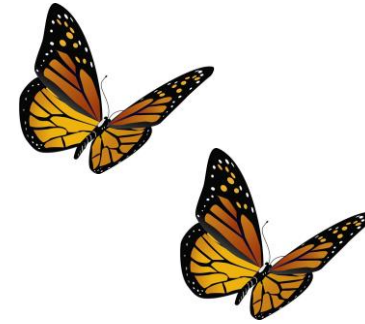
Likelihood of Presence of Milkweed

- Low
- Medium
- High



Sampling Surveys

- Sampling sites randomly selected within each suitability type
- Survey123 forms developed following the CCAA Tier 2 and 3 sampling protocols
- At high suitability sites, Tier 3 protocol was used
- At low and medium sites, Tier 2 protocol was used



Site Name _____ ROW Organization _____
 Assessor _____ Assessor's Affiliation _____
 Site Area _____ acres Date _____ Start Time _____

Survey Type
 Random/Systematic
 Representative

INSTRUCTIONS
 This scorecard provides a Tier 3 assessment of pollinator habitat. Tier 3 assessments provide a qualitative rating of habitat quality and plant composition information. Total all point boxes in the Total Points box to calculate a score. Note additional pollinator and management information on the back. Use the attached Plant Species Worksheets.

Plot Number _____ Plot Location _____ Photos (describe)
 Plot Description (ROW type, off-ROW or facility, leased vs. owned, etc.)

Adjacent Land Use (select up to two categories for land use adjacent to ROW nearest the plot location)
 Cropland Woodland Grassland (Diverse) Other:
 Developed Wetland Grassland (Non-Diverse)

Potentially Flowering Nectar Plant Cover	Additional Habitat Resources	Notes
<input type="radio"/> 0% -----> { 0 }	<input type="checkbox"/> Native bunch grasses ----->	<input type="checkbox"/>
<input type="radio"/> 1-5% -----> { 1 }	<input type="checkbox"/> Brush piles ----->	<input type="checkbox"/>
<input type="radio"/> 6-10% -----> { 6 }	<input type="checkbox"/> Undisturbed thatch ----->	<input type="checkbox"/>
<input type="radio"/> 11-25% -----> { 12 }	<input type="checkbox"/> Dead wood/snags ----->	<input type="checkbox"/>
<input type="radio"/> 26-50% -----> { 18 }	<input type="checkbox"/> Rock piles ----->	<input type="checkbox"/>
<input type="radio"/> 51-75% -----> { 24 }	<input type="checkbox"/> More than 1 sq. ft bare ground ----->	<input type="checkbox"/>
<input type="radio"/> 76-100% -----> { 30 }	<input type="checkbox"/> Plants with hollow pithy stems ----->	<input type="checkbox"/>
	<input type="checkbox"/> Larval host plants (e.g., milkweed) ----->	<input type="checkbox"/>
POINTS <input type="text"/>	POINTS (3 POINTS EACH) <input type="text"/>	

Number of Nectar Plant Species* Number of Native Nectar Plant Species*
 0 species -----> { 0 } 0 species -----> { 0 }
 1-5 species -----> { 3 } 1-5 species -----> { 1 }
 6-10 species -----> { 6 } 6-10 species -----> { 2 }

ArcGIS Survey123

ROW as Habitat Pollinator Scorecard - Tier 3

▼ List Nectar Species

Species

Q|

- Arizona milkweed - *Asclepias angustifolia*
- Bract milkweed - *Asclepias brachystephana*
- Jewel milkweed - *Asclepias cryptoceras*

Native?
 yes no unknown

Blooming?
 yes no

Flag for further review?
 yes no

Unknown species. Take a photo.

Photo(s)



Citations



- Dilts, T. E., M. O. Steele, J. Engler, E. M. Pelton, S. J. Jepsen, S. McKnight, A. R. Taylor, C. Fallon, S. H. Black, E. Cruz, D. R. Craver, and M. L. Forister. 2019. [Host plants and climate structure habitat associations of the western monarch butterfly](#). *Frontiers in Ecology and Evolution*
- Muscarella, R., Galante, P. J., Soley-Guardia, M., Boria, R. A., Kass, J. M., Uriarte, M., & Anderson, R. P. (2014). ENMeval: An R package for conducting spatially independent evaluations and estimating optimal model complexity for Maxent ecological niche models. *Methods in Ecology and Evolution*, 5, 1198–1205.
- Kass J.M., Muscarella R, Galante PJ, Bohl CL, Pinilla-Buitrago GE, Boria RA, Soley-Guardia M, Anderson RP (2021). “ENMeval 2.0.1: Redesigned for customizable and reproducible modeling of species’ niches and distributions.” *Methods in Ecology and Evolution*. <https://doi.org/10.1111/2041-210X.13628>.
- Steven J. Phillips, Miroslav Dudík, Robert E. Schapire. [Internet] Maxent software for modeling species niches and distributions (Version 3.4.4). Available from url: http://biodiversityinformatics.amnh.org/open_source/maxent/. Accessed on 2021-8-25.
- Webinar on [CalTrans Milkweed Suitability model](#)
- [ADOT Roadside Vegetation Management Guidelines](#)



Photo: Arizona DOT

