

Montana Natural Heritage Program Information



<https://mtnhp.mt.gov>

Bryce Maxell, Program Coordinator bmaxell@mt.gov

Montana Natural Heritage Program

Explore Data

View species and habitat information

Montana Field Guide

Map Viewer

Dashboards and Tools

Request Data

For environmental reviews, permits, or planning

Submit Request

Data Use Terms and Conditions

Collect and Submit Data

Contribute data to MTNHP

iNaturalist / Citizen Science

MTNHP Forms

Report Invasive Species

Additional Resources

Explore program-specific information

Zoology / Animals

Botany / Plants and Fungi

Ecology / Wetlands and Land Cover

About Us

Learn about MTNHP or Contact Us

Program Info

Staff Contacts

Partners

A Species of Concern



Tapertip Onion
Allium acuminatum

New to this website?

[Take An In-Depth Video Tour!](#)

- [Guide to Publicly Available Resources](#)
- [Invasive Species Manager Guide](#)
- [Biologist / Resource Manager Guide](#)

Announcements

[Montana Natural Heritage Program 2025 Annual Partner's Meeting](#)

[Montana Beaver Restoration HUB Released](#)

[Montana Citizen Botany Pilot Study 2022-2024 results!](#)

[Montana Native Plant Conservation Strategy Published](#)

The Montana Natural Heritage Program is a program of the [Montana State Library's Natural Resource Information System](#)



Spatial Analysis Lab

UNIVERSITY OF
MONTANA

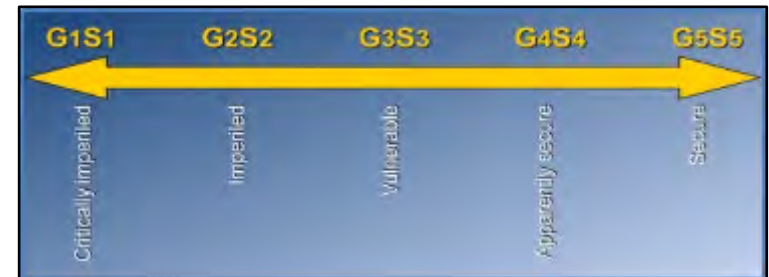
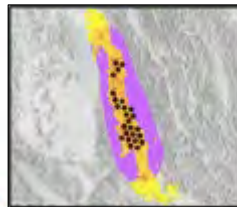
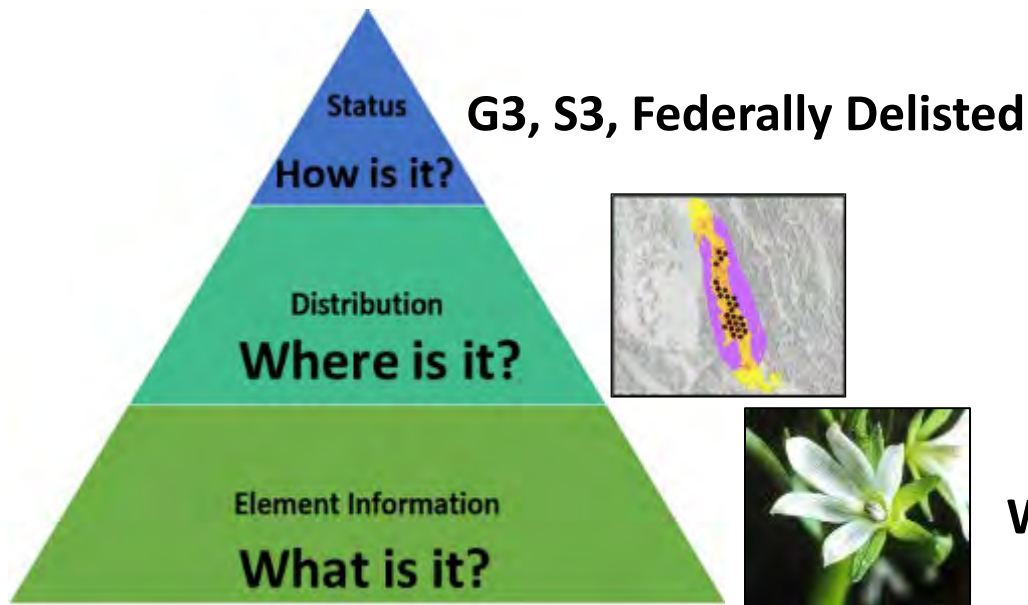


O'Connor Center for the
Rocky Mountain West
Ecological Mapping Monitoring
and Analysis Group (EMMA)



Why have a Natural Heritage Program?

- Common set of information available to everyone
- Inform environmental review, permitting, and planning
- Inform species and habitat management decisions
- Inform disaster and invasive species response efforts
- Make informed decisions quickly
- Expedite processes to save time and money
- Provide certainty (avoid litigation and harm to species)
- Maintain local authority on species/habitat management

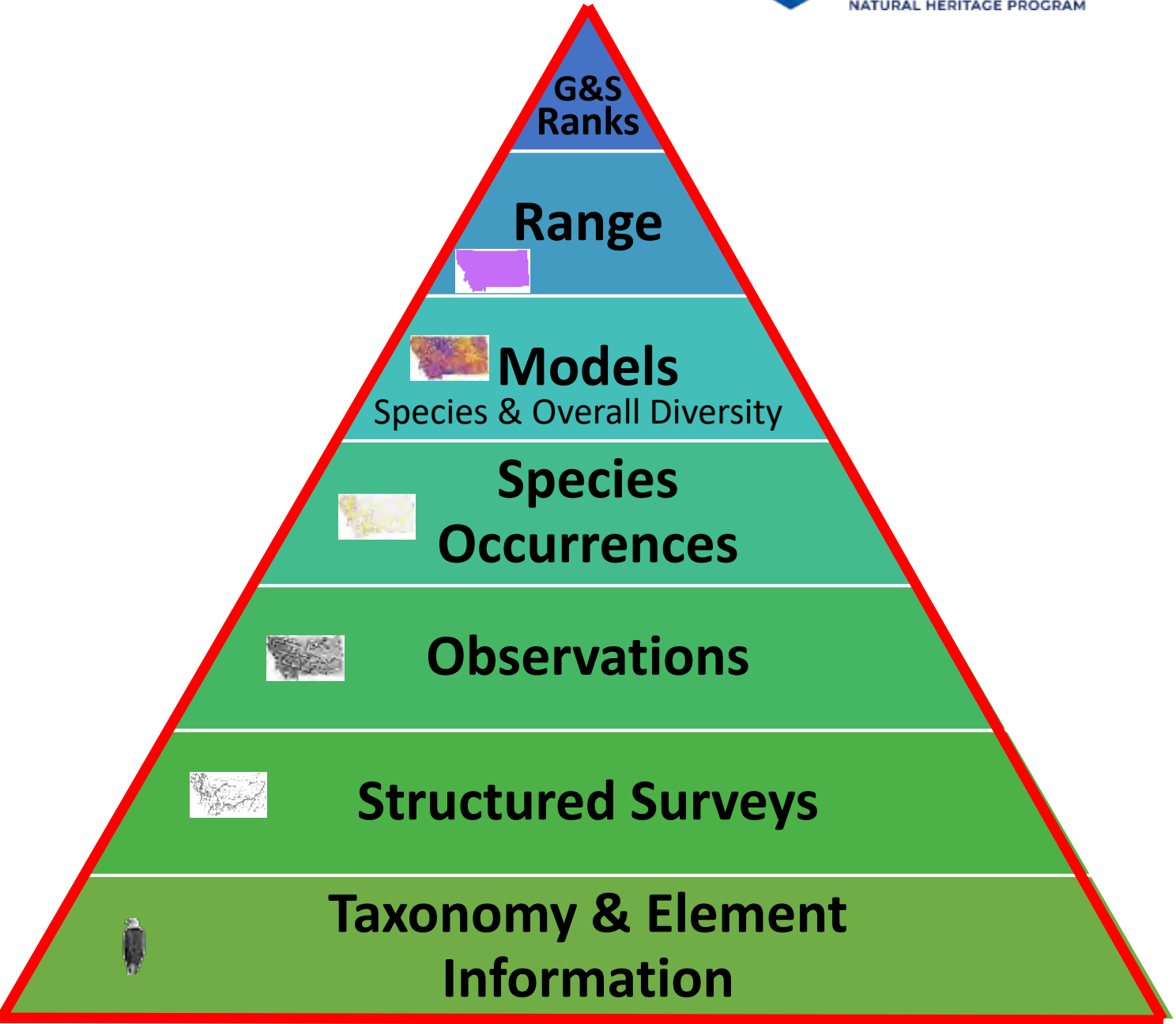


Water Howellia (*Howellia aquatilis*)

Species Data Products



2026 Counts

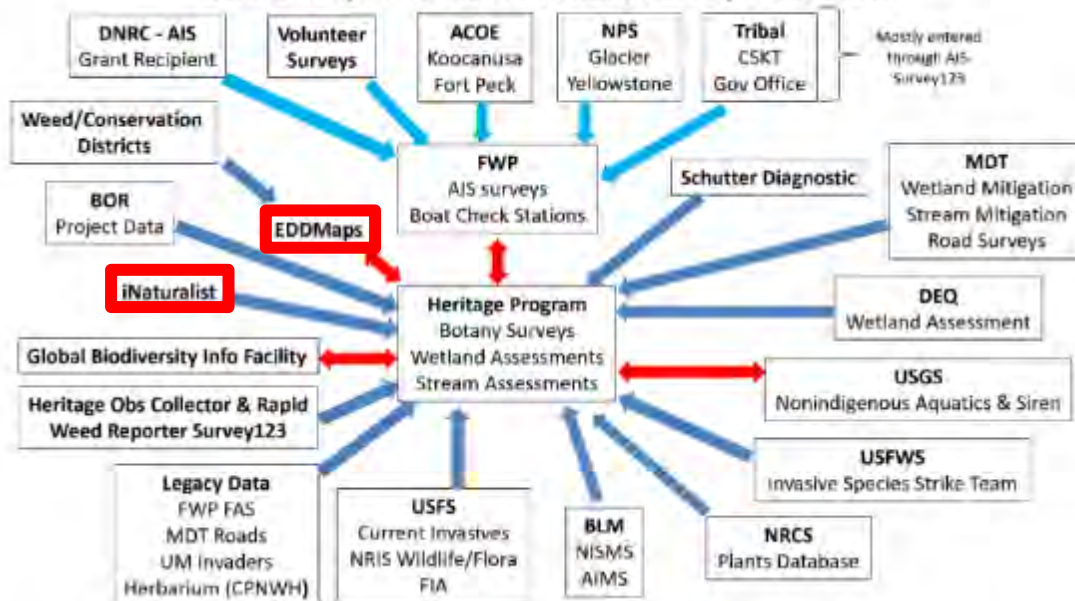


Status of Invasive Species Information

- 1,367 non-native species (138 aquatic, 1,229 terrestrial)
- 1,108,139 observation records (~¾ vascular plants)
- 170,201 structured surveys
- ~1,300 data sources
- Invasion risk models for 302 species



Invasive Species Observation/Survey Data Flow



Some iNaturalist EDRR Success Stories



Weeds Listed in Surrounding States and Provinces of Potential Concern

Alberta

<https://www.alberta.ca/provincially-regulated-weeds.aspx#jumplinks-2>

<https://open.alberta.ca/publications/distribution-of-regulated-weeds-in-alberta>

British Columbia

<https://bcinvasives.ca/wp-content/uploads/2023/05/Field-Guide-to-Noxious-Weeds-12th-WEB.pdf>

Idaho

<https://invasivespecies.idaho.gov/plants>

<https://content-hub.uidaho.edu/api/public/content/310aea9f9bcc411ca9c56d8abc934f76?v=cbb20de3>

Montana

<https://agr.mt.gov/Topics/N-P/Noxious-Weeds-Pages/Noxious-Weed-Education>

North Dakota

<https://www.ndda.nd.gov/divisions/plant-industries/noxious-weeds>

Saskatchewan

<https://pubsaskdev.blob.core.windows.net/pubsask-prod/148856/2025-Minister-Order-designating-weeds.pdf>

South Dakota

<https://danr.sd.gov/Conservation/PlantIndustry/WeedPest/WeedandPestInfo>

Wyoming

<https://wyoweed.org/noxious-species/>

Invasive Plant Predicted Risk Models Montana Natural Heritage Program



https://mtnhp.mt.gov/resources/botany/docs/Predicted_Risk_Models_Invasive_Plants_in_Montana_20260715.pdf

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Braden Burkholder, Data Systems and Sciences Lead bburkholder@mt.gov

Montana Natural Heritage Program

Botany Resources

The Botany Program manages information on the distribution, status, and biology of native and non-native vascular plant, moss that are of conservation concern.

Primary Web Applications

- [Montana Field Guide](#)
- [Map Viewer](#)
- [Species Spreadsheet](#)
- [Species of Concern Report](#)

Montana Native Plant Conservation Strategy

- [The Strategy](#)
- [Presentation on Strategy to Montana Native Plant Society](#)

Montana Citizen Botany Program

- [Frameworks](#)
- [2022 Presentation on Proposed Framework](#)
- [2022-2024 Pilot Study Report](#)

Checklists

- [Montana Vascular Plants, 2013](#)
- [Montana Moss Checklist with Distributions](#)

Botanical Tools

- [Botanical Terminology Glossary](#)
- [Winter Field Key to the Native Shrubs of Montana](#)
- [D-Value Spreadsheet](#)

Predicted Models

- [Predicted Suitable Habitat Models](#)

Program Reports

- [Botany Reports](#)

Presentations

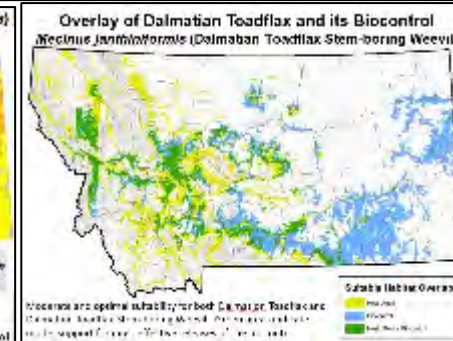
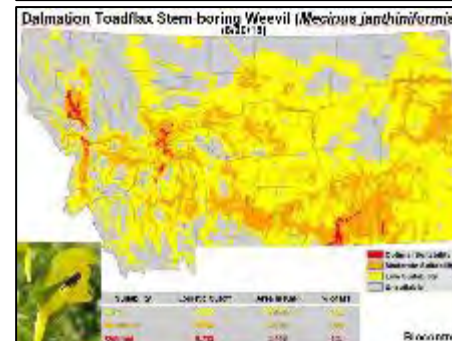
- [Invasive Plant Predicted Risk Models-- May 4, 2023](#)

Websites of Interest

- [Related Web Sites](#)

- Predicted Invasion Risk Models for 245 Non-native Plants and Biocontrols
- 90 added in 2026!

Common Name	MT	ID	B.C.	AB	SK	ND	SD	WY
American Water-lily	AIS							
Blueweed	N1B	Control	Regional Noxious	Noxious			Watch	
Bohemian Knotweed	N1B	Control	Noxious	Prohibited Noxious				
Brazilian Waterweed	N2	LDRR						
Brittleleaf Nodol	AIS							
Canada Thistle	N2B	Containment	Noxious	Noxious	Noxious	Noxious	Noxious	Noxious
Cheatgrass	R3			Noxious	Noxious			
Common Buckthorn	N2A			Prohibited Noxious	Noxious			
Common Hound's-tongue	N2B	Containment	Noxious	Noxious	Prohibited	Noxious		Noxious
Common St. John's-wort	N2B		Invasive of Concern	Prohibited Noxious				Noxious
Common Tansy	N2B		Regional Noxious	Noxious	Noxious			Noxious
Common Water Hyacinth	AIS	LDRR						
Curly-leaf Pondweed	N2B/AIS	Containment			Prohibited			
Dalmatian Toadflax	N2B	Containment	Noxious	Noxious	Prohibited	Noxious		Noxious
Diffuse Knapweed	N2B	Containment	Noxious	Prohibited Noxious	Prohibited	Noxious		Noxious
Dyer's Wood	N1A	Control		Prohibited Noxious			Watch	Noxious
Eurasian Water-milfoil	N2A/AIS	Control		Prohibited Noxious	Prohibited			
European Common Reed	N1A	Control	Noxious					
Fanwort	AIS	EDRR						
Field Bindweed	N2B	Containment	Invasive of Concern	Noxious	Noxious			Noxious
Flowering-rush	N2A/AIS	Containment	Noxious	Prohibited Noxious	Prohibited			
Giant Knotweed	N1B	Control	Noxious	Prohibited Noxious				
Hoary False-alyssum	N2B	Containment	Regional Noxious	Prohibited Noxious	Noxious			
Hydrilla	R3	EDRR						
Japanese Knotweed	N1B	Control	Noxious	Prohibited Noxious				



Data Centralization Philosophy: There is No One Right Way

- Provide tools for observation submission



- Youtube Playlist on How to Submit Data to MTNHP

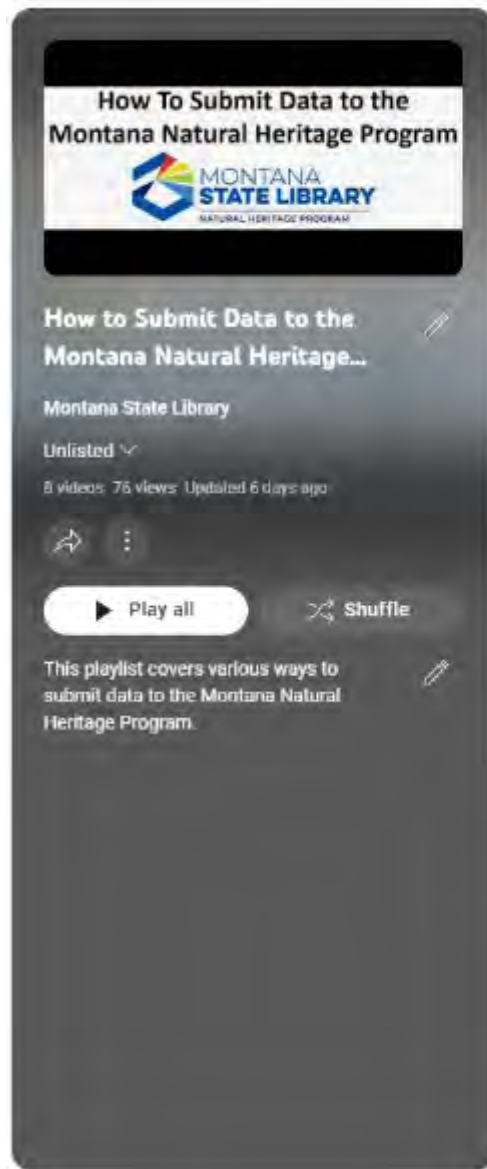
<https://www.youtube.com/playlist?list=PLRaydtZpHu2qOHPoSPq9cnM9uXGmEXACx>

- Seek out data submitted elsewhere



How to Submit Data to MTNHP - Youtube Playlist

<https://youtube.com/playlist?list=PLRaydtZpHu2qOHPoSPq9cnM9uXGmEXACx>



How To Submit Data to the Montana Natural Heritage Program

MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM

How to Submit Data to the Montana Natural Heritage...

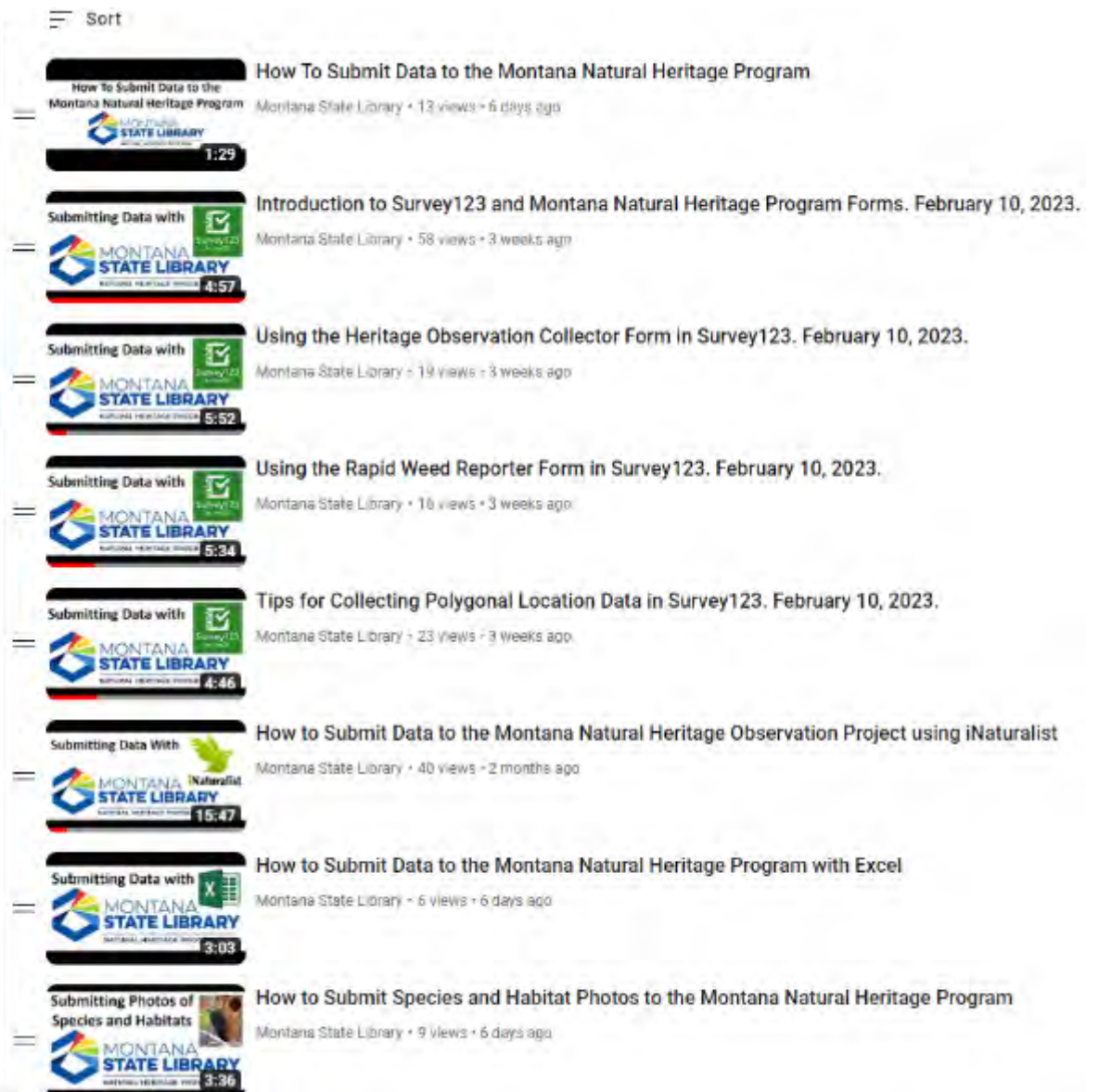
Montana State Library

Unlisted

8 videos • 76 views • Updated 6 days ago

▶ Play all 🔀 Shuffle

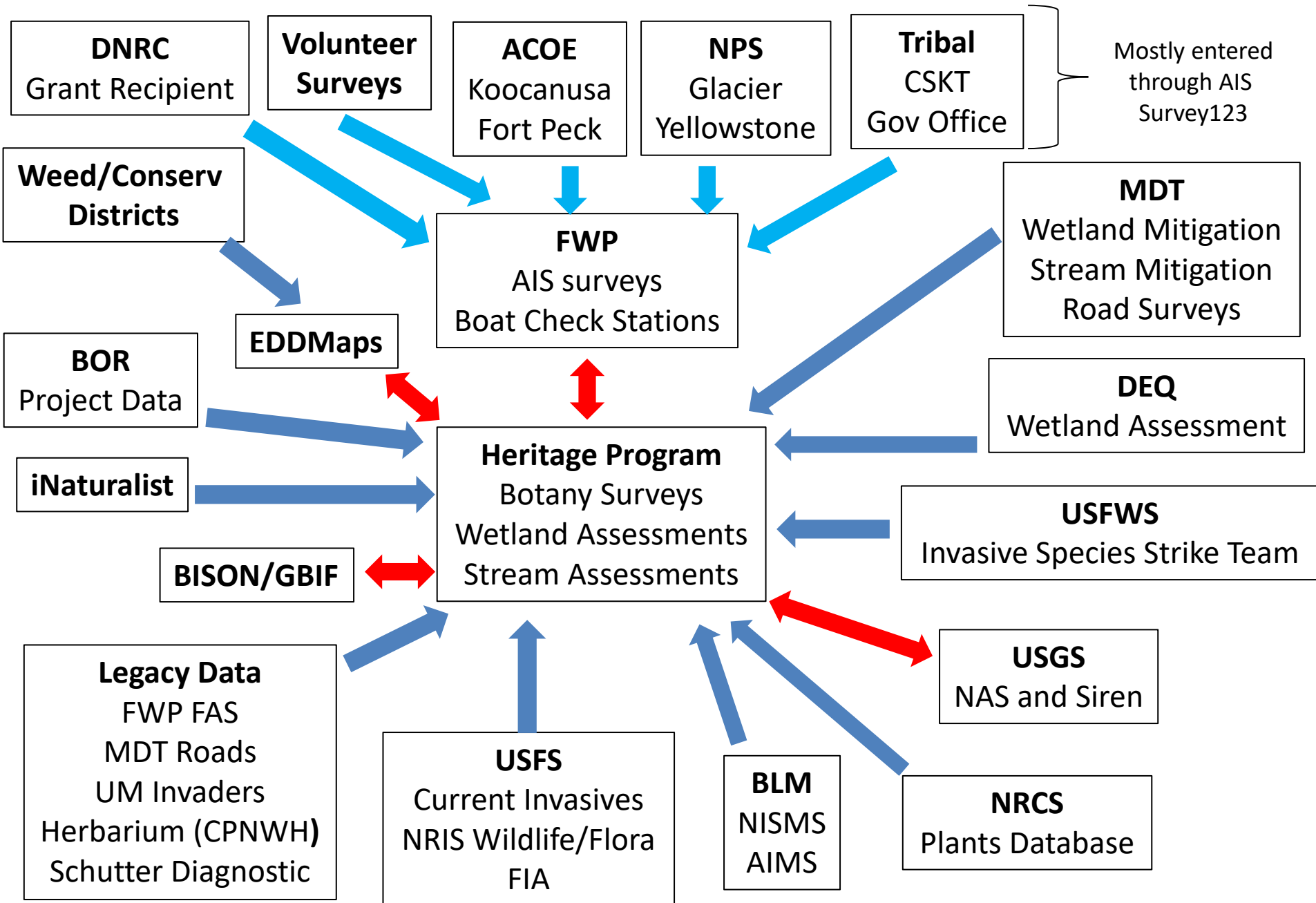
This playlist covers various ways to submit data to the Montana Natural Heritage Program.



Sort

- How To Submit Data to the Montana Natural Heritage Program**
Montana State Library • 13 views • 6 days ago
1:29
- Submitting Data with Survey123**
Introduction to Survey123 and Montana Natural Heritage Program Forms. February 10, 2023.
Montana State Library • 58 views • 3 weeks ago
4:57
- Submitting Data with Survey123**
Using the Heritage Observation Collector Form in Survey123. February 10, 2023.
Montana State Library • 19 views • 3 weeks ago
5:52
- Submitting Data with Survey123**
Using the Rapid Weed Reporter Form in Survey123. February 10, 2023.
Montana State Library • 16 views • 3 weeks ago
5:34
- Submitting Data with Survey123**
Tips for Collecting Polygonal Location Data in Survey123. February 10, 2023.
Montana State Library • 23 views • 3 weeks ago
4:46
- Submitting Data With iNaturalist**
How to Submit Data to the Montana Natural Heritage Observation Project using iNaturalist
Montana State Library • 40 views • 2 months ago
15:47
- Submitting Data with Excel**
How to Submit Data to the Montana Natural Heritage Program with Excel
Montana State Library • 6 views • 6 days ago
3:03
- Submitting Photos of Species and Habitats**
How to Submit Species and Habitat Photos to the Montana Natural Heritage Program
Montana State Library • 9 views • 6 days ago
3:36

Invasive Species Observation/Survey Data Flow



EDDMaps West and Heritage Data Exchange



Large Public Databases

For Example: USFS NRIS and Current Invasives or BLM NISMS and AIM



Heritage Program



EDDMaps

Smaller Local Data Sources (Non-EDDMaps data users)



Heritage Program

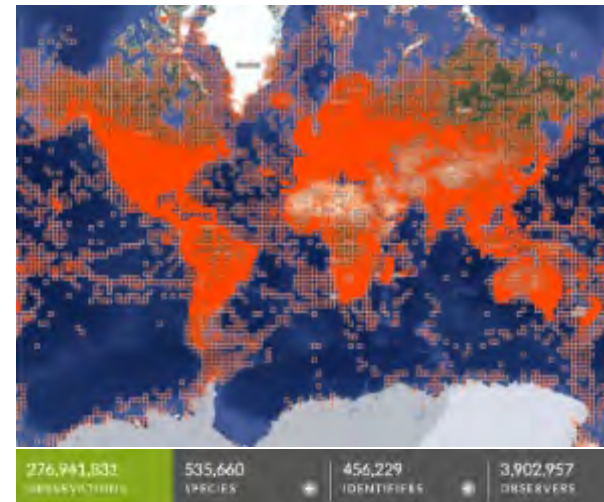
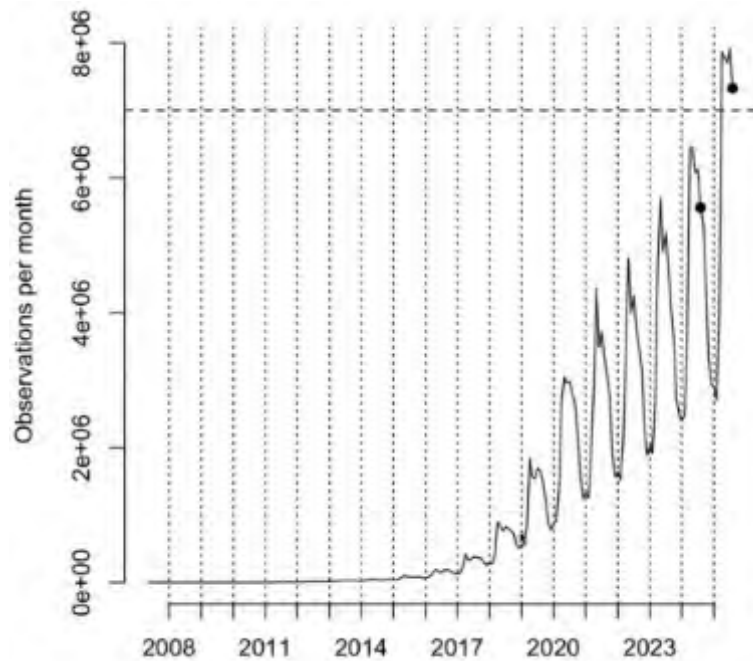


EDDMaps



- MTNHP and EDDMaps will both consume, evaluate, and add data from major public data sources as they have time
- MTNHP will centralize smaller local data sources (including polygonal and linear features) and provide both the raw datasets and the final evaluated data to EDDMaps
- MTNHP and EDDMaps will create APIs to allow each other to take live pulls of “accepted observations”, “deleted observations”, and survey locations
- MTNHP and EDDMaps will maintain persistent ID numbers and the ID numbers from the original data sources to facilitate cross walks
- MTNHP and EDDMaps will populate “record update and date” fields to facilitate record reviews and needed updates on either end
- MTNHP and EDDMaps will share data dictionaries for all data fields in their databases

Tremendous Growth in Citizen Science Data That Can Inform Conservation Decisions



iNaturalist Contributions to Montana Natural Heritage Program Data System - 1

- **34 species (26 native and 8 non-native) added to the data system because of an iNaturalist record**
 - 5 native and 1 non-native vascular plants
 - 6 native algae
 - 2 non-native vertebrates
 - 12 native insects
 - 1 native and 2 non-native spiders
 - 1 non-native ispod
 - 1 non-native terrestrial snail
 - 1 native and 1 non-native bryozoan
 - 1 native hydrazoan
 - **iNaturalist are first records in the data system for 702 species (659 native and 43 non-native)**
 - 17 native and 7 non-native vascular plants
 - 6 native algae
 - 157 native and 6 non-native fungi
 - 23 native and 1 non-native lichen
 - 2 non-native vertebrates
 - 420 native and 22 non-native insects
 - 34 native and 2 non-native spiders
 - 1 non-native isopod
 - 1 non-native terrestrial snail
 - 1 native and 1 non-native bryozoan
 - 1 native hydrazoan
- *Through March 11, 2026)
- **Extended or filled in gaps in the known range for many hundreds of species**
 - **Contributed to early detection of and rapid control for a number of non-native species**

Palmer's Amaranth



Rush Skeletonweed



Yellow Floating Heart



European Common Reed



Cutleaf Teasel



Policeman's Helmet



Roman Snail



iNaturalist Contributions to Montana Natural Heritage Program Data System – 2

(March 11, 2026)

iNaturalist Totals For Montana



521,493 OBSERVATIONS	9,686 SPECIES	12,444 IDENTIFIERS	23,638 OBSERVERS
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Summary of iNaturalist Records Integrated into the MTNHP Data System

Taxa	No. of Orders	Total No. of Obs	No. Obs for SOC	No. Obs for Non-natives
Vertebrates	44	44,500	8,002	1,486
Invertebrates	32	18,863	467	2,387
Fungi/Lichens	34	788	6	42
Vascular Plants	59	74,971	925	14,016
Nonvascular Plants	11	21	1	0

***63,363 zoological & 75,840 botanical records now appended (27% of MT iNat records)!**

iNaturalist Support Materials on Report Invasive Species Page

Collect and Submit Data

Contribute data to MTNHP

iNaturalist / Citizen Science

MTNHP Forms

Report Invasive Species

[https://mtnhp.mt.gov/submit/Report Invasives](https://mtnhp.mt.gov/submit/Report_Invasives)

Montana Natural Heritage Program

Citizen Science in Montana

Data collected through a variety of citizen science efforts are being centralized by the Montana Natural Heritage Program. Below are listings of citizen science initiatives that offer opportunities to learn about species and habitats in Montana and to contribute valuable data. This information plays a critical role in helping natural resource managers conserve and protect Montana's native species and habitats, as well as manage non-native species that threaten the state's native flora and fauna.

Reporting Applications

iNaturalist

Download the iNaturalist app



Take a Photo or Record a Sound



- App will suggest an Identification
- Accept that or suggest your own identification
- iNaturalist users around the globe can confirm your identification or suggest another



iNaturalist is a widely used global platform that allows users to report observations of any species using photos or sound recordings. The application includes algorithms that suggest species identifications, which users can accept or provide their own identification. Members of the iNaturalist community, including global experts for specific species groups, can then verify or refine these identifications. The following resources were created to help users get started with iNaturalist:

How to Use - Videos

Why and How to Use - Presentation

Business Cards - Print and Share

Identification Resources for Montana Species

Setting up an iNaturalist Account

1. Create an account at <https://www.inaturalist.org/>
2. Download iNaturalist app on your cell phone from your favorite app store



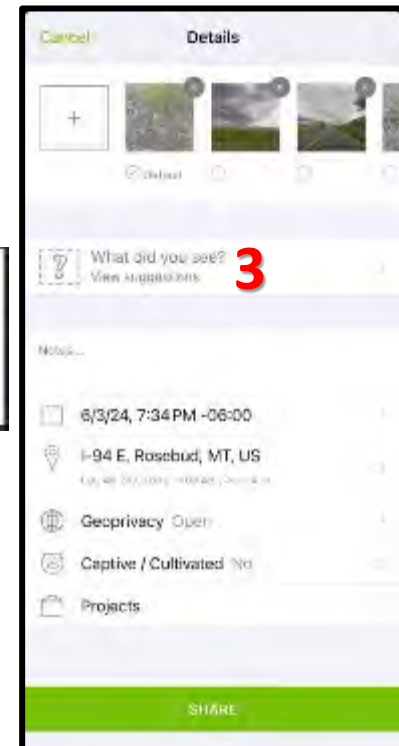
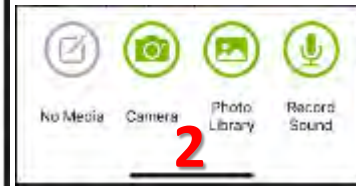
3. Login to your recently created account

Phone

1. Click Observe
2. Select photo or sound source
3. Identify what you saw as best you can. Use suggestions by iNaturalist for assistance.

Desktop (see following slides)

1. Subscribe to species of interest to get reports of observations for species & areas of interest
2. Identify observations of others



iNaturalist Resources

- Seek by iNaturalist for assistance with identification
 - https://www.inaturalist.org/pages/seek_app
- iNaturalist Resources for observers
 - <https://www.inaturalist.org/pages/video+tutorials>
- Guide for taking iNaturalist photos
 - https://bcparksfoundation.ca/site/assets/files/1697/inaturalist_photo_guide_final.pdf
- Montana Natural Heritage Observations Project
 - <https://www.inaturalist.org/projects/montana-natural-heritage-observations>
- How to submit data to the Montana Natural Heritage Observations Project
 - <https://www.youtube.com/watch?v=uiXwDiAuXxw>
- Individuals with expertise willing to be tagged to assist with ID in Montana
 - Scott Mincemoyer (**vascular plants**): @**scott_mt**
 - Peter Achuff (**vascular plants**): @**plachuff**
 - Kenda Herman (**vascular plants**): @**kendarae**
 - Dan Bachen (**general resource, vertebrates**): @**dbachen**
 - Bryce Maxell (**general resource, vertebrates**): @**bmaxell**
 - Zach Shattuck (**fish**): @**pantosteus**
 - Alexis McEwan (**amphibians, reptiles**): @**lex_13**
 - Bo Crees (**birds**): @**bocreos**
 - Ian Foley (**invertebrates**): @**ian26**
 - Noah Siegel (**fungi**): @**noah_siegel**
 - Ryan Patrick (**fungi**): @**biglaughinggym**
 - Craig McLane (**aquatic invasive species**): @**cmclane**



iNaturalist Data Workflow

Daily work in iNaturalist

Establish Projects for taxa of interest

- Heritage Obs
- Non-lichenizing fungi

Flag taxa for data obscuring/opening

Data Review and comments for:

- Taxa subscriptions
 - AIS
 - Noxious Weeds
 - Vert classes
- Reviews of projects
- Records identified by MTNHP audit reports

Communications on specific records to obscure or open

iNaturalist API
Monthly Download

MTNHP Processing Server

Working Table

Taxa Table

Expert Table

Other Lookup
and Archive
tables

Monthly
Audit
Reports

Annual
Audit
Report

Audit Report Record Review
in ArcPro and iNaturalist

- Species of Concern
- New species
- Records outside range
- Records >10km from previous records
- Obscuring changes

Review performance metrics for all identifiers relative to expert identifiers in order to add “experts”

Append “Expert” and
Selected “Research Grade
w 3 concurring IDs” to
MTNHP Obs Database

**Audit
Reports**

Nightly
Weekly
Monthly
Quarterly

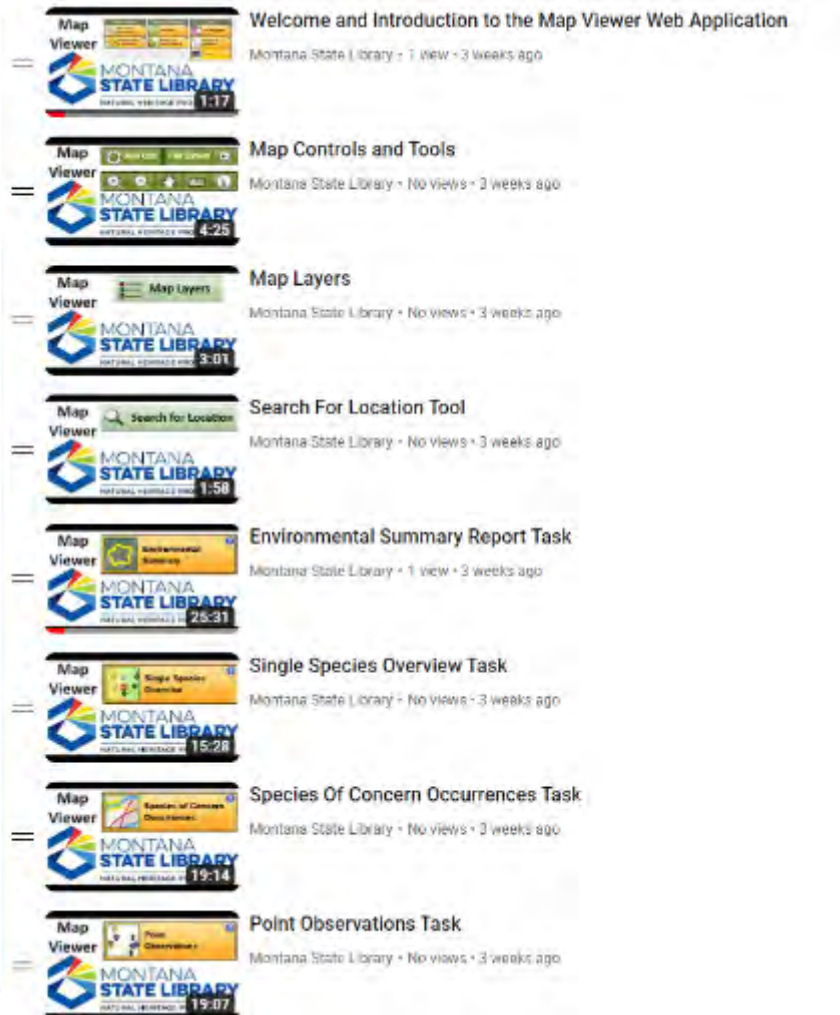
**Standard MTNHP
Review and Processing
of Records for QA/QC**

How to Access Weed Information on Map Viewer

<https://mtnhp.org/mapviewer>

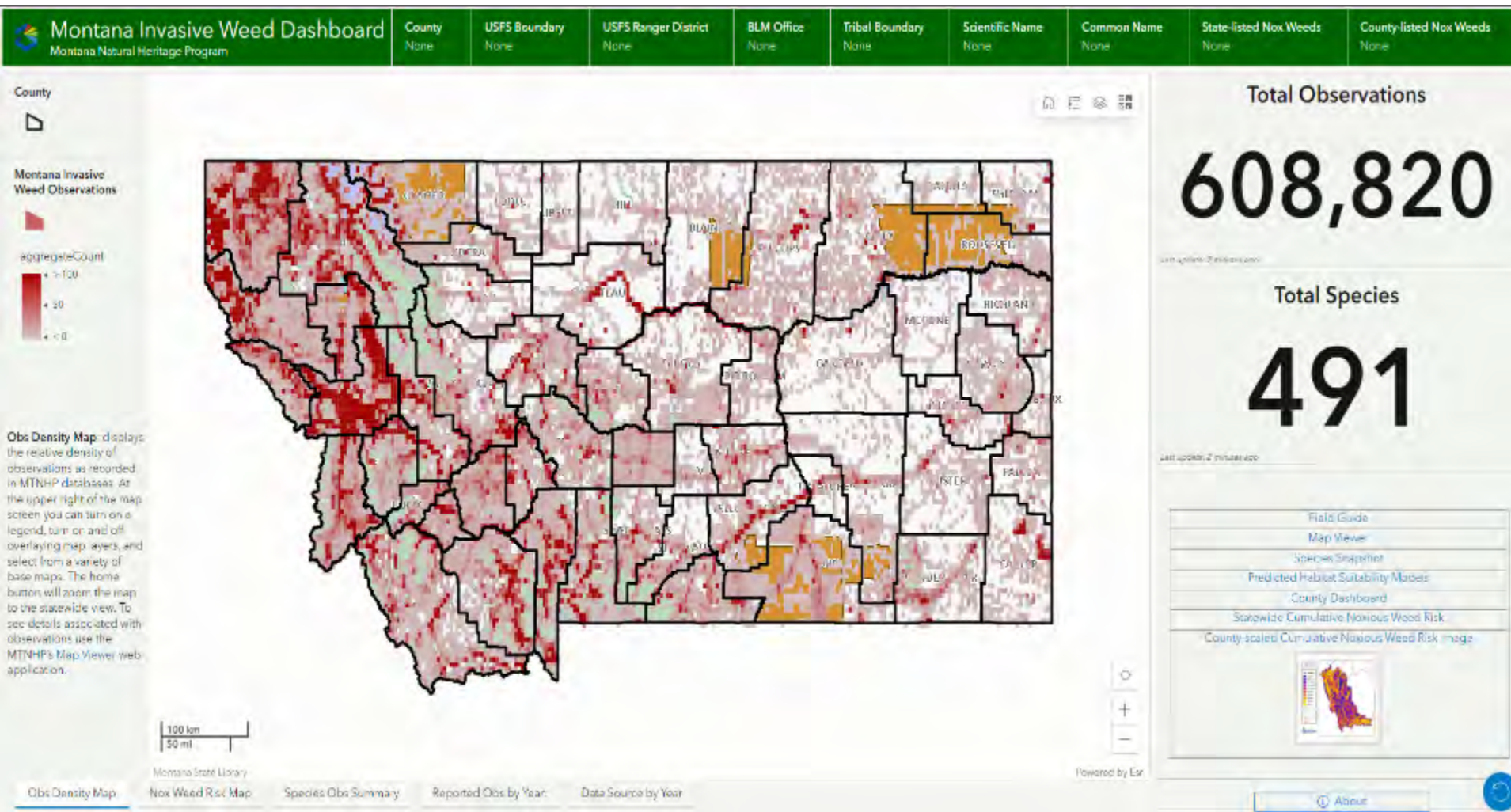
Youtube Playlist of Training Videos

<https://youtube.com/playlist?list=PLRaydtZpHu2rAl8P7VJUIoV4zoTu7eQFG>



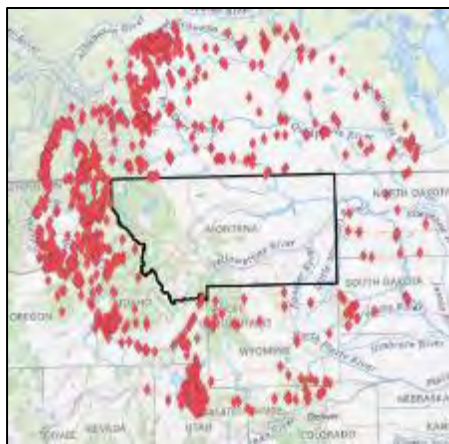
Montana Weed Dashboard

<http://tinyurl.com/2krv3w9r>

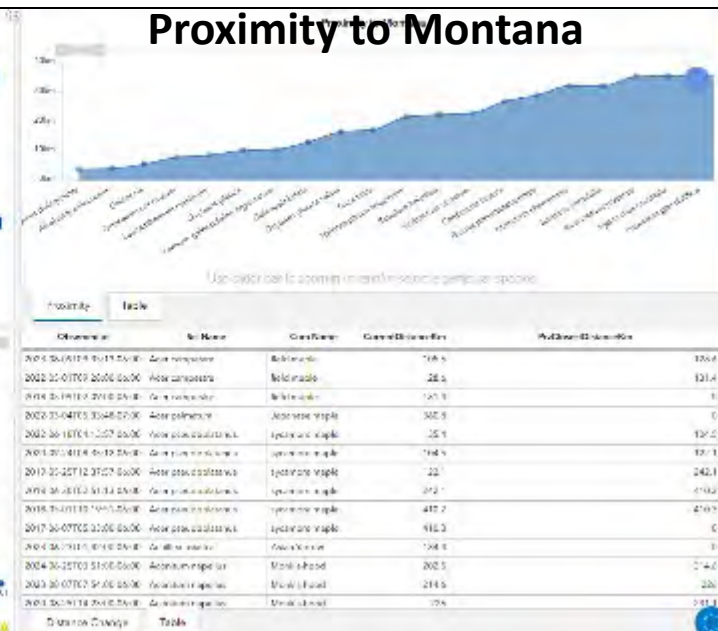
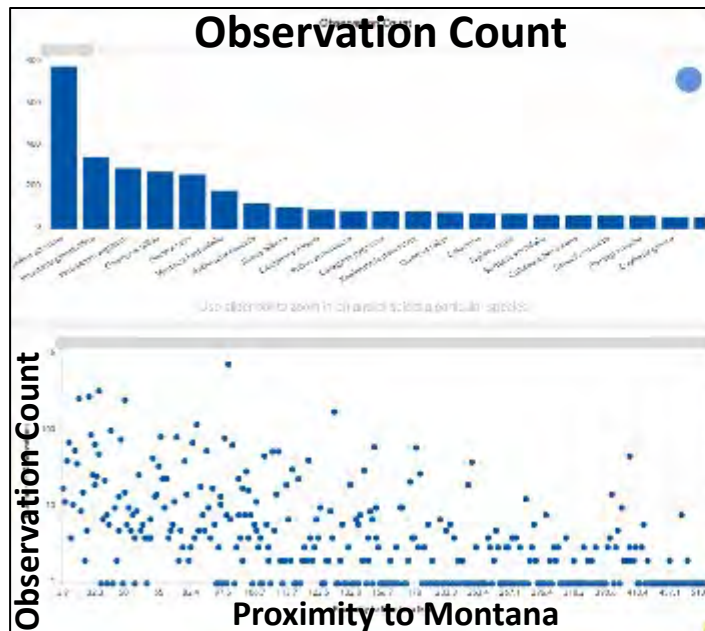


iNaturalist Non-native Species Watchlist

<https://tinyurl.com/5n8sn6az>



**Non-native records
outside state within
800-km radius of
center of Montana**



Data for Individual Records

Date	Species Group	Scientific Name	Common Name	Current Distance Km	Previous Distance Km	Distance Change Km	Observation Link
08/2011	Plantae	Coleogyne peltata	Blind Heep-ettia	381	504.7	448.6	344
11/2/2021	Plantae	Mentha aquatica	Peppermint	79.6	192.0	112.0	1240
7/11/2018	Plantae	Leucanthemum vulgare	Mountain Ragwort	12.9	406.0	395.3	2020
7/19/2022	Plantae	Coccyzus erythrophthalmus	Red-tailed Tropicbird	106.3	406.1	395.3	2020

Audit Reports eMailed Directly to Agency Staff

Email Bryce Maxell at bmaxell@mt.gov to sign up!

New Weed Observations - by USFS Ranger District

These noxious weed observations were added to the MTNHP database in the last quarter. Observations are organized by USFS Ranger District. Actual observation dates may be before this period. See these and other records in <https://mtnhp.org/mapviewer/>

Rerun this report: <http://intranet.nhp.mt.gov/SQLPRDNightlyAuditRunOne.asp?i=178>

250 records in this report This report runs every First of Quarter morning

RANGER_DISTRICT	MT_Weed_Status	Field_Guide_Link	MapViewLink	S_Com_Name	Num_Obs_Last_Quarter_in_USFS_RD	Tot_Obs_For_USFS_RD	Tot_Obs_For_State
Beaverhead-Deerlodge National Forest, Butte Ranger District	State Listed Weed: N2B	PDAST2E090	Cirsium arvense	Canada Thistle	4	229	54018
Beaverhead-Deerlodge National Forest, Butte Ranger District	County Listed Only	PDAST1S040	Carduus nutans	Musk Thistle	3	73	10738
Beaverhead-Deerlodge National Forest, Butte Ranger District	State Listed Weed: N2B	PDAST1Y140	Centaurea stoebe	Spotted Knapweed	1	1282	144060

New Invasive Species - Quarterly Report

These non-native species observations were added to the MTNHP database in the last quarter. Observations are organized by County.

See these and other records in <https://mtnhp.org/mapviewer/>

Rerun this report: <http://intranet.nhp.mt.gov/SQLPRDNightlyAuditRunOne.asp?i=57>

1278 records in this report This report runs every First of Quarter morning

County	MT_Status	Field_Guide_Link	S_Com_Name	Num_Obs_Last_Quarter	Tot_Obs_For_County	Tot_Obs_For_State
Beaverhead	R3	PMPOA151H0	Cheatgrass	3	450	10203
Beaverhead	N2B	PDAST1Y140	Spotted Knapweed	3	6232	144587
Beaverhead	N2B	PDAST2E090	Canada Thistle	23	2971	54589

New Weeds Observations >2km from Existing Obs

These noxious weed observations were added to the MTNHP database in the last week and are >2km from all previous observations (if mapped precisely). Actual observation dates may be before this period.

See these and other records in <https://mtnhp.org/mapviewer/>

Rerun this report: <http://intranet.nhp.mt.gov/SQLPRDNightlyAuditRunOne.asp?i=172>

1 records in this report This report runs every Sun morning

Field_Guide_Link	S_Com_Name	MT_Status	Obs_ID	Location	Latitude	Longitude	Distance_fromOldObs_km	Date_Added	Date_Observed
PMPOT03060	Curly-leaf Pondweed	N2B/AIS	2314213	Flathead Lake FWP WaterbodyID: 39716 FWP SectionID: 42345848	47.86318	-114.27468	5.4	2024-01-25	2023-10-10

Spatial Data Web Services

Description:

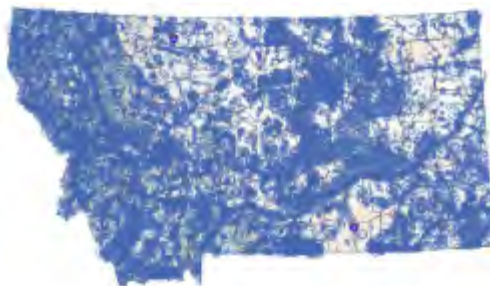
The Montana Natural Heritage Program (MTNHP) provides access to our species spatial data to our collaborating partners via ArcGIS Online (AGOL). We have published seven feature services:

- Botanical [Species Occurrences](#)
- Zoological [Species Occurrences](#)
- Botanical [Observations](#) of Montana [Species of Concern](#) (SOC) and [Potential Species of Concern](#) (PSOC)
- Zoological [Observations](#) of Montana [Species of Concern](#) (SOC) and [Special Status Species](#) (SSS)
- [Noxious Weeds](#)
- [Aquatic Invasive Species](#)
- Other Species of Management Interest (USFS & BLM Sensitive, SWAP SGIN, and Potential Species of Concern)

These data are only available through a restricted access ArcGIS Online group. Data can be queried by taxa, location, or other attributes. The services are updated on the first of each month.

Example services:

Zoological Species Occurrences



Botanical Species Occurrences



Requirements for access:

An Organizational AGOL account with one of MTNHP's collaborating partners.

See also: [MTNHP Data Use Terms and Conditions](#).

Requesting access:

To request access to these resources, please reach out to Braden Burkholder, bburkholder@mt.gov. Include your AGOL username in your correspondence.

Accessing the data:

Once you have accepted the invitation to the AGOL group (NHP Data Resources), you may either use an online map viewer/application or desktop GIS software (e.g. ArcGIS Pro) to view and query the data. Either:

1. navigate to a service under the AGOL group content in a web browser or
2. log in to ArcGIS Pro and add the service(s) listed in My Groups (found in Catalog or Add Data).

Inductive Modeling with Maxent

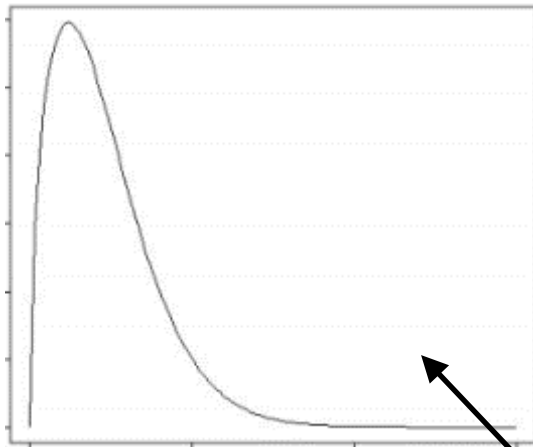
- Ideal for positive data only
- Uses random background points as pseudo-absences
- Uses different levels of complexity depending on amount of data available
- Logistic output interpretable as relative habitat suitability
- Output is generally satisfactory in regions with at least some observation points
- Equivalent or superior to other predictive modeling approaches (*Elith et al. 2006 - Ecography 29: 199-151*)
- Uses empirical distributions to constrain estimated distributions
- Iterative machine learning approach with deterministic outcome

Maxent Algorithm

Phillips et al. 2006 - Ecological Modelling 190:231-259

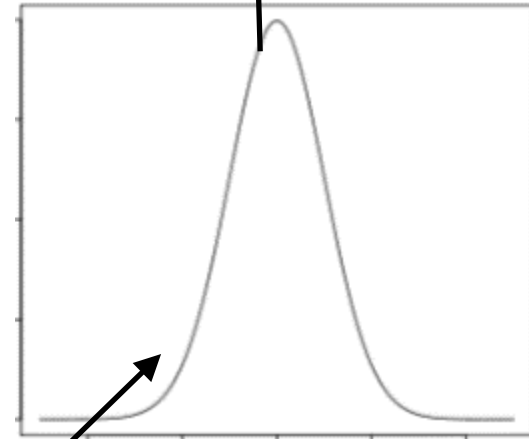
Phillips and Dudik 2008 – Ecography 31:161-175

$$P(x) = \exp(c1 * f1(x) + c2 * f2(x) + c3 * f3(x)...) / Z$$

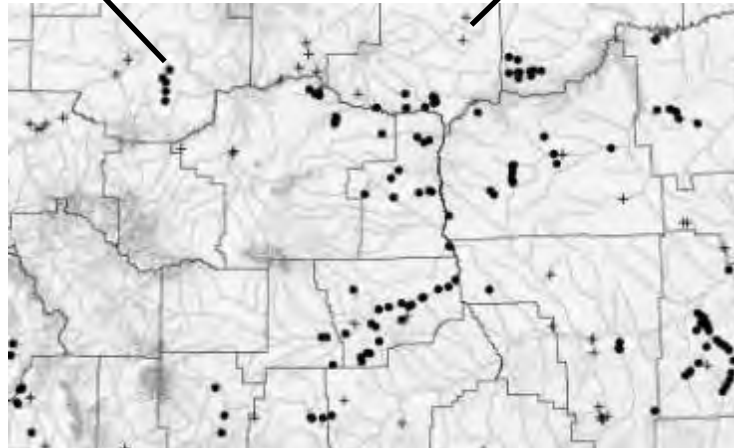


Empirical Distribution
(Positive Observations)

→ Constraints →



Estimated Distribution
(Background Points)



Constraints

Number of Samples	Feature Class
0-9	Linear (variable)
≥ 10	above + Quadratic (square of variable)
≥ 15	above + Hinge (linear, but constant below a threshold)
≥ 80	above + Product (product of two variables) and Threshold (0 or 1, binary transformation)

44 Environmental Input Layers

Layer Name	Class	Variable	Original Scale
NED_AspectEW	Landform	Aspect (East-West)	≈10m
NED_AspectNS	Landform	Aspect (North-South)	≈10m
NED_Elevation	Landform	Elevation	≈10m
NED_Ruggedness	Landform	Ruggedness	≈10m
NED_Slope	Landform	Slope	≈10m
NED_SRISummer	Landform	Summer Solar Radiation	≈10m
NED_SRIWinter	Landform	Winter Solar Radiation	≈10m
NED_TPI	Landform	Topographic Position Index	≈10m
NHD_Dist2WaterEdge	Hydrography	Distance to Water Edge	vector
NHP_AnthroInfl	Human	Anthropogenic Influence	vector
NRCS_FrostFreeDays	Climate	Frost Free Days	30m
NRCS_REAP	Climate	Relative Effective Annual Precipitation	10m
PRISM_Precipitation	Climate	Annual Precipitation	≈800m
PRISM_WinPrecip	Climate	Percent Winter Precipitation	≈800m
SoilGrid_BD	Soils	Bulk Density	100m
SoilGrid_Clay	Soils	Percent Clay	100m
SoilGrid_EC	Soils	Electric Conductivity	100m
SoilGrid_OrgC	Soils	Organic Carbon	100m
SoilGrid_pH	Soils	Soil pH	100m
SoilGrid_Sand	Soils	Percent Sand	100m
SoilGrid_Silt	Soils	Percent Silt	100m
SoilGrid_TotN	Soils	Total Nitrogen	100m

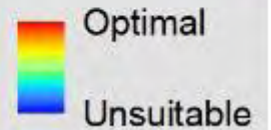
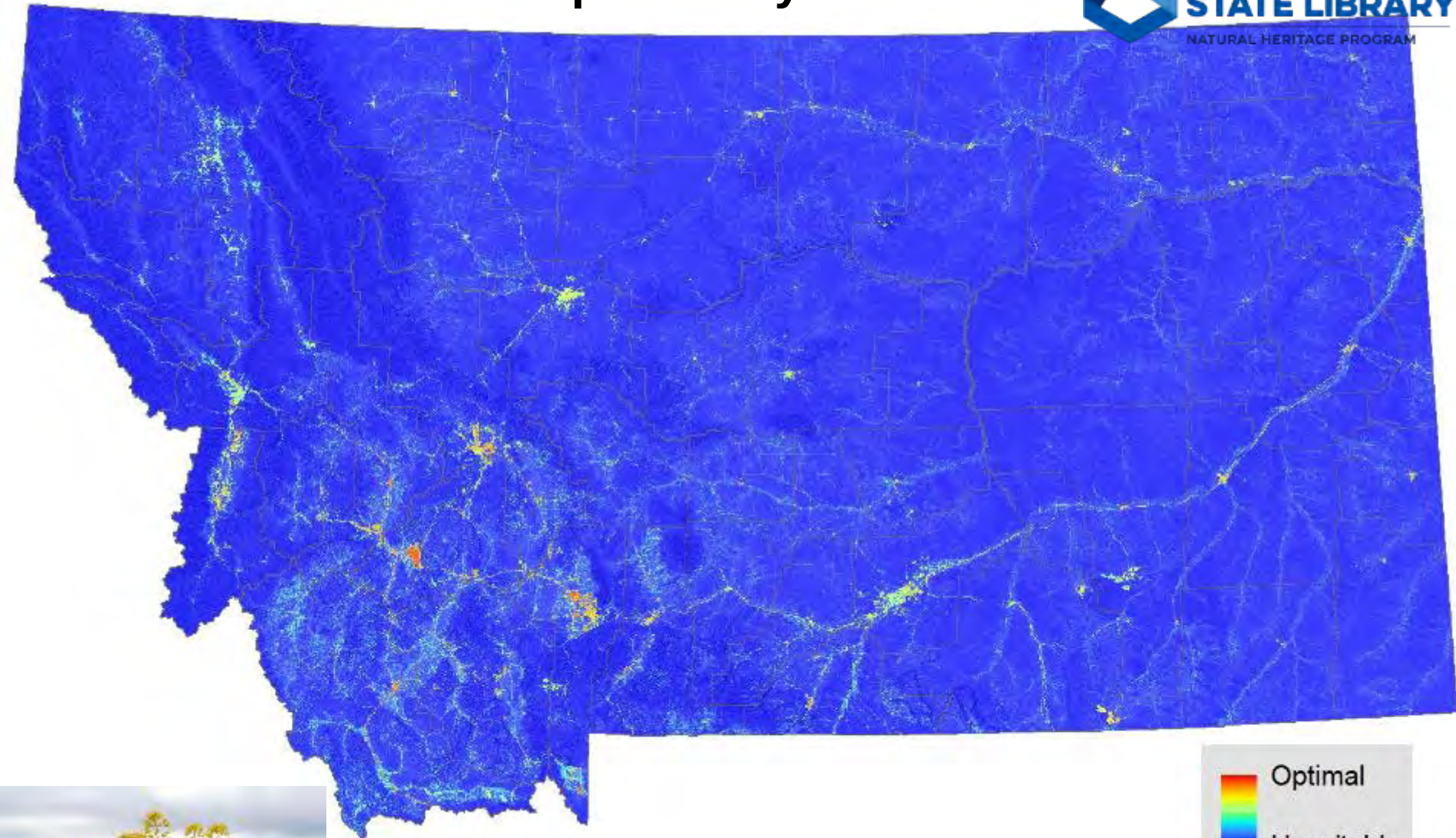
Layer Name	Class	Variable	Original Scale
LC_AgDry_97	Landcover	Developed - Dry Agriculture	30m
LC_AgIrr_97	Landcover	Developed - Irrigated Lands	30m
LC_Alpine_97	Landcover	Alpine	30m
LC_Barren_97	Landcover	Sparse and Barren	30m
LC_Developed_97	Landcover	Developed - All Other	30m
LC_ForestBurn_97	Landcover	Forest - Burned	30m
LC_ForestConif_97	Landcover	Forest - Conifer	30m
LC_ForestDecid_97	Landcover	Forest - Deciduous	30m
LC_ForestHarv_97	Landcover	Forest - Harvested	30m
LC_ForestInsct_97	Landcover	Forest - Insect Killed	30m
LC_Grassland_97	Landcover	Grasslands	30m
LC_IntroVeg_97	Landcover	Introduced Vegetation	30m
LC_ShrubBurn_97	Landcover	Shrublands - Burned	30m
LC_Shrubland_97	Landcover	Shrublands	30m
LC_WetRip_97	Landcover	Wetland Riparian	30m
LC_Dist2Forest	Landcover	Distance to Forest	30m
MCO_DegreeDays	Climate	Degree Days	800m
MCO_MaxSumTemp	Climate	Maximum Summer Temp	800m
MCO_MinWinTemp	Climate	Minimum Winter Temp	800m
MCO_NDVI	Climate	Normalized Difference Vegetation Index	925m
MTGeol_Dist2Alluv	Geology	Distance to Alluvium	vector
MTGeol_Dist2C03	Geology	Distance to Carbonate Rock	vector
Layer Name	Class	Variable	Original Scale
NED_AspectEW	Landform	Aspect (East-West)	≈10m
NED_AspectNS	Landform	Aspect (North-South)	≈10m
NED_Elevation	Landform	Elevation	≈10m

Example Modeling for Dyer's Woad

- 945 total records
- 885 with acceptable locational uncertainty (≤ 800 m)
- 32 spatially independent (separated by $\geq 1,600$ meters)
- Use ~29 training and 3 test points per fold

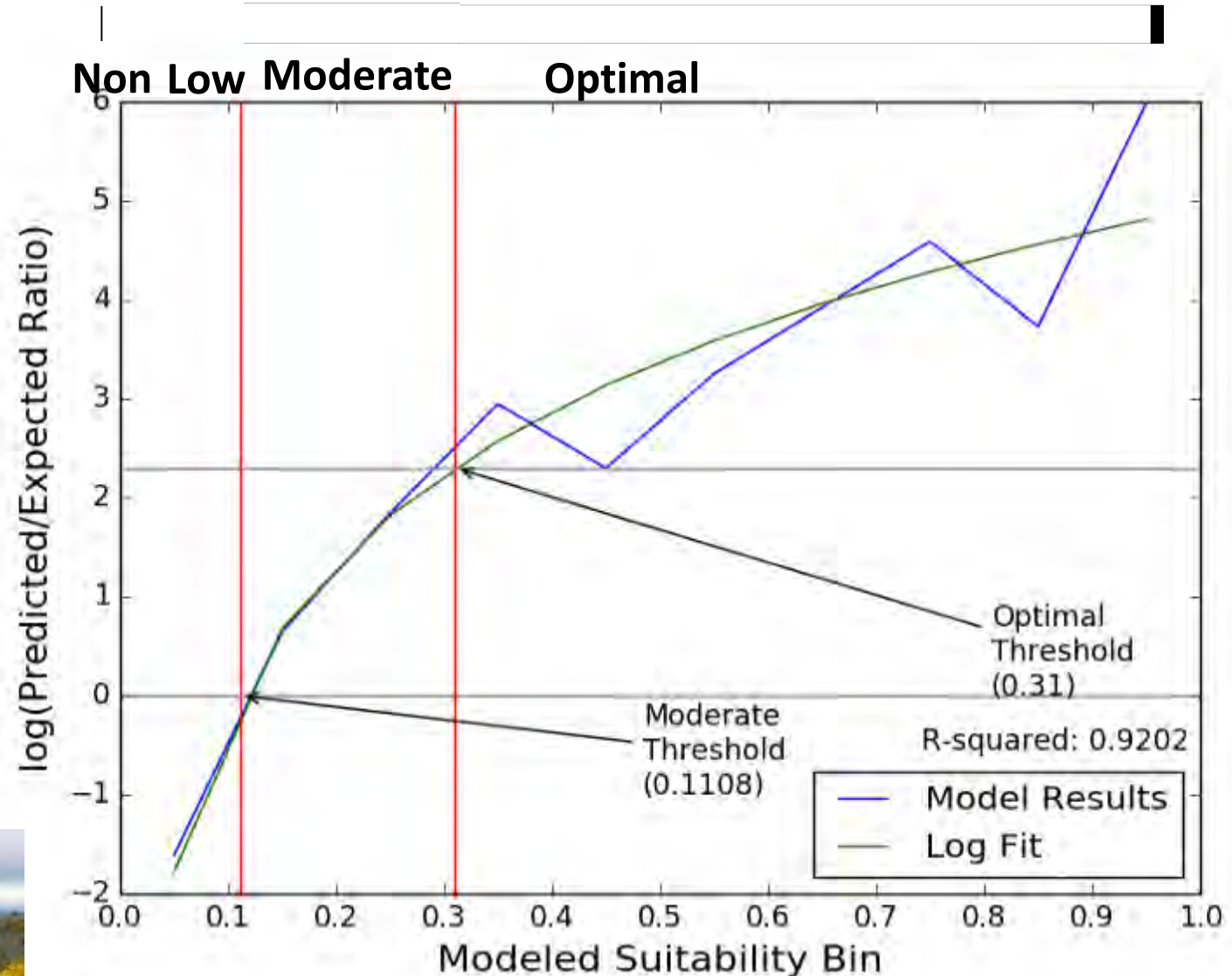


Continuous Model Output for Dyer's Woad



Delineating Habitat Suitability Classes

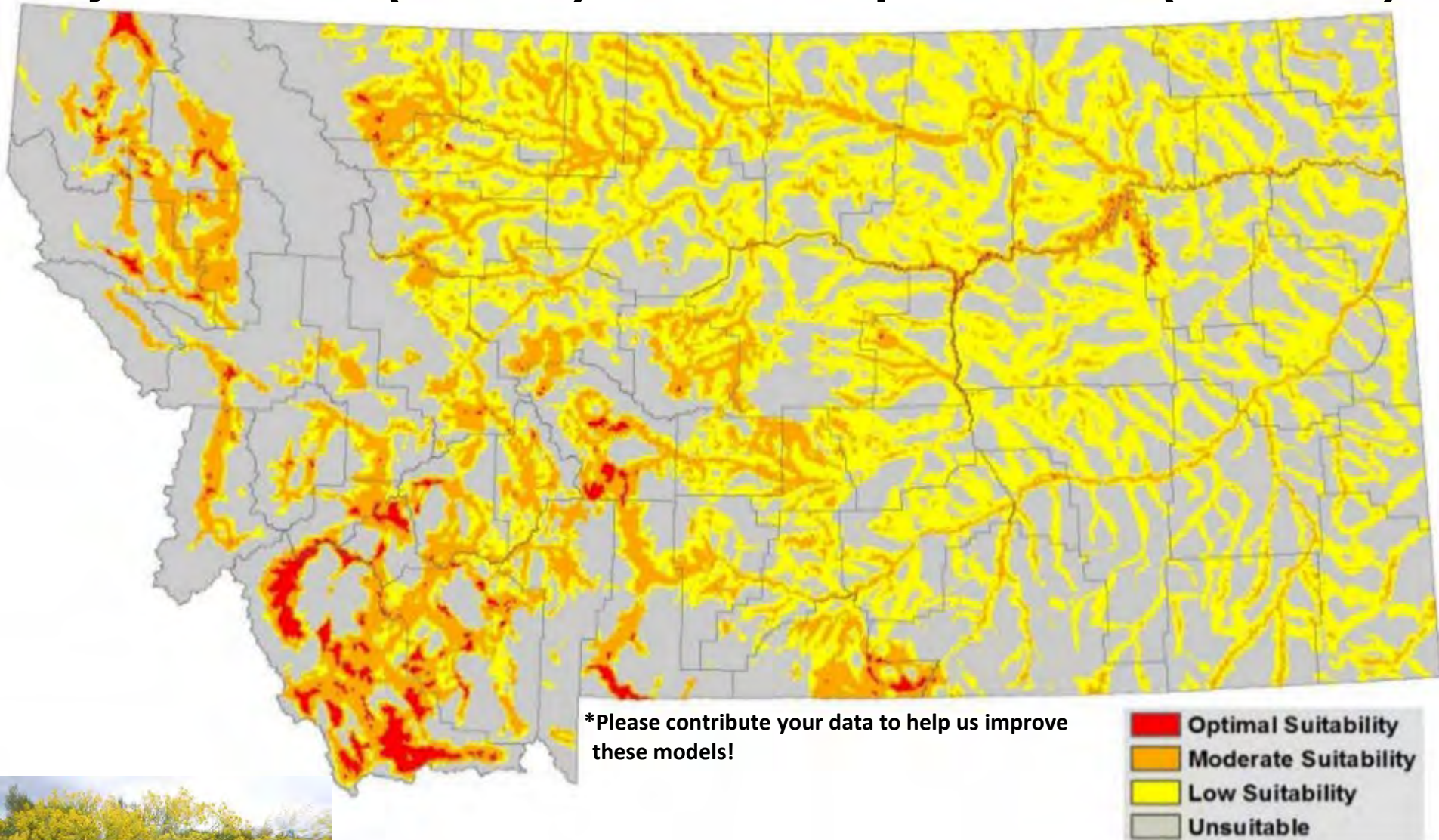
(Hirzel et al. 2006)



Low = 0.018

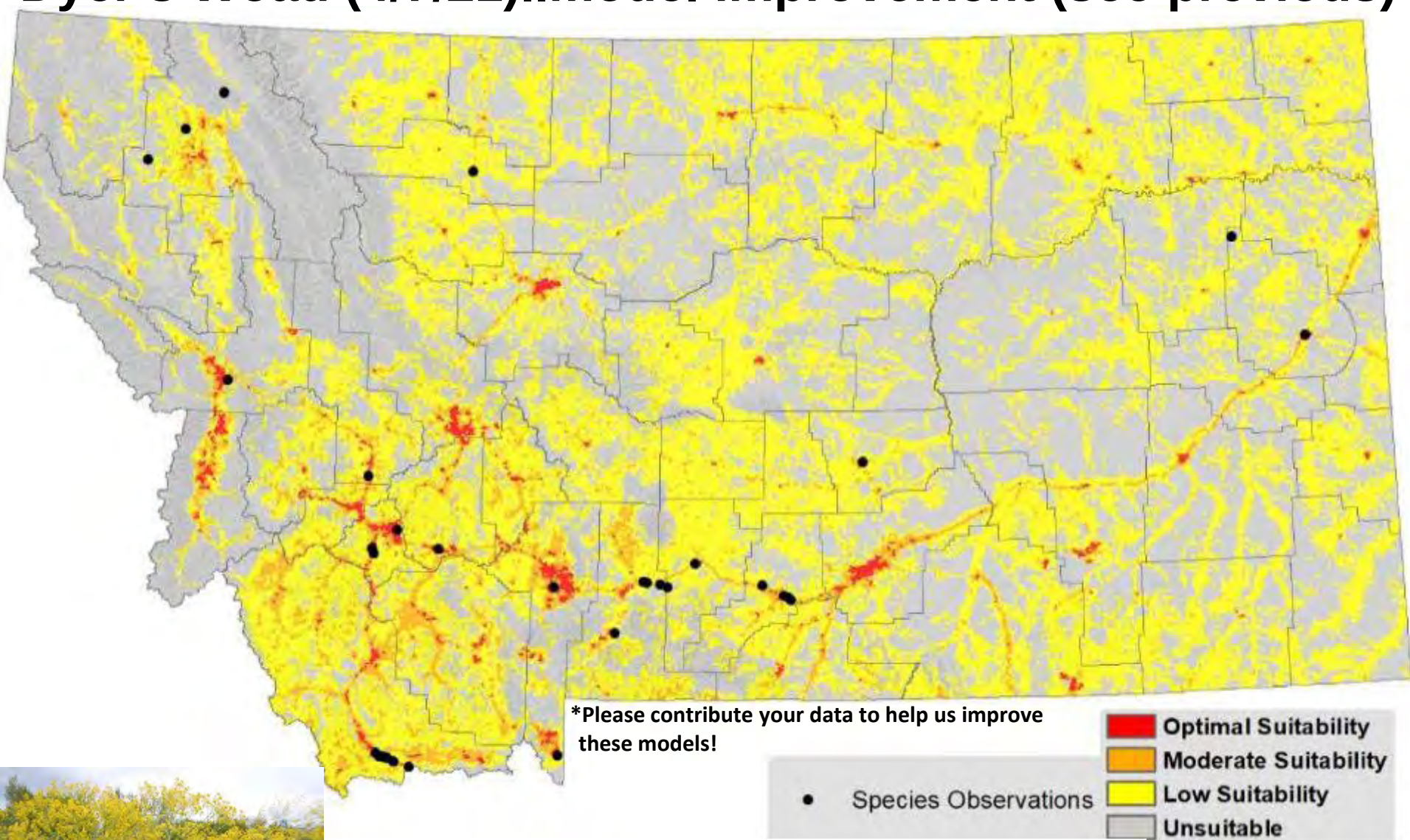


Dyer's Woad (1/25/19)...model improvement (see next)



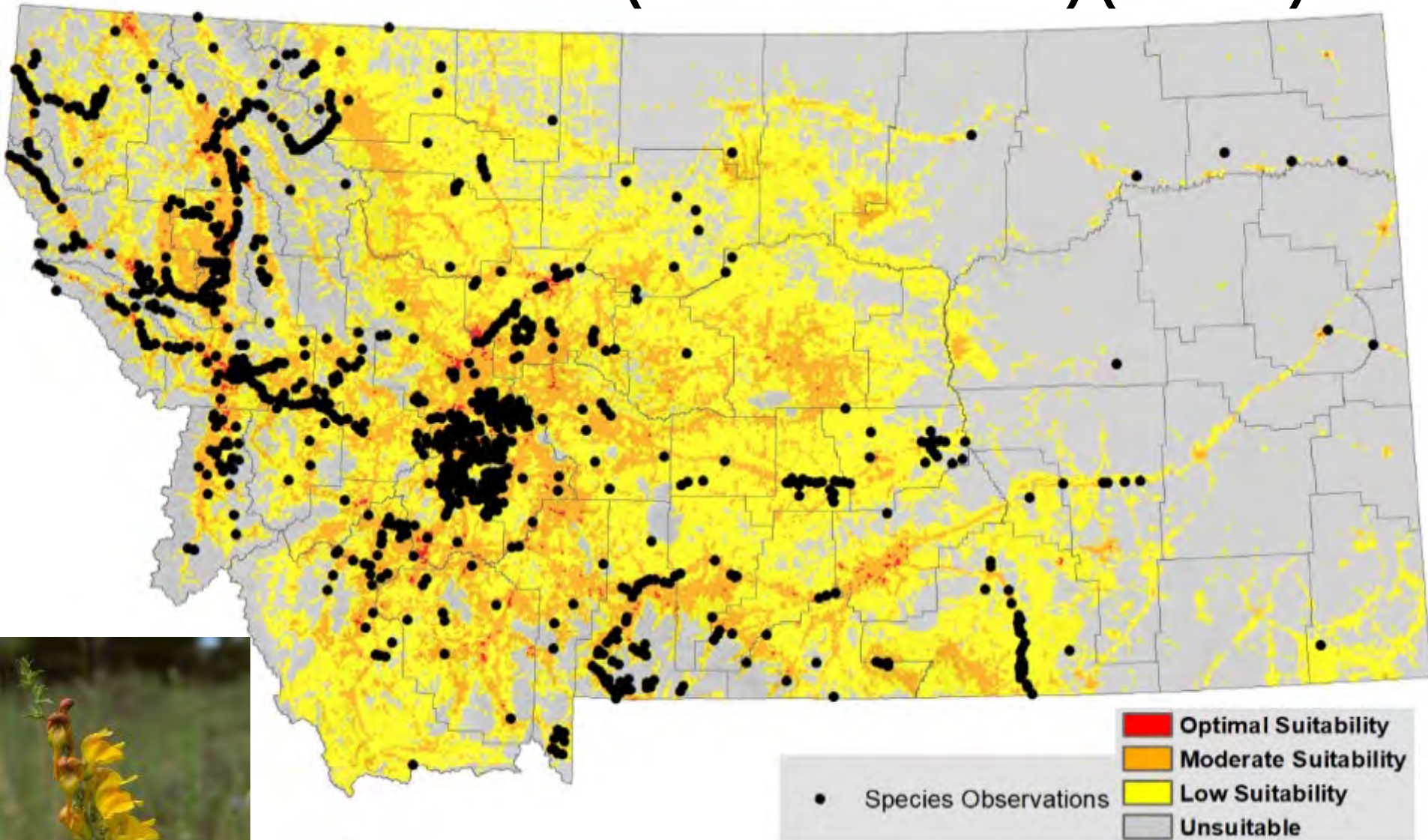
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.095	113,617	30%
Moderate	0.231	54,220	14%
Optimal	0.627	8,146	2%

Dyer's Woad (4/7/21)..model improvement (see previous)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	117,956	31%
Moderate	0.111	13,878	4%
Optimal	0.310	6,065	2%

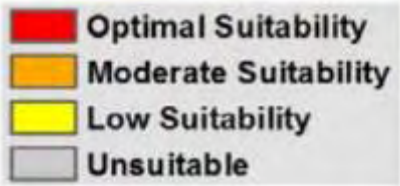
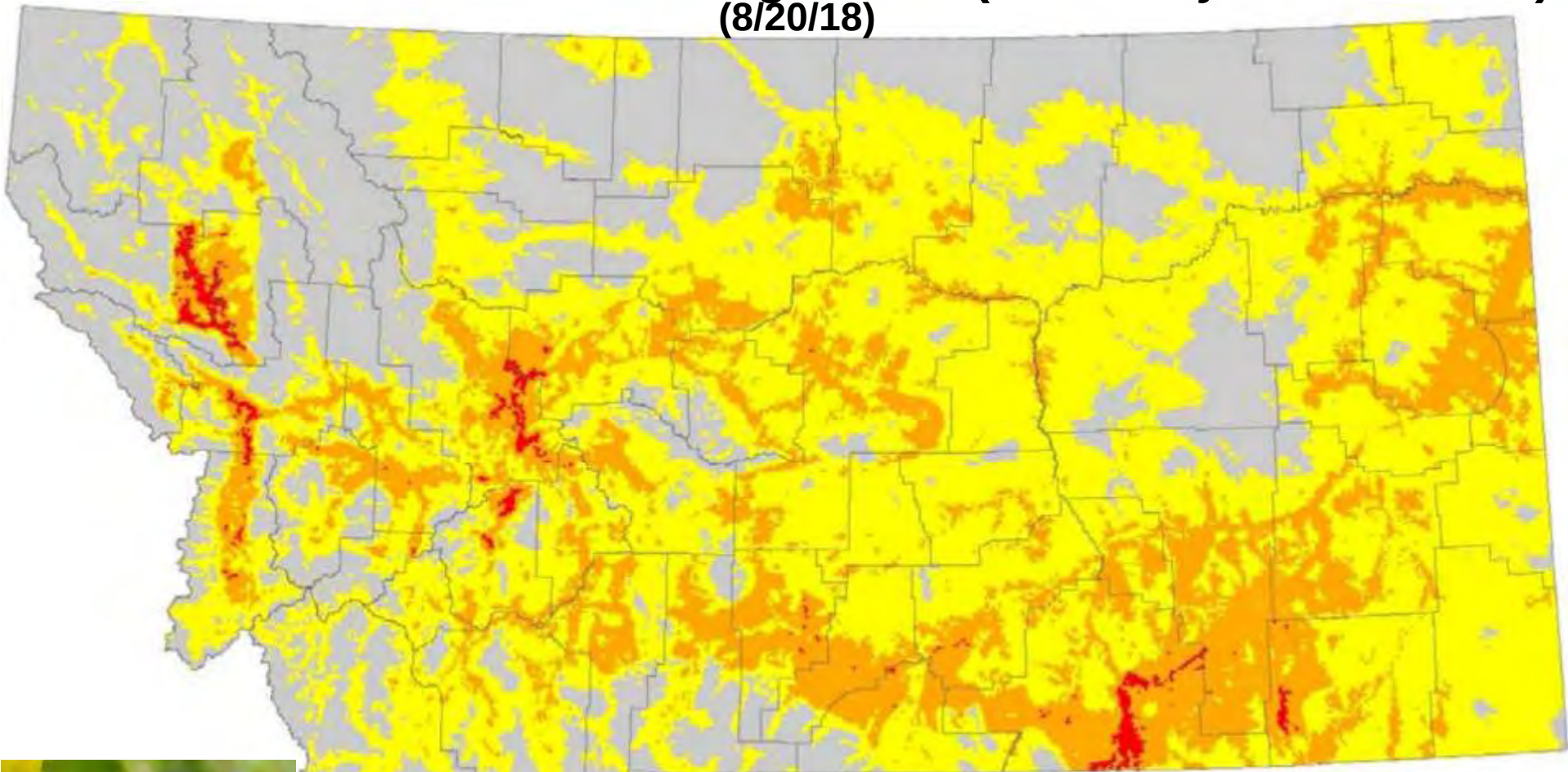
Dalmatian Toadflax (*Linaria dalmatica*) (3/26/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.048	110,643	29%
Moderate	0.175	42,841	11%
Optimal	0.521	10,130	3%

Dalmatian Toadflax Stem-boring Weevil (*Mecinus janthiniformis*)

(8/20/18)

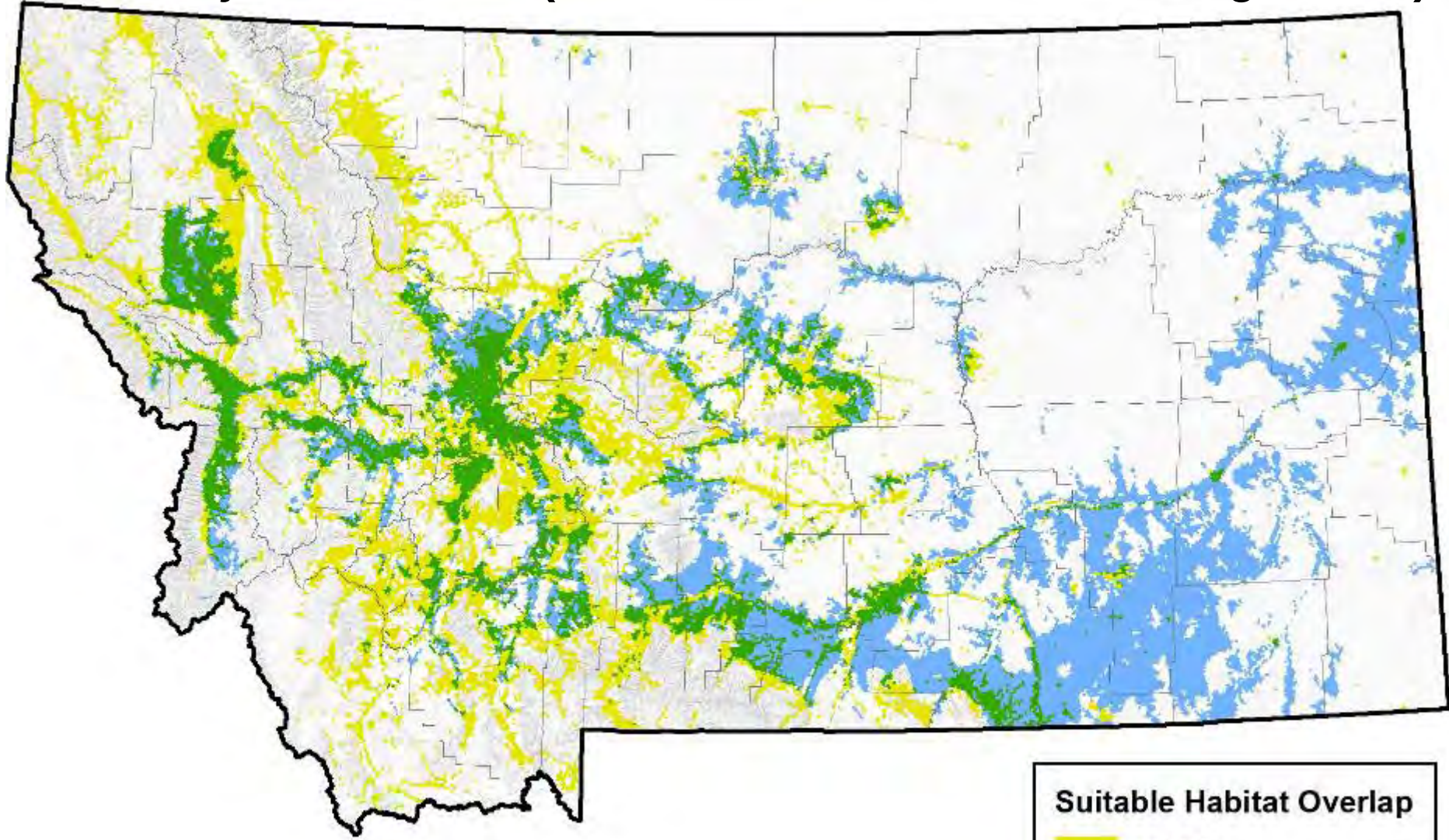


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.048	179,606	47%
Moderate	0.324	62,501	16%
Optimal	0.732	5,448	1%

Biocontrol

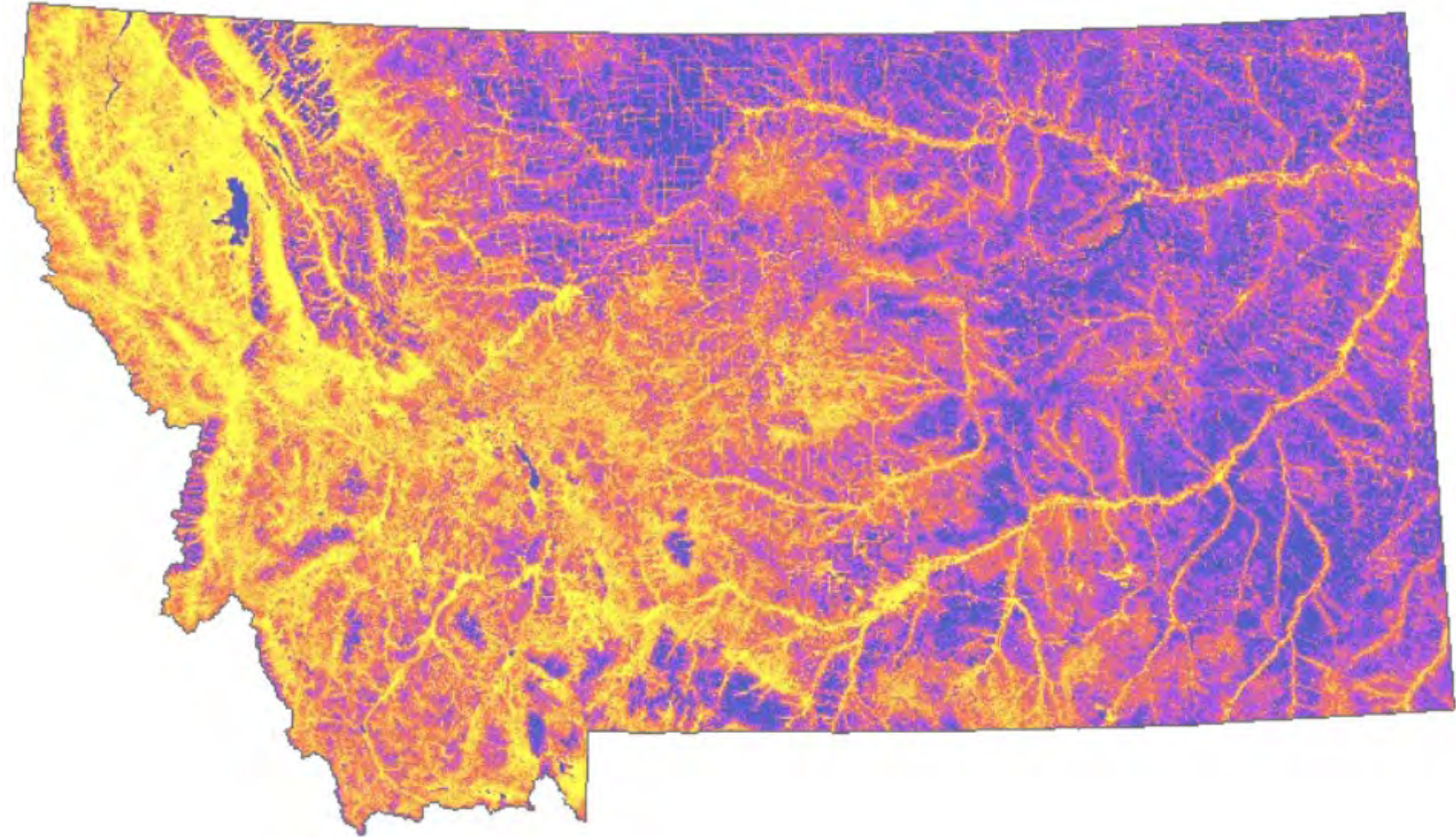
Overlay of Dalmatian Toadflax and its Biocontrol

Mecinus janthiniformis (Dalmatian Toadflax Stem-boring Weevil)



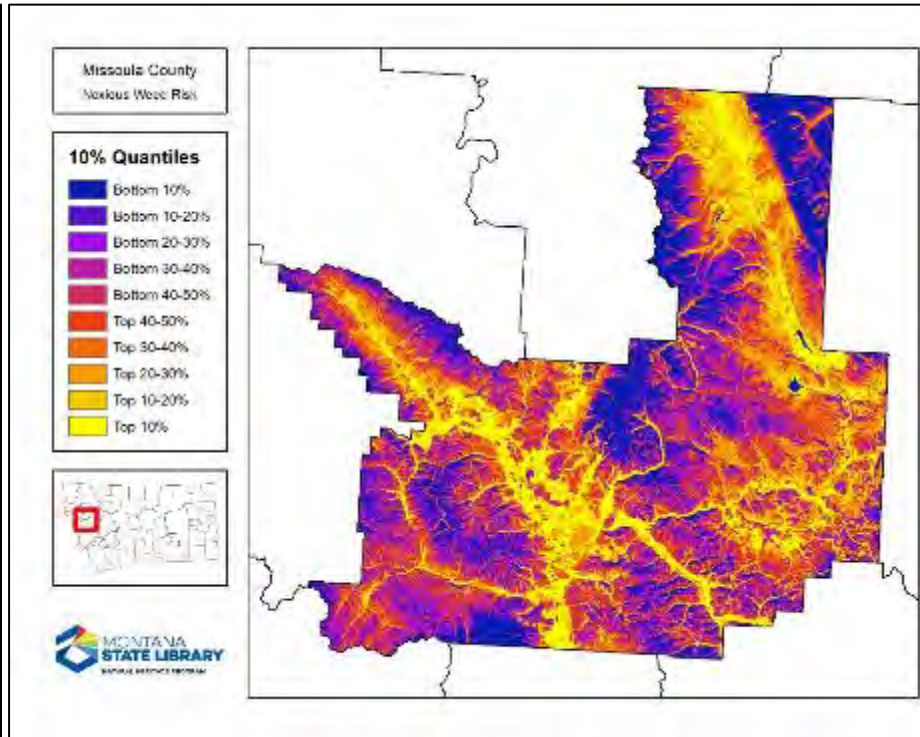
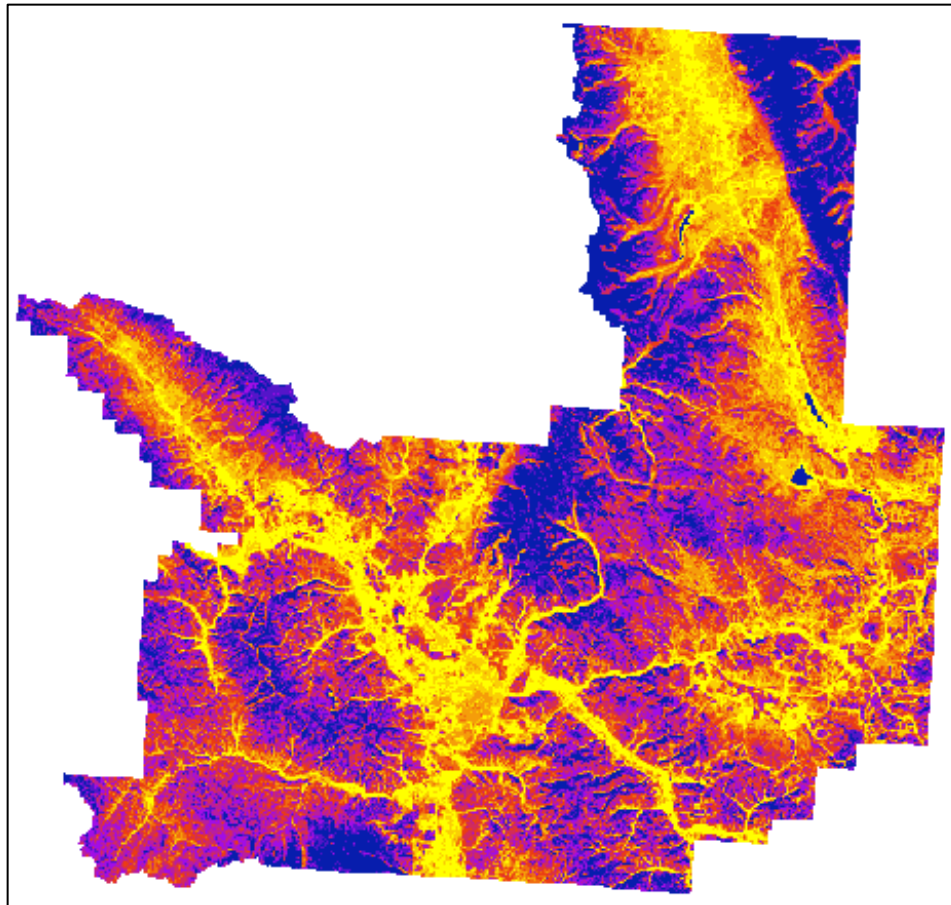
Moderate and optimal suitability for both Dalmatian Toadflax and Dalmatian Toadflax Stem-boring Weevil. Green areas indicate model support for most effective releases of the biocontrol.

Cumulative Statewide Risk of Invasion by 41 Modeled State-listed Noxious Weeds



* Statewide categorical 90 x 90-meter pixel outputs for individual species' models were scored as (Optimal = 1, Moderate = 0.75, Low = 0.25, unsuitable = 0), added across all species, binned into 10 equal quantiles, and displayed with hotter to cooler colors representing higher to lower cumulative risk of invasion.

Rescaled Output to show Cumulative Risk of Invasion within Missoula County for State-listed Noxious Weeds



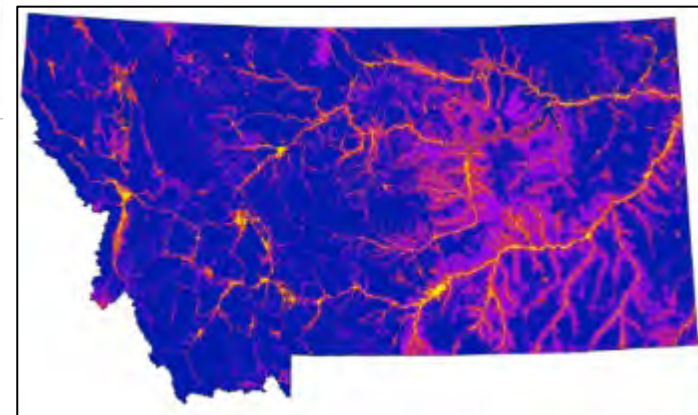
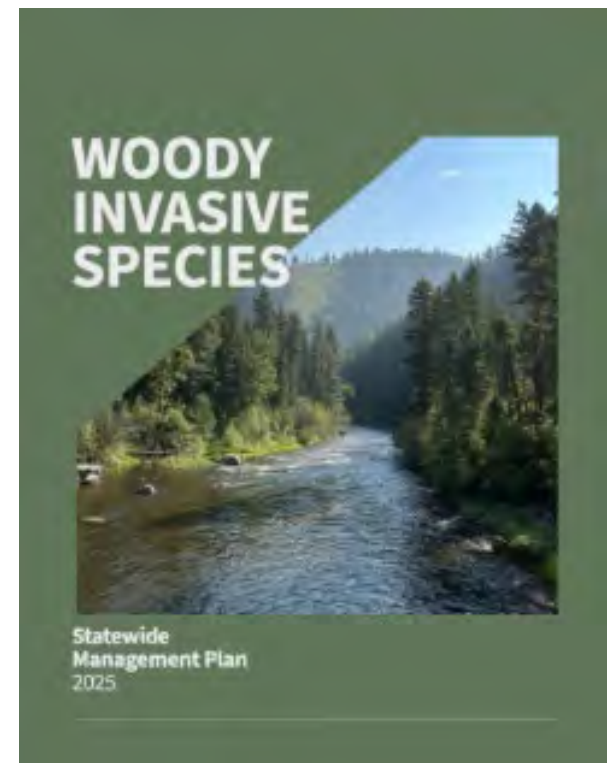
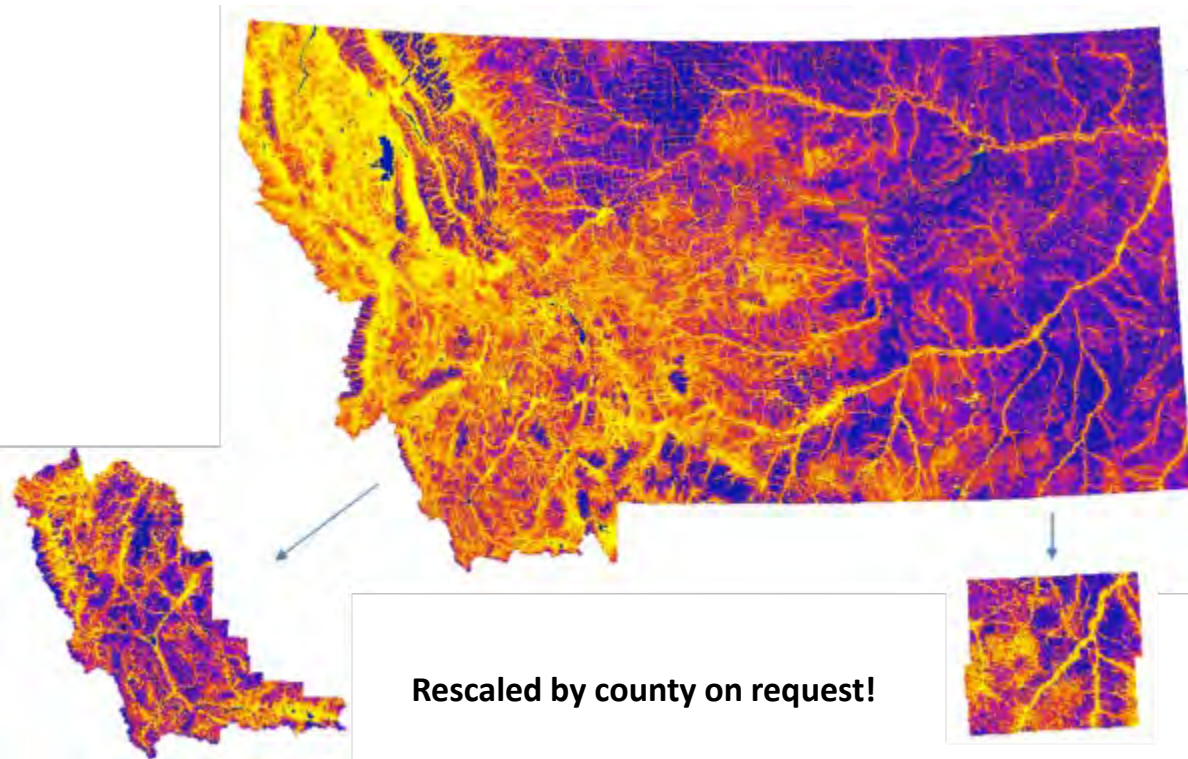
* Output available with and without legend for all counties, BLM Field Offices, National Forests, FWP Regions, and Tribal Reservations.

* Cumulative risk relative to within County. Compare with previous slide with relative risk statewide.

* At statewide and county scales, categorical 90 x 90-meter pixel outputs for individual species' models were scored as (Optimal = 1, Moderate = 0.75, Low = 0.25, unsuitable = 0), added across all species, binned into 10 equal quantiles, and displayed with hotter to cooler colors representing higher to lower cumulative risk of invasion.

Cumulative Invasion Risk Maps

State-listed Noxious Weeds



Species Where Climate Variables Were In the Top Three of Importance for 44 Environmental Variables Used

Climate Variables Included: Growing Degree Days, Maximum Summer Temperature, Minimum Winter Temperature, Number of Frost-Free Days, Total Annual Precipitation, Winter Precipitation, and Relative Effective Annual Precipitation (REAP)

***Numbers in table indicate importance rank of variable.**

****Future climates may be conducive to enhanced spread of these species.**

*****Tabulated for models completed in 2021 & 2022. Not updated for models completed after 2022.**

Common Name	Growing Degree Days	Max Summer Temperature	Min Winter Temperature	Frost Free Days	REAP	Annual Precipitation	Winter Precipitation
American Water-lily	3						
Black Bindweed							3
Black Henbane	1			2			
Bladder Campion						2	
Bladder-vetch						1	
Blueweed		1	3				2
Bull Thistle				2			
Cheatgrass							1
Climbing Nightshade		2	1				
Clover Dodder			2				1
Common Blue-mustard						1	
Common Bugloss			3				2
Common Burdock						1	
Common Crupina	1						
Common Mullein	3						
Common Shepherd's Purse						2	
Common St. John's-wort							1
Common Tansy		1					3
Common Teasel	2	1	3				
Common Wormwood	2						
Curly Dock							2
Desert Alyssum	1						
Diffuse Knapweed					2		1
Eurasian Water-milfoil		1			2		
Field Bindweed						3	2

Common Name	Growing Degree Days	Max Summer Temperature	Min Winter Temperature	Frost Free Days	REAP	Annual Precipitation	Winter Precipitation
Garlic Mustard					2		
Germander Speedwell			1				
Ground-cherry Nightshade					2		
Halogeton						1	
Hoary False-alyssum		3					
Japanese Knotweed			2				3
Knotweed	2		3				
Leafy Spurge						3	1
Lenspod Whitetop					3		
Medusahead					1	2	
Musk Thistle		2					
Narrowleaf Dock						3	1
Narrowleaf Hawksbeard					1		
Night-flowering Catchfly	3						
Orange Hawkweed	2						
Oxeye Daisy							2
Prickly Lettuce							2
Puncture-vine		3					
Reed Canarygrass	3			1			
Rush Skeletonweed			1				
Russian Thistle						1	
Scentless Chamomile							1
Scotch Broom							3
Scotch Thistle	3						
Sheep Sorrel			2				

Common Name	Growing Degree Days	Max Summer Temperature	Min Winter Temperature	Frost Free Days	REAP	Annual Precipitation	Winter Precipitation
Small-flowered Forget-me-not				3			
Spotted Cat's-ear							3
Spotted Knapweed						3	
Sprangletop		2					
Stork's Bill			2				
Sulphur Cinquefoil		3					2
Tall Baby's-breath					3		
Tansy Ragwort	1			3			
Urban Spurge					1		3
Ventenata	2	3					
Whitetop	2						3
Yellow Mignonette							3
Yellow Sweetclover	2	1					3
Yellow Toadflax	2						3
Yellowflag Iris		1	2				

State-listed Noxious Weeds & Regulated Plants

**Models can be viewed in the Single Species Overview
Task in Map Viewer with agency-level sign in at:**

<https://mtnhp.org/mapviewer>

Model write ups are available for download at:

<https://mtnhp.org/models/>

You can request geodatabases of model outputs at:

<https://nris.mt.gov/reqapp/userMain.asp>

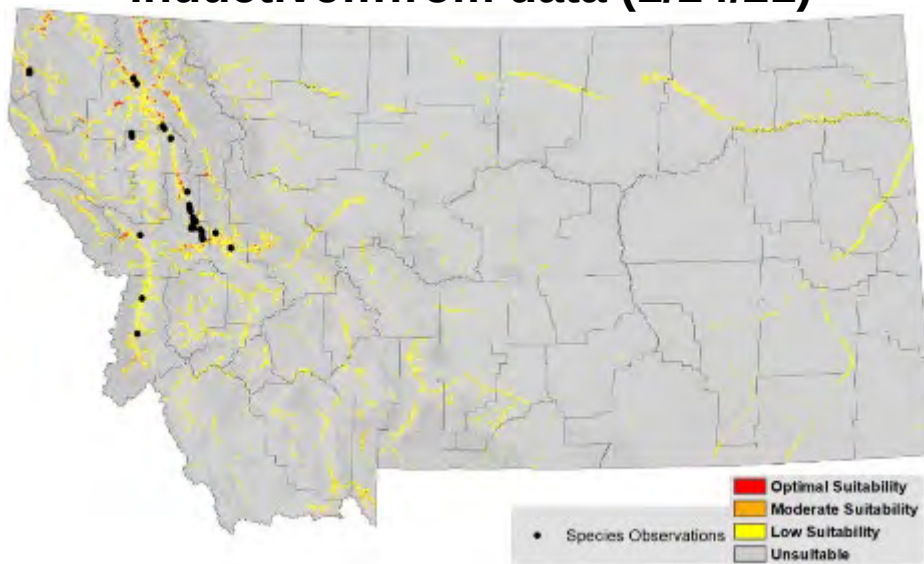
**Bolded status listings have changed since the 2025
version of this presentation.**

Common Name	MT	ID	B.C.	AB	SK	ND	SD	WY
American Water-lily	AIS							
Blueweed	N1B	Control	Regional Noxious	Noxious	Prohibited		Watch	
Bohemian Knotweed	N1B	Control	Noxious	Prohibited Noxious				
Brazilian Waterweed	R3	EDRR						
Brittleleaf Naiad	AIS							
Canada Thistle	N2B	Containment	Noxious	Noxious	Nuisance	Noxious	Noxious	Noxious
Cheatgrass	R3			Noxious	Noxious			
Common Buckthorn	N2A			Prohibited Noxious	Noxious			
Common Hound's-tongue	N2B	Containment	Noxious	Noxious	Noxious	Noxious		Noxious
Common St. John's-wort	N2B		Invasive of Concern	Prohibited Noxious				Noxious
Common Tansy	N2B		Regional Noxious	Noxious	Noxious			Noxious
Common Water Hyacinth	AIS	EDRR						
Curly-leaf Pondweed	N2B/AIS	Containment			Prohibited			
Dalmatian Toadflax	N2B	Containment	Noxious	Noxious	Prohibited	Noxious		Noxious
Diffuse Knapweed	N2B	Containment	Noxious	Noxious	Prohibited	Noxious		Noxious
Dyer's Woad	N1A	Control		Prohibited Noxious	Prohibited		Watch	Noxious
Eurasian Water-milfoil	N2A/AIS	Control		Prohibited Noxious	Prohibited			
European Common Reed	N1A	Control	Noxious	Prohibited Noxious	Prohibited			
Fanwort	AIS	EDRR						
Field Bindweed	N2B	Containment		Noxious	Noxious			Noxious
Flowering-rush	N2A/AIS	Containment	Noxious	Prohibited Noxious	Prohibited			
Giant Knotweed	N1B	Control	Noxious	Prohibited Noxious	Prohibited			
Hoary False-alyssum	N2B	Containment	Regional Noxious	Prohibited Noxious	Noxious			
Hydrilla	R3	EDRR						
Japanese Knotweed	N1B	Control	Noxious	Prohibited Noxious	Prohibited			

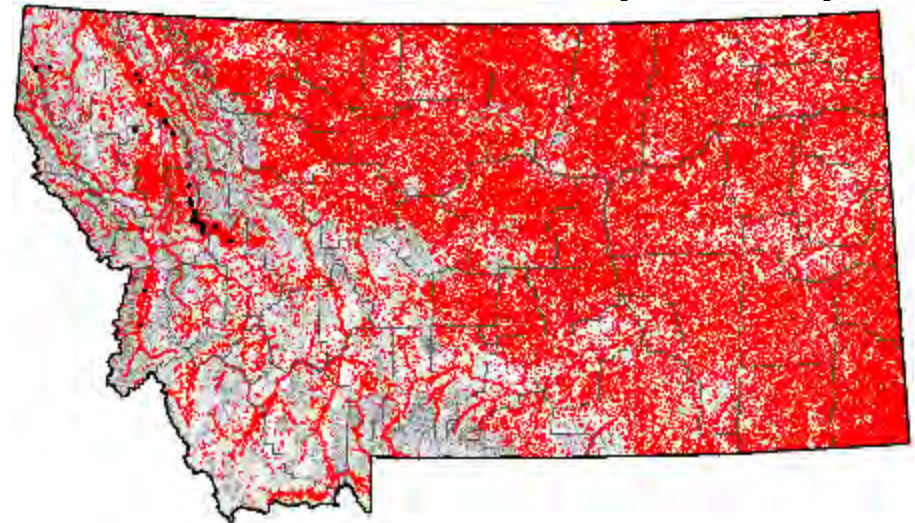
Common Name	MT	ID	B.C.	AB	SK	ND	SD	WY
Kingdevil Hawkweed	N2A			Noxious				
Leafy Spurge	N2B	Containment	Noxious	Noxious	Noxious	Noxious	Noxious	Noxious
Meadow Hawkweed	N2A	Control		Noxious	Prohibited			
Medusahead	N1A			Prohibited Noxious	Prohibited		Watch	Noxious
Orange Hawkweed	N2A	Control	Regional Noxious	Noxious	Prohibited		Watch	
Oxeye Daisy	N2B	Containment	Regional Noxious	Noxious	Noxious			Noxious
Parrot Feather Water-milfoil	R3	Control						
Perennial Pepperweed	N2A	Containment	Regional Noxious	Noxious	Noxious			Noxious
Purple Loosestrife	N1B	Containment	Noxious	Prohibited Noxious	Noxious	Noxious	Noxious	Noxious
Rush Skeletonweed	N1B	Containment	Noxious	Prohibited Noxious			Watch	
Russian Knapweed	N2B	Control	Regional Noxious	Prohibited Noxious	Noxious	Noxious	Watch	Noxious
Russian Olive	R3							Noxious
Salt Cedar	N2B	Containment		Prohibited Noxious	Prohibited	Noxious	Noxious	Noxious
Scotch Broom	N1B	Prohibited Genera	Invasive of Concern					
Spotted Knapweed	N2B	Containment	Noxious	Noxious	Prohibited	Noxious		Noxious
Starry Stonewort	AIS	EDRR						
Sulphur Cinquefoil	N2B		Regional Noxious	Prohibited Noxious				
Tall Buttercup	N2A			Noxious				
Tall Hawkweed	N2A	EDRR		Noxious				
Tansy Ragwort	N2A	Containment	Noxious	Prohibited Noxious				
Ventenata	N2A		Noxious	Prohibited Noxious	Prohibited			Noxious
Whitetop	N2B	Containment	Regional Noxious	Noxious	Noxious		Noxious	Noxious
Yellow Floating Heart	AIS	EDRR			Prohibited			
Yellow Starthistle	N1A	Containment	Noxious	Prohibited Noxious	Prohibited			Noxious
Yellow Toadflax	N2B	Containment	Noxious	Noxious	Noxious	Noxious		Noxious
Yellowflag Iris	N2A/AIS	Containment	Noxious	Prohibited Noxious				

American Water-lily (*Nymphaea odorata*)

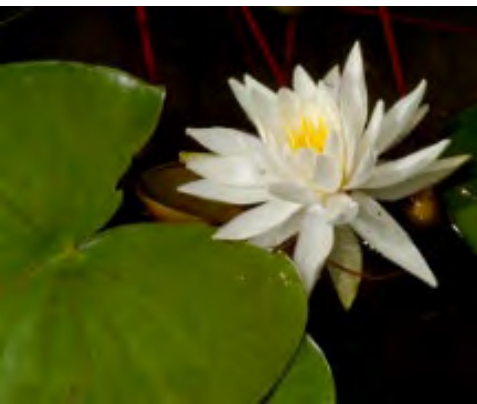
Inductive...from data (1/14/21)



Deductive...rule based (10/29/21)



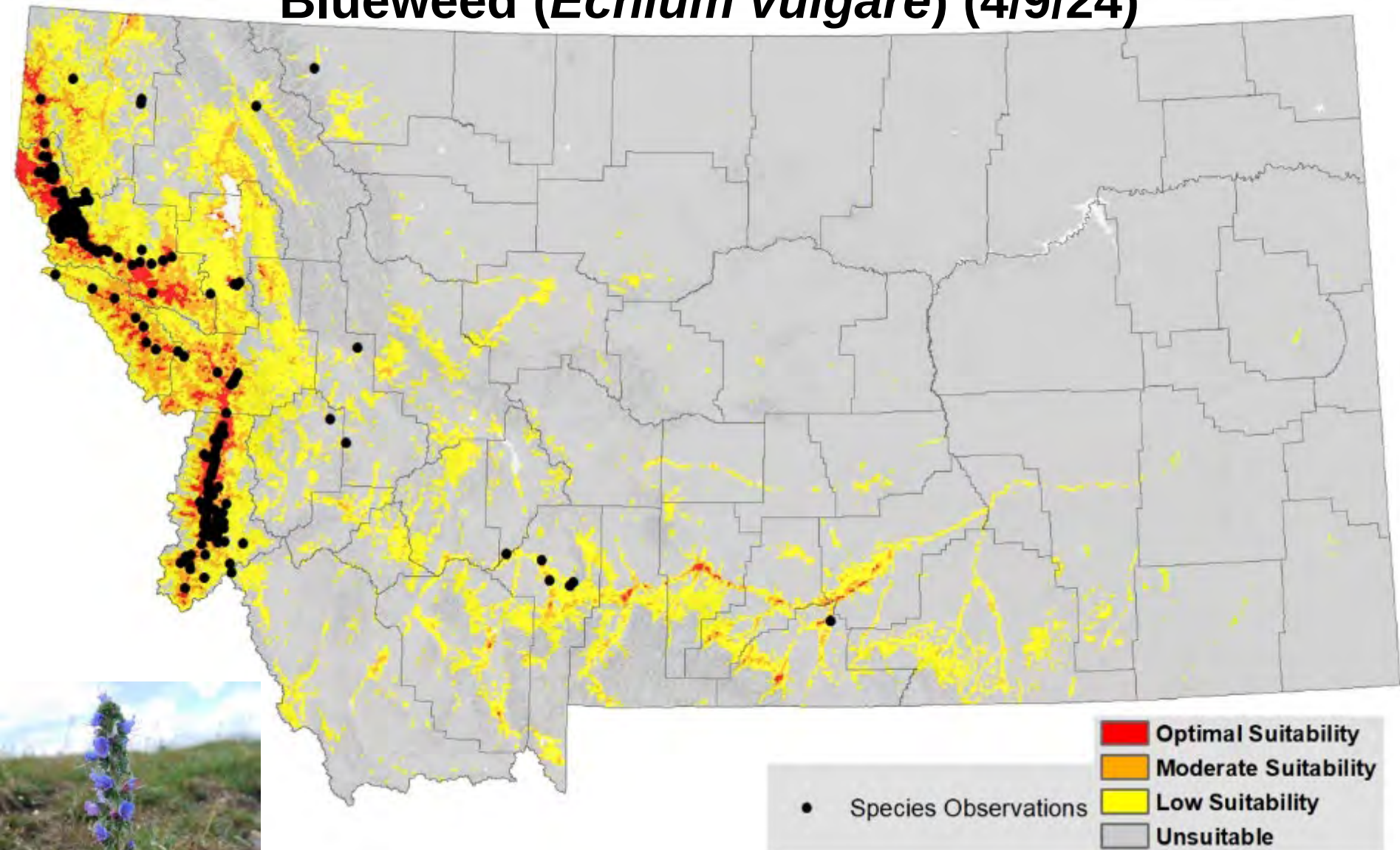
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.0004	3,360	1%
Moderate	0.050	295	<1%
Optimal	0.126	552	<1%



This is a simple rule-based model for aquatic invasive plants that have invaded Montana or have the potential to invade Montana. The rules applied were as follows:

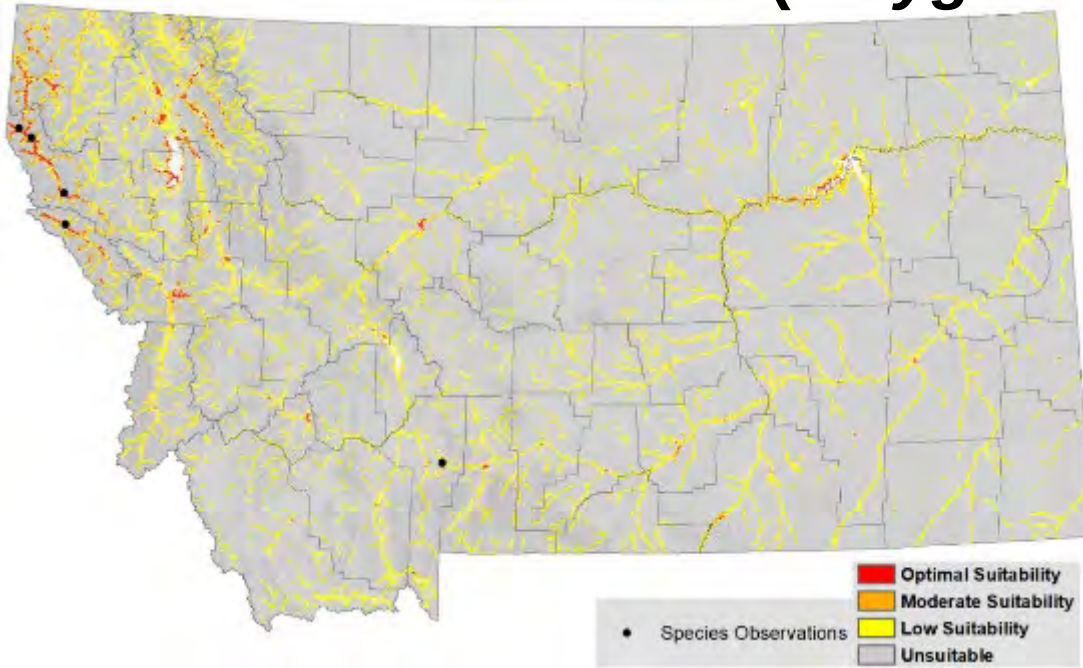
- Include modern National Wetland Inventory mapped wetland areas for palustrine systems with Permanently Flooded or Intermittently Exposed water regimes and lacustrine systems (Limnetic and Littoral) with Permanently Flooded or Intermittently Exposed water regimes
- Include National Hydrography Dataset features for Reservoirs, Lakes, Ponds, Rivers and large Streams
- Exclude the interior limnetic areas of Flathead Lake, Canyon Ferry Reservoir, and Fort Peck
- Exclude any features above 7000 ft (2135 m) in elevation

Blueweed (*Echium vulgare*) (4/9/24)

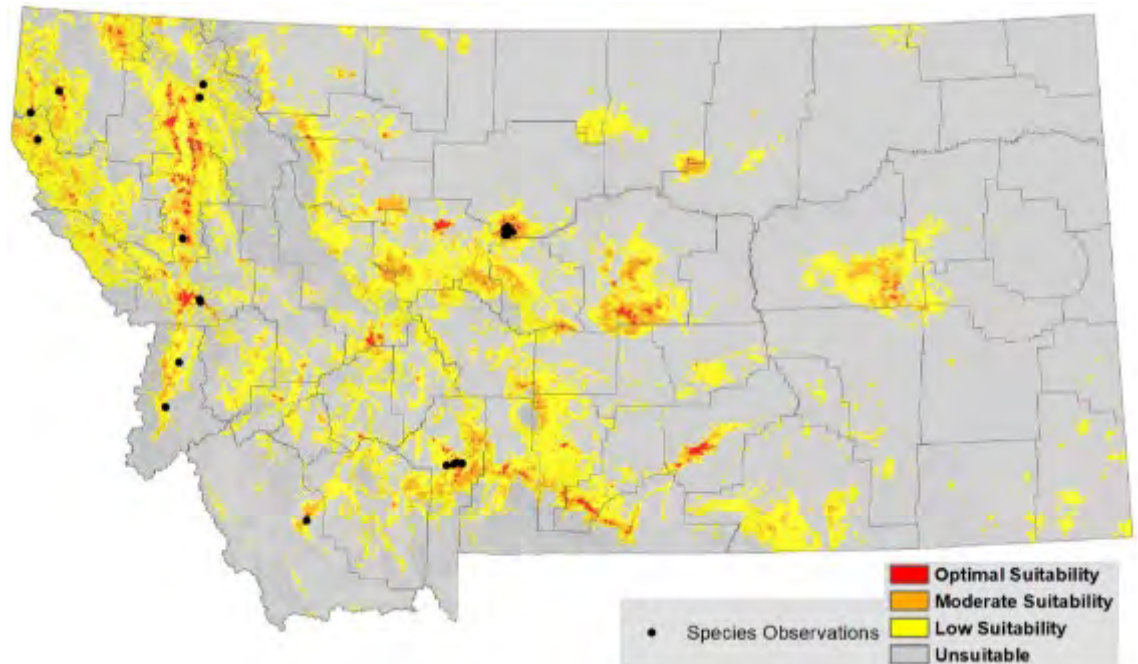


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.011	36,556	10%
Moderate	0.104	7,607	2%
Optimal	0.264	4,724	1%

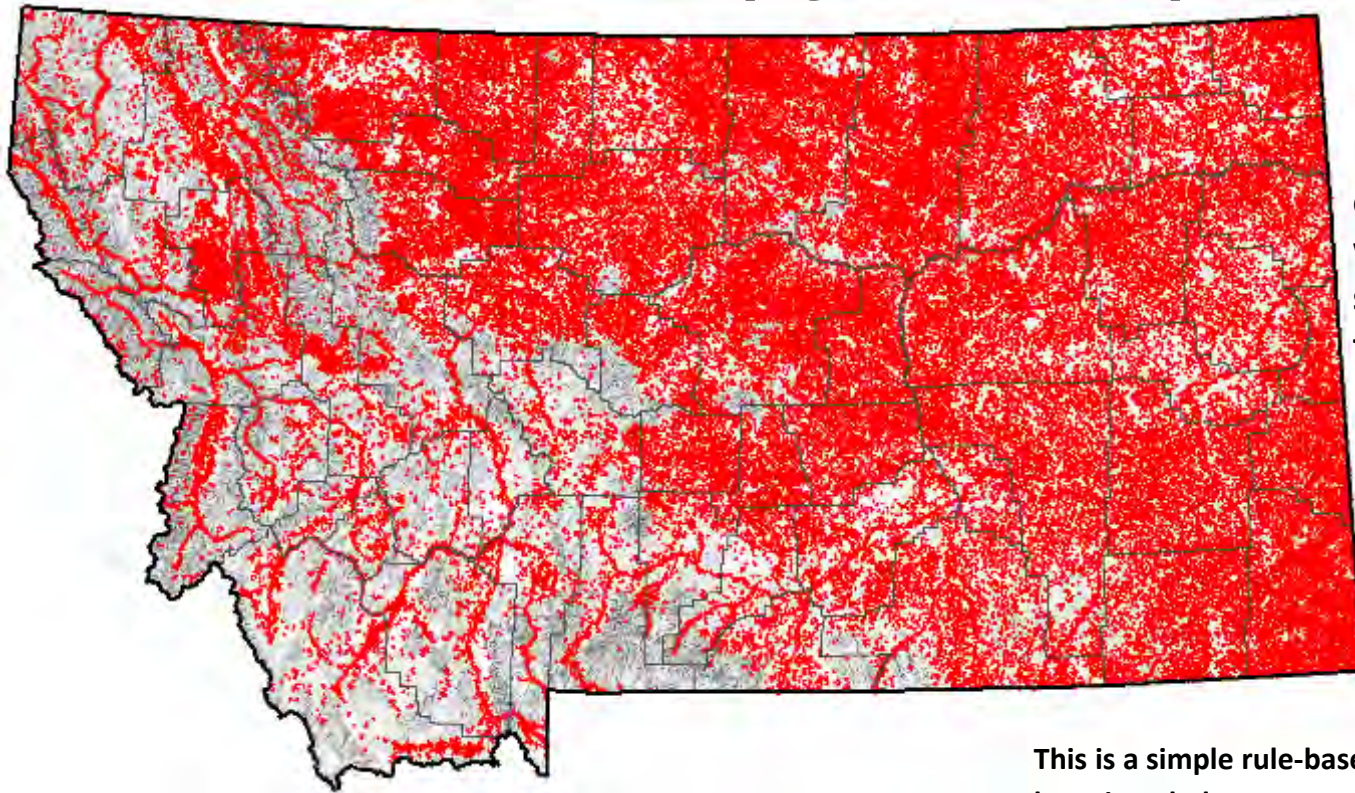
Bohemian Knotweed (*Polygonum x bohemicum*) 4/7/24



*There are only 5 records that can be used for modeling *Polygonum x bohemicum*. Despite that limitation, the model to the left seems very reasonable. The model below for the potential distribution of Japanese Knotweed (*Polygonum cuspidatum*) is provided for comparison.



Brazilian Waterweed (*Egeria densa*) Deductive (10/29/21)



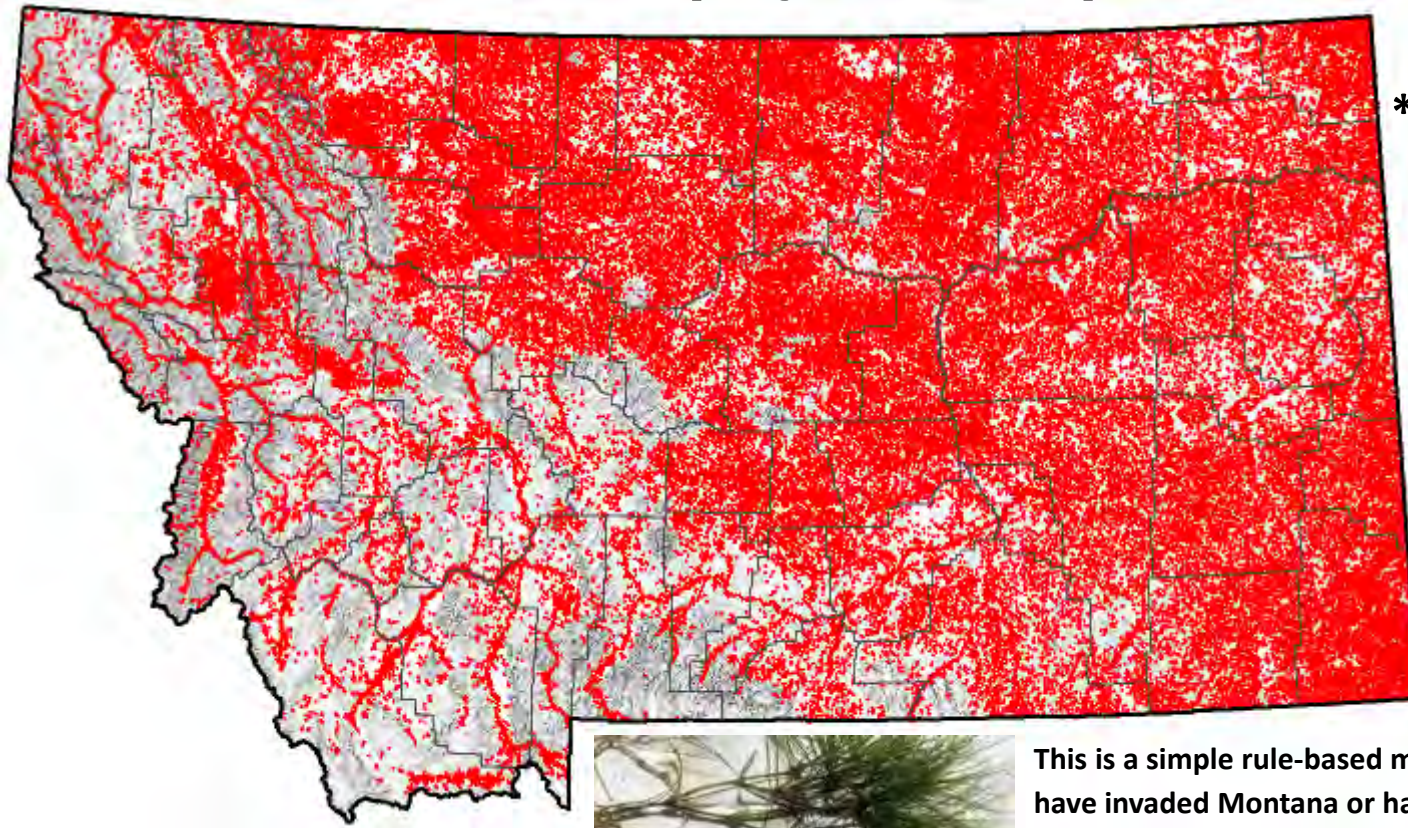
* Reports from Georgetown Lake in 1973, 1981, & 1982 were only to genus and no specimens were collected. Thus, there is still no documented evidence of this species in Montana.



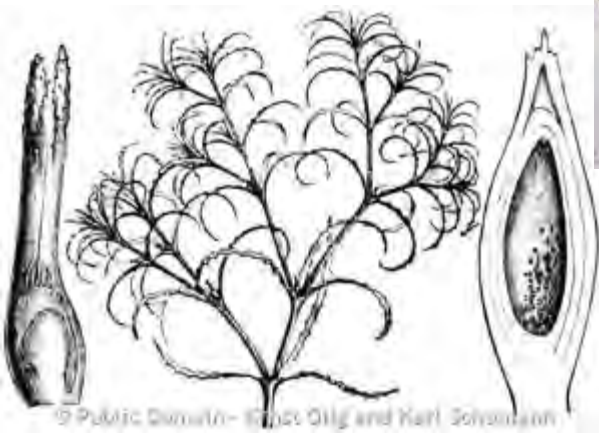
This is a simple rule-based model for aquatic invasive plants that have invaded Montana or have the potential to invade Montana. The rules applied were as follows:

- Include modern National Wetland Inventory mapped wetland areas for palustrine systems with Permanently Flooded or Intermittently Exposed water regimes and lacustrine systems (Limnetic and Littoral) with Permanently Flooded or Intermittently Exposed water regimes
- Include National Hydrography Dataset features for Reservoirs, Lakes, Ponds, Rivers and large Streams
- Exclude the interior limnetic areas of Flathead Lake, Canyon Ferry Reservoir, and Fort Peck
- Exclude any features above 7000 ft (2135 m) in elevation

Brittleleaf Naiad (*Najas minor*) Deductive (10/29/21)



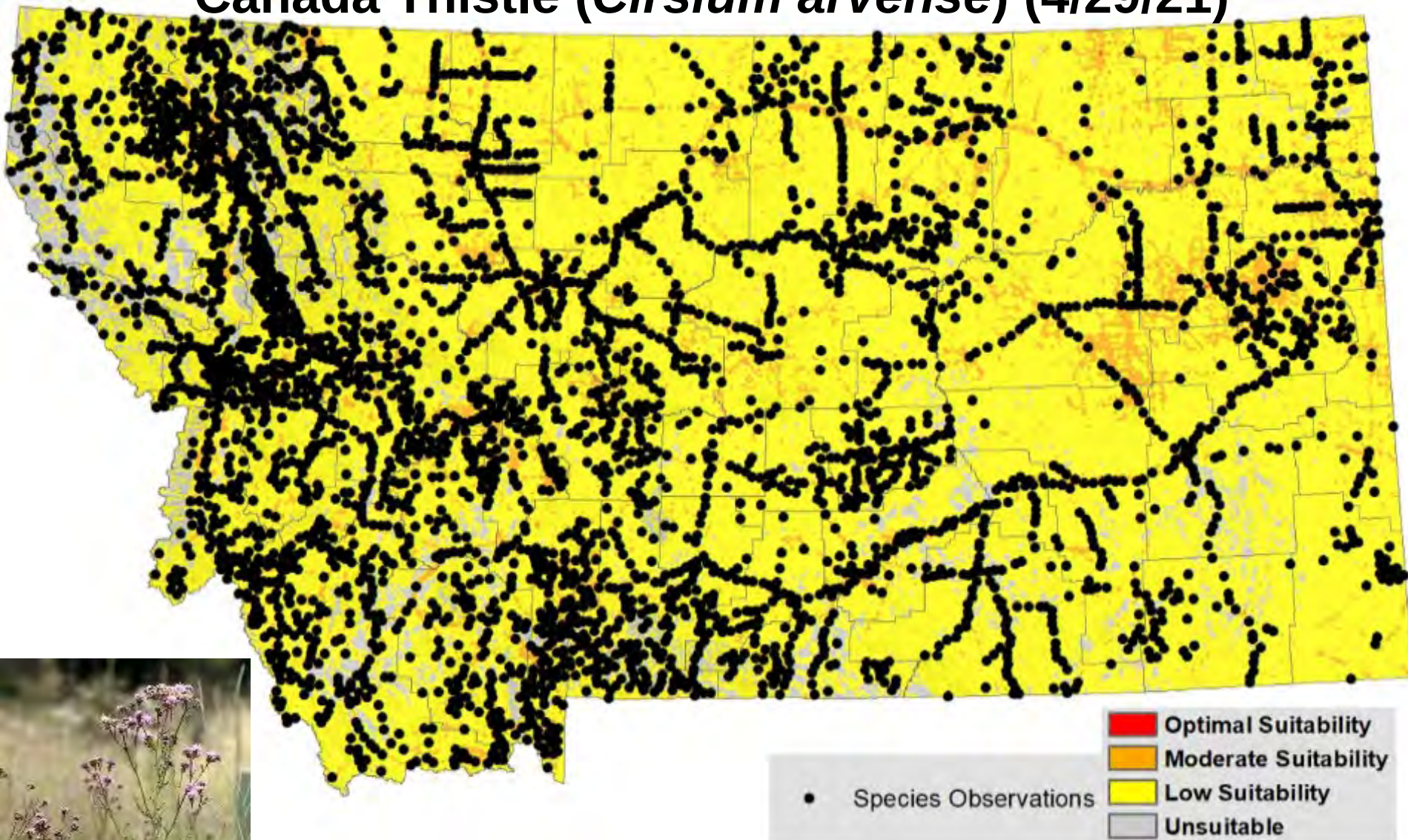
***Not documented in Montana to-date.**



This is a simple rule-based model for aquatic invasive plants that have invaded Montana or have the potential to invade Montana. The rules applied were as follows:

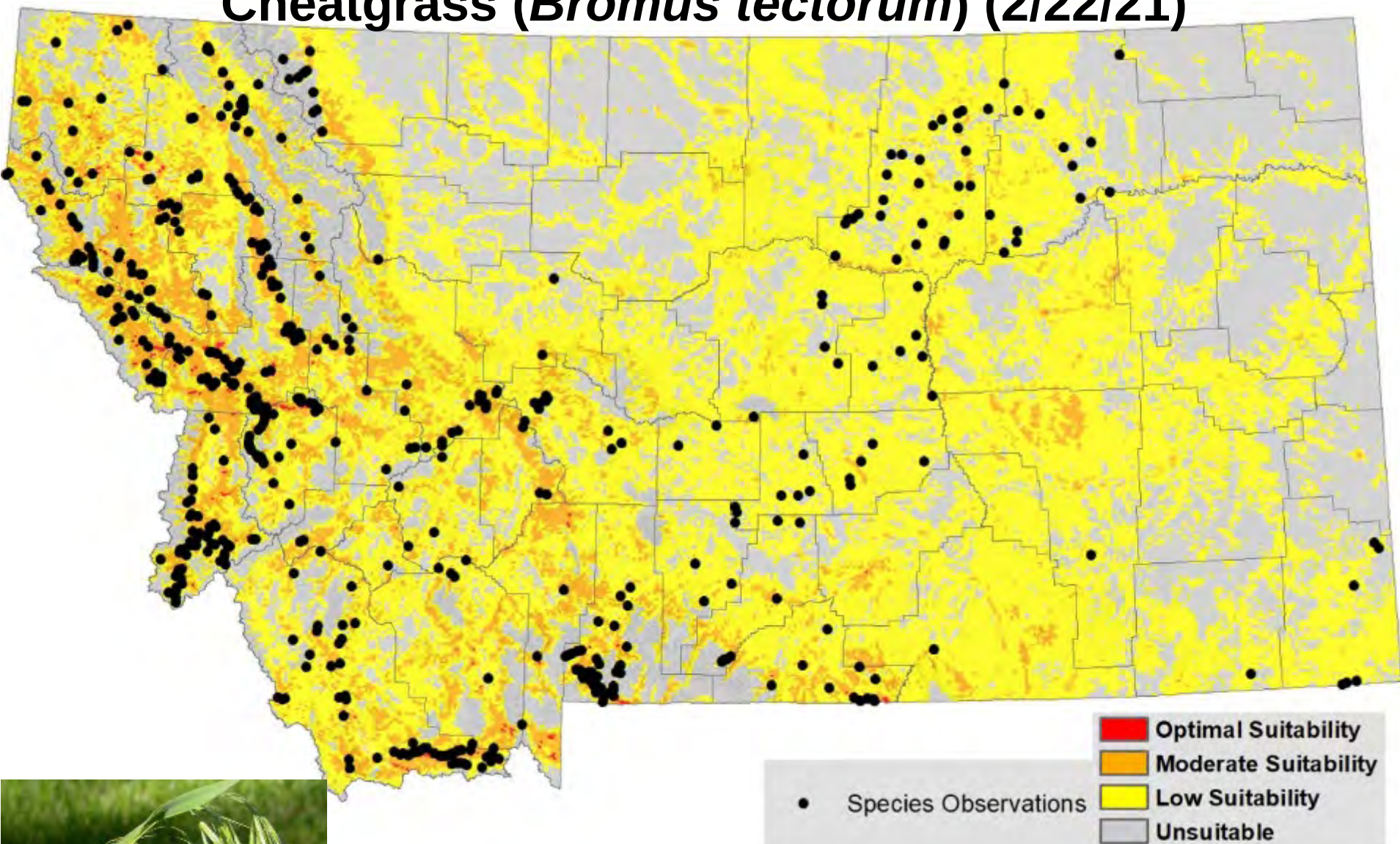
- Include modern National Wetland Inventory mapped wetland areas for palustrine systems with Permanently Flooded or Intermittently Exposed water regimes and lacustrine systems (Limnetic and Littoral) with Permanently Flooded or Intermittently Exposed water regimes
- Include National Hydrography Dataset features for Reservoirs, Lakes, Ponds, Rivers and large Streams
- Exclude the interior limnetic areas of Flathead Lake, Canyon Ferry Reservoir, and Fort Peck
- Exclude any features above 7000 ft (2135 m) in elevation

Canada Thistle (*Cirsium arvense*) (4/29/21)



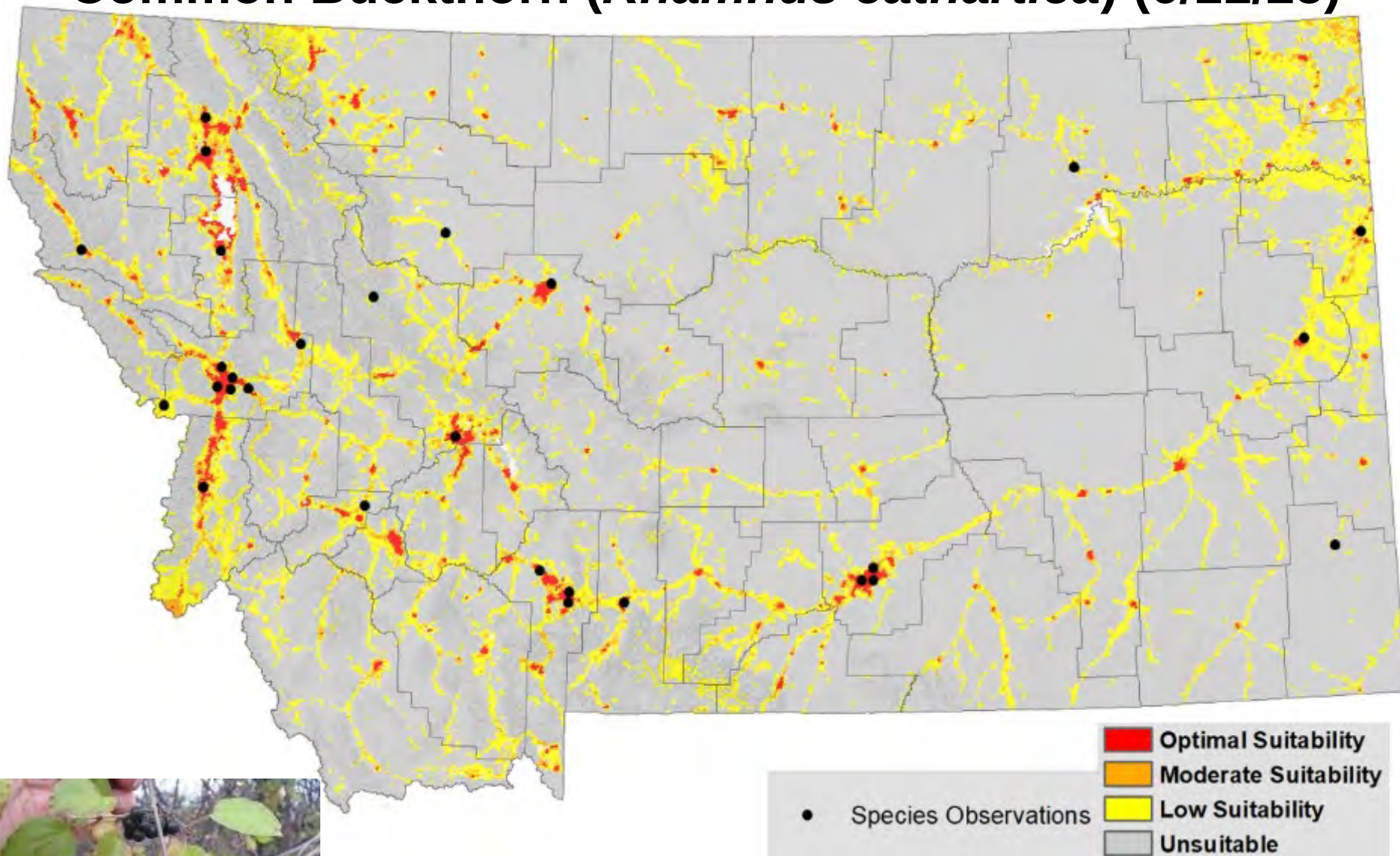
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.063	253,737	67%
Moderate	0.307	55,783	15%
Optimal	0.742	5,115	1%

Cheatgrass (*Bromus tectorum*) (2/22/21)



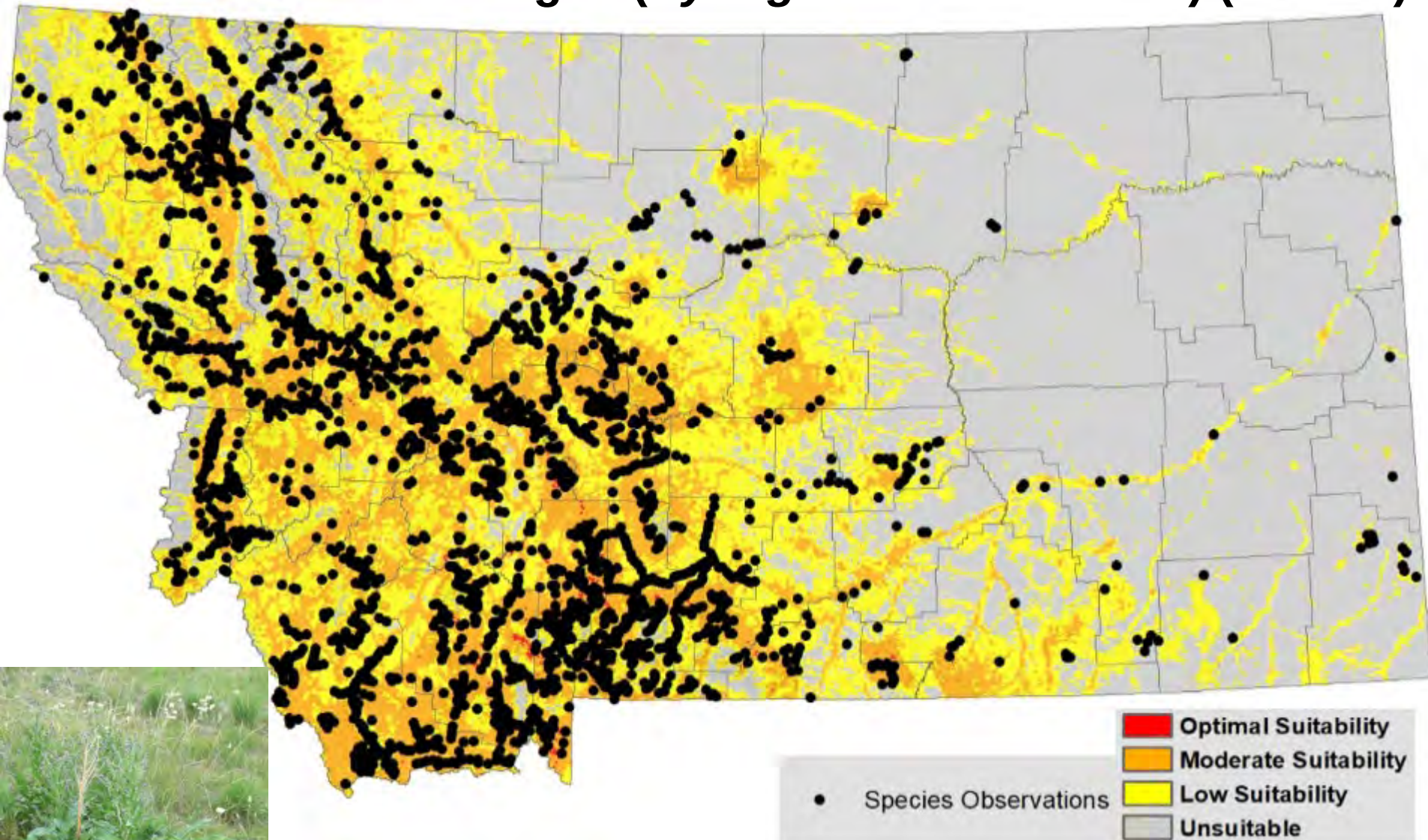
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.062	161,034	42%
Moderate	0.280	39,256	10%
Optimal	0.660	6,878	2%

Common Buckthorn (*Rhamnus cathartica*) (6/11/25)



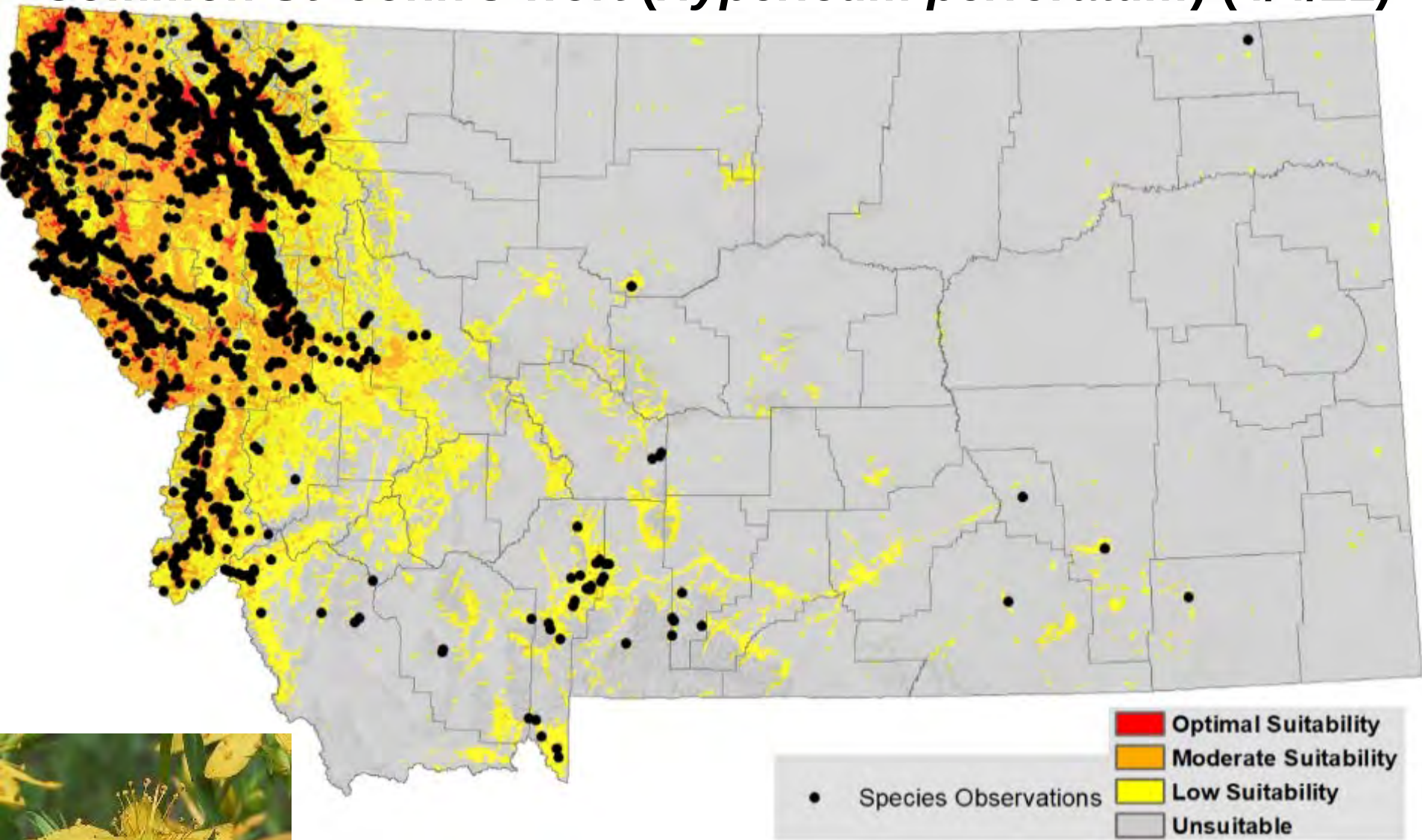
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.013	43,847	12%
Moderate	0.094	5,580	1%
Optimal	0.265	4,311	1%

Common Hound's-tongue (*Cynoglossum officinale*) (3/24/21)



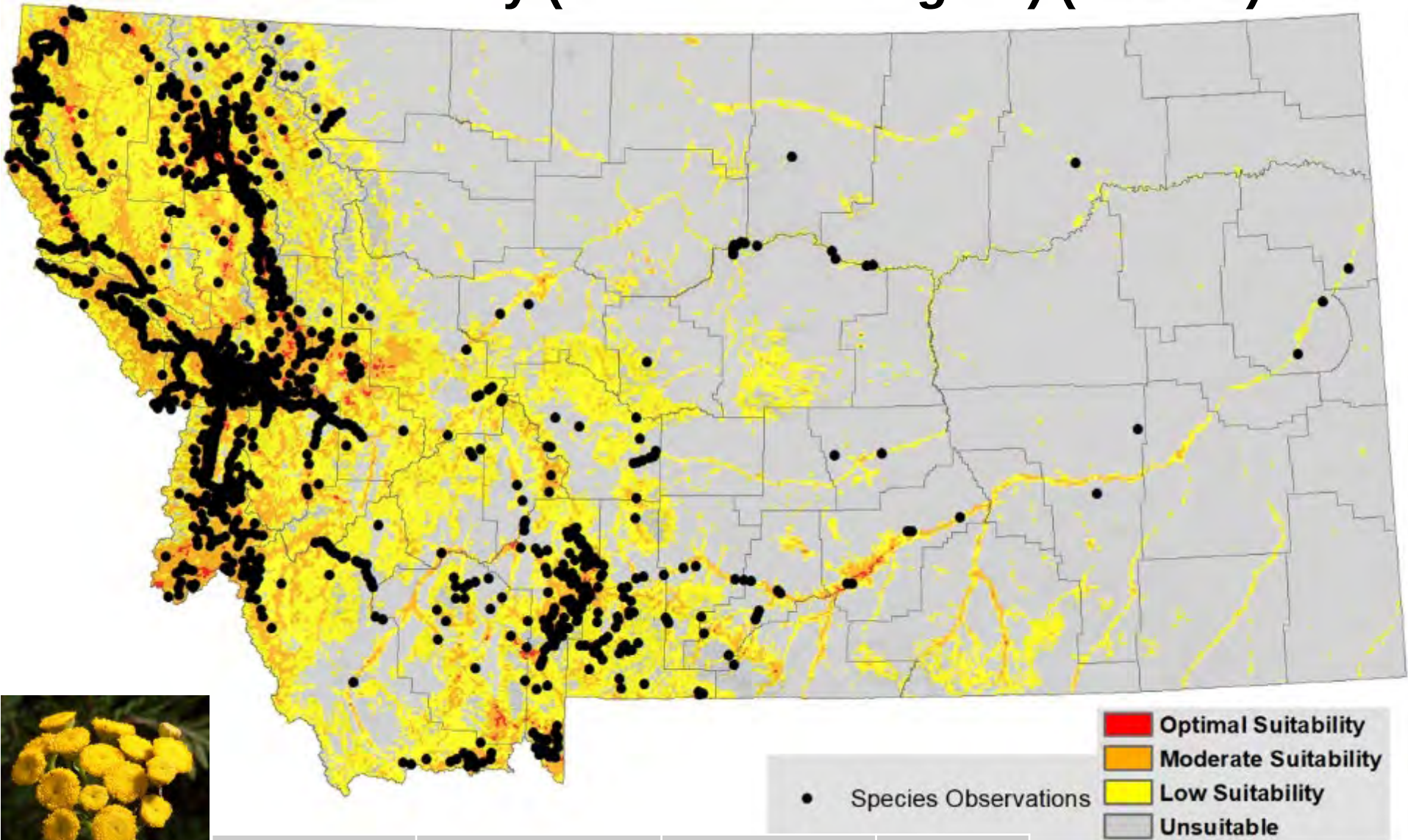
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.059	97,706	26%
Moderate	0.212	61,322	16%
Optimal	0.614	10,120	3%

Common St. John's-wort (*Hypericum perforatum*) (4/4/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.027	42,768	11%
Moderate	0.154	23,712	6%
Optimal	0.411	10,660	3%

Common Tansy (*Tanacetum vulgare*) (4/15/21)

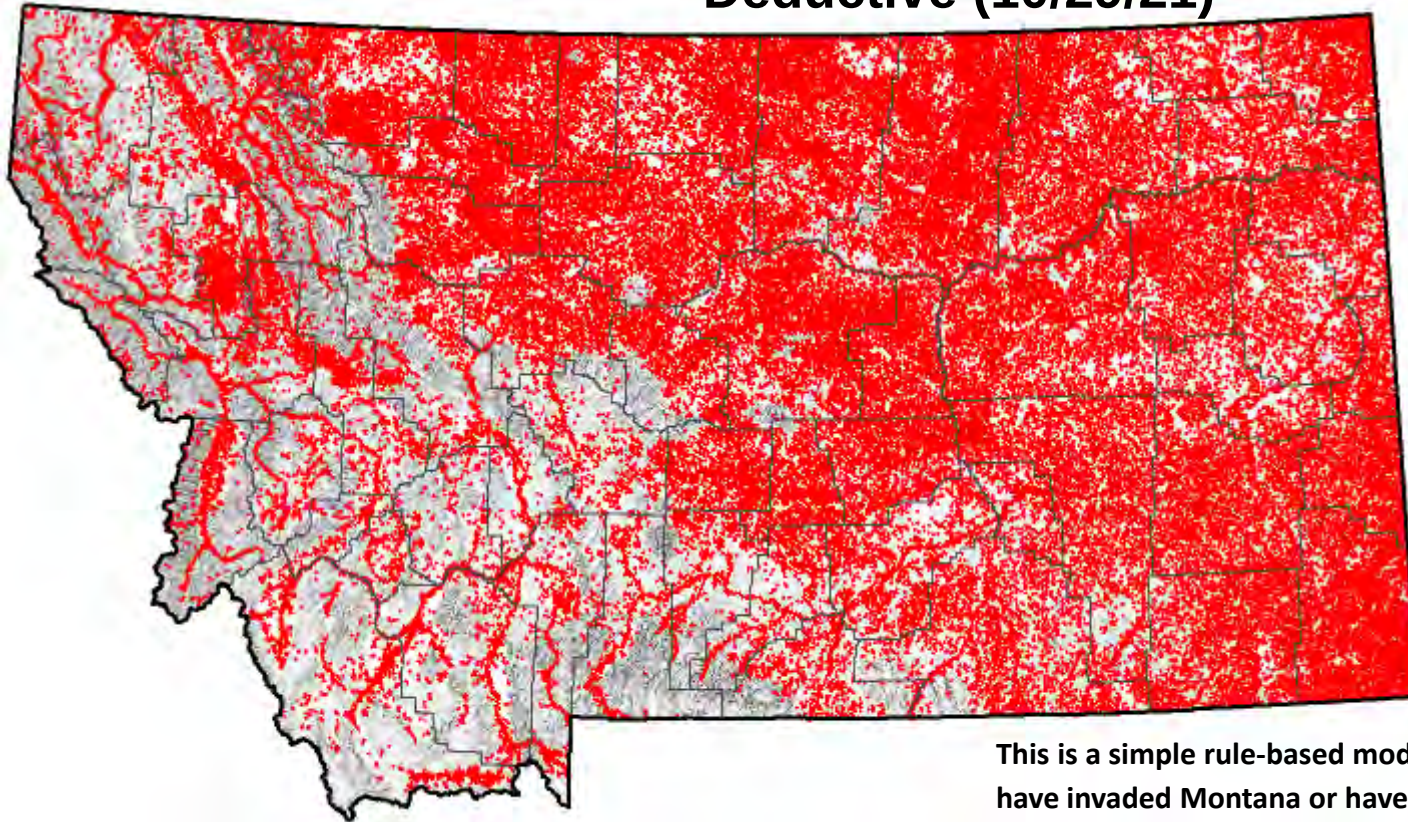


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.029	70,715	19%
Moderate	0.149	26,538	7%
Optimal	0.423	9,638	3%

Common Water Hyacinth (*Eichhornia crassipes*)

Deductive (10/29/21)

***Not documented in Montana to-date.**



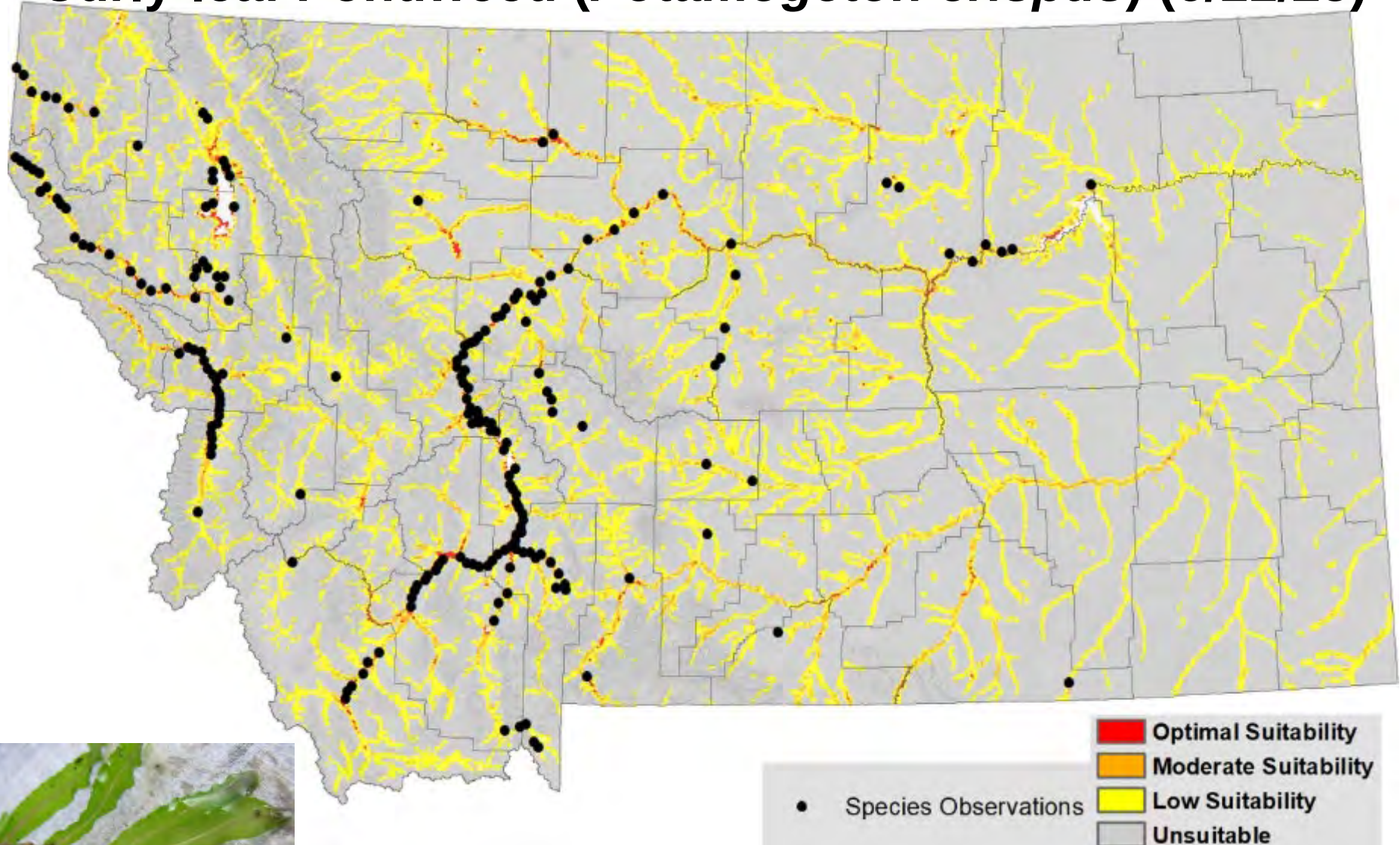
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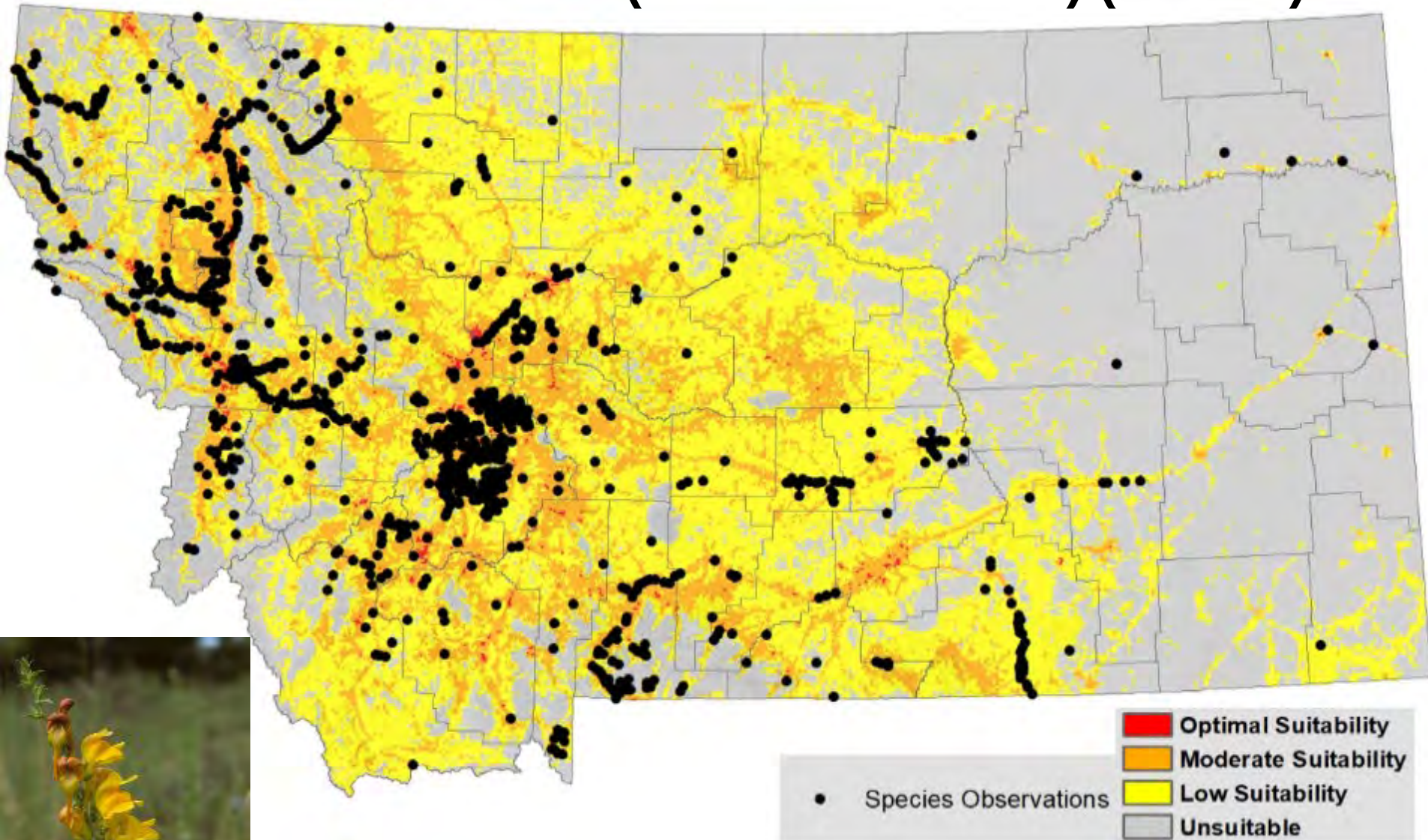


Curly-leaf Pondweed (*Potamogeton crispus*) (6/11/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.002	40,977	11%
Moderate	0.103	3,670	<1%
Optimal	0.238	3,530	<1%

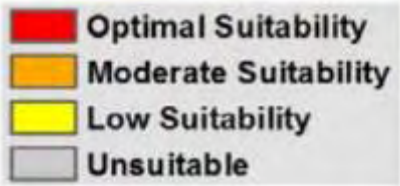
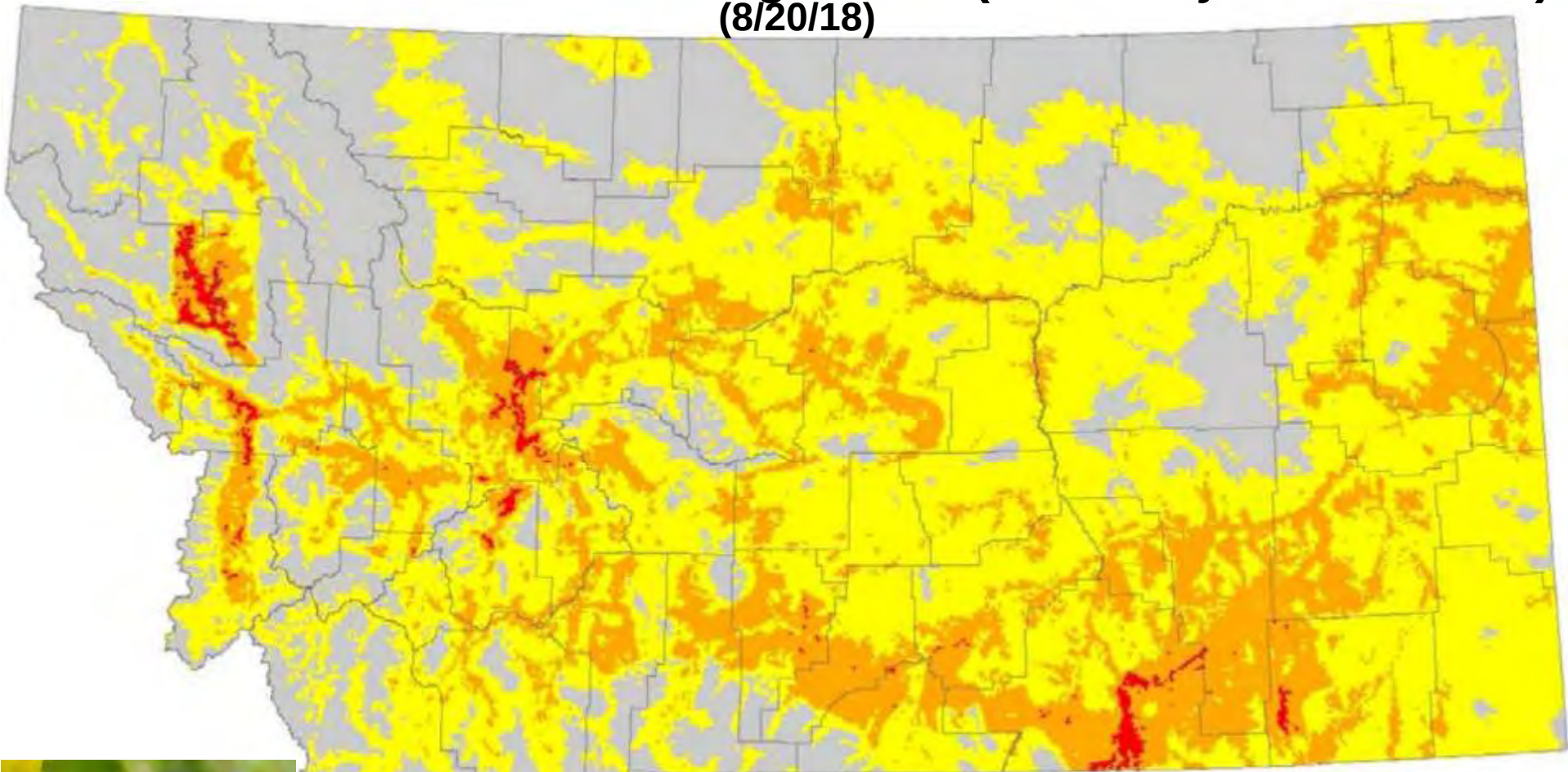
Dalmatian Toadflax (*Linaria dalmatica*) (3/26/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.048	110,643	29%
Moderate	0.175	42,841	11%
Optimal	0.521	10,130	3%

Dalmatian Toadflax Stem-boring Weevil (*Mecinus janthiniformis*)

(8/20/18)

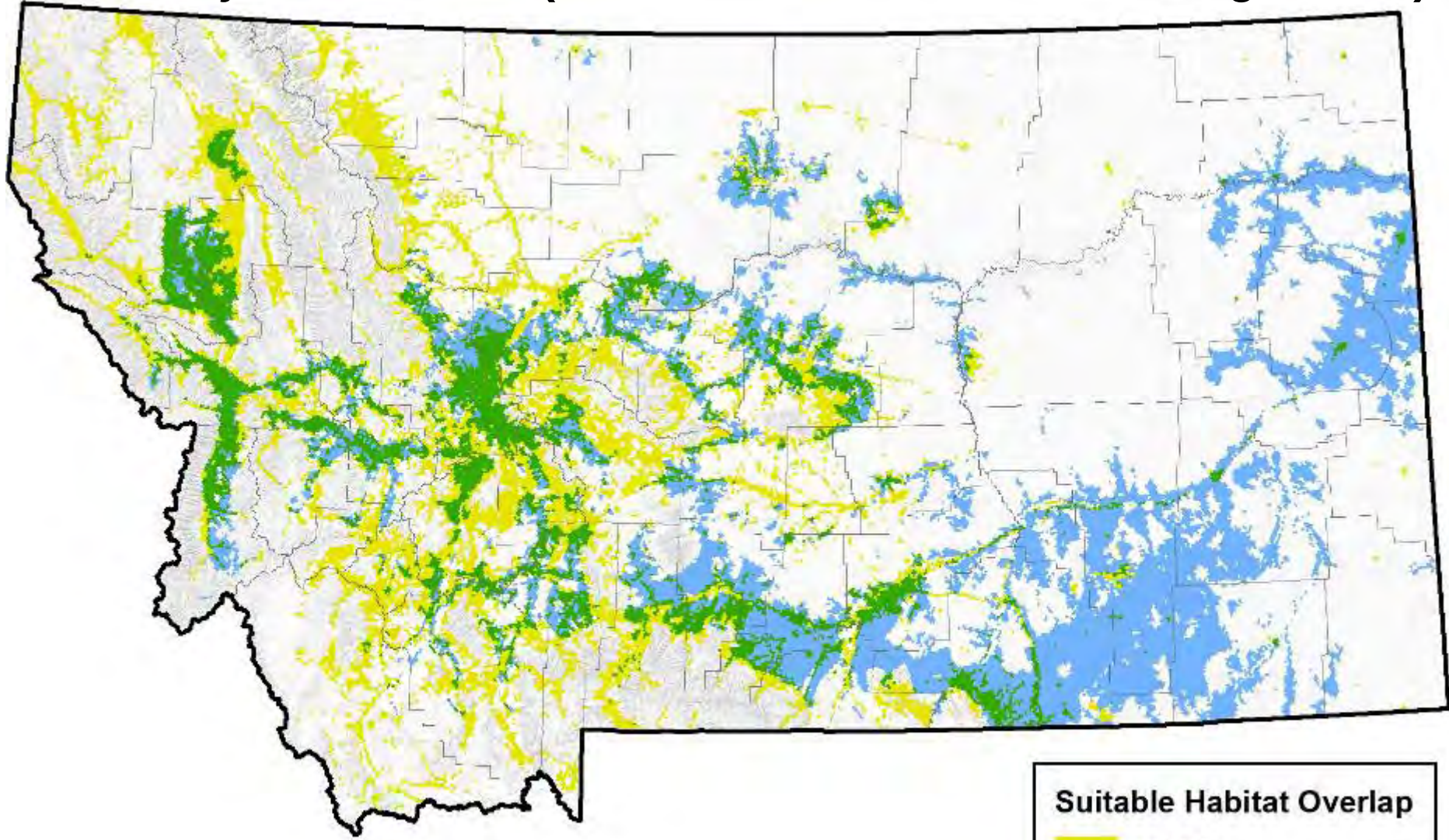


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.048	179,606	47%
Moderate	0.324	62,501	16%
Optimal	0.732	5,448	1%

Biocontrol

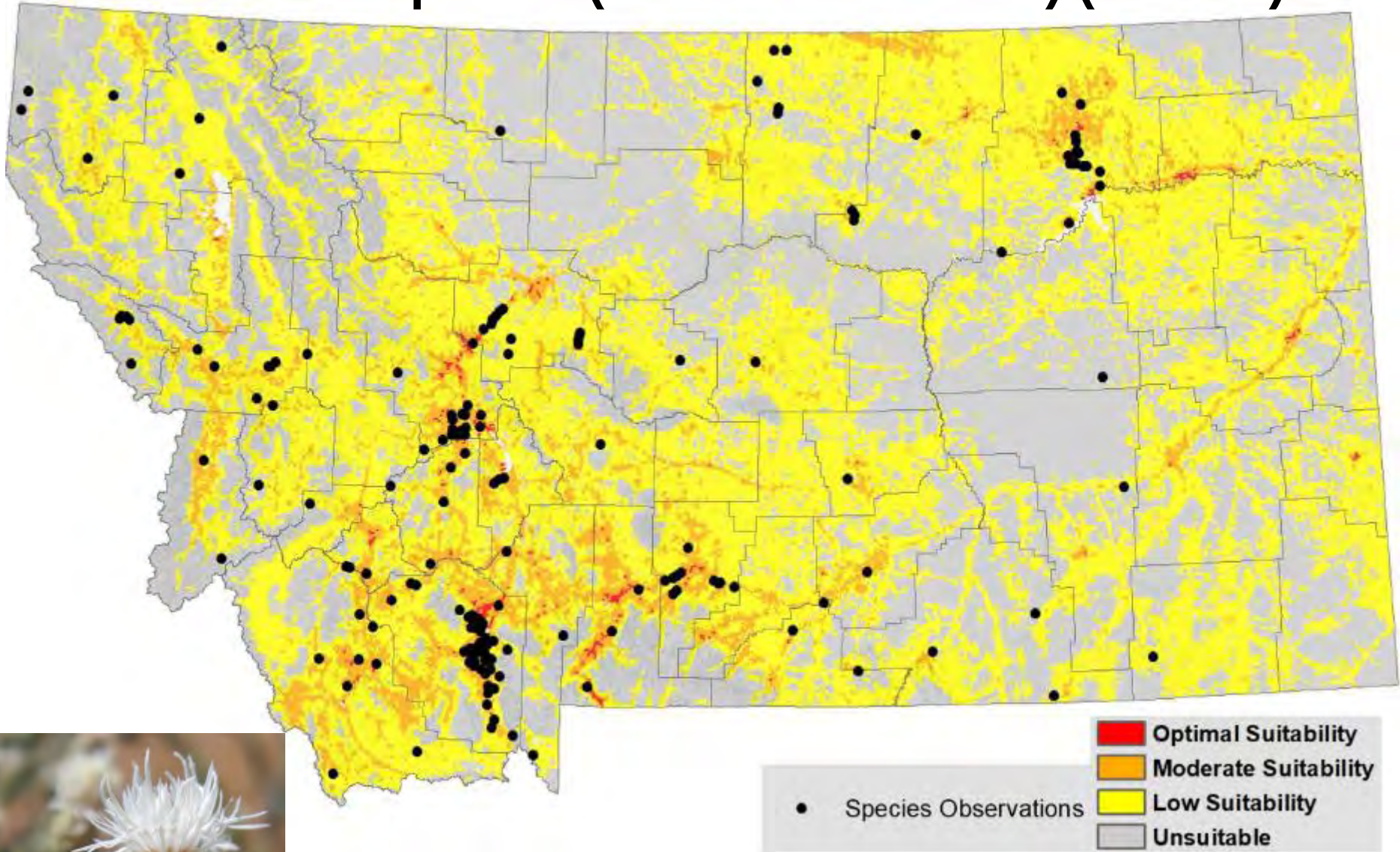
Overlay of Dalmatian Toadflax and its Biocontrol

Mecinus janthiniformis (Dalmatian Toadflax Stem-boring Weevil)



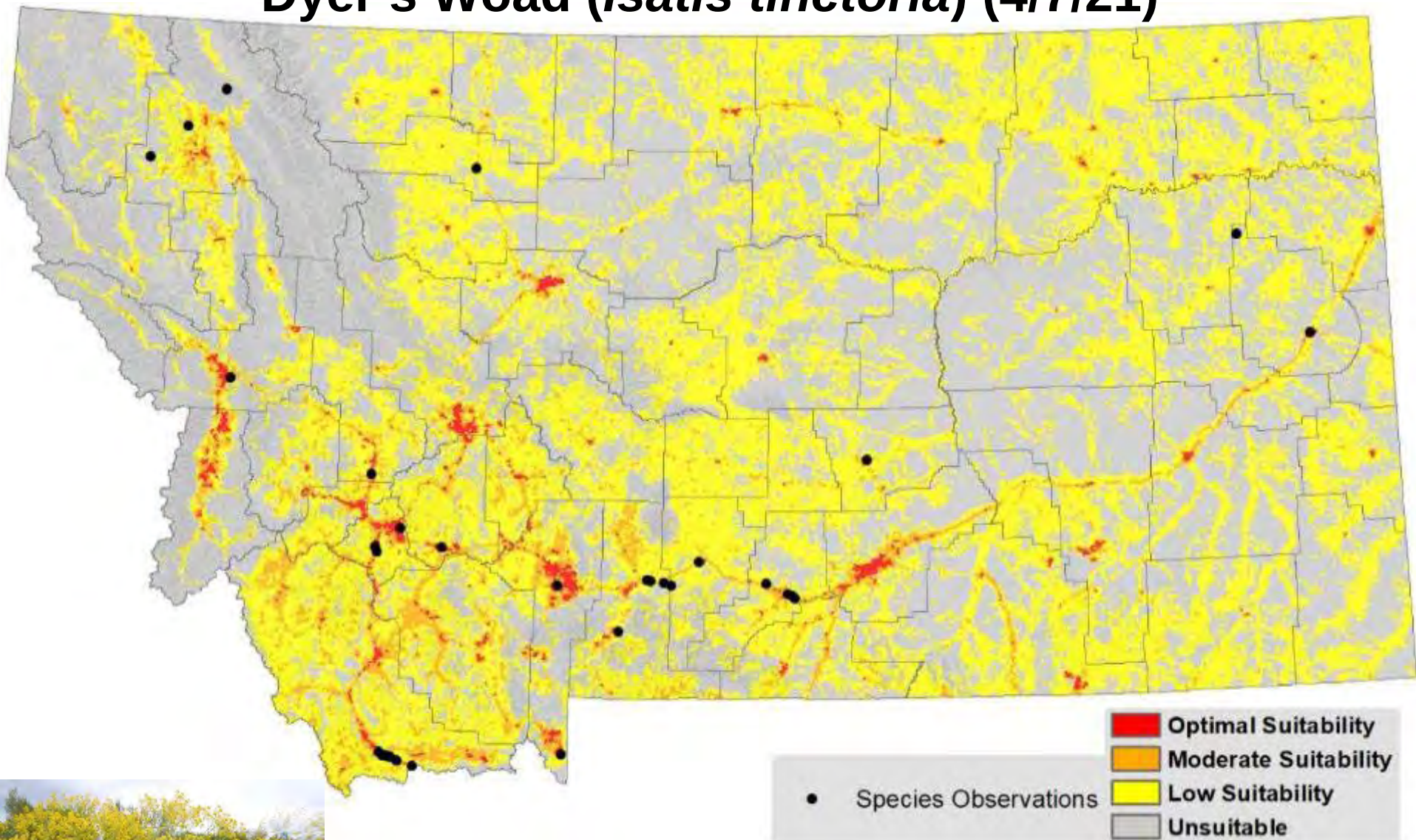
Moderate and optimal suitability for both Dalmatian Toadflax and Dalmatian Toadflax Stem-boring Weevil. Green areas indicate model support for most effective releases of the biocontrol.

Diffuse Knapweed (*Centaurea diffusa*) (6/11/25)



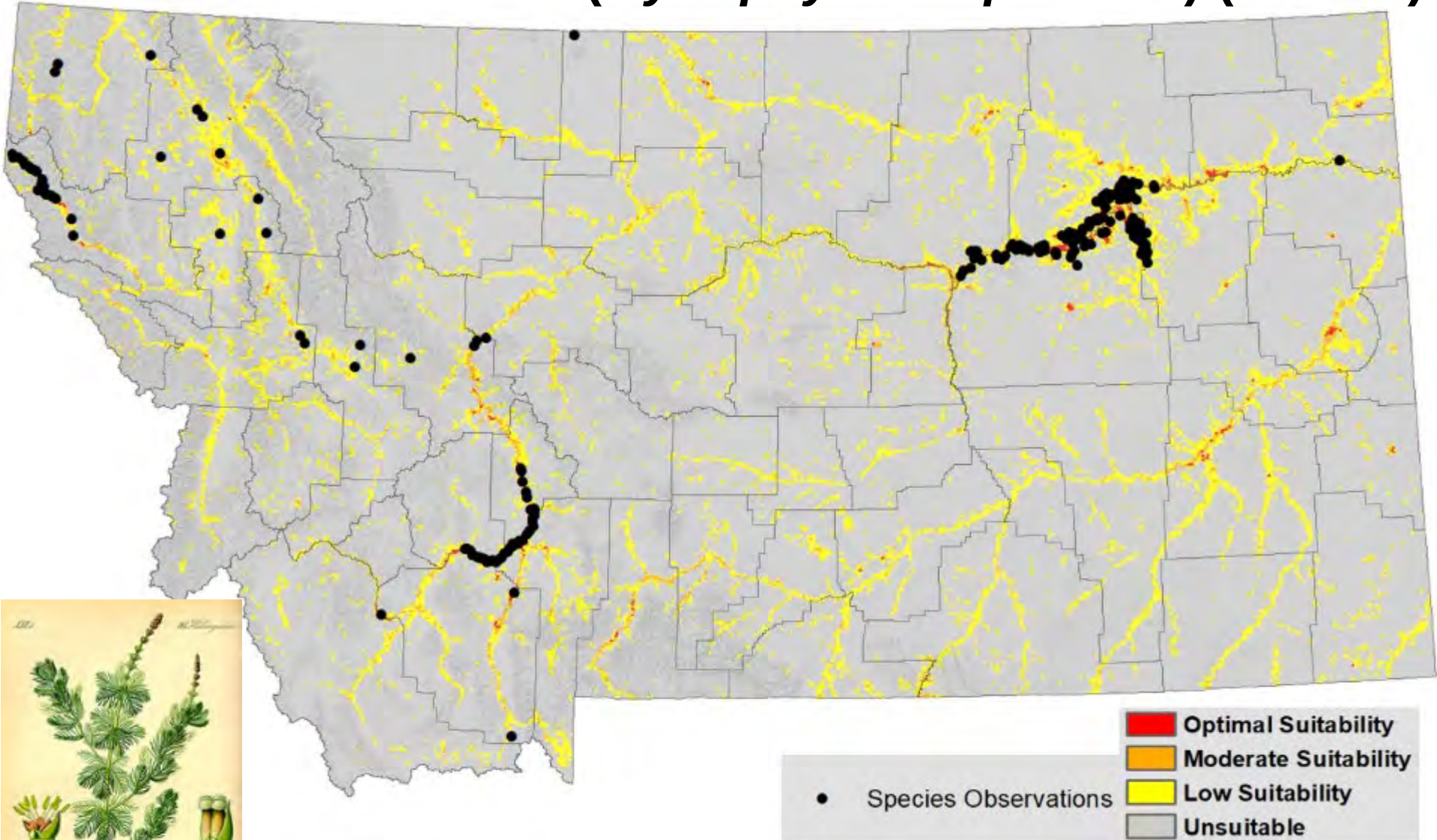
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.024	101,327	27%
Moderate	0.126	30,797	8%
Optimal	0.514	4,733	1%

Dyer's Woad (*Isatis tinctoria*) (4/7/21)



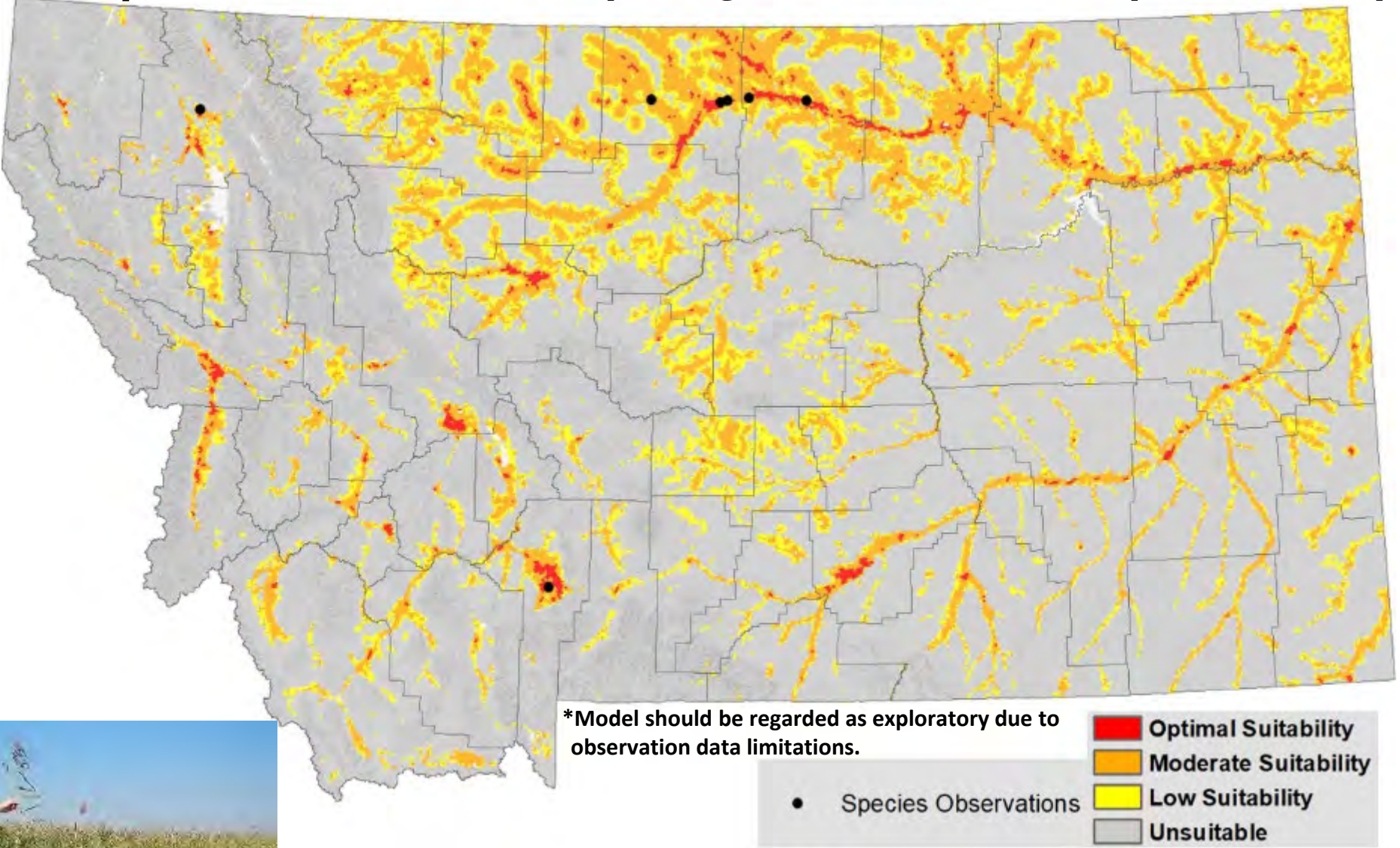
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	117,956	31%
Moderate	0.111	13,878	4%
Optimal	0.310	6,065	2%

Eurasian Water-milfoil (*Myriophyllum spicatum*) (4/16/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.0004	9,508	2%
Moderate	0.046	1,190	<1%
Optimal	0.144	1,748	<1%

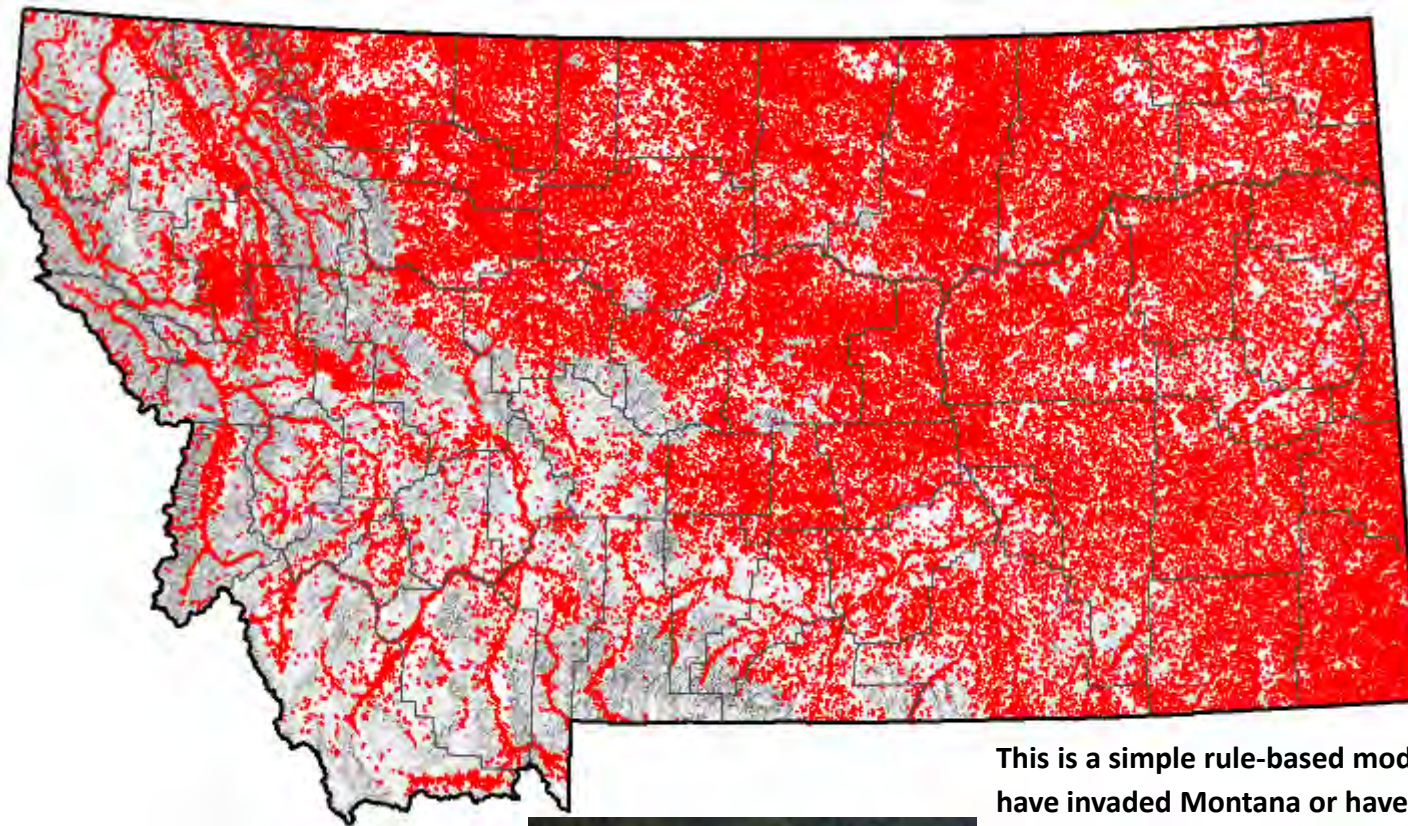
European Common Reed (*Phragmites australis* ssp. *australis*)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	30,062	8%
Moderate	0.058	36,200	10%
Optimal	0.318	5,350	1%

Modeled (5/8/25)

Fanwort (*Cabomba caroliniana*) Deductive (10/29/21)



***Not documented in Montana to-date.**



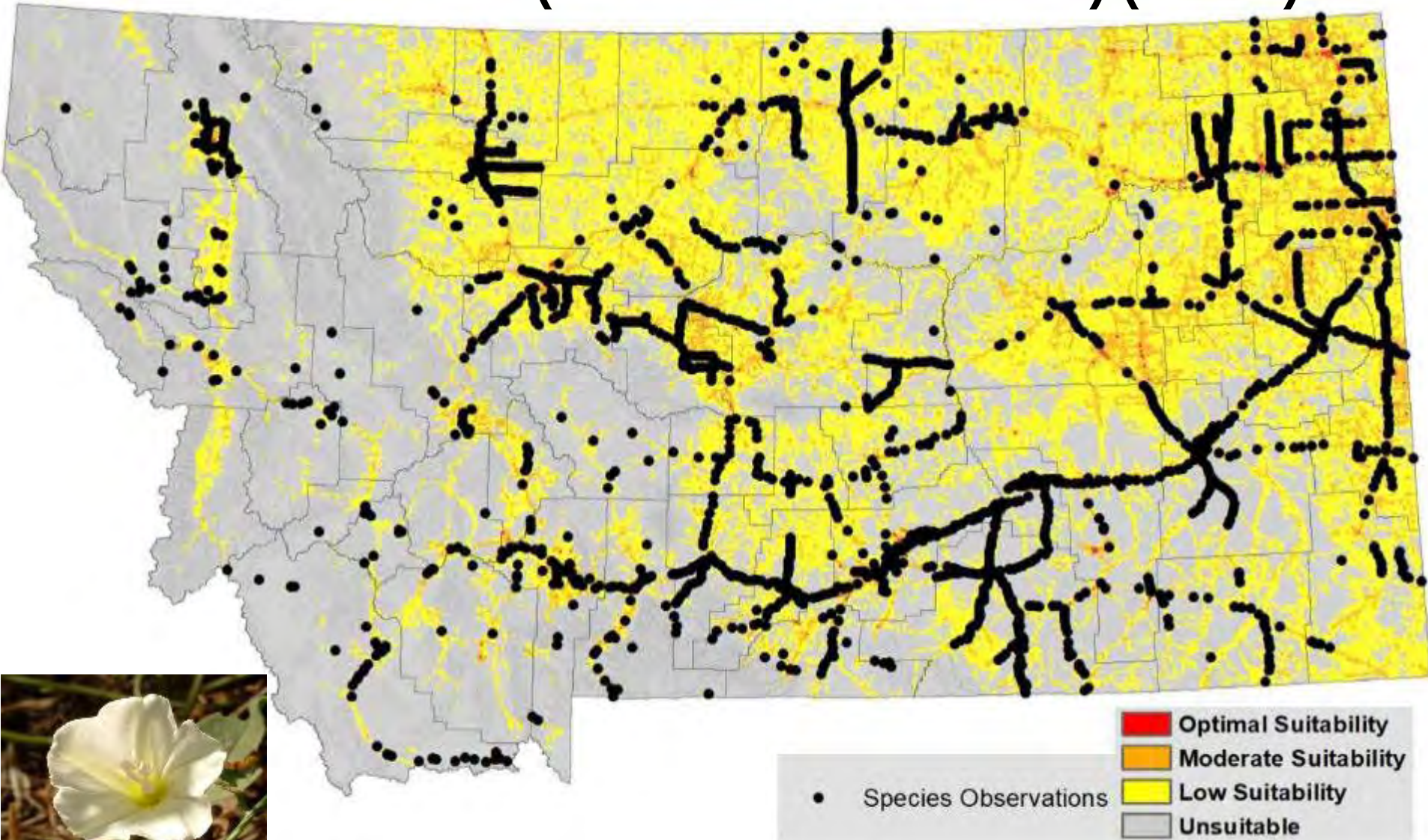
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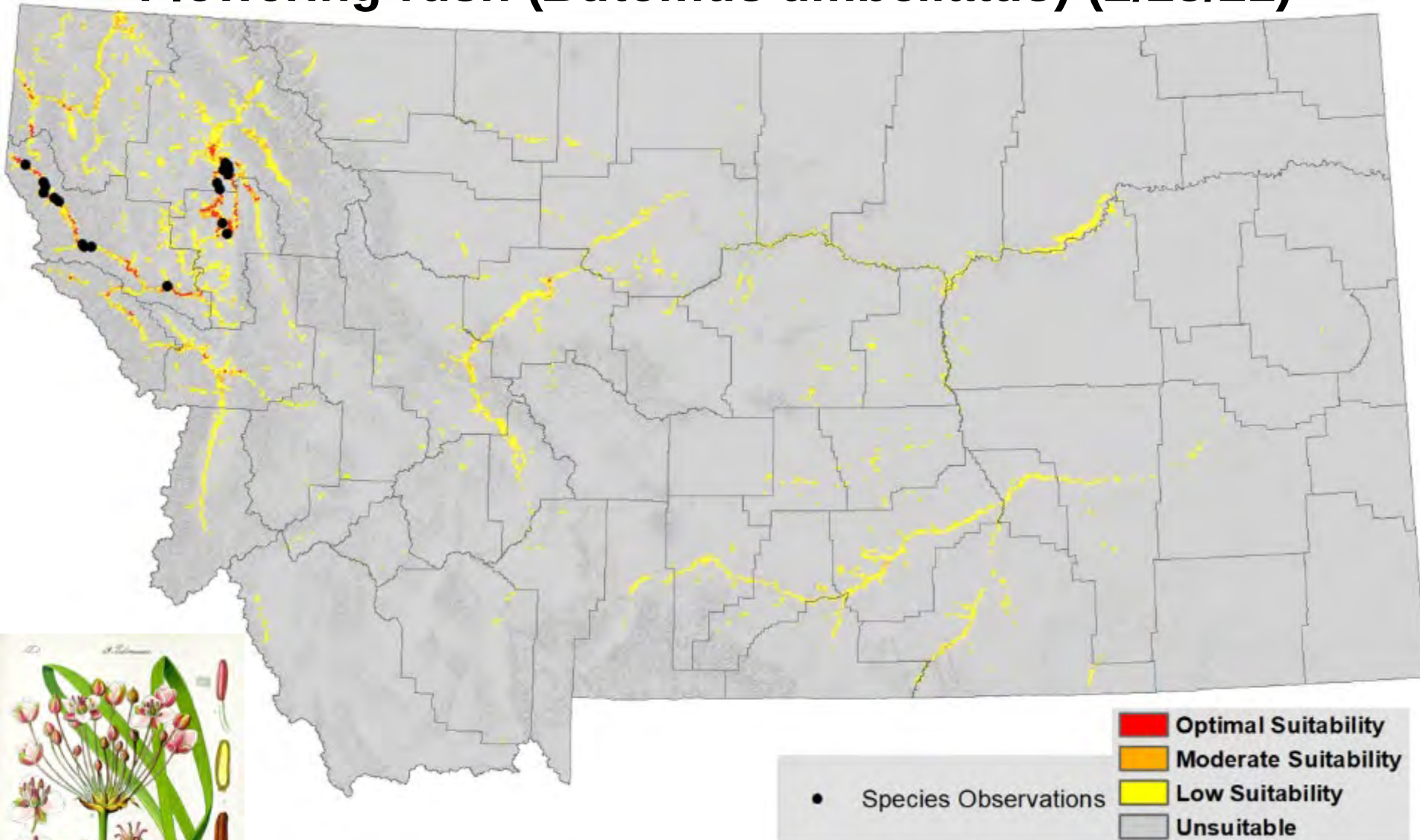
AIS

Field Bindweed (*Convolvulus arvensis*) (4/3/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.023	109,211	29%
Moderate	0.131	21,023	6%
Optimal	0.374	8,873	2%

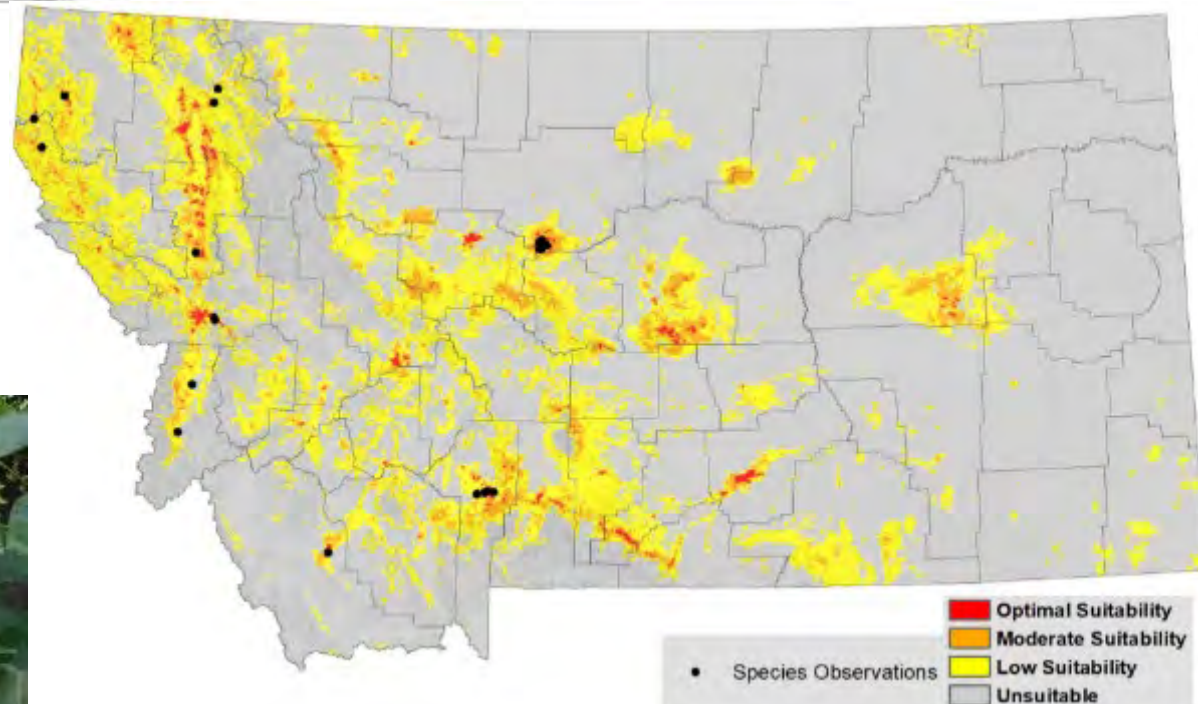
Flowering-rush (*Butomus umbellatus*) (2/23/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.0003	3,002	<1%
Moderate	0.040	217	<1%
Optimal	0.097	434	<1%

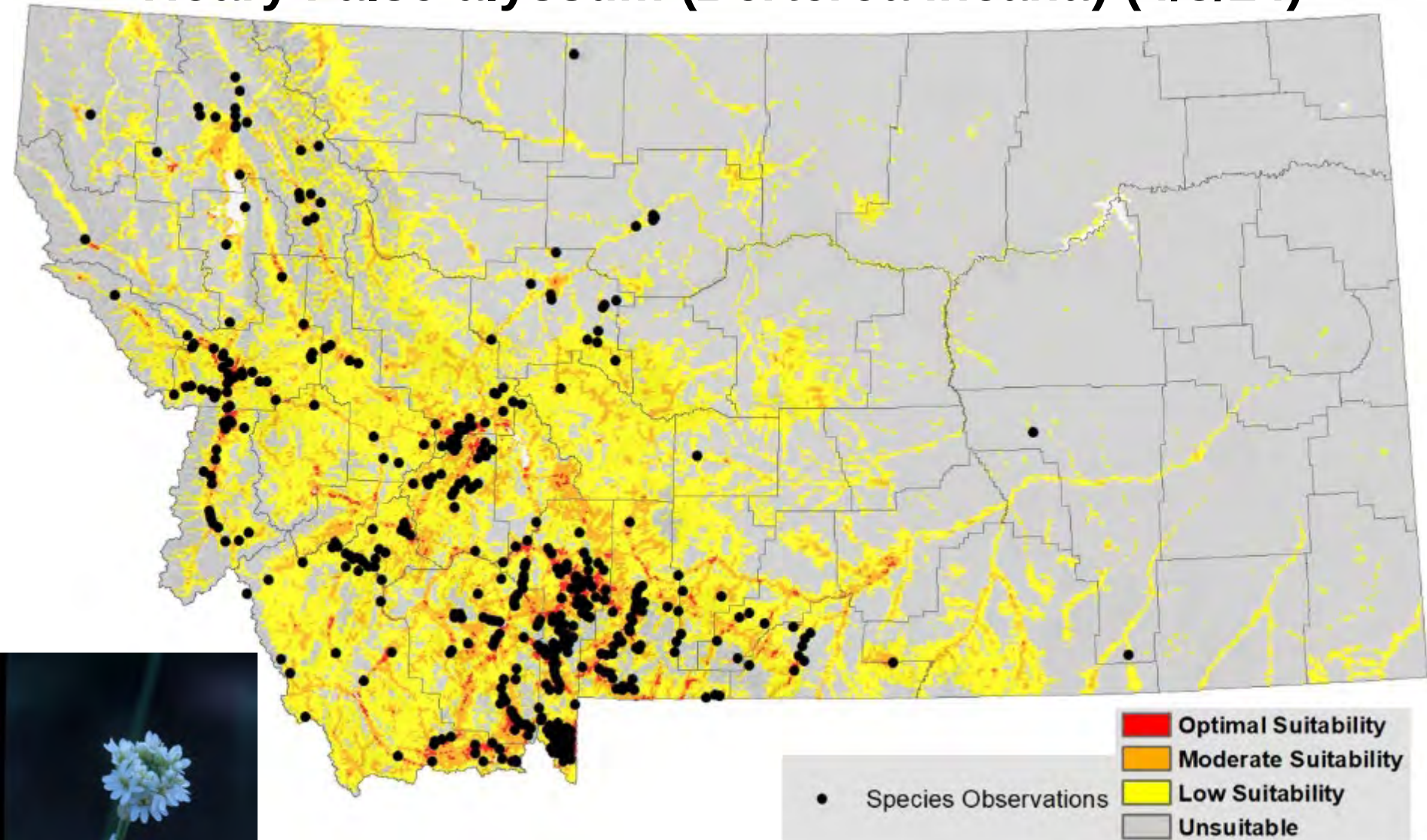
Giant Knotweed (*Polygonum sachalinense*)

*None of the 30 records shown in the map at the left for this species have precise location information. The model below for Japanese Knotweed (*Polygonum cuspidatum*) is provided as a proxy for the potential distribution of *Polygonum sachalinense*.



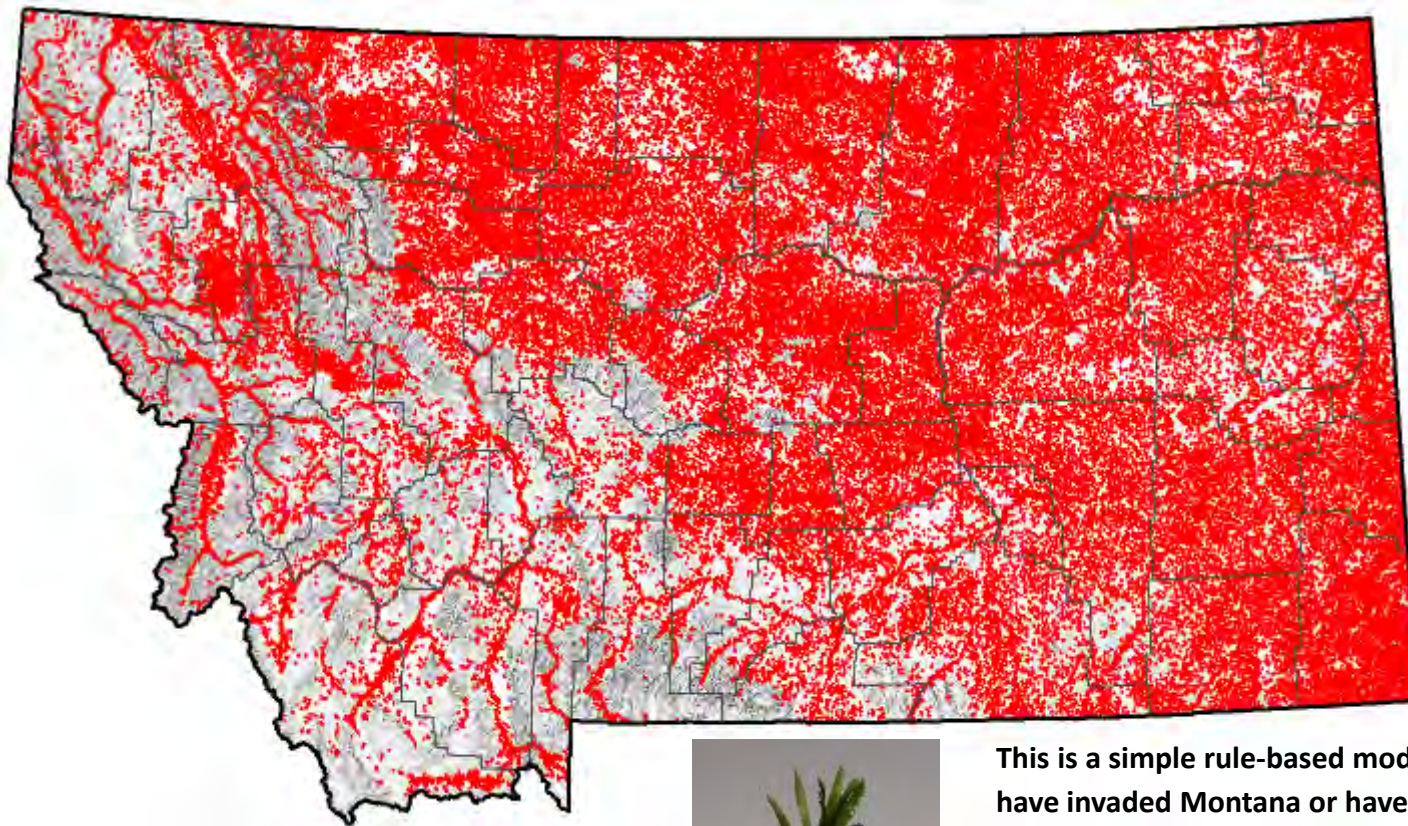
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	51,513	14%
Moderate	0.141	11,931	3%
Optimal	0.451	3,469	1%

Hoary False-allyssum (*Berteroa incana*) (4/8/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.014	70,852	19%
Moderate	0.115	16,267	4%
Optimal	0.340	7,642	2%

Hydrilla (*Hydrilla verticillata*) Deductive (10/29/21)



***Not documented in Montana to-date.**

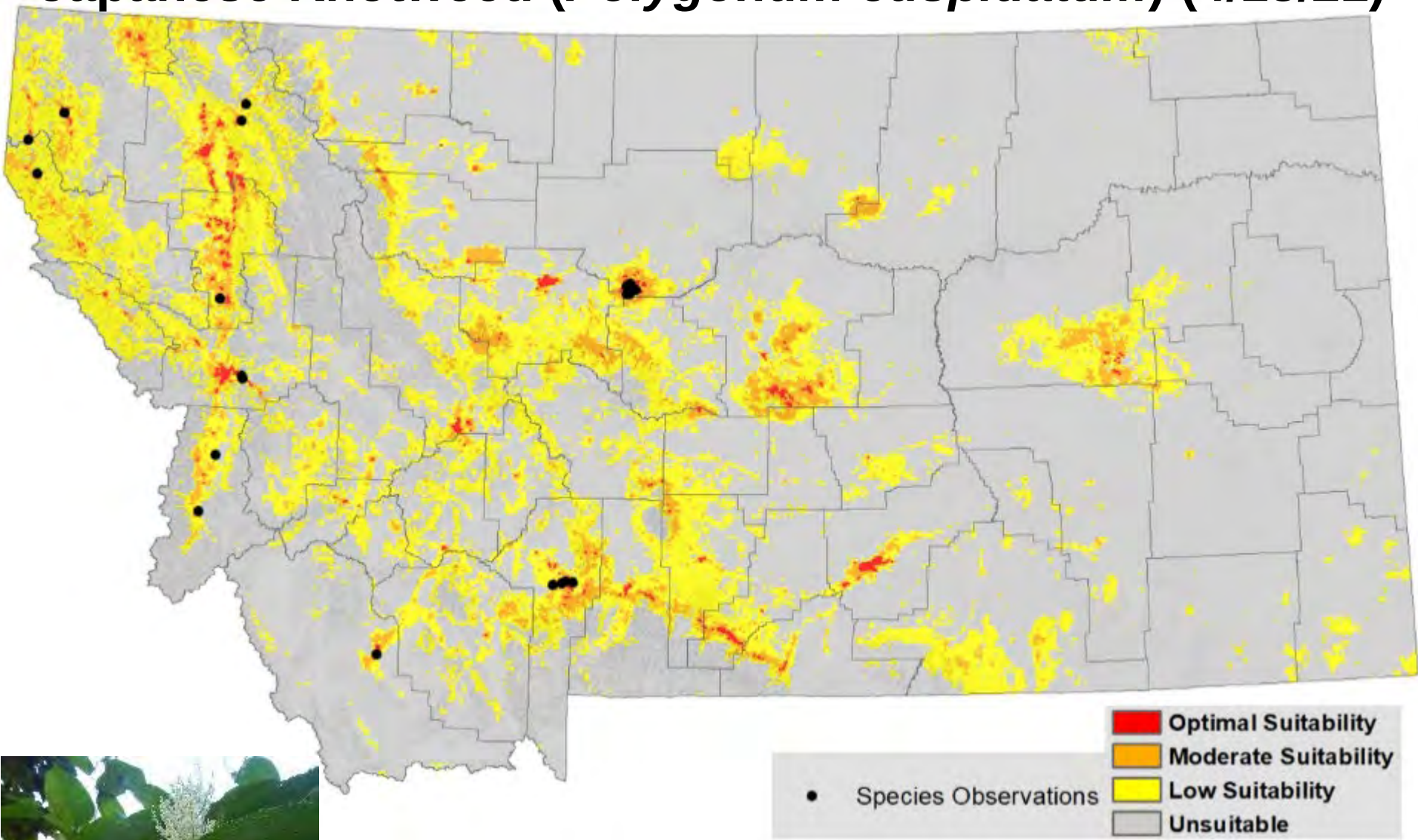


This is a simple rule-based model for aquatic invasive plants that have invaded Montana or have the potential to invade Montana.

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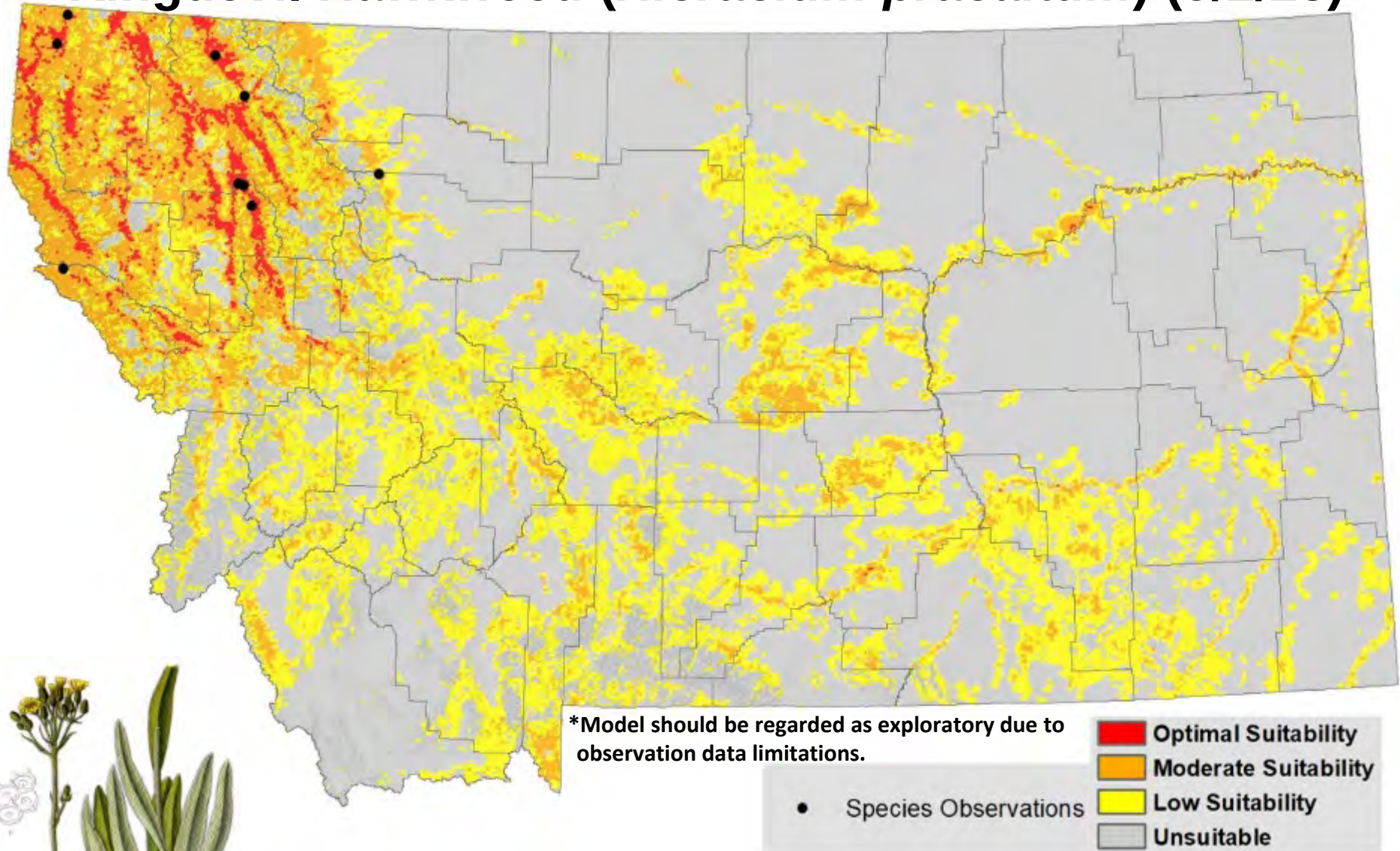
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Japanese Knotweed (*Polygonum cuspidatum*) (4/13/21)



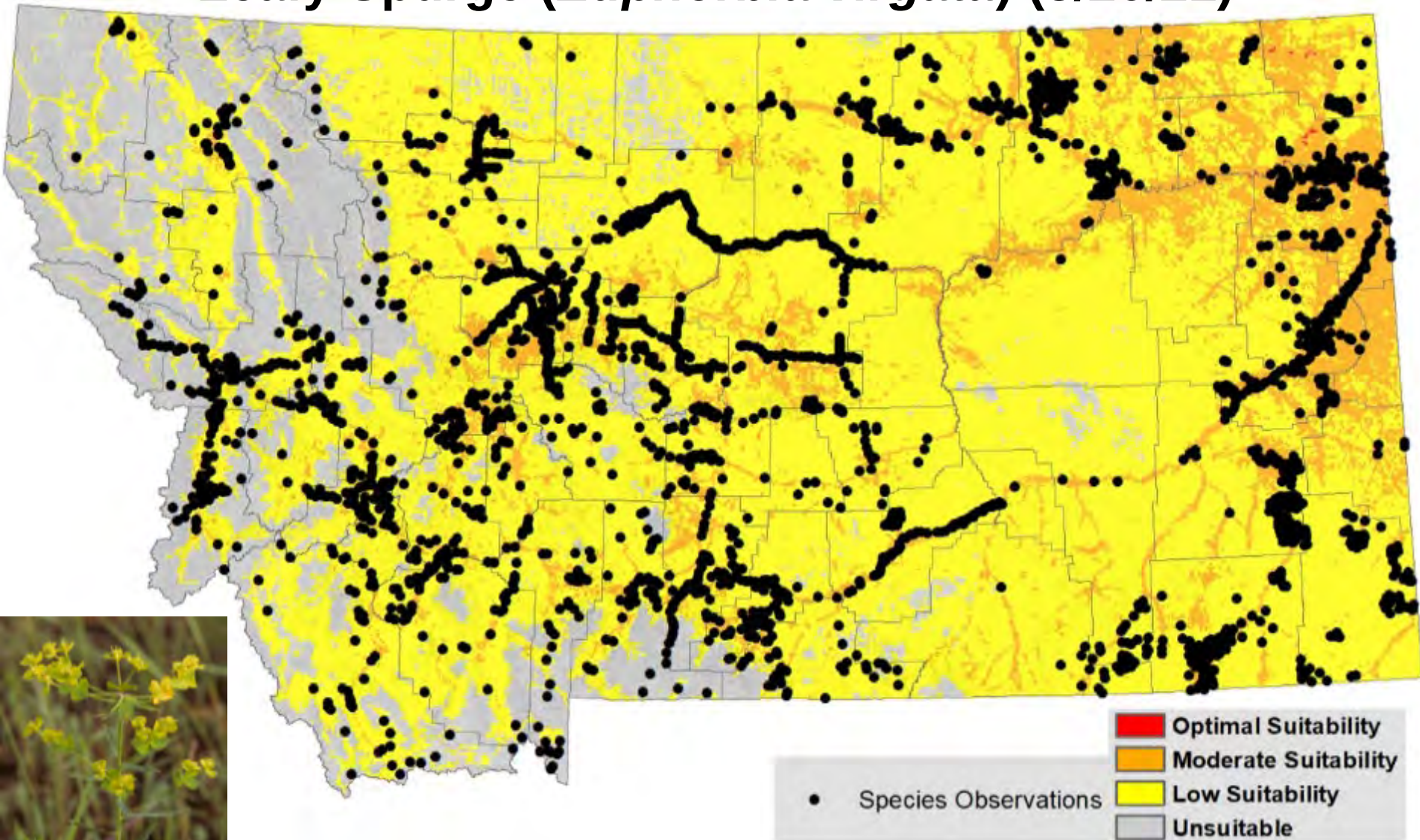
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	51,513	14%
Moderate	0.141	11,931	3%
Optimal	0.451	3,469	1%

Kingdevil Hawkweed (*Hieracium praealtum*) (5/2/23)



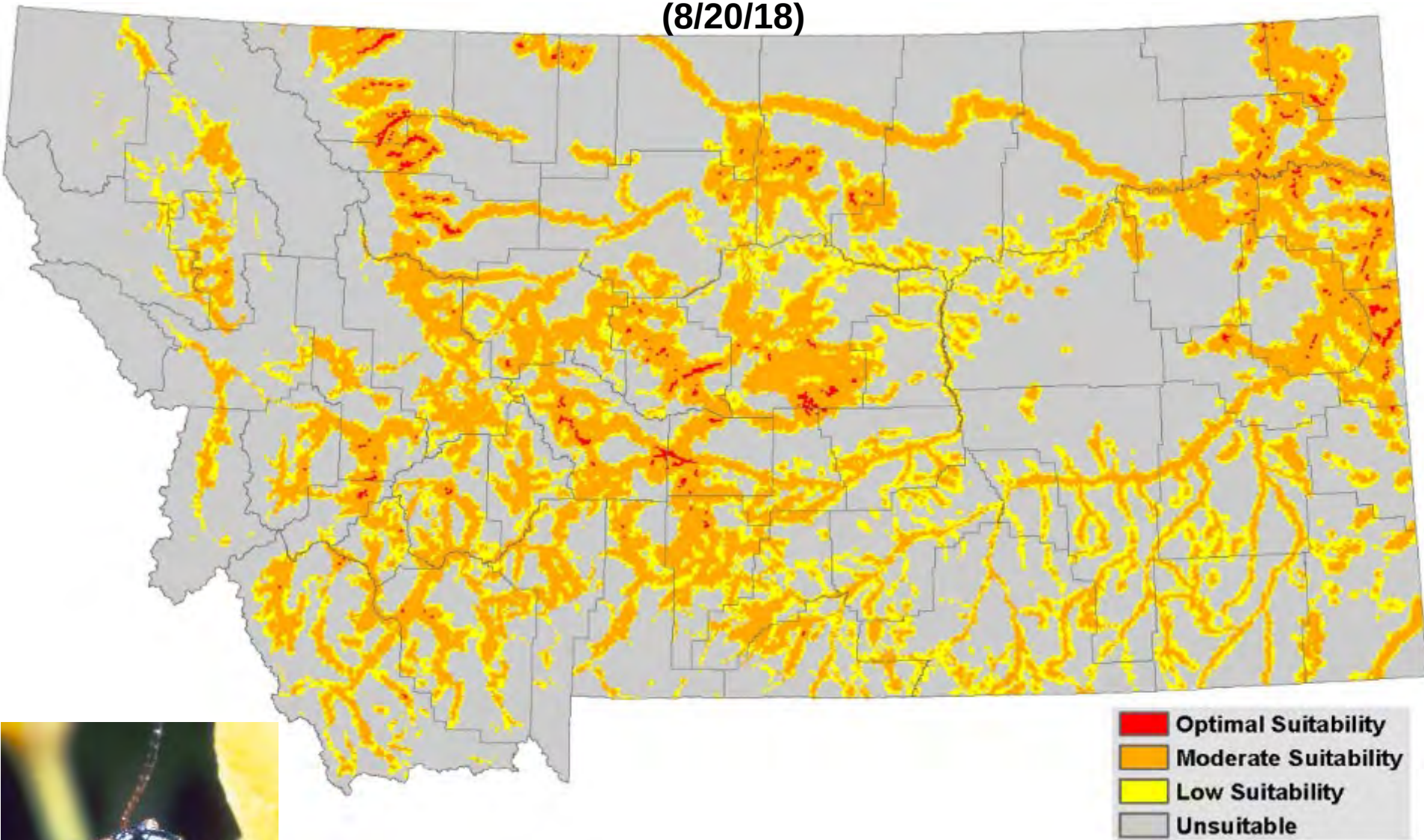
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.050	70,286	18%
Moderate	0.165	35,325	9%
Optimal	0.481	9,607	3%

Leafy Spurge (*Euphorbia virgata*) (3/26/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.051	223,506	59%
Moderate	0.329	62,408	16%
Optimal	0.754	5,069	1%

Aphthona lacertosa (Brown-legged Leafy Spurge Flea Beetle) (8/20/18)

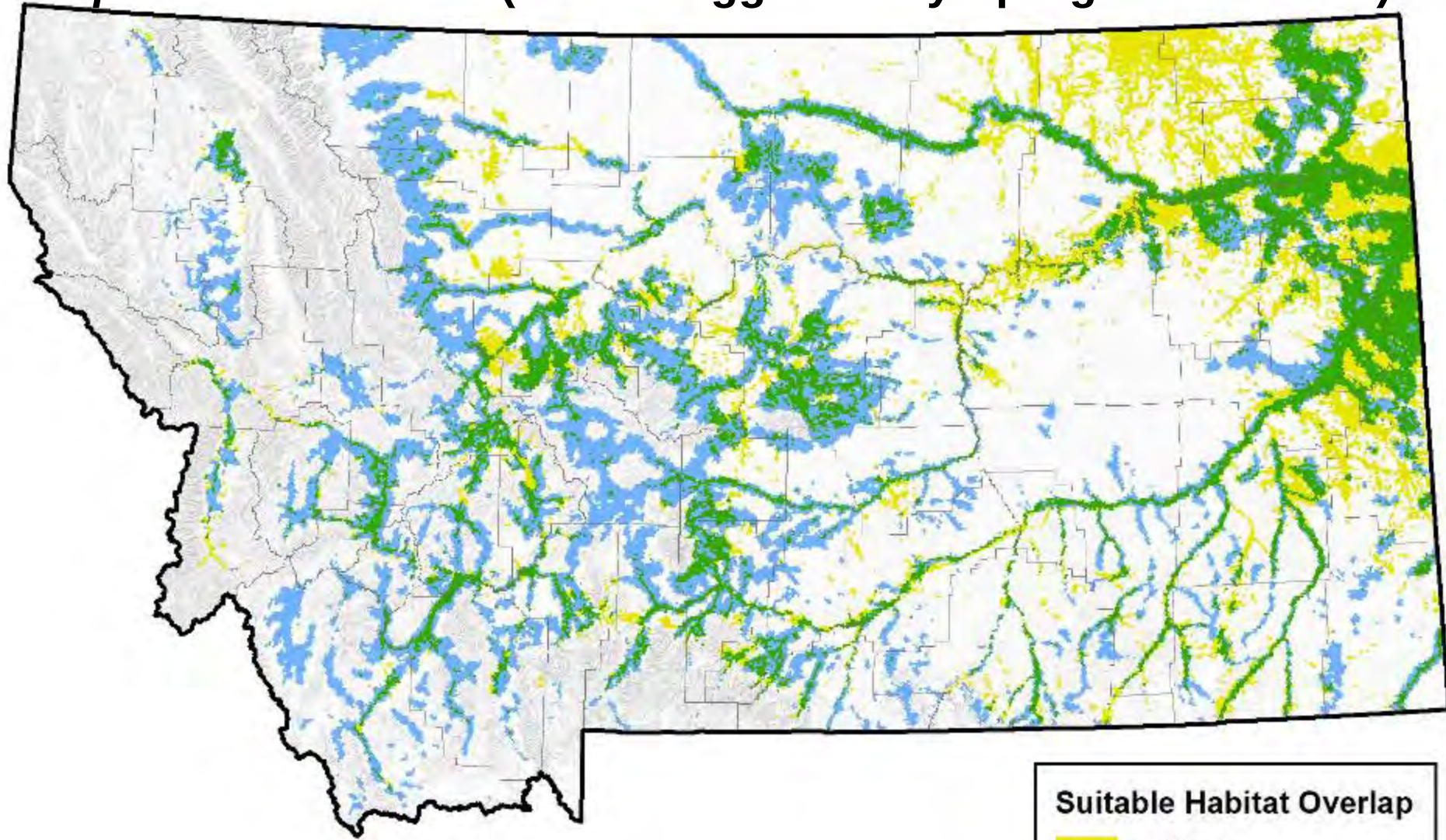


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.081	46,563	12%
Moderate	0.170	76,981	20%
Optimal	0.695	4,892	1%

Biocontrol

Overlay of Leafy Spurge and its Biocontrol

Aphthona lacertosa (Brown-legged Leafy Spurge Flea Beetle)



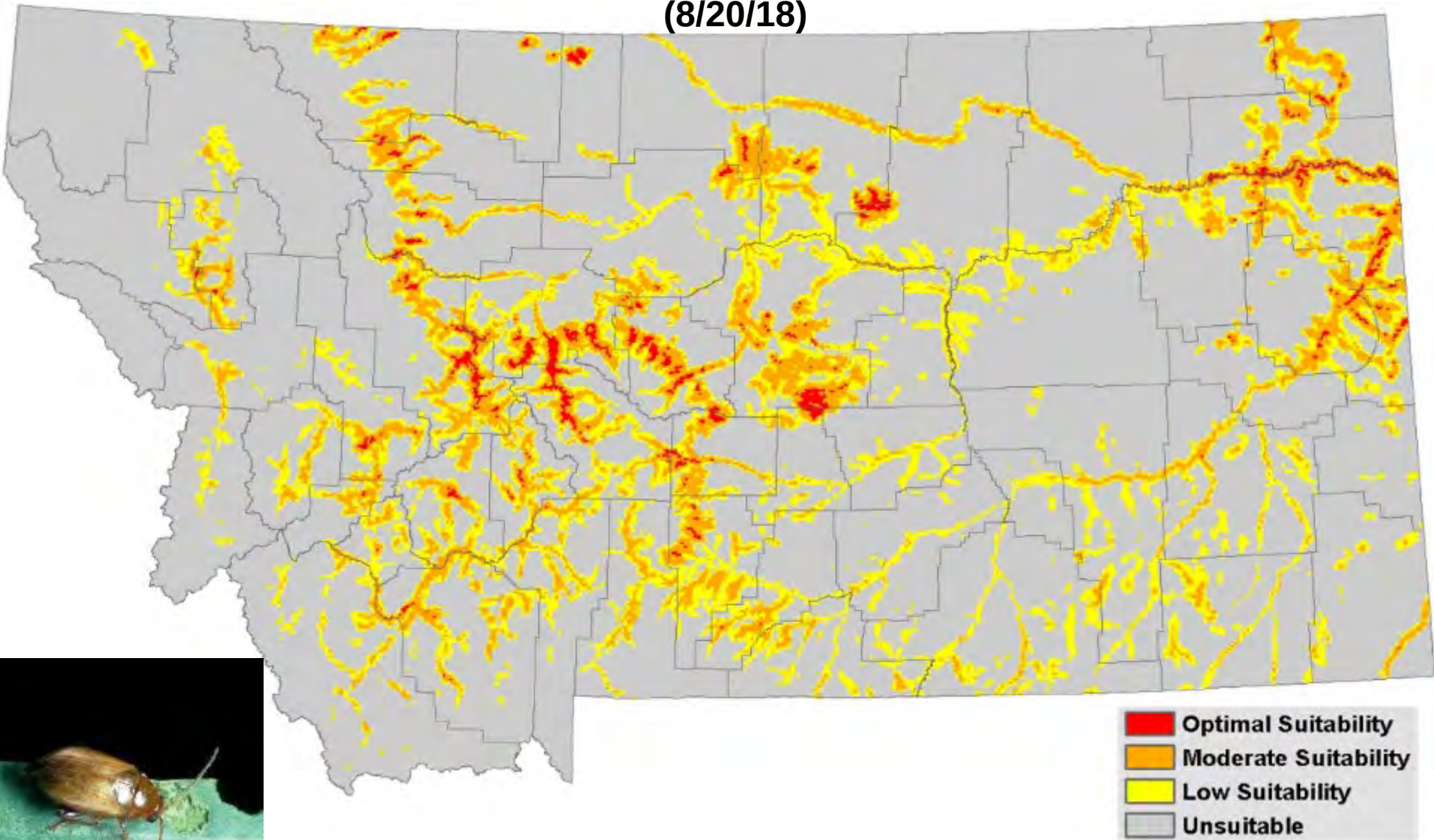
Suitable Habitat Overlap

- Host Weed
- Biocontrol
- Host Weed + Biocontrol

Moderate and optimal suitability for both Leafy Spurge and Brown-legged Leafy Spurge Flea Beetle. Green areas indicate model support for most effective releases of the biocontrol.

Aphthona nigriscutis (Black Dot Leafy Spurge Flea Beetle)

(8/20/18)

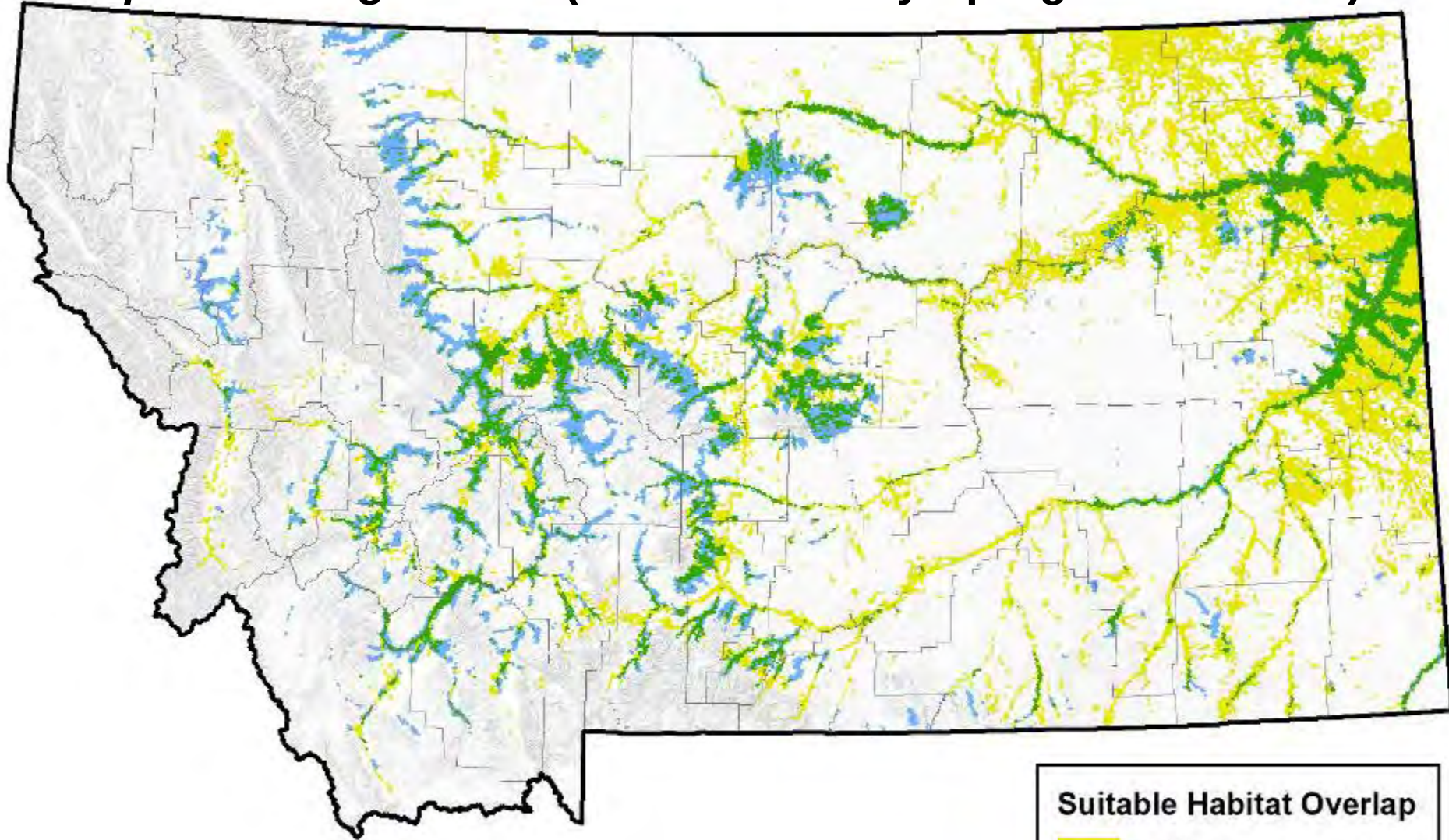


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.027	41,956	11%
Moderate	0.113	24,408	6%
Optimal	0.458	5,724	2%

Biocontrol

Overlay of Leafy Spurge and its Biocontrol

Aphthona nigriscutis (Black Dot Leafy Spurge Flea Beetle)

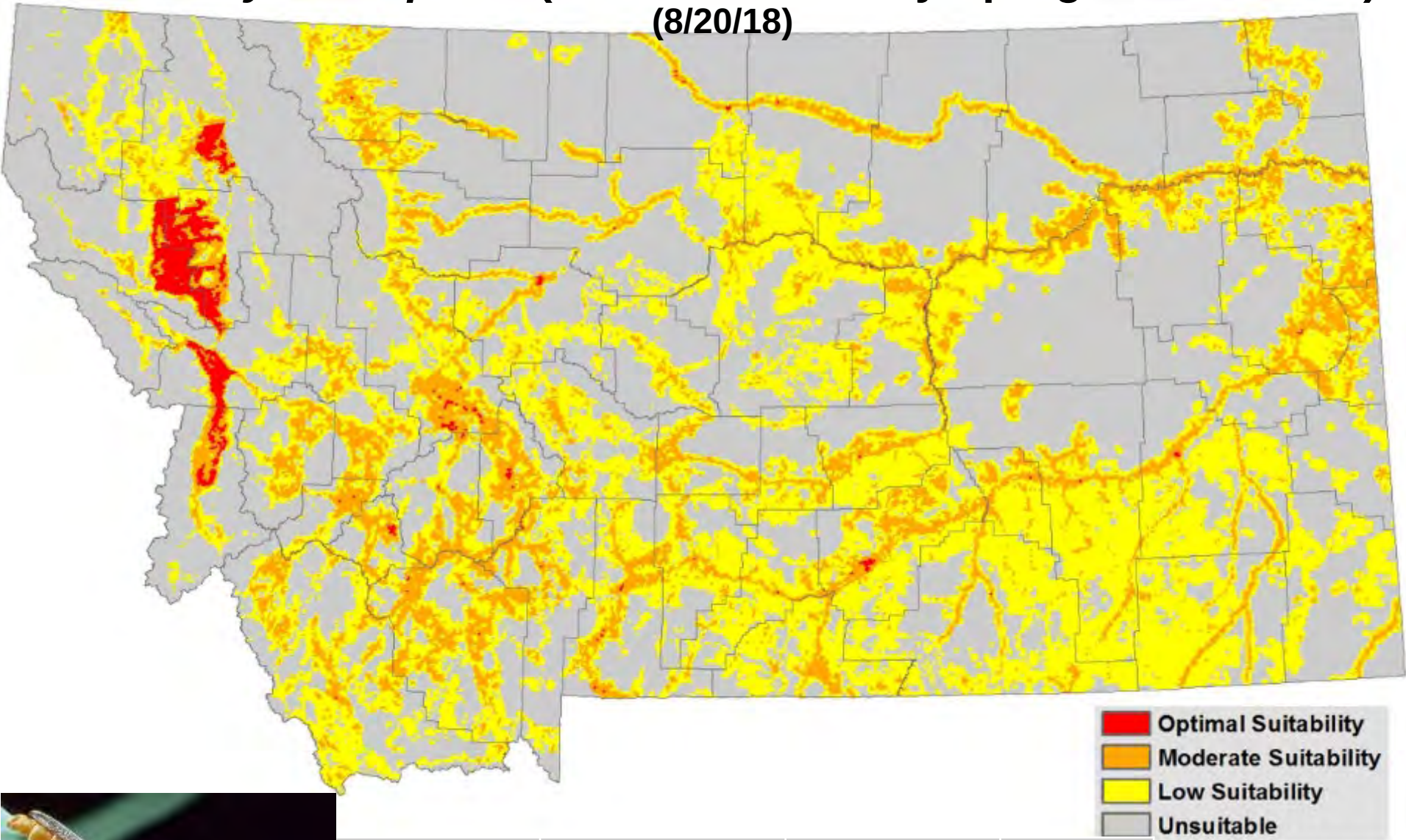


Suitable Habitat Overlap

- Host Weed
- Biocontrol
- Host Weed + Biocontrol

Moderate and optimal suitability for both Leafy Spurge and Black Dot Leafy Spurge Flea Beetle. Green areas indicate model support for most effective releases of the biocontrol.

Oberea erythrocephala (Red-headed Leafy Spurge Stem Borer) (8/20/18)

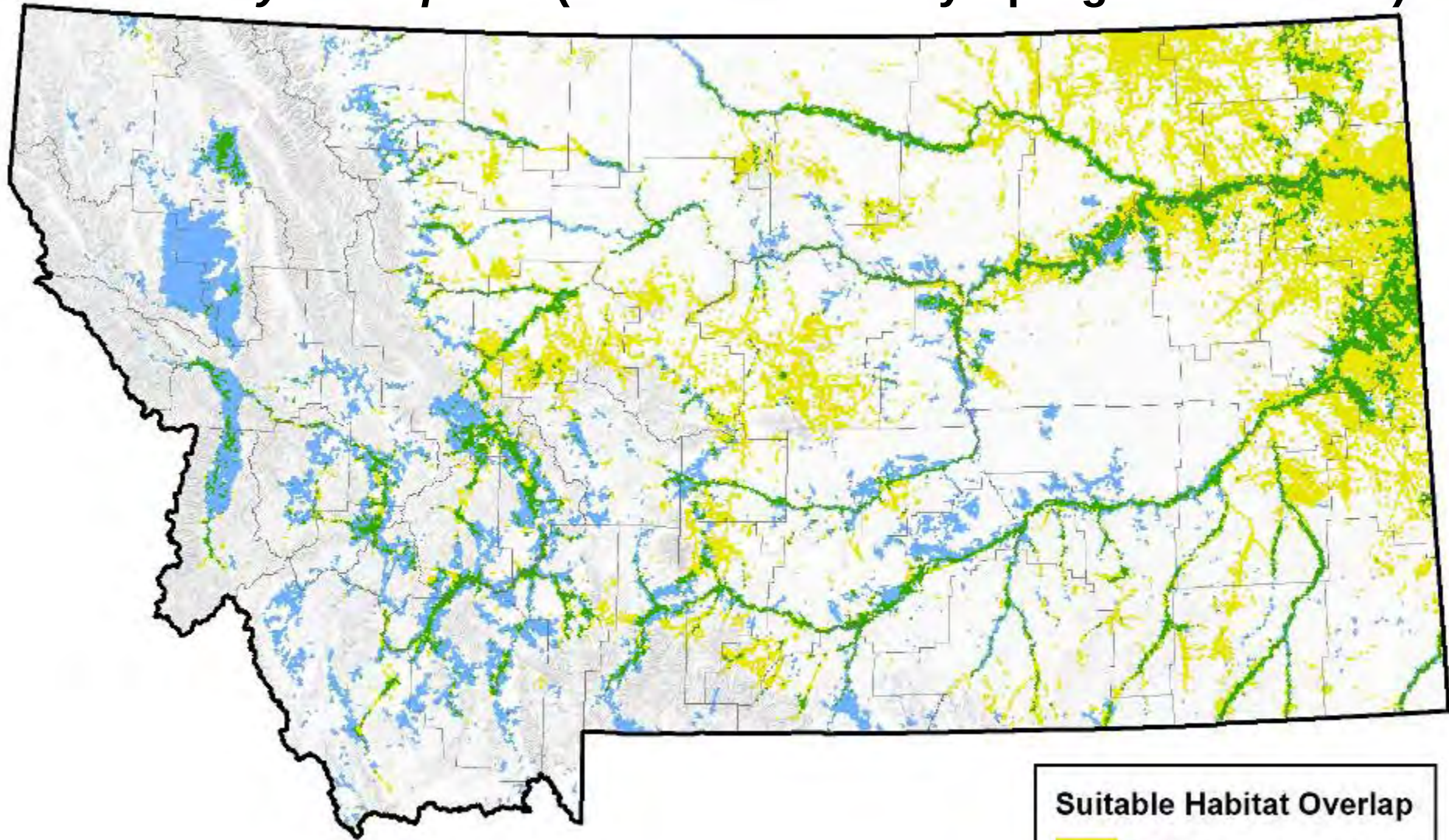


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.050	96,316	25%
Moderate	0.150	34,117	9%
Optimal	0.492	7,302	2%

Biocontrol

Overlay of Leafy Spurge and its Biocontrol

Oberea erythrocephala (Red-headed Leafy Spurge Stem Borer)

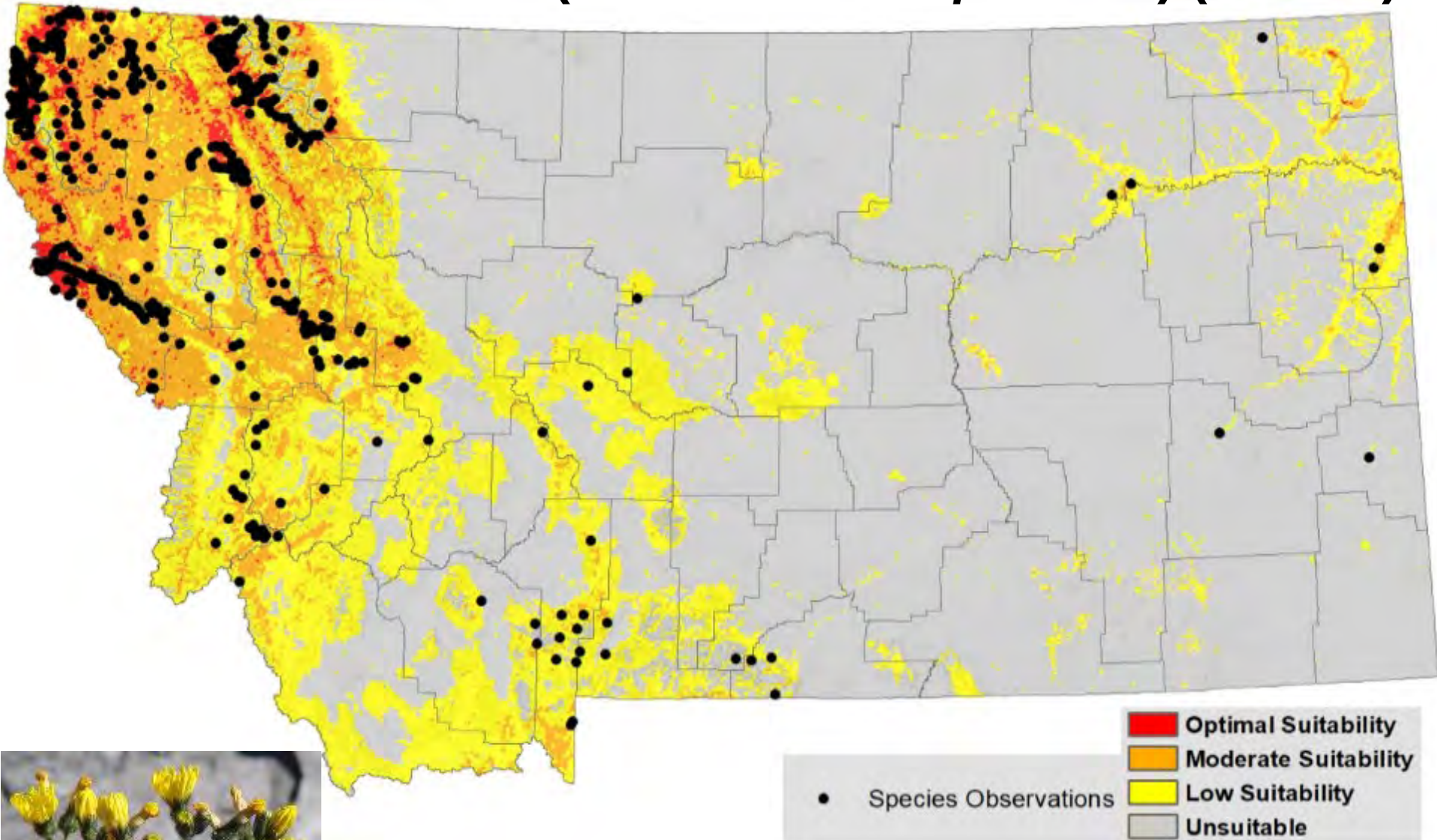


Suitable Habitat Overlap

- Host Weed
- Biocontrol
- Host Weed + Biocontrol

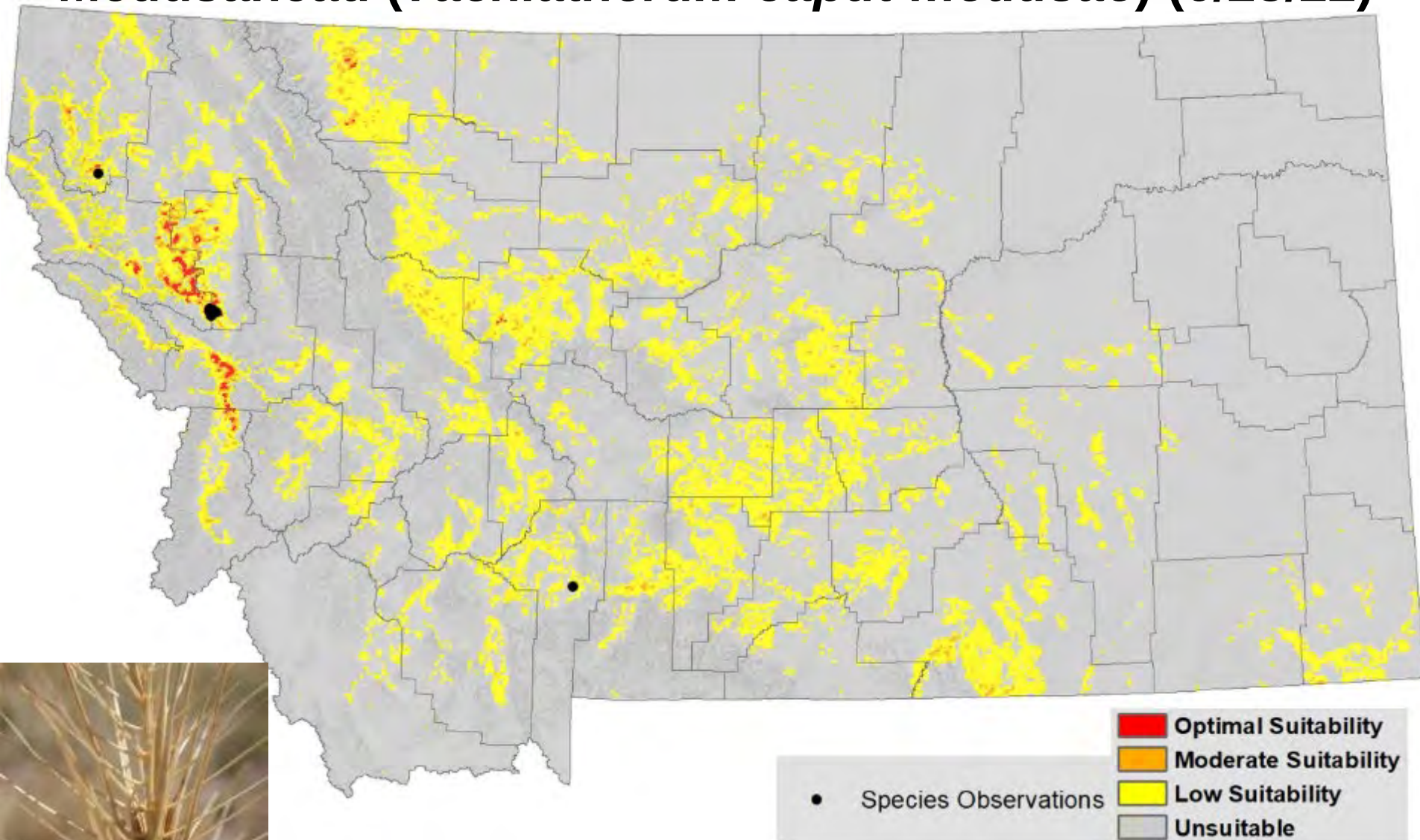
Moderate and optimal suitability for both Leafy Spurge and Red-headed Leafy Spurge Stem Borer. Green areas indicate model support for most effective releases of the biocontrol.

Meadow Hawkweed (*Hieracium caespitosum*) (4/10/21)



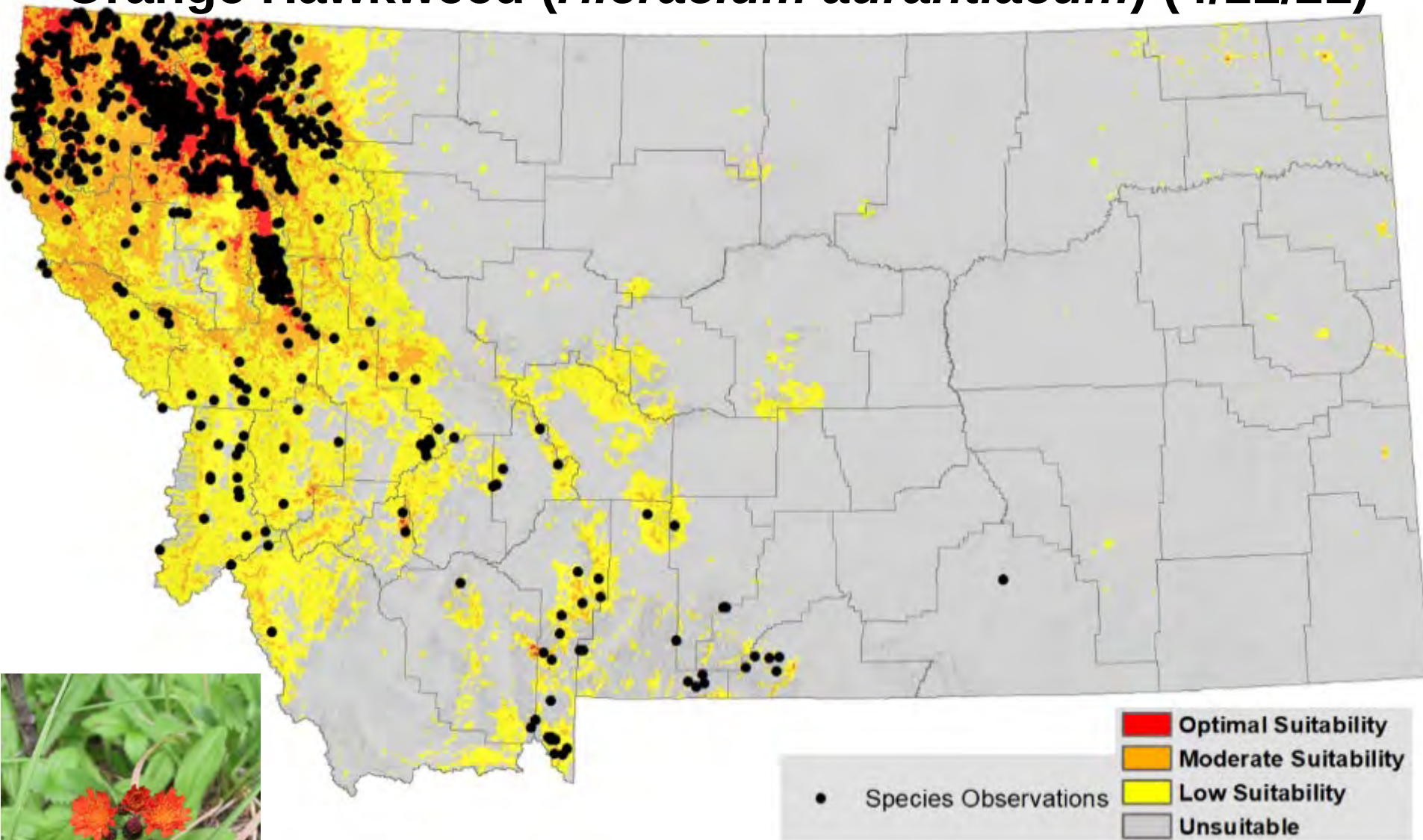
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.019	66,298	17%
Moderate	0.140	29,390	8%
Optimal	0.427	10,655	3%

Medusahead (*Taeniatherum caput-medusae*) (6/28/22)



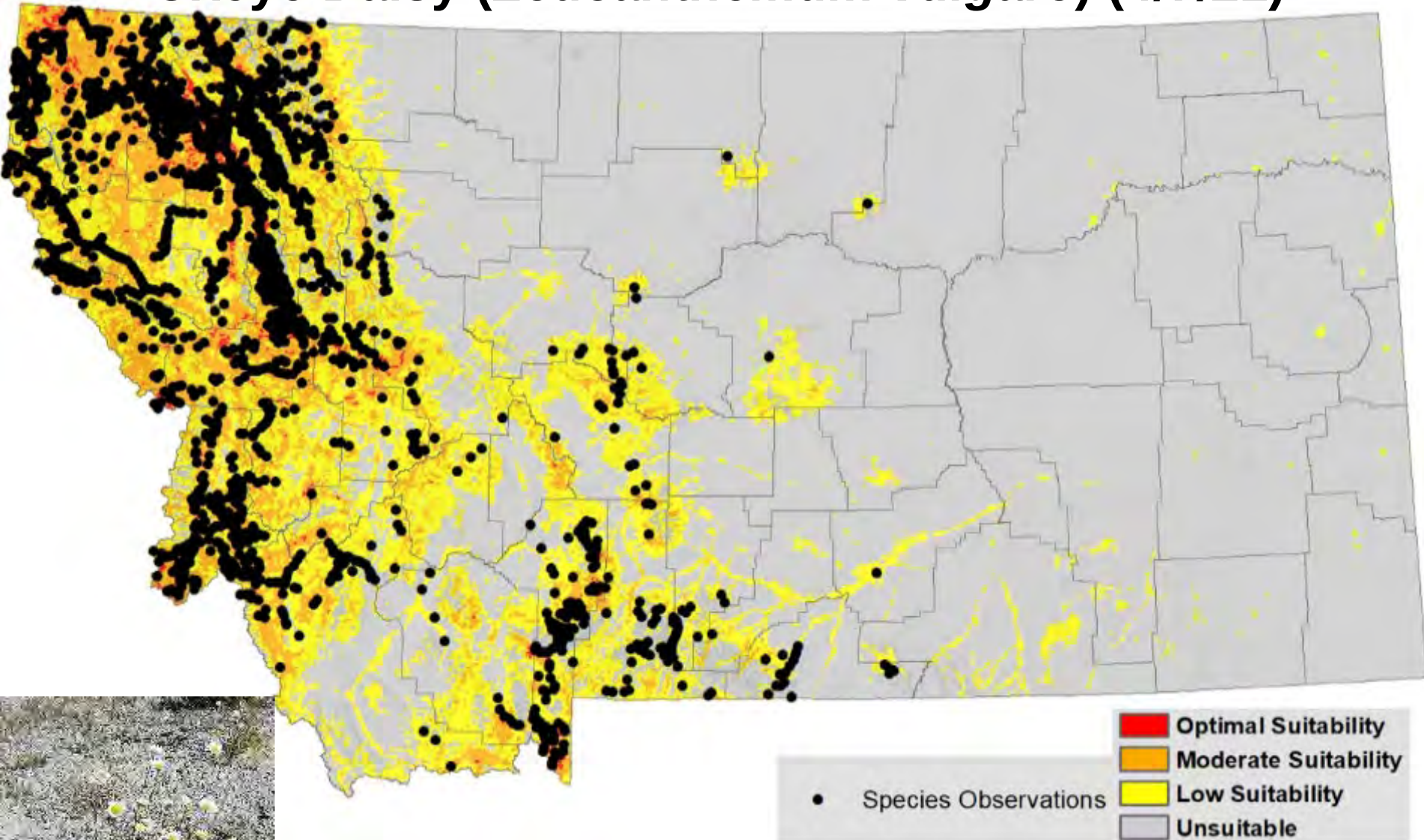
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.006	32,115	8%
Moderate	0.200	2,501	<1%
Optimal	0.406	1,265	<1%

Orange Hawkweed (*Hieracium aurantiacum*) (4/11/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.025	47,731	13%
Moderate	0.149	20,868	5%
Optimal	0.414	10,874	3%

Oxeye Daisy (*Leucanthemum vulgare*) (4/7/21)

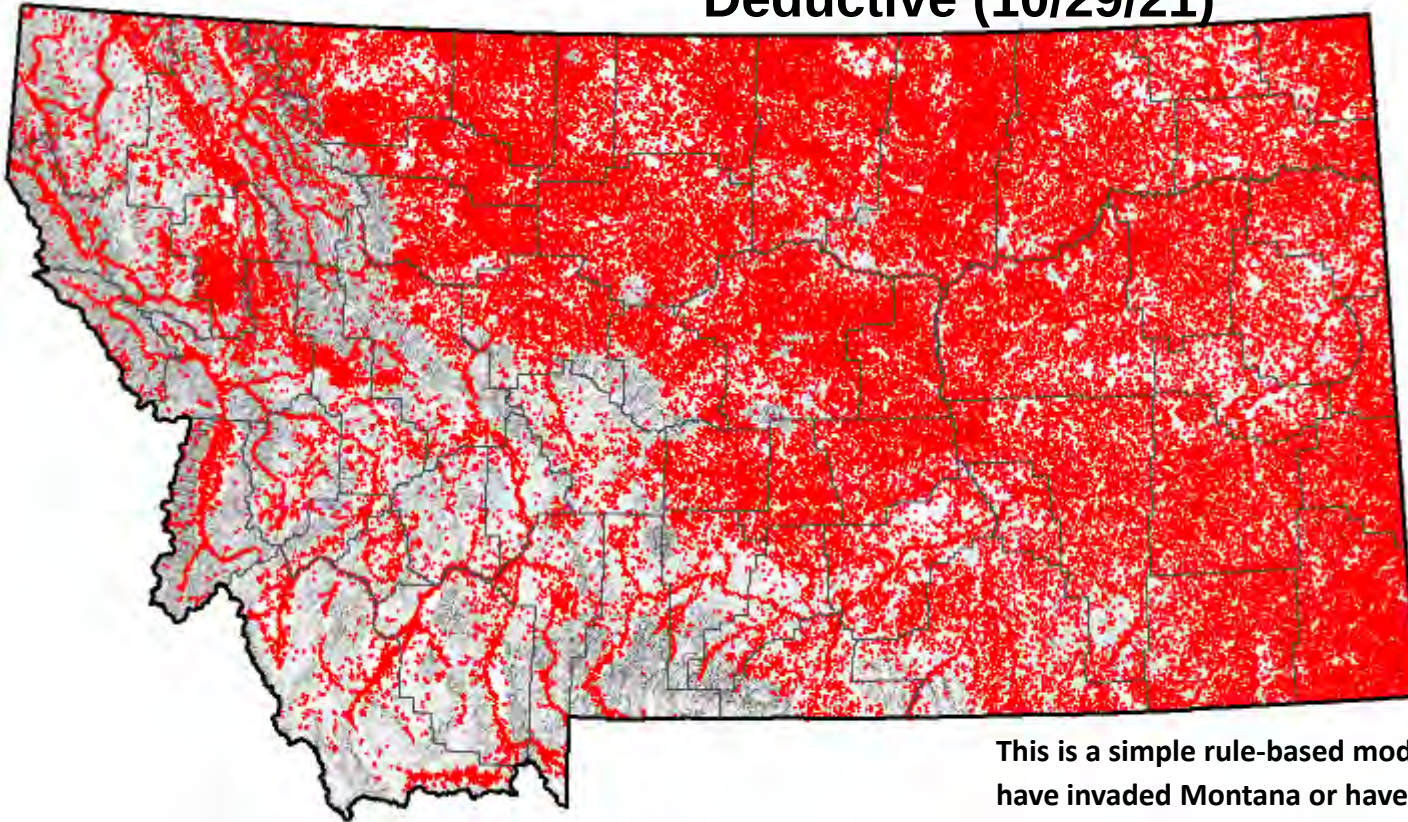


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.031	61,451	16%
Moderate	0.170	31,966	8%
Optimal	0.456	10,800	3%

Parrot Feather Water-milfoil (*Myriophyllum aquaticum*)

Deductive (10/29/21)

***Not documented in Montana to-date.**



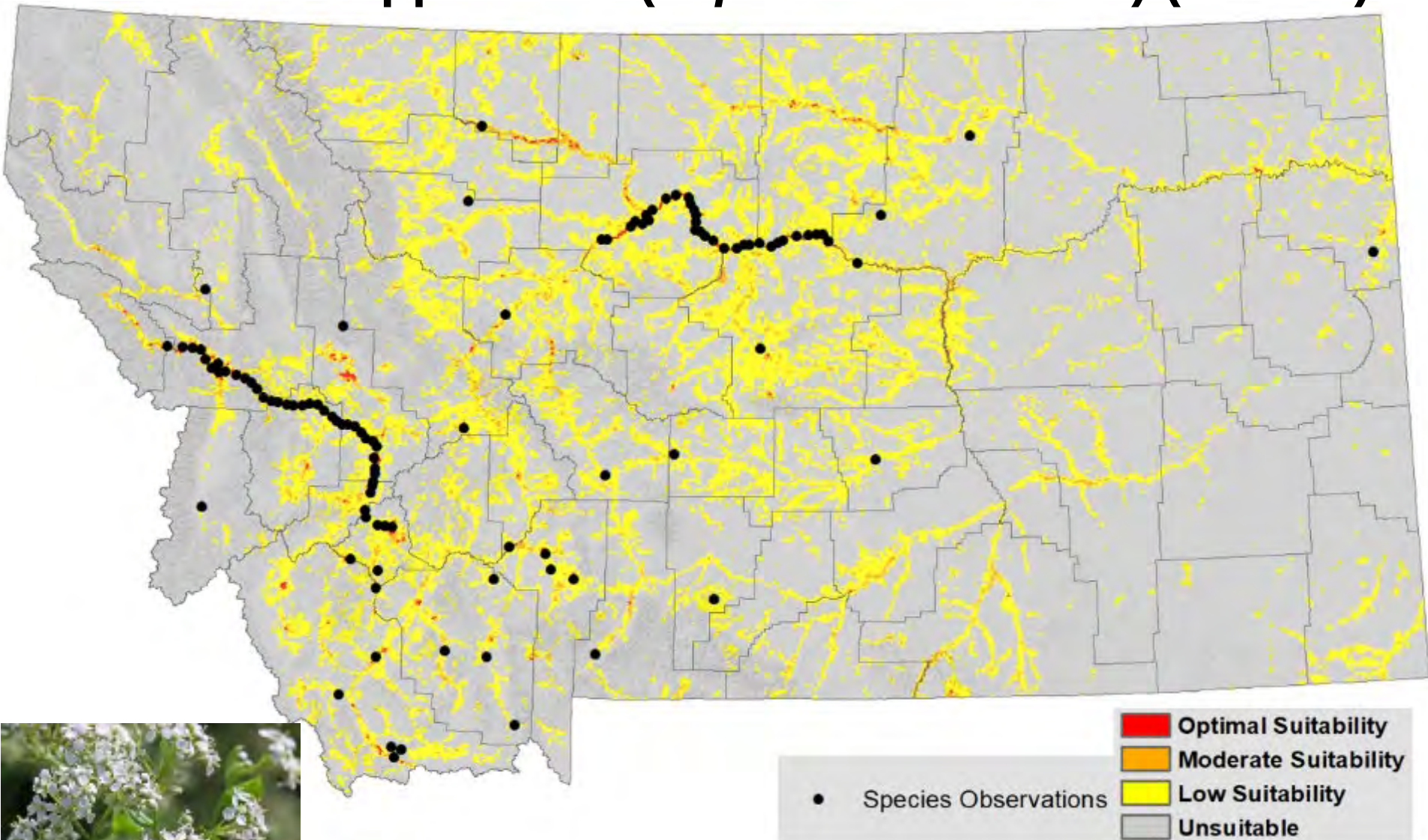
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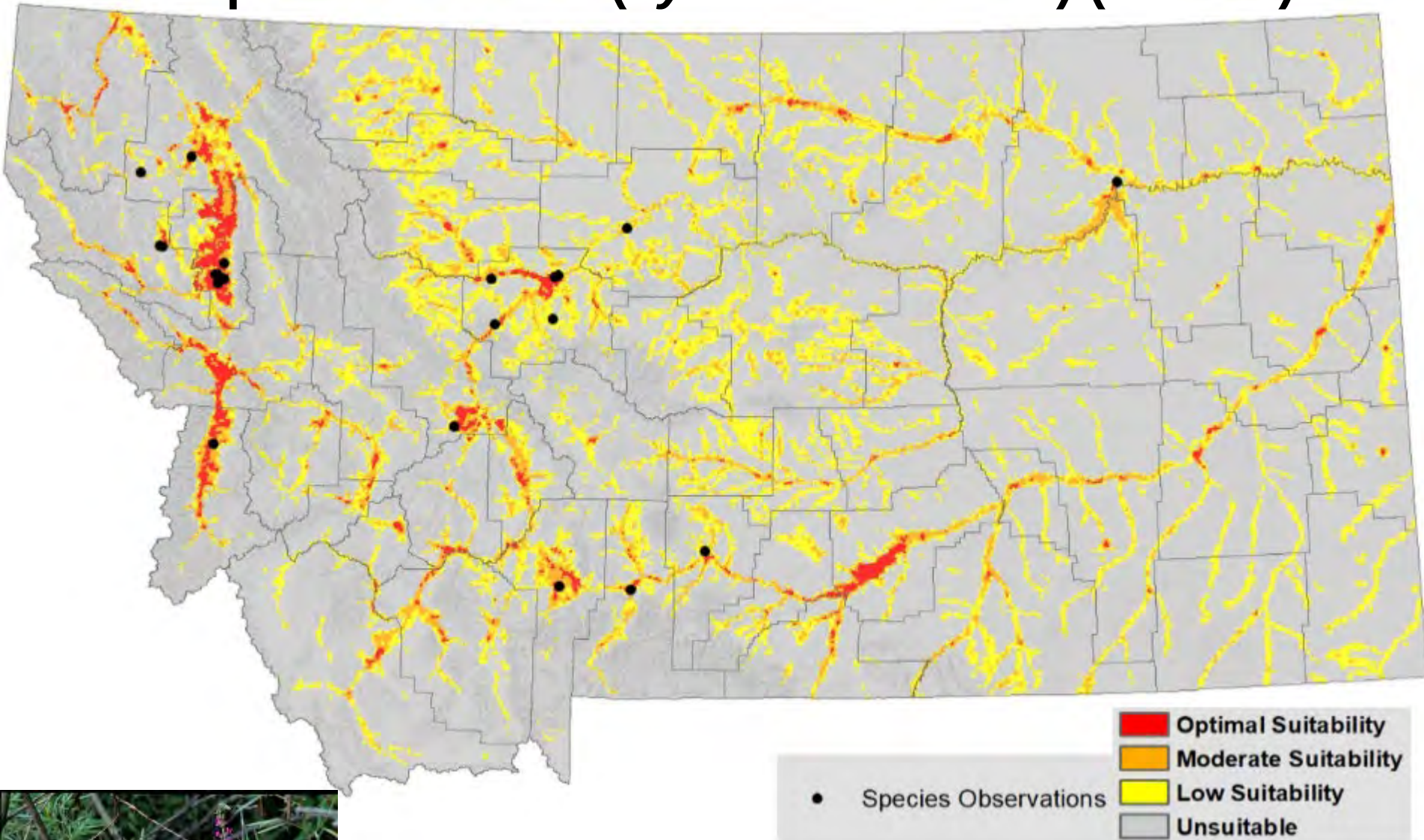


Perennial Pepperweed (*Lepidium latifolium*) (5/14/21)



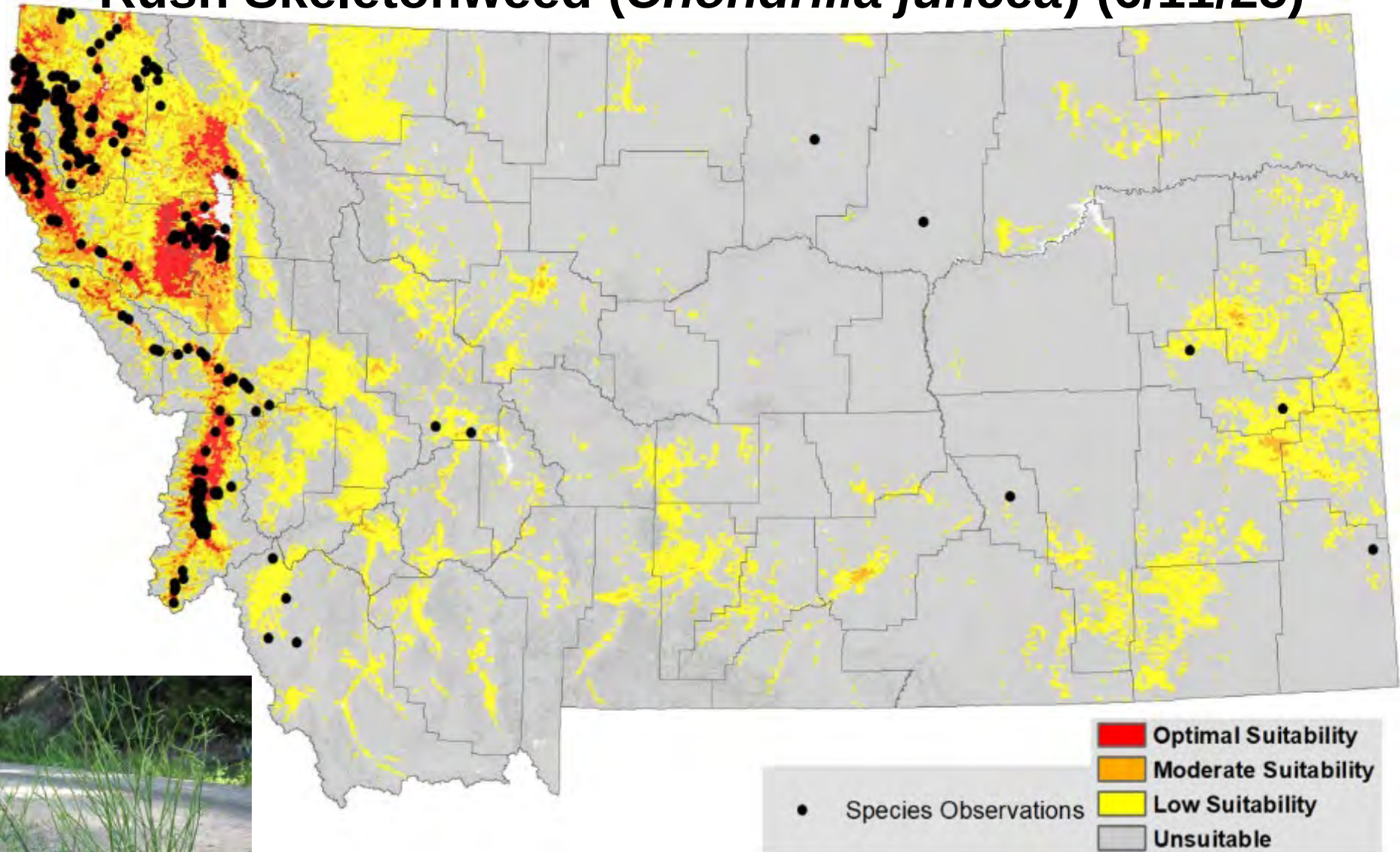
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.001	33,064	9%
Moderate	0.056	2,023	<1%
Optimal	0.184	1,719	<1%

Purple Loosestrife (*Lythrum salicaria*) (4/12/21)



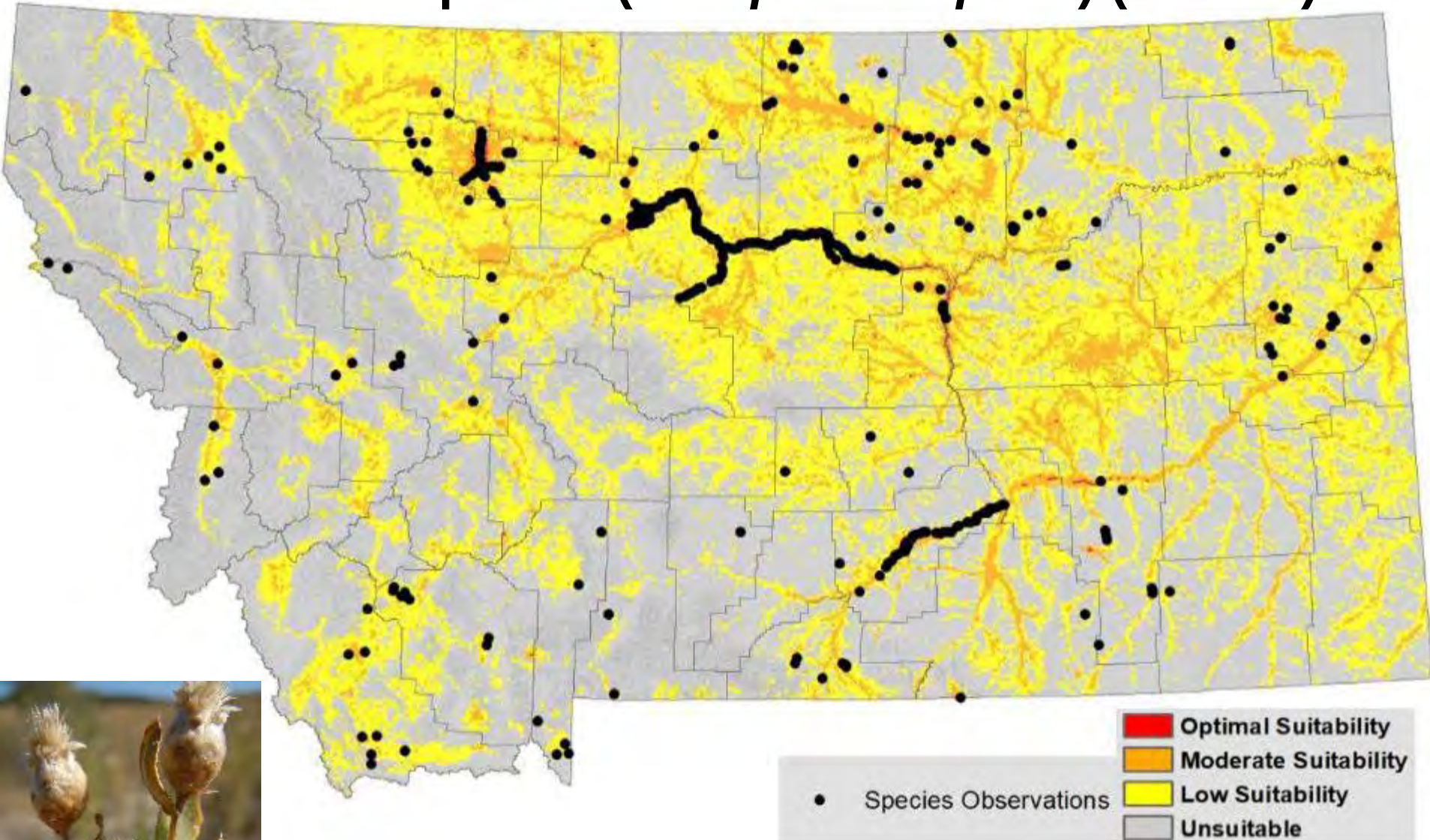
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.015	35,817	9%
Moderate	0.095	11,860	3%
Optimal	0.276	6,471	2%

Rush Skeletonweed (*Chondrilla juncea*) (6/11/25)



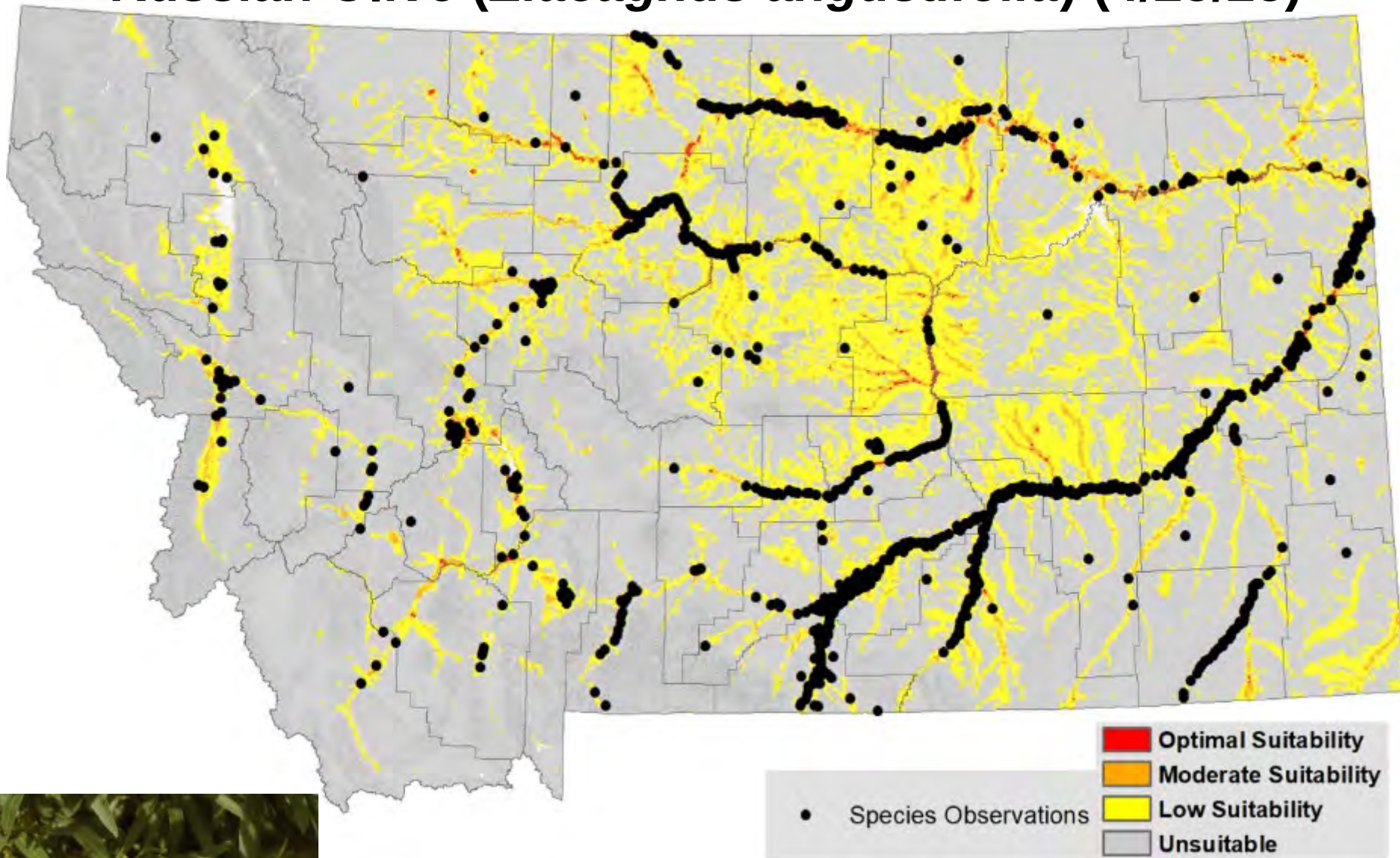
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.017	48,697	13%
Moderate	0.113	9,100	2%
Optimal	0.309	7,395	2%

Russian Knapweed (*Acroptilon repens*) (2/18/21)



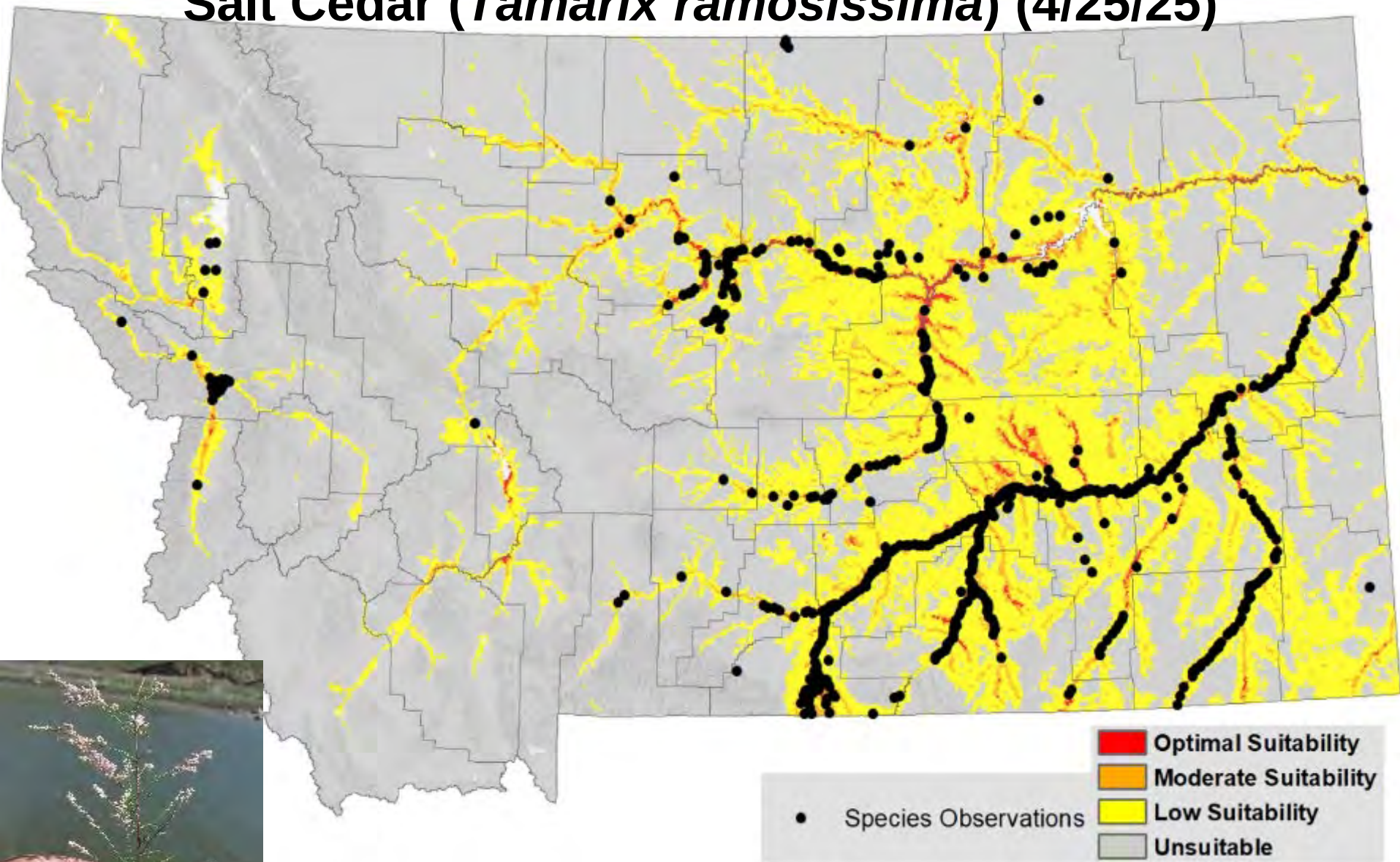
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.007	89,906	24%
Moderate	0.060	24,770	7%
Optimal	0.438	3,011	1%

Russian Olive (*Elaeagnus angustifolia*) (4/25/25)



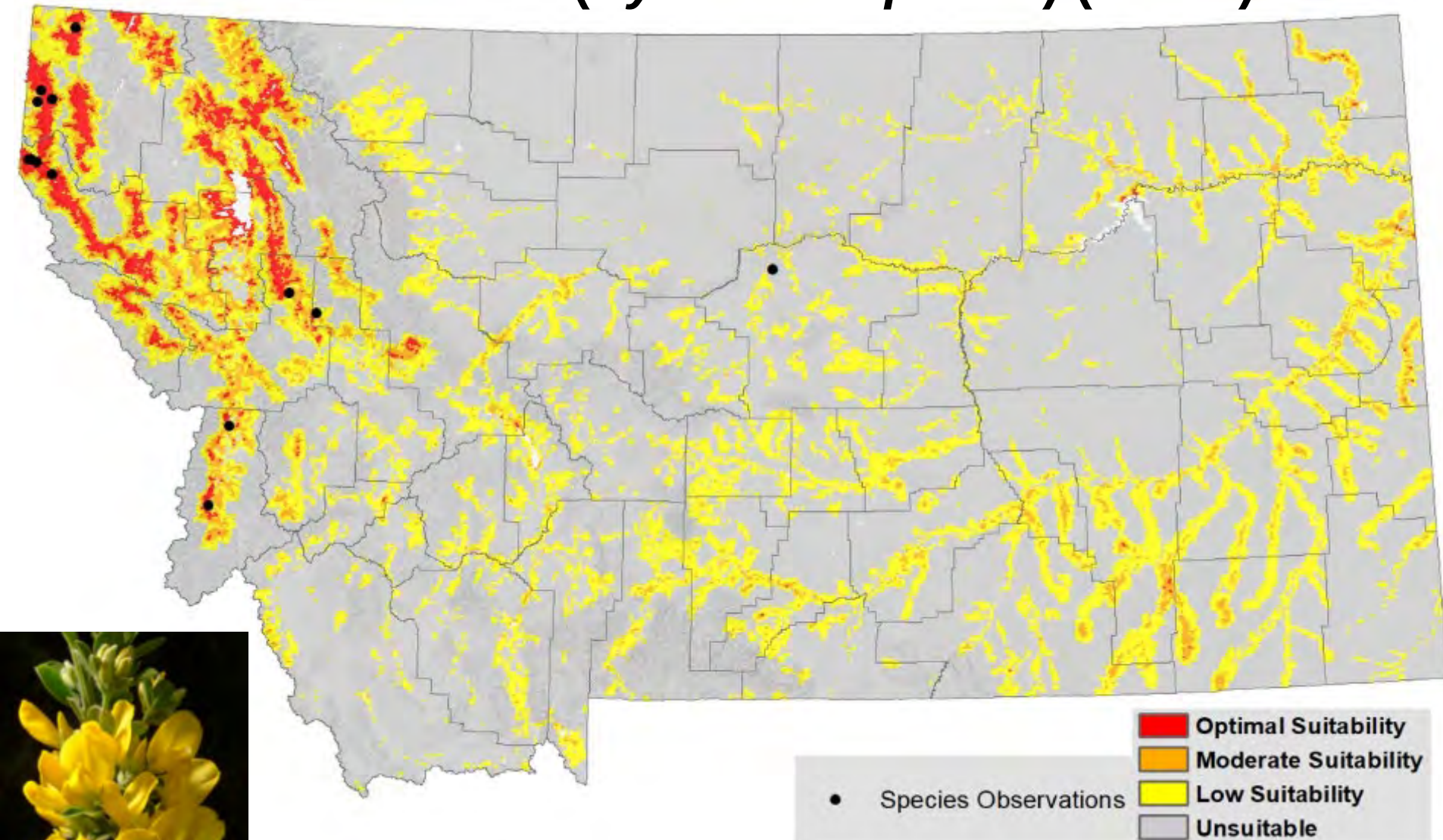
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.007	57,113	15%
Moderate	0.098	6,759	2%
Optimal	0.263	4,891	1%

Salt Cedar (*Tamarix ramosissima*) (4/25/25)



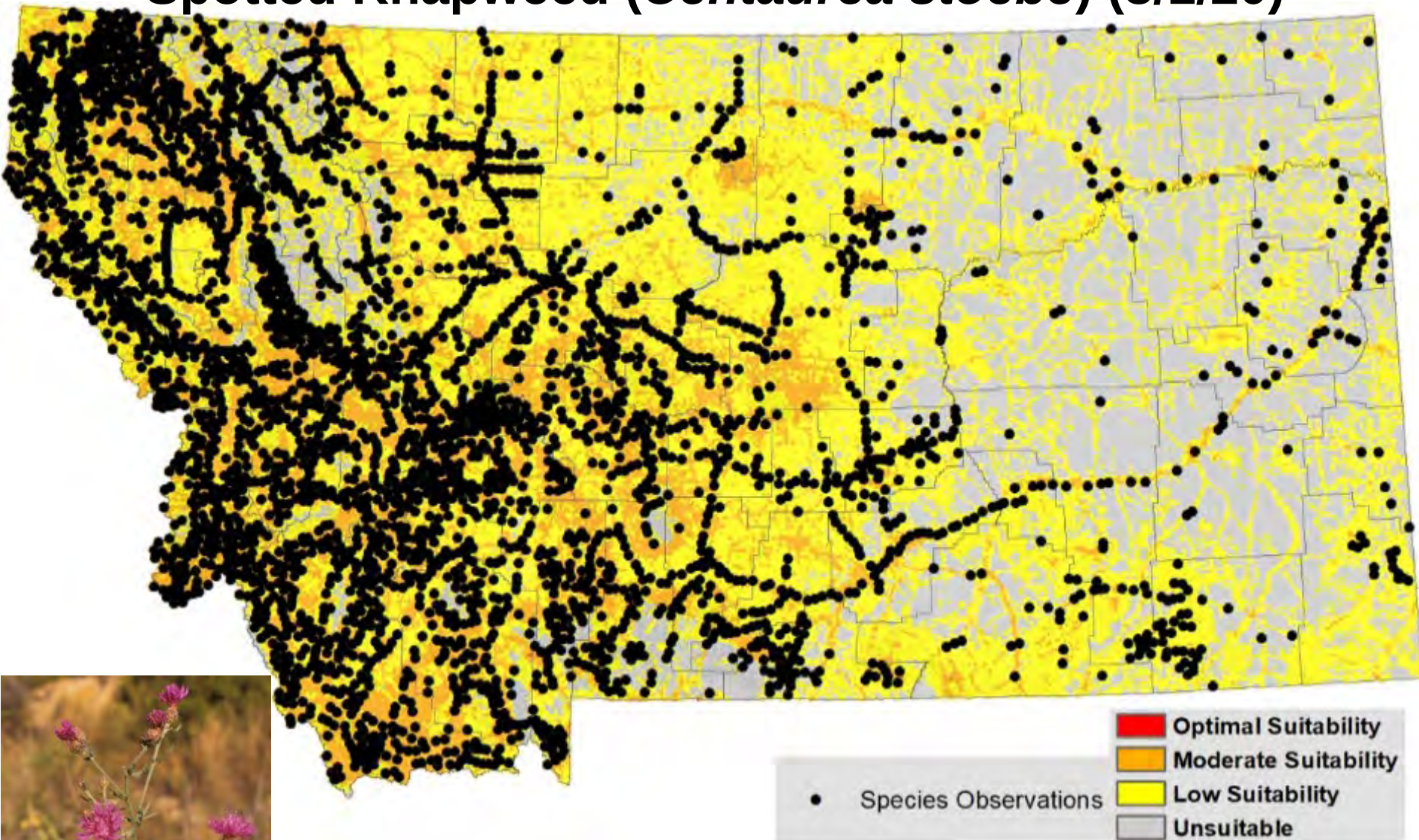
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.005	79,549	21%
Moderate	0.108	7,433	2%
Optimal	0.286	5,054	1%

Scotch Broom (*Cytisus scoparius*) (4/7/24)



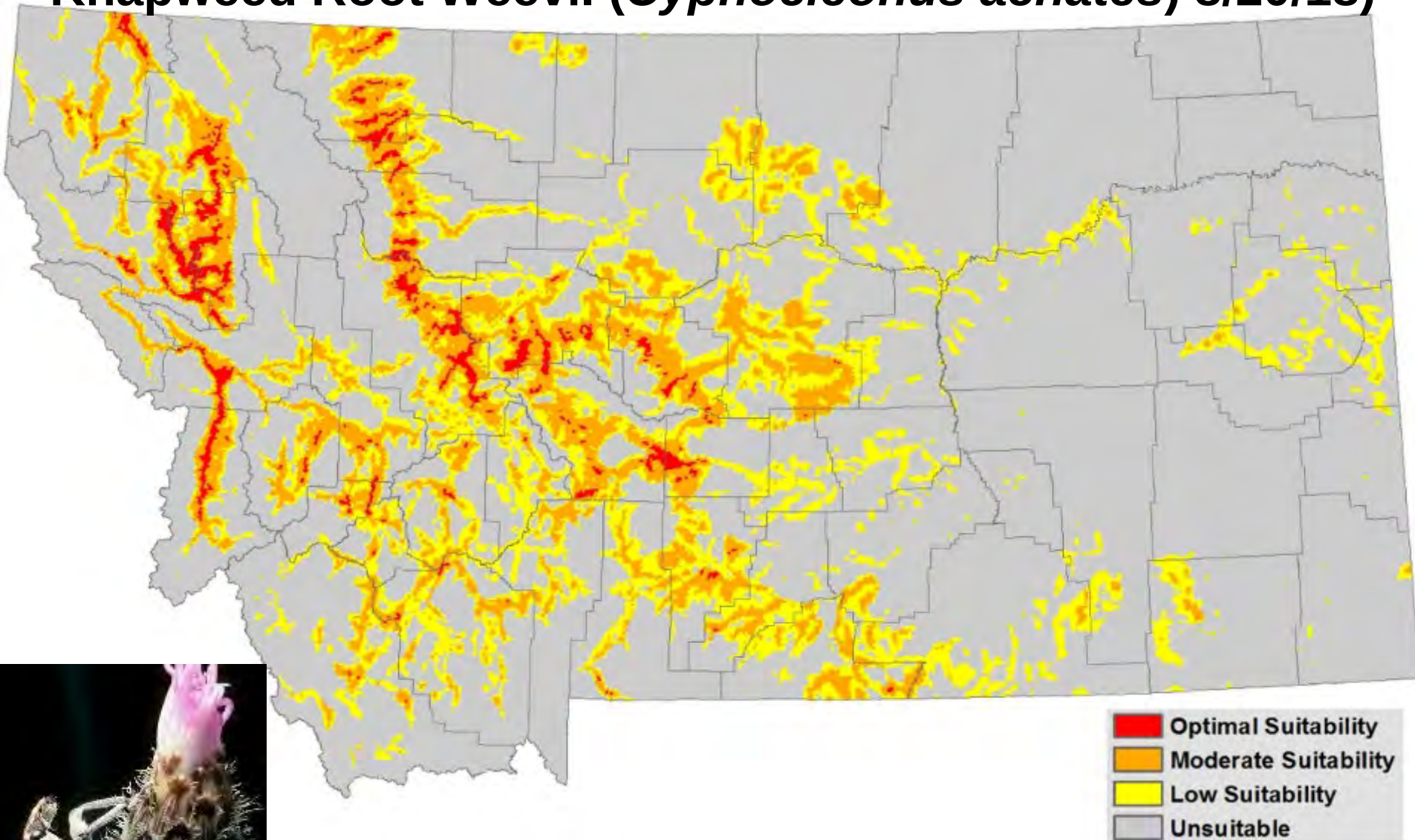
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	52,467	14%
Moderate	0.101	13,004	3%
Optimal	0.259	7,303	2%

Spotted Knapweed (*Centaurea stoebe*) (8/1/20)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.082	151,051	40%
Moderate	0.237	82,399	22%
Optimal	0.723	6,717	2%

Knapweed Root Weevil (*Cyphocleonus achates*) 8/20/18

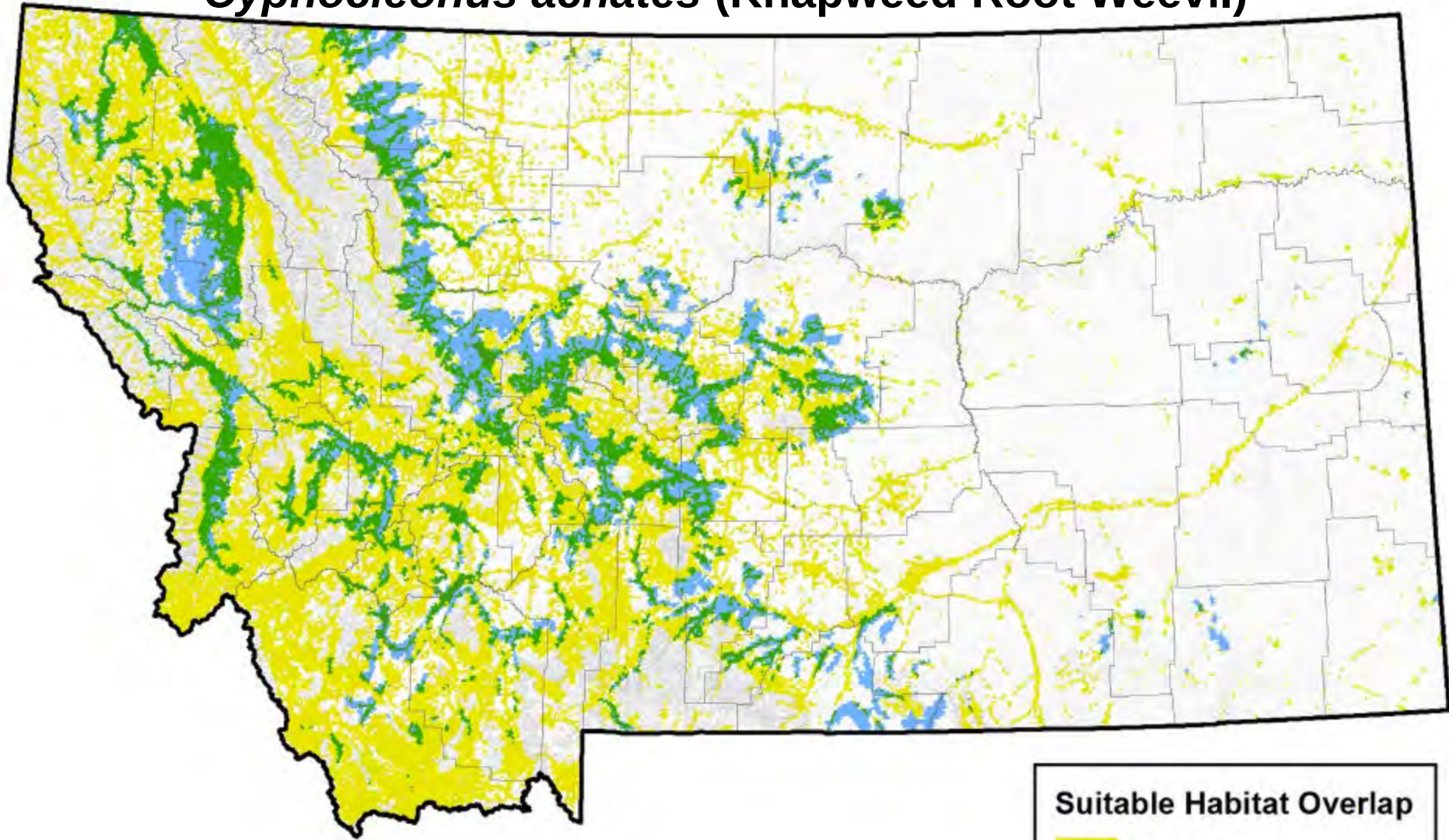


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.031	47,427	12%
Moderate	0.134	31,241	8%
Optimal	0.172	6,263	2%

Biocontrol

Overlay of Spotted Knapweed and its Biocontrol

Cyphocleonus achates (Knapweed Root Weevil)



Suitable Habitat Overlap

- Host Weed
- Biocontrol
- Host Weed + Biocontrol

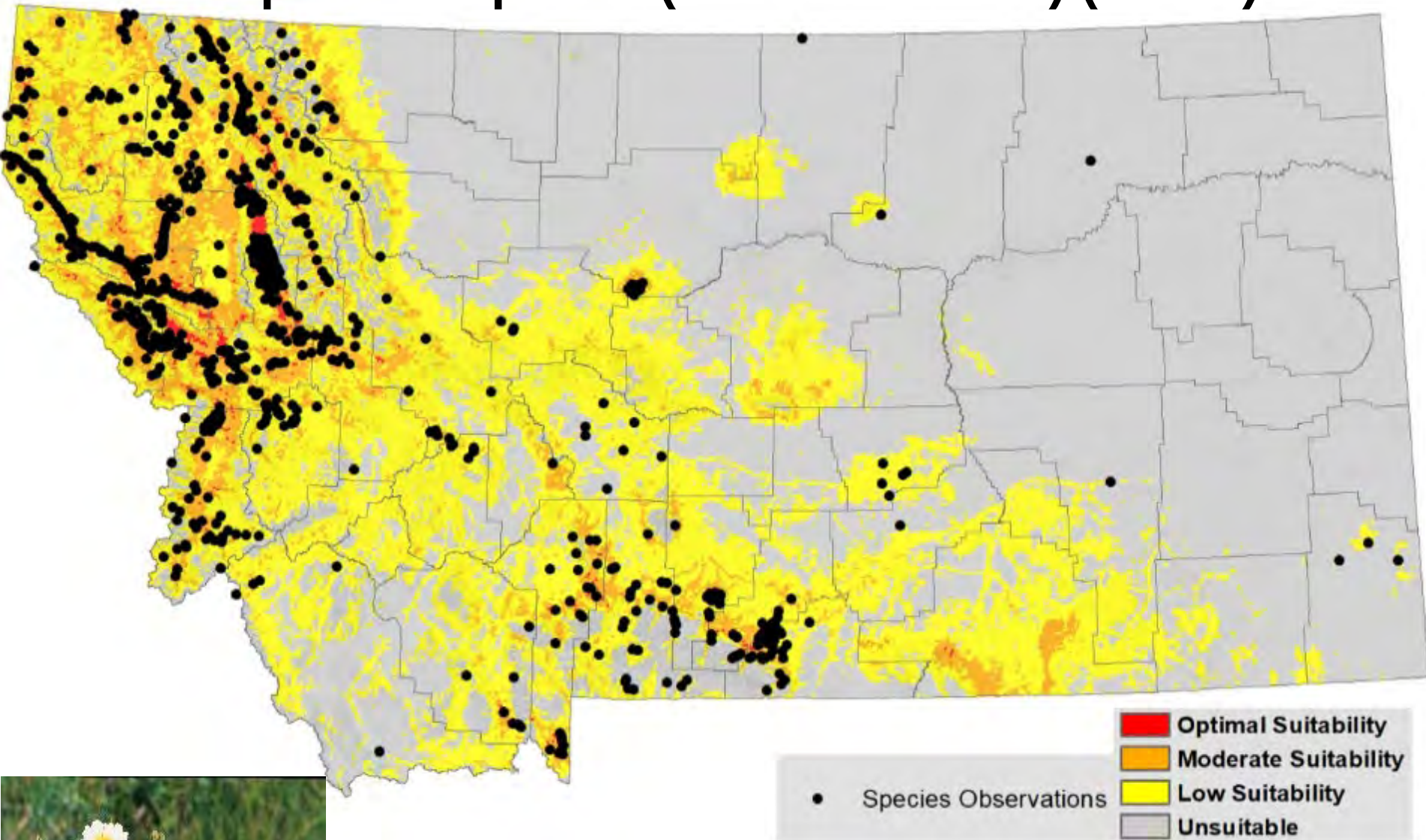
Moderate and optimal suitability for both Spotted Knapweed and Knapweed Root Weevil. Green areas indicate model support for most effective releases of the biocontrol.

Starry Stonewort (*Nitellopsis obtusa*)

***Not documented in Montana to-date.**

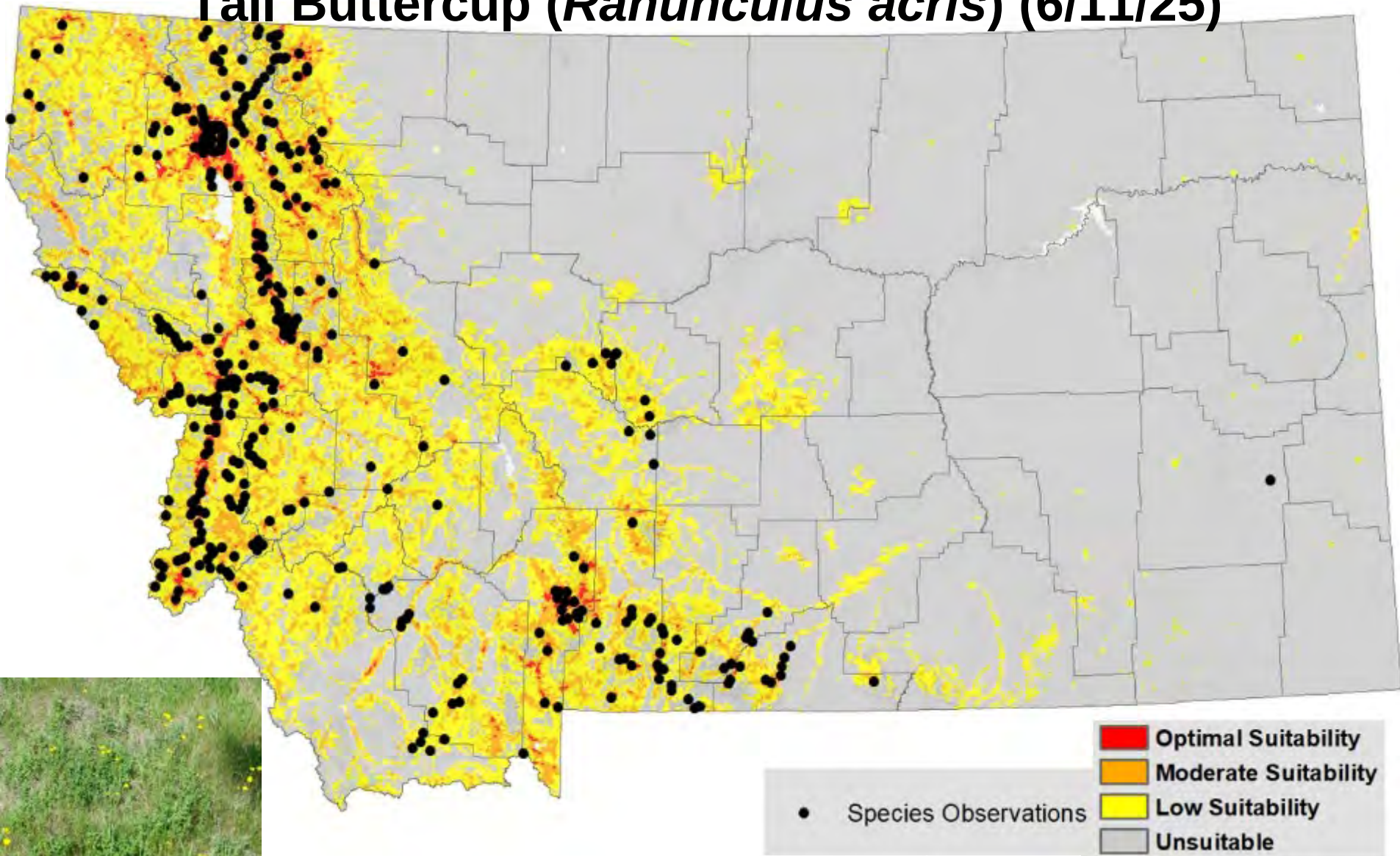


Sulphur Cinquefoil (*Potentilla recta*) (4/1/21)



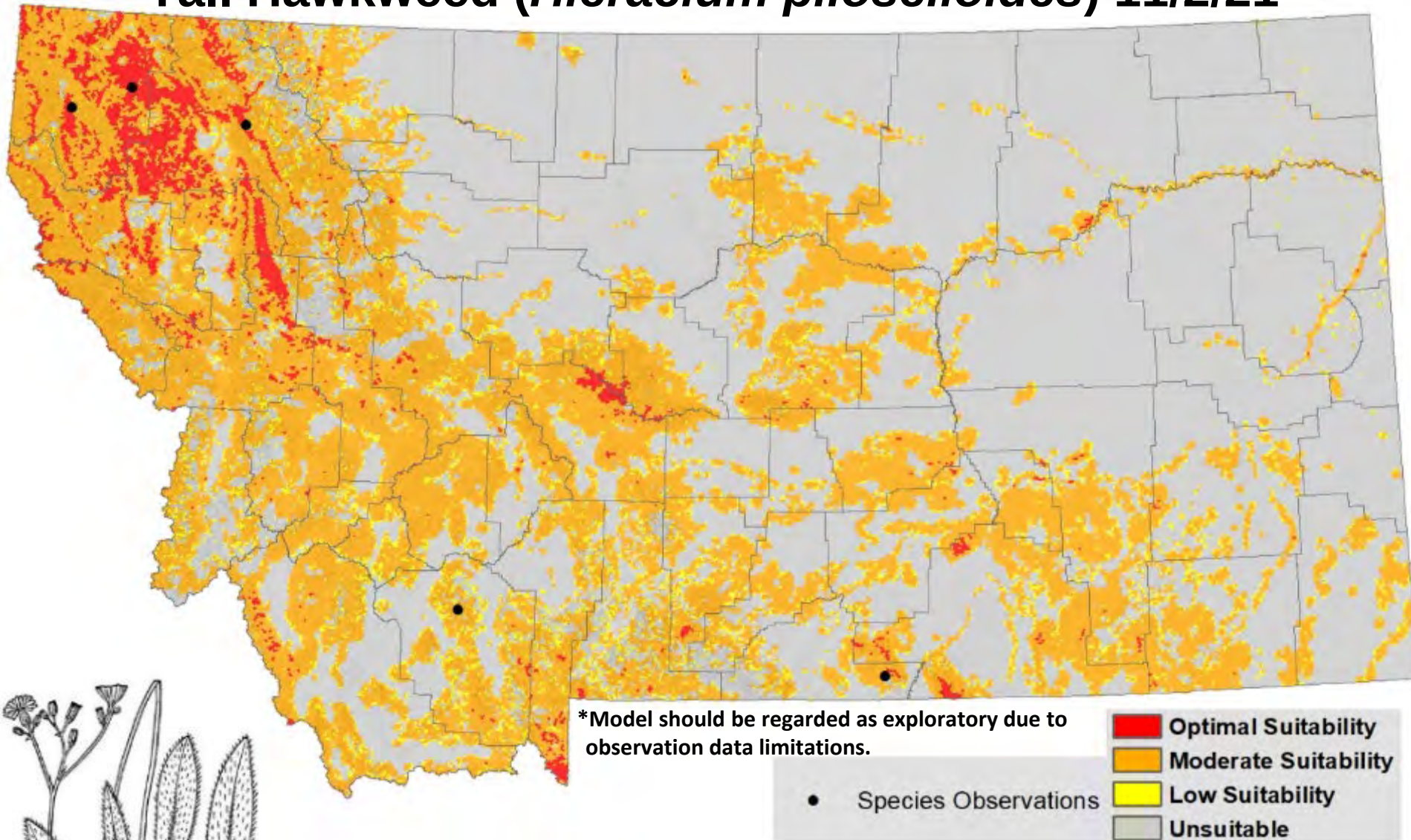
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.033	96,142	25%
Moderate	0.228	25,754	7%
Optimal	0.508	7,903	2%

Tall Buttercup (*Ranunculus acris*) (6/11/25)



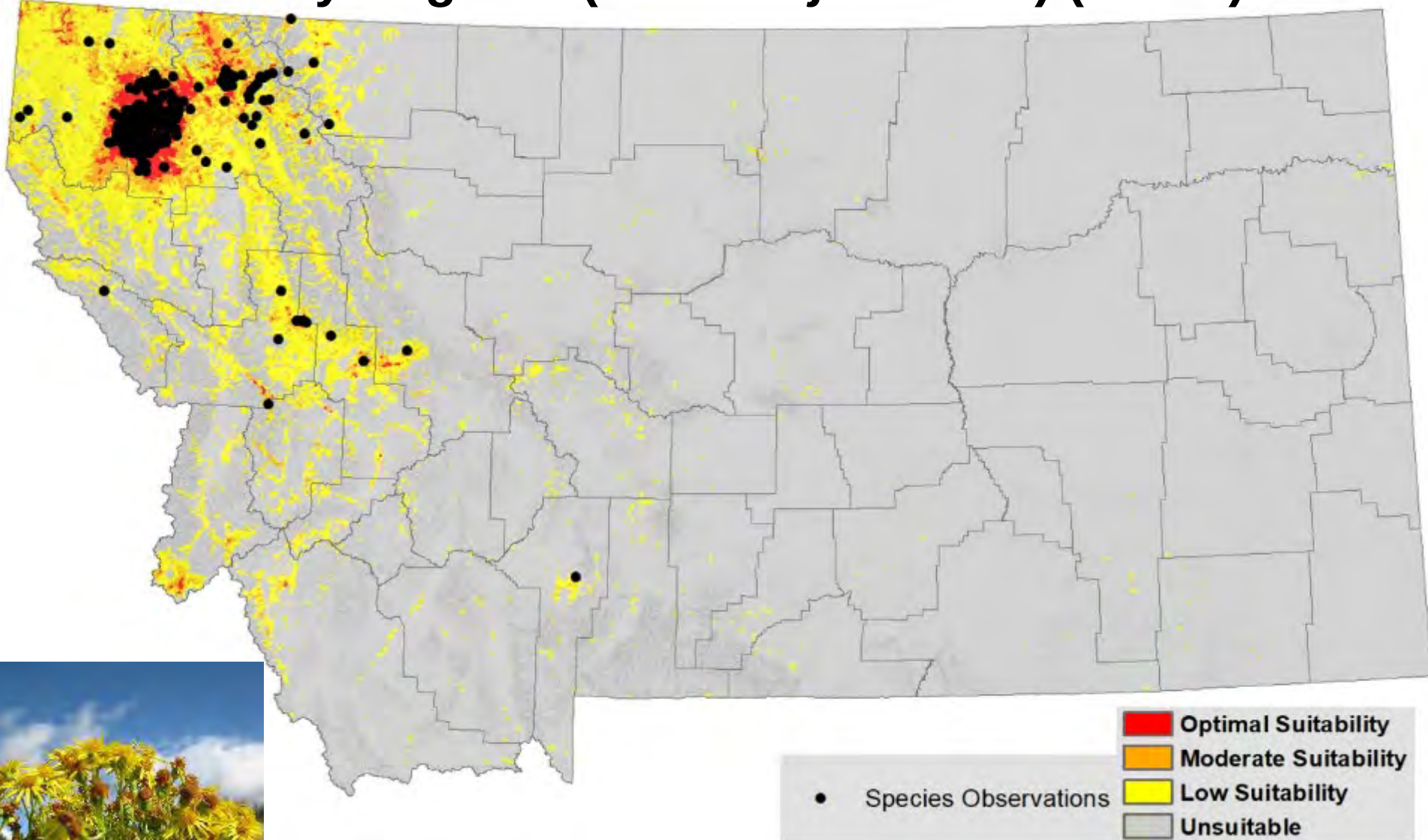
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.015	53,977	14%
Moderate	0.106	17,141	5%
Optimal	0.325	7,658	2%

Tall Hawkweed (*Hieracium piloselloides*) 11/2/21



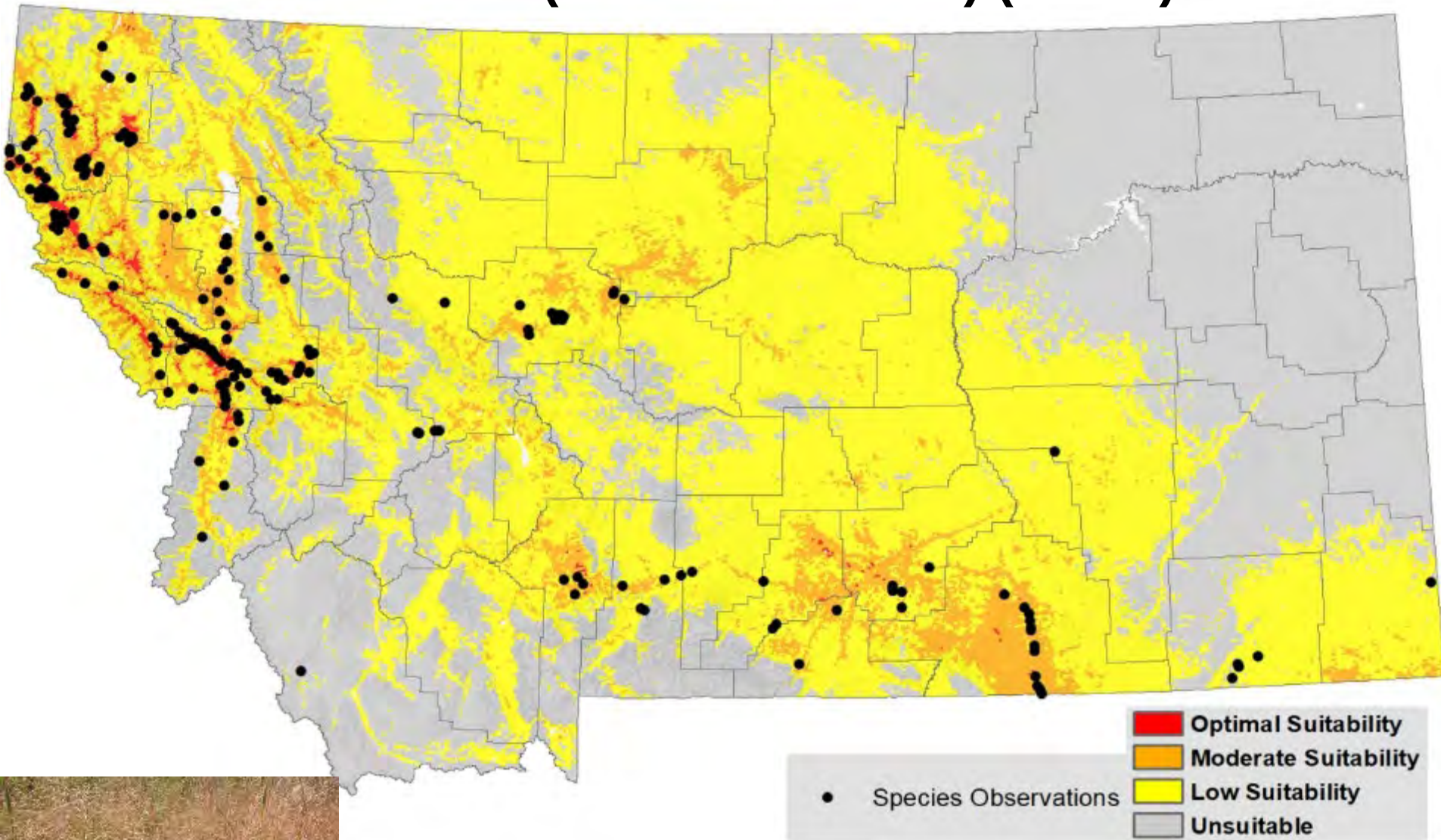
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.081	14,665	4%
Moderate	0.113	99,586	26%
Optimal	0.461	20,453	5%

Tansy Ragwort (*Senecio jacobaea*) (4/6/21)



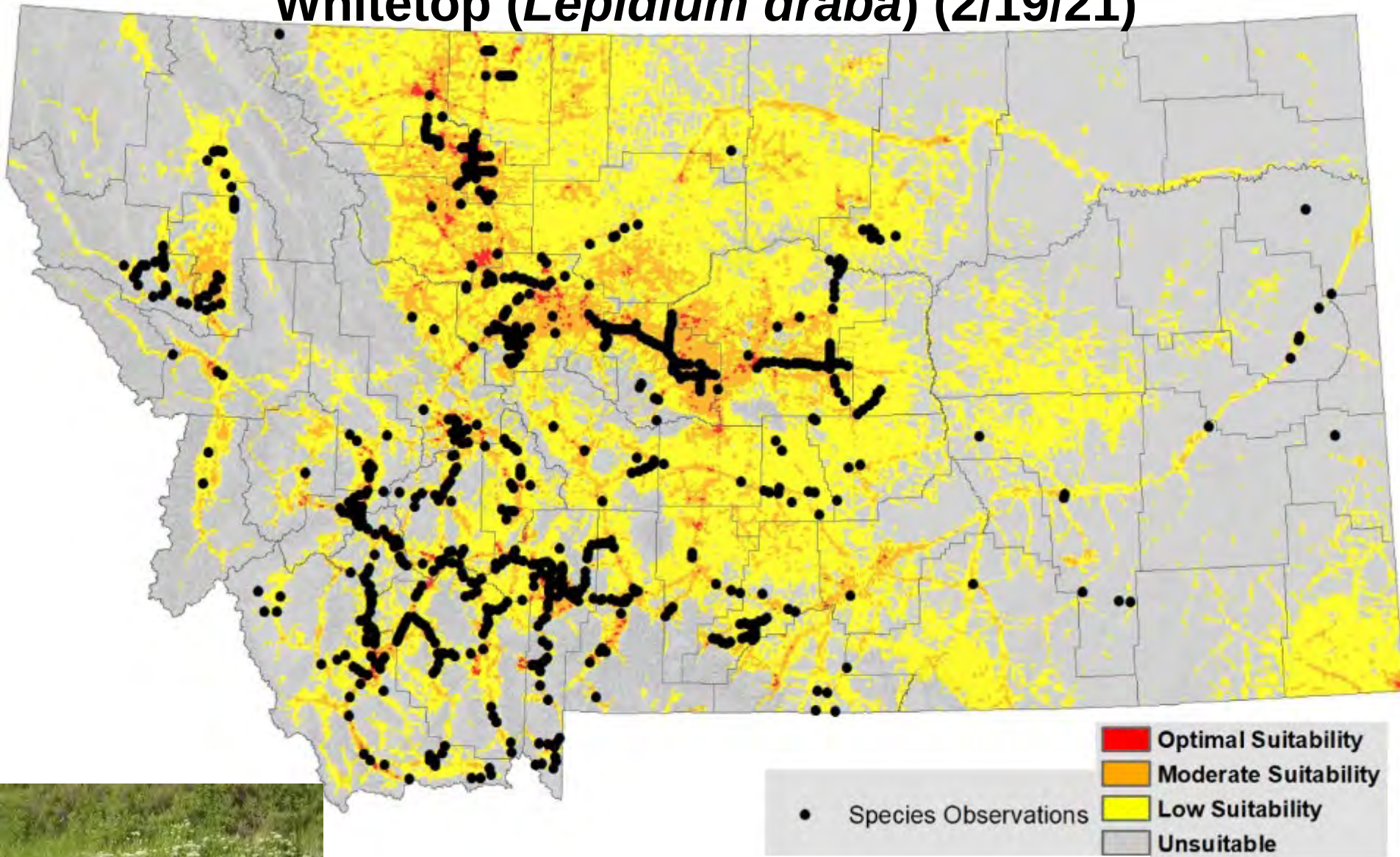
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.004	19,514	5%
Moderate	0.062	3,954	1%
Optimal	0.194	3,713	1%

Ventenata (*Ventenata dubia*) (4/5/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.028	170,204	45%
Moderate	0.261	26,247	7%
Optimal	0.589	5,870	2%

Whitetop (*Lepidium draba*) (2/19/21)

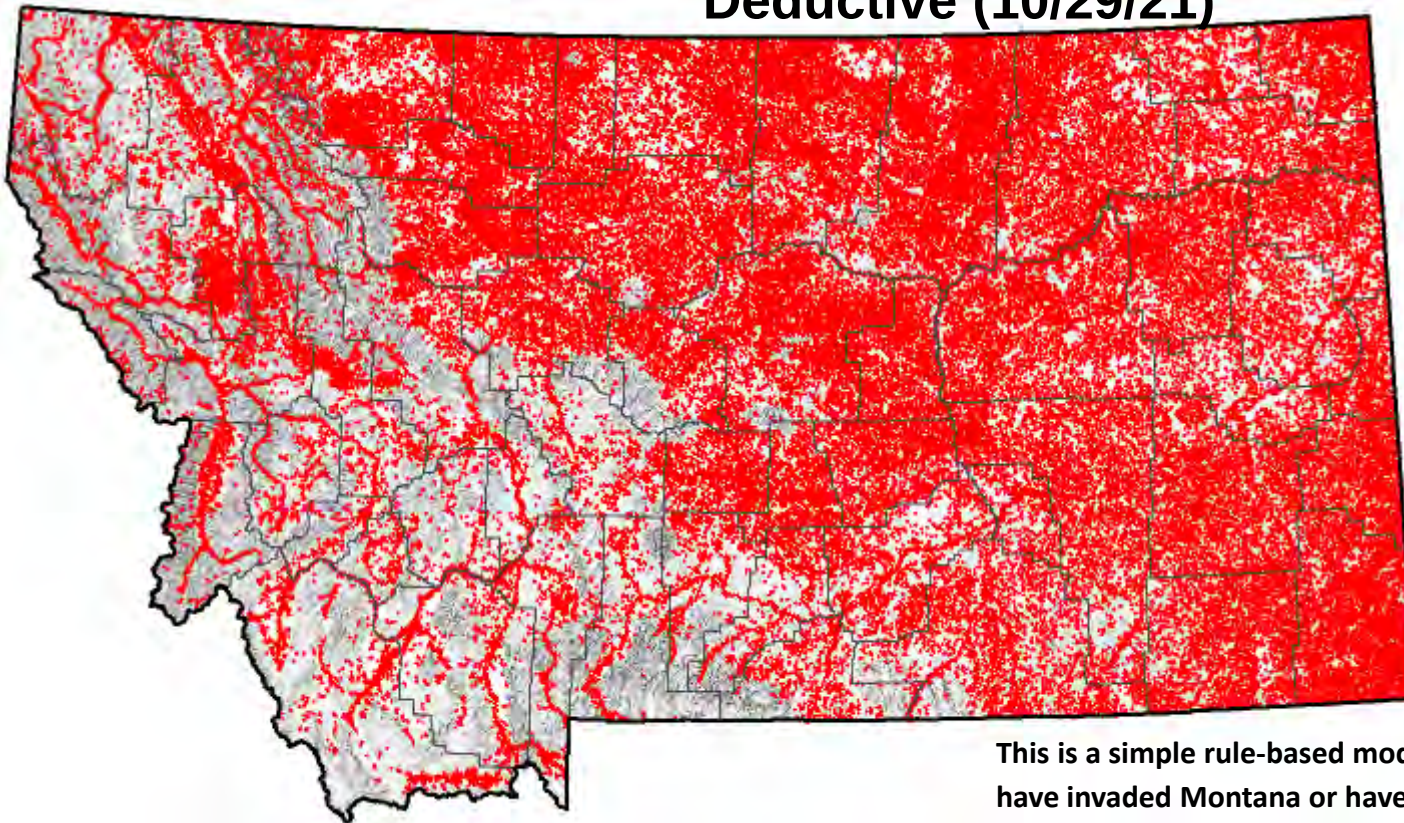


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	100,547	26%
Moderate	0.137	22,091	6%
Optimal	0.388	8,728	2%

Yellow Floating Heart (*Nymphoides peltata*)

Deductive (10/29/21)

***Not documented in Montana to-date.**



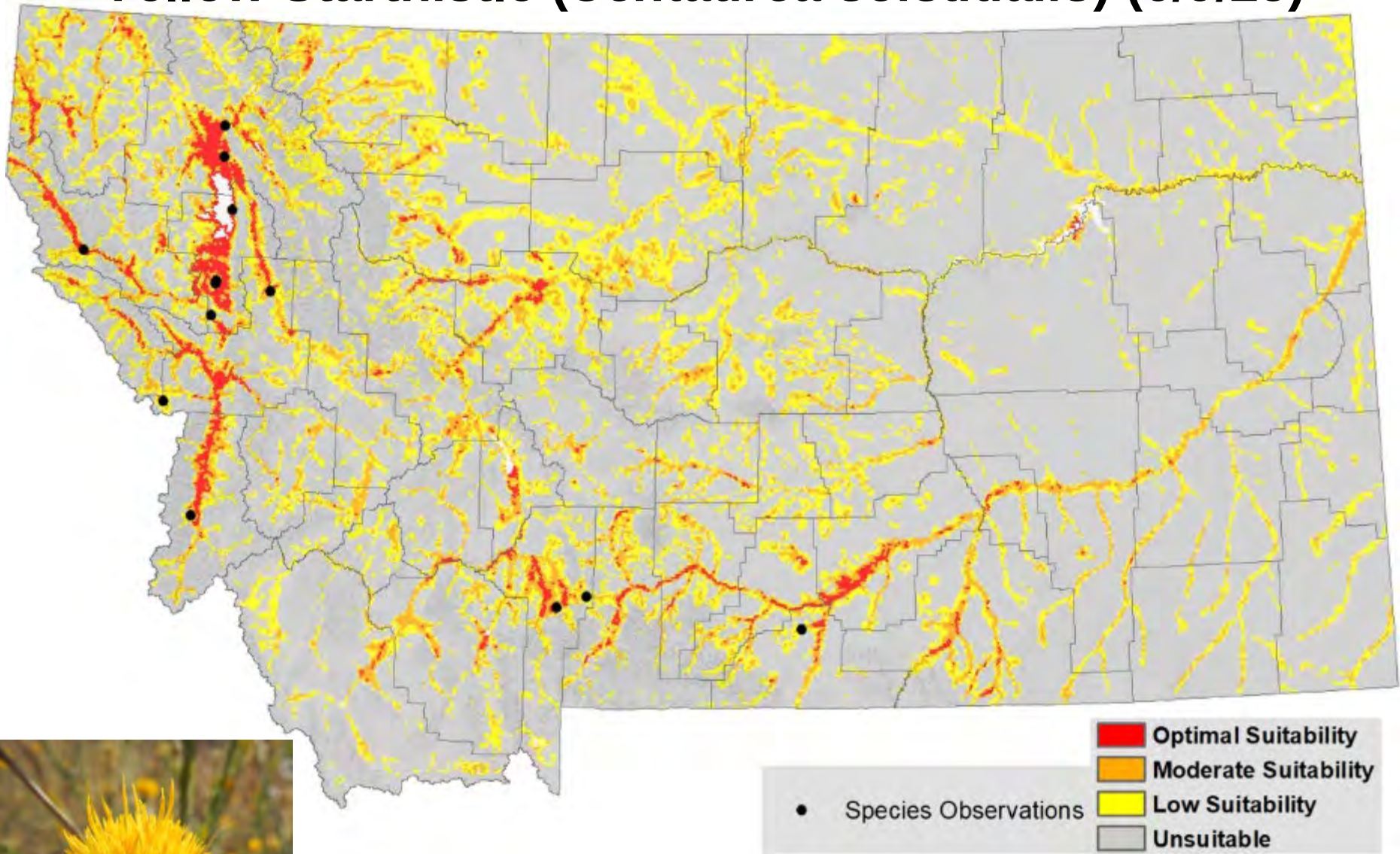
This is a simple rule-based model for aquatic invasive plants that have invaded Montana or have the potential to invade Montana.

The rules applied were as follows:

- Include modern National Wetland Inventory mapped wetland areas for palustrine systems with Permanently Flooded or Intermittently Exposed water regimes and lacustrine systems (Limnetic and Littoral) with Permanently Flooded or Intermittently Exposed water regimes
- Include National Hydrography Dataset features for Reservoirs, Lakes, Ponds, Rivers and large Streams
- Exclude the interior limnetic areas of Flathead Lake, Canyon Ferry Reservoir, and Fort Peck
- Exclude any features above 7000 ft (2135 m) in elevation

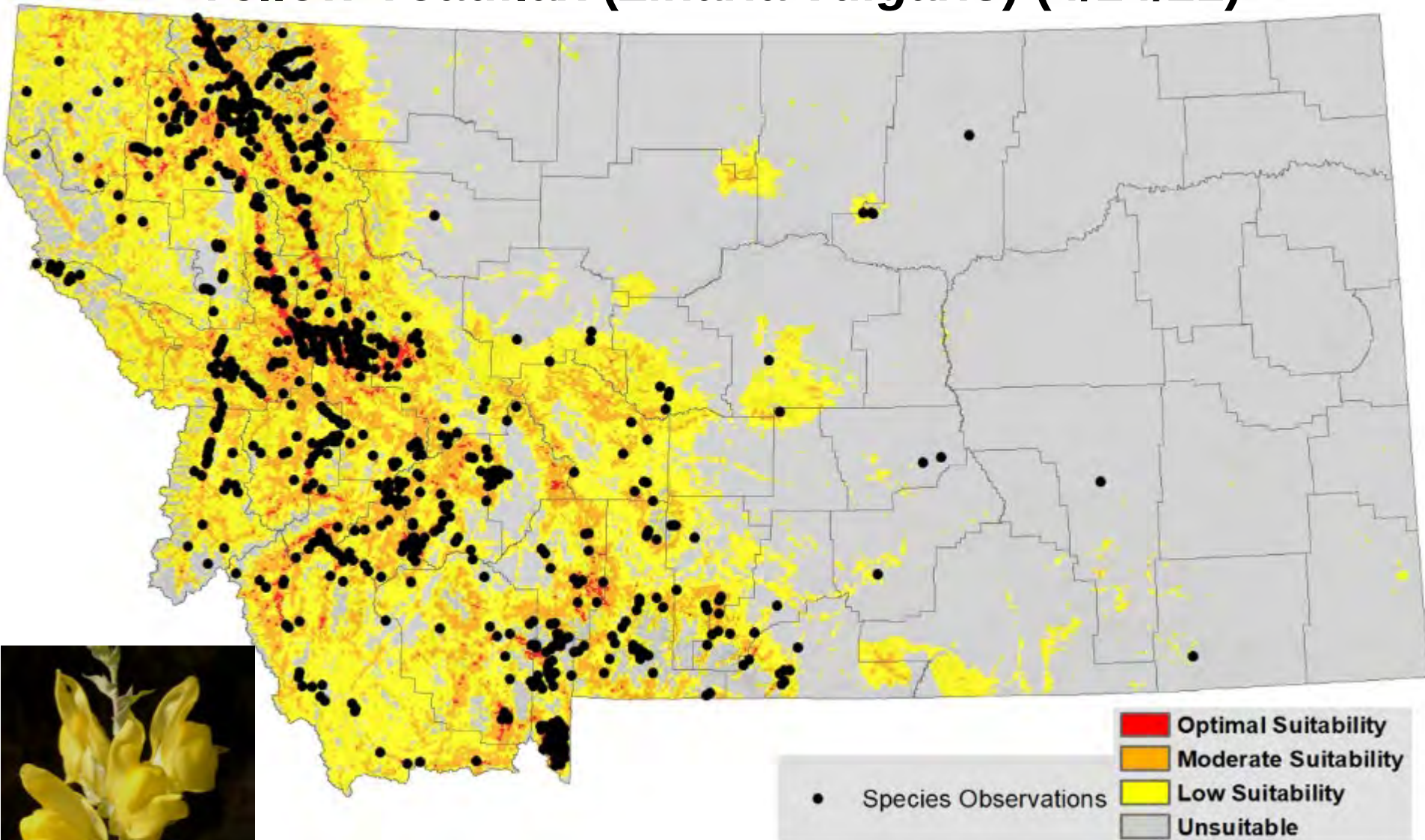


Yellow Starthistle (*Centaurea solstitialis*) (6/9/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.026	42,615	11%
Moderate	0.121	15,755	4%
Optimal	0.333	10,084	3%

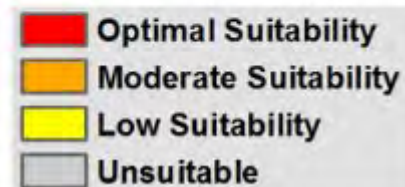
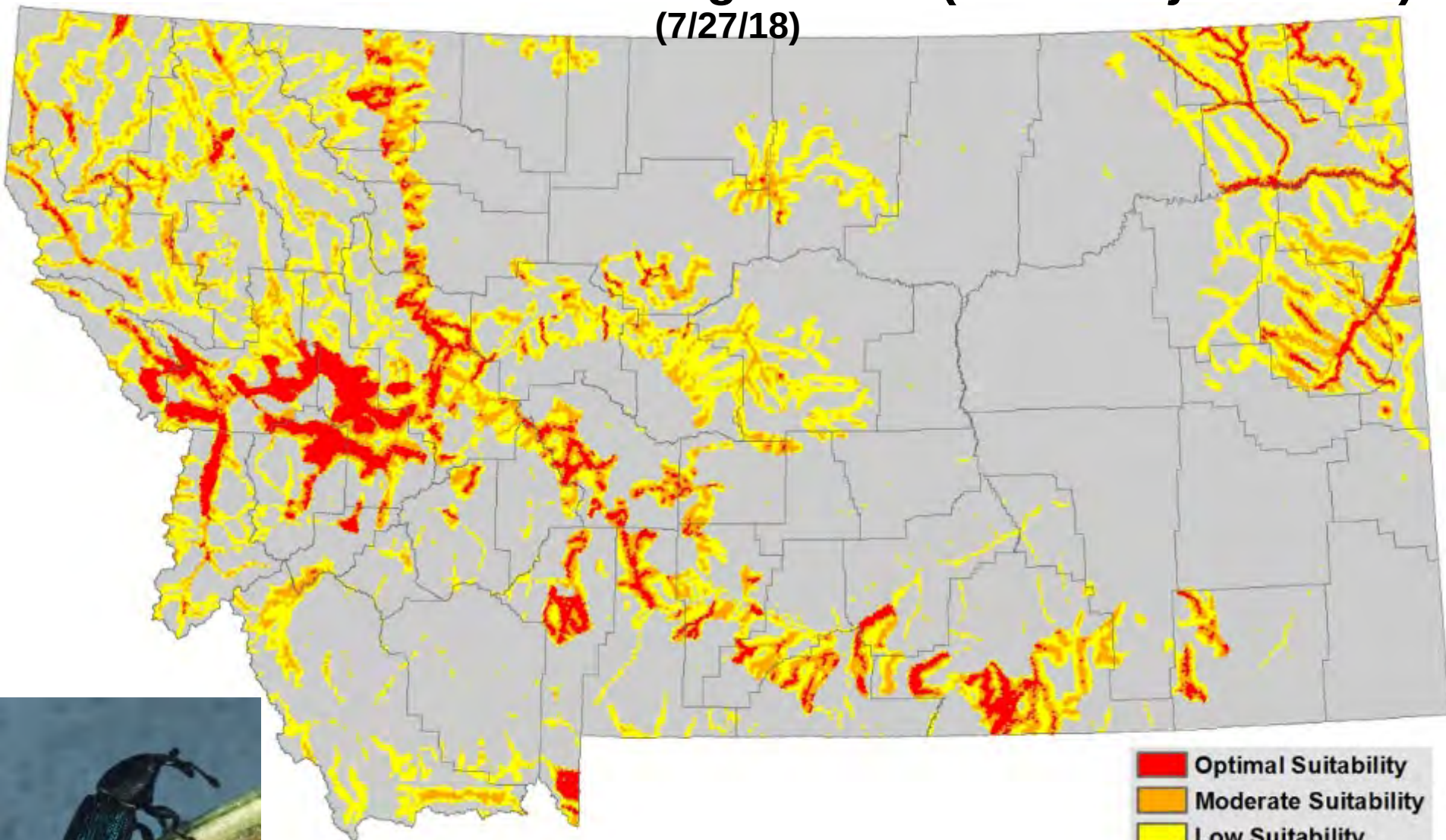
Yellow Toadflax (*Linaria vulgaris*) (4/14/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.015	79,283	21%
Moderate	0.116	26,712	7%
Optimal	0.380	9,023	2%

Yellow Toadflax Stem-boring Weavel (*Mecinus janthinus*)

(7/27/18)

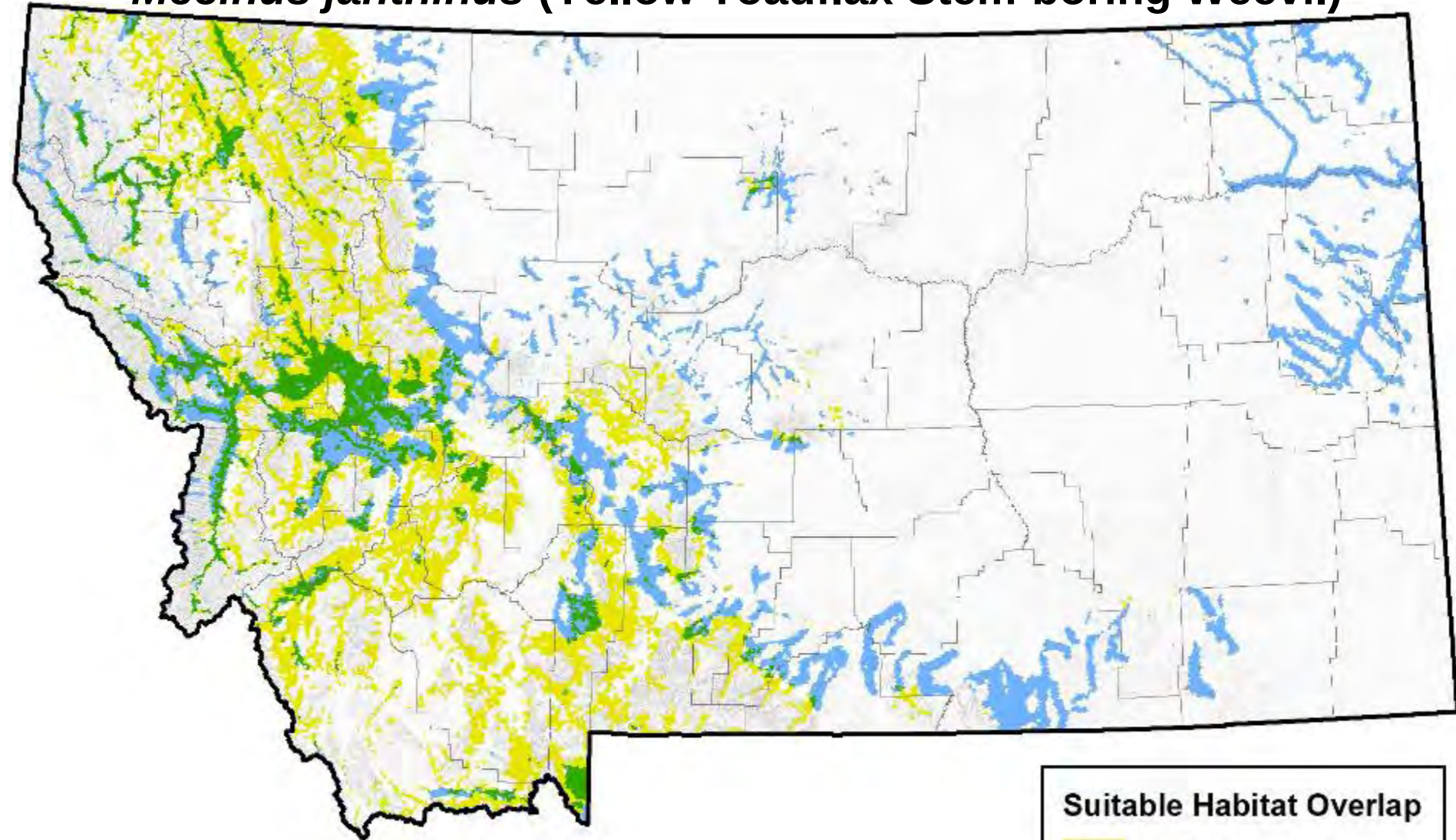


Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.021	52,632	14%
Moderate	0.071	20,881	5%
Optimal	0.172	14,168	4%

Biocontrol

Overlay of Yellow Toadflax and its Biocontrol

Mecinus janthinus (Yellow Toadflax Stem-boring Weevil)

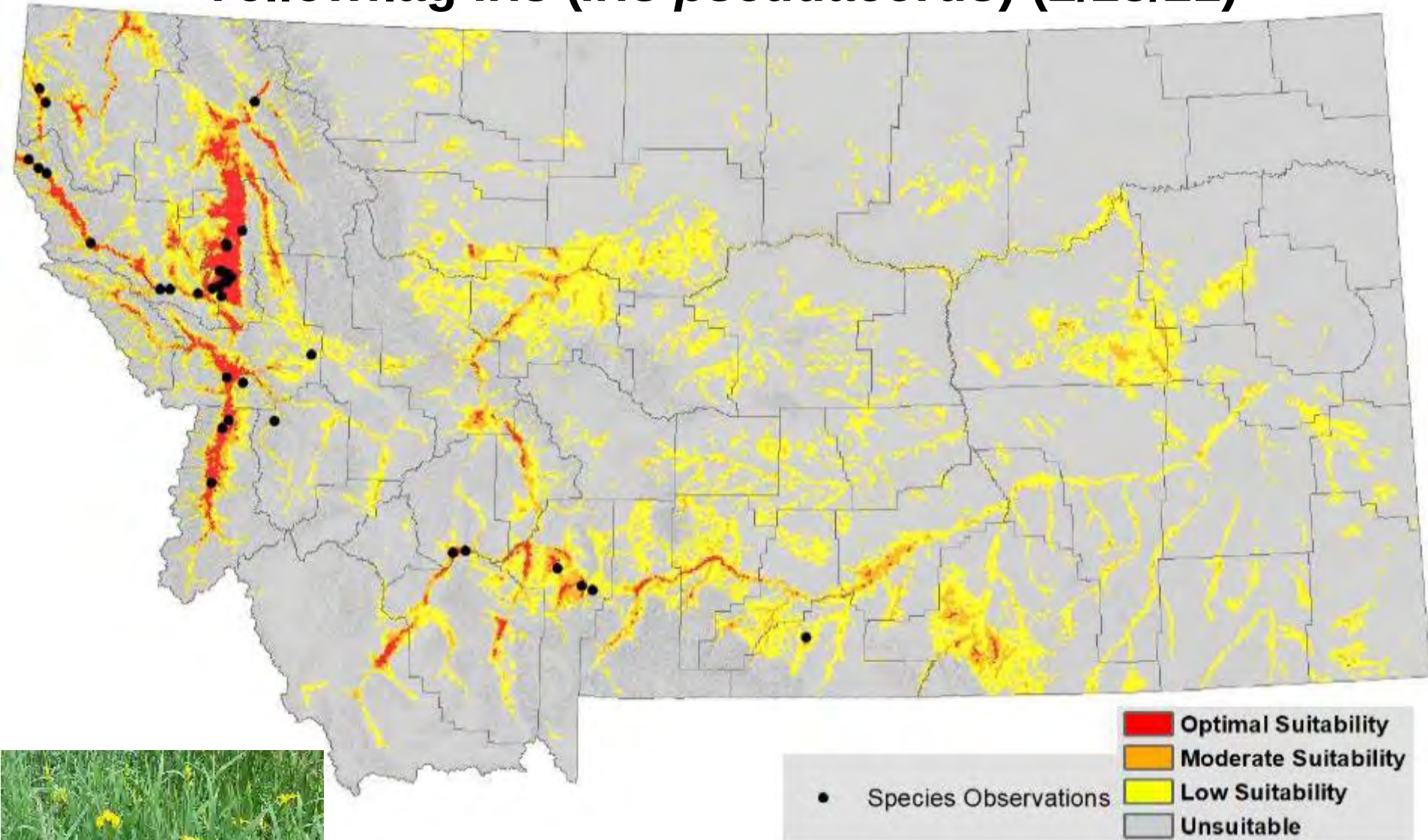


Suitable Habitat Overlap

- Host Weed
- Biocontrol
- Host Weed + Biocontrol

Moderate and optimal suitability for both Yellow Toadflax and Yellow Toadflax Stem-boring Weevil. Green areas indicate model support for most effective releases of the biocontrol.

Yellowflag Iris (*Iris pseudacorus*) (2/23/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.013	35,532	9%
Moderate	0.104	7,276	2%
Optimal	0.269	6,100	2%

County-listed Noxious Weeds

Models can be viewed in the Single Species Overview Task in Map Viewer with agency-level sign in at:

<https://mtnhp.org/mapviewer>

Model write ups are available for download at:

<https://mtnhp.org/models/>

You can request geodatabases of model outputs at:

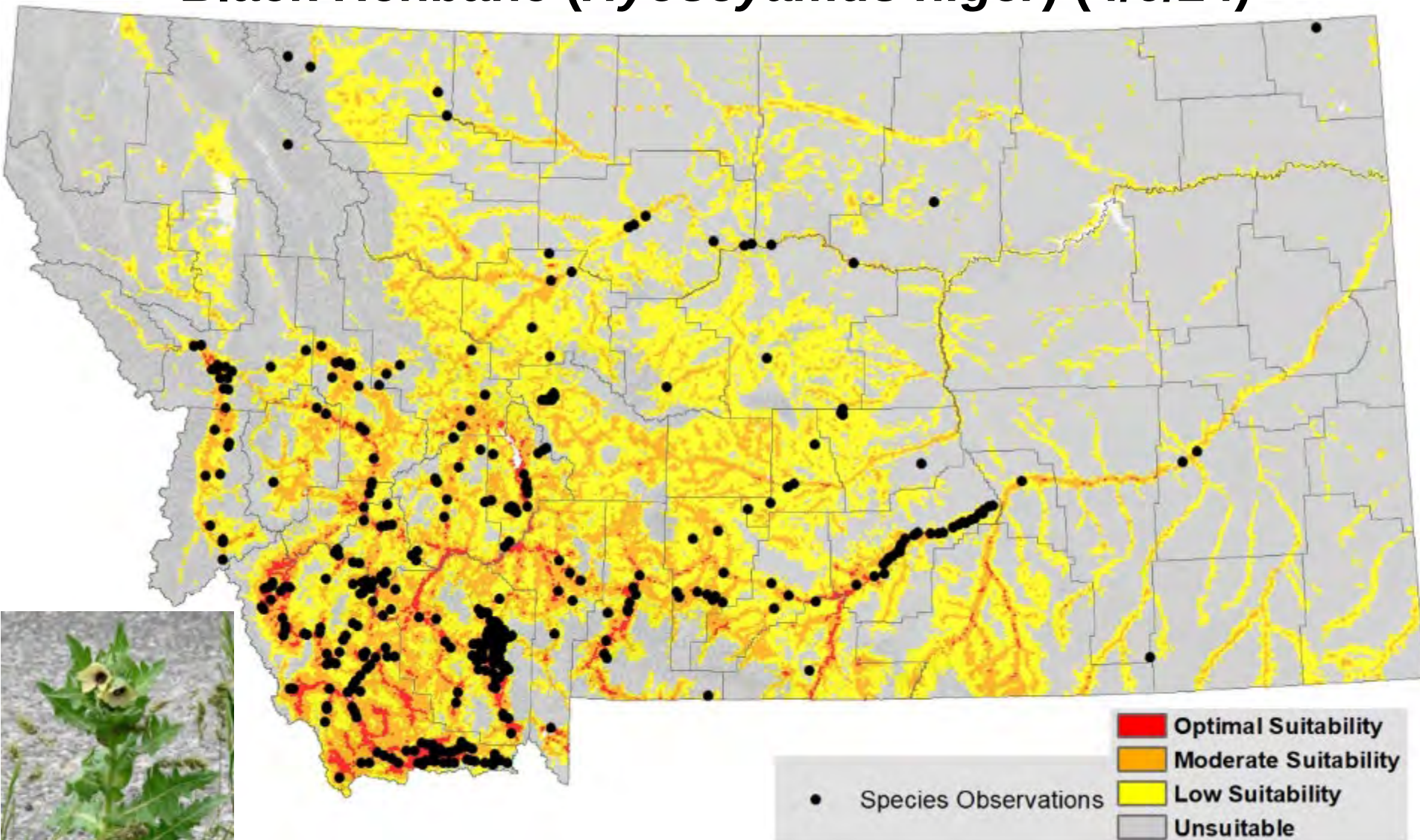
<https://nris.mt.gov/reqapp/userMain.asp>

Bolded status listings have changed since the 2025 version of this presentation.

Common Name	MT	ID	B.C.	AB	SK	ND	SD	WY
Black Henbane	County	Control	Invasive of Concern	Noxious	Noxious			Noxious
Bladder Champion	County		Regionally Noxious	Noxious	Noxious			
Bladder-vetch	County			Prohibited Noxious				
Bull Thistle	County		Invasive of Concern		Noxious			
Chicory	County		Invasive of Concern					
Common Blue-mustard	County							
Common Bugloss	County		Regional Noxious					
Common Burdock	County		Regional Noxious	Noxious	Noxious			Noxious
Common Caraway	County							
Common Crupina	County	Control	Noxious	Prohibited Noxious	Prohibited		Watch	
Common Kochia	County		Regionally Noxious		Noxious			
Common Matrimony Vine	County							
Common Mullein	County			Noxious	Noxious			Noxious
Common Teasel	County		Invasive of Concern		Prohibited			
Common Wormwood	County				Noxious	Noxious	Noxious	
Creeping Bellflower	County			Noxious	Noxious			
Curly Dock	County							
Cypress Spurge	County				Noxious			
Dwarf Snapdragon	County					Lincoln		
Field Scabious	County		Regional Noxious	Noxious	Prohibited			
Field Sowthistle	County	Control	Noxious	Noxious	Nuisance		Noxious	Noxious
Garlic Mustard	County		Noxious	Prohibited Noxious	Prohibited			
Germander Speedwell	County							
Gypsy-weed	County							
Halogeton	County			Prohibited Noxious	Prohibited			

Common Name	MT	ID	B.C.	AB	SK	ND	SD	WY
Mayweed	County							
Meadow Goat's-beard	County		Invasive of Concern		Noxious			
Meadow Knapweed	County	Control	Regional Noxious	Noxious				
Musk Thistle	County	Control	Invasive of Concern	Prohibited Noxious	Nuisance	Noxious		Noxious
Myrtle Spurge	County							
Pacific Mosquito Fern	County	EDRR						
Poison Hemlock	County	Containment	Invasive of Concern		Prohibited			
Prickly Lettuce	County				Nuisance			
Puncture-vine	County	Containment	Regional Noxious	Prohibited Noxious	Prohibited			
Russian Thistle	County		Regional Noxious		Nuisance			
Scentless Chamomile	County		Noxious	Noxious	Noxious			
Scotch Thistle	County	Containment	Regional Noxious					Noxious
Sheep Sorrel	County							
Spiny Plumeless-thistle	County	Containment	Regional Noxious	Prohibited Noxious	Prohibited			Noxious
Spotted Cat's-ear	County							
Tall Baby's-breath	County		Invasive of Concern	Noxious	Noxious			
Tall Tumble-mustard	County							
Urban Spurge	County							
Wood Sage	County							
Yellow Mignonette	County							

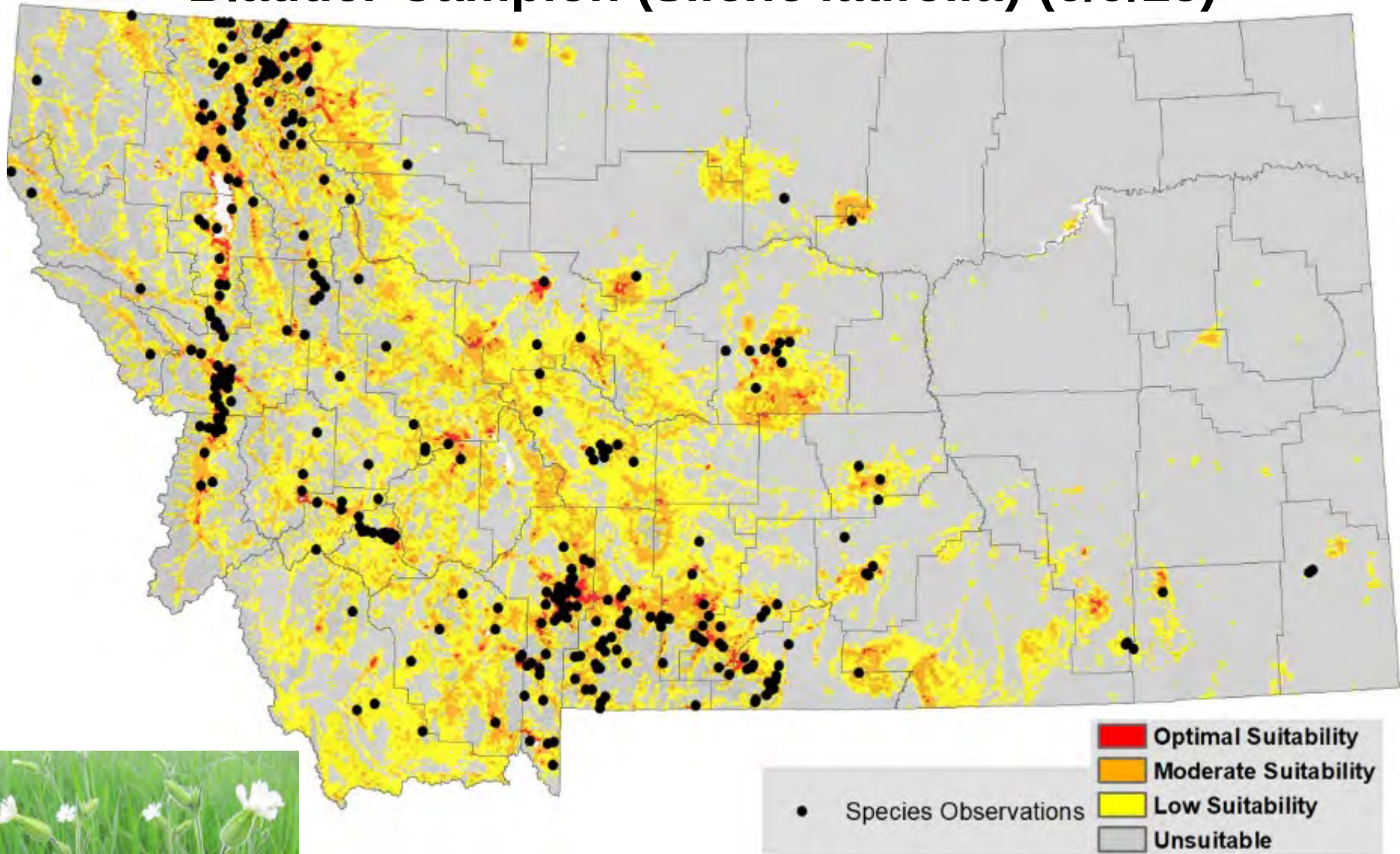
Black Henbane (*Hyoscyamus niger*) (4/6/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.025	78,031	21%
Moderate	0.138	29,509	8%
Optimal	0.429	10,084	3%

15 Counties

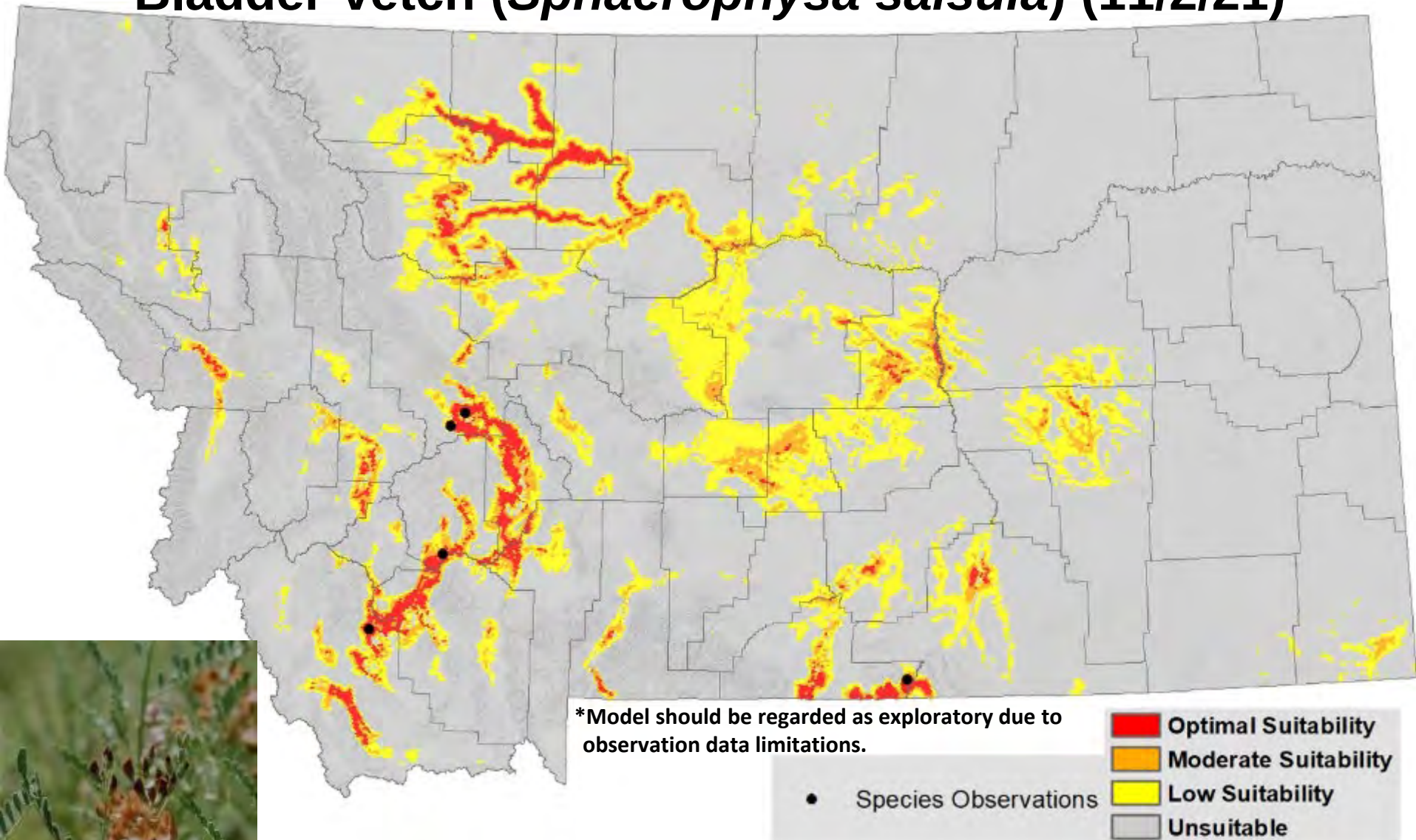
Bladder Campion (*Silene latifolia*) (6/9/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	51,395	14%
Moderate	0.097	19,983	5%
Optimal	0.334	7,715	2%

2 Counties

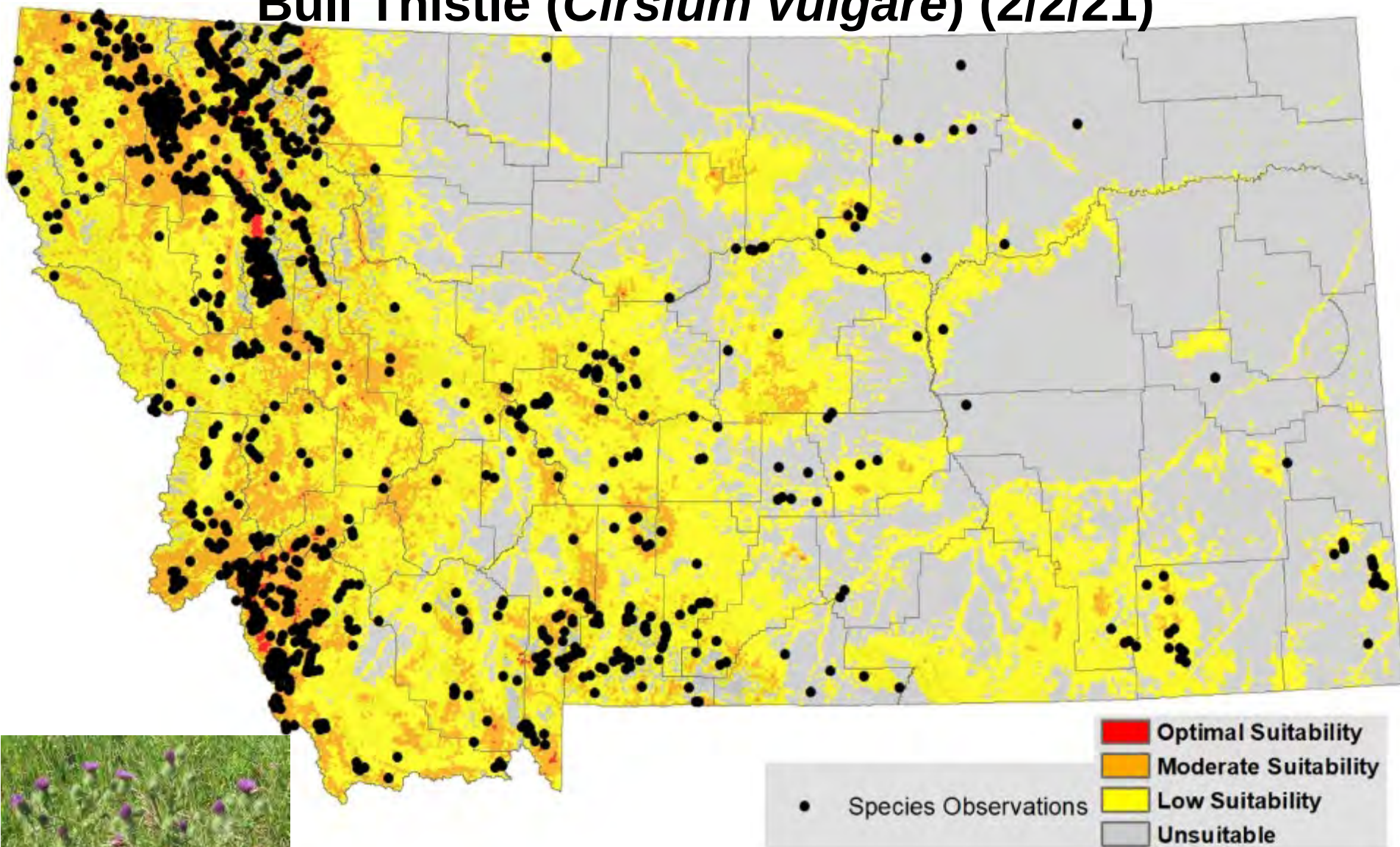
Bladder-vetch (*Sphaerophysa salsula*) (11/2/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.010	31,450	8%
Moderate	0.071	8,248	2%
Optimal	0.179	6,518	2%

2 Counties

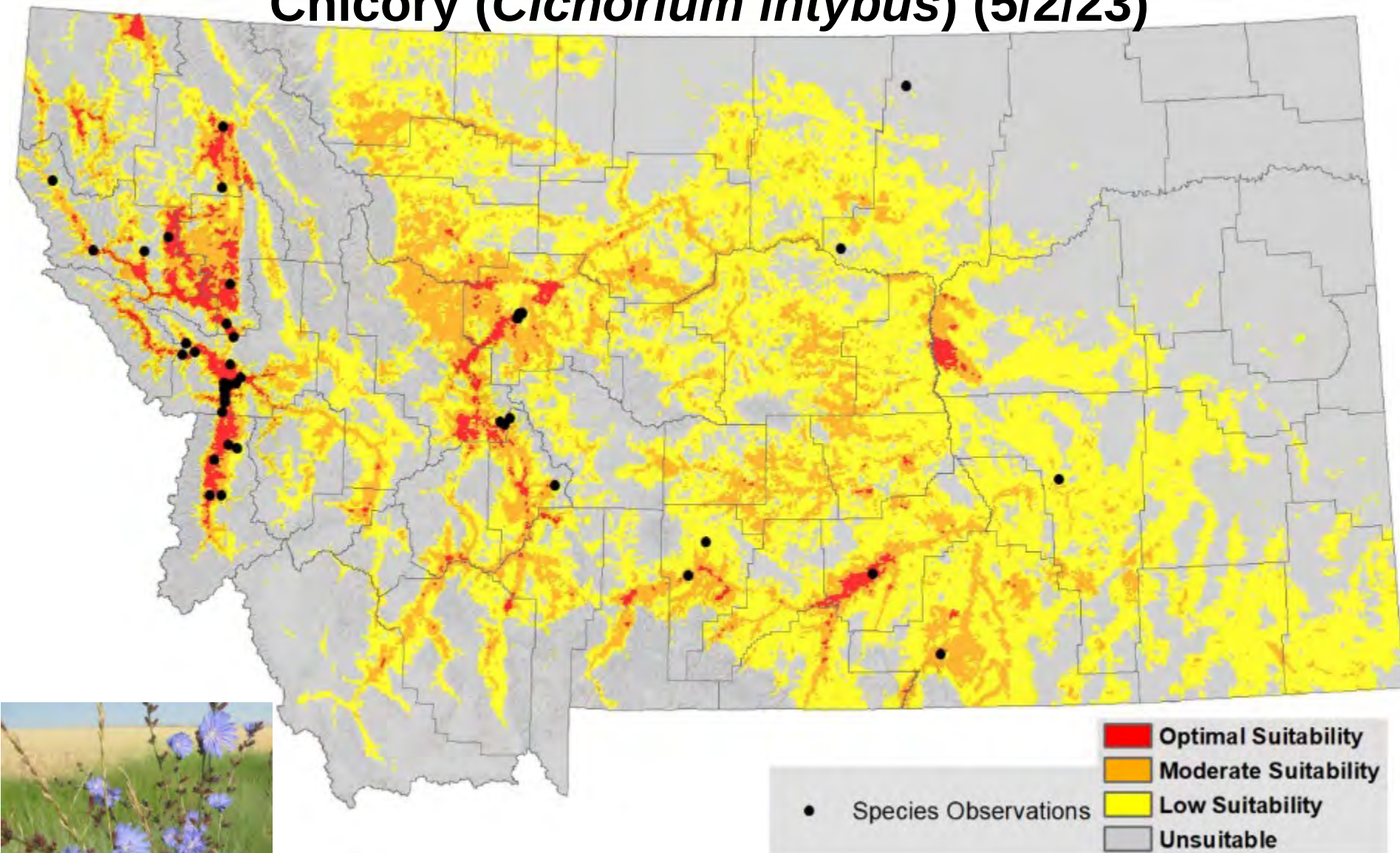
Bull Thistle (*Cirsium vulgare*) (2/2/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.041	132,015	35%
Moderate	0.272	38,835	10%
Optimal	0.646	7,433	2%

2 Counties

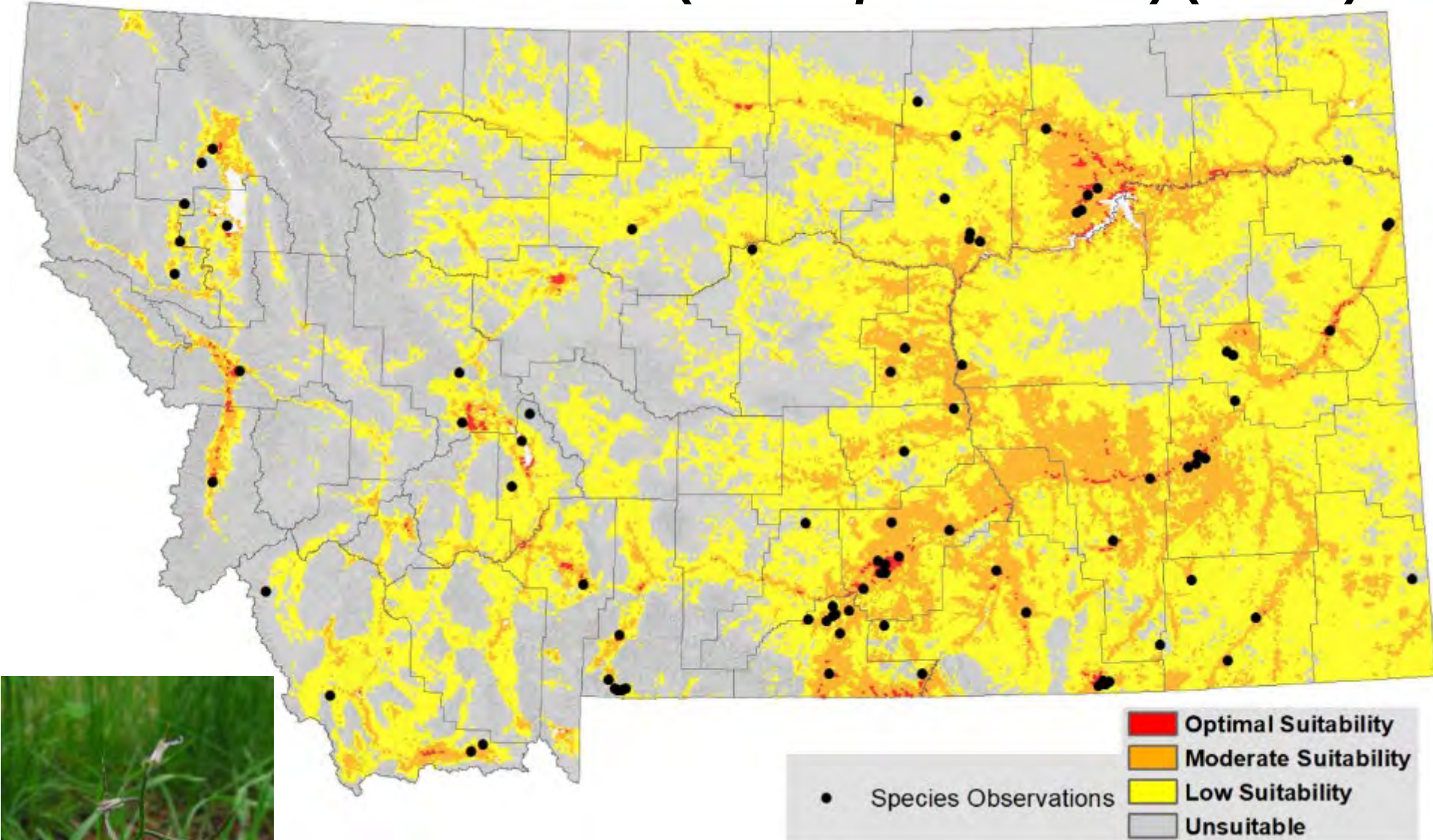
Chicory (*Cichorium intybus*) (5/2/23)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.024	103,891	27%
Moderate	0.165	34,628	9%
Optimal	0.471	9,056	2%

1 County

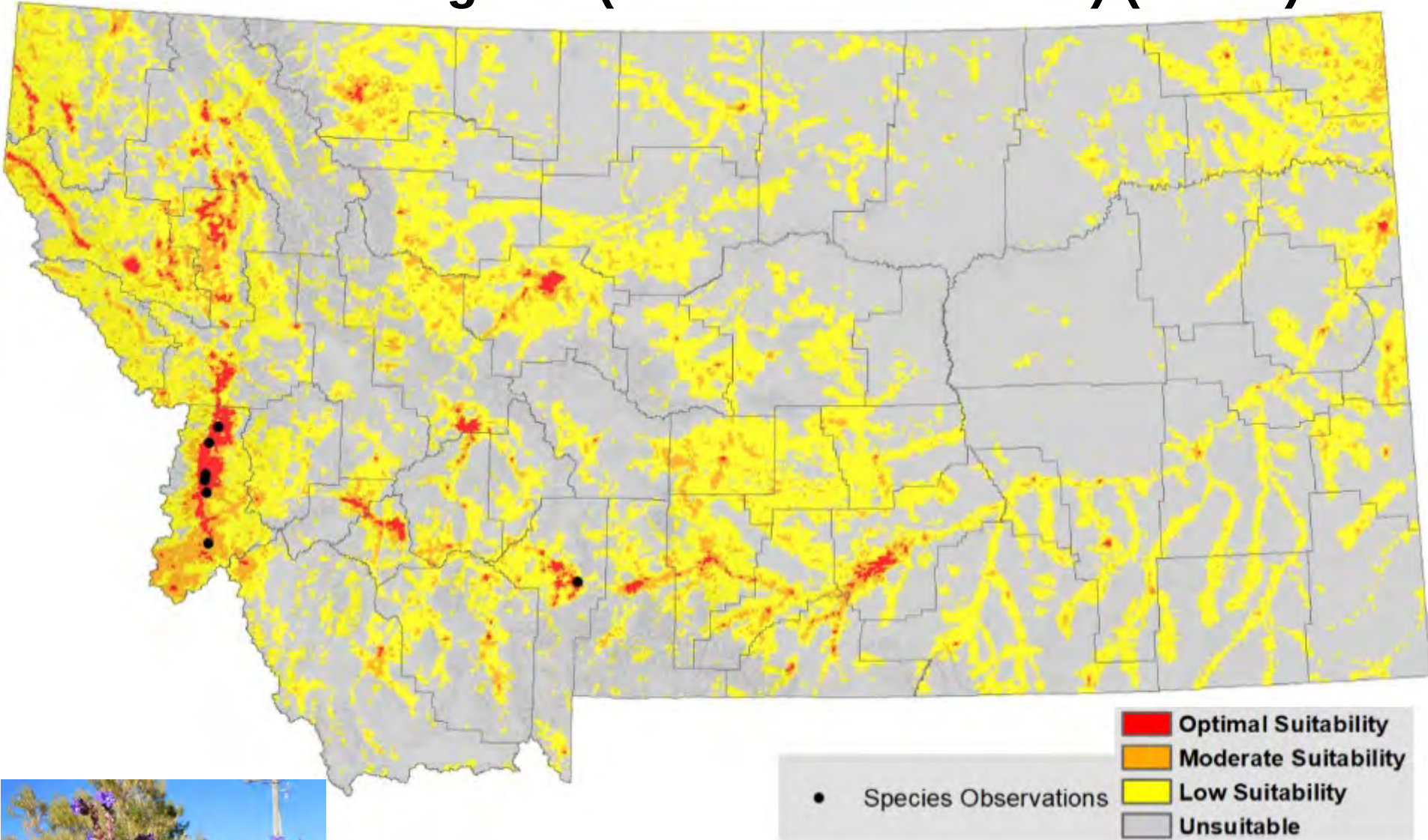
Common Blue-mustard (*Chorispora tenella*) (4/8/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.056	134,740	35%
Moderate	0.276	43,523	11%
Optimal	0.644	6,409	2%

2 Counties

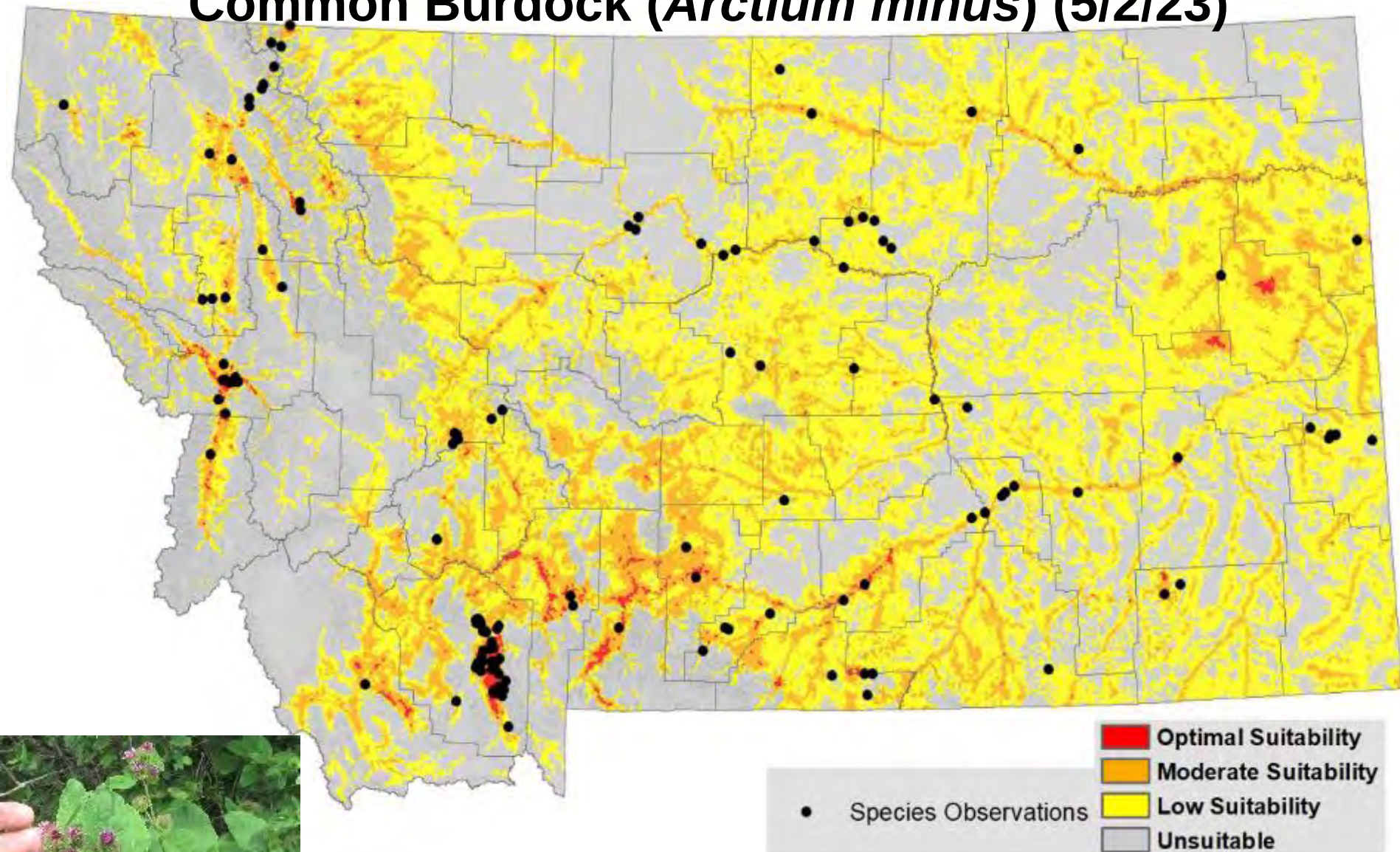
Common Bugloss (*Anchusa officinalis*) (2/9/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.037	102,198	27%
Moderate	0.192	16,853	4%
Optimal	0.444	4,466	1%

2 Counties

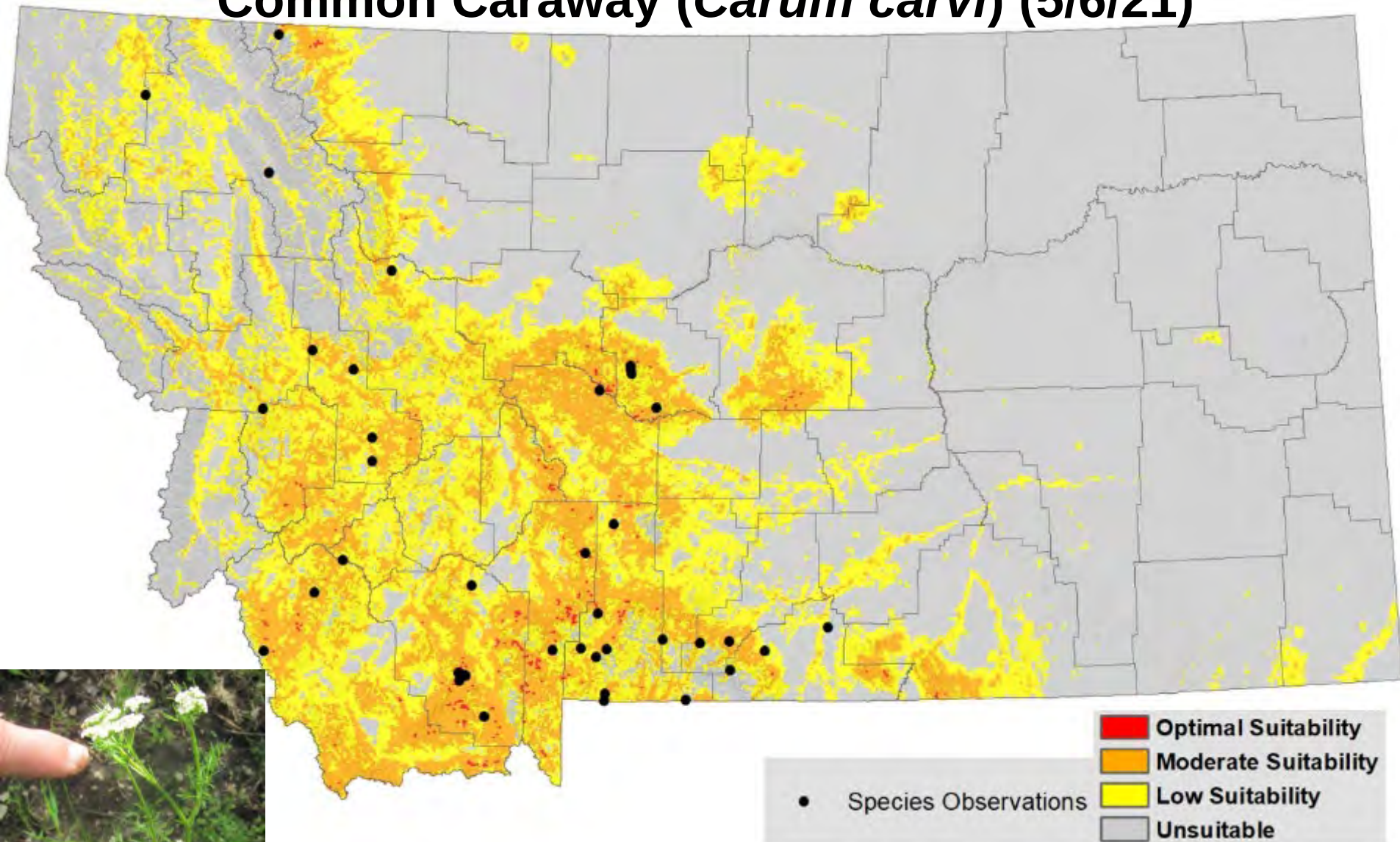
Common Burdock (*Arctium minus*) (5/2/23)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.020	105,028	28%
Moderate	0.112	34,830	9%
Optimal	0.393	8,017	2%

10 Counties

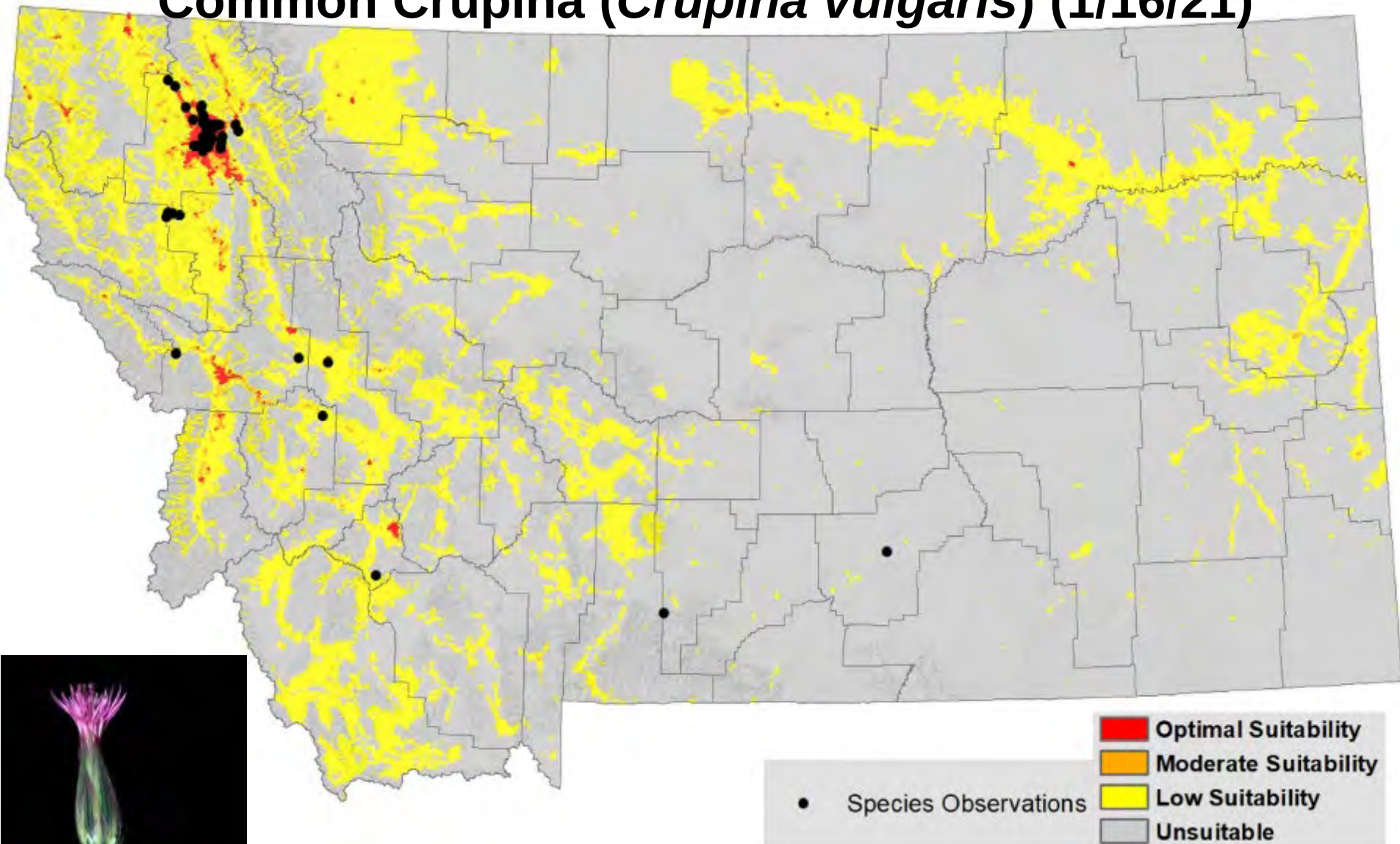
Common Caraway (*Carum carvi*) (5/6/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.042	59,418	16%
Moderate	0.181	32,933	9%
Optimal	0.562	6,103	2%

1 County

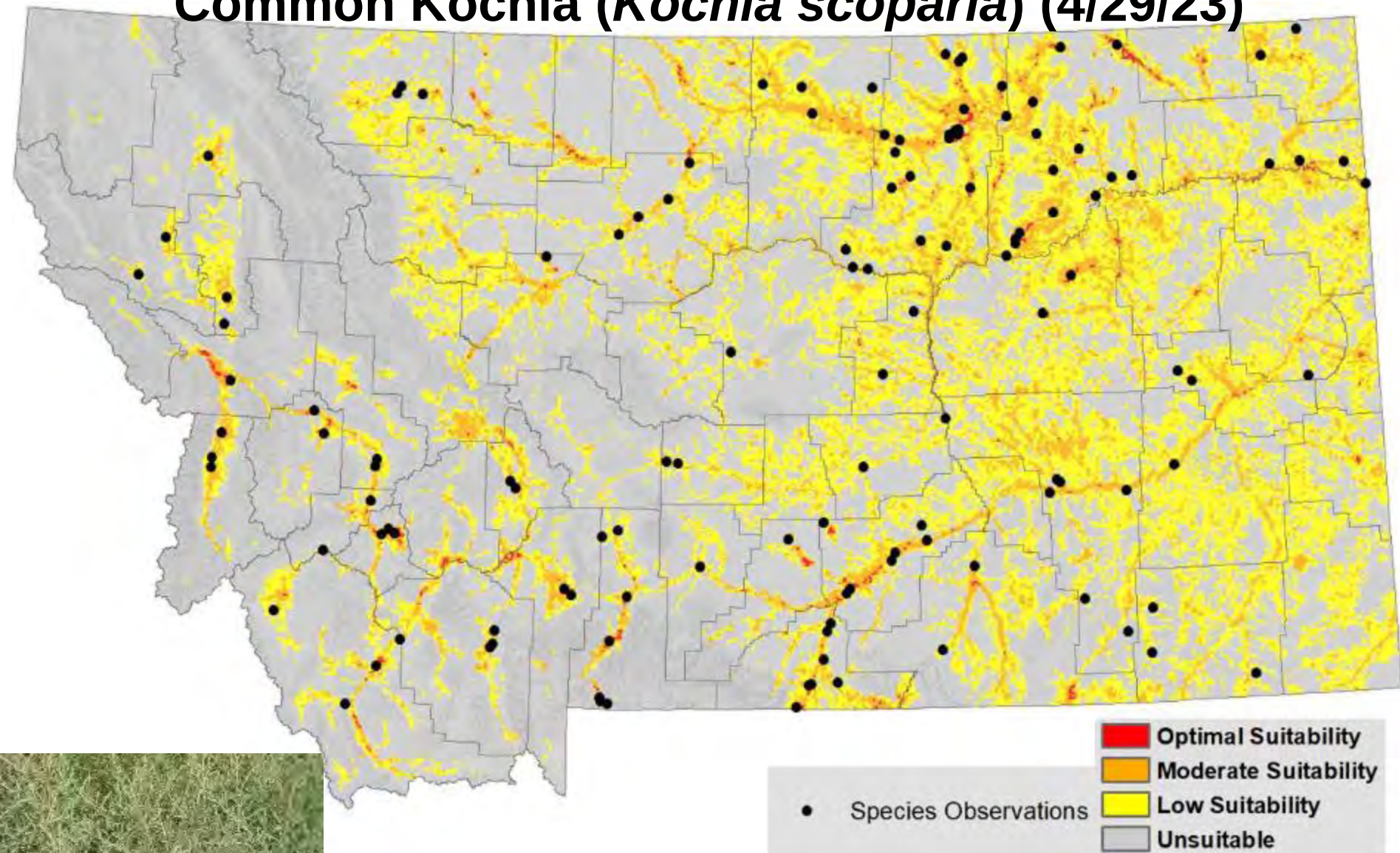
Common Crupina (*Crupina vulgaris*) (1/16/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.001	55,509	15%
Moderate	0.070	1,509	<1%
Optimal	0.175	1,437	<1%

1 County

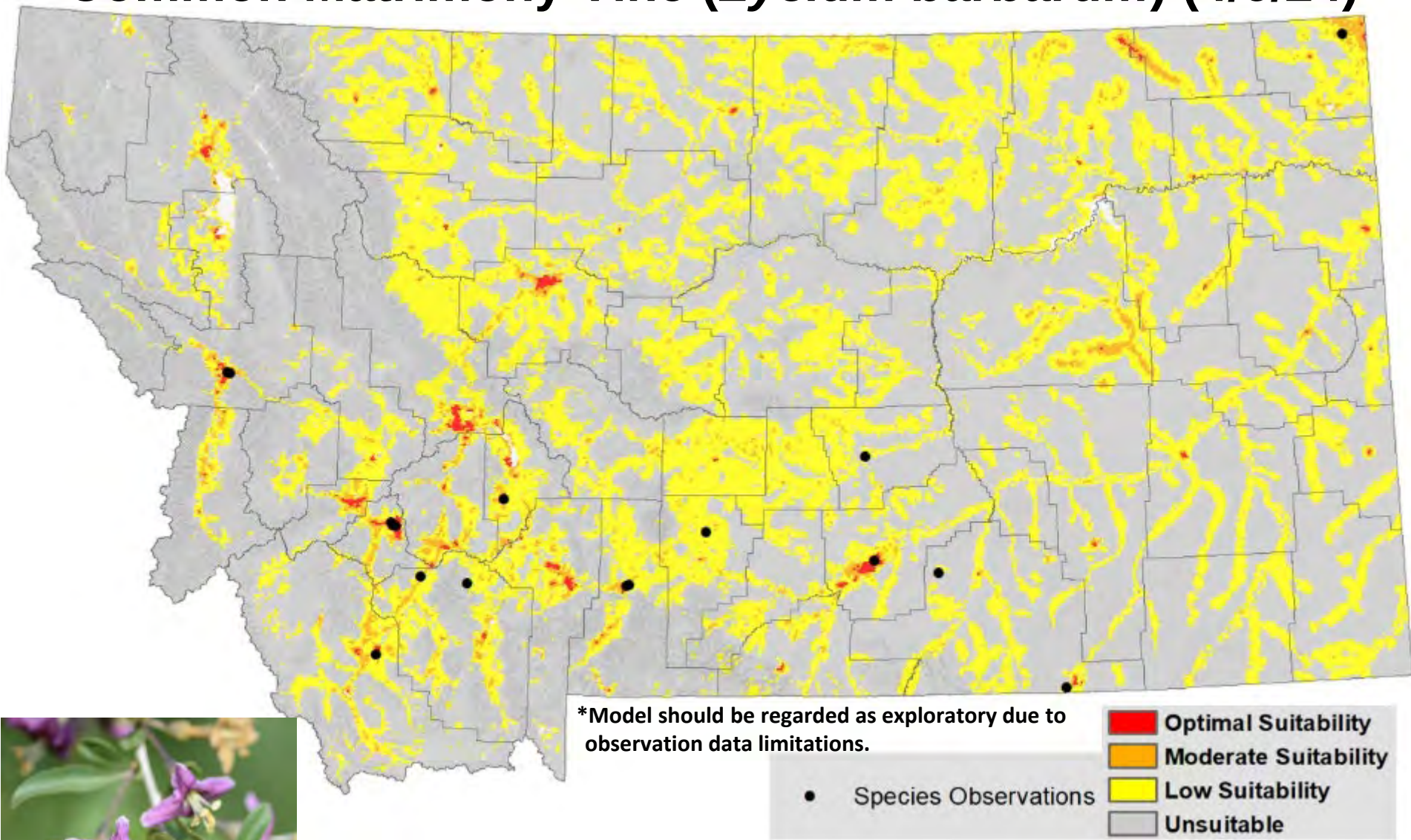
Common Kochia (*Kochia scoparia*) (4/29/23)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.011	60,074	16%
Moderate	0.077	19,105	5%
Optimal	0.309	5,914	2%

5 Counties

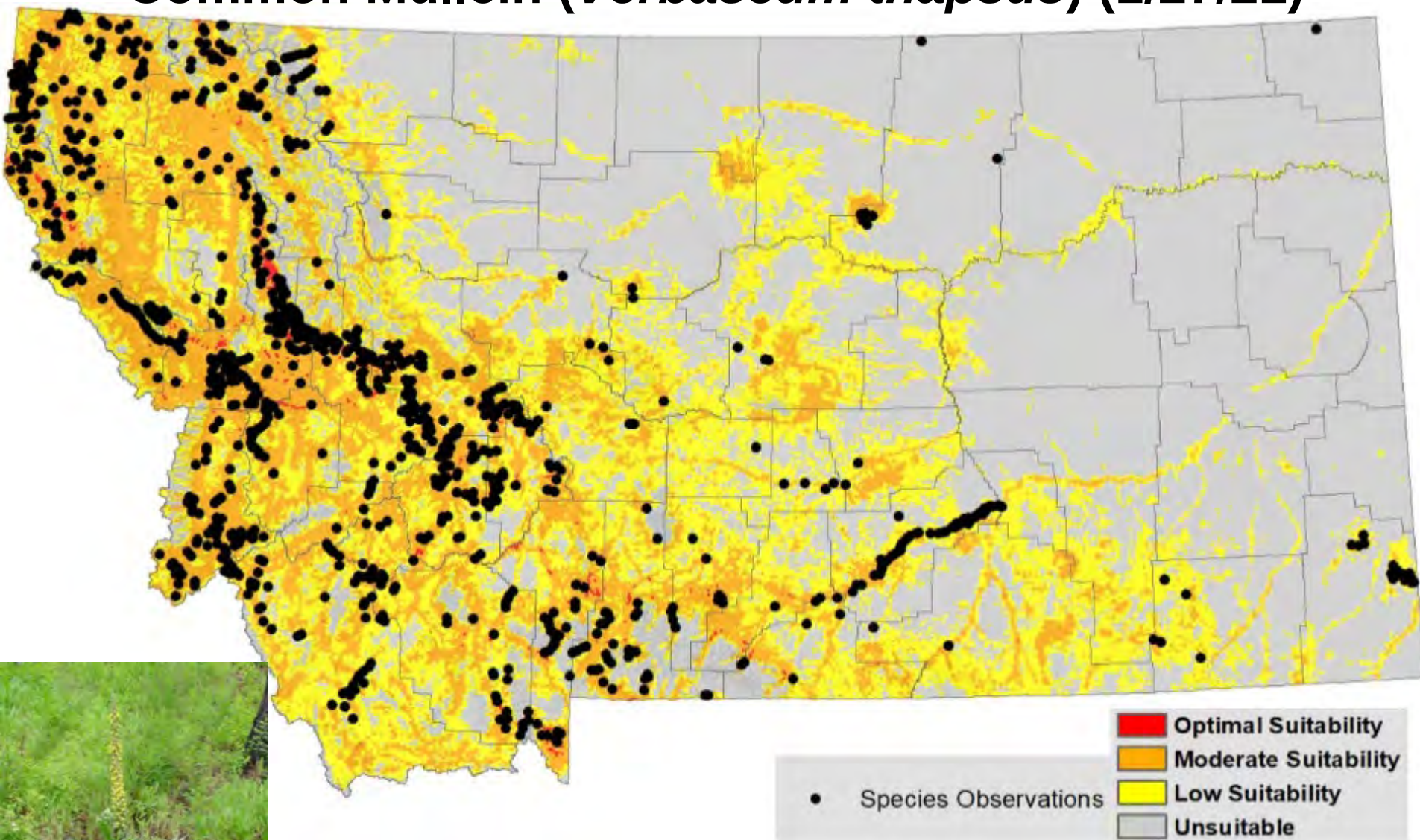
Common Matrimony Vine (*Lycium barbarum*) (4/6/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	78,906	21%
Moderate	0.156	9,022	2%
Optimal	0.430	2,038	<1%

1 County

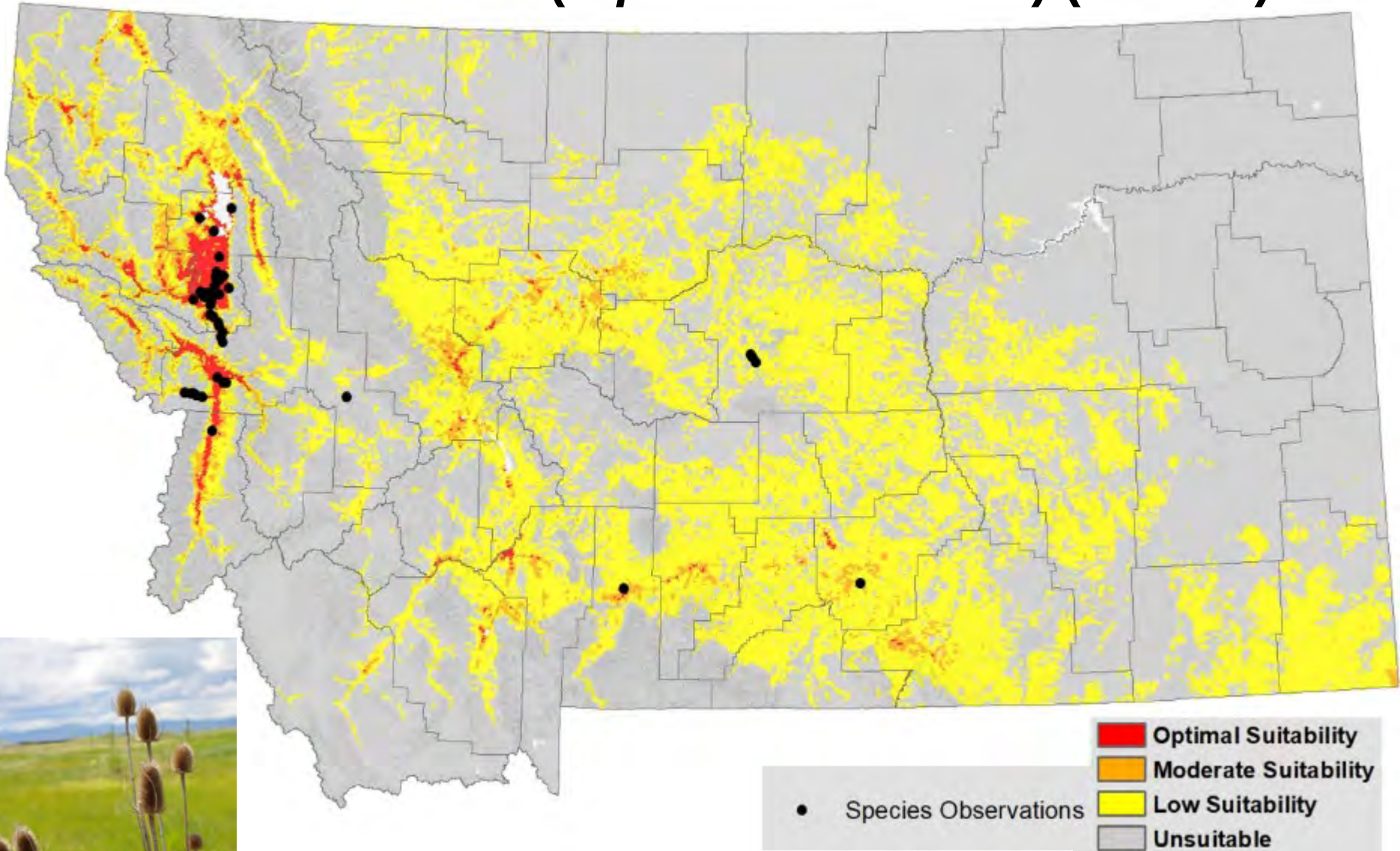
Common Mullein (*Verbascum thapsus*) (1/27/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.066	87,823	23%
Moderate	0.222	62,441	16%
Optimal	0.635	10,052	3%

12 Counties

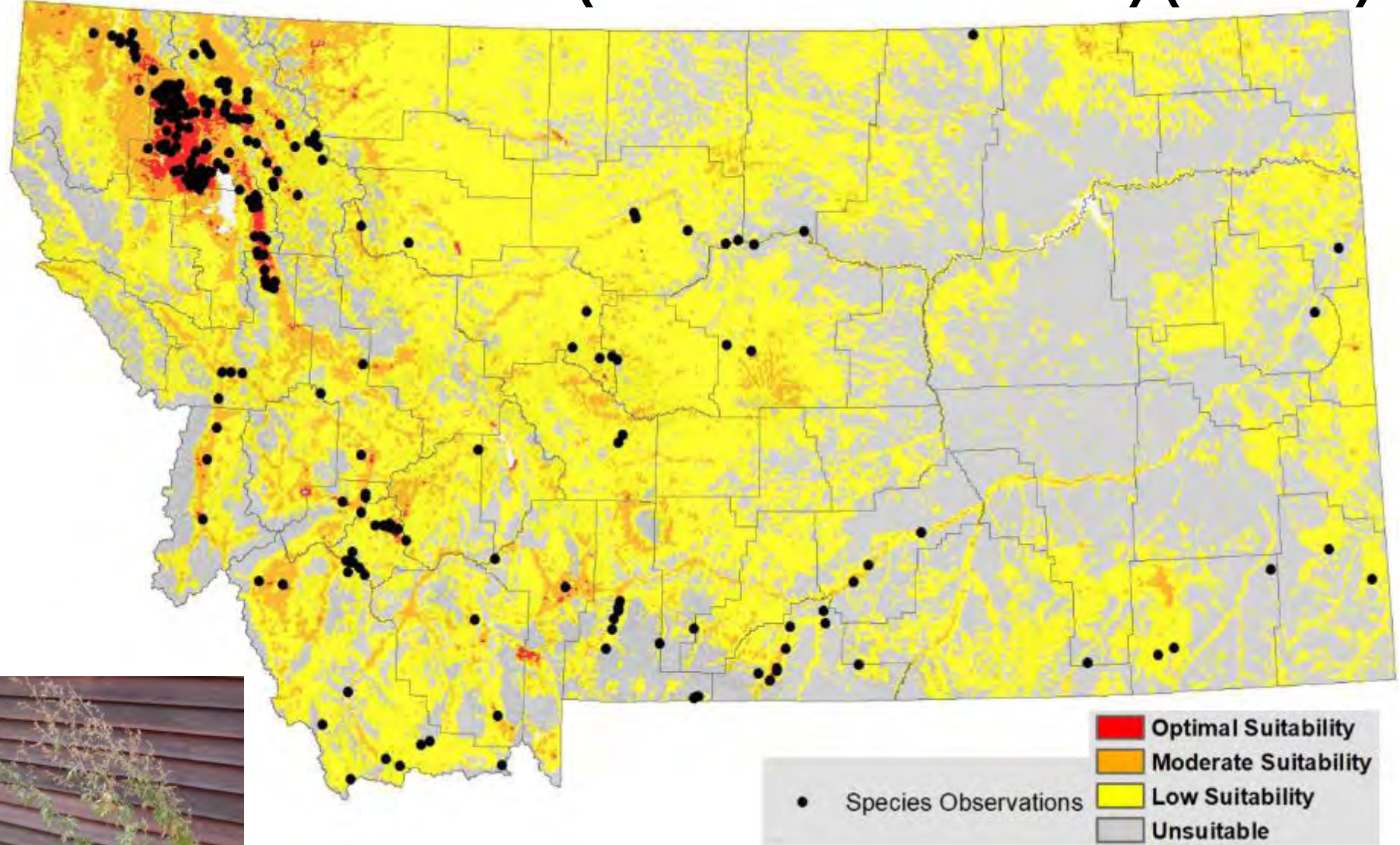
Common Teasel (*Dipsacus fullonum*) (6/10/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.005	70,661	19%
Moderate	0.110	6,768	2%
Optimal	0.283	4,508	1%

3 Counties

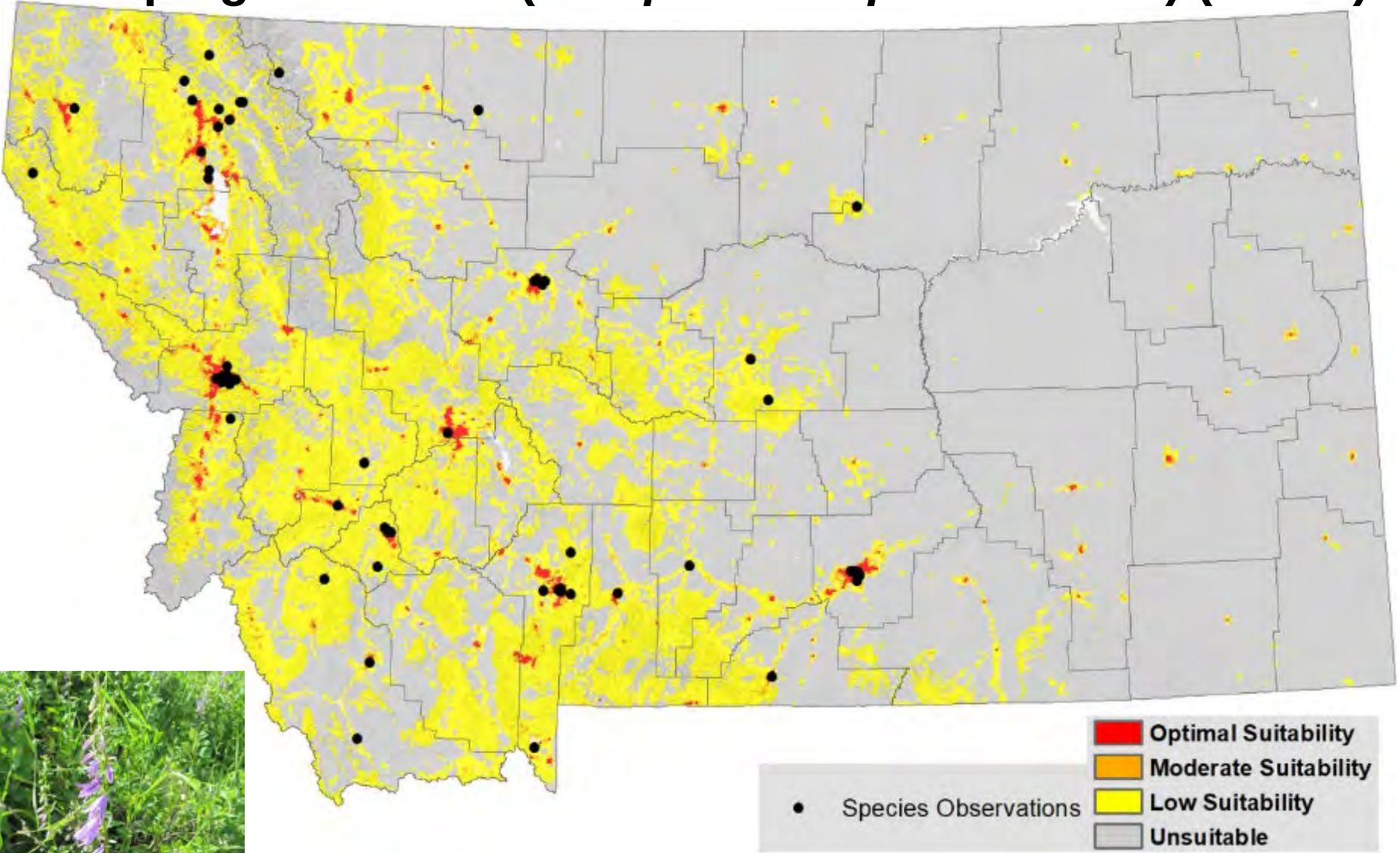
Common Wormwood (*Artemisia absinthium*) (6/30/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.027	156,427	41%
Moderate	0.203	28,192	7%
Optimal	0.590	6,772	2%

5 Counties

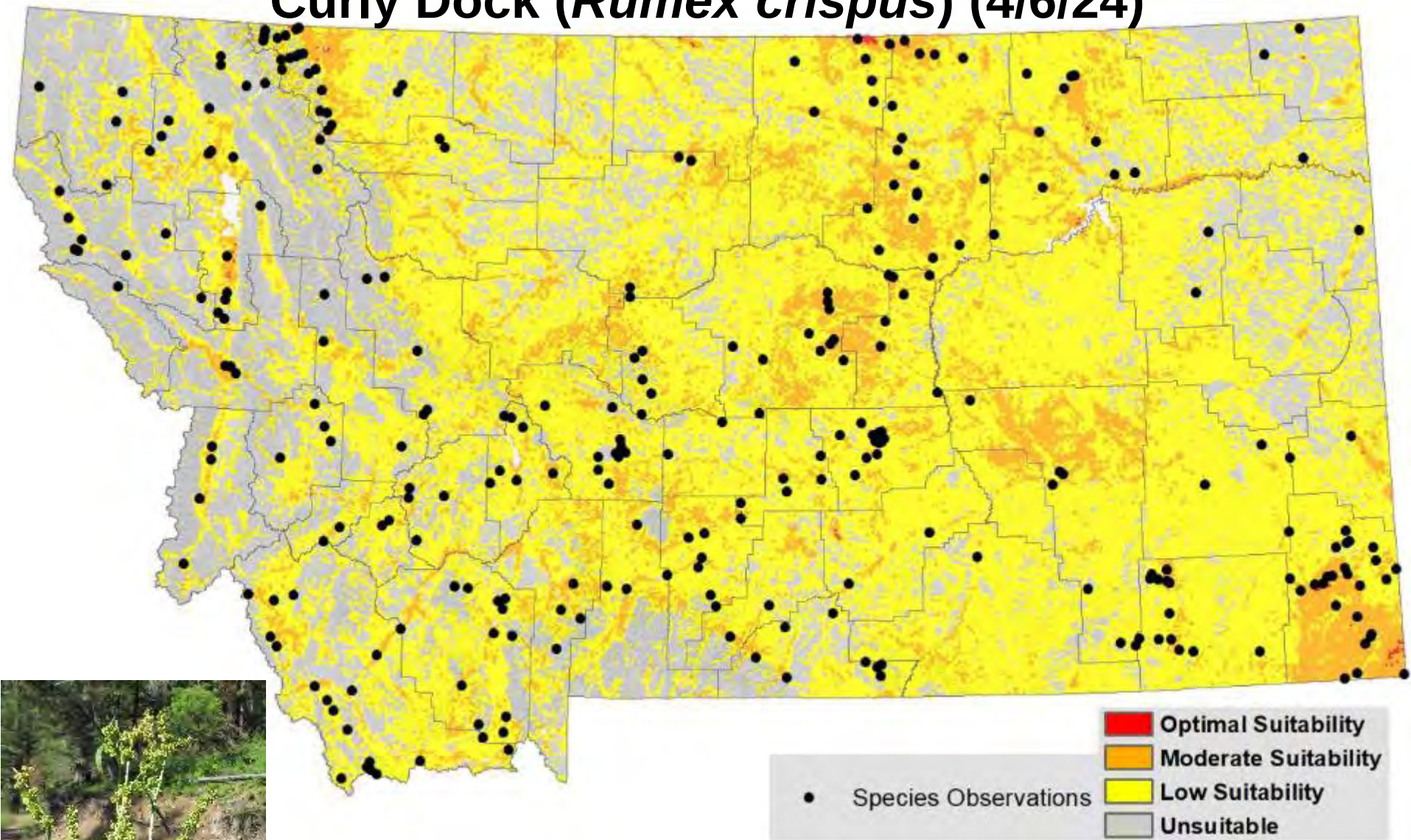
Creeping Bellflower (*Campanula rapunculoides*) (6/5/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.007	58,263	15%
Moderate	0.099	4,431	1%
Optimal	0.250	3,126	1%

1 County

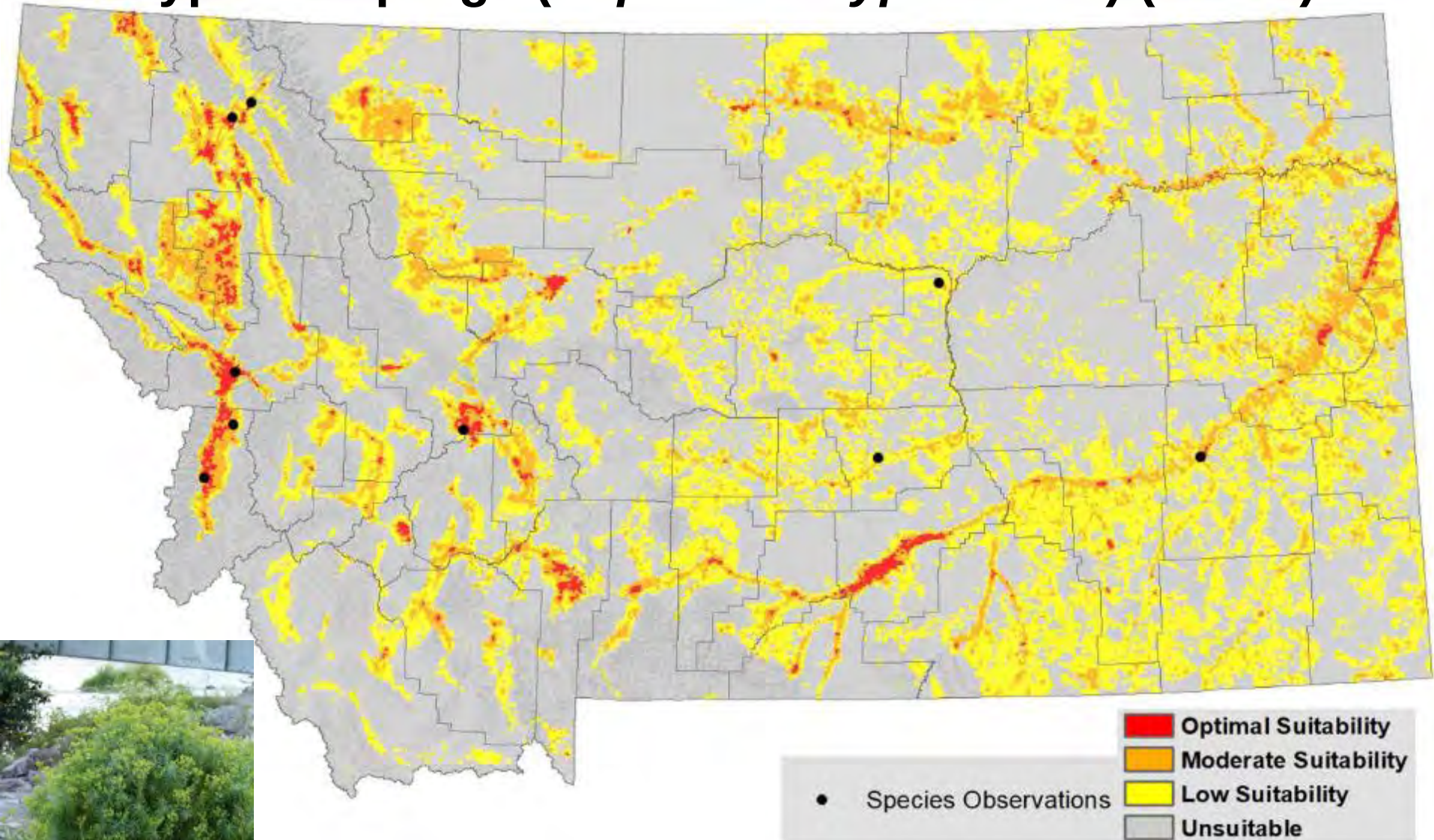
Curly Dock (*Rumex crispus*) (4/6/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.043	135,786	36%
Moderate	0.222	52,429	14%
Optimal	0.680	5,581	1%

1 County

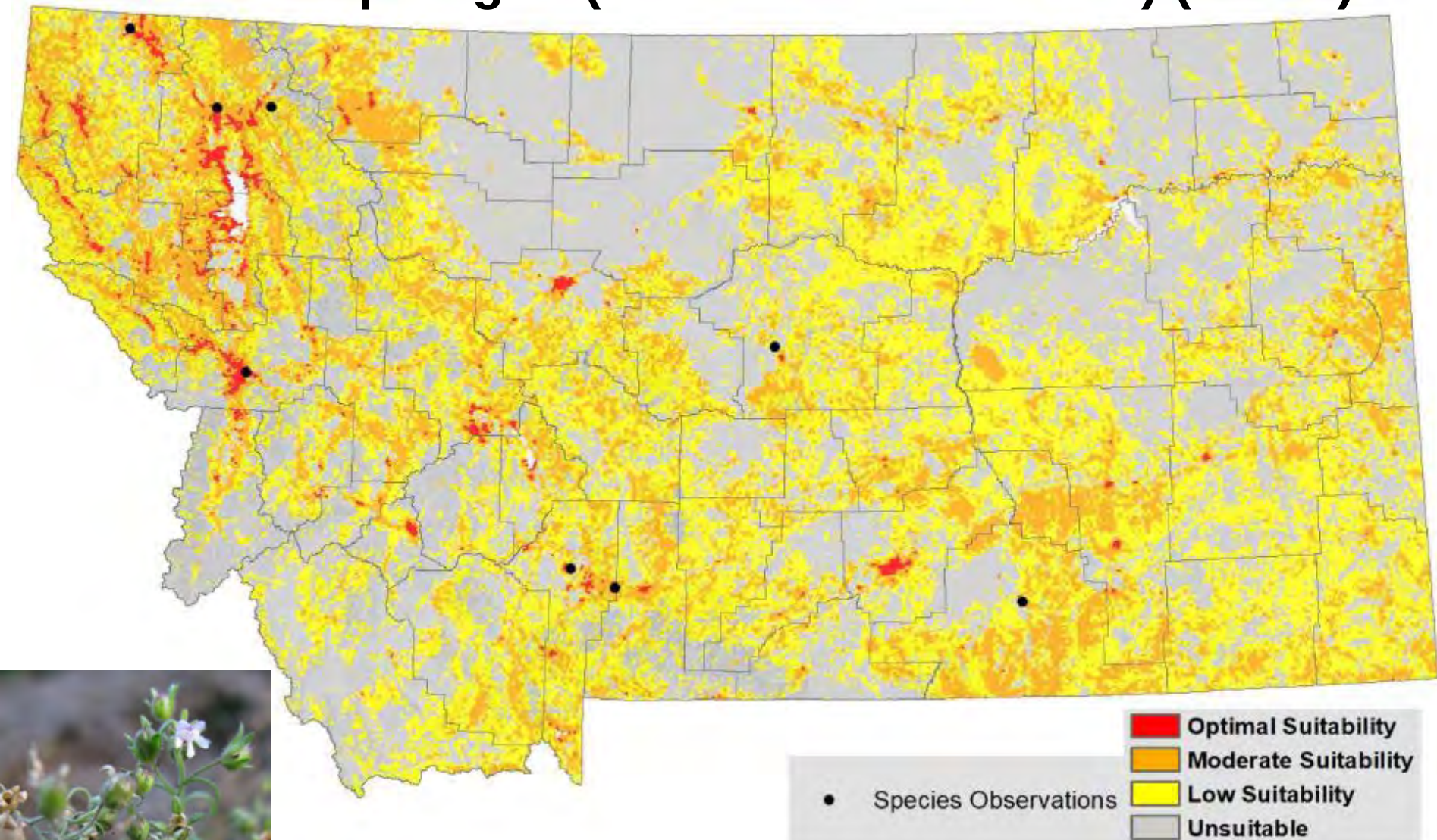
Cypress Spurge (*Euphorbia cyparissias*) (5/6/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.046	67,741	18%
Moderate	0.190	31,774	8%
Optimal	0.499	6,343	2%

1 County

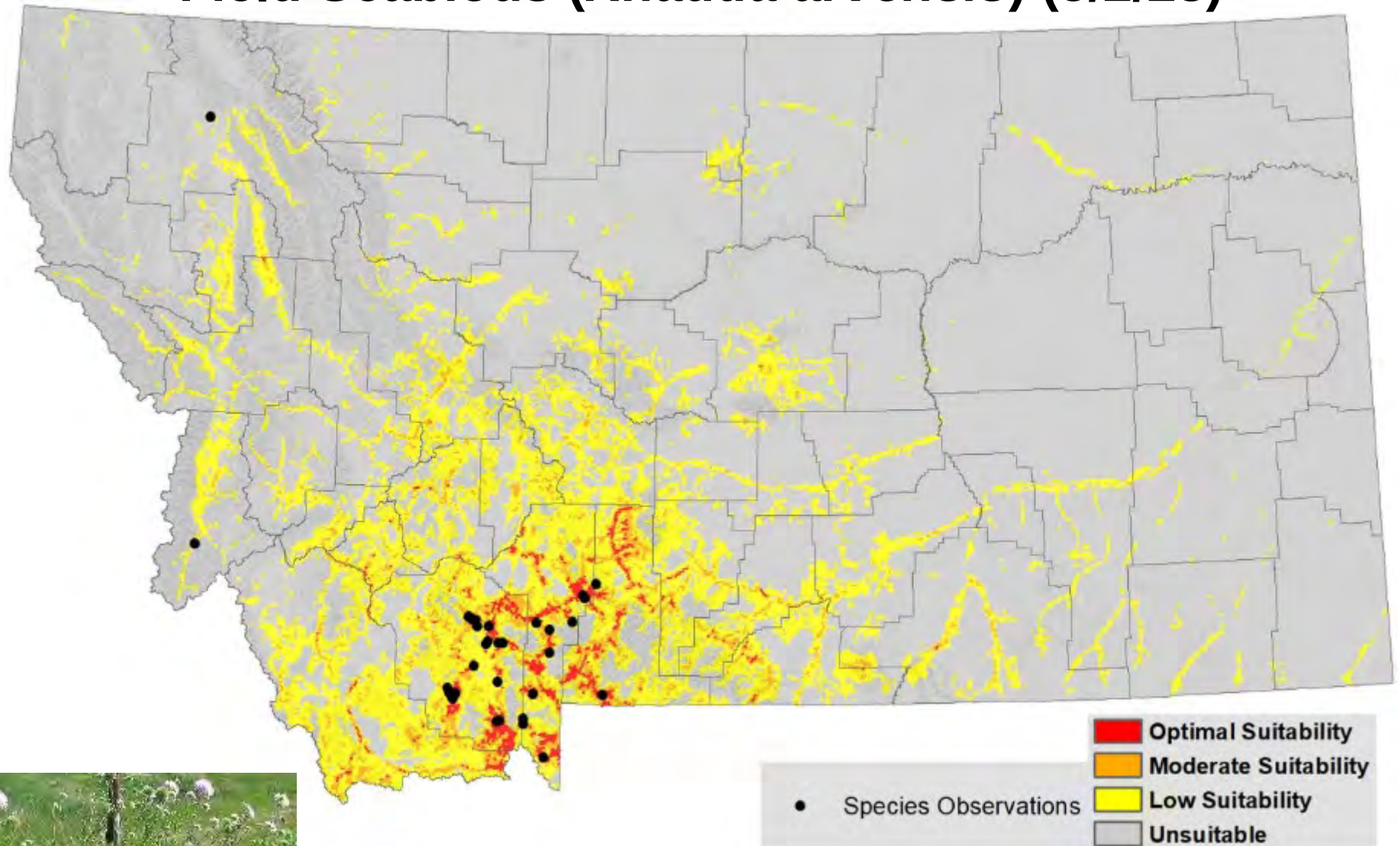
Dwarf Snapdragon (*Chaenorhinum minus*) (4/6/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.077	91,006	24%
Moderate	0.185	75,620	20%
Optimal	0.521	7,304	2%

1 County

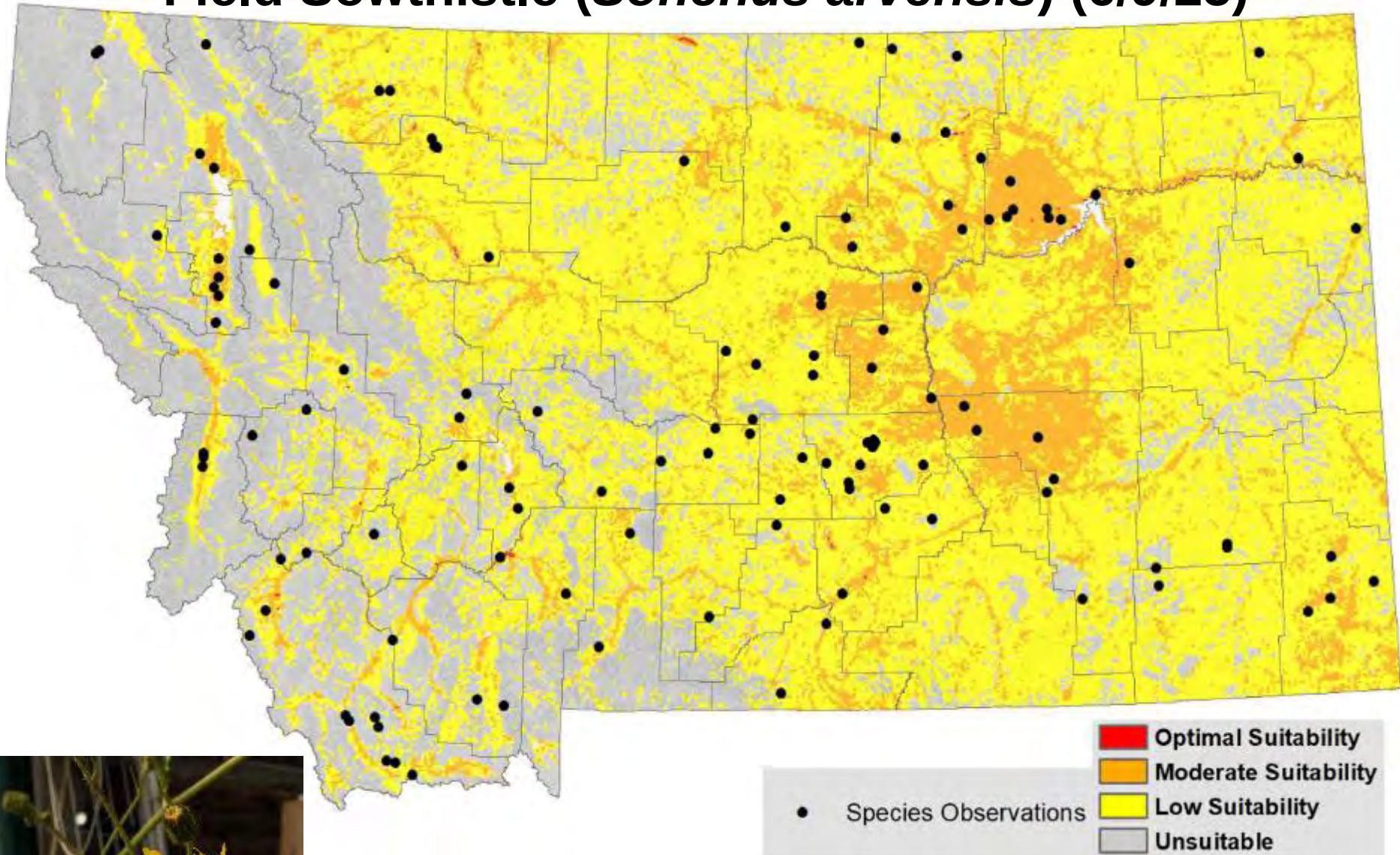
Field Scabious (*Knautia arvensis*) (5/2/23)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.009	37,381	10%
Moderate	0.104	4,970	1%
Optimal	0.248	3,828	1%

6 Counties

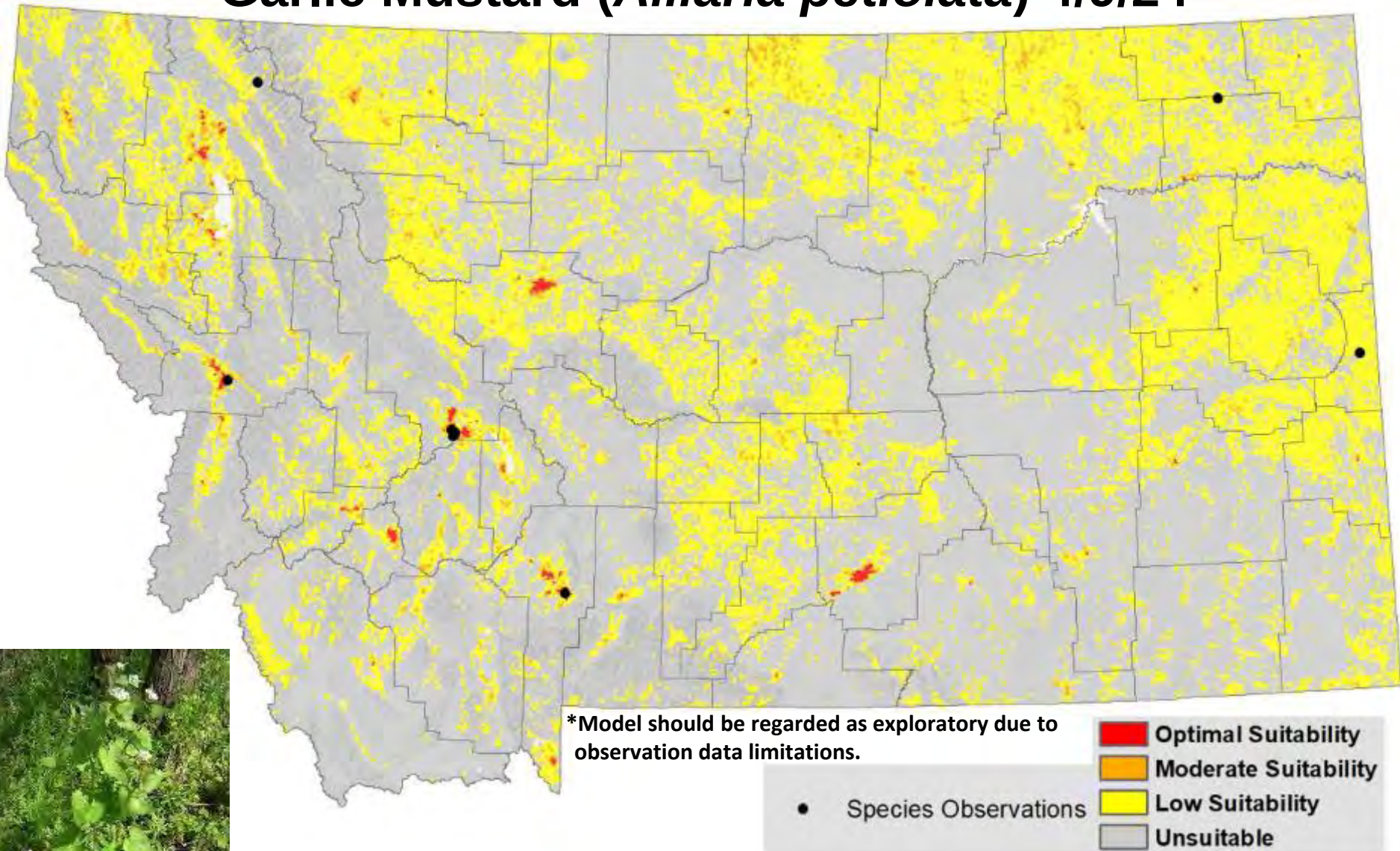
Field Sowthistle (*Sonchus arvensis*) (6/9/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.038	138,652	36%
Moderate	0.190	52,104	14%
Optimal	0.670	4,774	1%

6 Counties

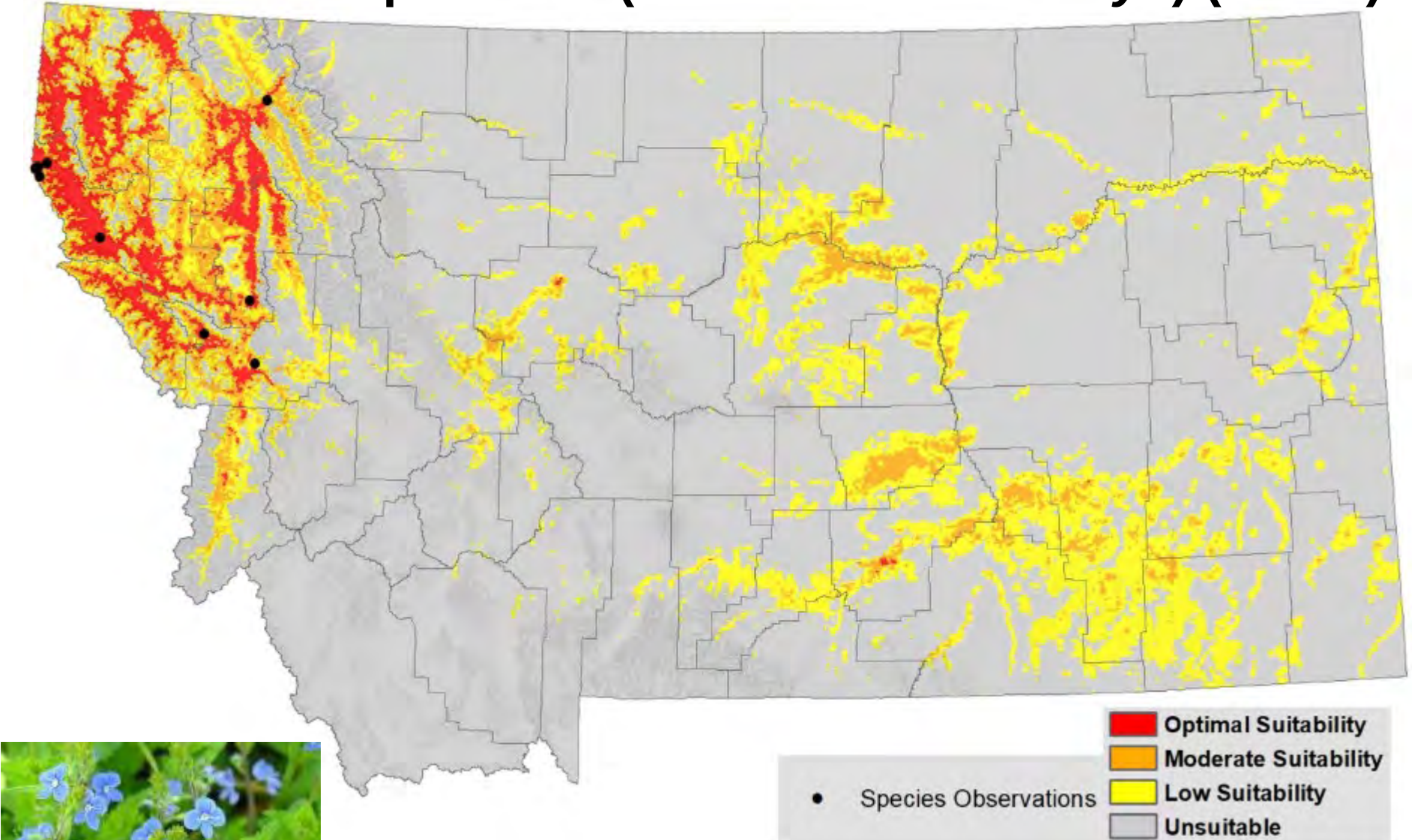
Garlic Mustard (*Alliaria petiolata*) 4/9/24



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.019	62,391	16%
Moderate	0.185	12,789	3%
Optimal	0.449	1,564	<1%

1 County

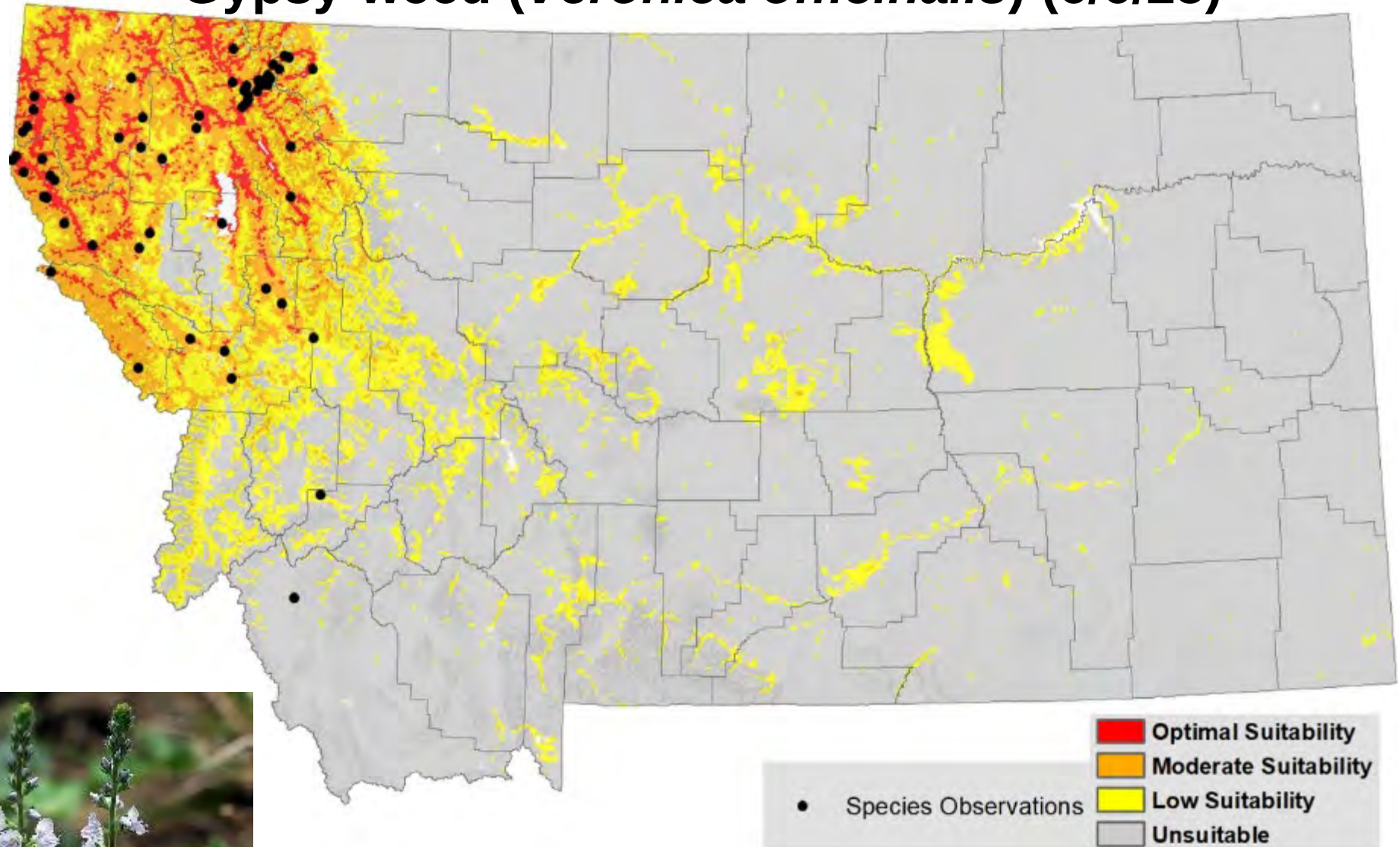
Germander Speedwell (*Veronica chamaedrys*) (5/3/23)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.021	47,274	12%
Moderate	0.079	16,696	4%
Optimal	0.221	9,966	2%

1 County

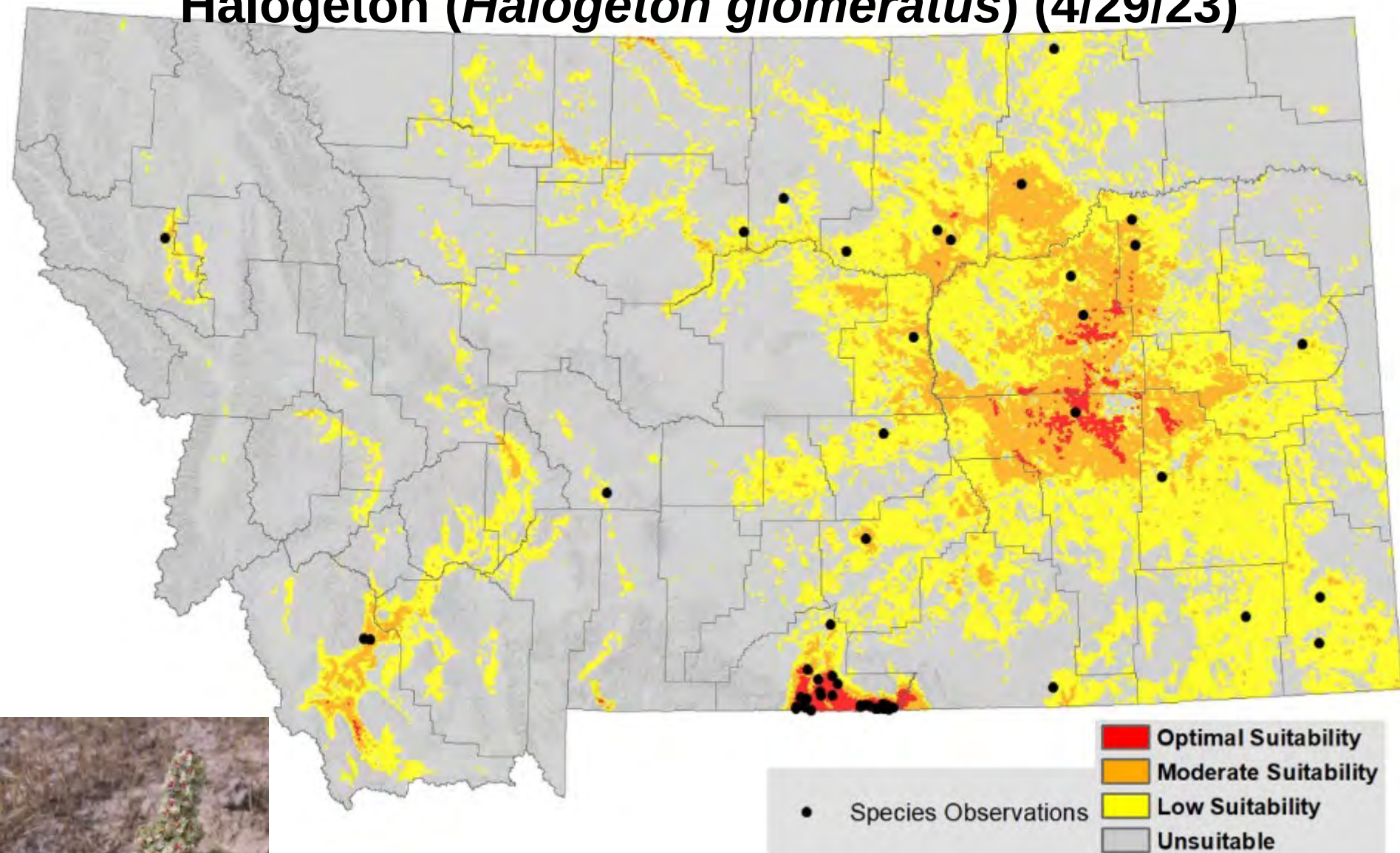
Gypsy-weed (*Veronica officinalis*) (6/6/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	36,046	9%
Moderate	0.115	17,523	5%
Optimal	0.370	9,064	2%

1 County

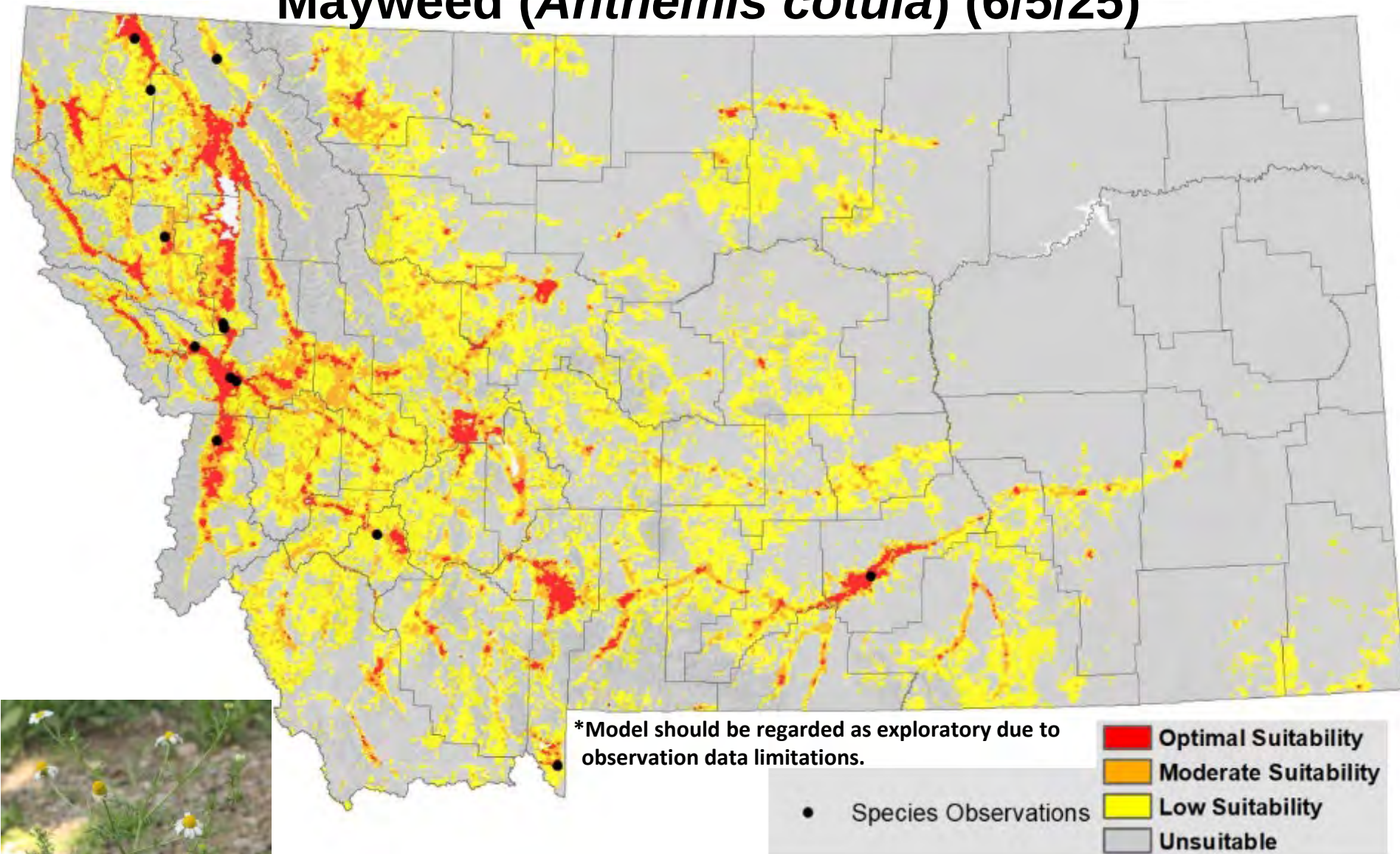
Halogeton (*Halogeton glomeratus*) (4/29/23)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.036	79,146	21%
Moderate	0.220	23,193	6%
Optimal	0.554	3,793	1%

1 County

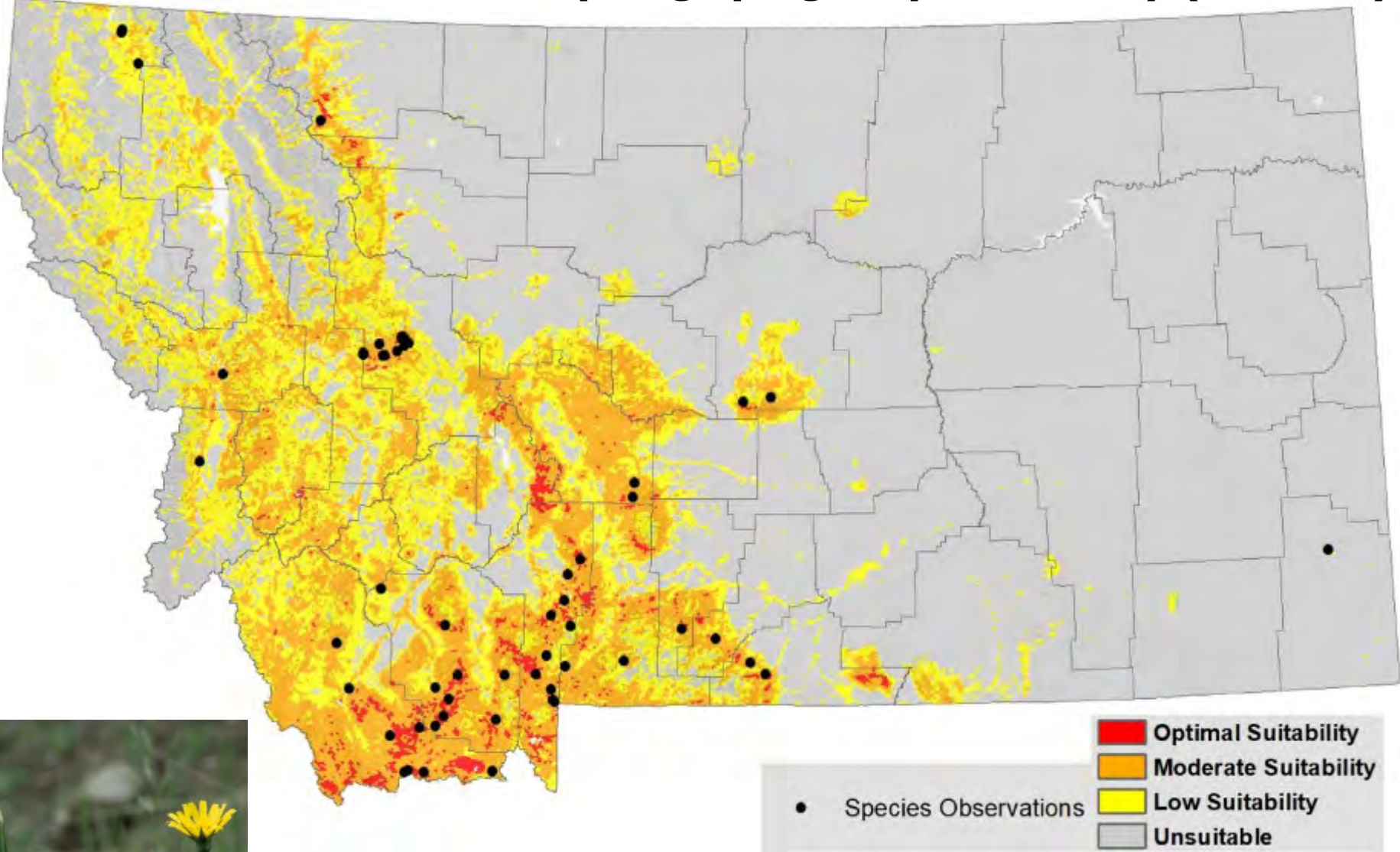
Mayweed (*Anthemis cotula*) (6/5/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.024	55,121	14%
Moderate	0.097	19,741	5%
Optimal	0.264	9,328	2%

1 County

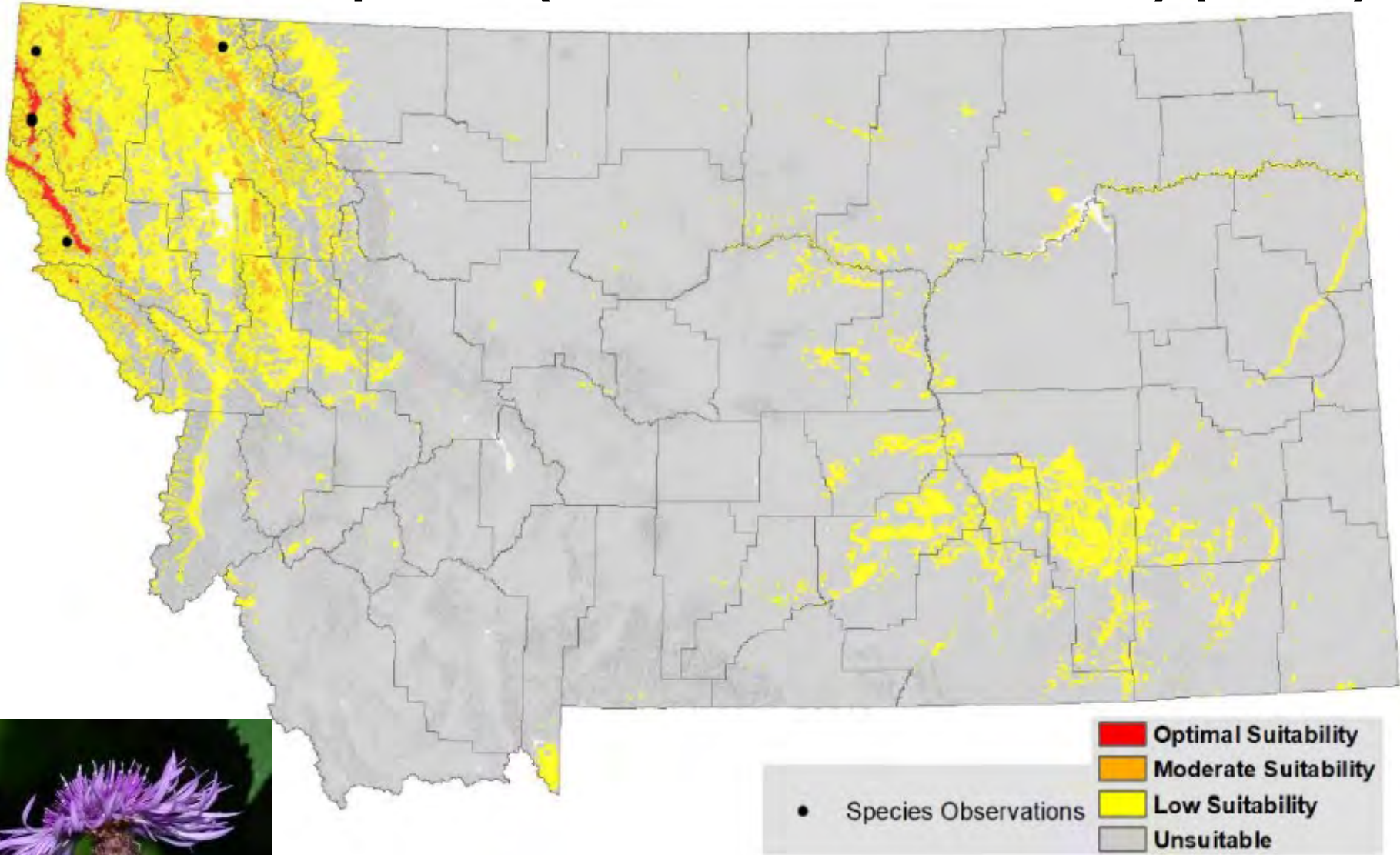
Meadow Goat's-beard (*Tragopogon pratensis*) (5/28/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.036	44,653	12%
Moderate	0.135	32,372	9%
Optimal	0.449	9,280	2%

1 County

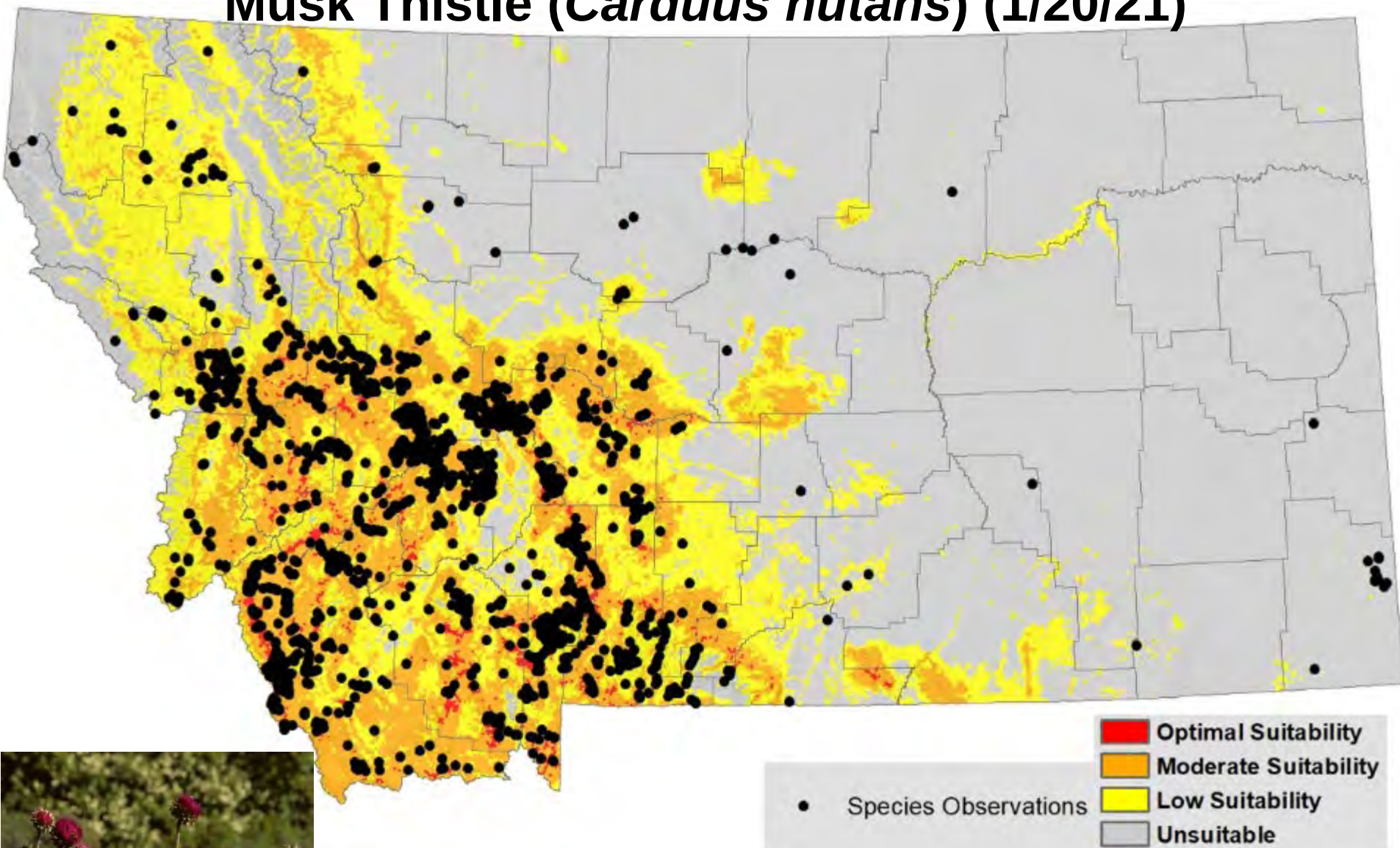
Meadow Knapweed (*Centaurea x moncktonii*) (6/4/26)



Suitability	Logistic Cutoff	Area in Km²	% of MT
Low	0.005	35,642	9%
Moderate	0.097	3,864	1%
Optimal	0.333	1,055	<1%

1 County

Musk Thistle (*Carduus nutans*) (1/20/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.032	74,272	20%
Moderate	0.167	46,300	12%
Optimal	0.505	10,714	3%

16 Counties

Myrtle Spurge (*Euphorbia myrsinites*)

- County-listed as Noxious by Beaverhead County
- Model not constructed due to lack of records and lack of evidence of escape from horticultural plantings
- Horticultural record in Missoula County

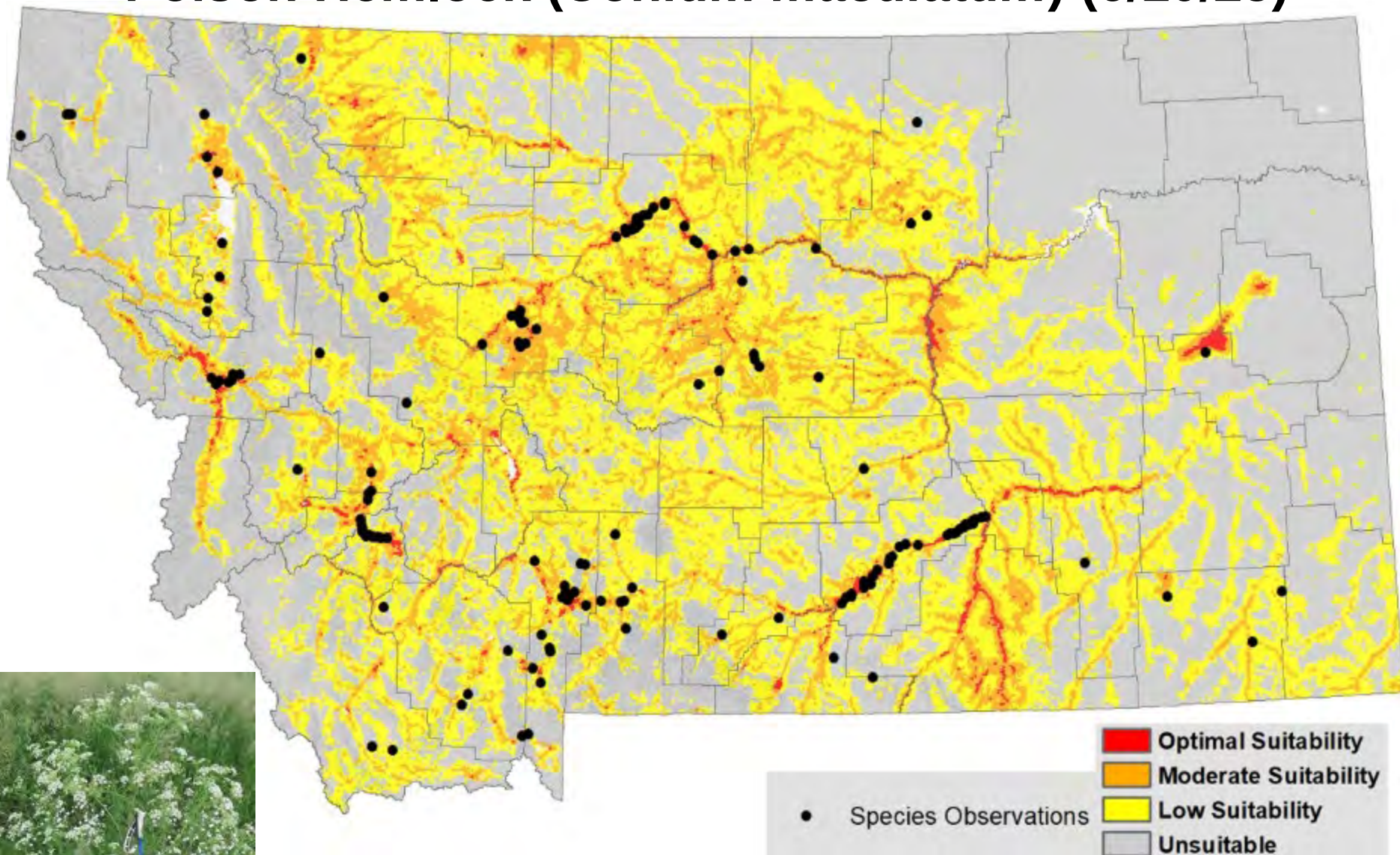


Pacific Mosquito Fern (*Azolla filiculoides*)

- **County-listed as Noxious by Lake County**
- **Model not constructed due to lack of records**



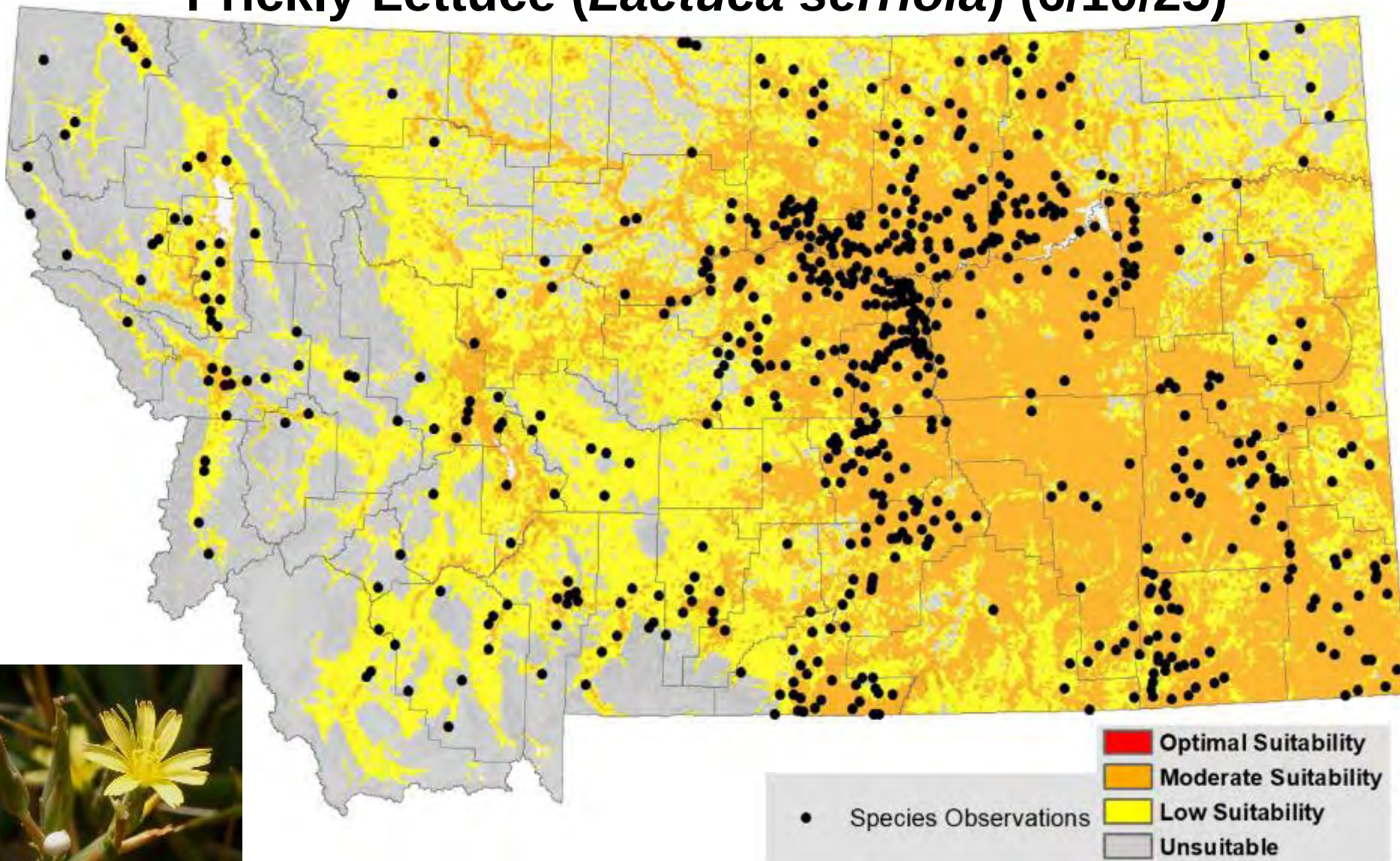
Poison Hemlock (*Conium maculatum*) (6/10/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.023	111,449	29%
Moderate	0.125	31,484	8%
Optimal	0.412	8,029	2%

14 Counties

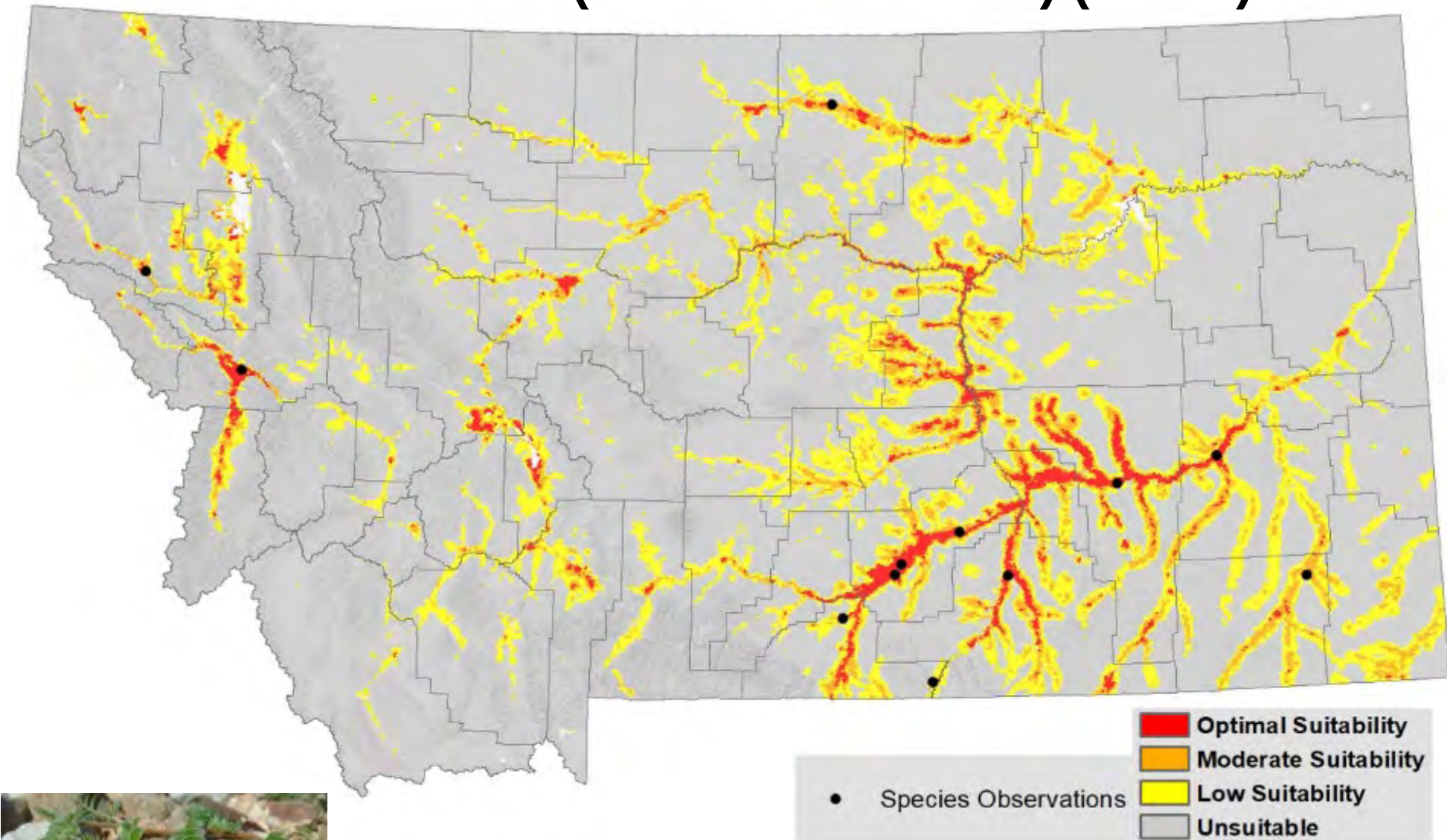
Prickly Lettuce (*Lactuca serriola*) (6/10/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.047	96,455	25%
Moderate	0.226	134,255	35%
Optimal	0.831	846	<1%

2 Counties

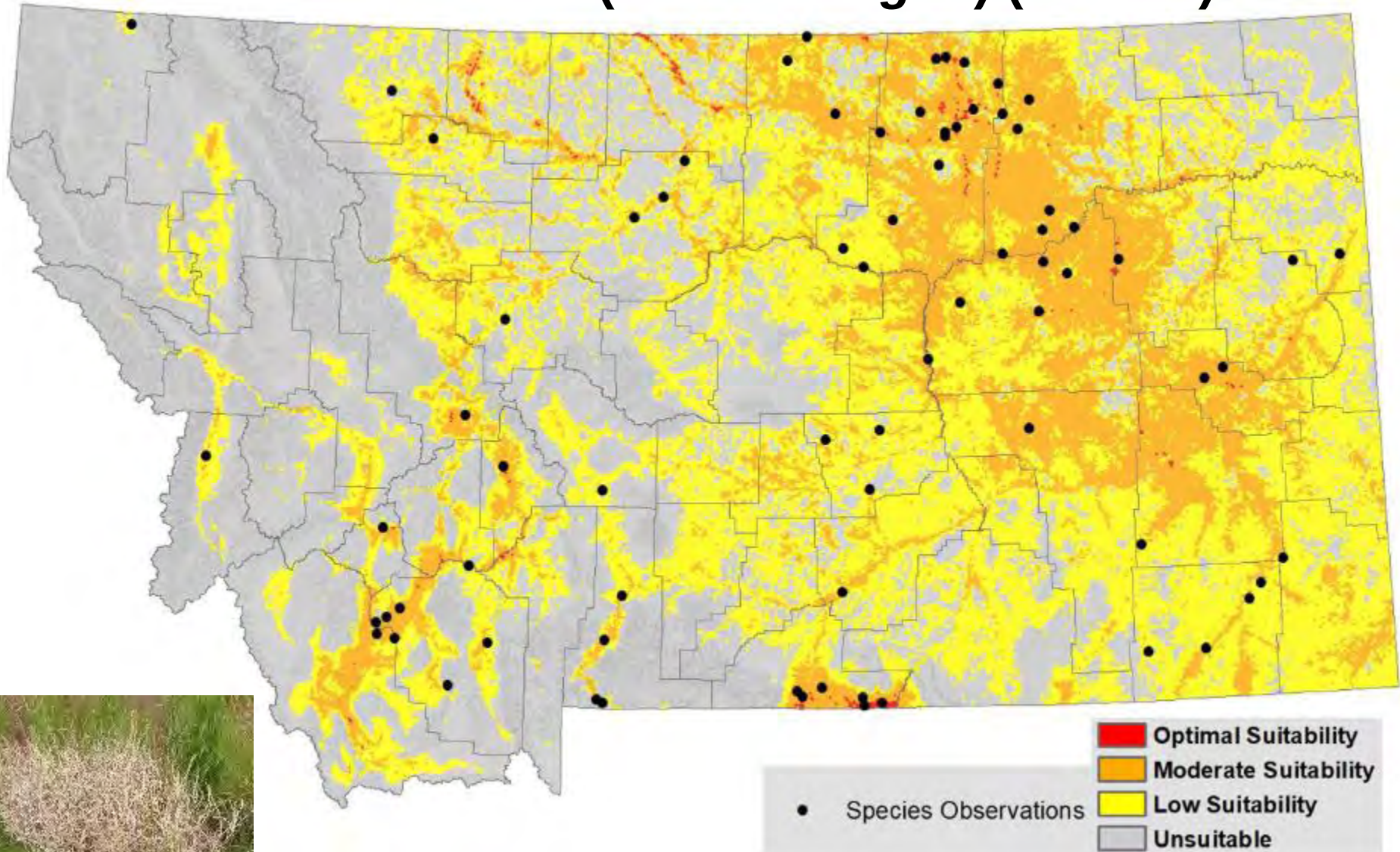
Puncture-vine (*Tribulus terrestris*) (4/6/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.013	37,907	10%
Moderate	0.092	11,267	3%
Optimal	0.211	7,780	2%

3 Counties

Russian Thistle (*Salsola tragus*) (4/29/23)

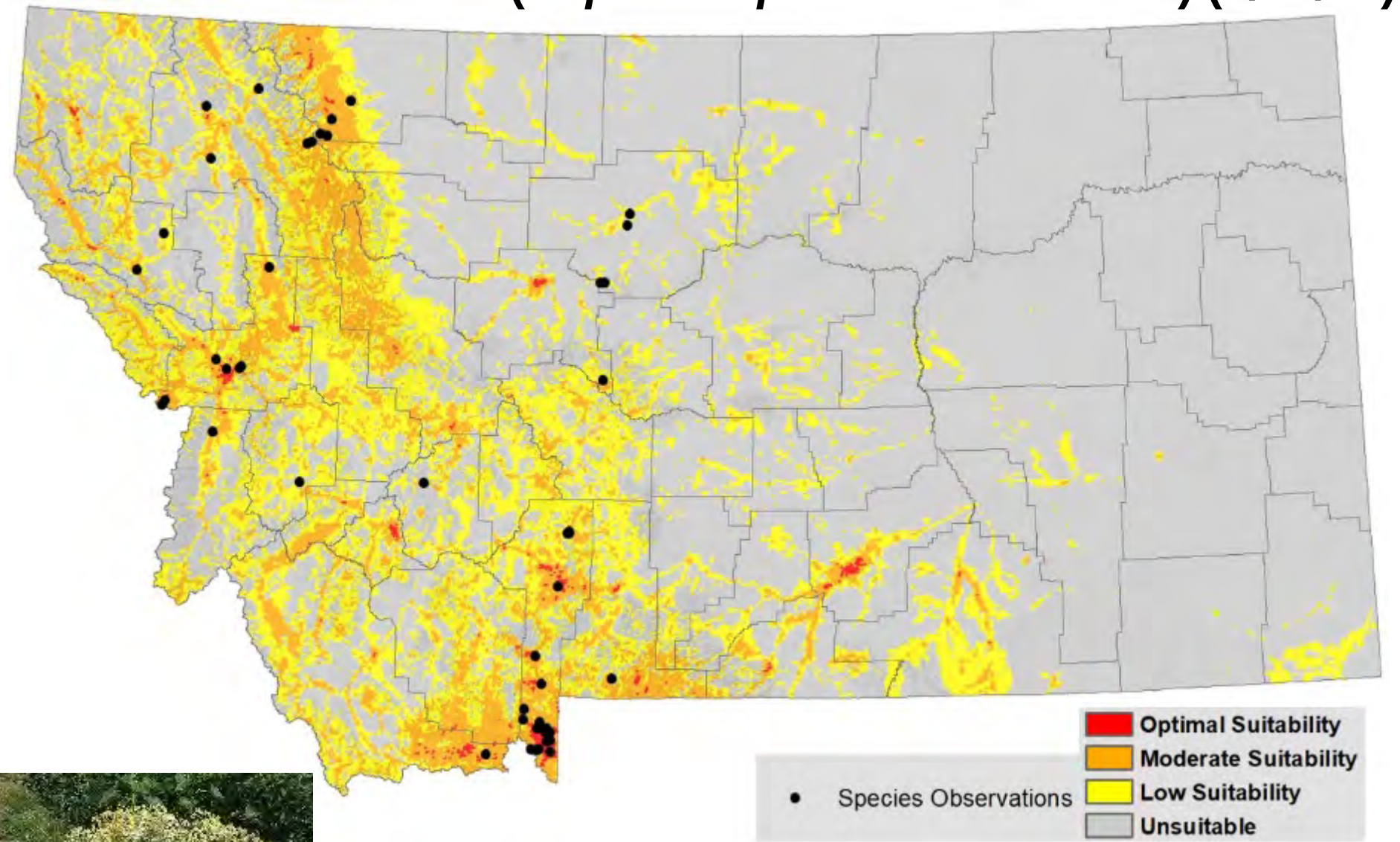


© Matt Lavin

Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.042	107,005	28%
Moderate	0.246	62,111	16%
Optimal	0.671	5,448	1%

1 County

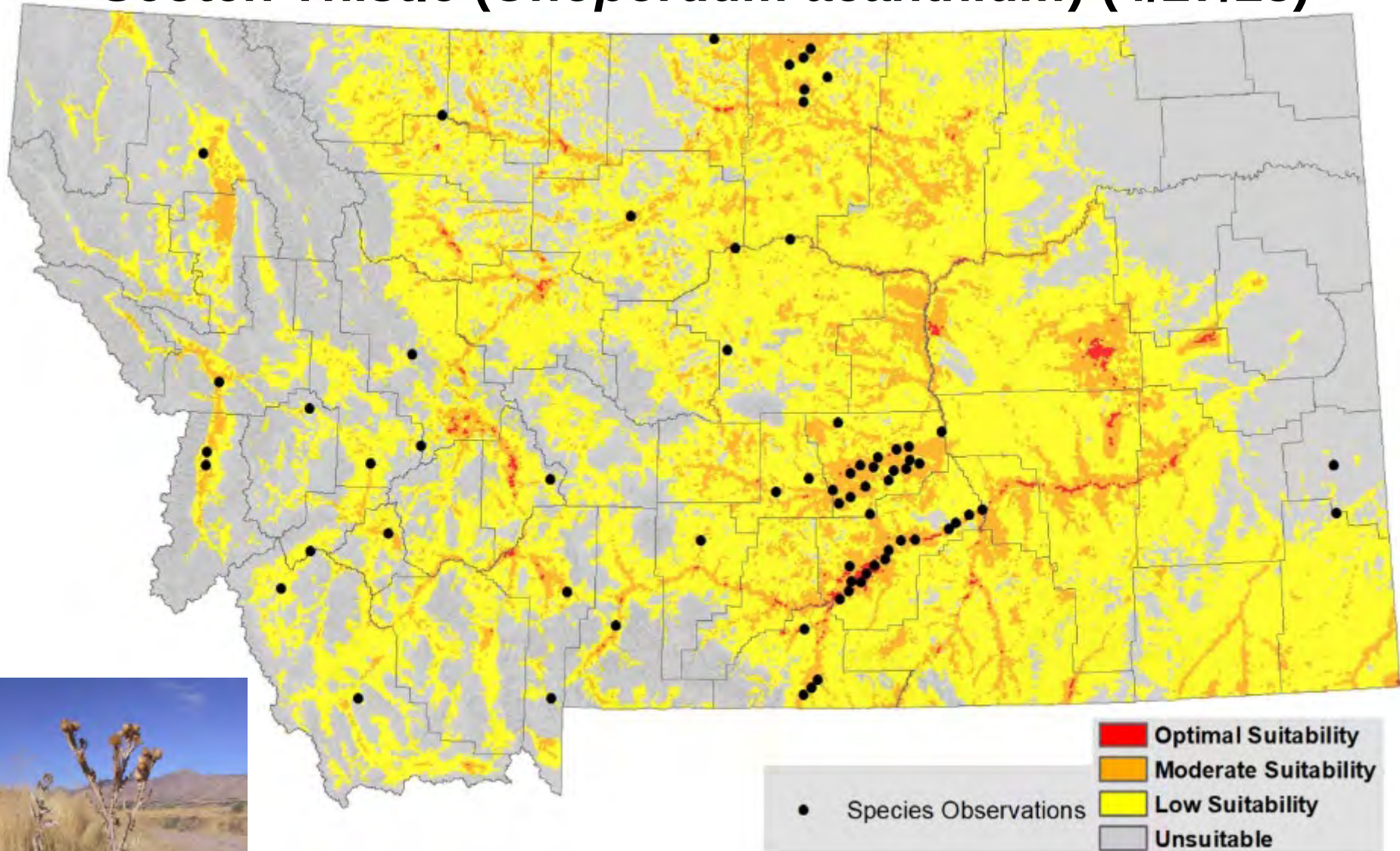
Scentless Chamomile (*Tripleurospermum inodorum*) (4/27/23)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.020	48,004	13%
Moderate	0.075	25,103	7%
Optimal	0.464	3,609	1%

7 Counties

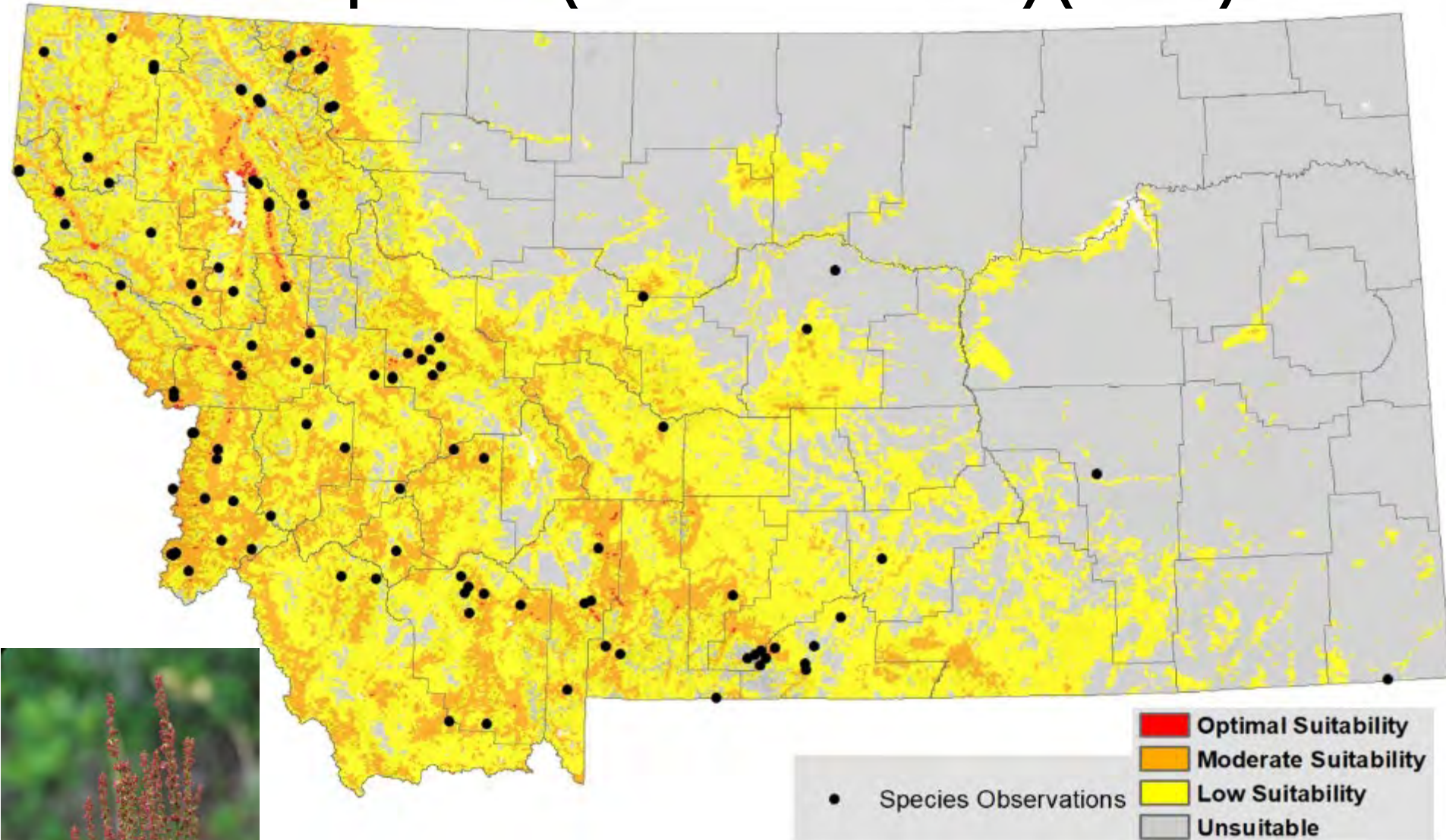
Scotch Thistle (*Onopordum acanthium*) (4/27/23)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.043	137,334	36%
Moderate	0.280	38,870	10%
Optimal	0.647	6,615	2%

10 Counties

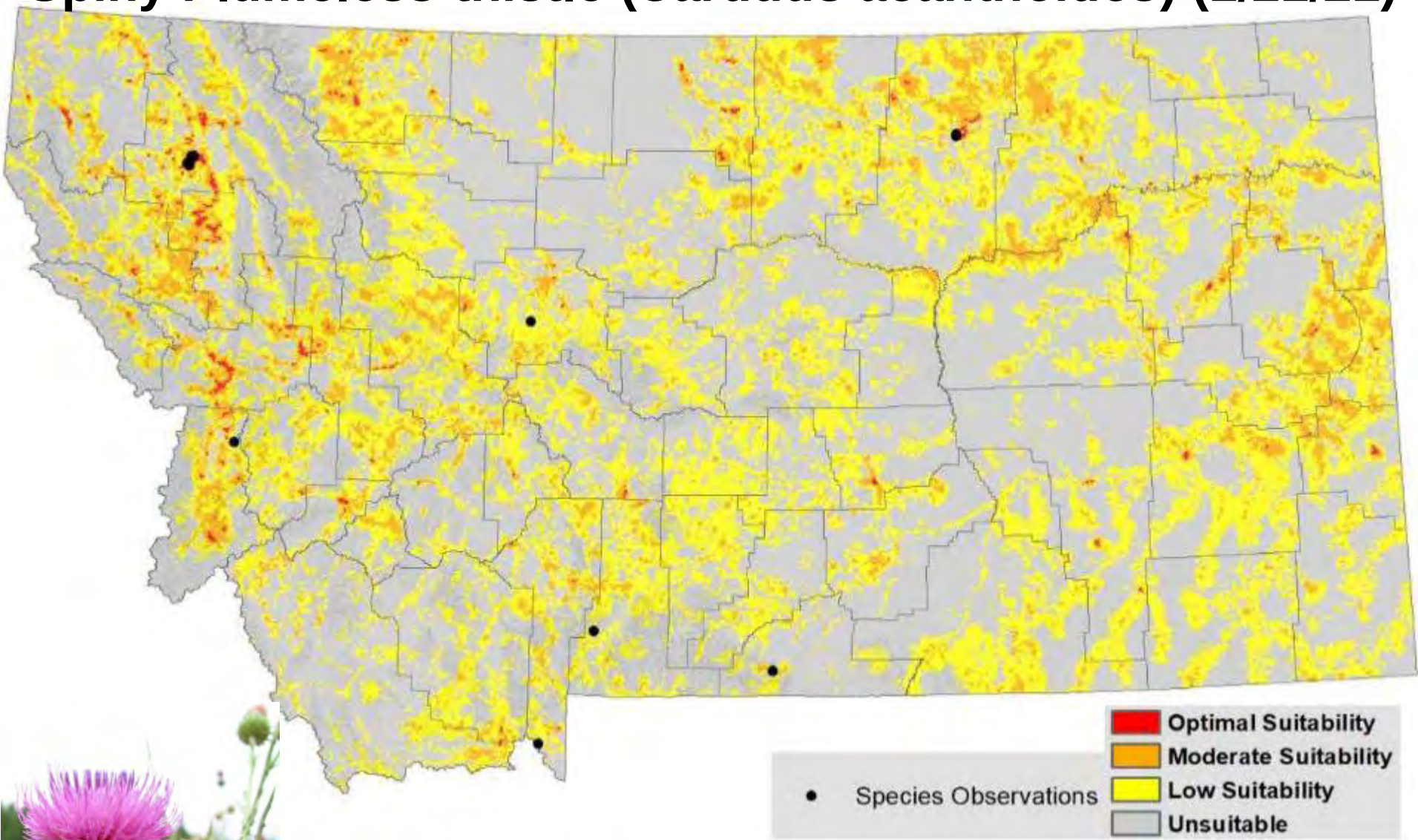
Sheep Sorrel (*Rumex acetosella*) (5/3/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.043	103,202	27%
Moderate	0.211	36,674	10%
Optimal	0.606	5,832	2%

1 County

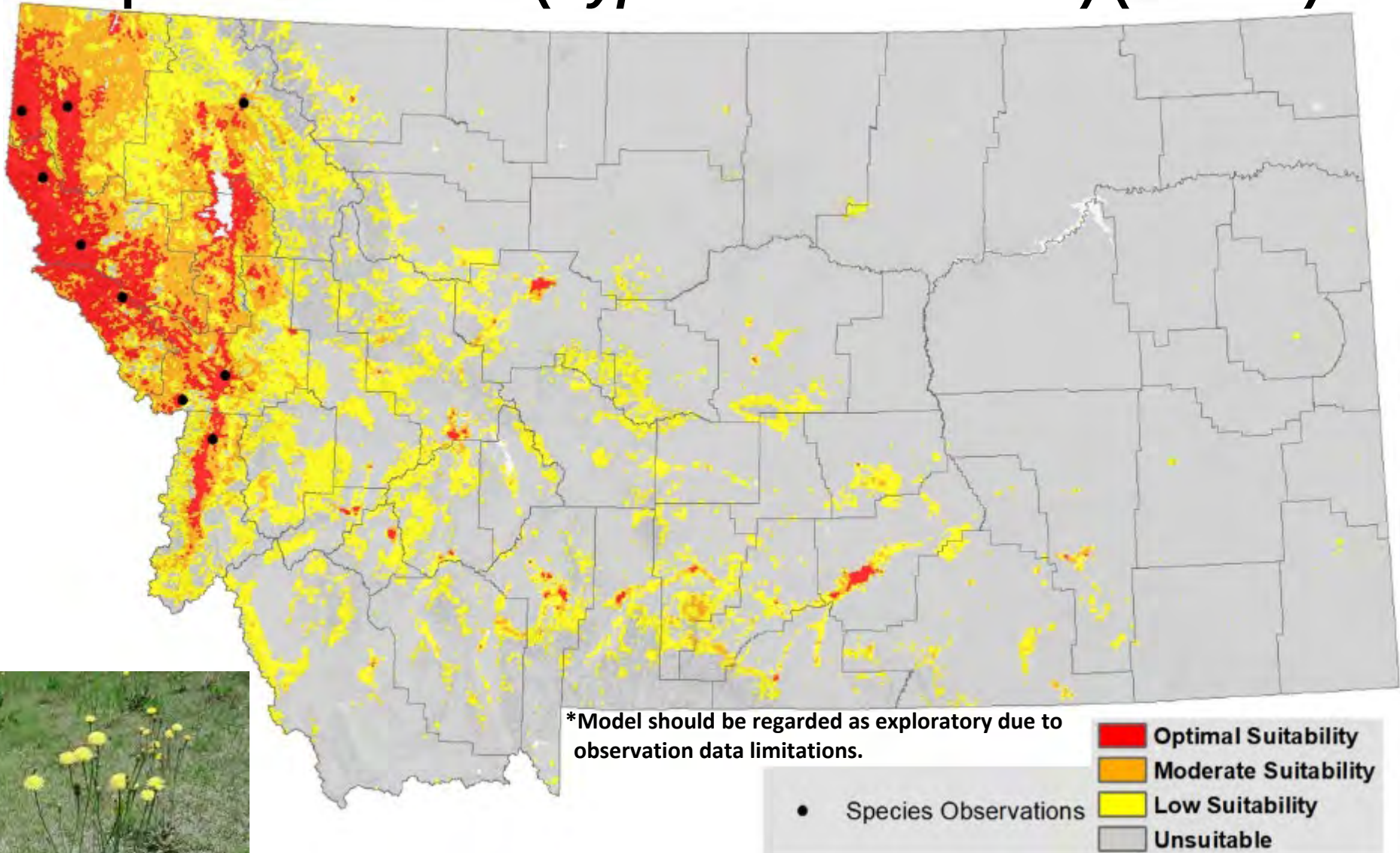
Spiny Plumeless-thistle (*Carduus acanthoides*) (1/21/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.050	79,746	21%
Moderate	0.209	32,844	9%
Optimal	0.503	6,049	2%

1 County

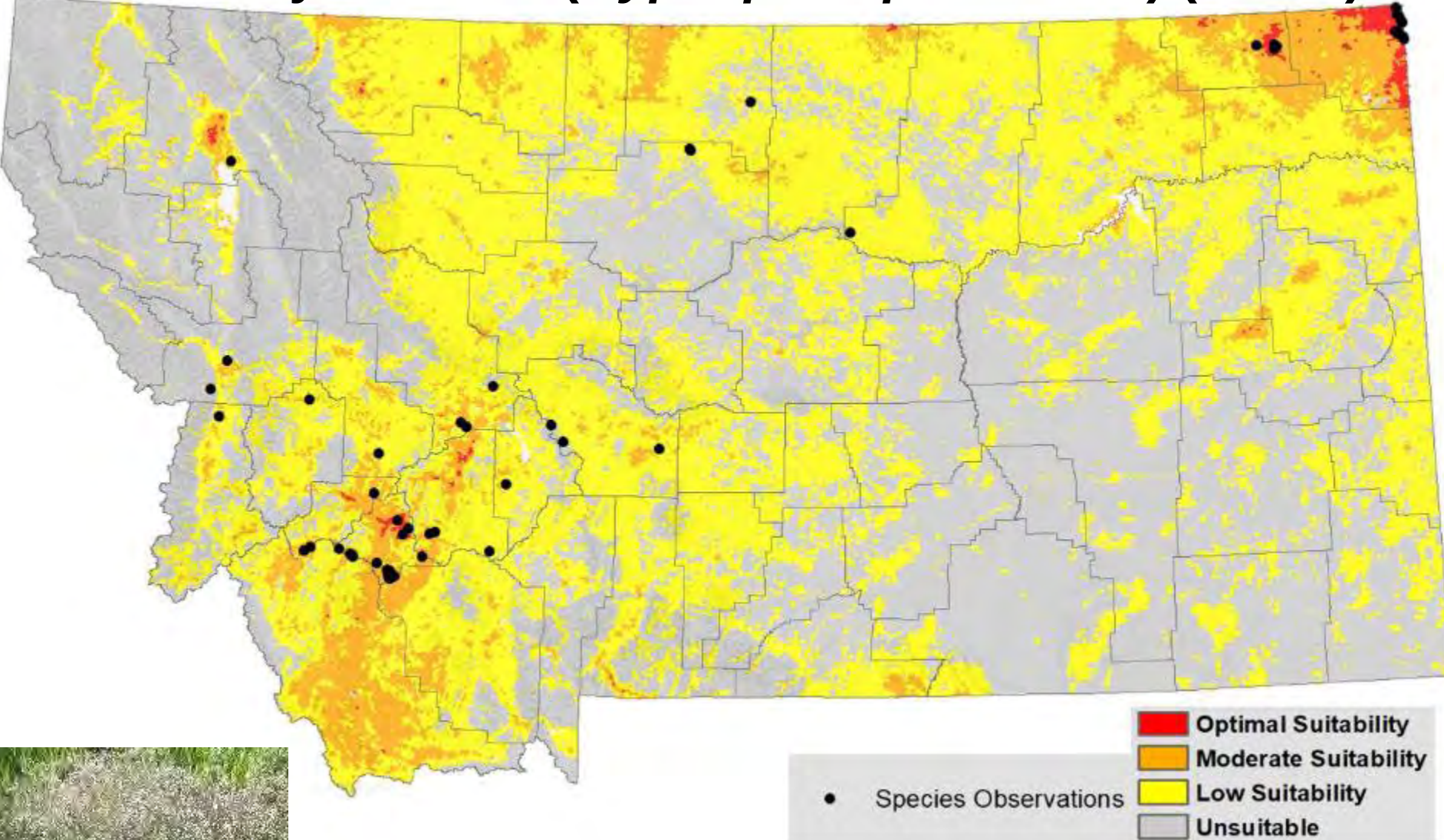
Spotted Cat's-ear (*Hypochaeris radicata*) (6/30/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.022	41,065	11%
Moderate	0.097	15,614	4%
Optimal	0.246	12,920	3%

1 County

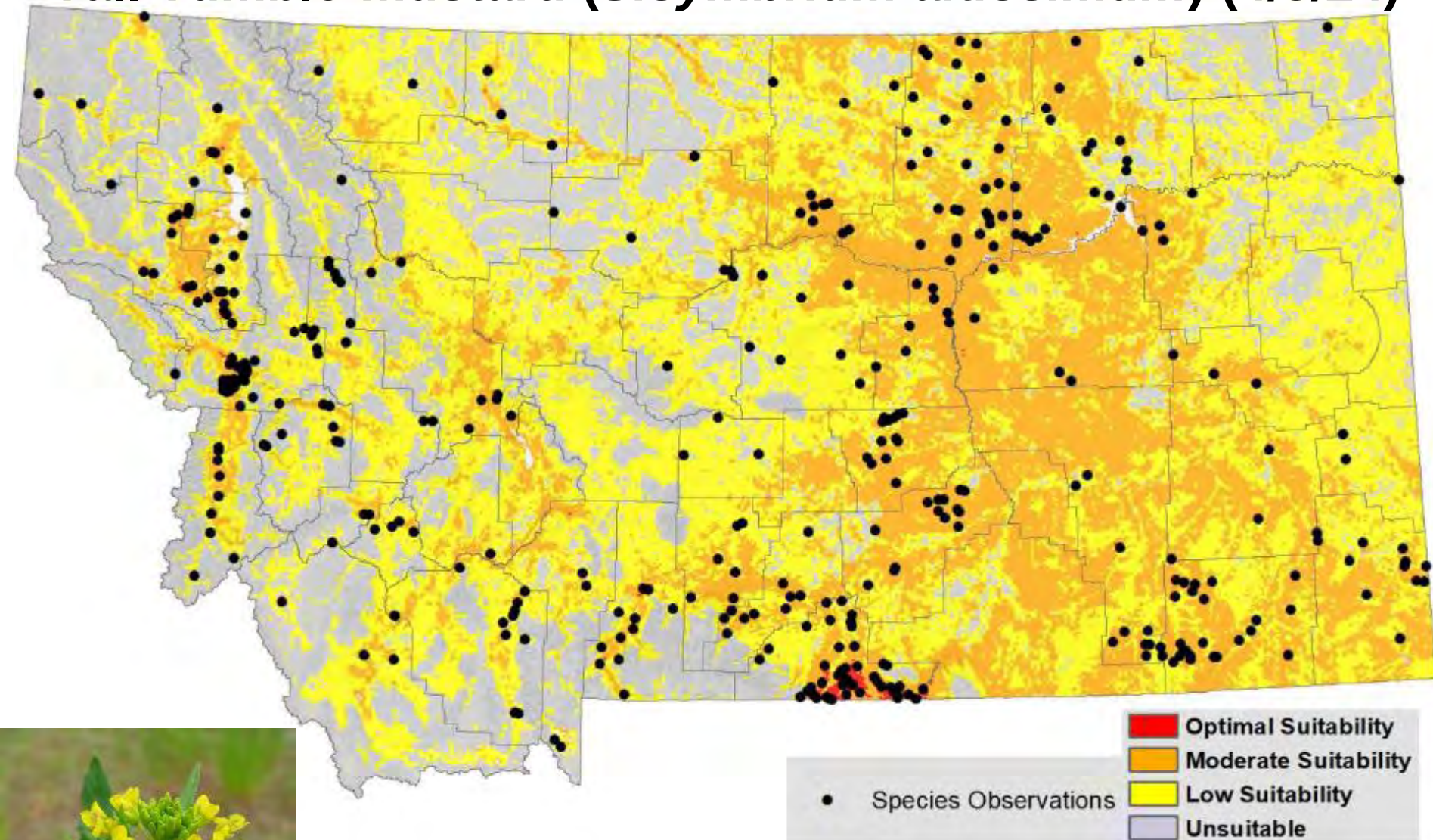
Tall Baby's Breath (*Gypsophila paniculata*) (4/7/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.011	139,758	37%
Moderate	0.117	25,577	7%
Optimal	0.485	3,205	<1%

14 Counties

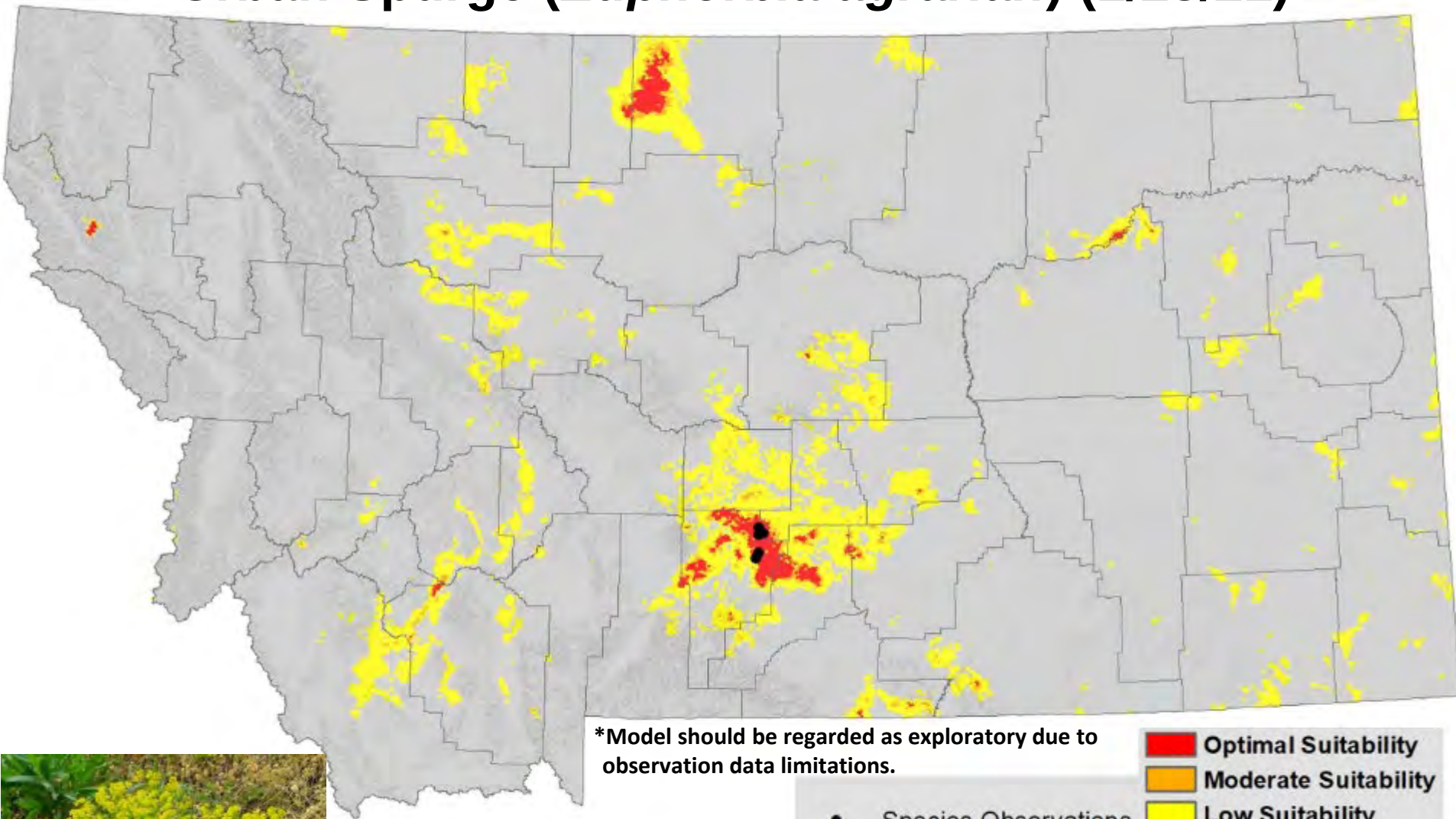
Tall Tumble-mustard (*Sisymbrium altissimum*) (4/8/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.069	122,619	32%
Moderate	0.328	105,505	28%
Optimal	0.770	3,316	1%

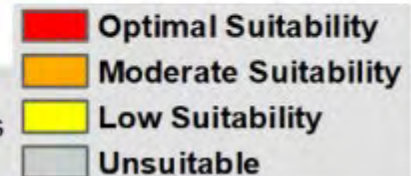
1 County

Urban Spurge (*Euphorbia agrarian*) (1/28/21)



*Model should be regarded as exploratory due to observation data limitations.

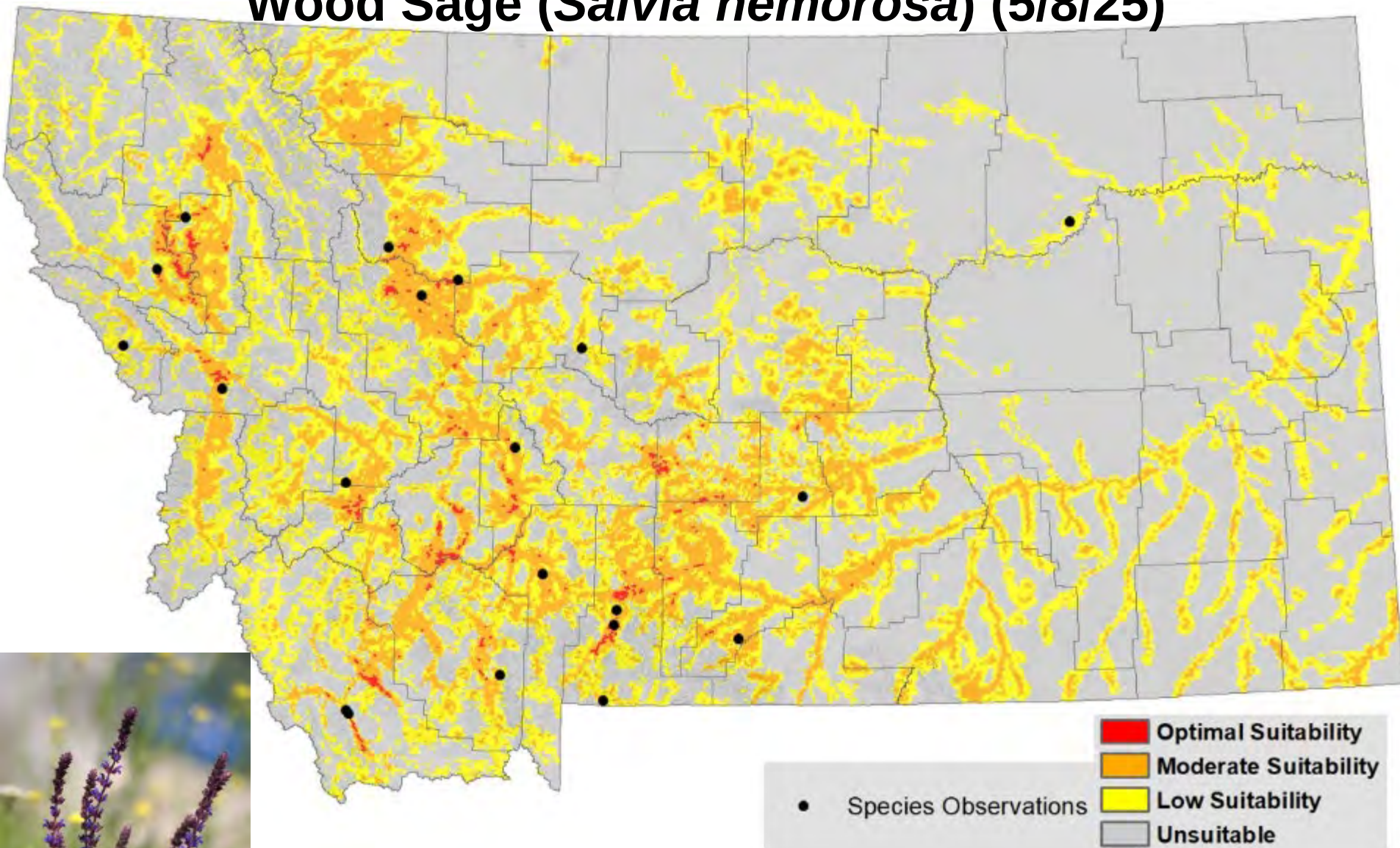
• Species Observations



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.002	20,189	5%
Moderate	0.062	1,291	<1%
Optimal	0.121	1,934	<1%

1 County

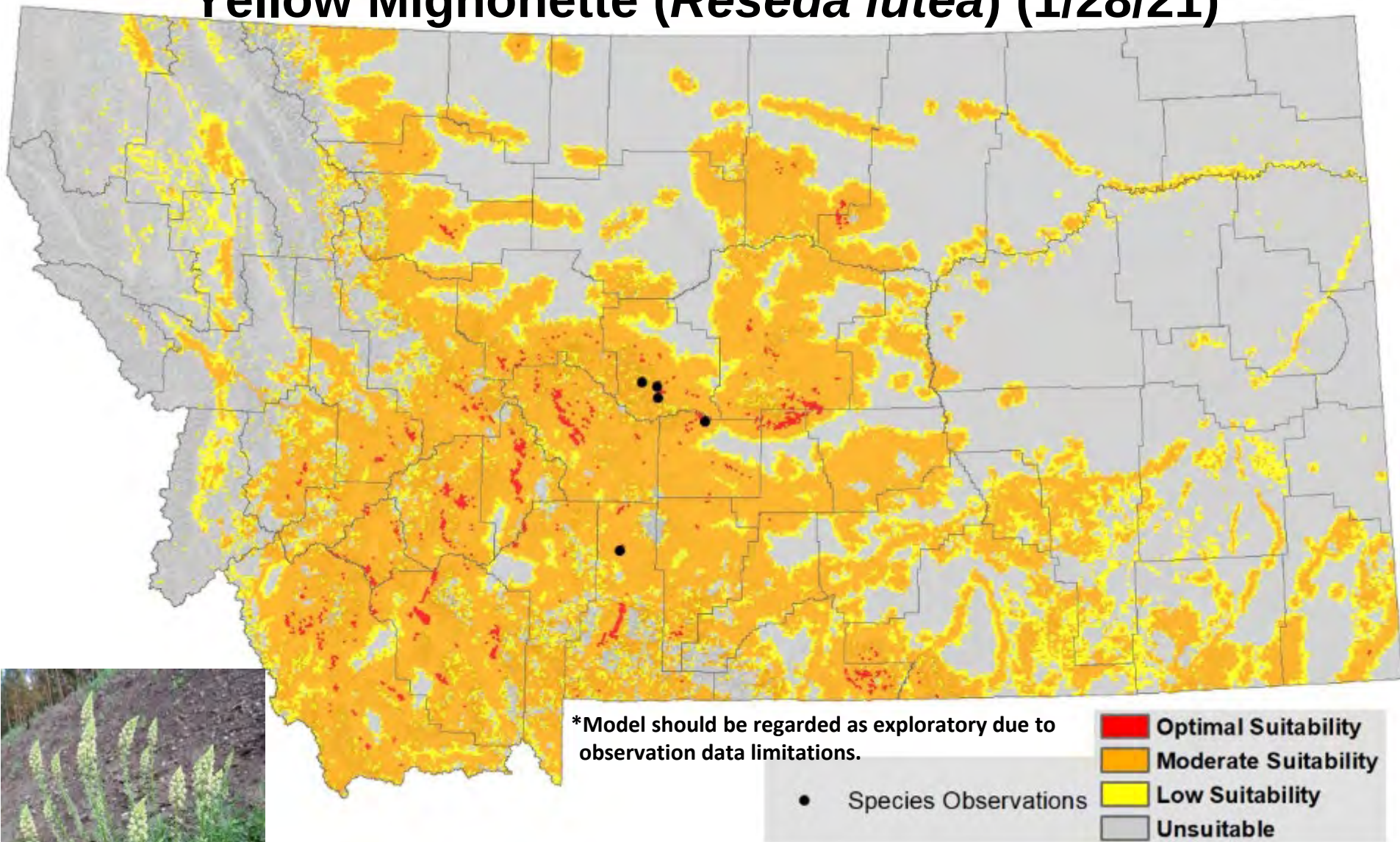
Wood Sage (*Salvia nemorosa*) (5/8/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.090	73,471	19%
Moderate	0.222	71,649	19%
Optimal	0.755	2,626	<1%

1 County

Yellow Mignonette (*Reseda lutea*) (1/28/21)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.078	42,451	11%
Moderate	0.132	103,526	27%
Optimal	0.485	9,723	3%

3 Counties

Weeds Listed in Surrounding States and Provinces of Potential Concern

Alberta

<https://www.alberta.ca/provincially-regulated-weeds.aspx#jumplinks-2>

<https://open.alberta.ca/publications/distribution-of-regulated-weeds-in-alberta>

British Columbia

<https://bcinvasives.ca/wp-content/uploads/2023/05/Field-Guide-to-Noxious-Weeds-12th-WEB.pdf>

Idaho

<https://invasivespecies.idaho.gov/plants>

<https://content-hub.uidaho.edu/api/public/content/310aea9f9bcc411ca9c56d8abc934f76?v=cbb20de3>

Montana

<https://agr.mt.gov/Topics/N-P/Noxious-Weeds-Pages/Noxious-Weed-Education>

North Dakota

<https://www.ndda.nd.gov/divisions/plant-industries/noxious-weeds>

Saskatchewan

<https://pubsaskdev.blob.core.windows.net/pubsask-prod/148856/2025-Minister-Order-designating-weeds.pdf>

South Dakota

<https://danr.sd.gov/Conservation/PlantIndustry/WeedPest/WeedandPestInfo>

Wyoming

<https://wyoweed.org/noxious-species/>

Weeds Listed in Surrounding States and Provinces of Potential Concern

- Only yellow highlighted species currently have models.
- Bolded status listings have changed since the 2025 version of this presentation.
- Please let us know if you have a weed or biocontrol species you would like a model developed for! bmaxell@mt.gov

Models can be viewed in the Single Species Overview Task in Map Viewer with agency-level sign in at: <https://mtnhp.org/mapviewer>

Model write ups are available for download at:
<https://mtnhp.org/models/>

You can request geodatabases of model outputs at:
<https://nris.mt.gov/reqapp/userMain.asp>

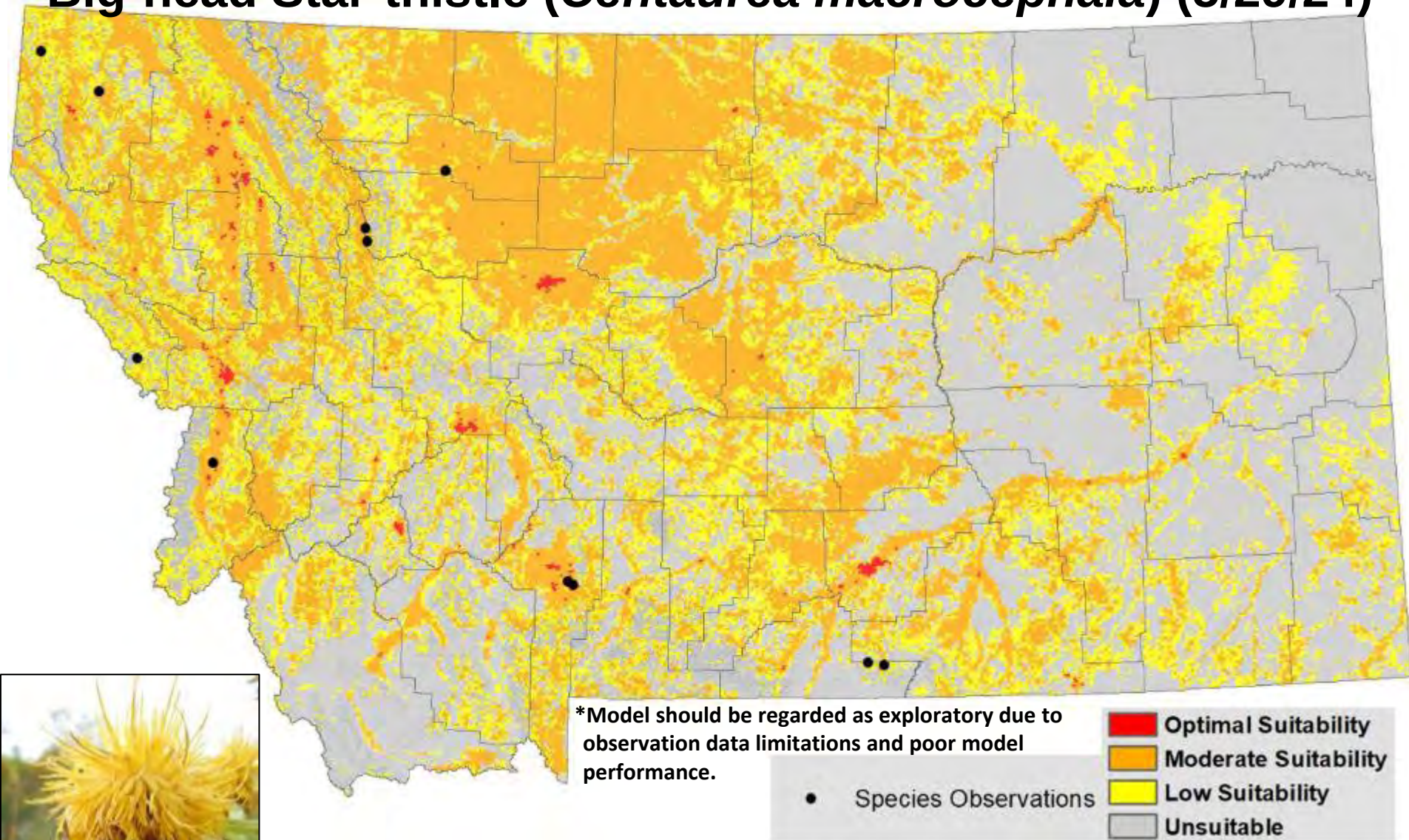
Common Name	MT	ID	B.C.	AB	SK	ND	SD	WY
Autumn-olive				Prohibited Noxious				
Big-head Purple Star-thistle		EDRR						
Big-head Star-thistle				Noxious	Prohibited			
Black Medic					Noxious			
Black Starthistle		Control	Regional Noxious	Noxious				
Black Swallow-wort				Prohibited Noxious				
Blessed Milk-thistle			Noxious					
Brooms (Tagasaste, Escabon, or Tree Lucerne, or French Broom)		Prohibited genera						
Brown Starthistle			Invasive of Concern	Noxious	Prohibited			
Buffalo Bur (native to eastern MT)		Control						
Bur Chervil			Noxious					
Celandine			Invasive of Concern					
Chufa Flatsedge			Noxious	Prohibited Noxious				
Clasping Pepper-grass			Regional Noxious		Noxious			
Climbing Nightshade			Invasive of Concern					
Clover Dodder			Noxious					
Cogon Satintail		EDRR						
Common Crown-vetch					Prohibited			
Common Dandelion					Nuisance			
Common Frogbit		EDRR						
Common Hawkweed				Prohibited Noxious				
Common Milkpea		EDRR						
Common Sowthistle			Noxious		Nuisance			
Cordgrass			Noxious					
Corn Mustard			Regional Noxious					
Creeping Buttercup			Invasive of Concern					

Common Name	MT	ID	B.C.	AB	SK	ND	SD	WY
Dame's Rocket				Noxious	Noxious			
Dwarf Cheeseweed			Invasive of Concern					
European Barberry				Prohibited Noxious	Prohibited			
Field Pepper-grass			Regional Noxious					
Fig-root Buttercup			Invasive of Concern					
Garden Pepper-grass					Noxious			
Giant Foxtail					Prohibited			
Giant Hogweed		EDRR	Noxious	Prohibited Noxious	Prohibited			
Giant Reed			Invasive of Concern					
Giant Salvinia		EDRR						
Globe-podded Whitetop			Regional Noxious	Noxious	Noxious			
Golden Virgin's-bower				Noxious				
Gorse			Noxious					
Greater Burdock			Regional Noxious	Noxious				
Grecian Foxglove							Watch	
Green Bristle Grass			Regional Noxious					
Ground-cherry Nightshade			Invasive of Concern					
Hairy Cupgrass					Prohibited			
Harmal Peganum				Prohibited Noxious	Prohibited			
Himalayan Blackberry			Invasive of Concern					
Himalayan Knotweed			Noxious					
Hybrid Knapweed				Noxious				
Iberian Starthistle		EDRR						
Japanese Brome				Noxious	Noxious			
Jimsonweed				Prohibited Noxious				

Common Name	MT	ID	B.C.	AB	SK	ND	SD	WY
Johnson Grass		Control						
Jointed Goatgrass		Containment	Noxious	Prohibited Noxious	Prohibited			
Lenspod Whitetop			Regional Noxious	Noxious	Noxious			
Maiden's-tears			Regional Noxious		Prohibited			
Marsh Thistle				Prohibited Noxious				
Meadow Goat's-beard			Invasive of Concern		Nuisance			
Mediterranean Sage		Control						
Milium		Containment						
Moor Matgrass		Control						
Mouse-ear Hawkweed			Invasive of Concern	Prohibited Noxious				
Narrowleaf Hawksbeard					Noxious			
Night-flowering Catchfly			Regional Noxious		Noxious			
Palmer's Amaranth				Prohibited Noxious	Prohibited	Noxious		Noxious
Persian Ryegrass				Prohibited	Noxious			
Policeman's Helmet		EDRR	Invasive of Concern	Prohibited Noxious	Prohibited			
Purple Flatsedge			Noxious					
Quackgrass			Regional Noxious		Nuisance			Noxious
Red Odontites				Prohibited Noxious	Prohibited		Watch	
Reed Mannagrass			Noxious					
Roughfruit Amaranth				Prohibited Noxious	Prohibited			
Running Cheeseweed					Noxious			
Shining Crane's-bill			Invasive of Concern					
Short-fringe Star-thistle				Noxious				
Skeleton-leaf Bursage								Noxious
Slender False Brome			Invasive of Concern					

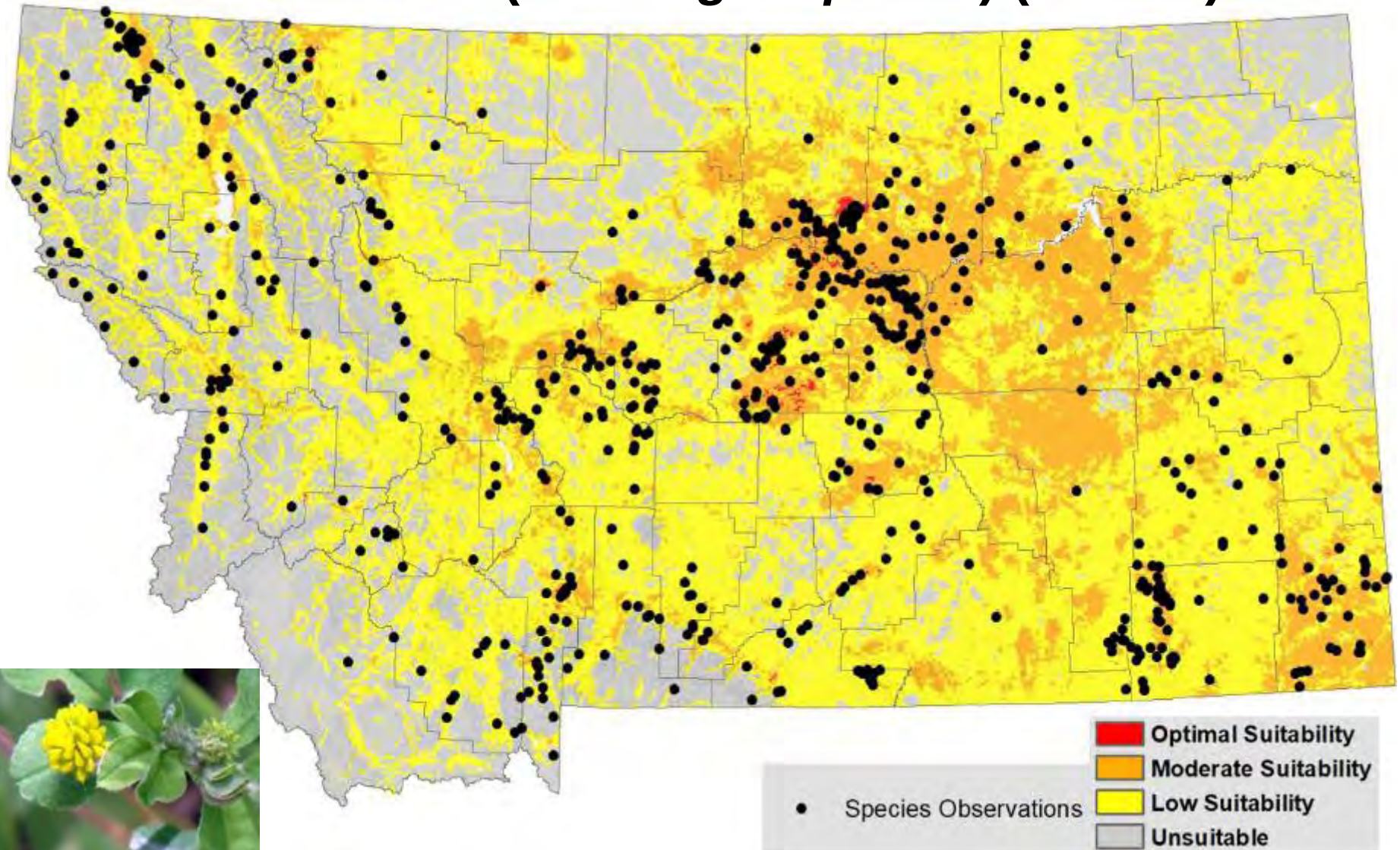
Common Name	MT	ID	B.C.	AB	SK	ND	SD	WY
Small Bugloss		Control						
Smallflower Tamarisk				Prohibited Noxious				
Small-seed Alfalfa Dodder			Noxious					
Spiny-leaf Sowthistle					Nuisance			
Spotted Hawkweed				Prohibited Noxious				
Squarrose Knapweed		EDRR		Noxious	Prohibited			
Stork's Bill					Noxious			
Syrian Bean-caper		EDRR						
Thesium arvense				Prohibited Noxious				
Turkish Thistle		EDRR						
Velvet-leaf			Noxious					
Viperine					Prohibited			
Water Chestnut		EDRR						
Wall Hawkweed				Prohibited Noxious				
Whiplash Hawkweed			Invasive of Concern					
White Bryony		Containment						
Wild Carrot				Prohibited Noxious				
Wild Chervil			Regional Noxious		Prohibited			
Wild Oats			Noxious					
Wild Parsnip			Invasive of Concern		Noxious			
Woolly Burdock			Regional Noxious	Noxious	Noxious			
Yellow Arch-angel			Invasive of Concern					
Yellow Devil Hawkweed		EDRR						

Big-head Star-thistle (*Centaurea macrocephala*) (5/29/24)



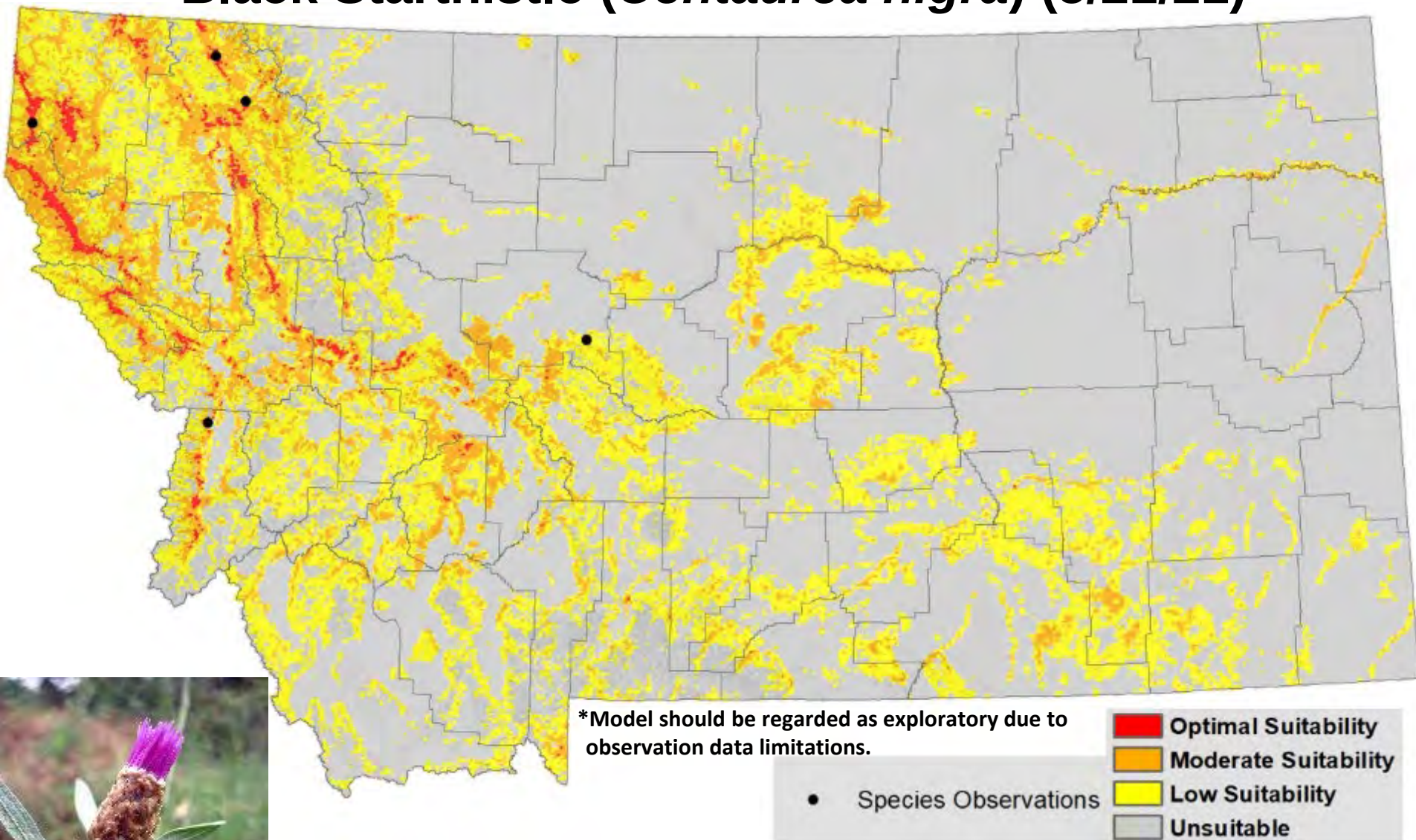
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.129	53,932	14%
Moderate	0.252	112,345	30%
Optimal	0.661	3,463	1%

Black Medic (*Medicago lupulina*) (6/12/25)



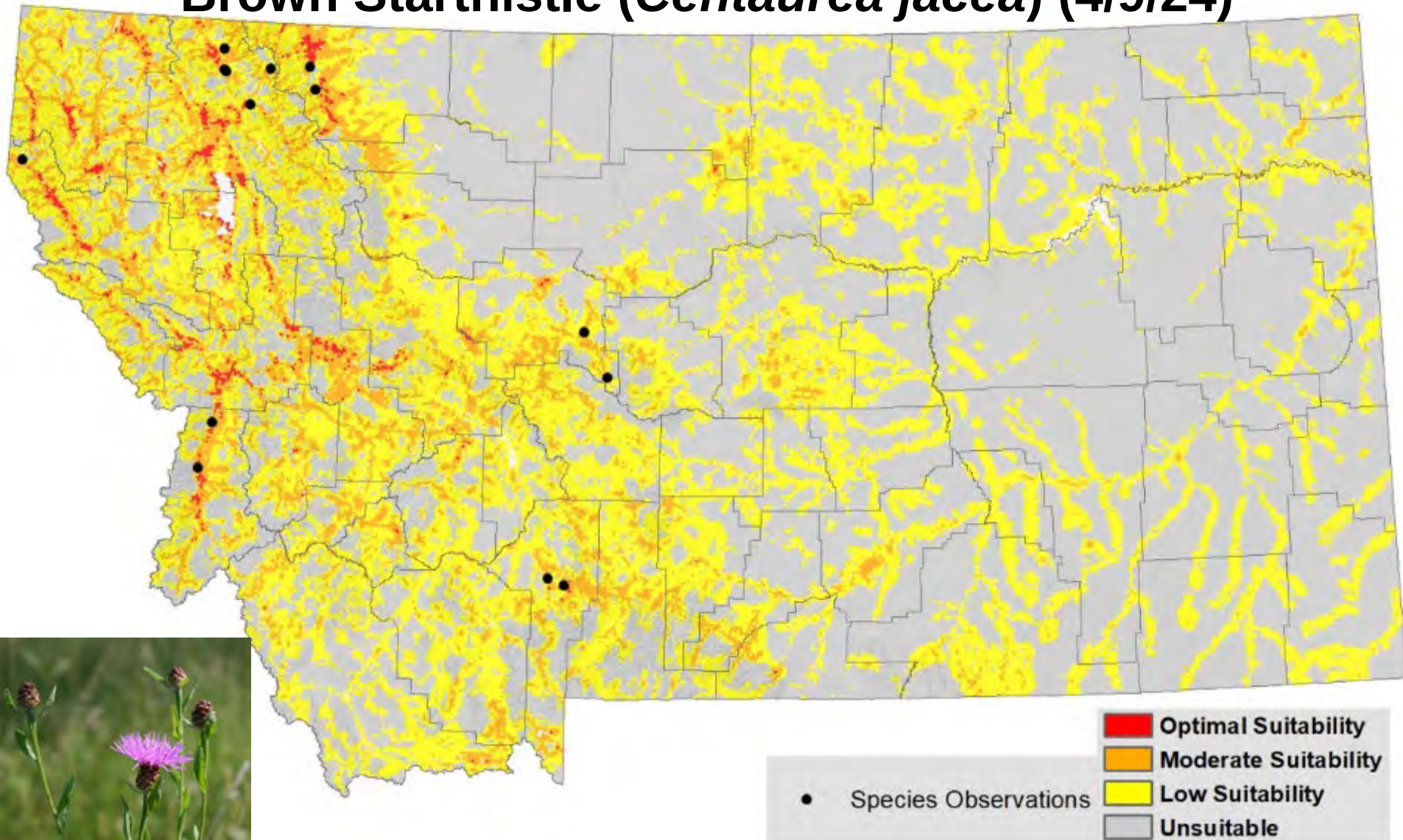
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.053	155,729	41%
Moderate	0.313	66,983	18%
Optimal	0.717	5,394	1%

Black Starthistle (*Centaurea nigra*) (5/21/21)



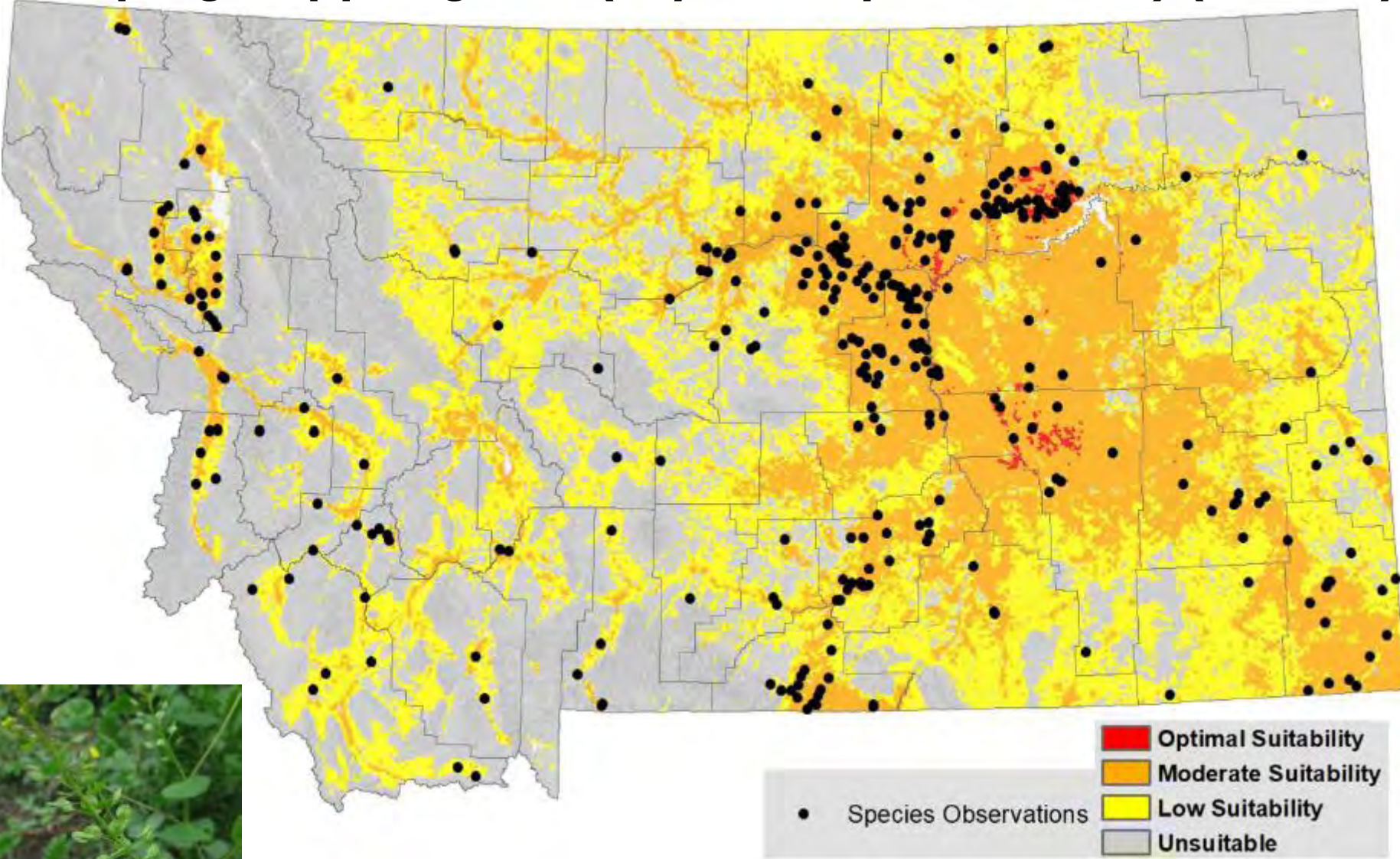
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.023	61,062	16%
Moderate	0.107	27,416	7%
Optimal	0.342	5,010	1%

Brown Starthistle (*Centaurea jacea*) (4/9/24)



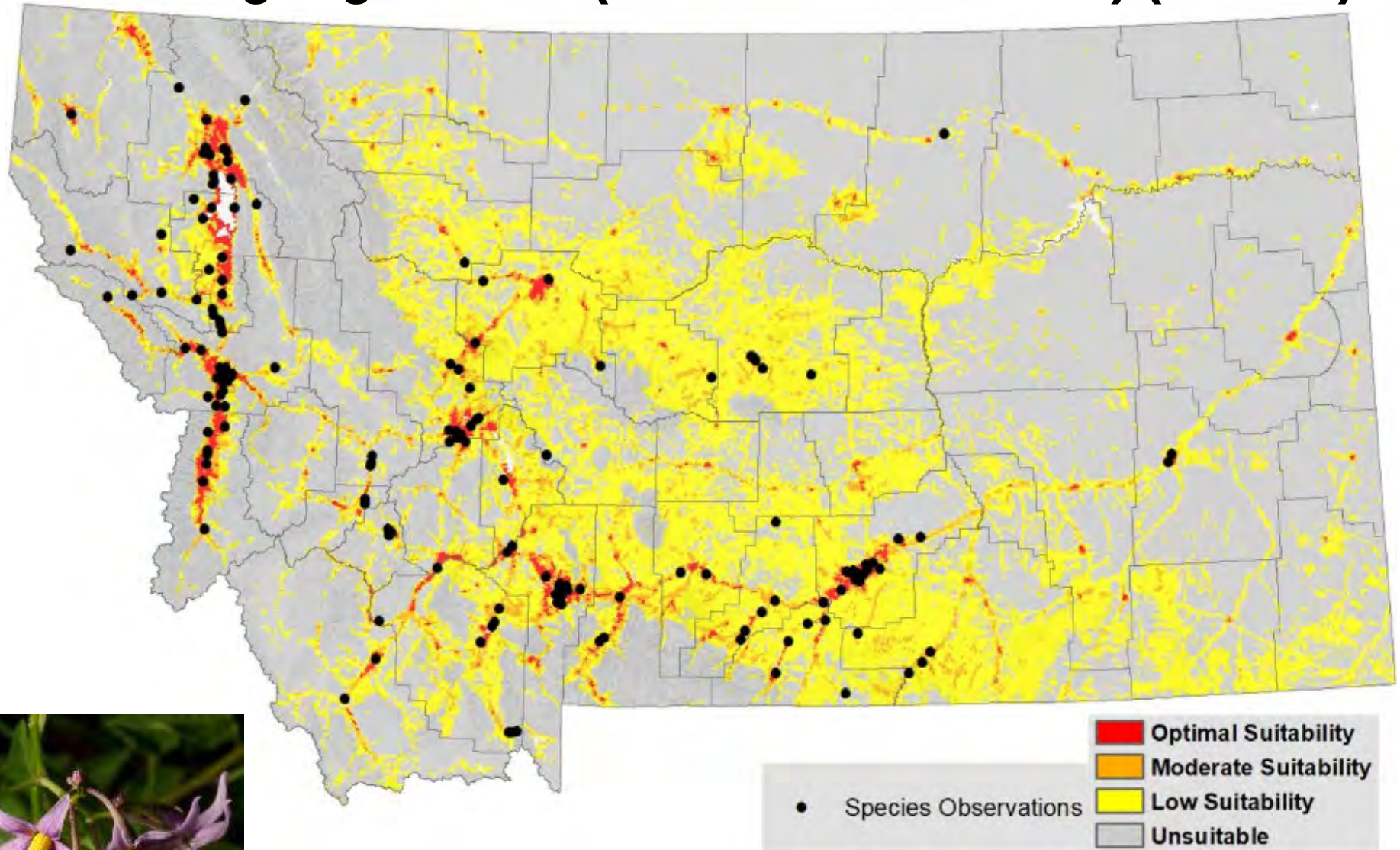
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.062	106,155	28%
Moderate	0.241	27,503	7%
Optimal	0.574	6,519	2%

Clasping Pepper-grass (*Lepidium perfoliatum*) (6/10/25)



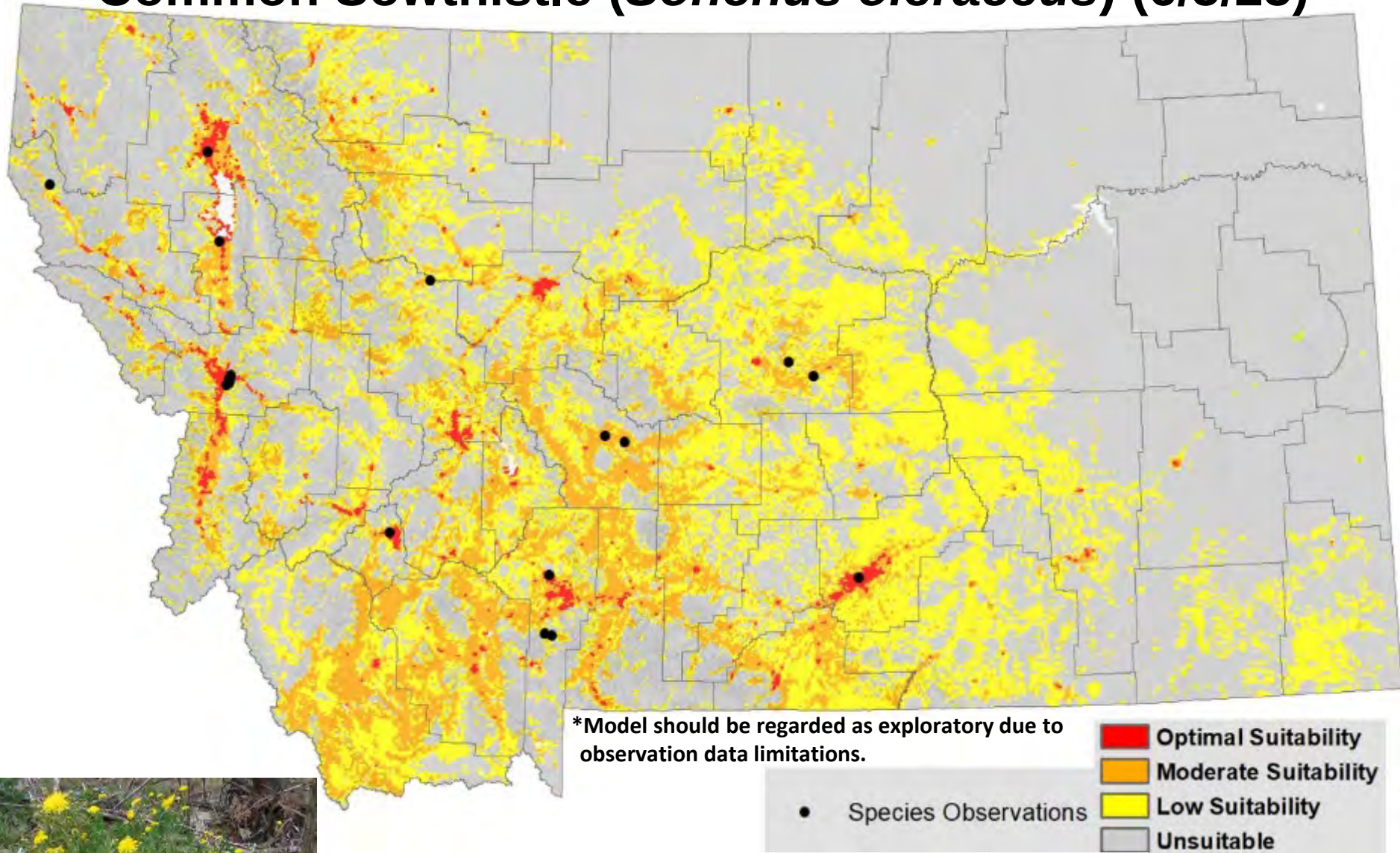
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.043	87,522	23%
Moderate	0.177	80,654	21%
Optimal	0.742	3,999	1%

Climbing Nightshade (*Solanum dulcamara*) (6/17/25)



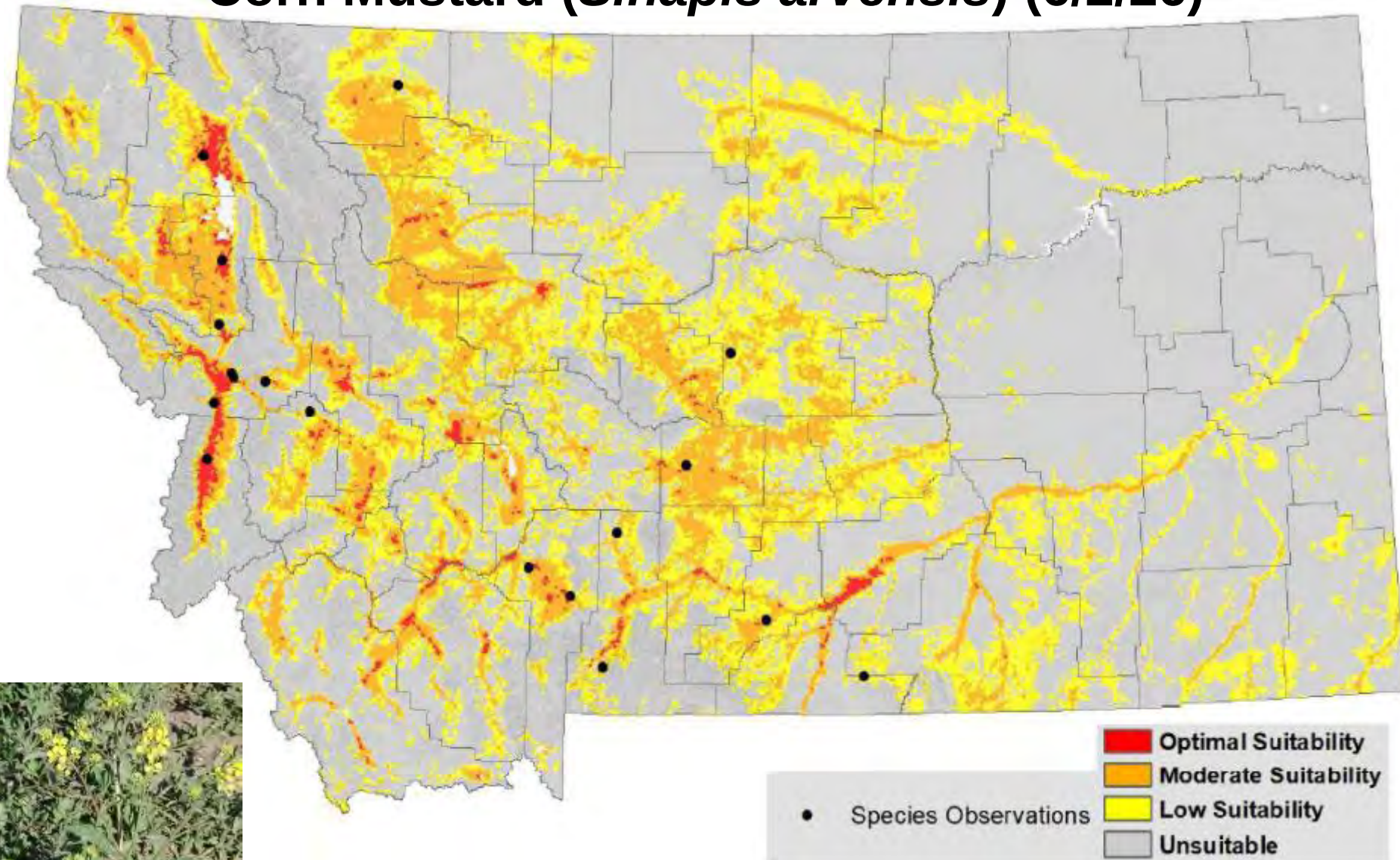
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.028	81,572	21%
Moderate	0.133	13,173	3%
Optimal	0.348	7,162	2%

Common Sowthistle (*Sonchus oleraceus*) (6/5/25)



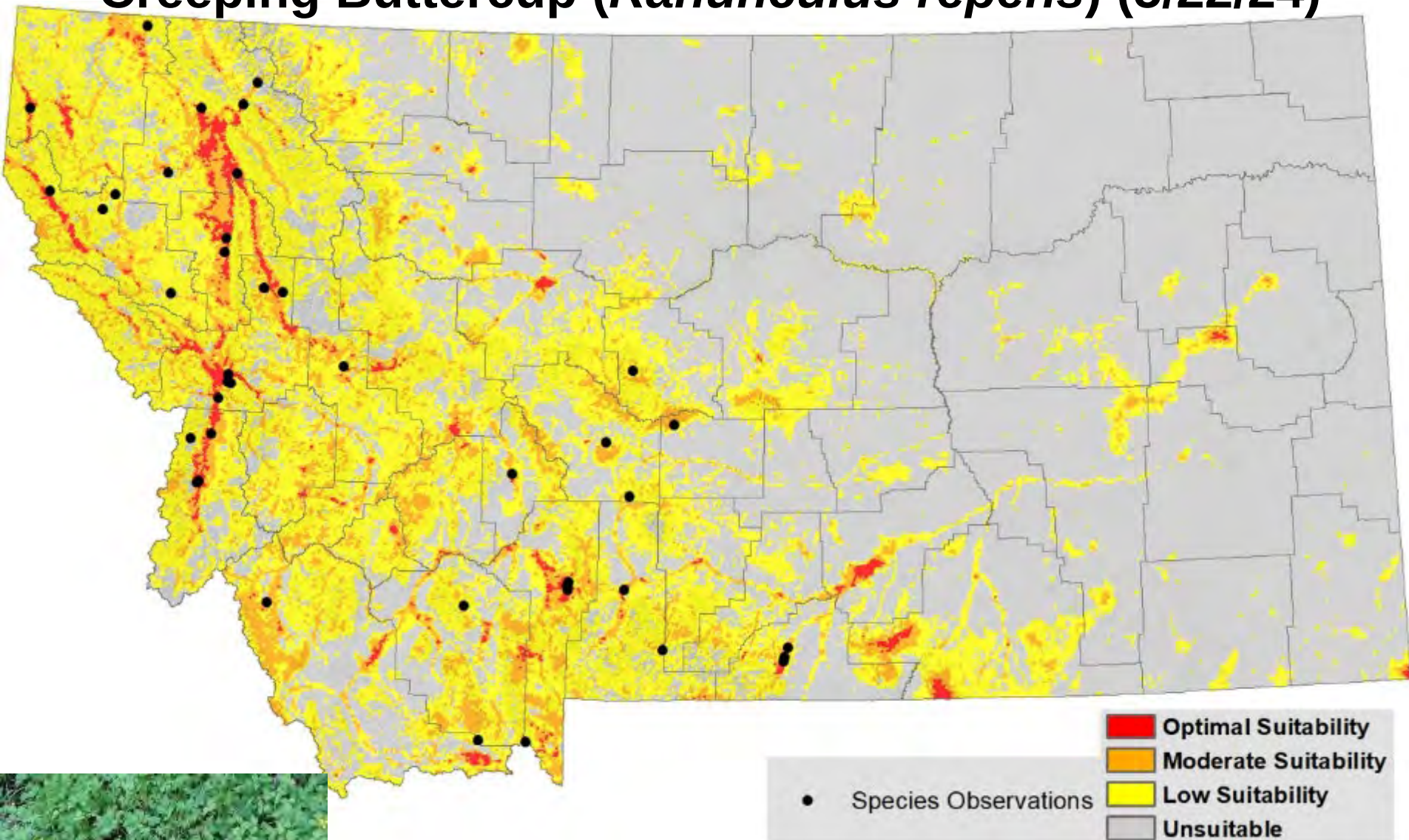
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.031	57,239	15%
Moderate	0.103	31,579	8%
Optimal	0.305	9,165	2%

Corn Mustard (*Sinapis arvensis*) (6/2/26)



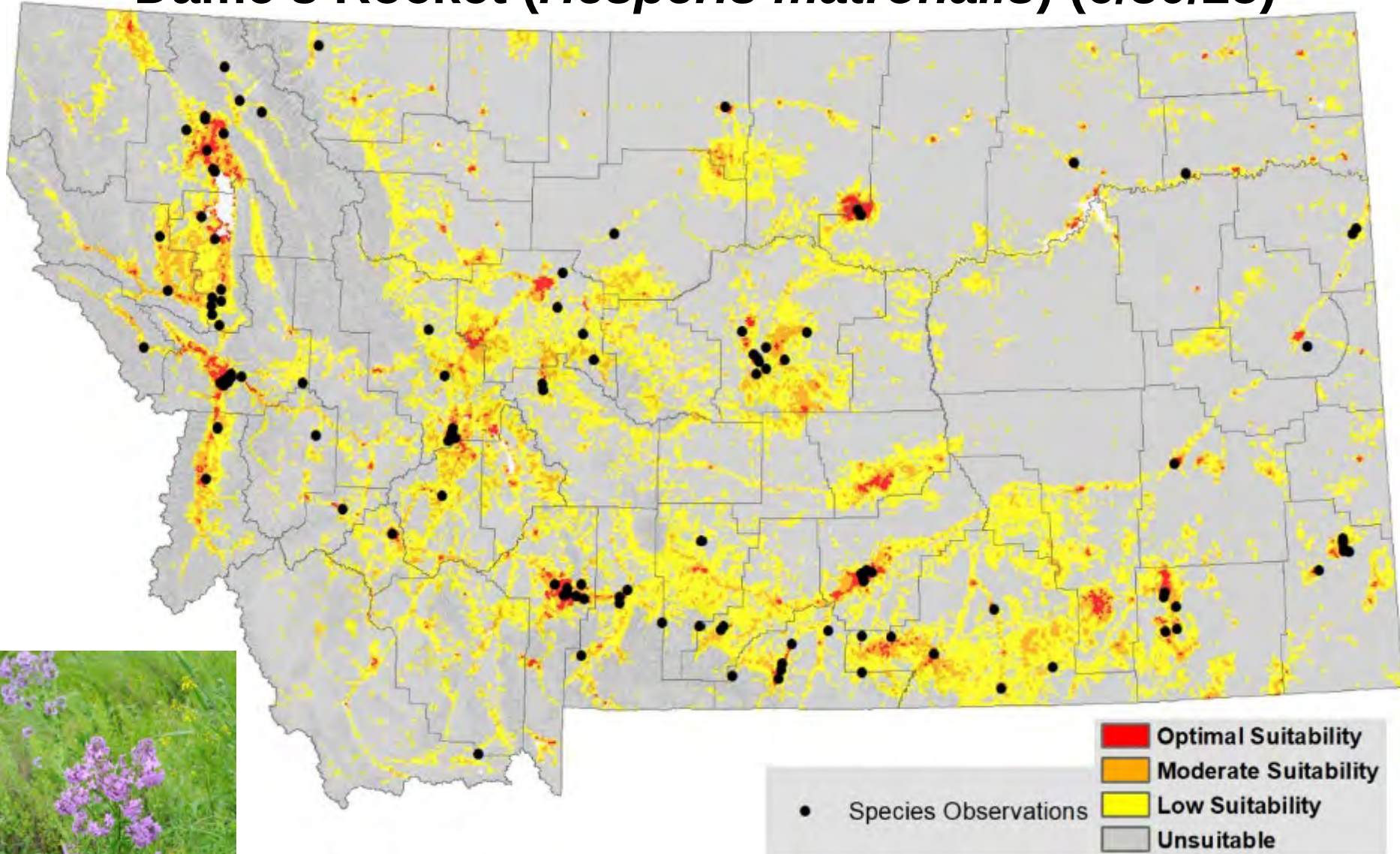
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.054	51,640	14%
Moderate	0.193	39,818	10%
Optimal	0.587	7,201	2%

Creeping Buttercup (*Ranunculus repens*) (5/22/24)



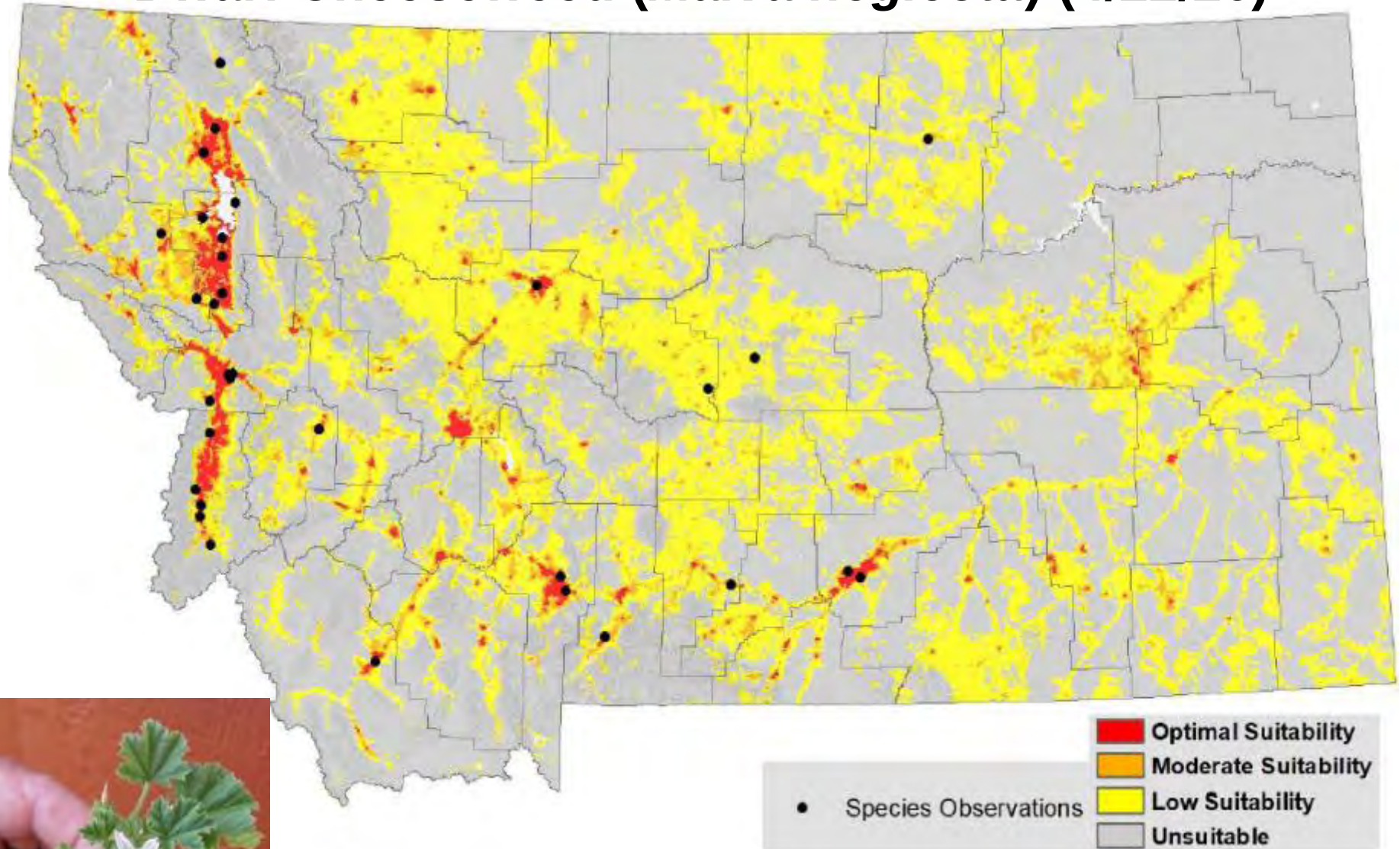
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	76,395	20%
Moderate	0.107	23,674	6%
Optimal	0.356	7,921	2%

Dame's Rocket (*Hesperis matronalis*) (6/30/25)



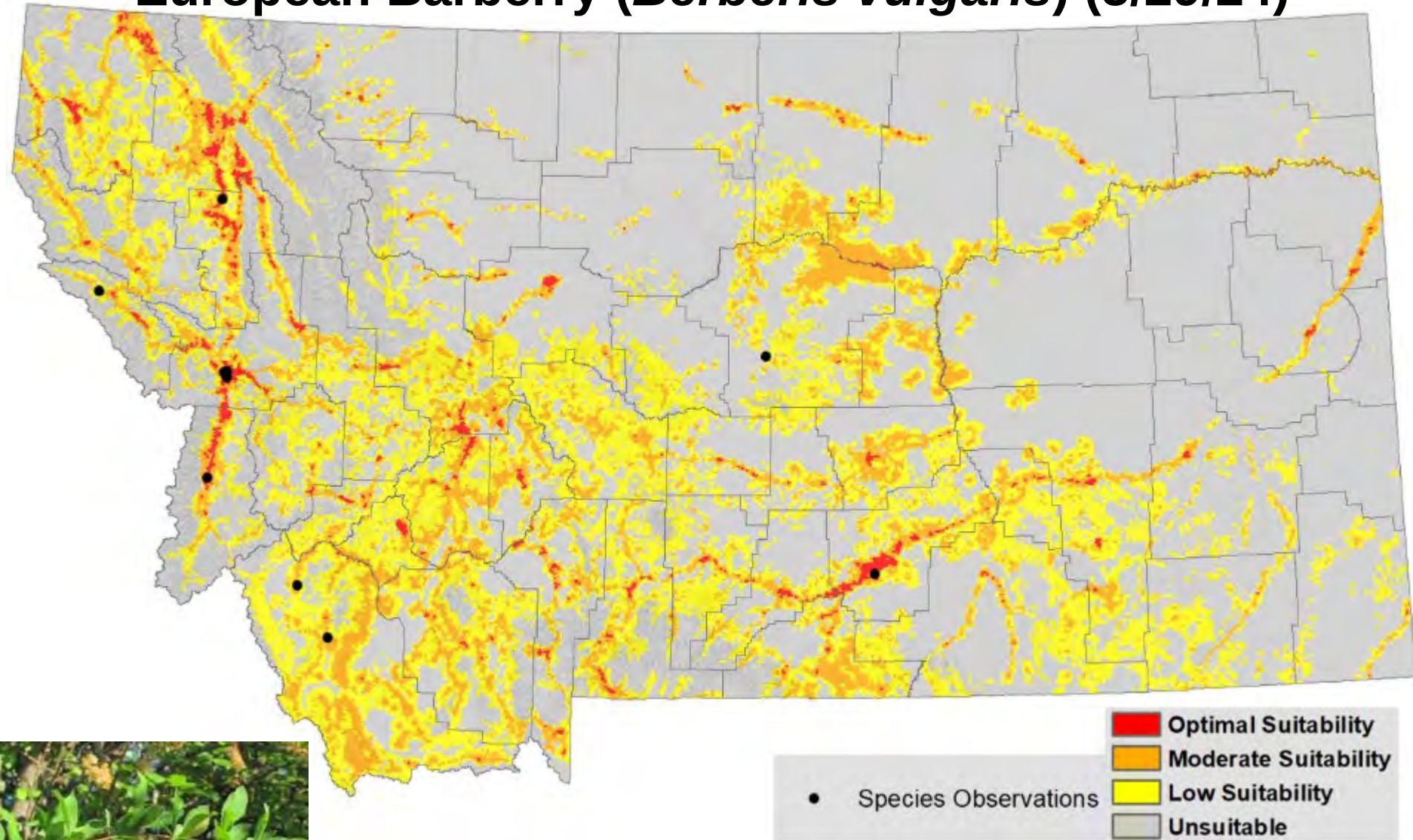
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.011	51,521	14%
Moderate	0.084	10,644	3%
Optimal	0.258	5,429	1%

Dwarf Cheeseweed (*Malva neglecta*) (4/22/26)



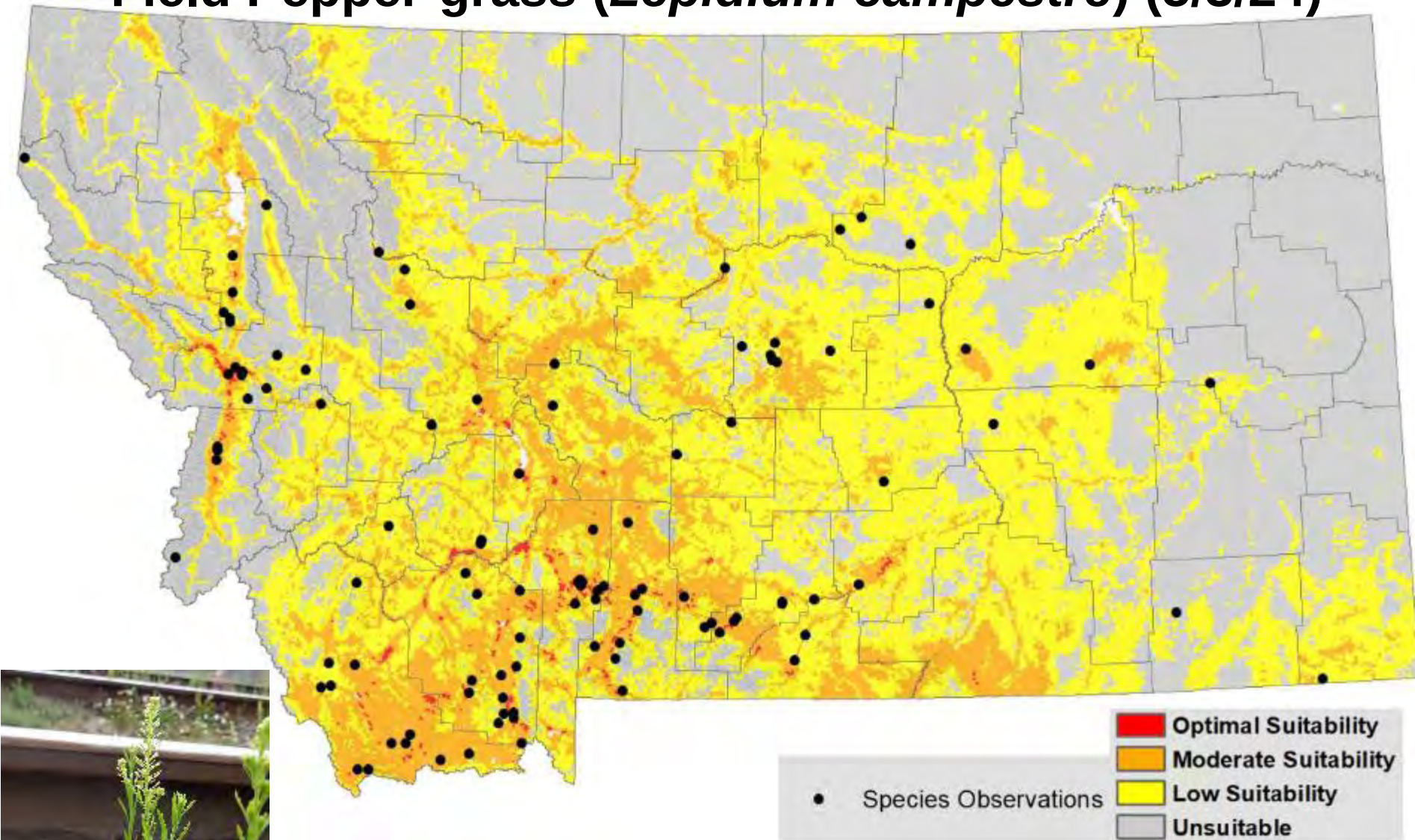
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.009	81,959	22%
Moderate	0.103	10,922	3%
Optimal	0.287	6,182	2%

European Barberry (*Berberis vulgaris*) (5/29/24)



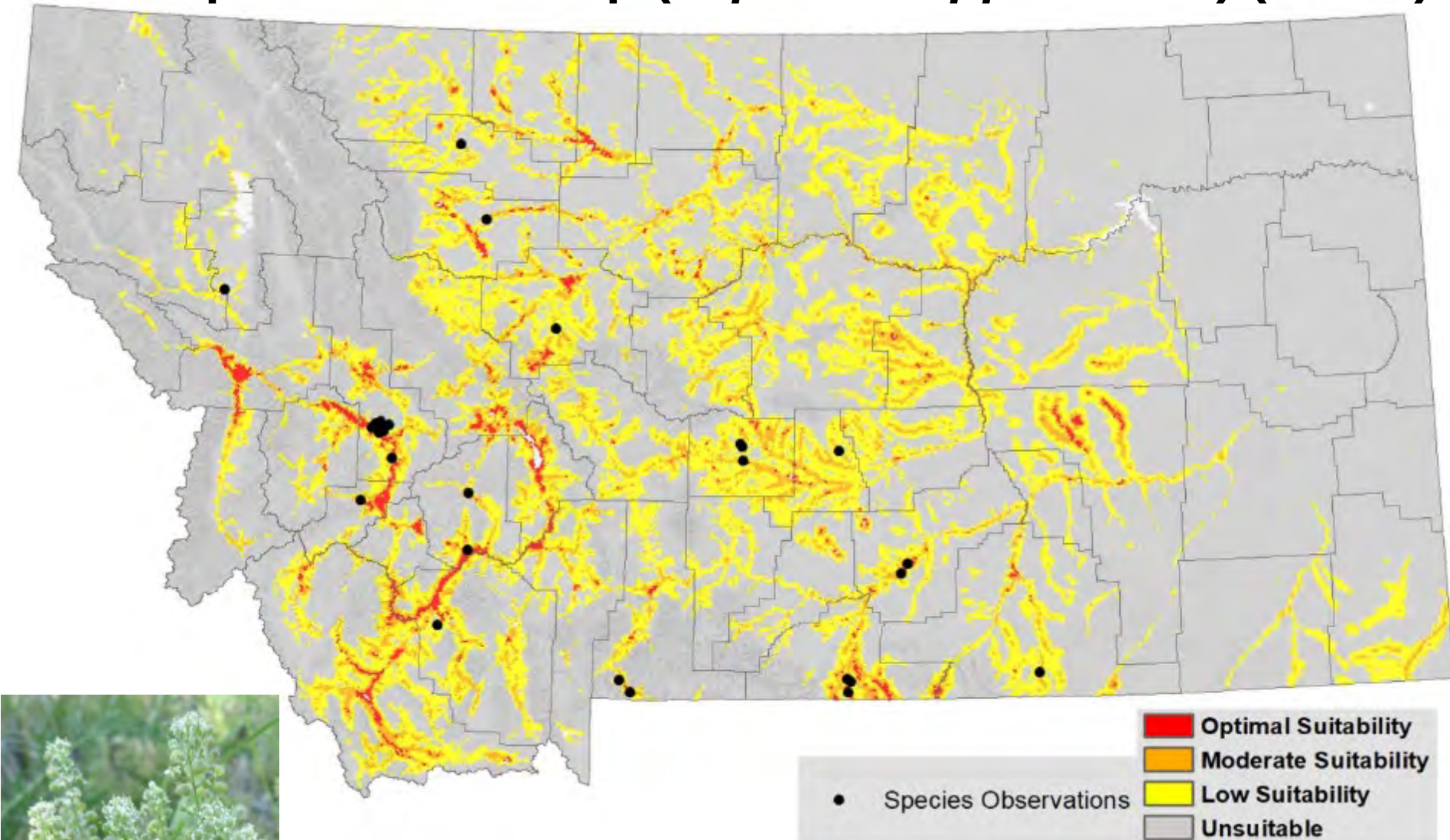
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.033	66,864	18%
Moderate	0.113	34,543	9%
Optimal	0.425	5,614	1%

Field Pepper-grass (*Lepidium campestre*) (5/3/24)



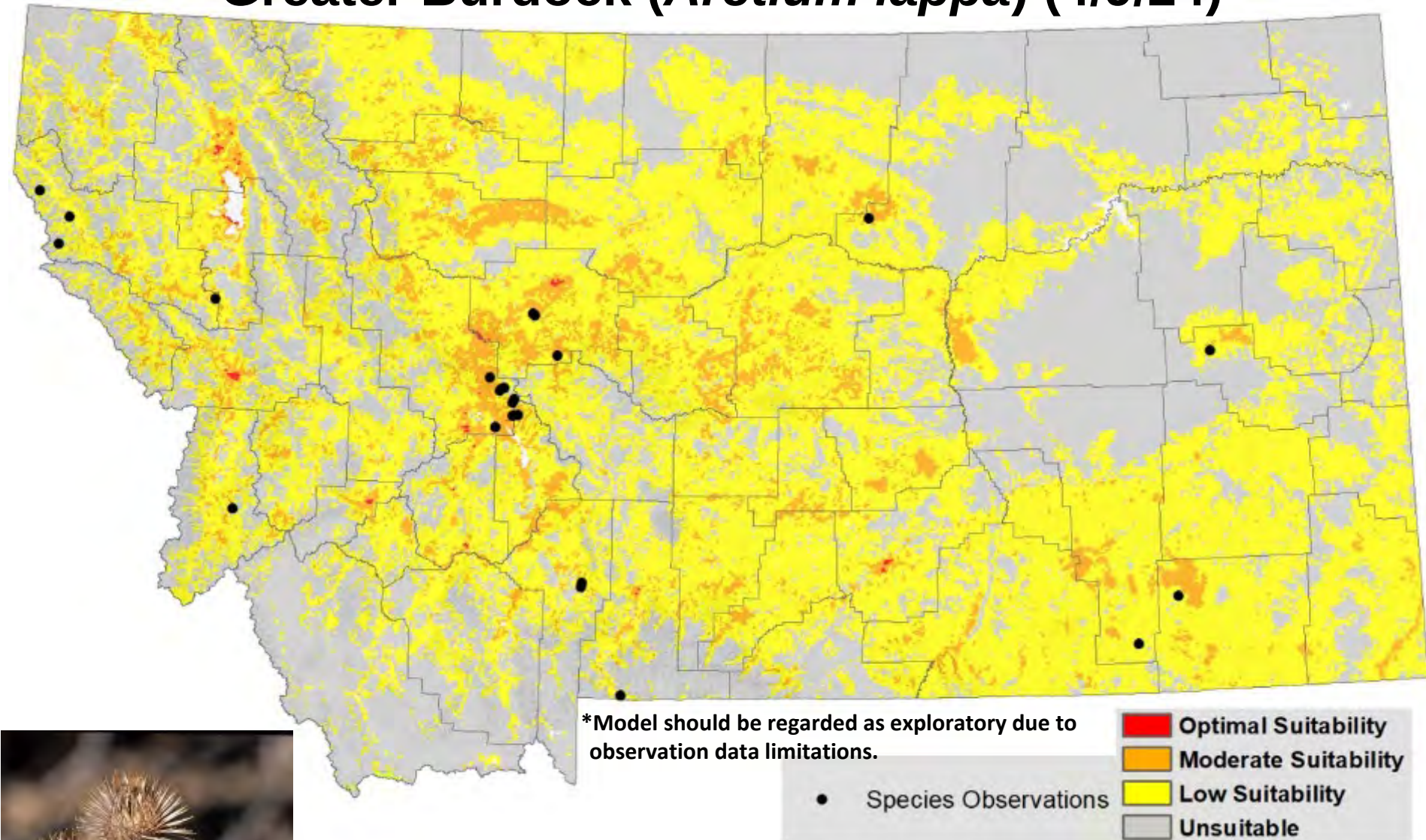
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.051	121,245	32%
Moderate	0.242	45,026	12%
Optimal	0.650	6,263	2%

Globe-podded Whitetop (*Lepidium appelianum*) (4/8/24)



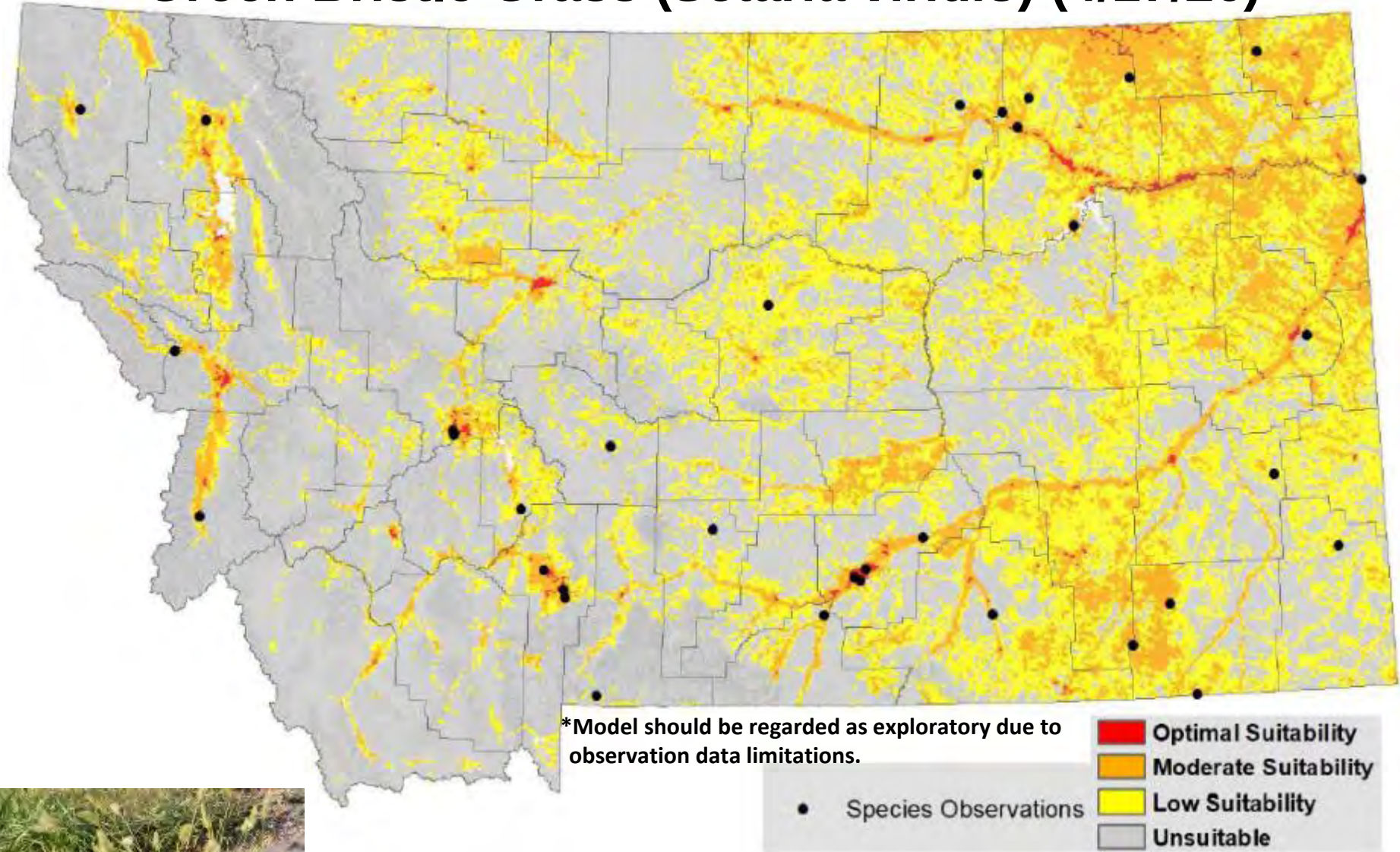
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	46,810	12%
Moderate	0.132	11,036	3%
Optimal	0.321	6,612	2%

Greater Burdock (*Arctium lappa*) (4/9/24)



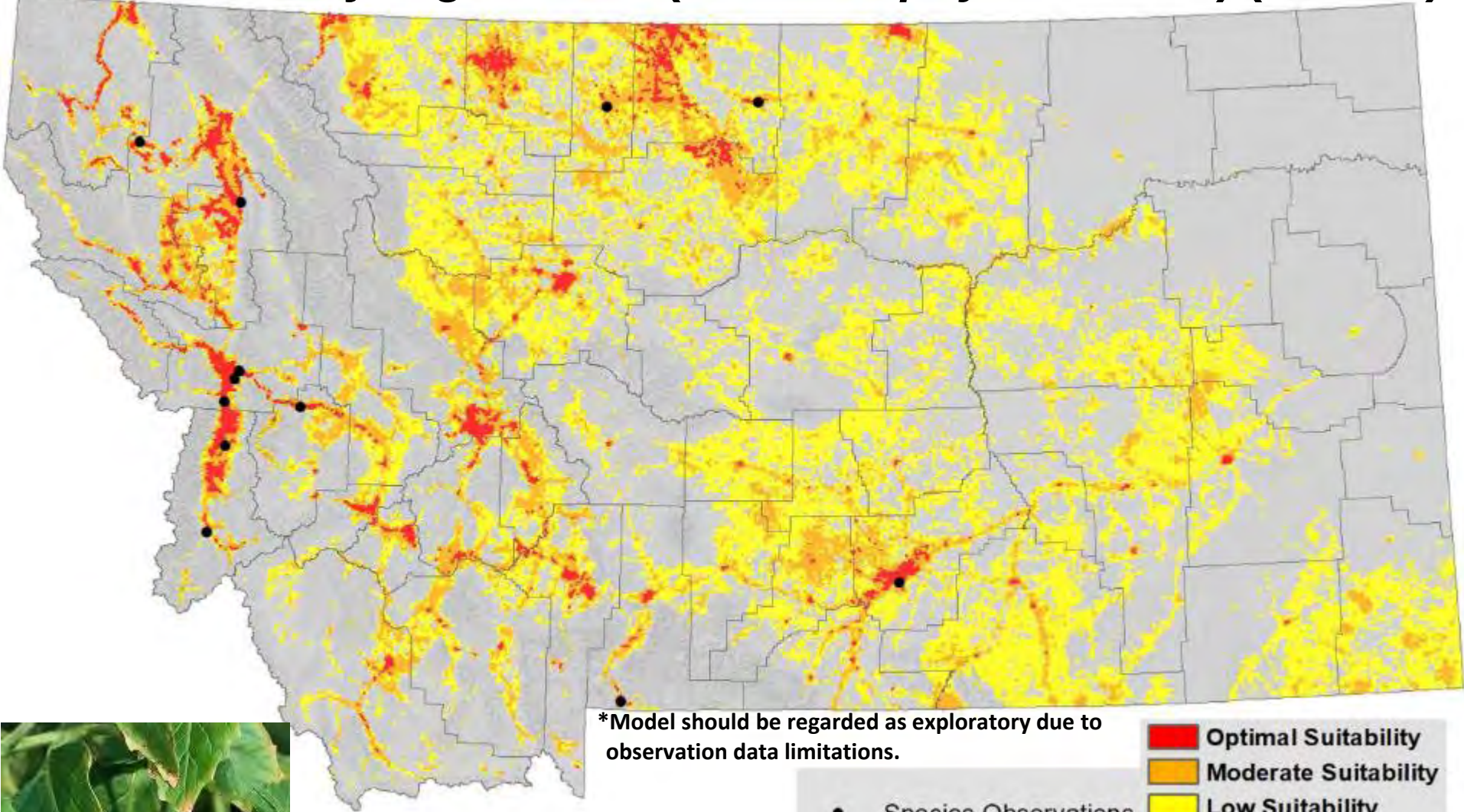
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.080	135,468	36%
Moderate	0.287	37,339	10%
Optimal	0.613	5,301	1%

Green Bristle Grass (*Setaria viridis*) (4/17/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.051	66,706	18%
Moderate	0.147	43,256	11%
Optimal	0.554	5,648	1%

Ground-cherry Nightshade (*Solanum physalifolium*) (11/5/21)

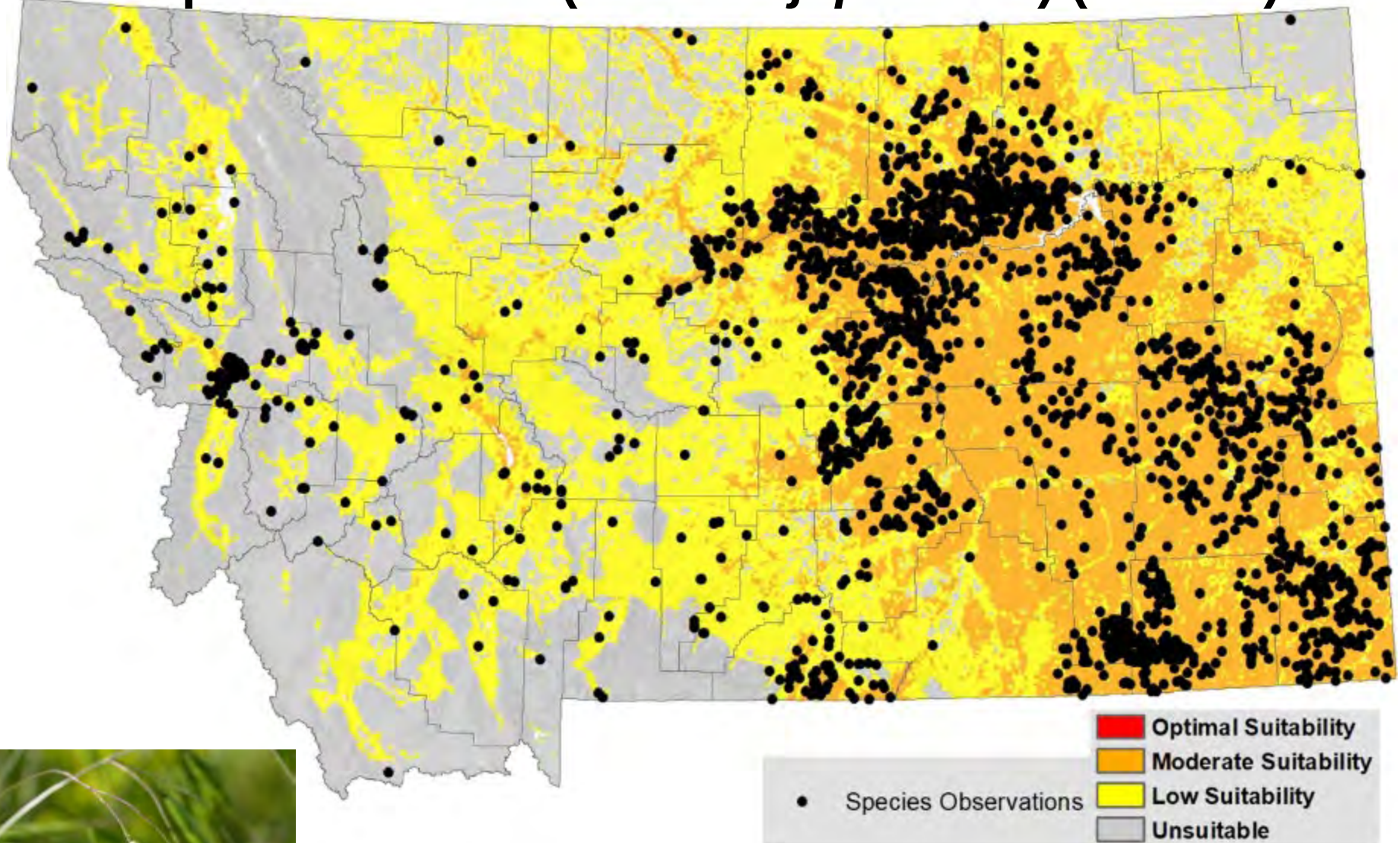


*Model should be regarded as exploratory due to observation data limitations.



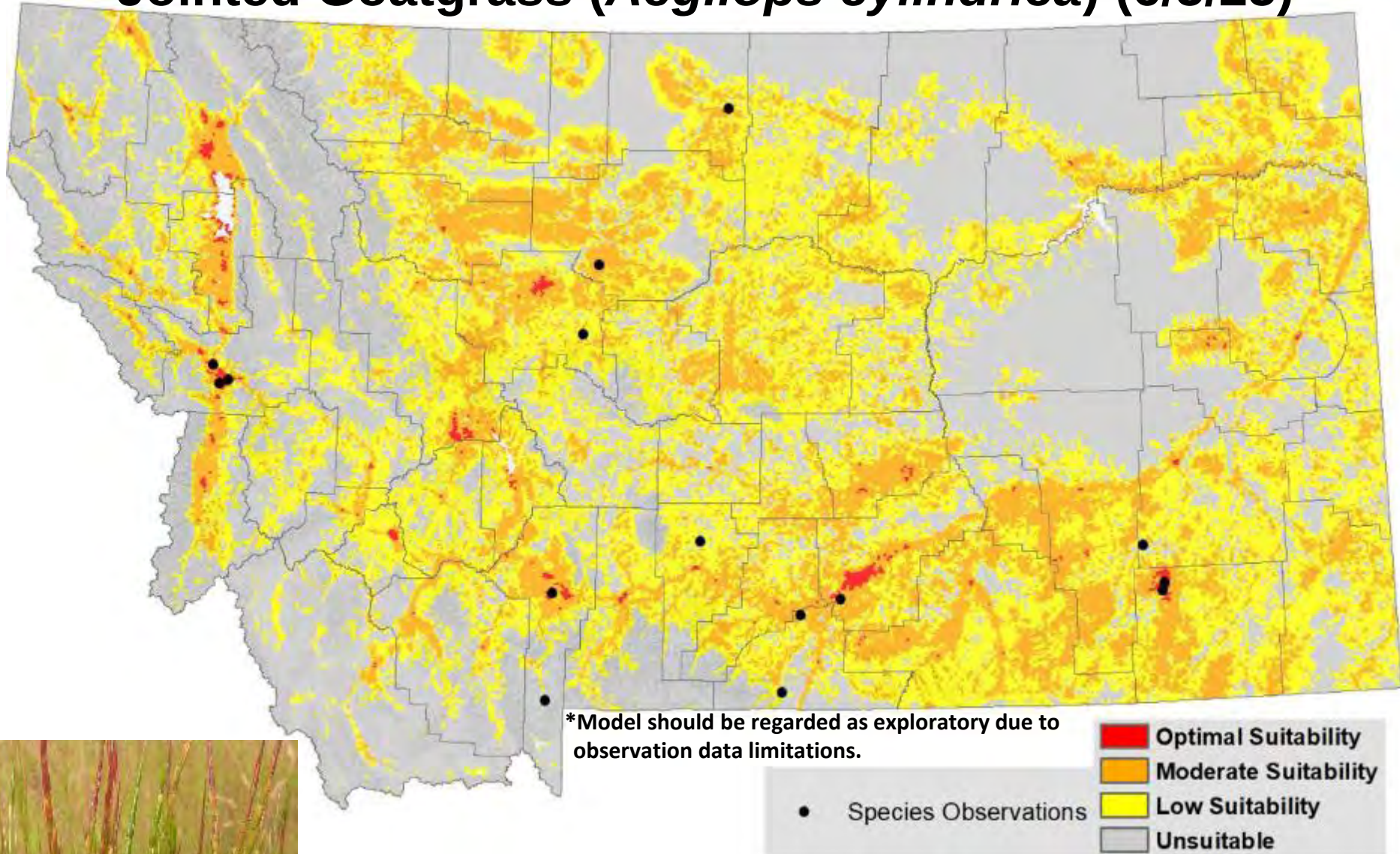
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.026	64,711	17%
Moderate	0.081	31,510	8%
Optimal	0.257	8,802	2%

Japanese Brome (*Bromus japonicus*) (6/11/25)



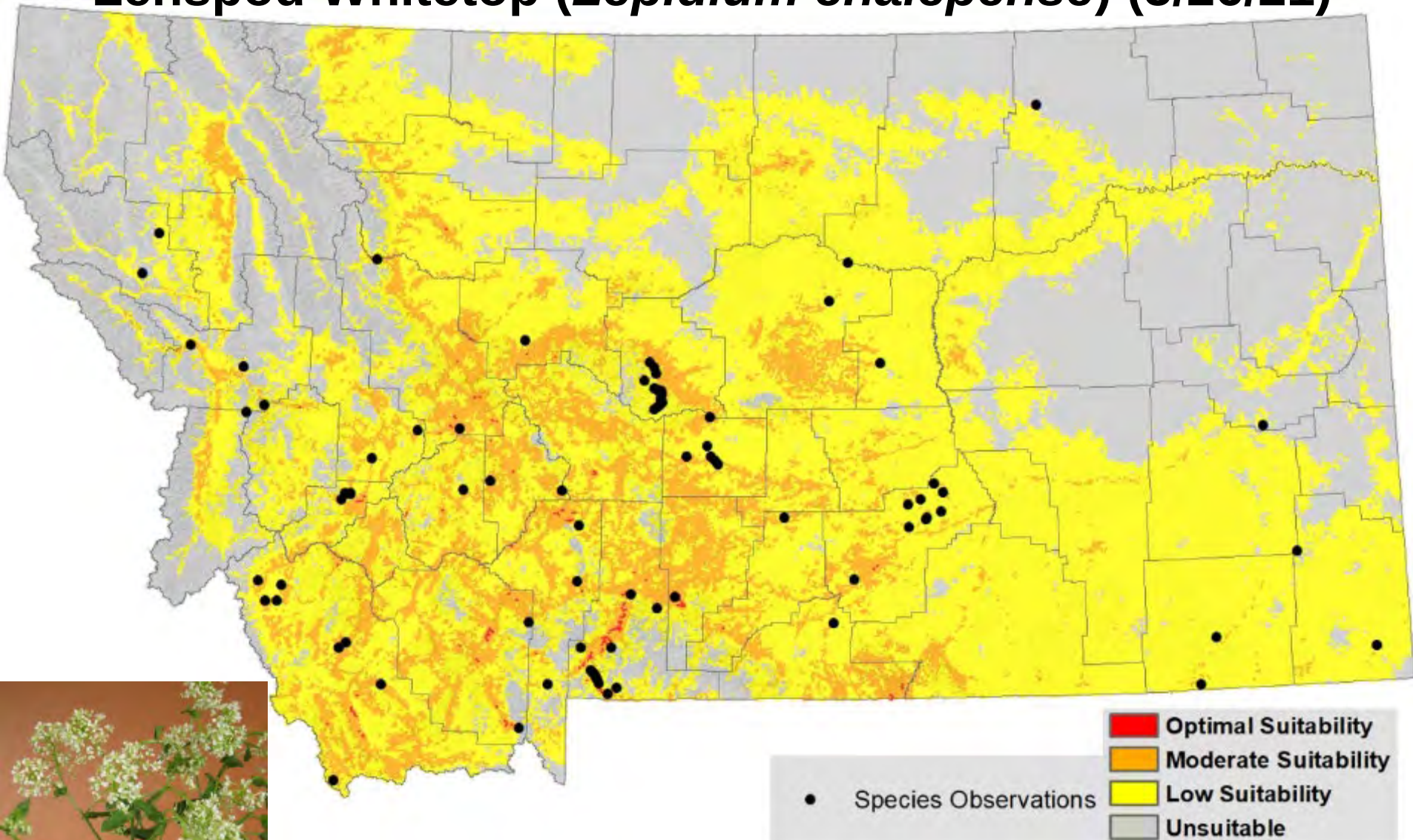
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.033	105,443	28%
Moderate	0.240	116,495	31%
Optimal	0.911	1	<1%

Jointed Goatgrass (*Aegilops cylindrica*) (6/5/25)



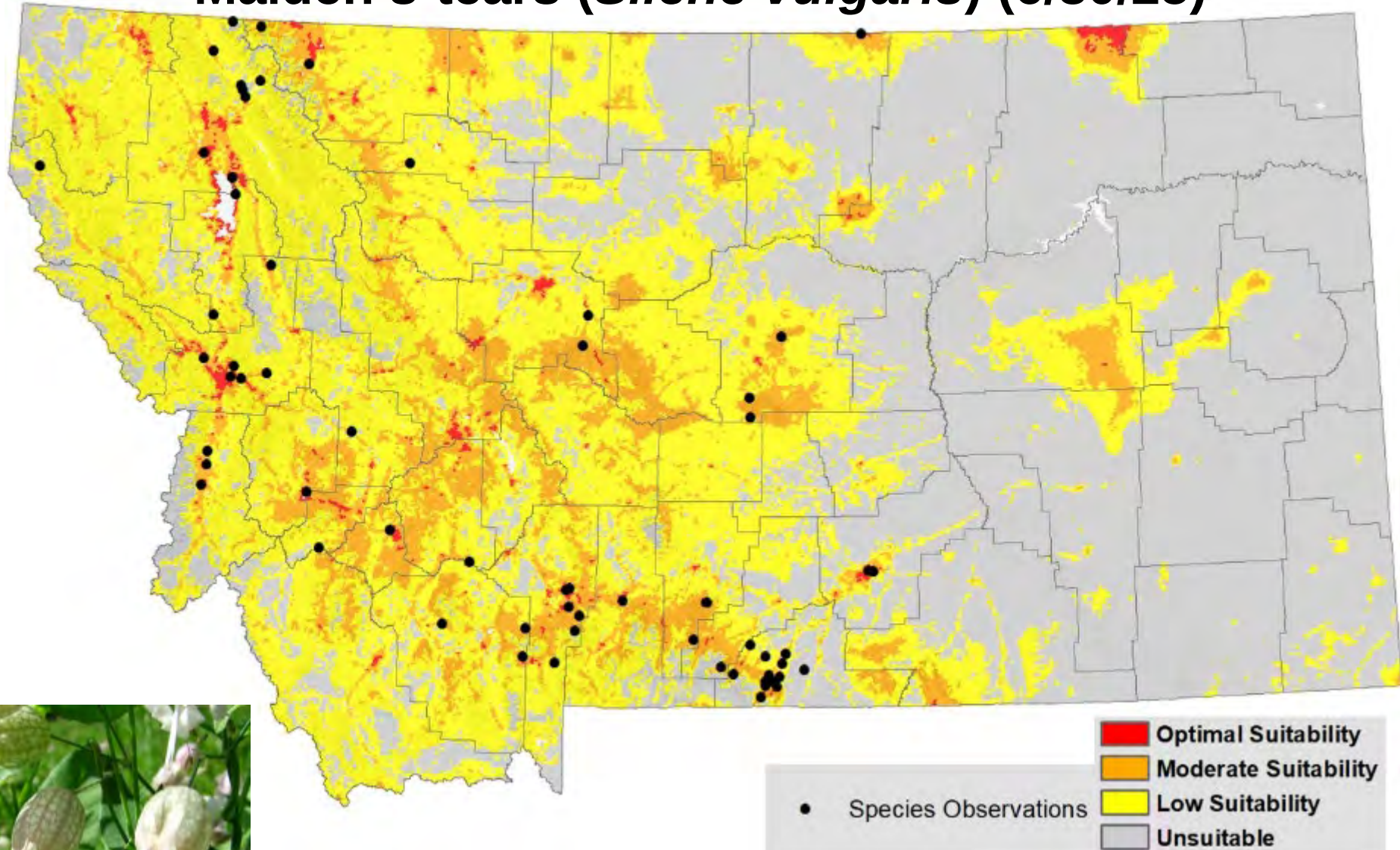
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.119	86,906	23%
Moderate	0.302	77,157	20%
Optimal	0.708	4,242	1%

Lenspod Whitetop (*Lepidium chalepense*) (5/26/21)



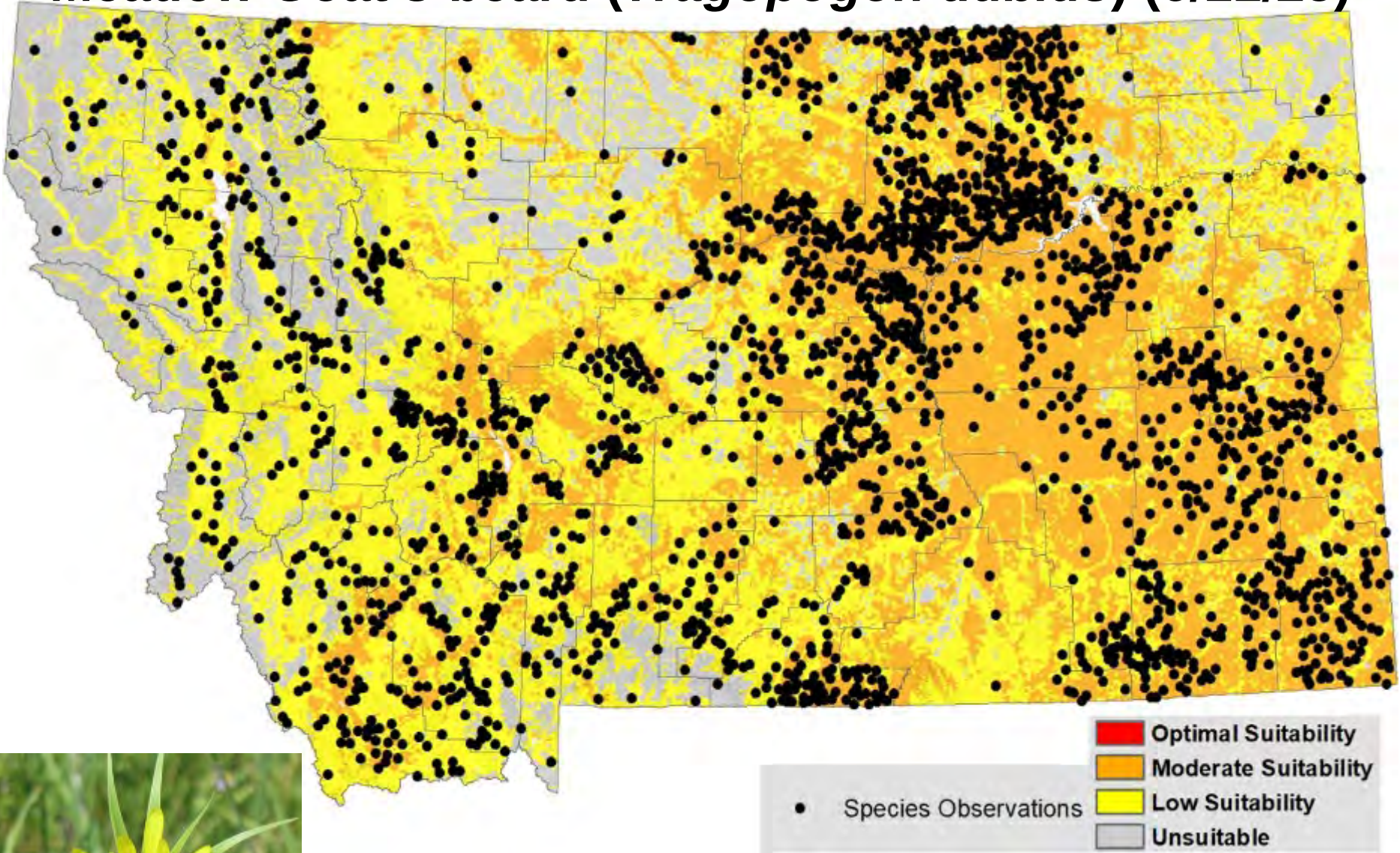
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.038	158,890	42%
Moderate	0.291	40,893	11%
Optimal	0.663	5,482	1%

Maiden's-tears (*Silene vulgaris*) (6/30/25)



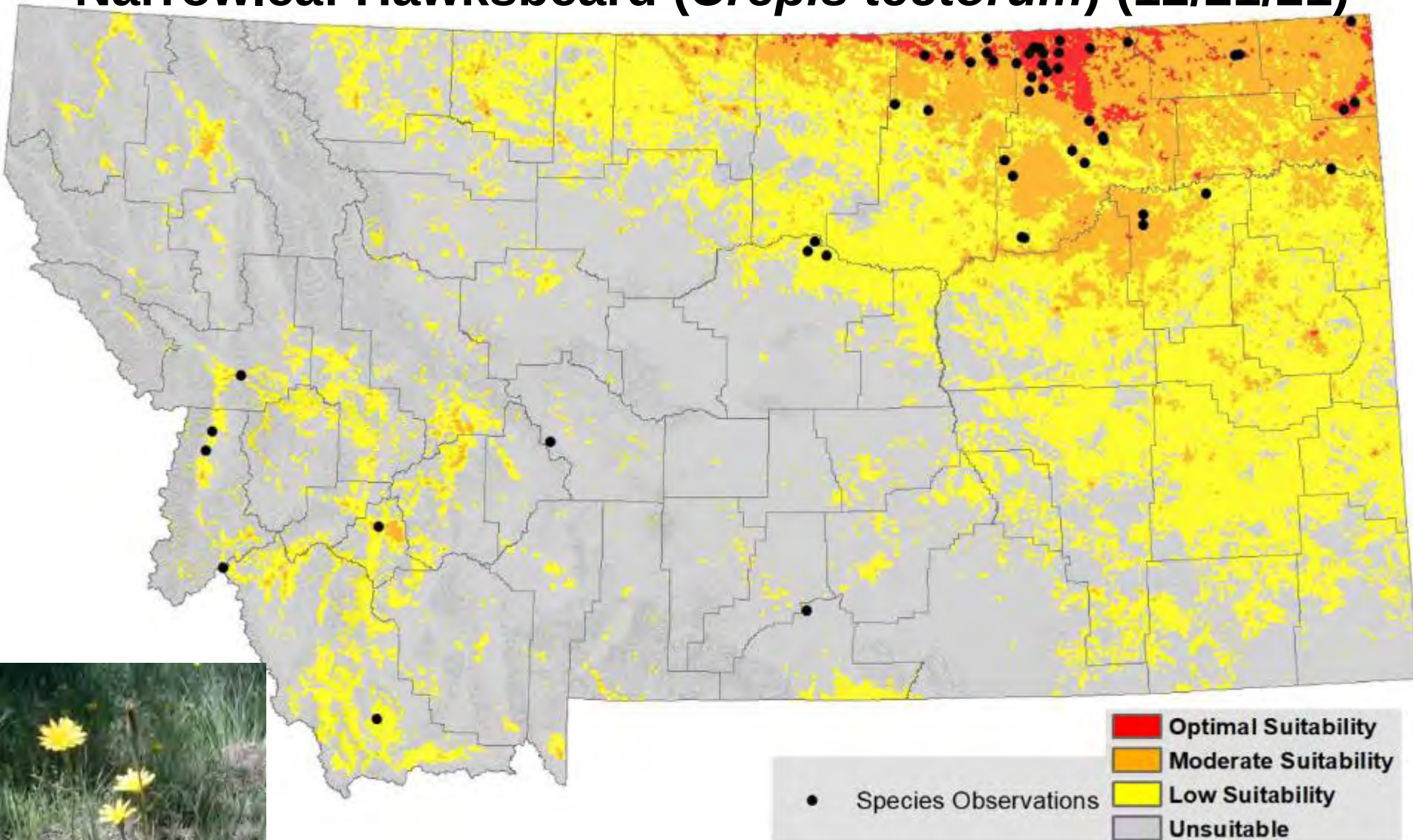
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.047	134,342	35%
Moderate	0.237	37,534	10%
Optimal	0.620	6,071	1.6%

Meadow Goat's-beard (*Tragopogon dubius*) (6/11/25)



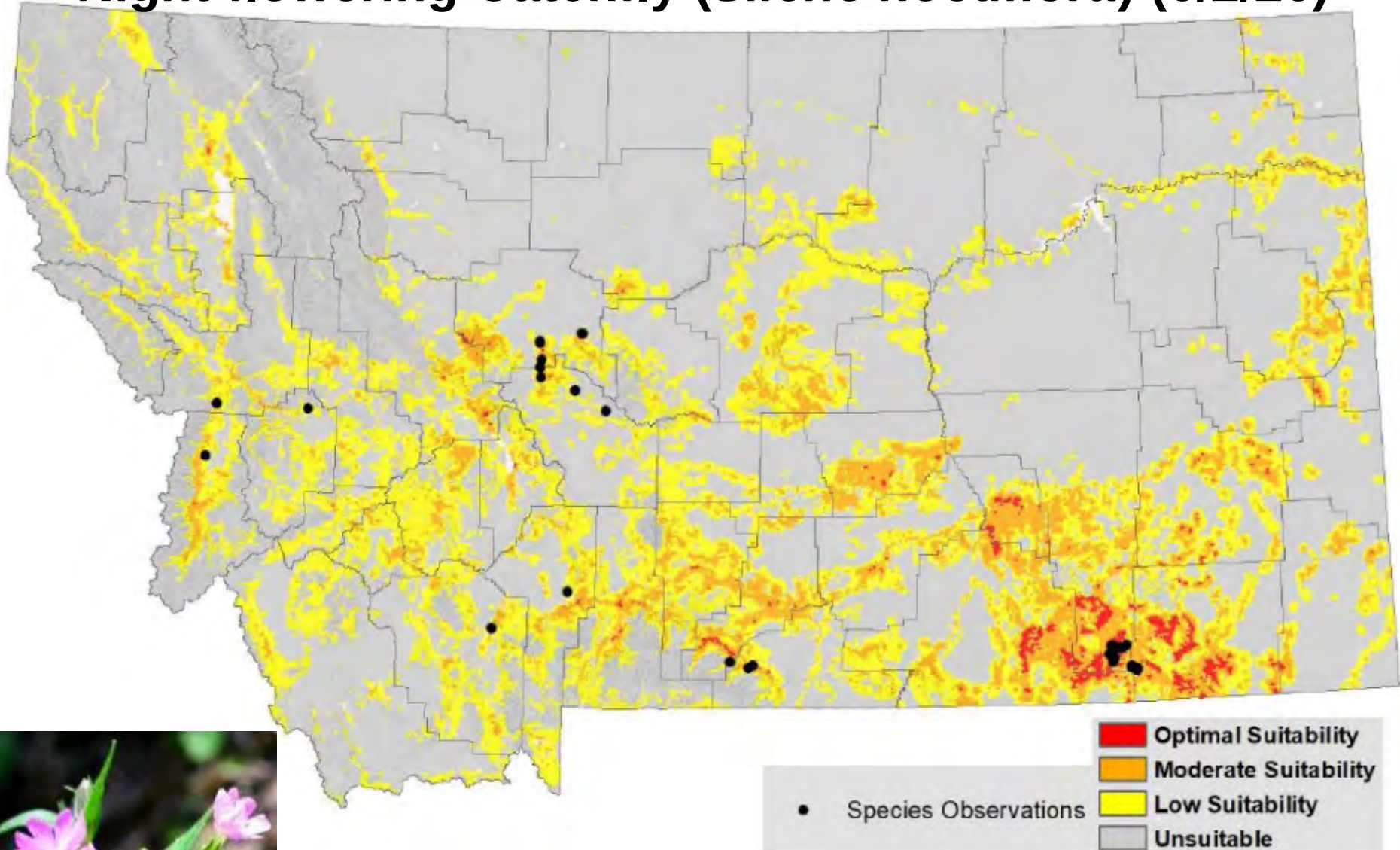
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.059	116,343	31%
Moderate	0.298	156,761	41%
Optimal	0.999	0	0%

Narrowleaf Hawksbeard (*Crepis tectorum*) (12/21/21)



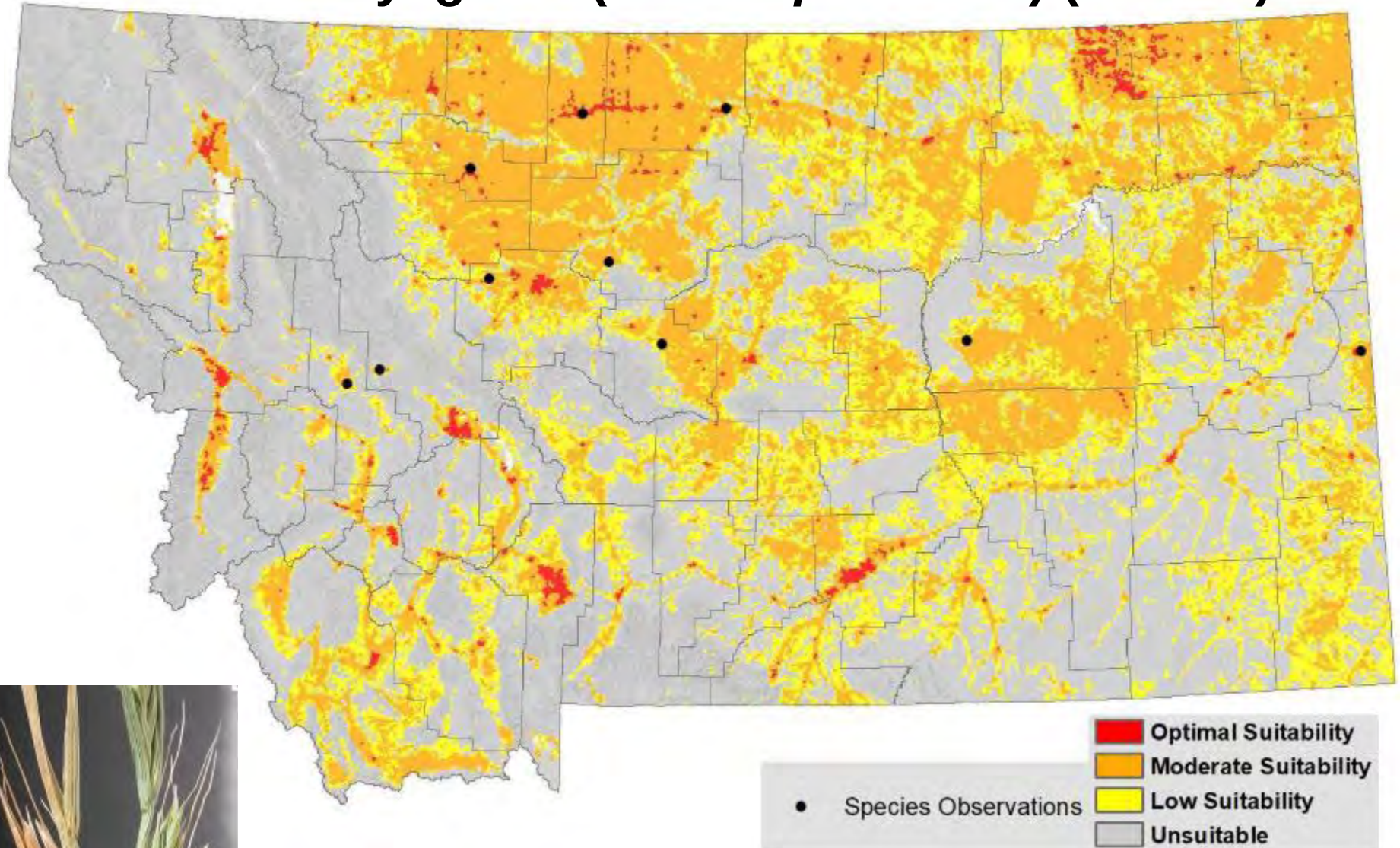
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.037	96,948	25%
Moderate	0.203	31,558	8%
Optimal	0.620	6,795	2%

Night-flowering Catchfly (*Silene noctiflora*) (6/2/26)



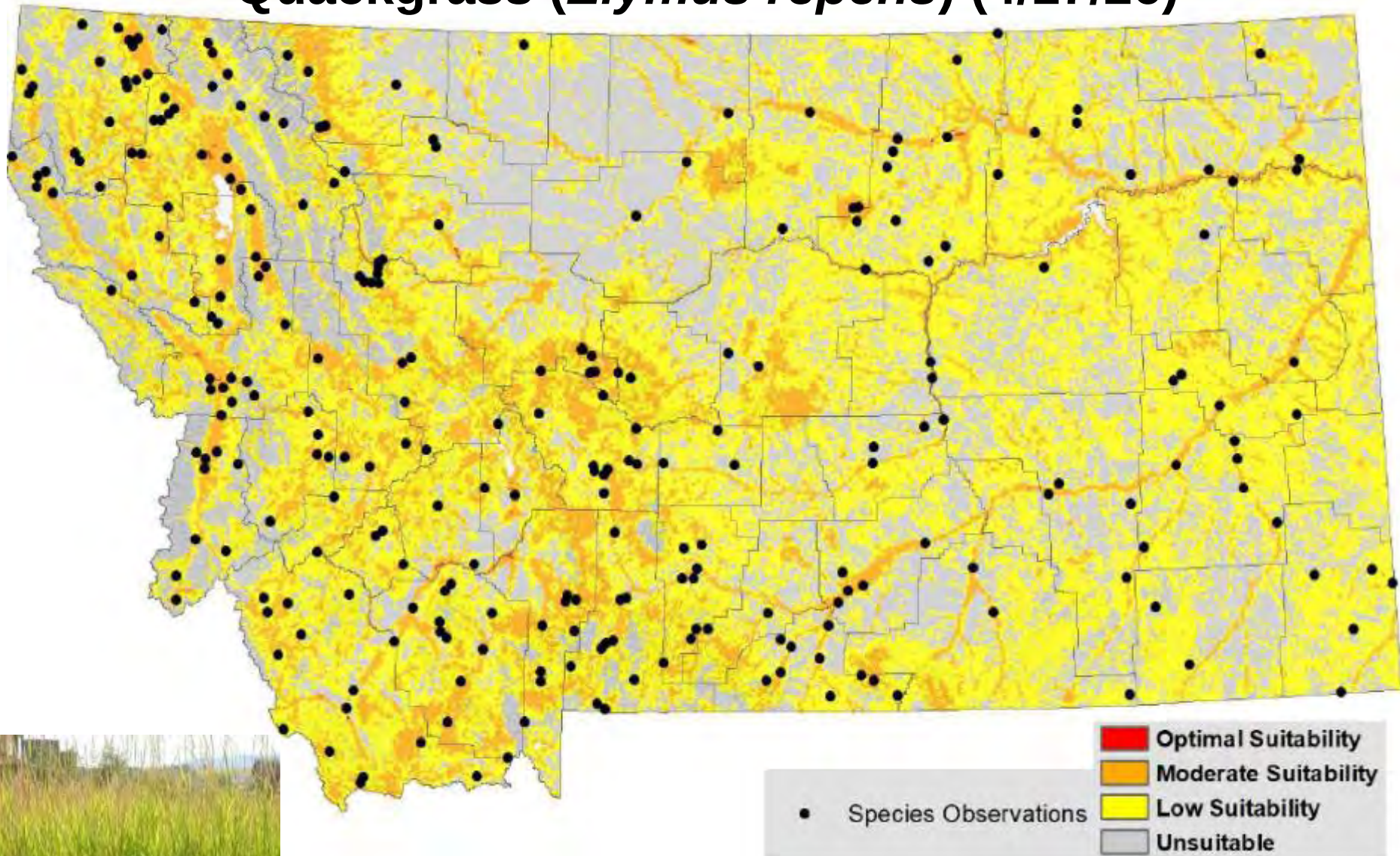
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.033	53,912	14%
Moderate	0.188	22,845	6%
Optimal	0.533	5,809	2%

Persian Ryegrass (*Lolium persicum*) (4/21/26)



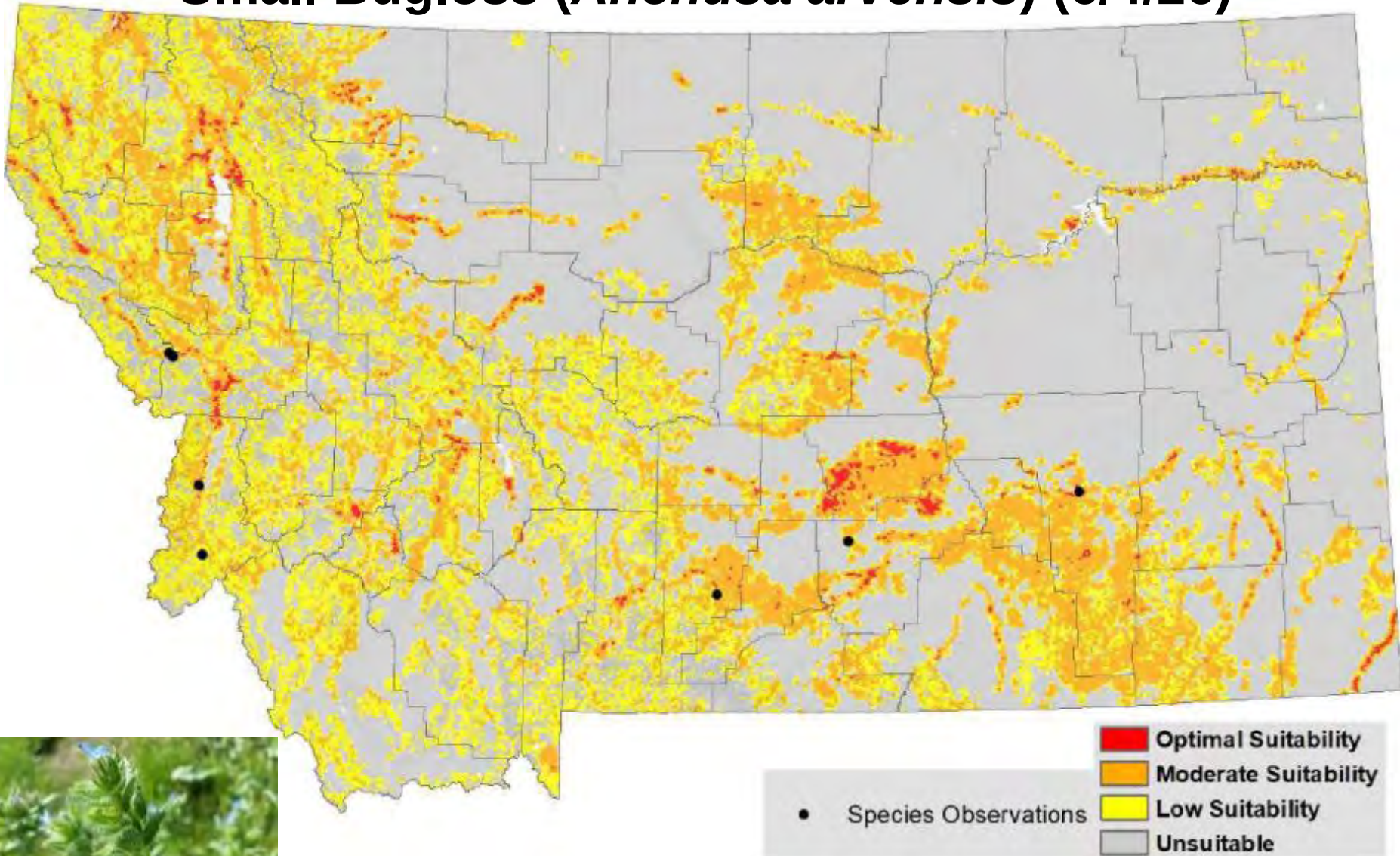
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.094	55,714	15%
Moderate	0.201	98,230	26%
Optimal	0.565	6,613	2%

Quackgrass (*Elymus repens*) (4/17/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.067	117,445	31%
Moderate	0.226	58,676	15%
Optimal	0.723	5,004	1%

Small Bugloss (*Anchusa arvensis*) (6/4/26)



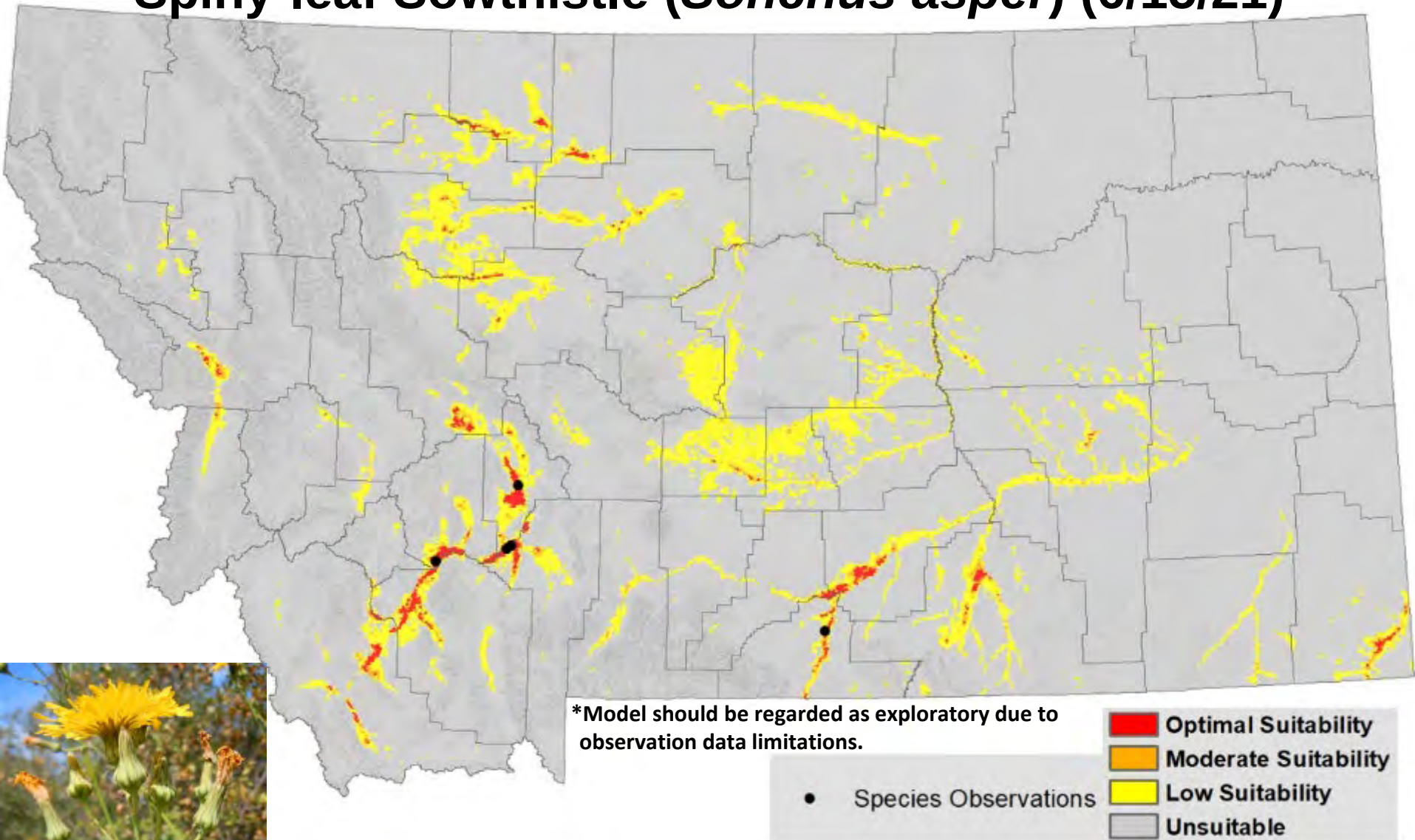
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.054	42,391	11%
Moderate	0.142	60,151	16%
Optimal	0.515	7,998	2%

Small-seed Alfalfa Dodder (*Cuscuta approximata*)



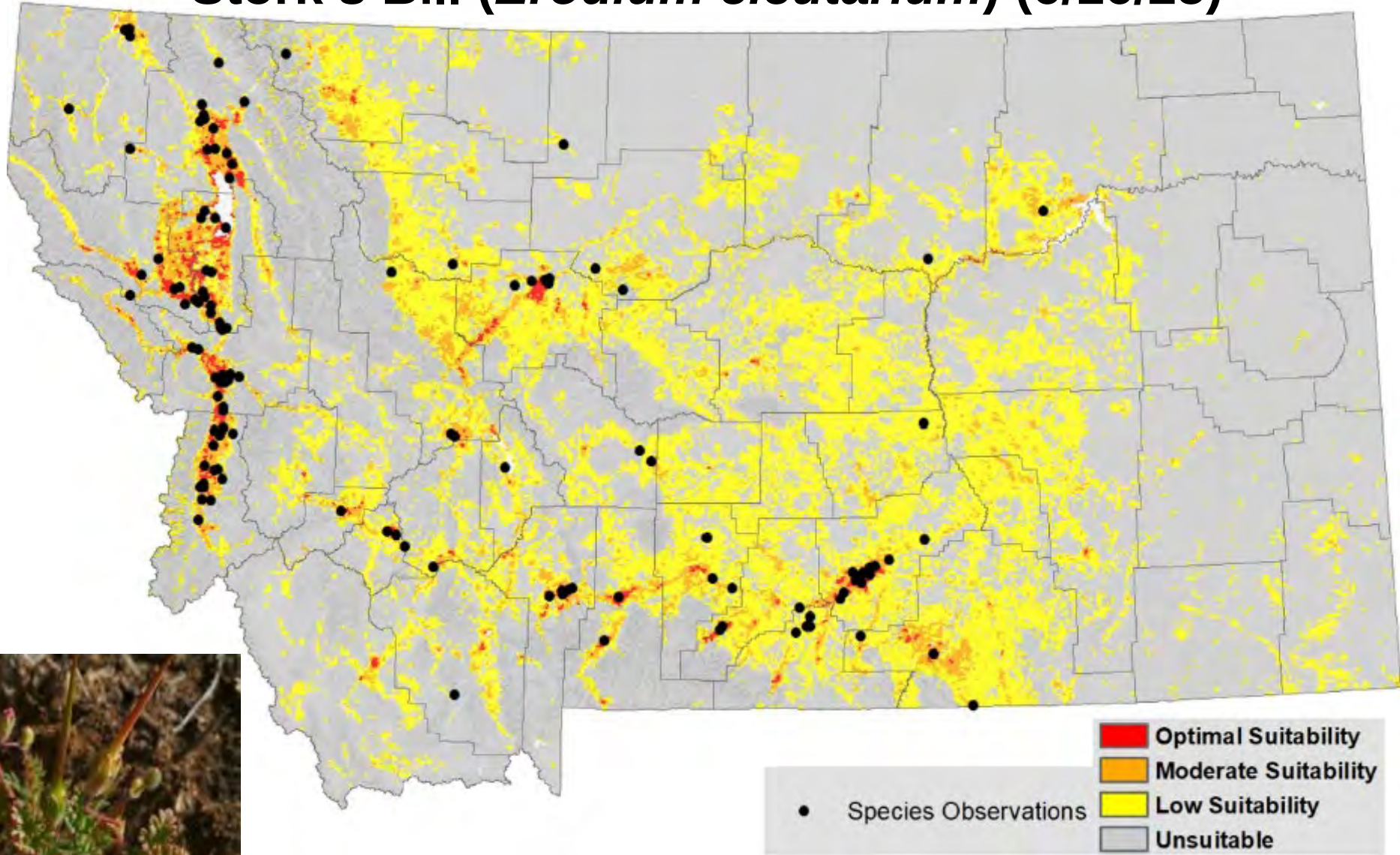
***Of the 15 records we have for this species, only 1 is mapped precisely enough for use in modeling the species' invasion risk.**

Spiny-leaf Sowthistle (*Sonchus asper*) (6/15/21)



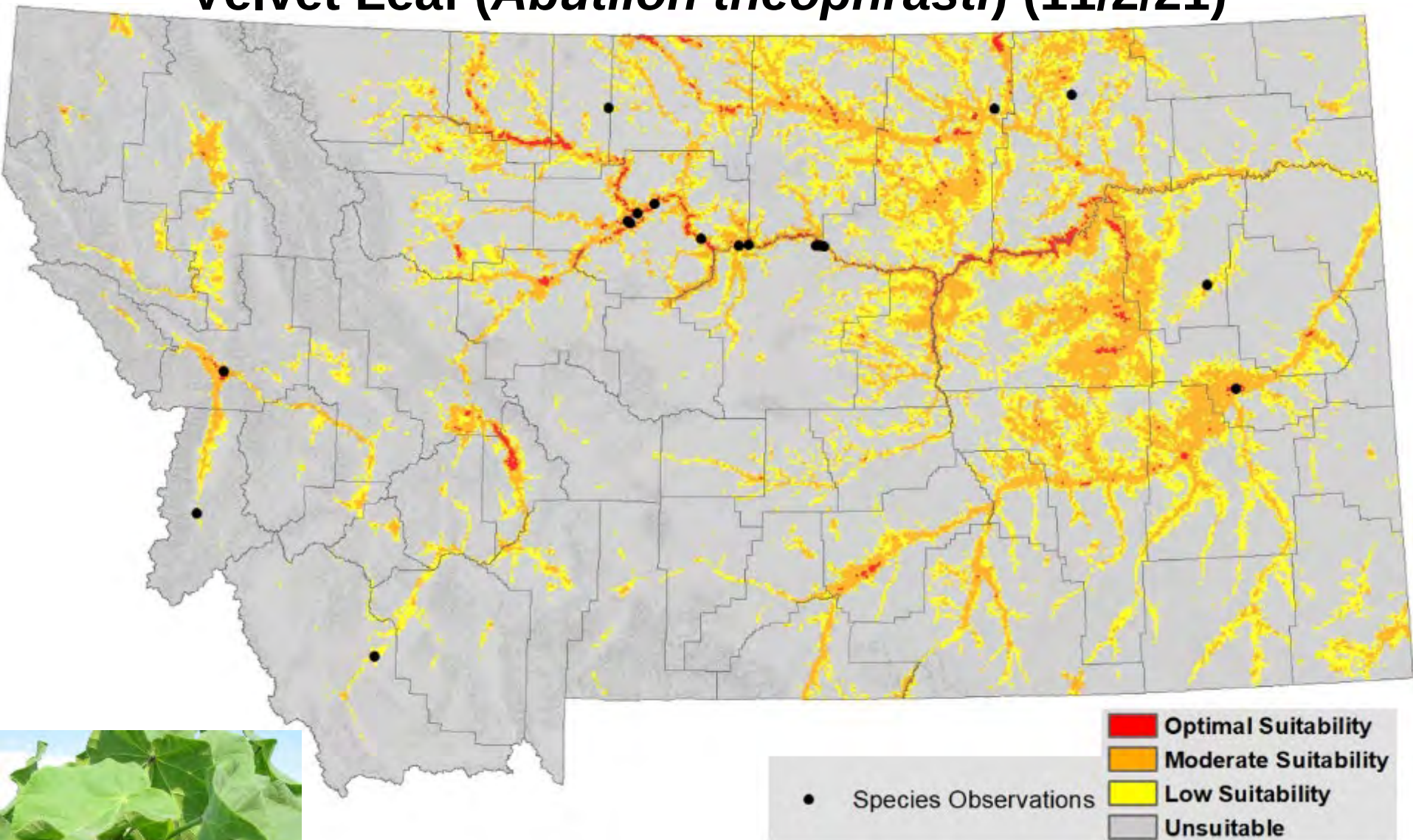
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.002	16,240	4%
Moderate	0.065	1,149	<1%
Optimal	0.131	1,664	<1%

Stork's Bill (*Erodium cicutarium*) (6/16/25)



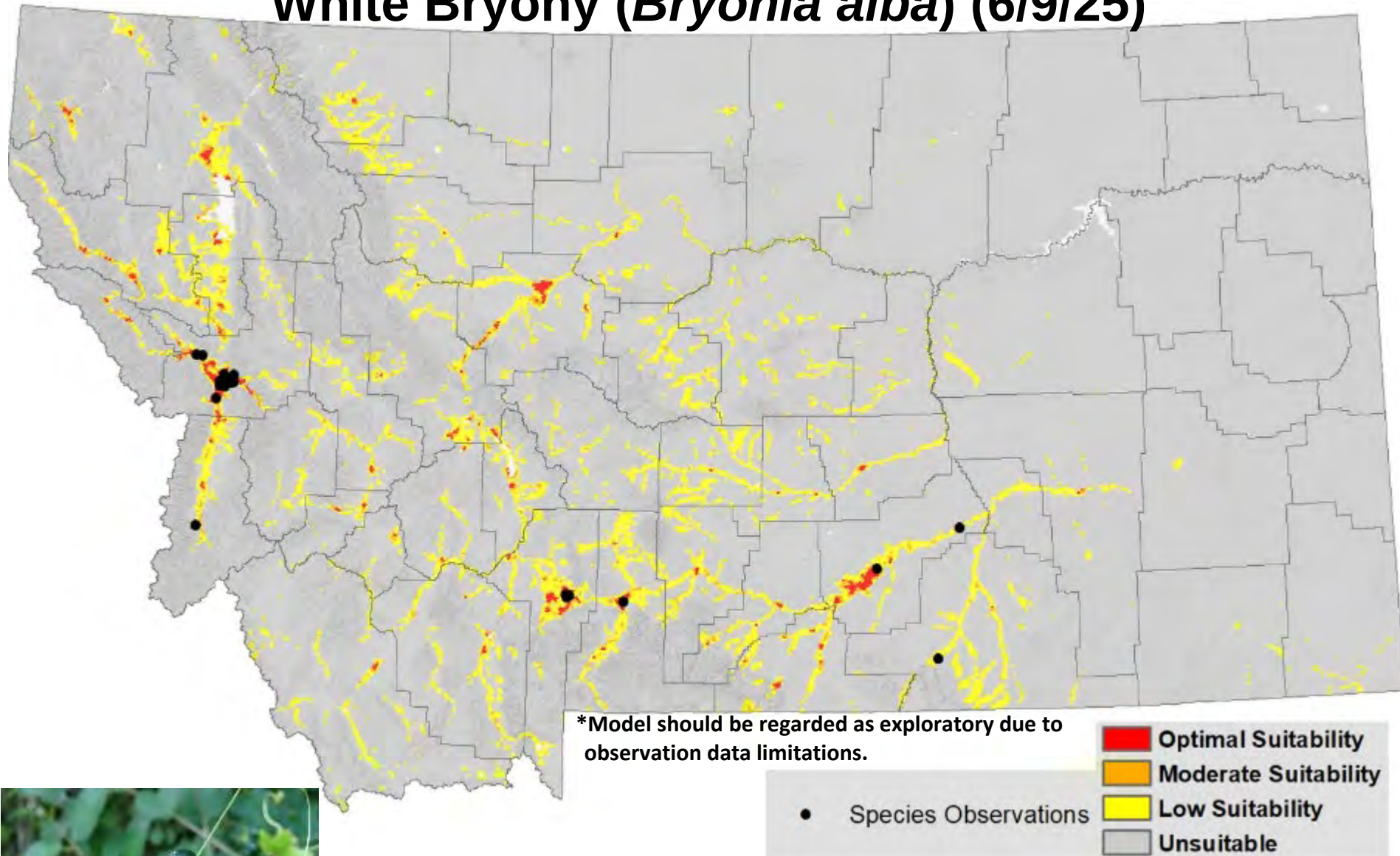
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.005	48,270	13%
Moderate	0.059	9,869	3%
Optimal	0.245	4,489	1%

Velvet Leaf (*Abutilon theophrasti*) (11/2/21)



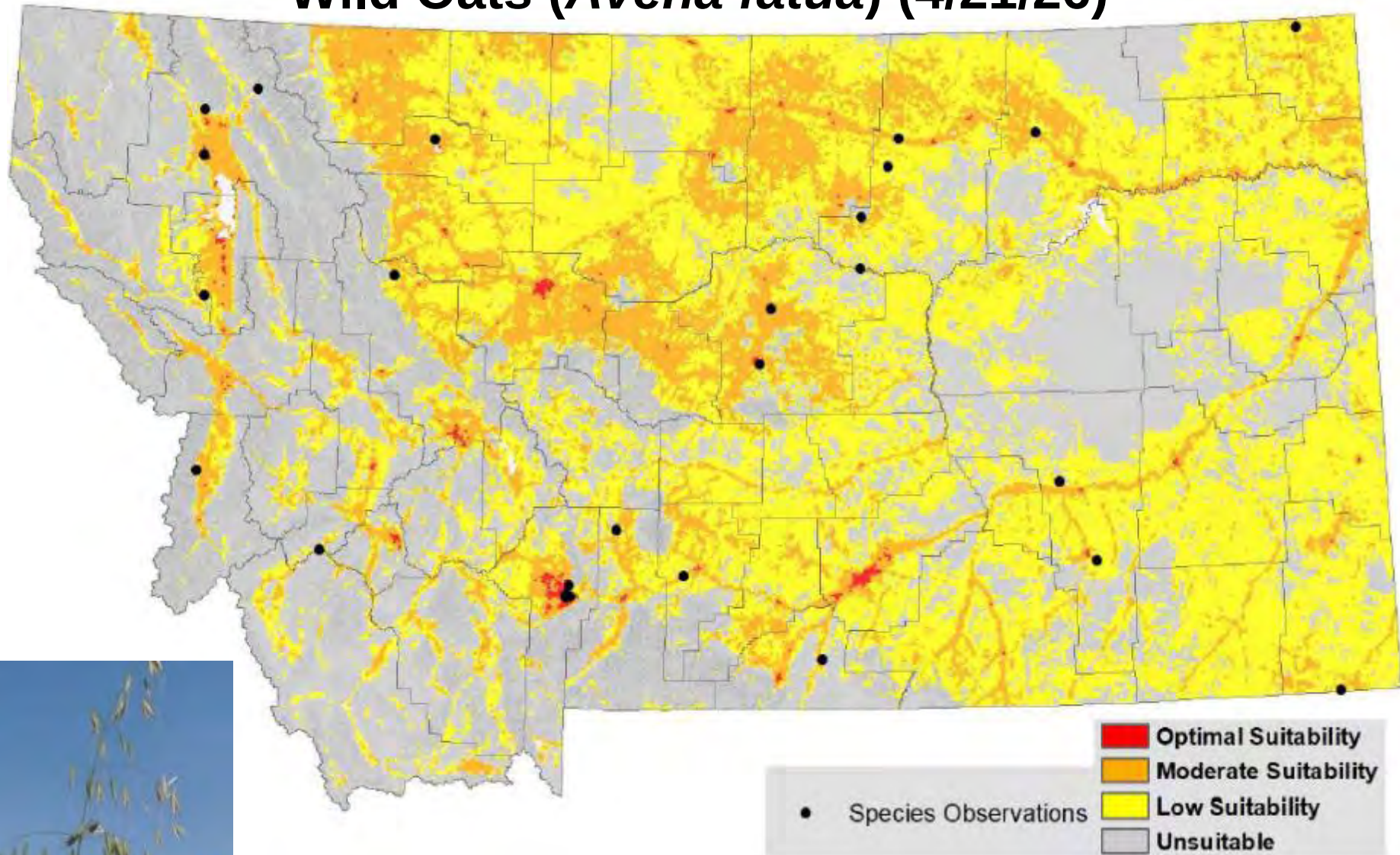
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.019	32,128	8%
Moderate	0.067	26,206	7%
Optimal	0.440	4,491	1%

White Bryony (*Bryonia alba*) (6/9/25)



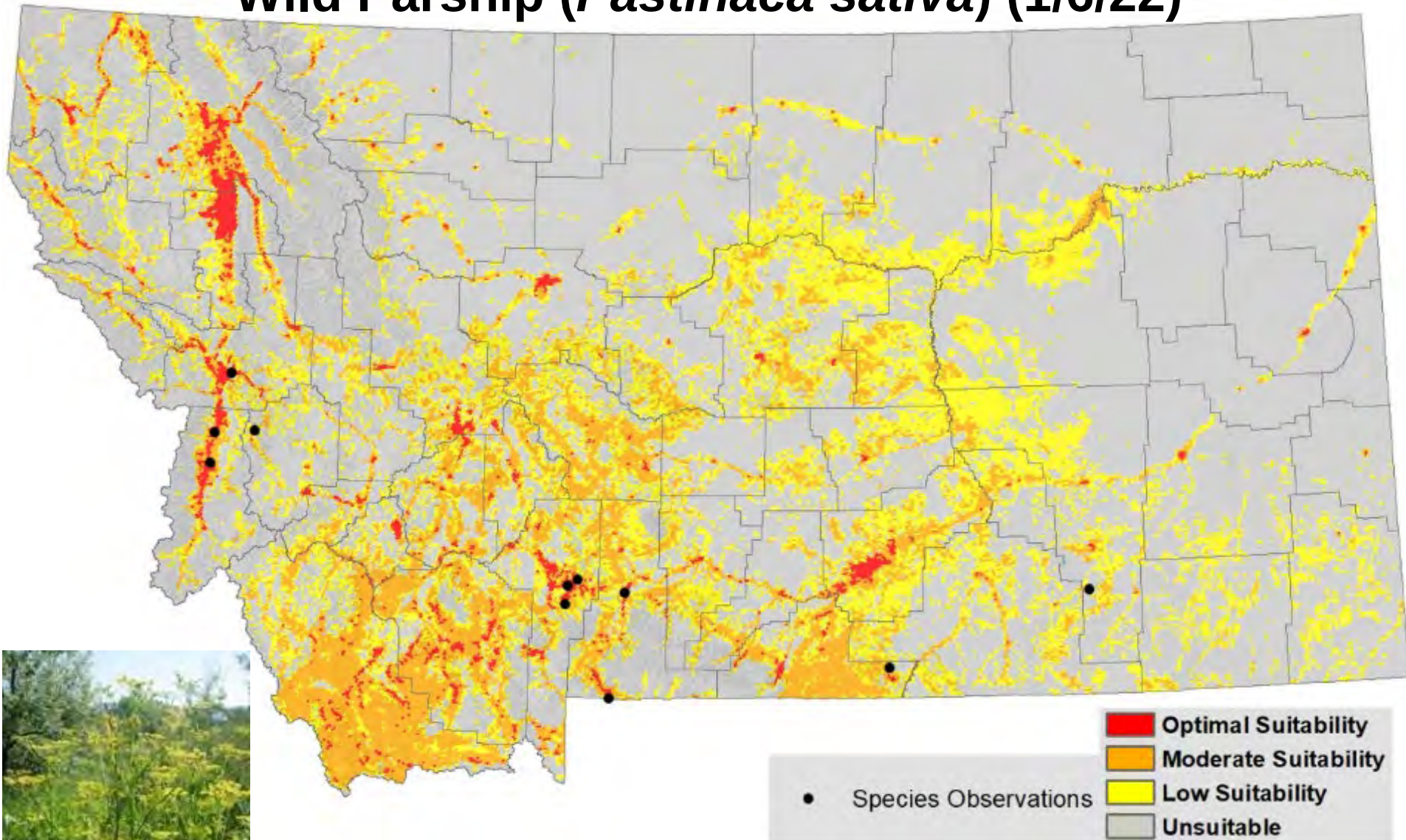
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.001	12,893	3%
Moderate	0.052	1,009	<1%
Optimal	0.128	1,278	<1%

Wild Oats (*Avena fatua*) (4/21/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.119	130,006	34%
Moderate	0.307	61,986	16%
Optimal	0.768	3,395	1%

Wild Parsnip (*Pastinaca sativa*) (1/6/22)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.030	42,950	11%
Moderate	0.090	33,597	9%
Optimal	0.274	12,289	3%

Other Weed Species Modeled

***Please let us know if you have a weed or biocontrol species you would like a model developed for!**

bmaxell@mt.gov

Models can be viewed in the Single Species Overview Task in Map Viewer with agency-level sign in at:

<https://mtnhp.org/mapviewer>

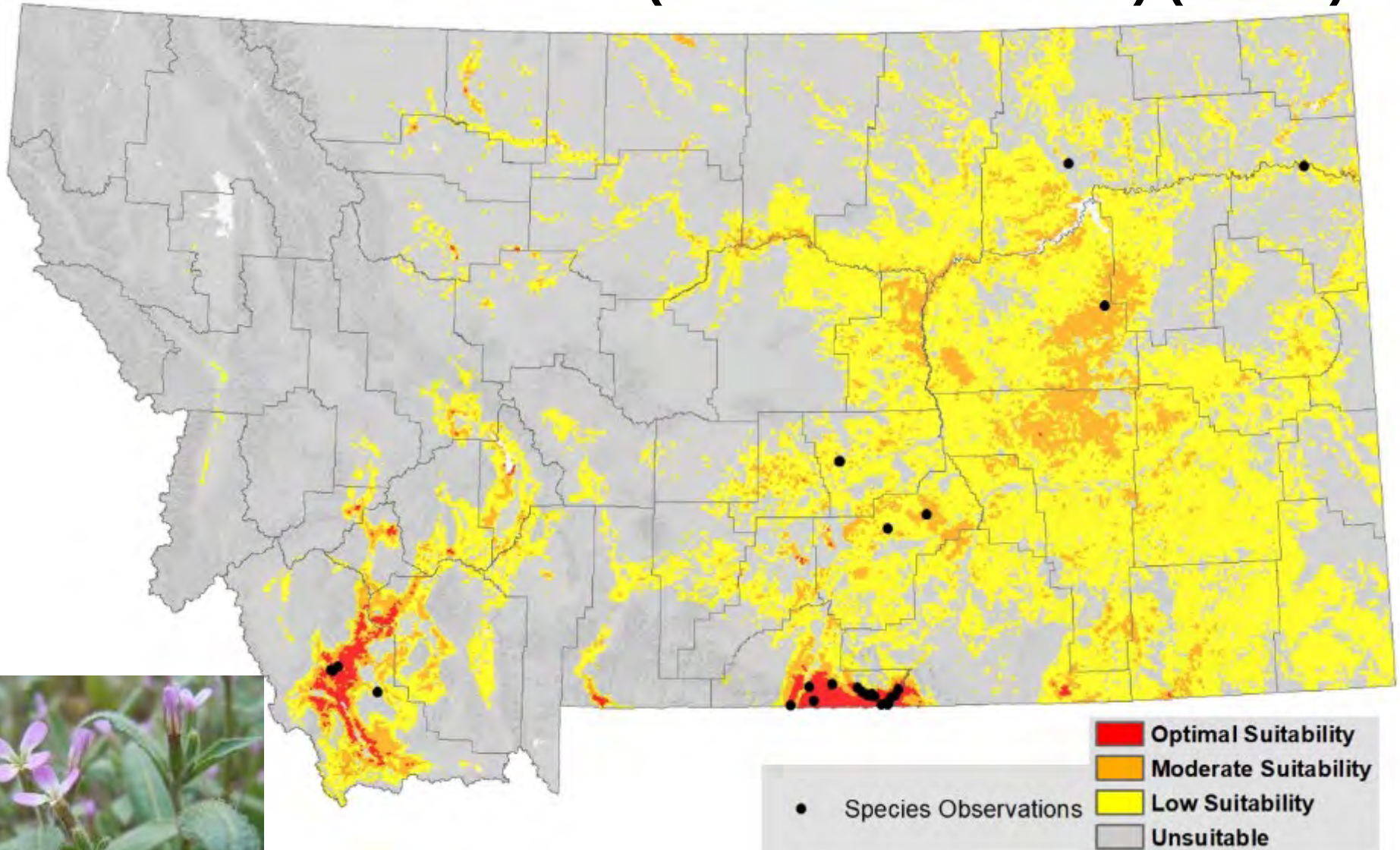
Model write ups are available for download at:

<https://mtnhp.org/models/>

You can request geodatabases of model outputs at:

<https://nris.mt.gov/reqapp/userMain.asp>

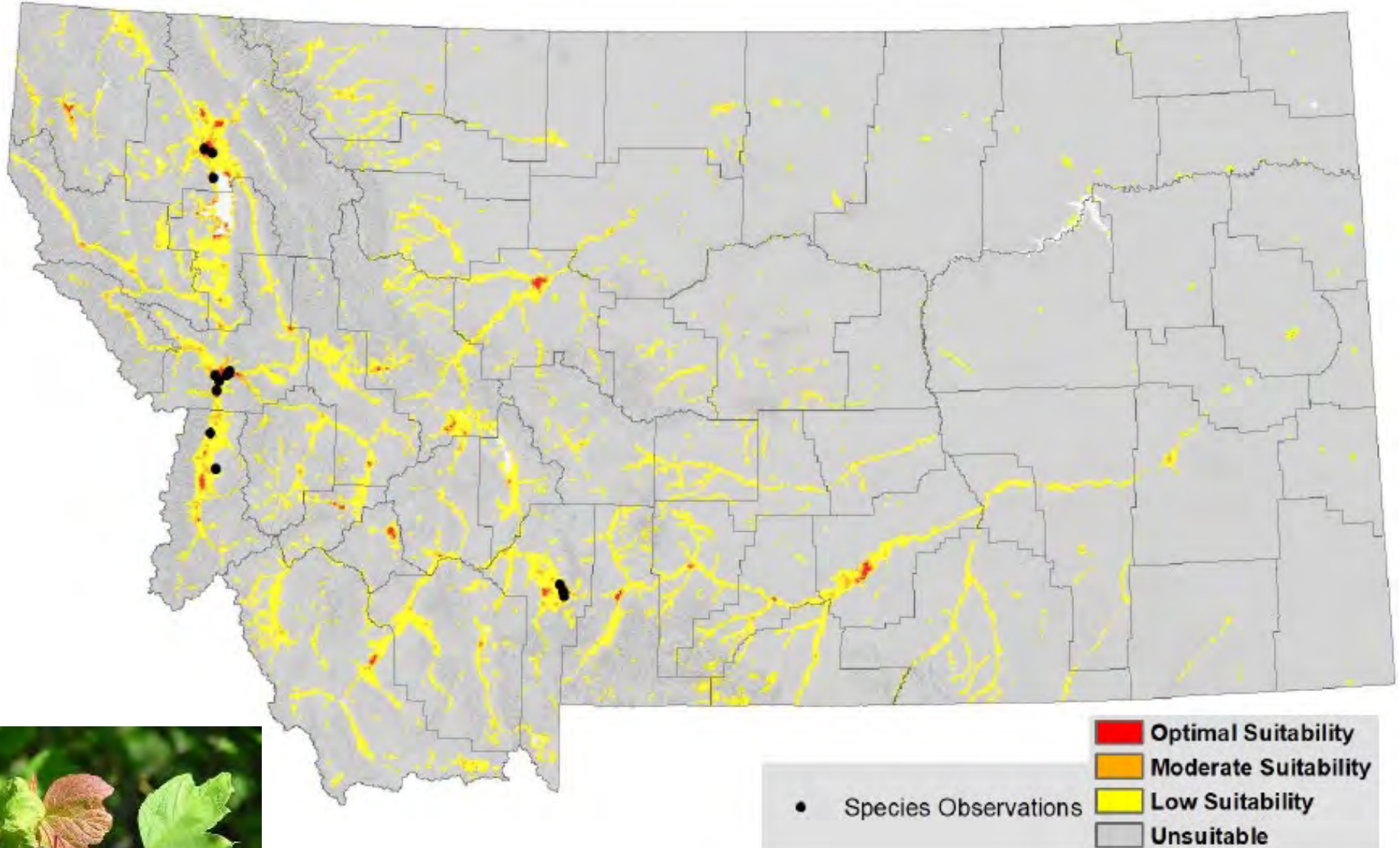
African Adder's-mouth (*Malcolmia africana*) (5/9/25)



© Matt Lavin

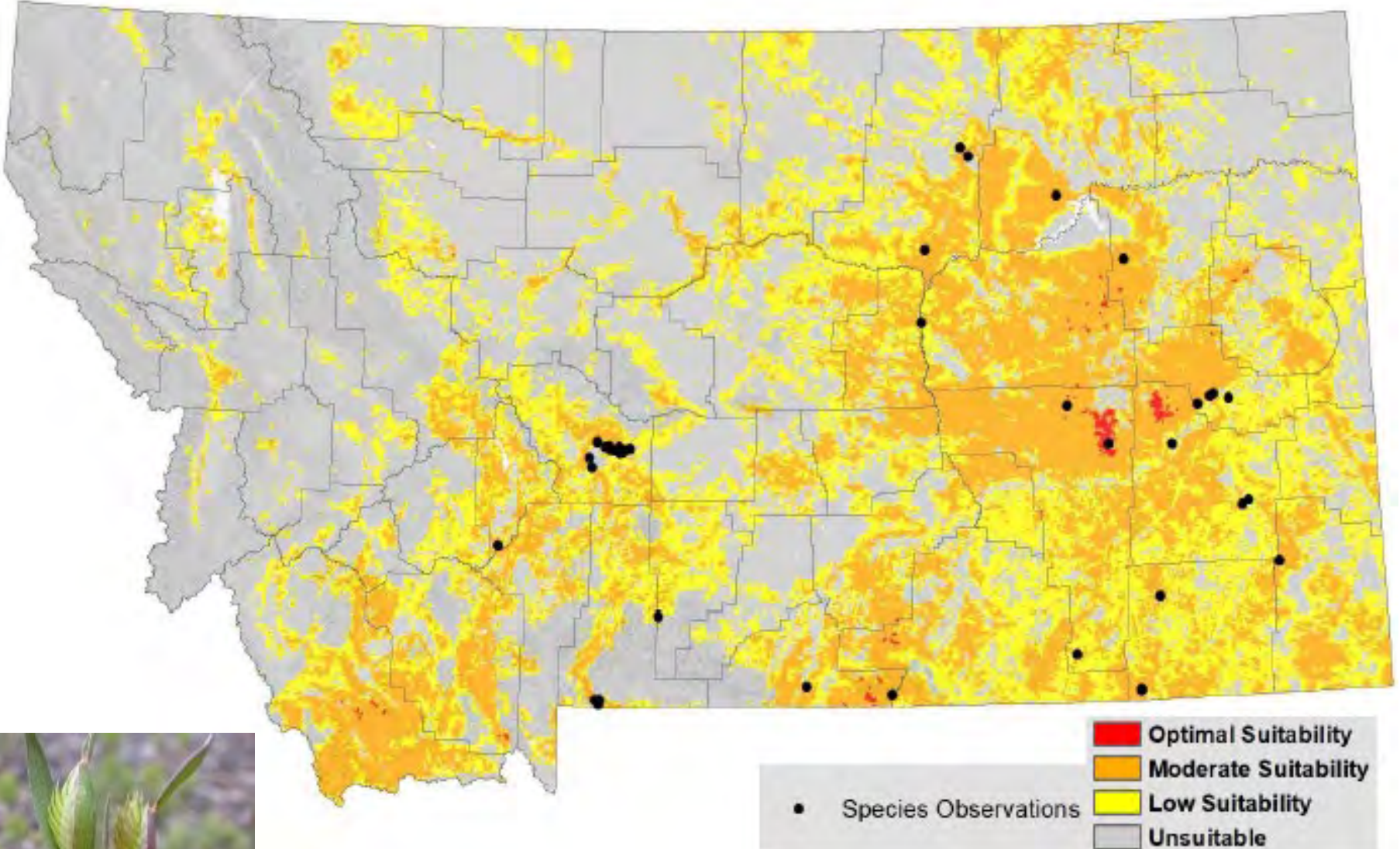
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.031	83,711	22%
Moderate	0.170	20,828	5%
Optimal	0.471	3,690	1%

American Cranberrybush (*Viburnum opulus*) (4/23/26)



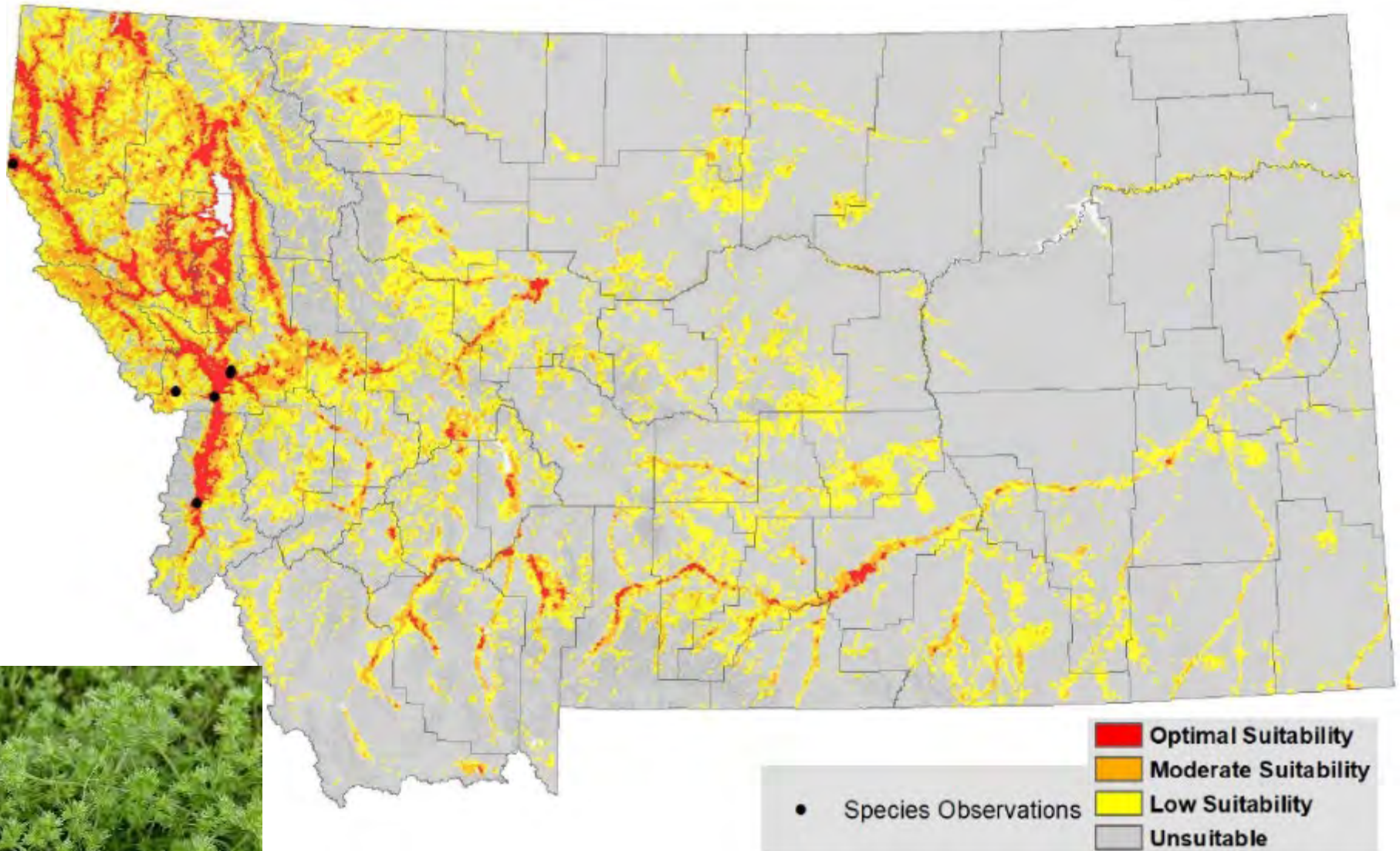
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.002	17,497	5%
Moderate	0.113	1,199	<1%
Optimal	0.326	696	<1%

Annual False Wheatgrass (*Eremopyrum triticeum*) (4/18/26)



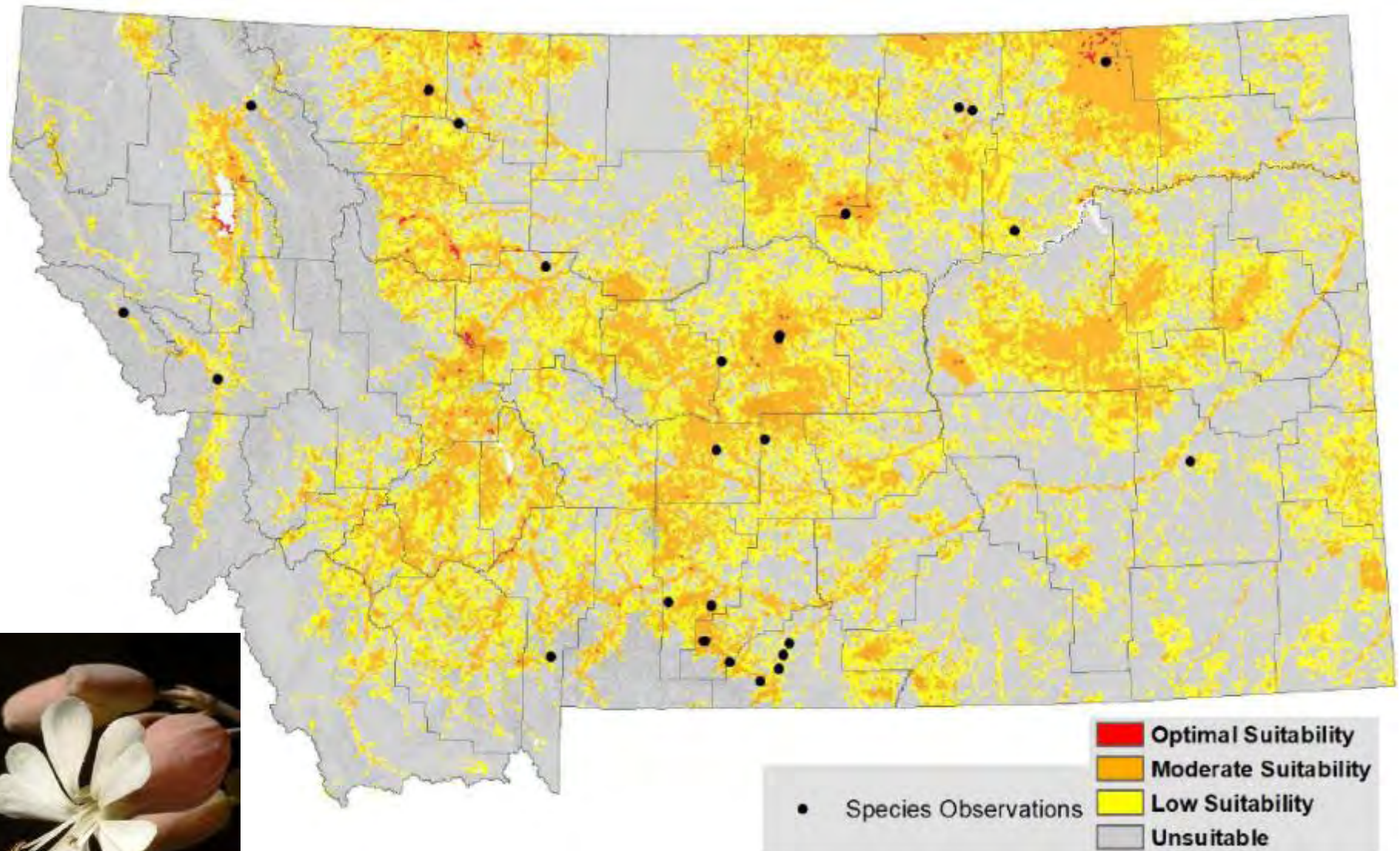
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.091	70,430	19%
Moderate	0.247	79,831	21%
Optimal	0.768	2,428	<1%

Annual Knawel (*Scleranthus annuus*) (6/2/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.019	46,928	12%
Moderate	0.077	19,814	5%
Optimal	0.216	10,049	3%

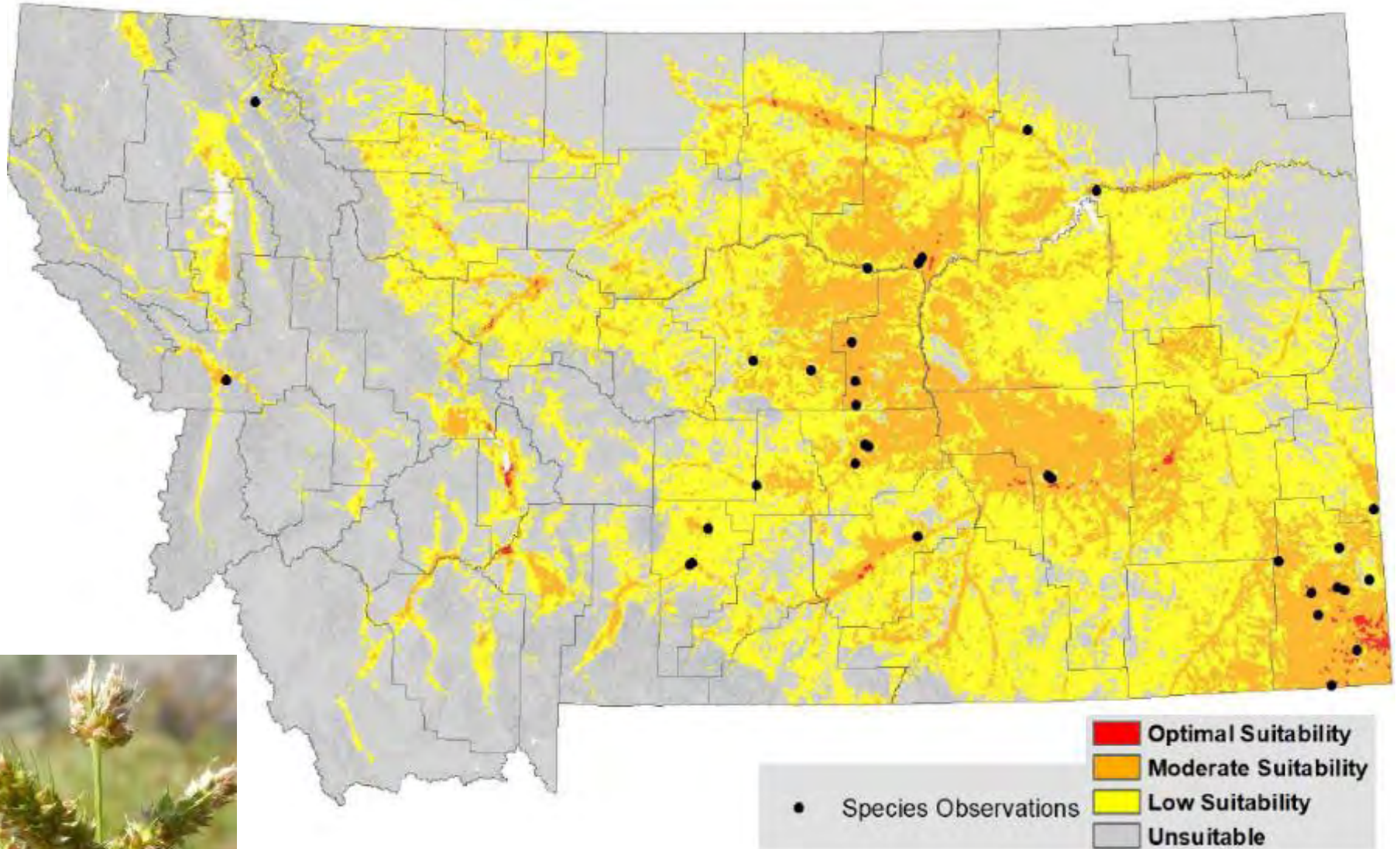
Balkan Catchfly (*Silene csereii*) (6/2/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.050	60,454	16%
Moderate	0.123	44,651	12%
Optimal	0.494	7,919	2%

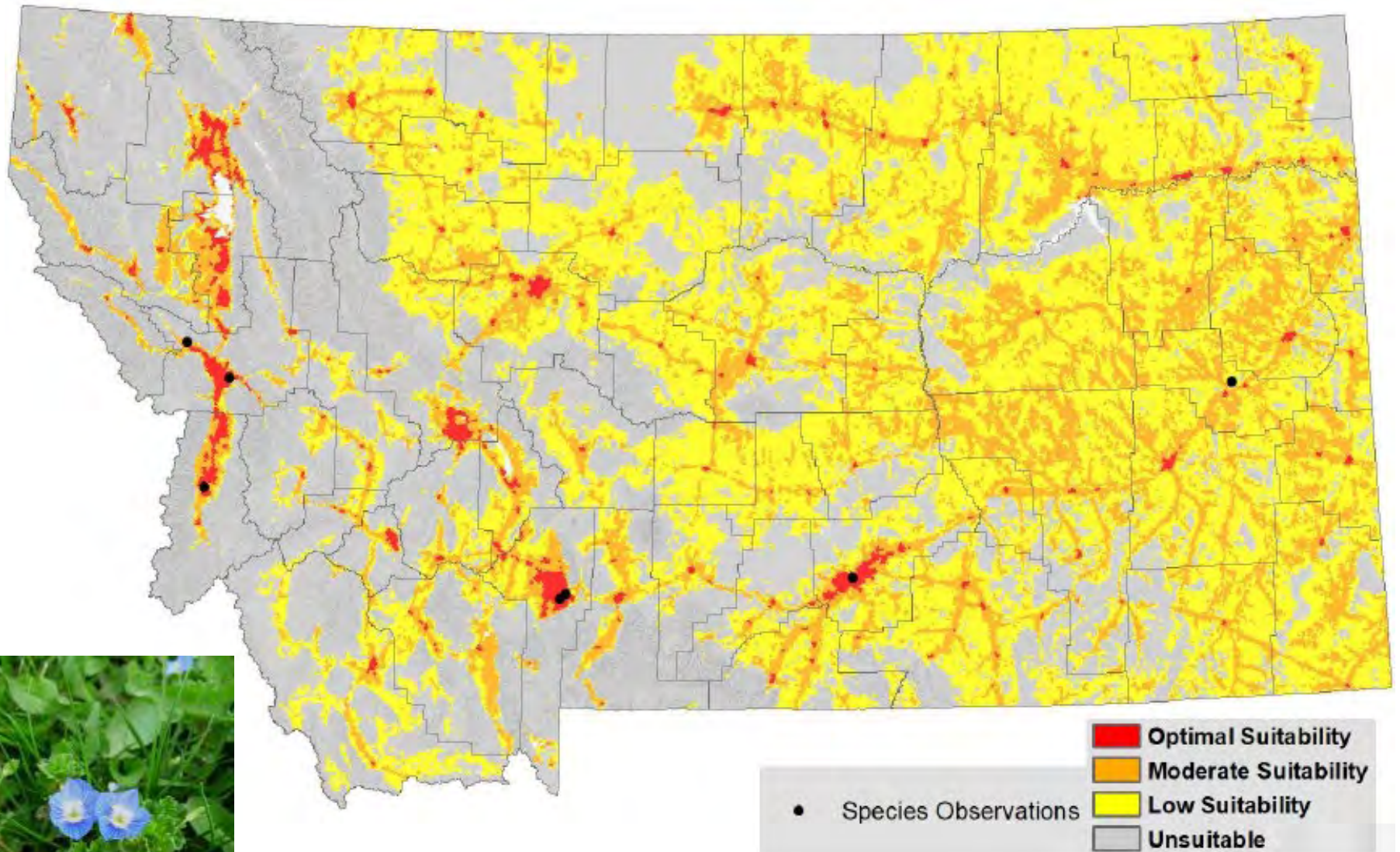


Barnyard Grass (*Echinochloa crus-galli*) (4/18/26)



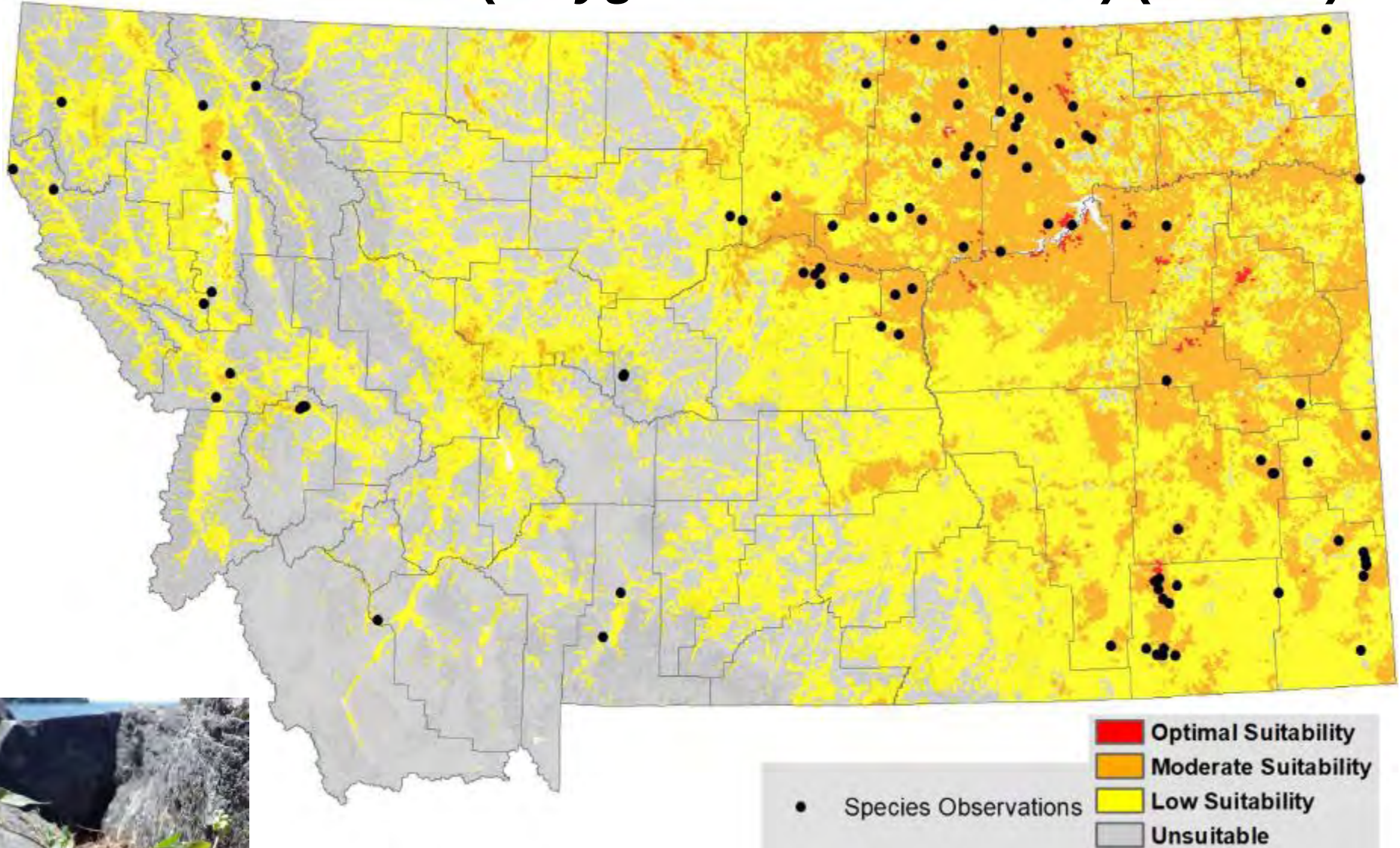
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.038	85,461	22%
Moderate	0.212	48,605	13%
Optimal	0.642	5,403	1%

Bird-eye Speedwell (*Veronica persica*) (5/21/26)



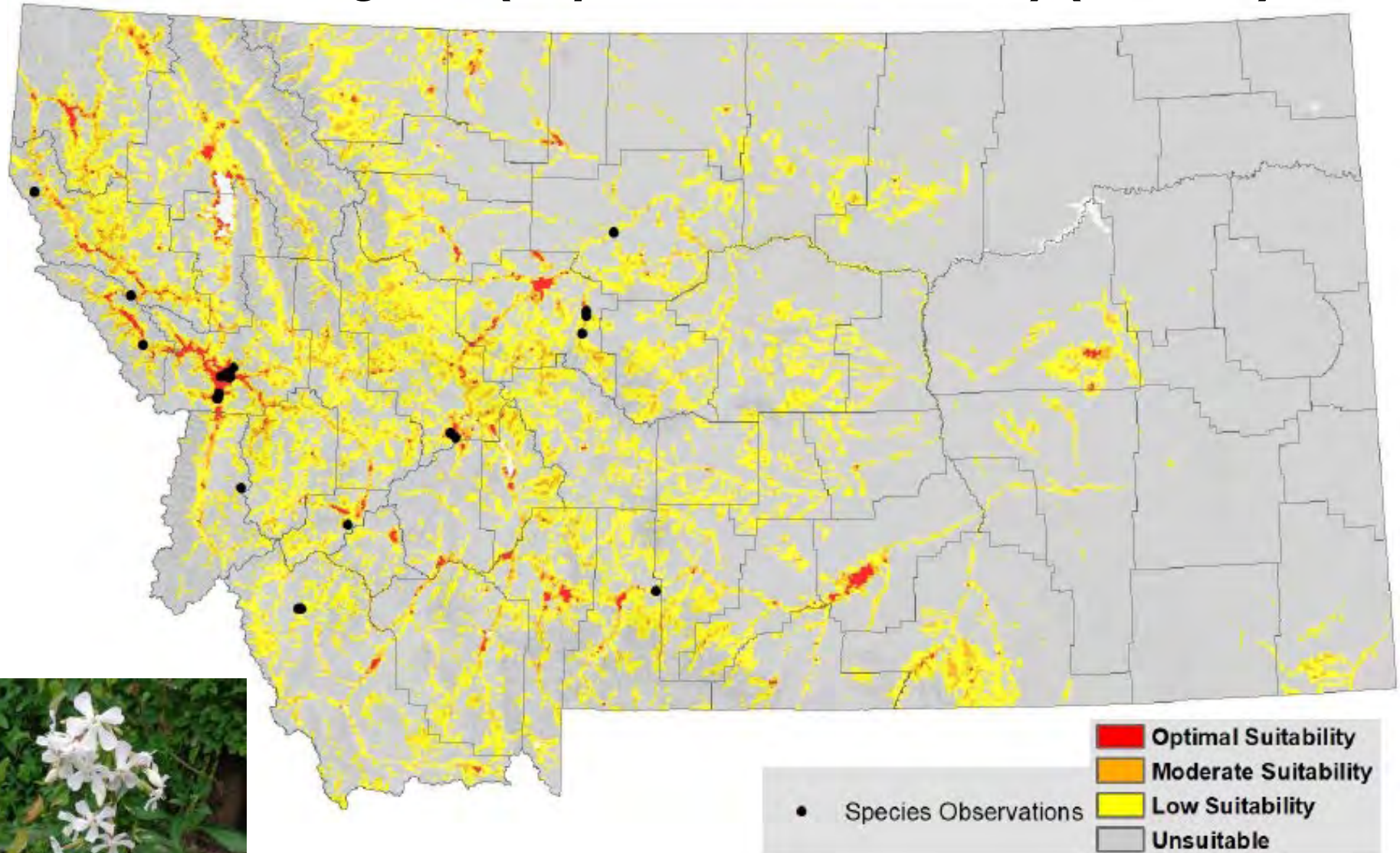
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.070	121,784	32%
Moderate	0.157	69,461	18%
Optimal	0.488	5,826	2%

Black Bindweed (*Polygonum convolvulus*) (6/30/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.032	126,953	33%
Moderate	0.257	64,862	17%
Optimal	0.706	5,492	1%

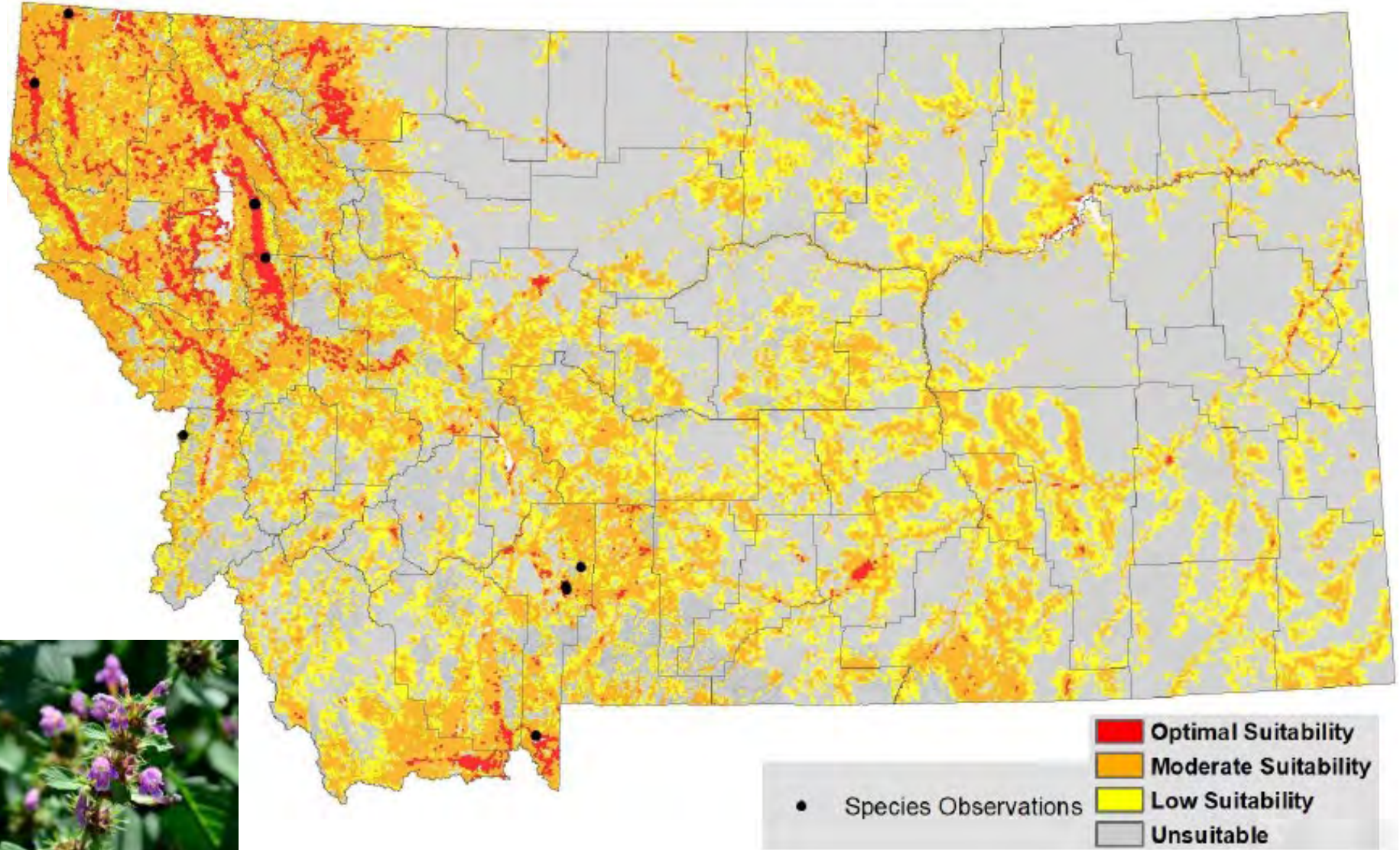
Bouncing-bet (*Saponaria officinalis*) (4/23/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.011	38,826	10%
Moderate	0.100	6,845	2%
Optimal	0.249	5,075	1%



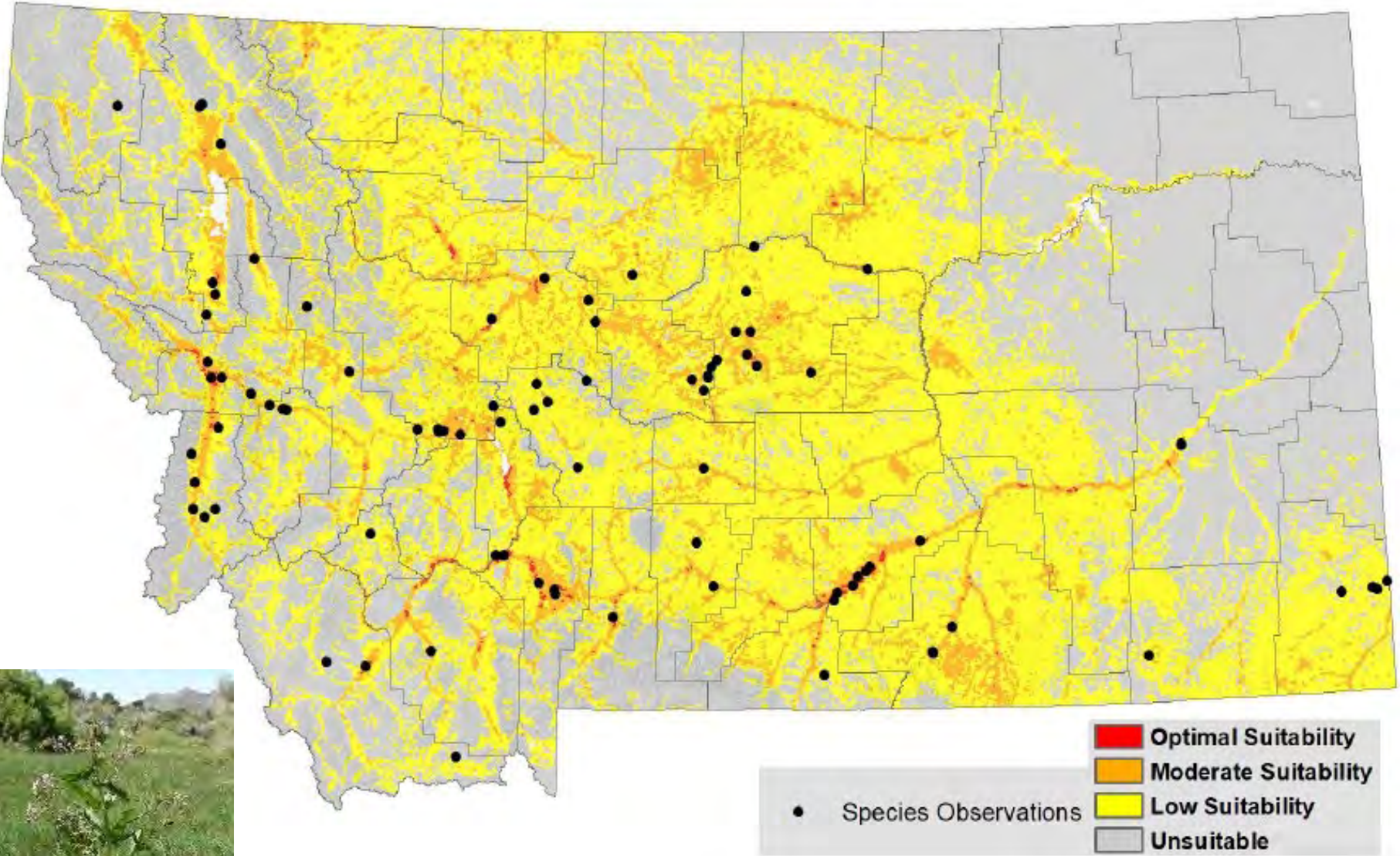
Brittle-stem Hempnettle (*Galeopsis tetrahit*) (5/27/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.067	60,354	16%
Moderate	0.130	73,022	19%
Optimal	0.386	16,913	4%

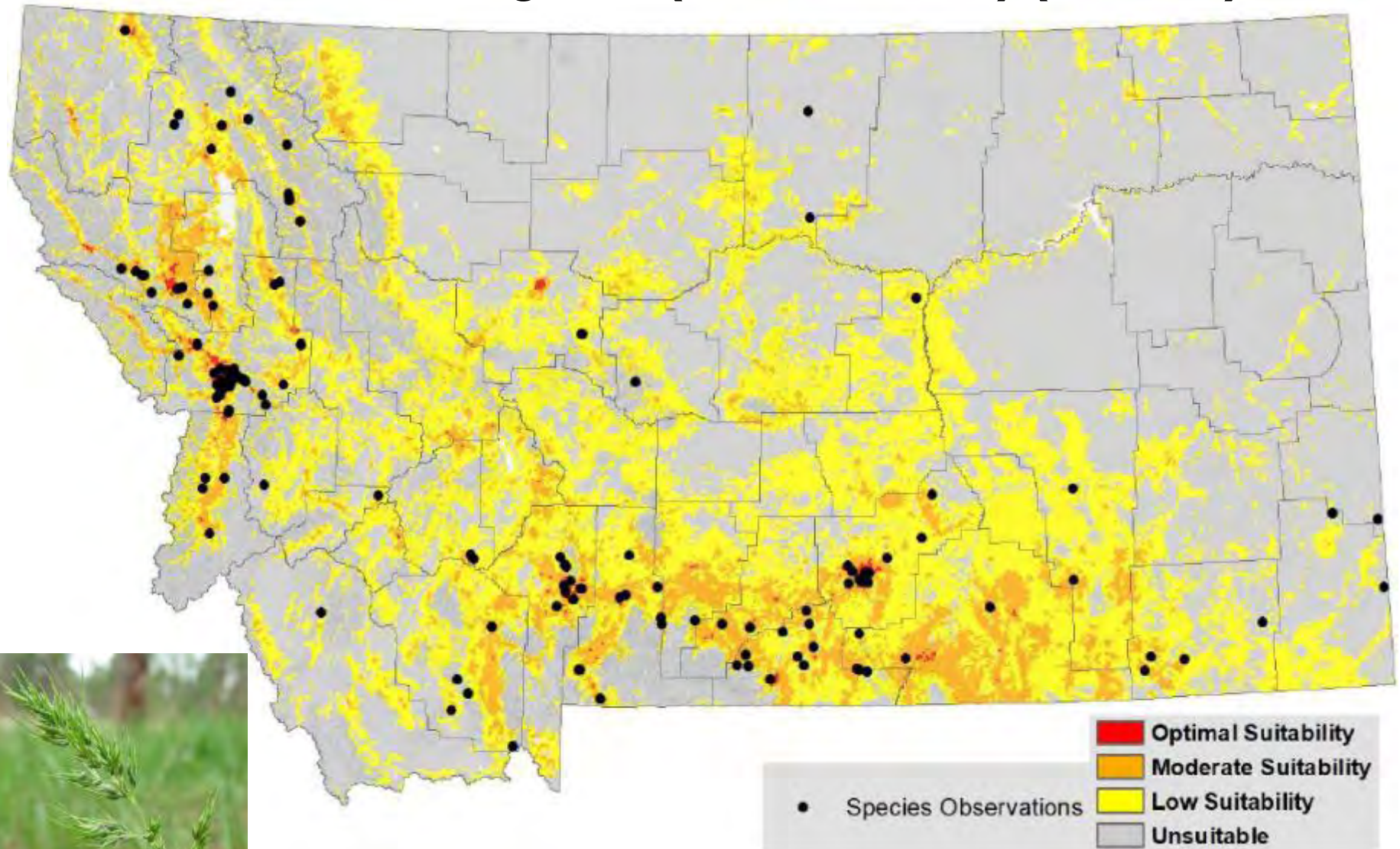


Brook-pimpernell (*Veronica anagallis-aquatica*) (4/21/26)



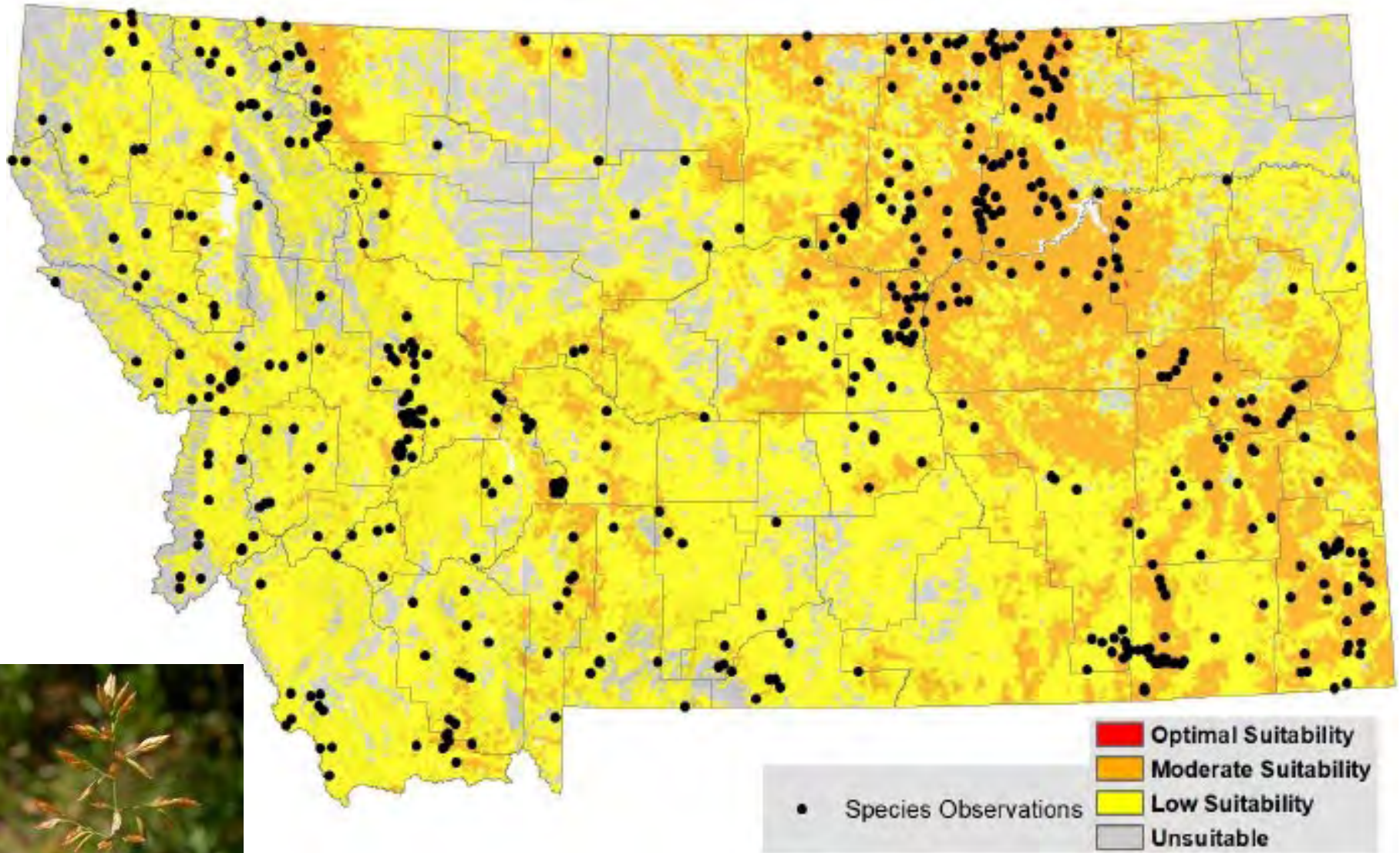
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.021	109,555	29%
Moderate	0.155	26,366	7%
Optimal	0.548	6,073	2%

Bulbous Bluegrass (*Poa bulbosa*) (4/18/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.019	77,917	20%
Moderate	0.126	23,876	6%
Optimal	0.498	3,921	1%

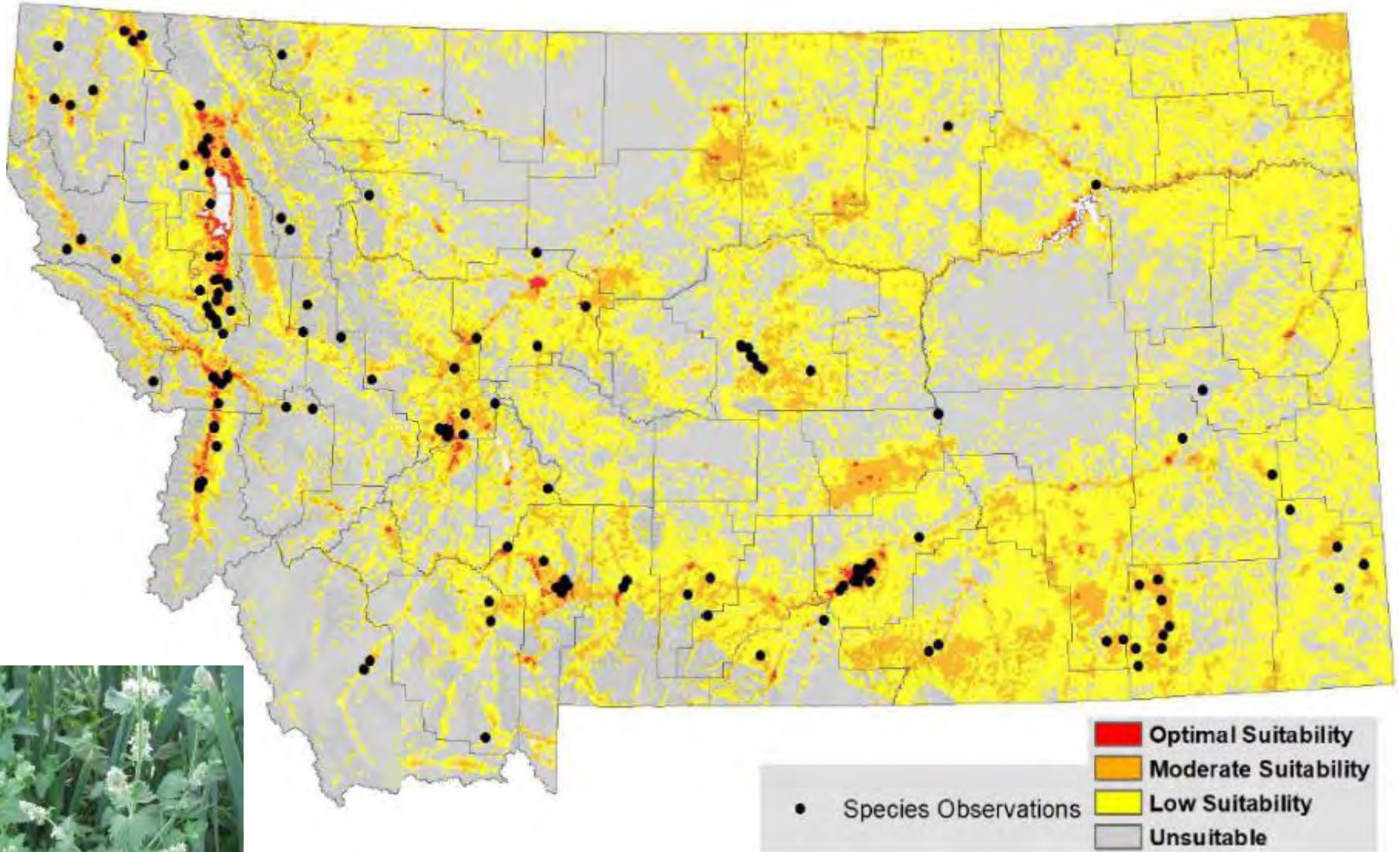
Canada Bluegrass (*Poa compressa*) (4/17/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.050	162,327	43%
Moderate	0.331	94,174	25%
Optimal	0.808	1,778	<1%

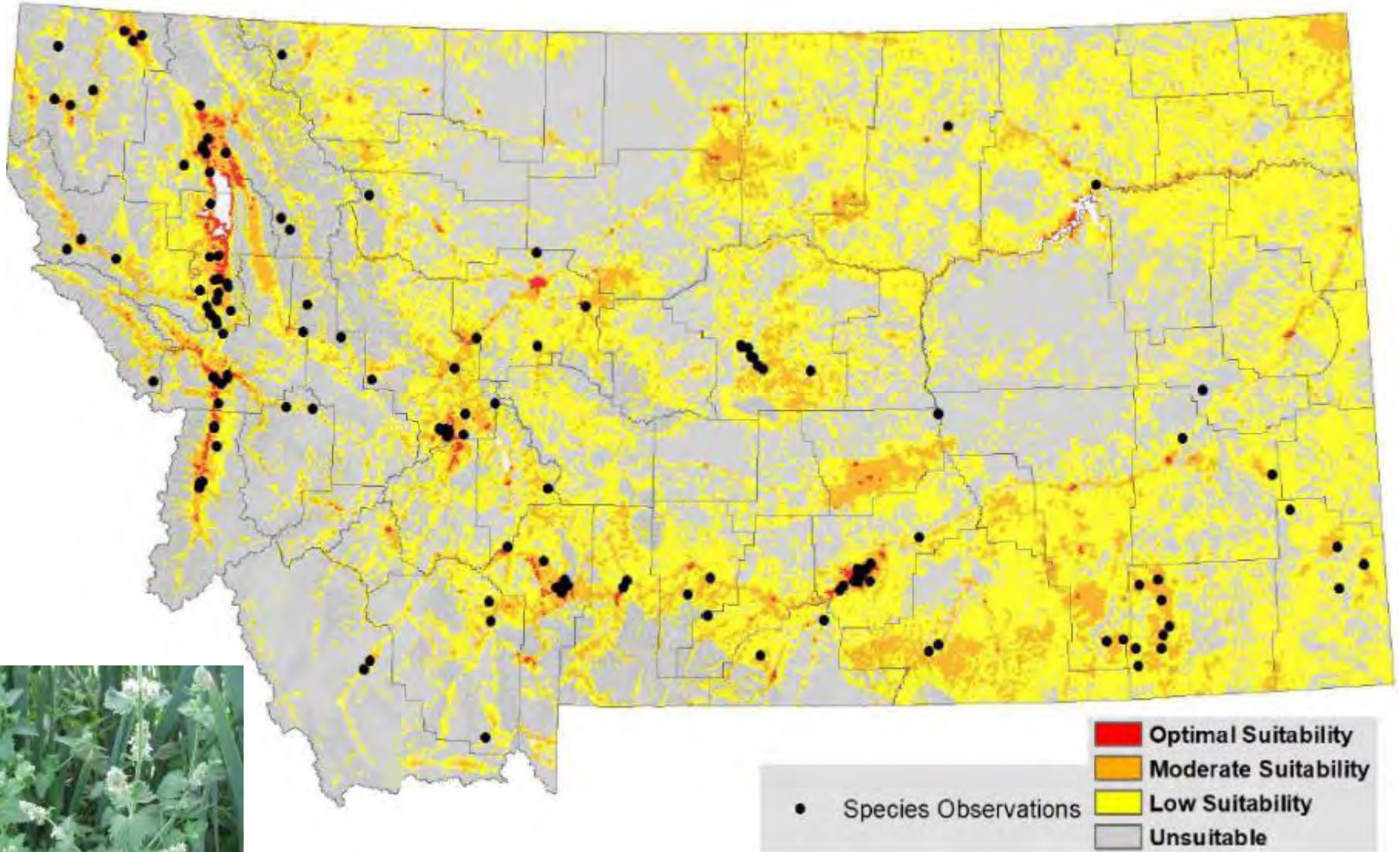


Catnip (*Nepeta cataria*) (4/23/26)



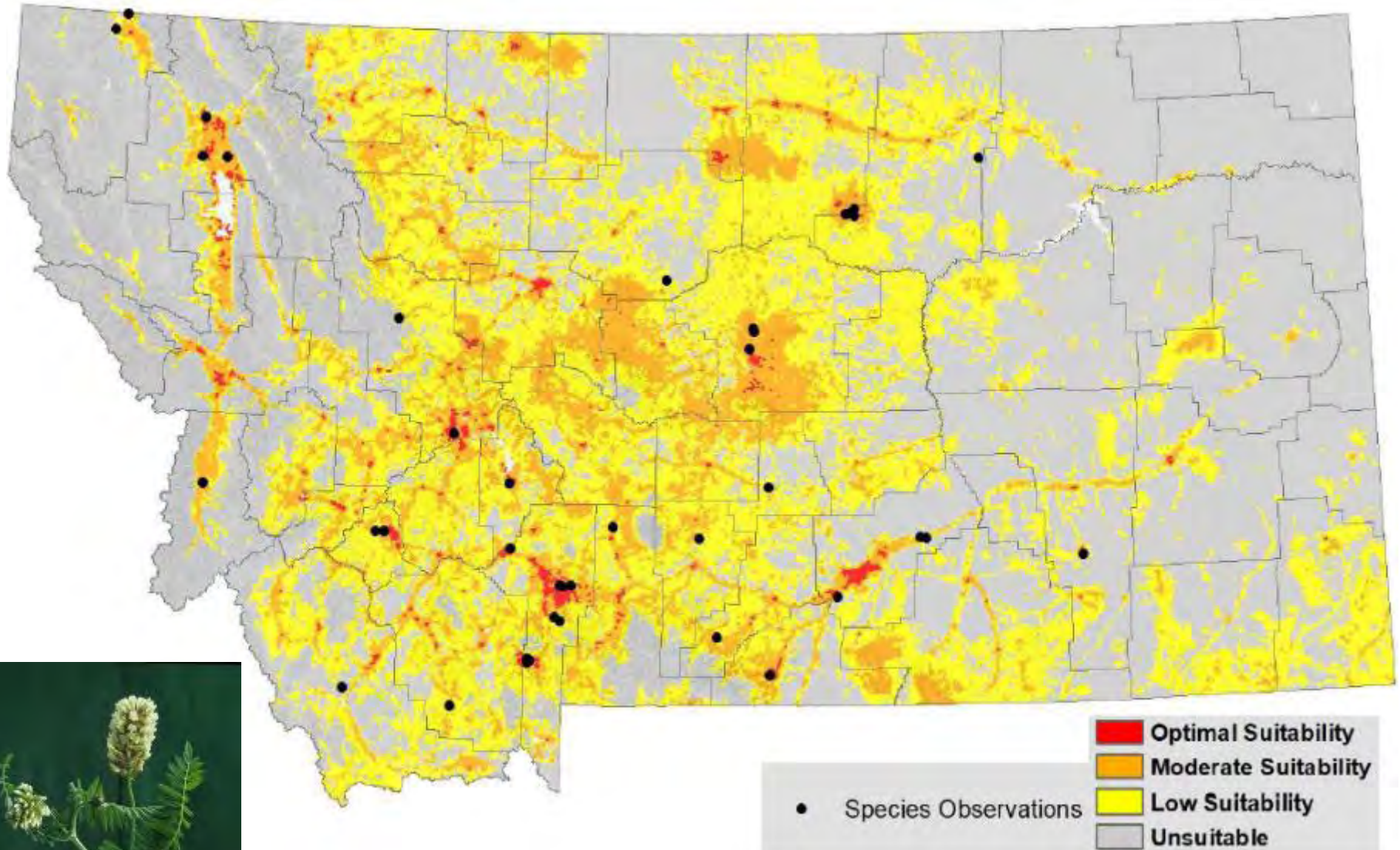
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	94,409	25%
Moderate	0.097	28,600	8%
Optimal	0.377	6,741	2%

Catnip (*Nepeta cataria*) (4/23/26)



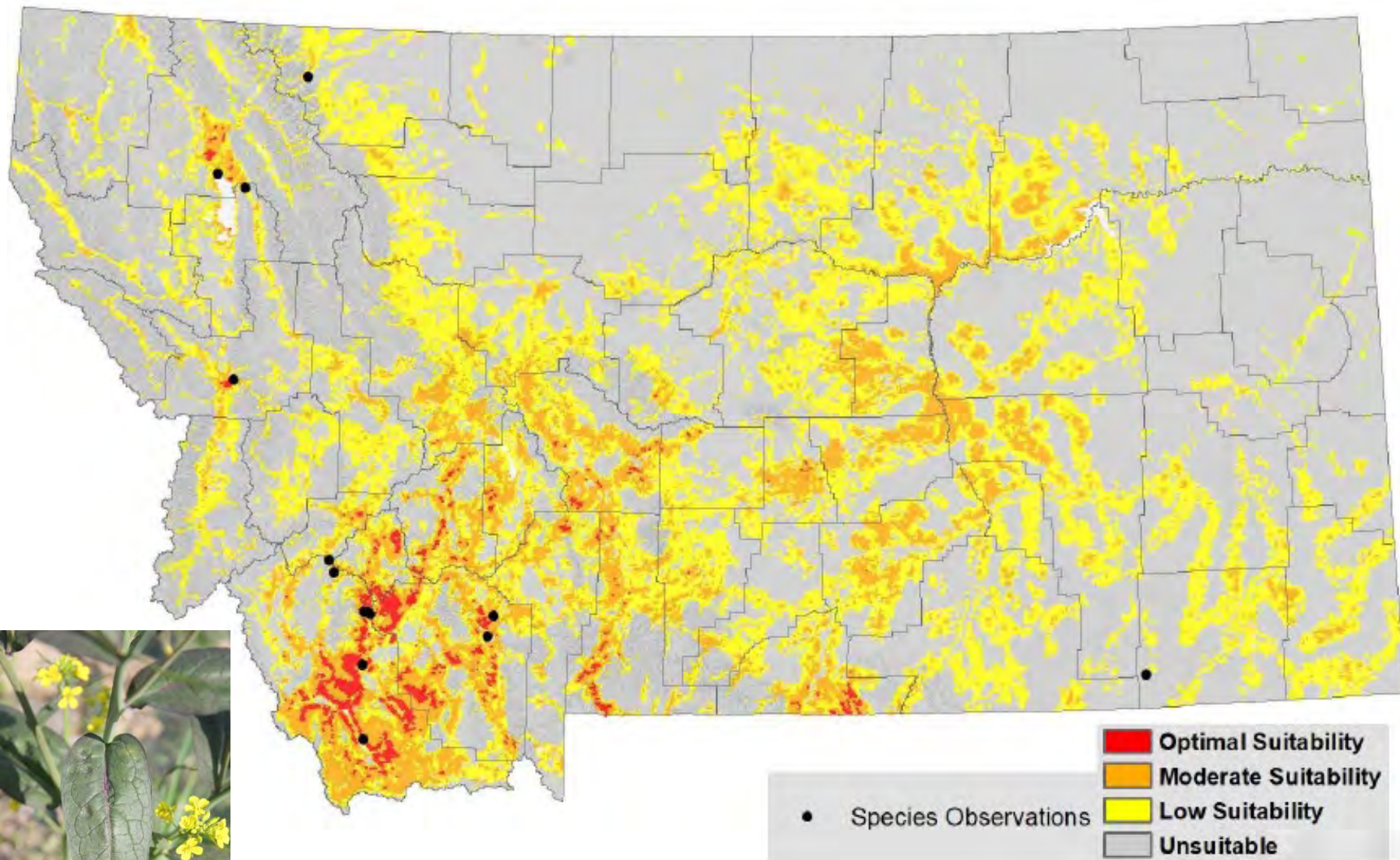
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.018	94,409	25%
Moderate	0.097	28,600	8%
Optimal	0.377	6,741	2%

Chickpea Milkvetch (*Astragalus cicer*) (4/23/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.065	97,418	26%
Moderate	0.201	43,148	11%
Optimal	0.624	5,375	1%

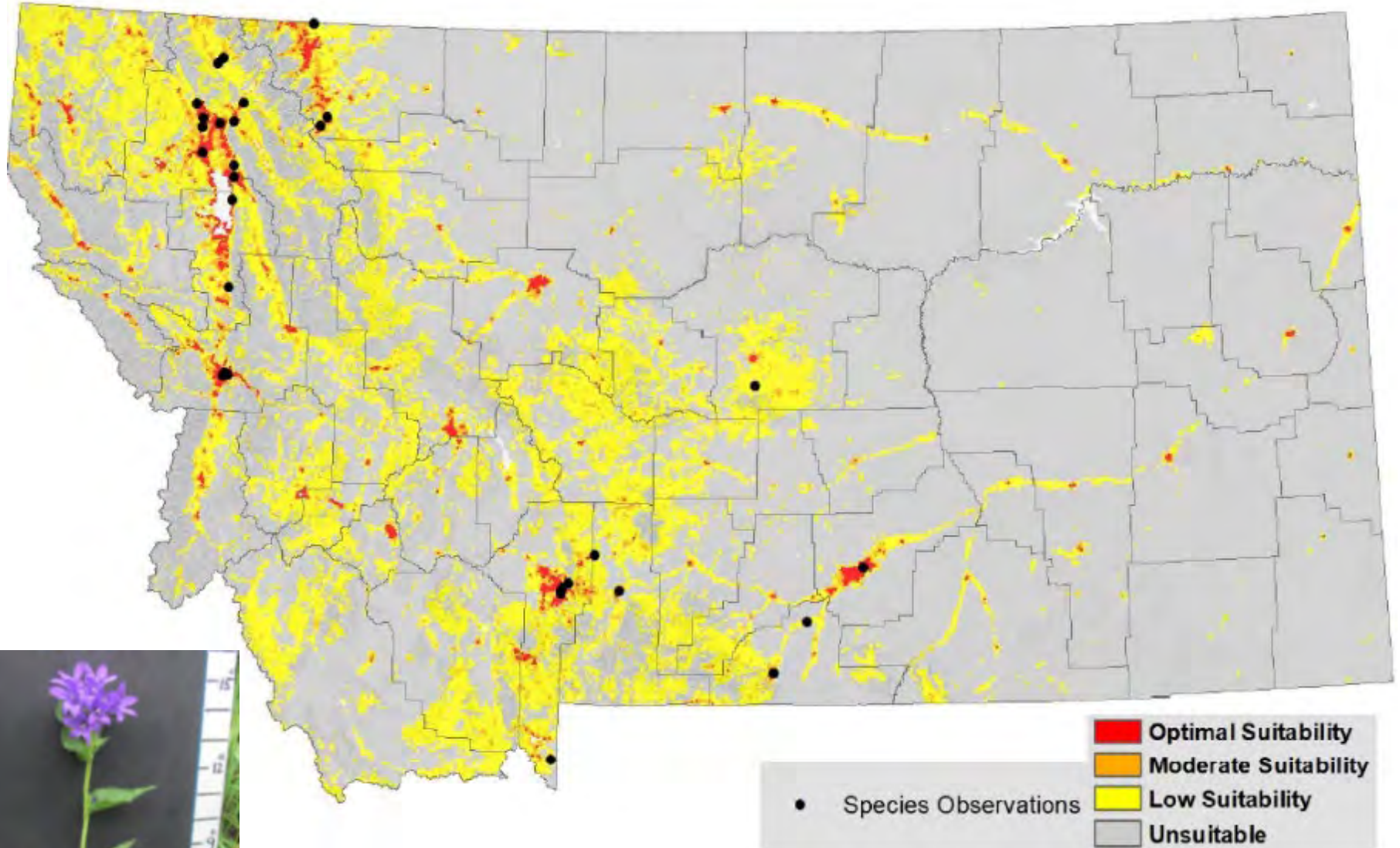
Chinese Mustard (*Brassica juncea*) (6/3/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.063	68,175	18%
Moderate	0.253	34,707	9%
Optimal	0.612	7,544	2%

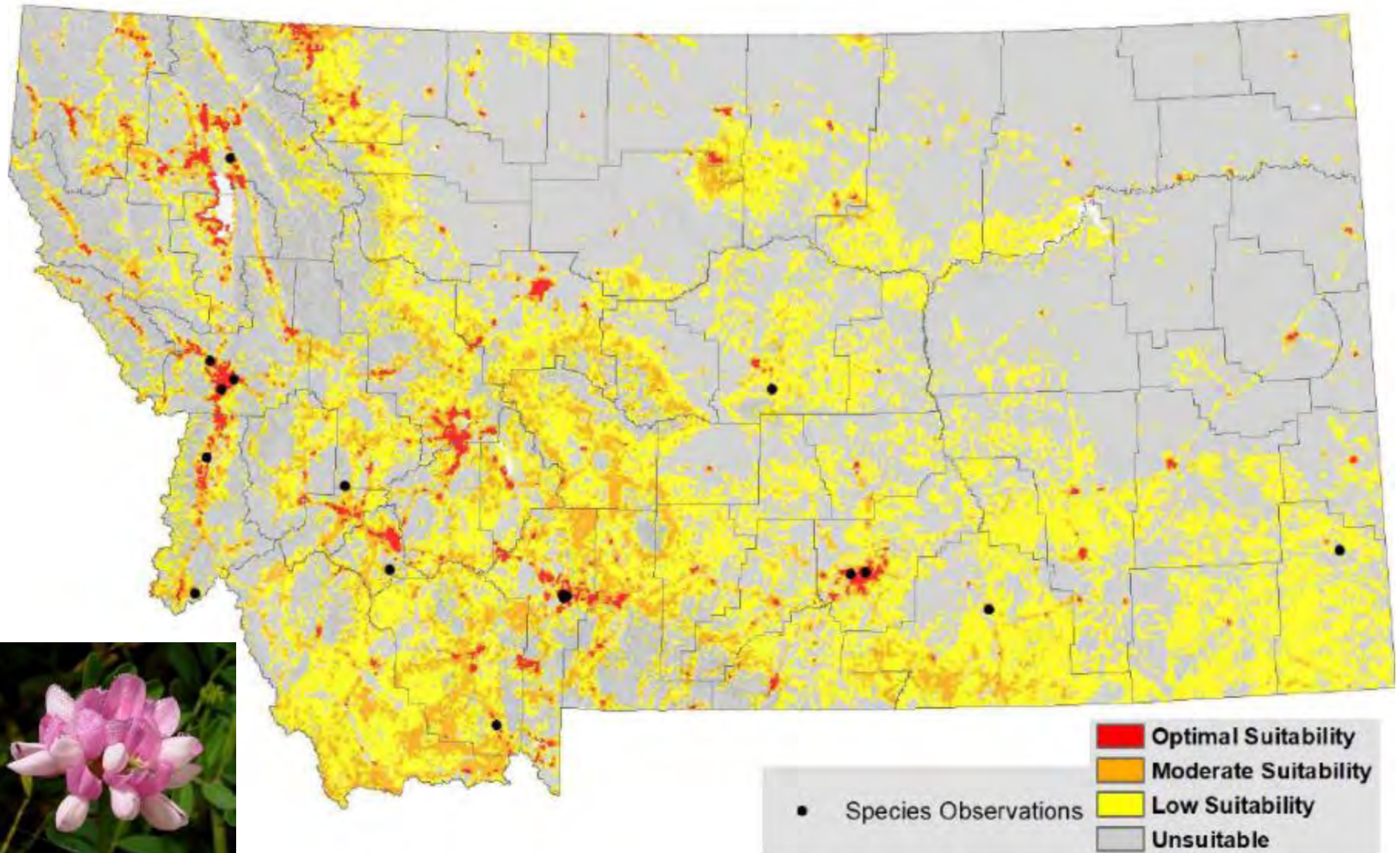


Clustered Bellflower (*Campanula glomerata*) (4/23/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.010	53,048	14%
Moderate	0.080	5,933	2%
Optimal	0.209	3,502	1%

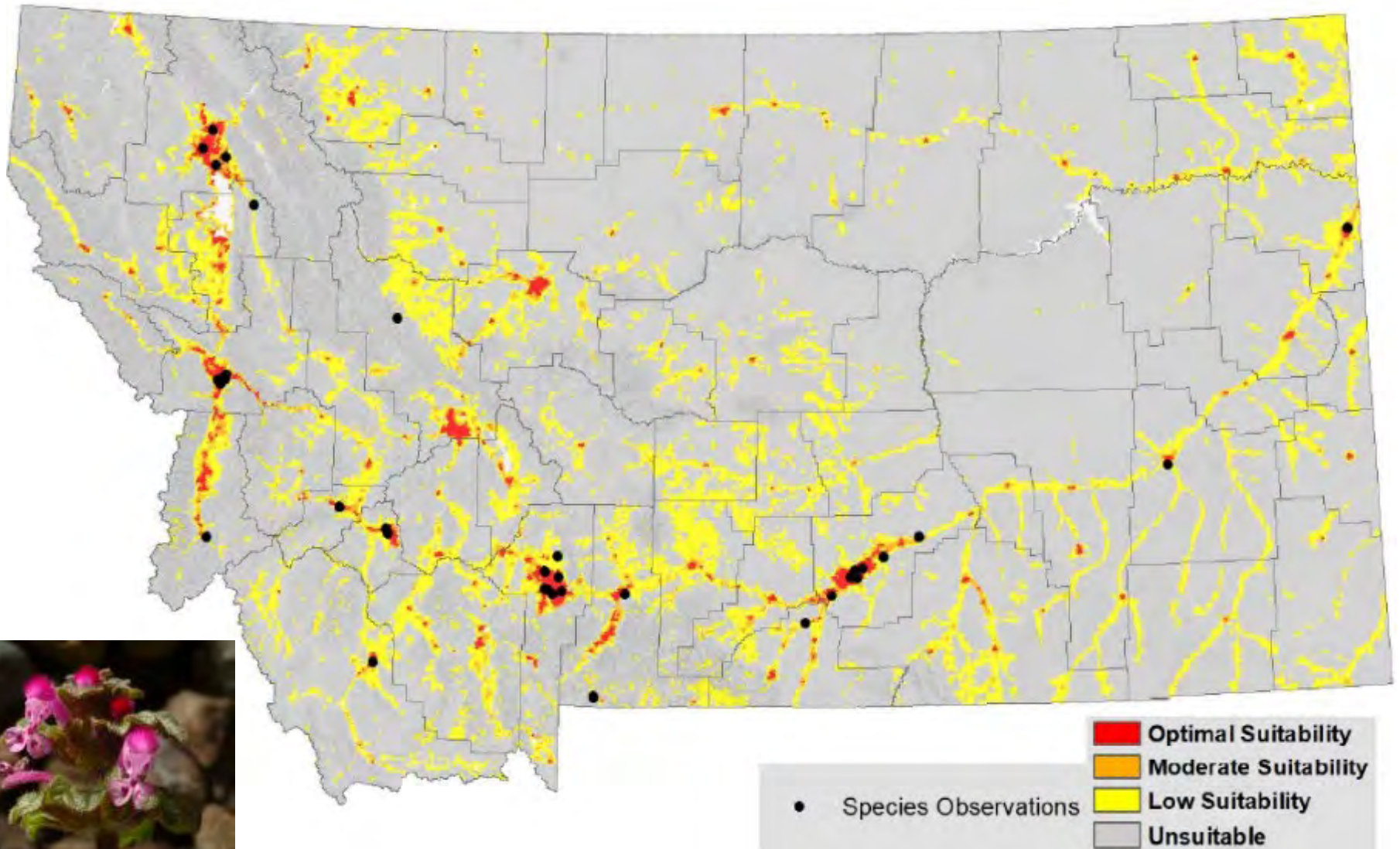
Common Crown-vetch (*Coronilla varia*) (5/28/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.036	83,448	22%
Moderate	0.116	29,033	8%
Optimal	0.328	7,966	2%



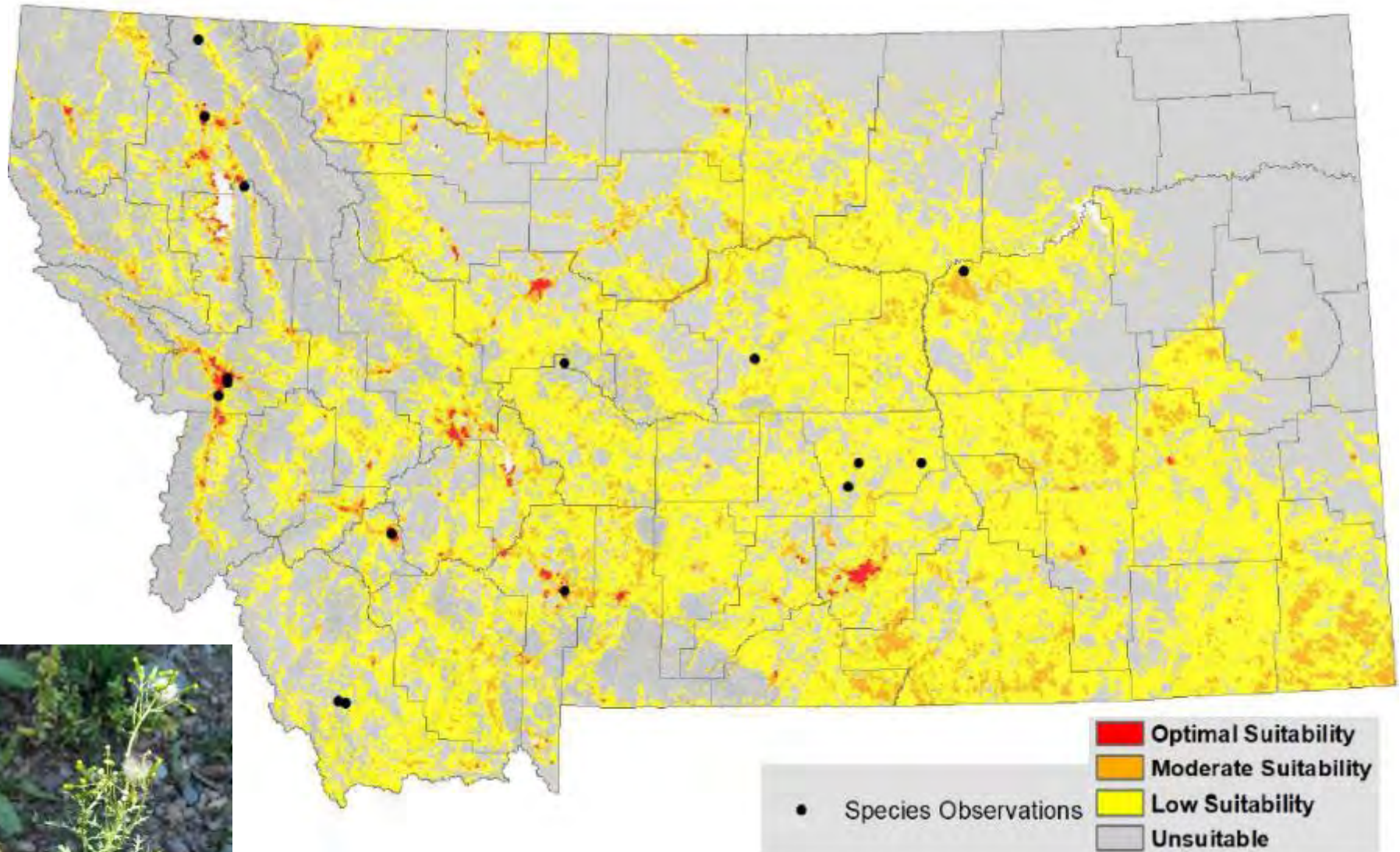
Common Deadnettle (*Lamium amplexicaule*) (4/22/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.009	45,306	12%
Moderate	0.090	4,128	1%
Optimal	0.233	3,567	1%



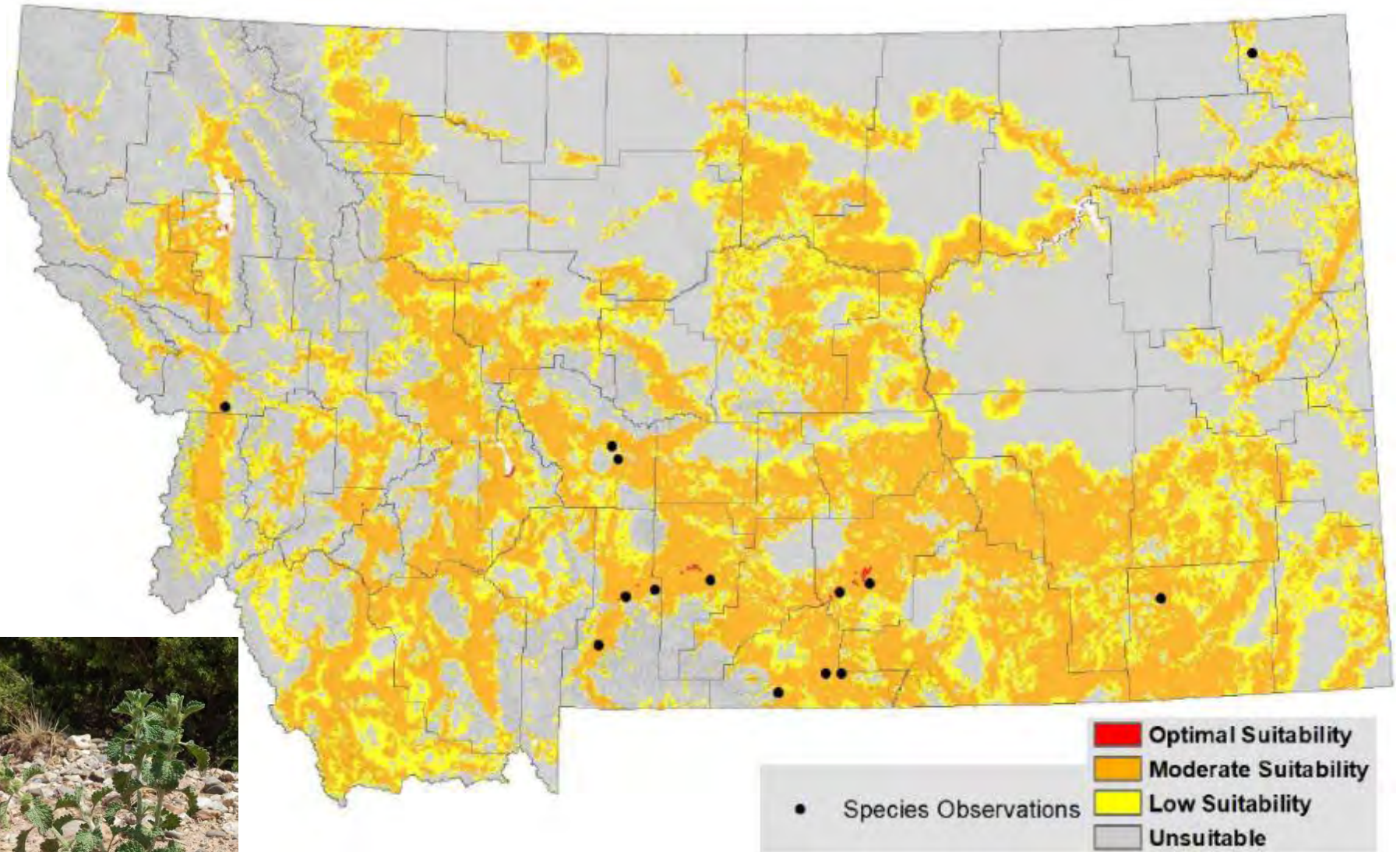
Common Groundsel (*Senecio vulgaris*) (6/4/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.049	96,468	25%
Moderate	0.209	28,502	7%
Optimal	0.520	4,999	1%

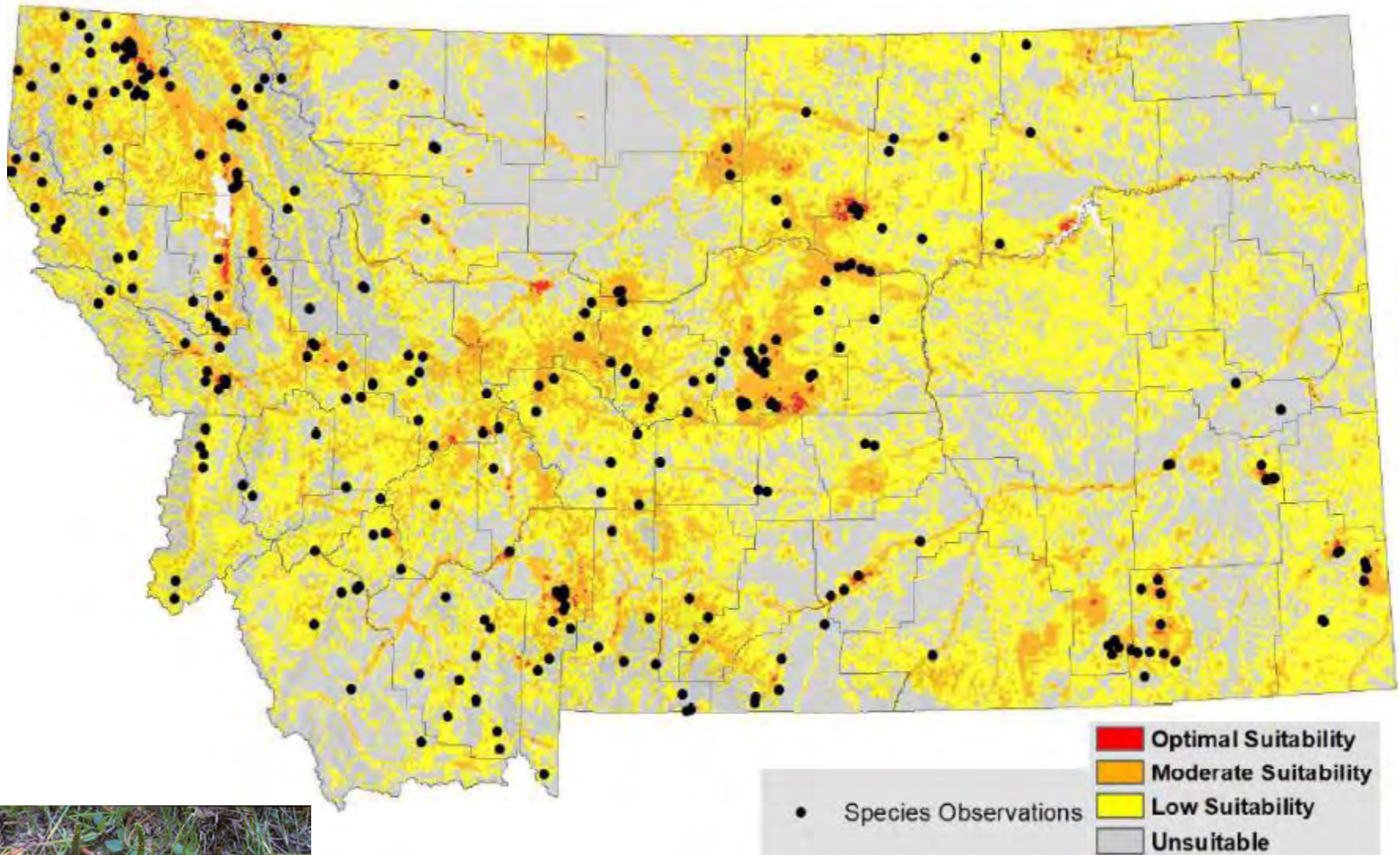


Common Horehound (*Marrubium vulgare*) (5/27/26)



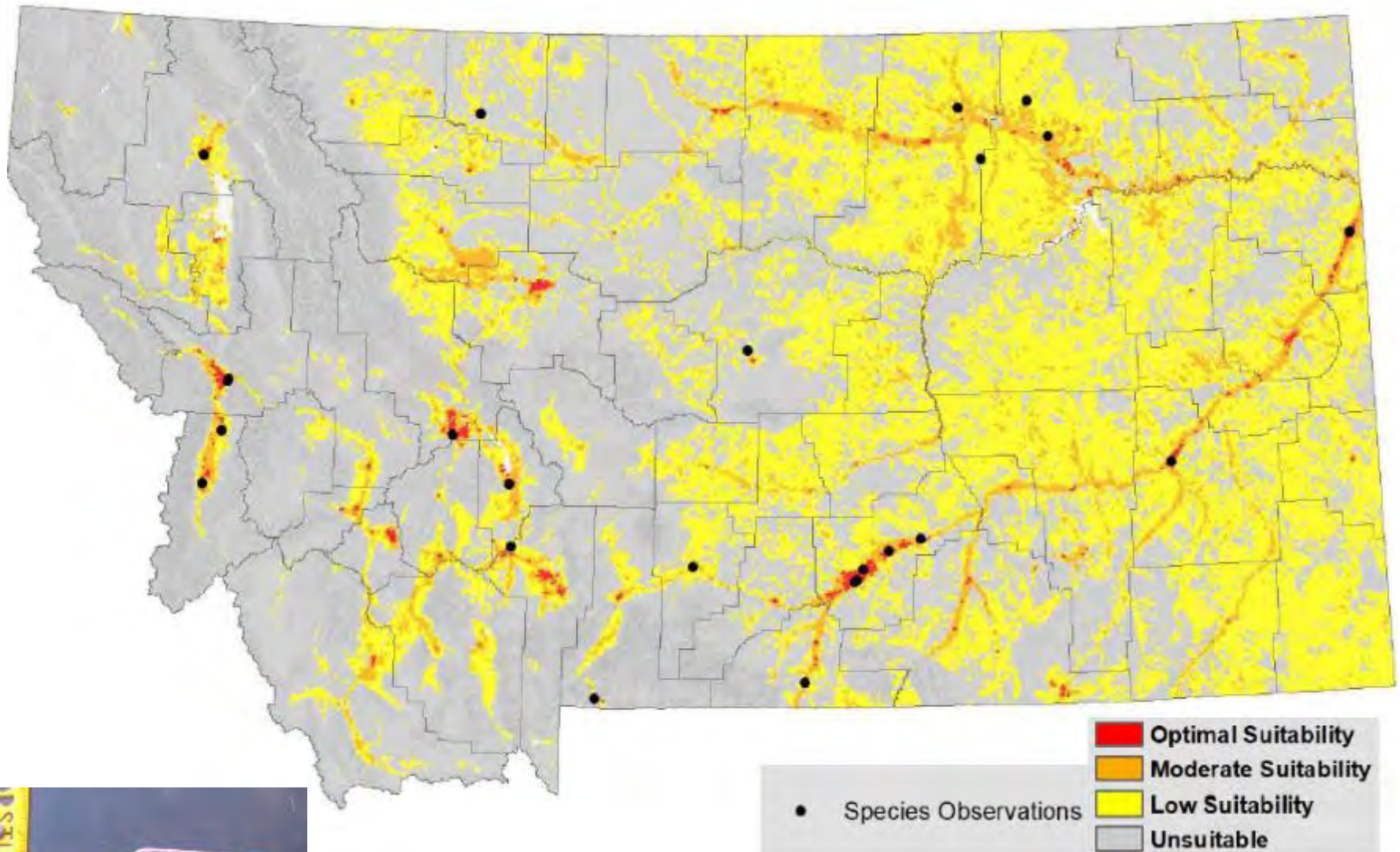
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.100	49,922	13%
Moderate	0.218	96,068	25%
Optimal	0.688	3,817	1%

Common Plantain (*Plantago major*) (4/22/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.028	99,891	26%
Moderate	0.126	39,796	10%
Optimal	0.471	9,208	2%

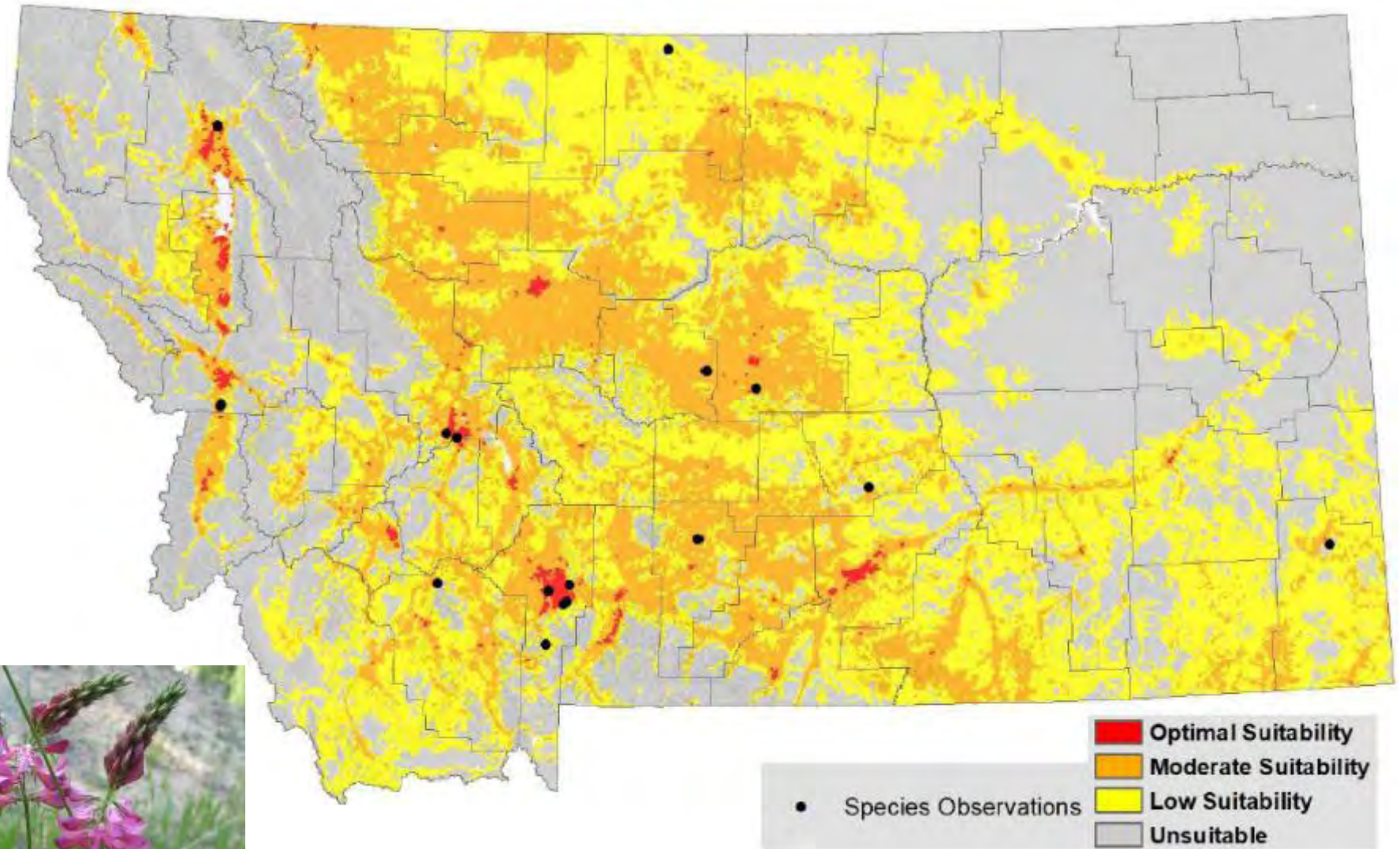
Common Purslane (*Portulaca oleracea*) (5/27/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.032	85,952	23%
Moderate	0.154	23,953	6%
Optimal	0.466	3,812	1%

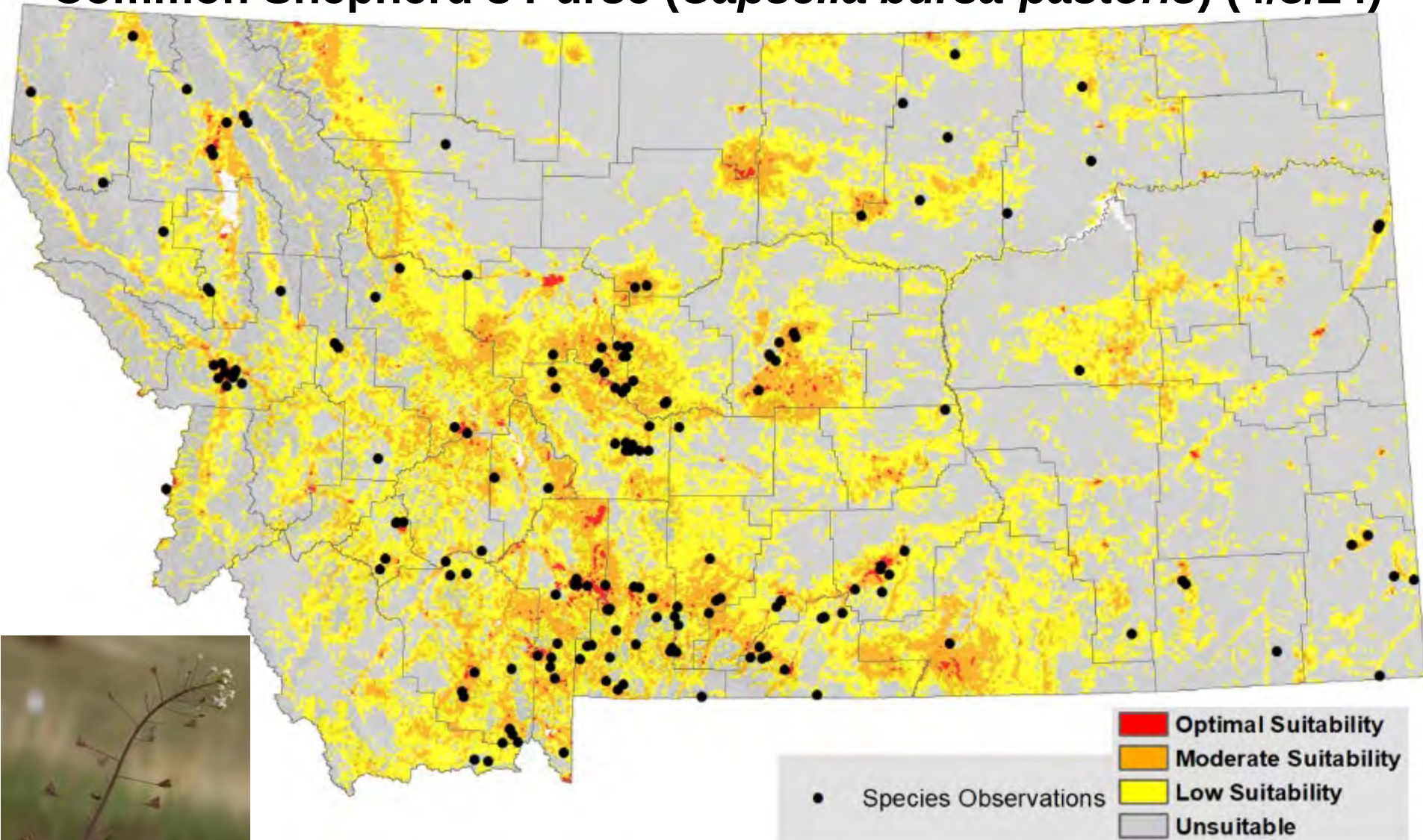


Common Sainfoin (*Onobrychis viciifolia*) (5/28/26)



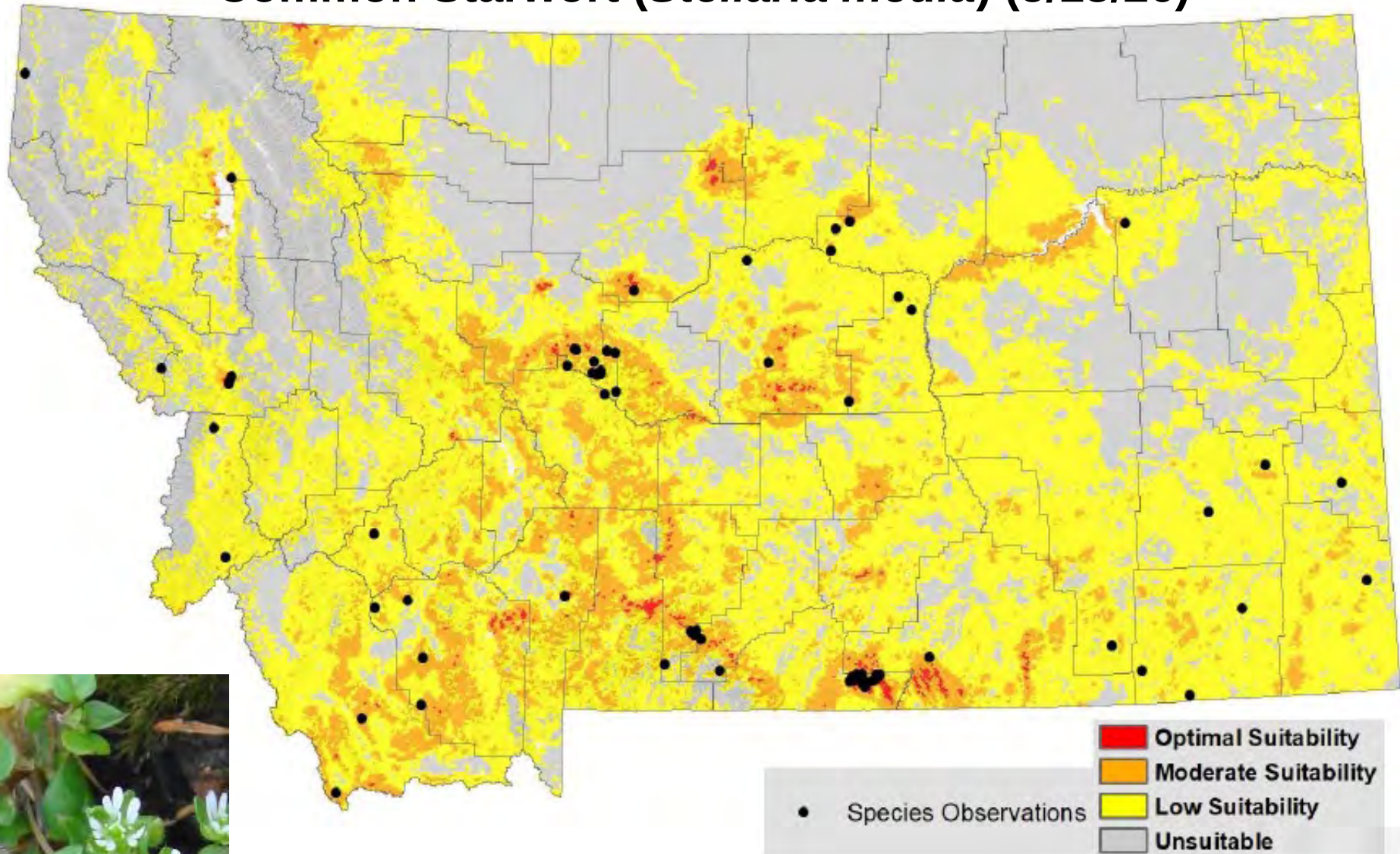
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.121	111,369	29%
Moderate	0.293	75,718	20%
Optimal	0.702	5,037	1%

Common Shepherd's Purse (*Capsella bursa-pastoris*) (4/8/24)



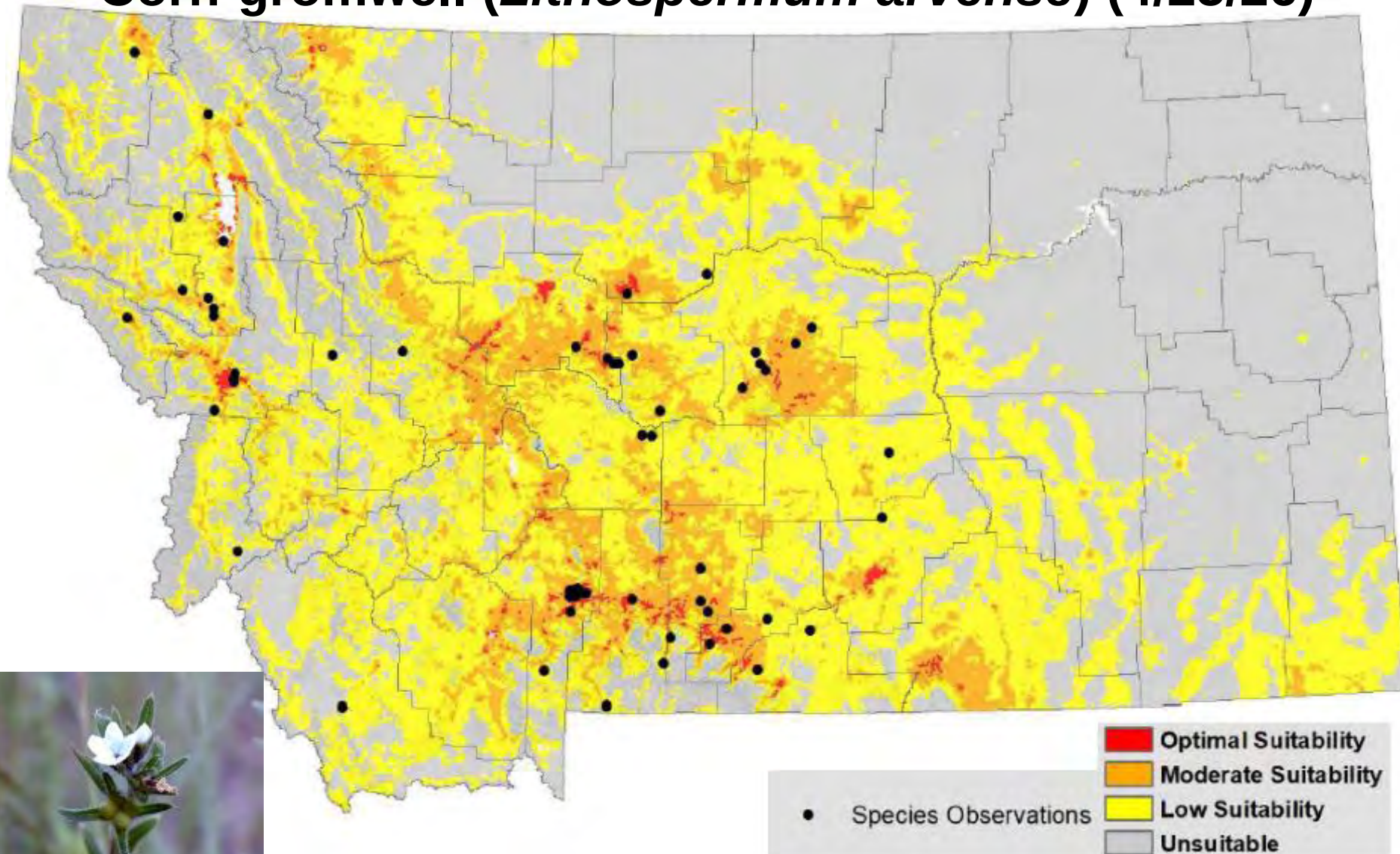
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.019	72,960	19%
Moderate	0.105	25,789	7%
Optimal	0.372	8,175	2%

Common Starwort (*Stellaria media*) (5/18/26)



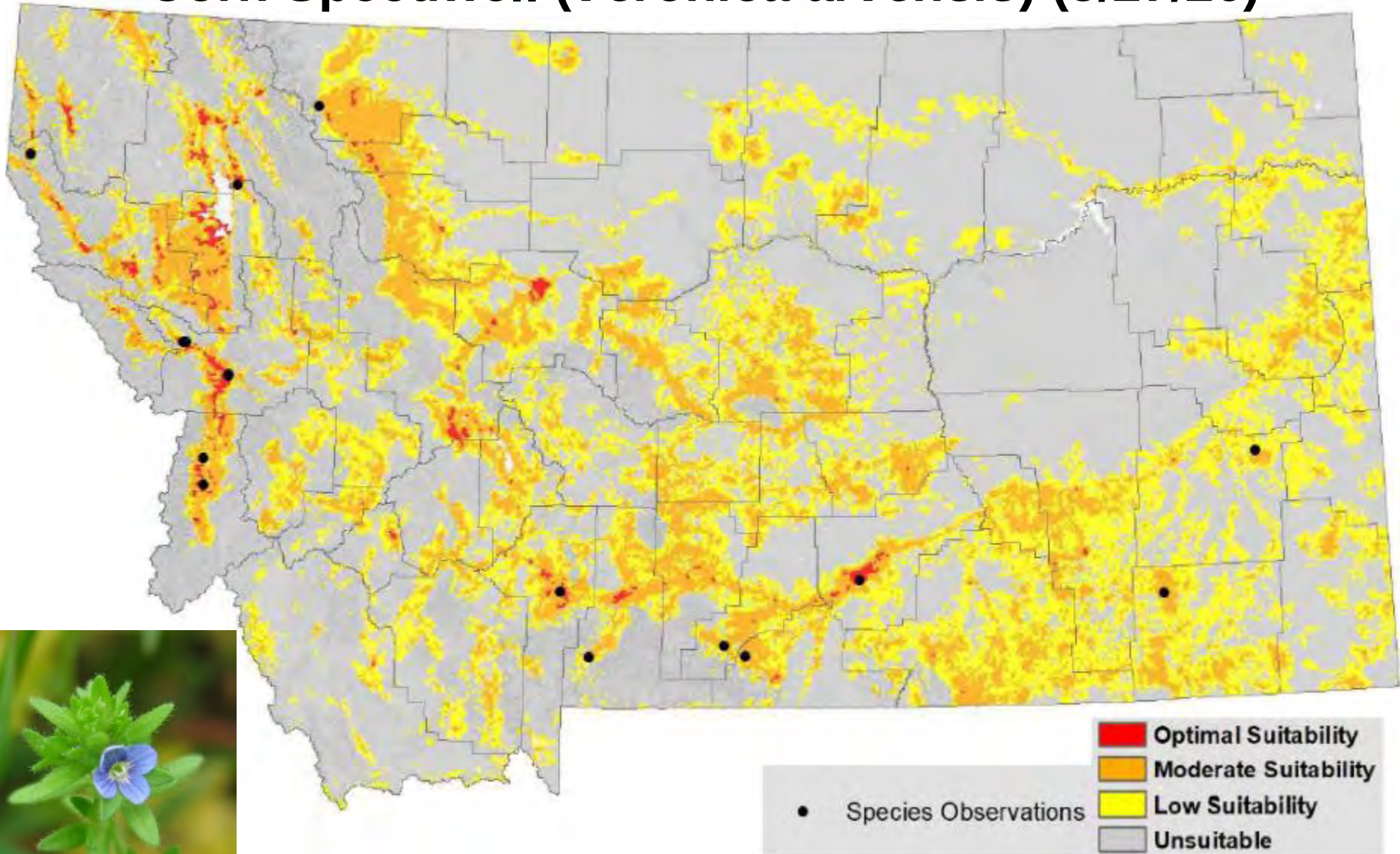
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.032	151,163	40%
Moderate	0.270	38,526	10%
Optimal	0.651	6,392	2%

Corn-gromwell (*Lithospermum arvense*) (4/25/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.047	116,024	30%
Moderate	0.269	32,762	9%
Optimal	0.650	5,572	1%

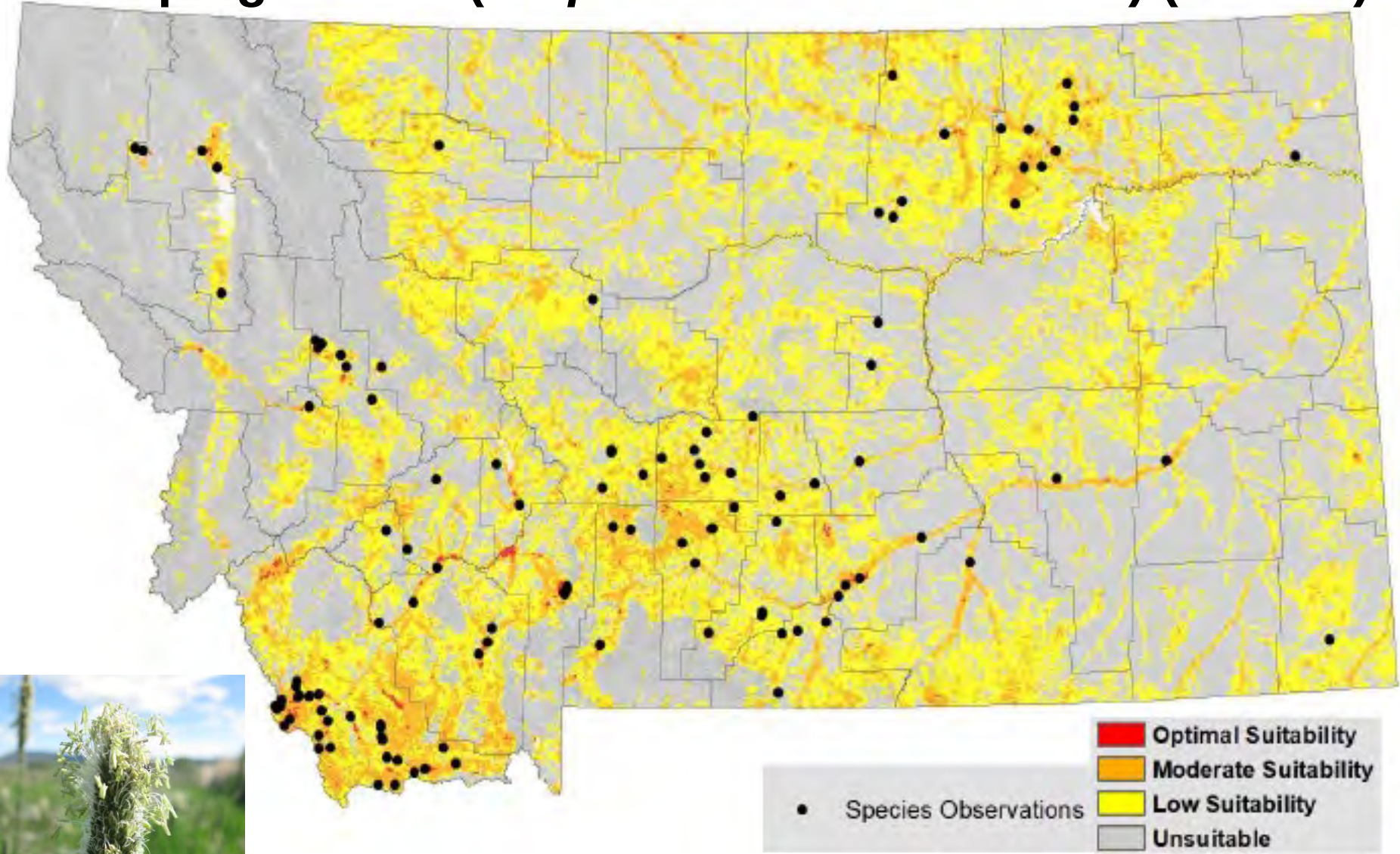
Corn Speedwell (*Veronica arvensis*) (5/27/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.049	56,999	15%
Moderate	0.162	44,209	12%
Optimal	0.548	5,115	1%

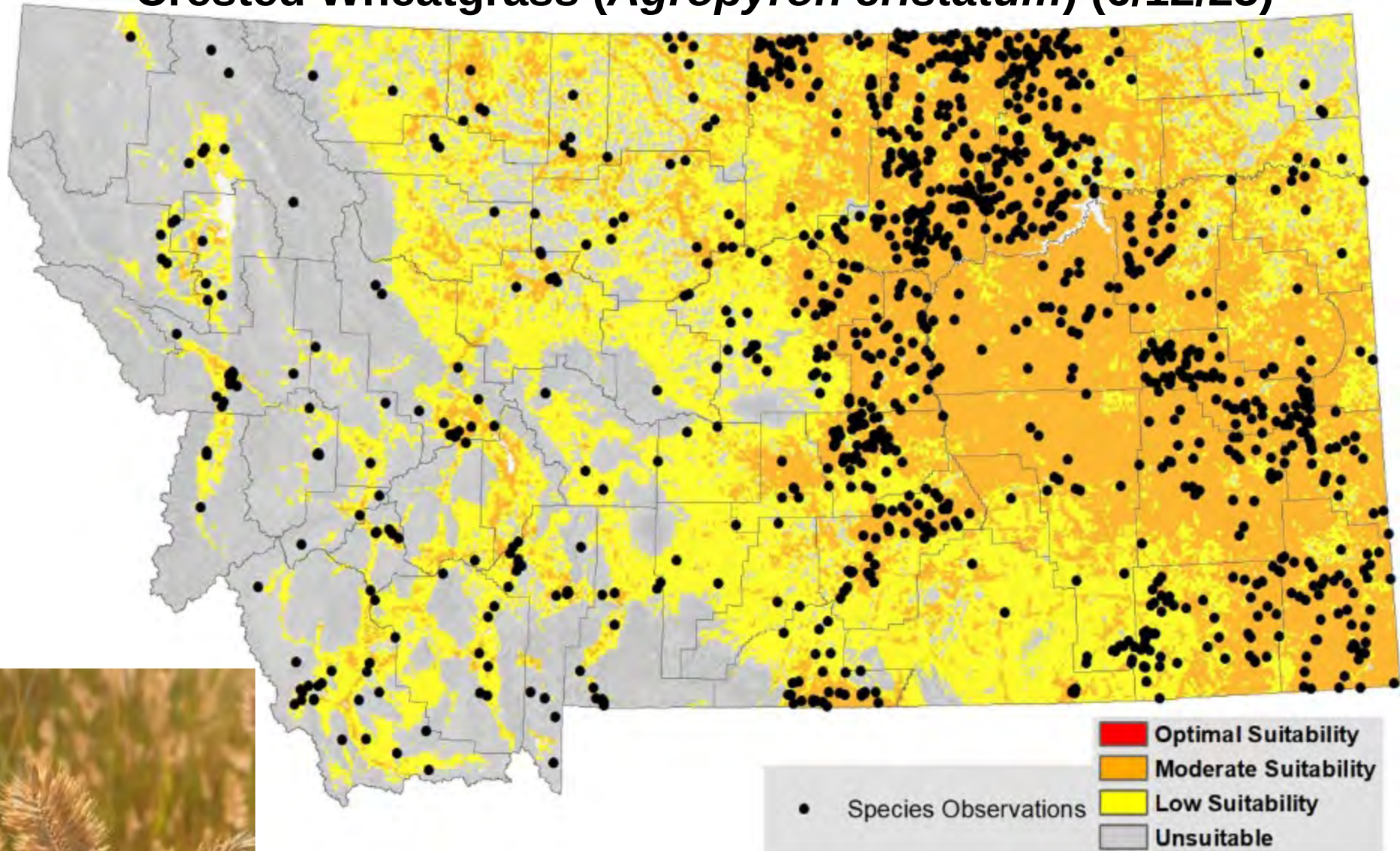


Creeping Foxtail (*Alopecurus arundinaceus*) (4/21/26)



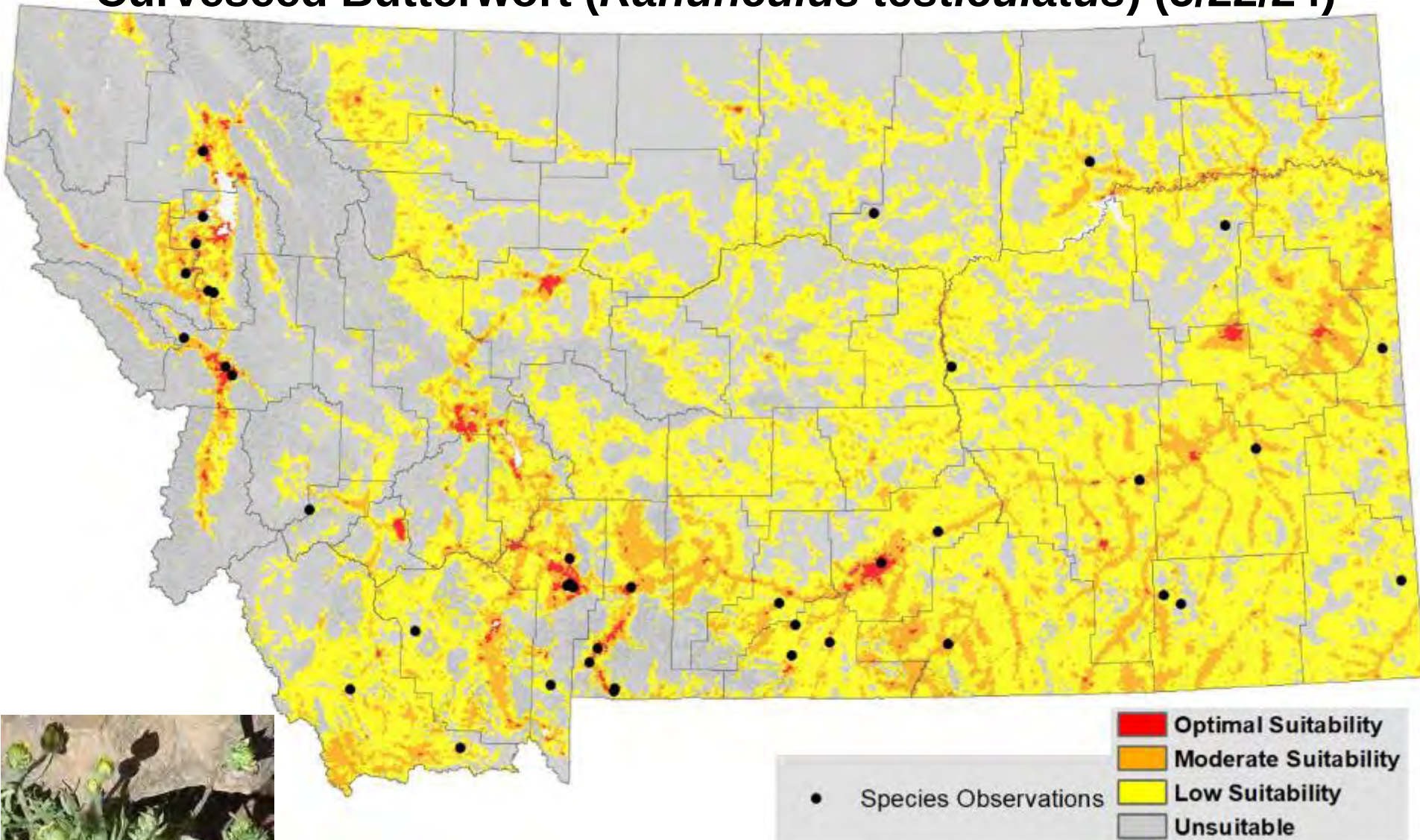
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.016	55,241	15%
Moderate	0.083	23,668	6%
Optimal	0.388	5,869	2%

Crested Wheatgrass (*Agropyron cristatum*) (6/12/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.055	93,509	25%
Moderate	0.214	122,004	32%
Optimal	0.976	3	<1%

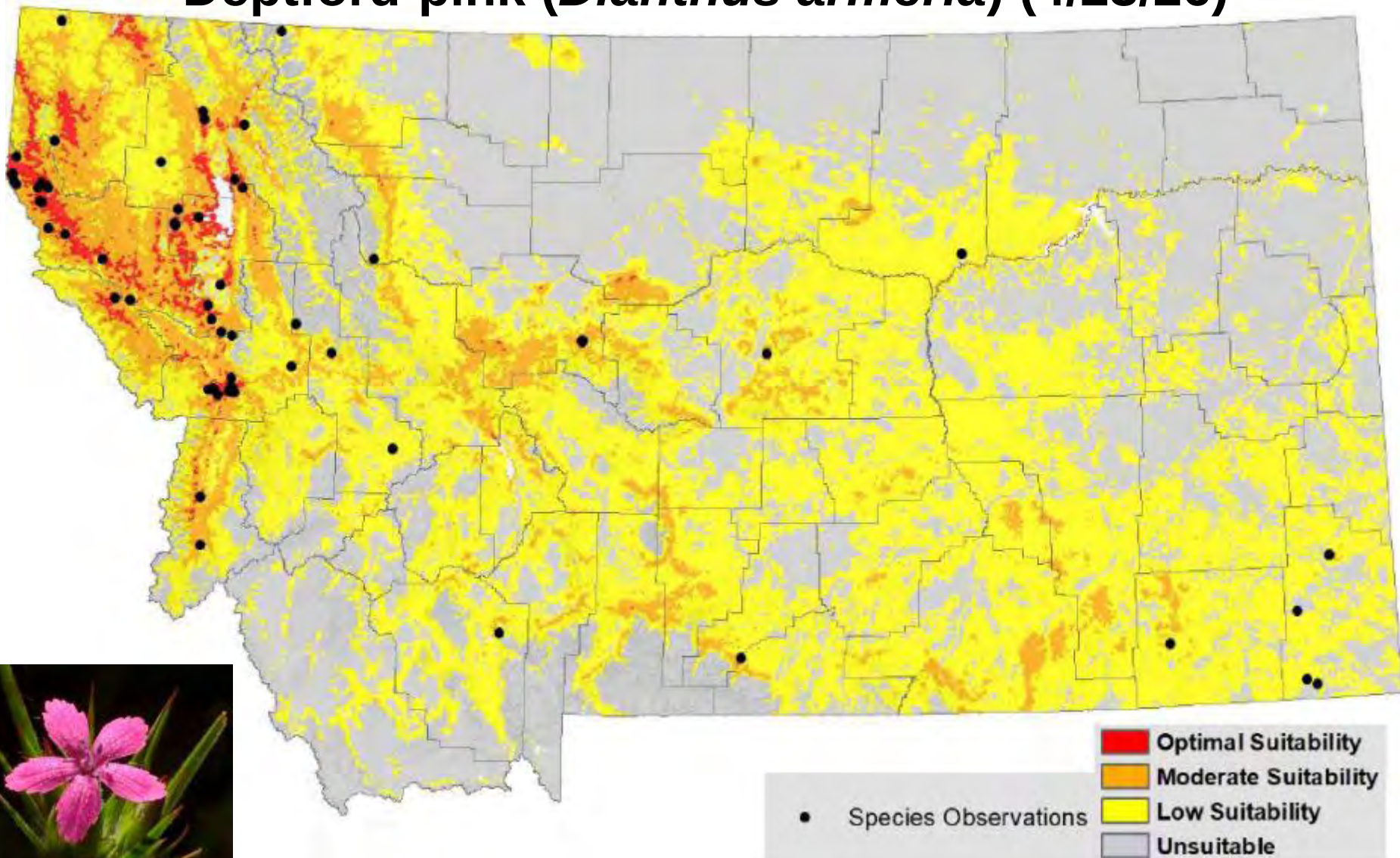
Curveseed Butterwort (*Ranunculus testiculatus*) (5/22/24)



© Craig Allen

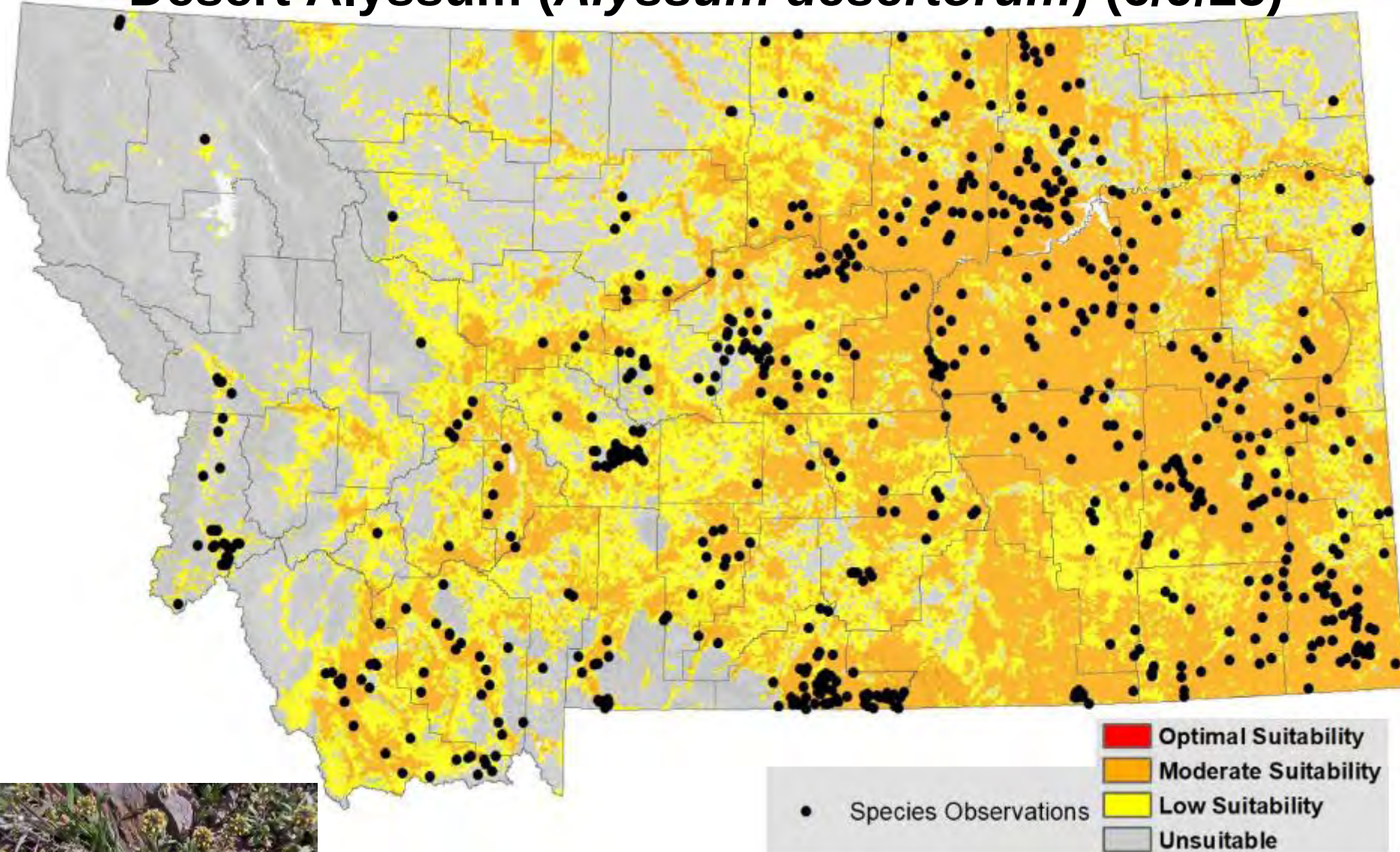
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.069	132,654	35%
Moderate	0.272	35,369	9%
Optimal	0.624	5,187	1%

Deptford-pink (*Dianthus armeria*) (4/23/26)



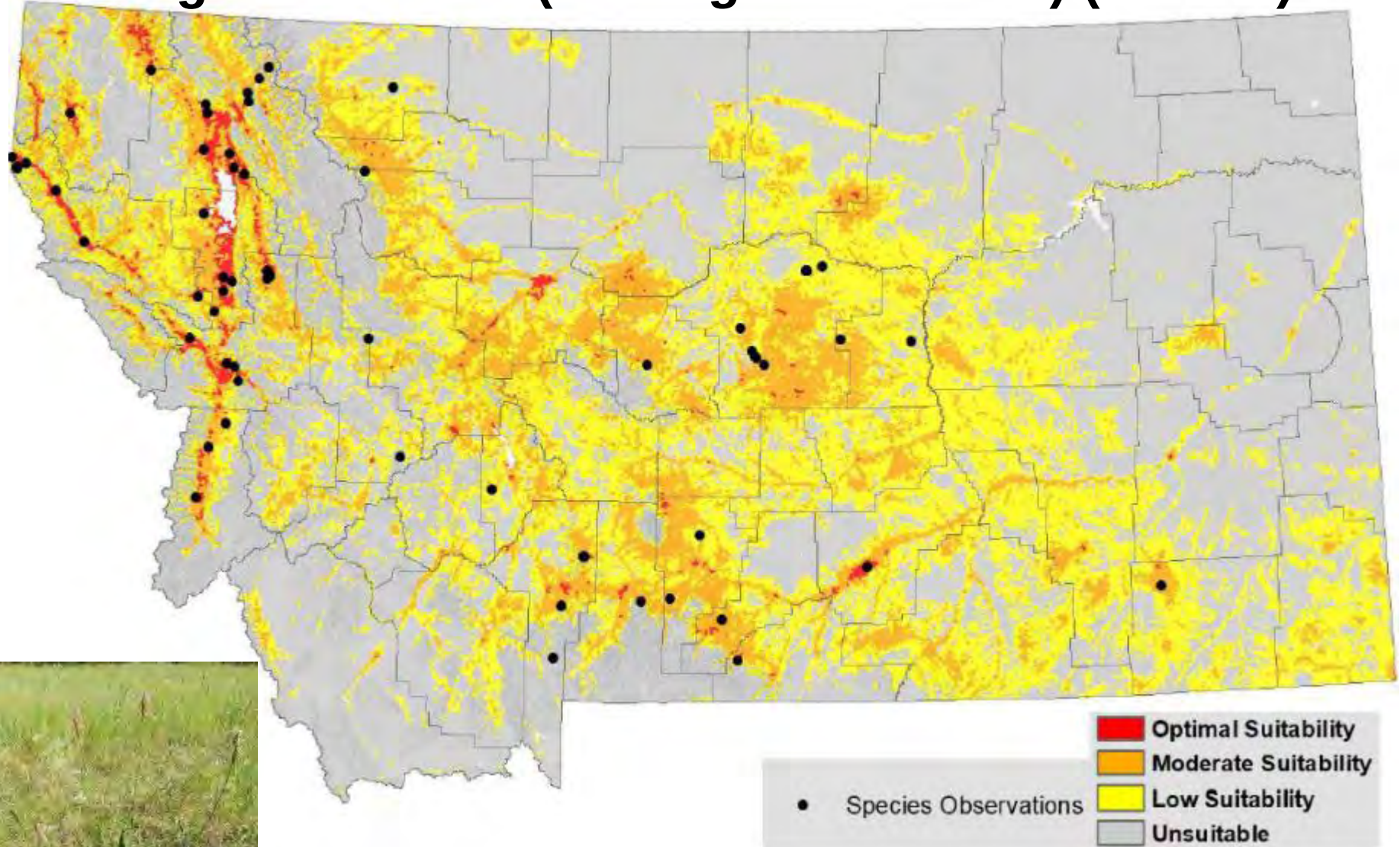
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.051	146,017	38%
Moderate	0.273	34,938	9%
Optimal	0.640	6,961	2%

Desert Alyssum (*Alyssum desertorum*) (6/9/25)



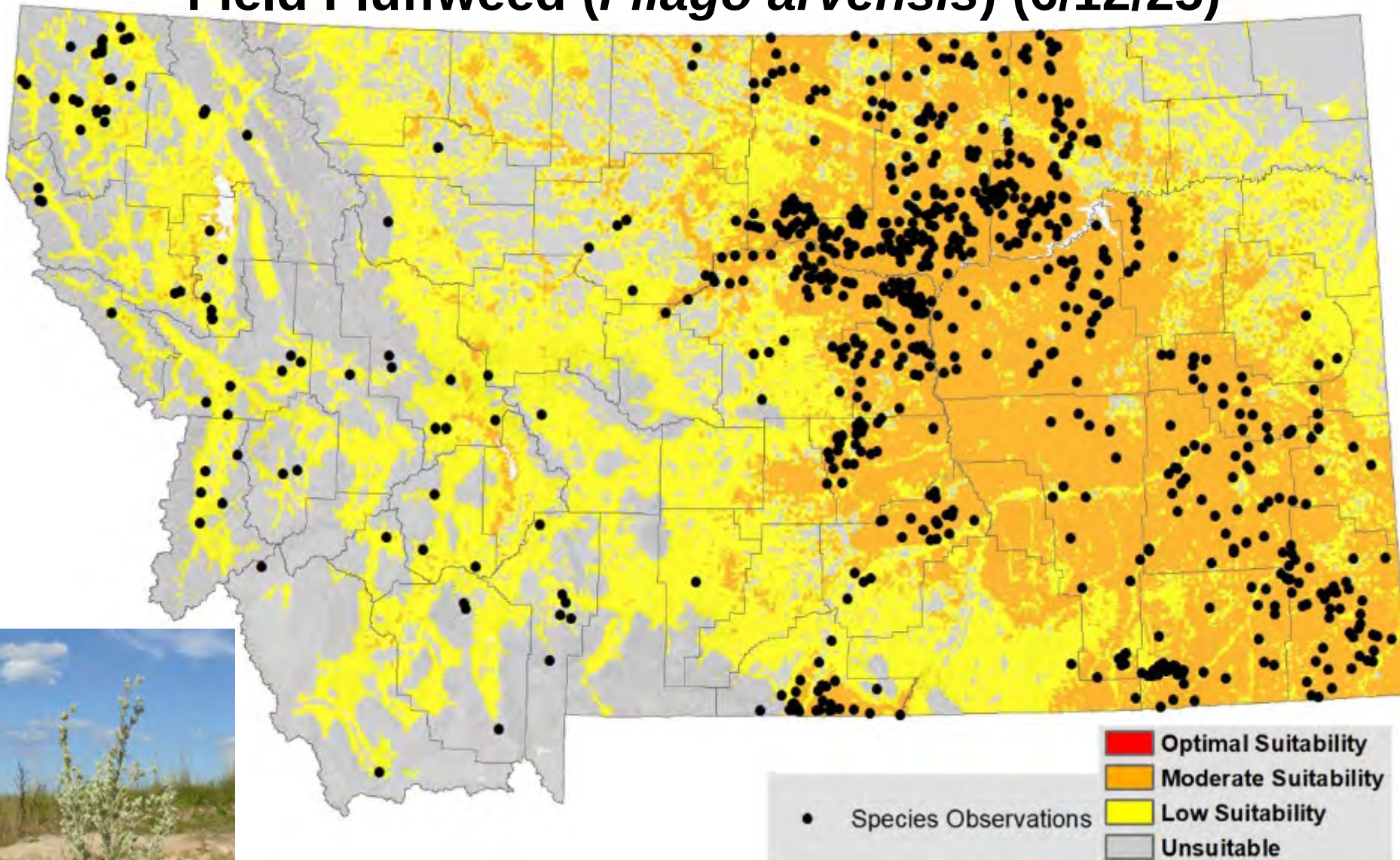
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.080	79,630	21%
Moderate	0.231	136,484	36%
Optimal	0.904	315	<1%

English Plantain (*Plantago lanceolata*) (4/22/26)



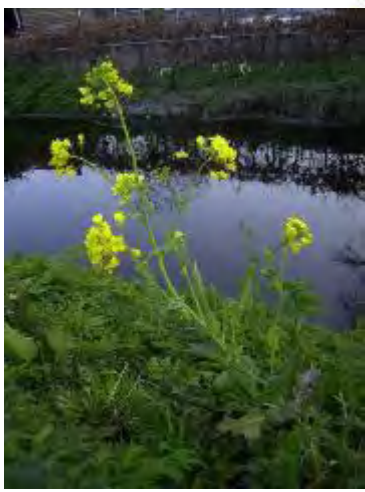
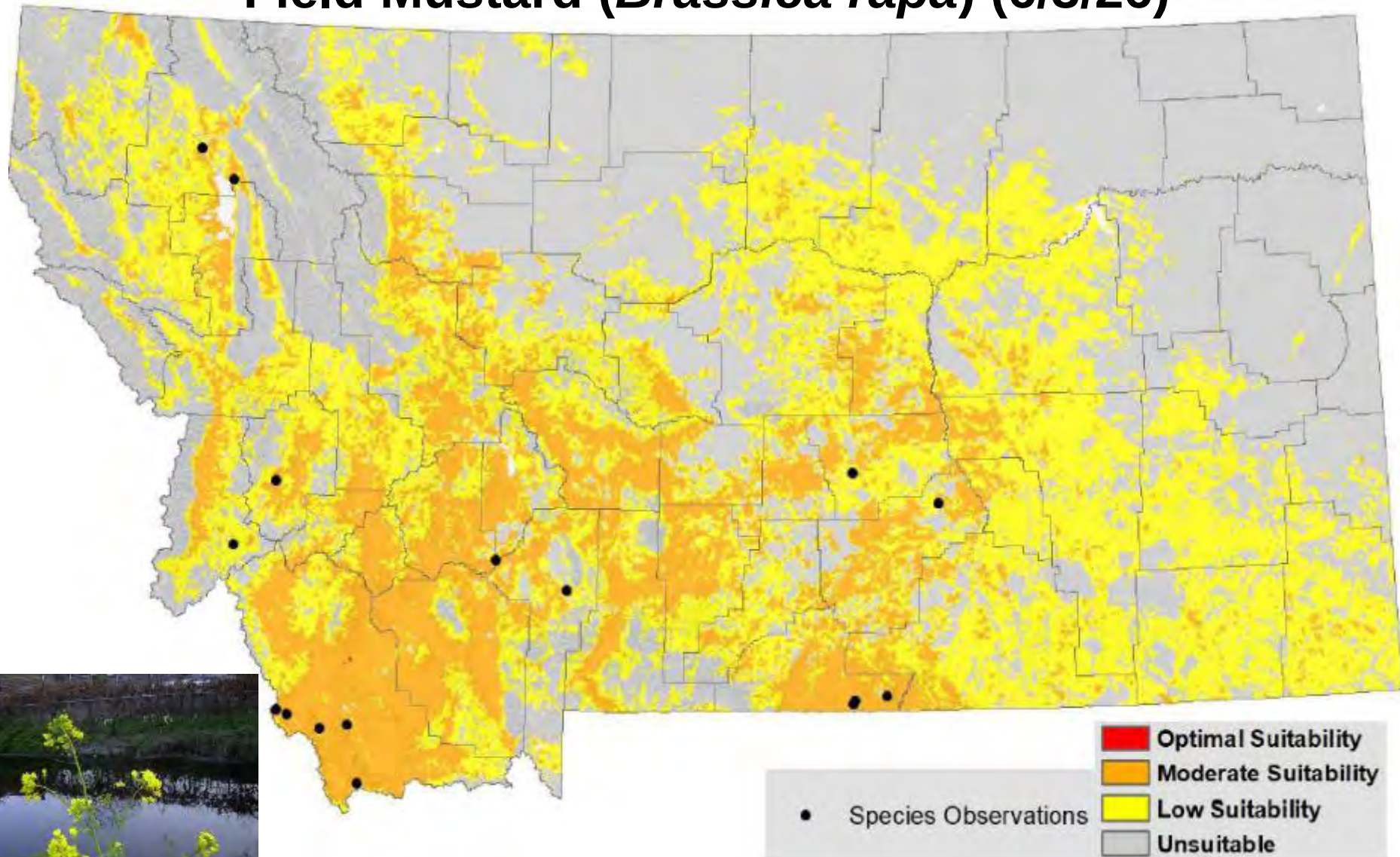
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.060	79,280	21%
Moderate	0.167	40,993	11%
Optimal	0.512	9,232	2%

Field Fluffweed (*Filago arvensis*) (6/12/25)



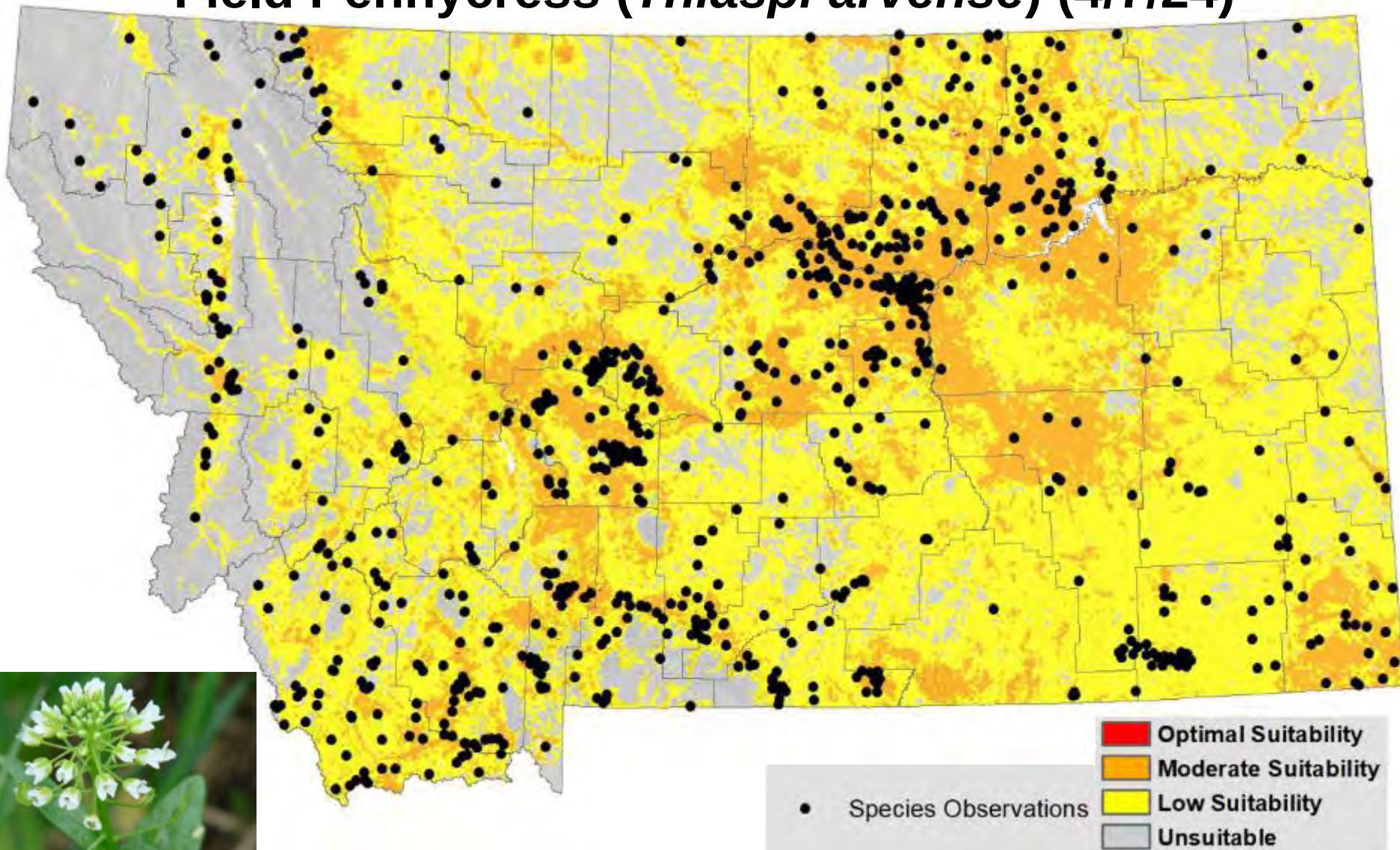
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.036	106,123	28%
Moderate	0.220	117,151	31%
Optimal	0.873	14	<1%

Field Mustard (*Brassica rapa*) (6/3/26)



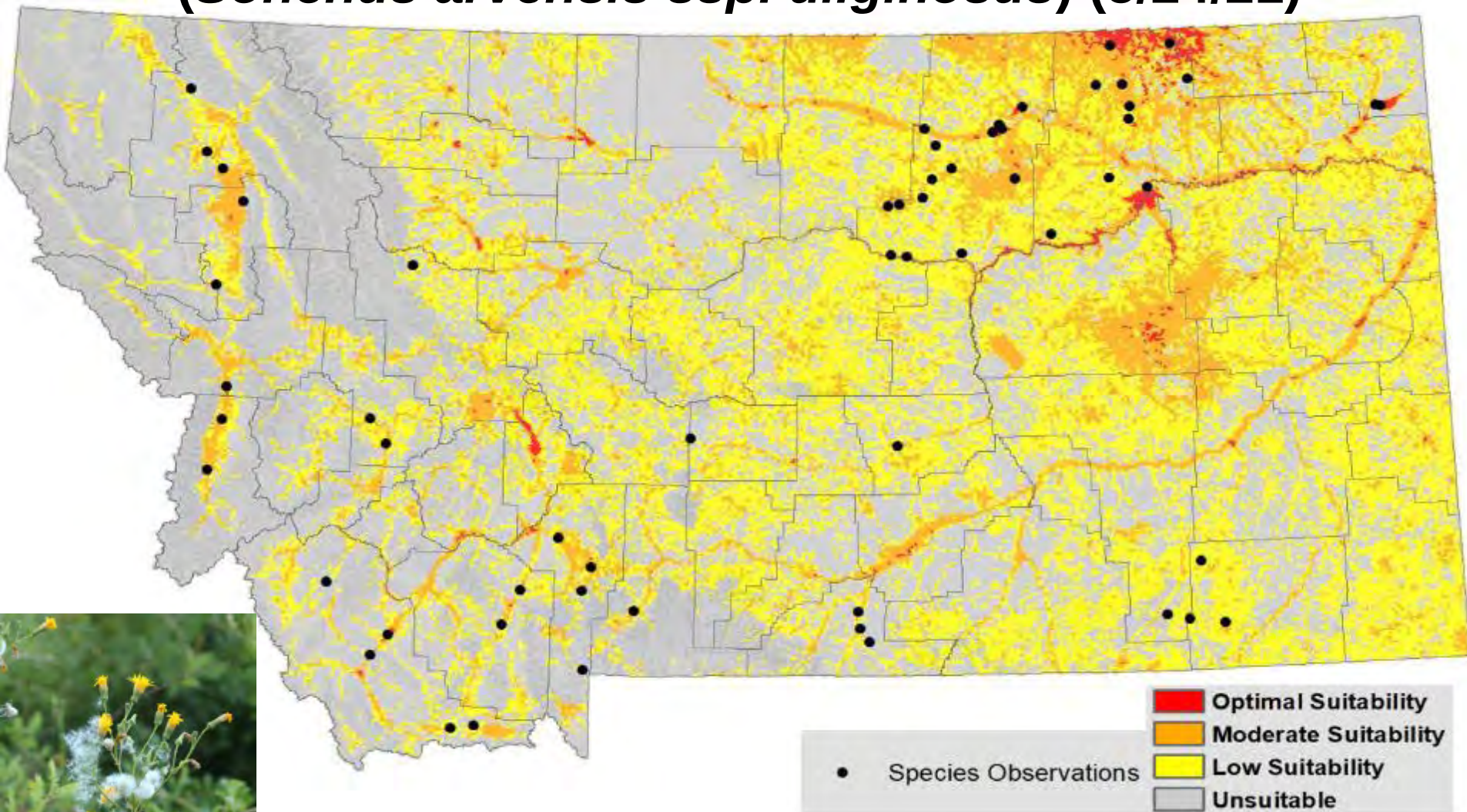
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.110	101,833	27%
Moderate	0.283	73,149	19%
Optimal	0.875	181	<1%

Field Pennycress (*Thlaspi arvense*) (4/7/24)



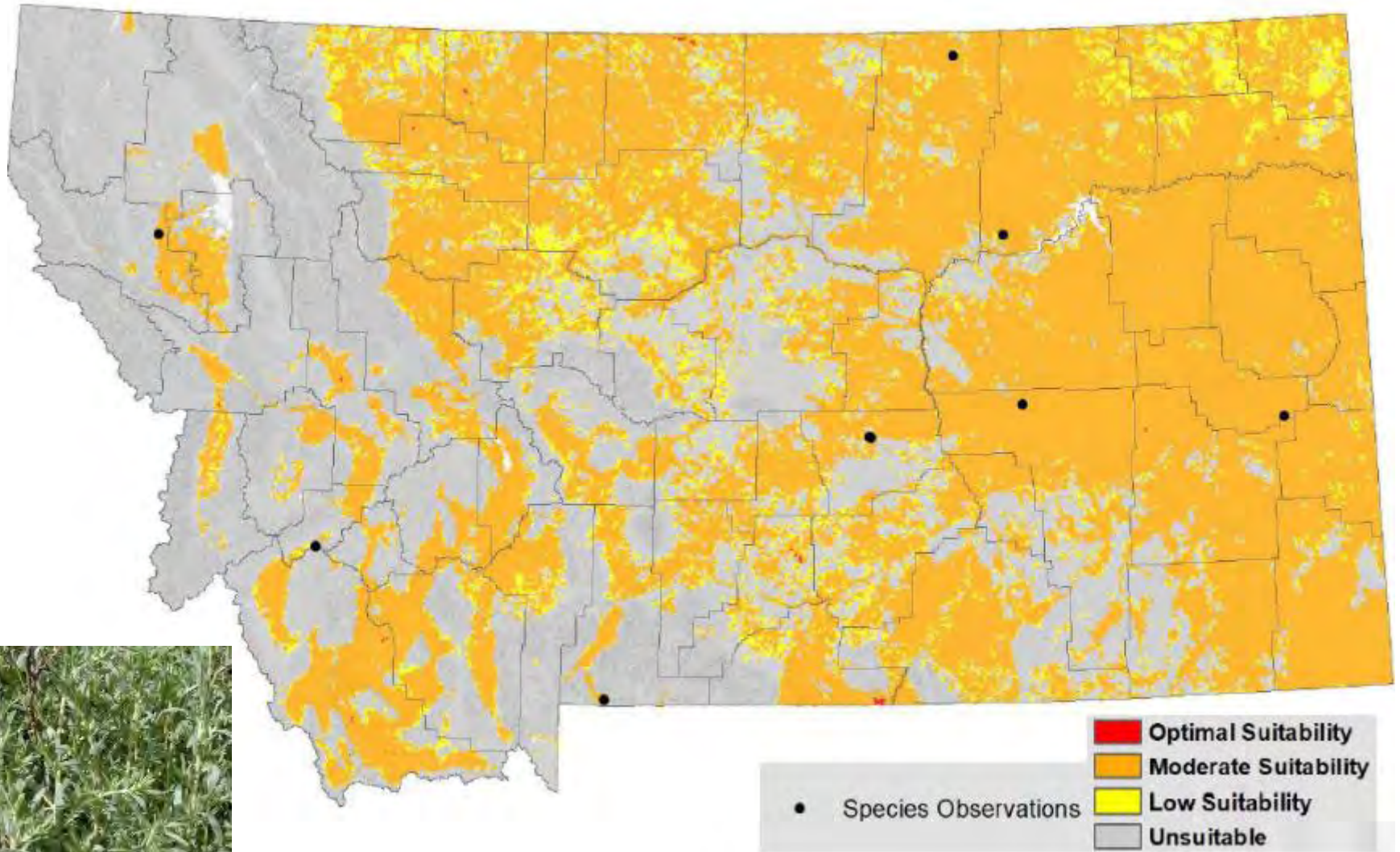
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.091	148,877	39%
Moderate	0.365	82,908	22%
Optimal	0.777	3,534	1%

Field Sowthistle variety uliginosus (*Sonchus arvensis* ssp. *uliginosus*) (5/24/21)



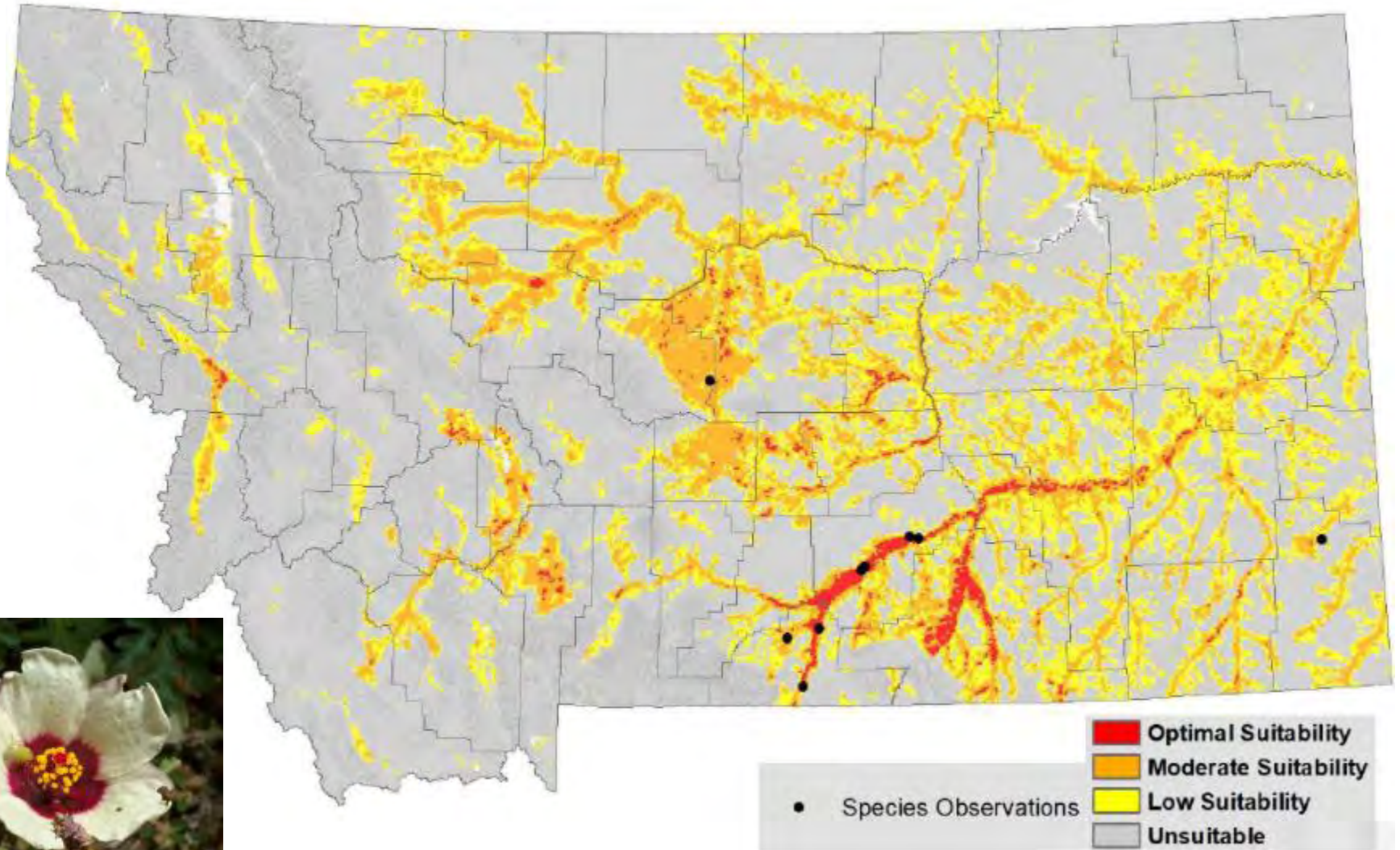
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.036	80,124	21%
Moderate	0.120	40,429	11%
Optimal	0.457	8,089	2%

Five-horn Smotherweed (*Bassia hyssopifolia*) (5/28/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.137	21,851	6%
Moderate	0.180	186,639	49%
Optimal	0.768	1,444	<1%

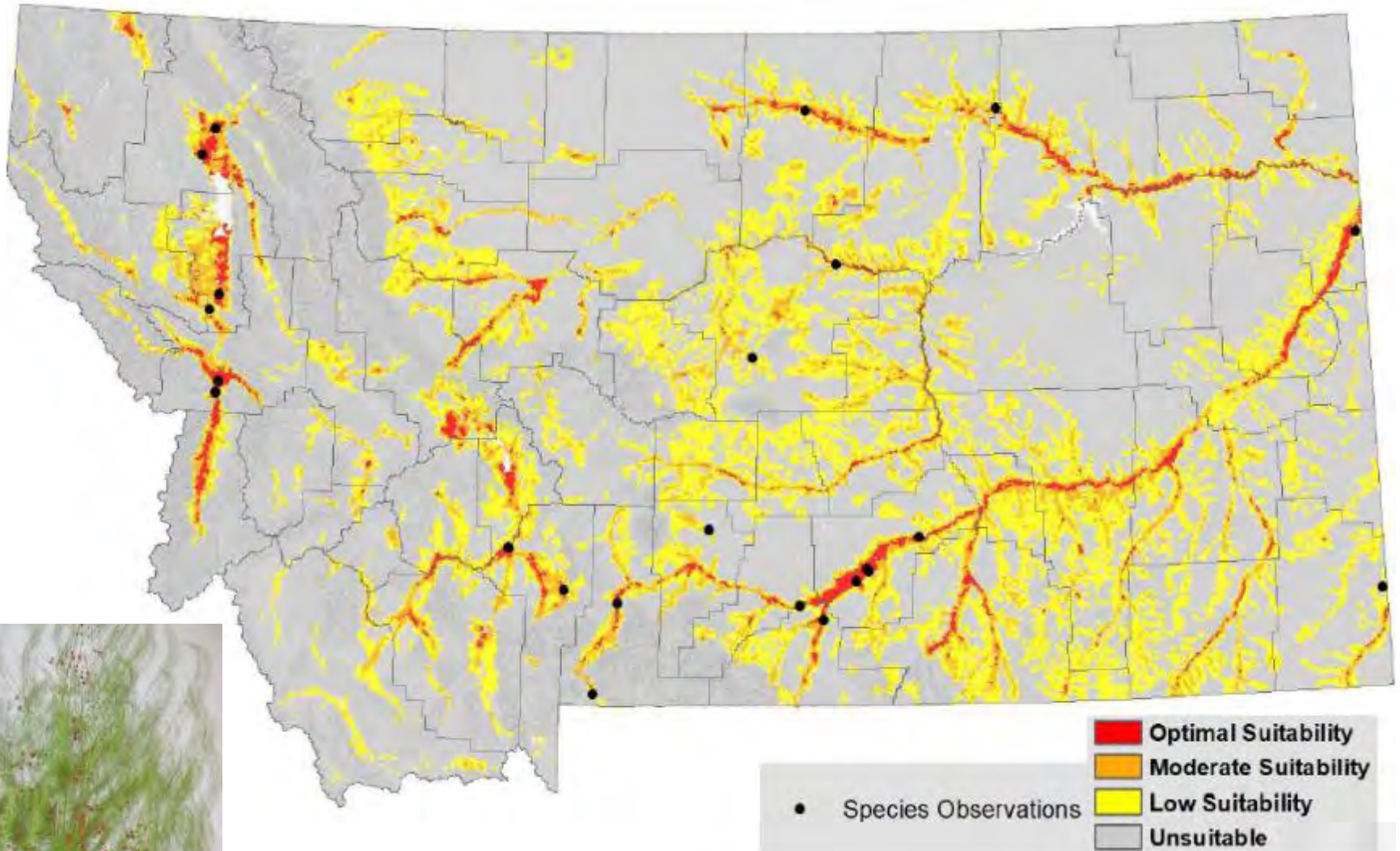
Flower-of-an-Hour (*Hibiscus trionum*) (5/27/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.041	50,932	13%
Moderate	0.142	32,587	9%
Optimal	0.484	7,775	2%



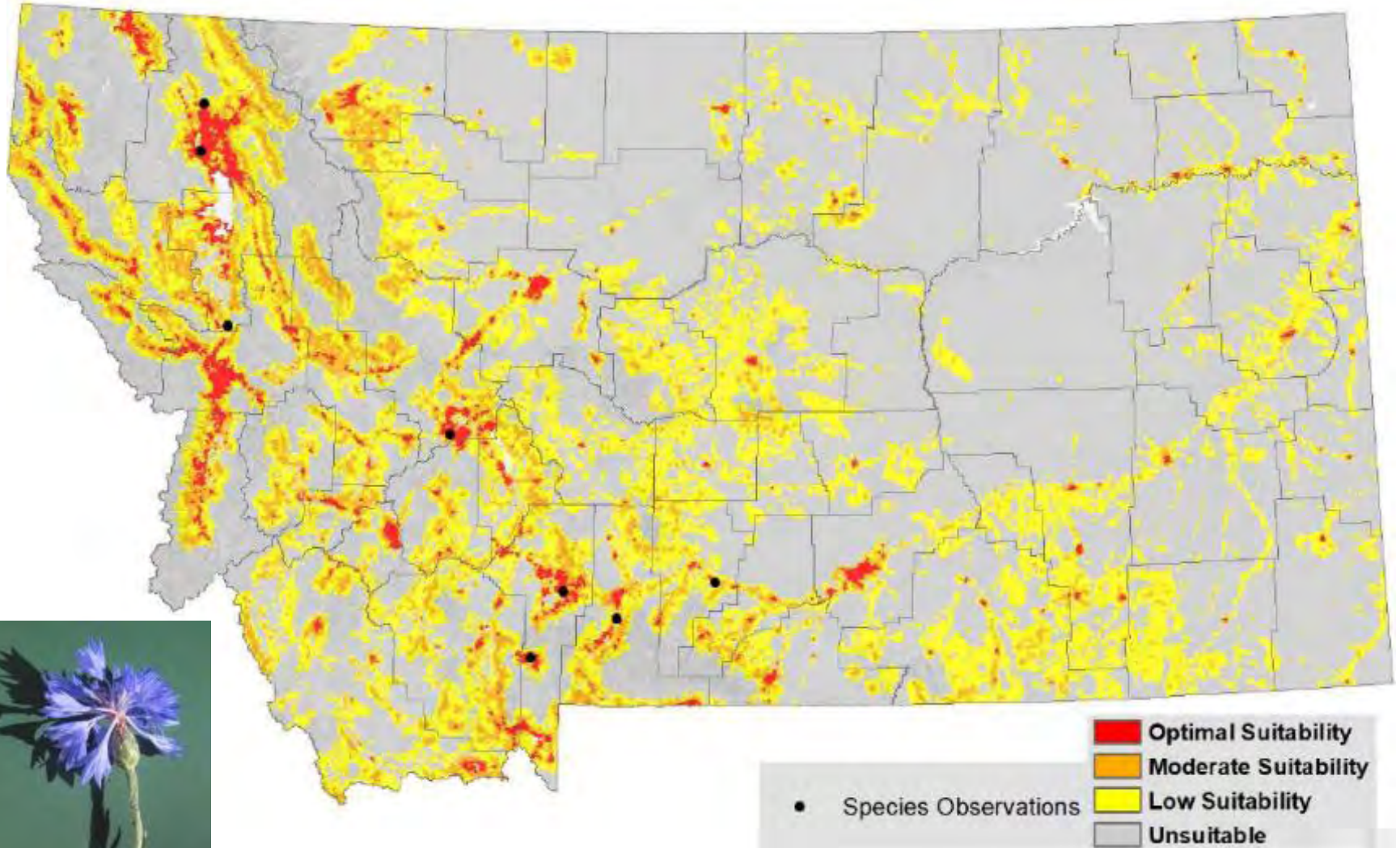
Garden Asparagus (*Asparagus officinalis*) (5/28/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.023	51,371	13%
Moderate	0.112	16,612	4%
Optimal	0.302	8,766	2%

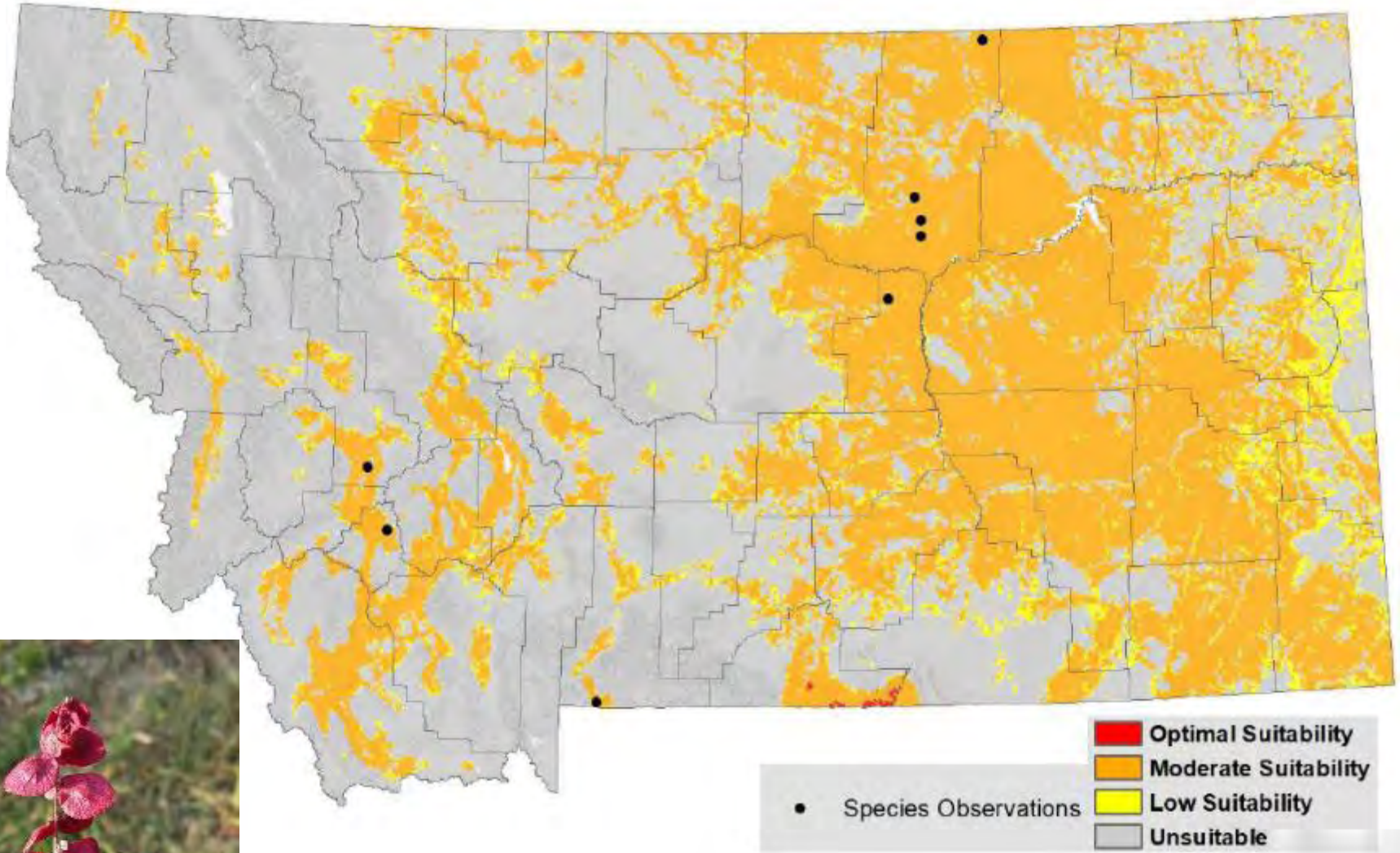


Garden Cornflower (*Centaurea cyanus*) (6/4/26)



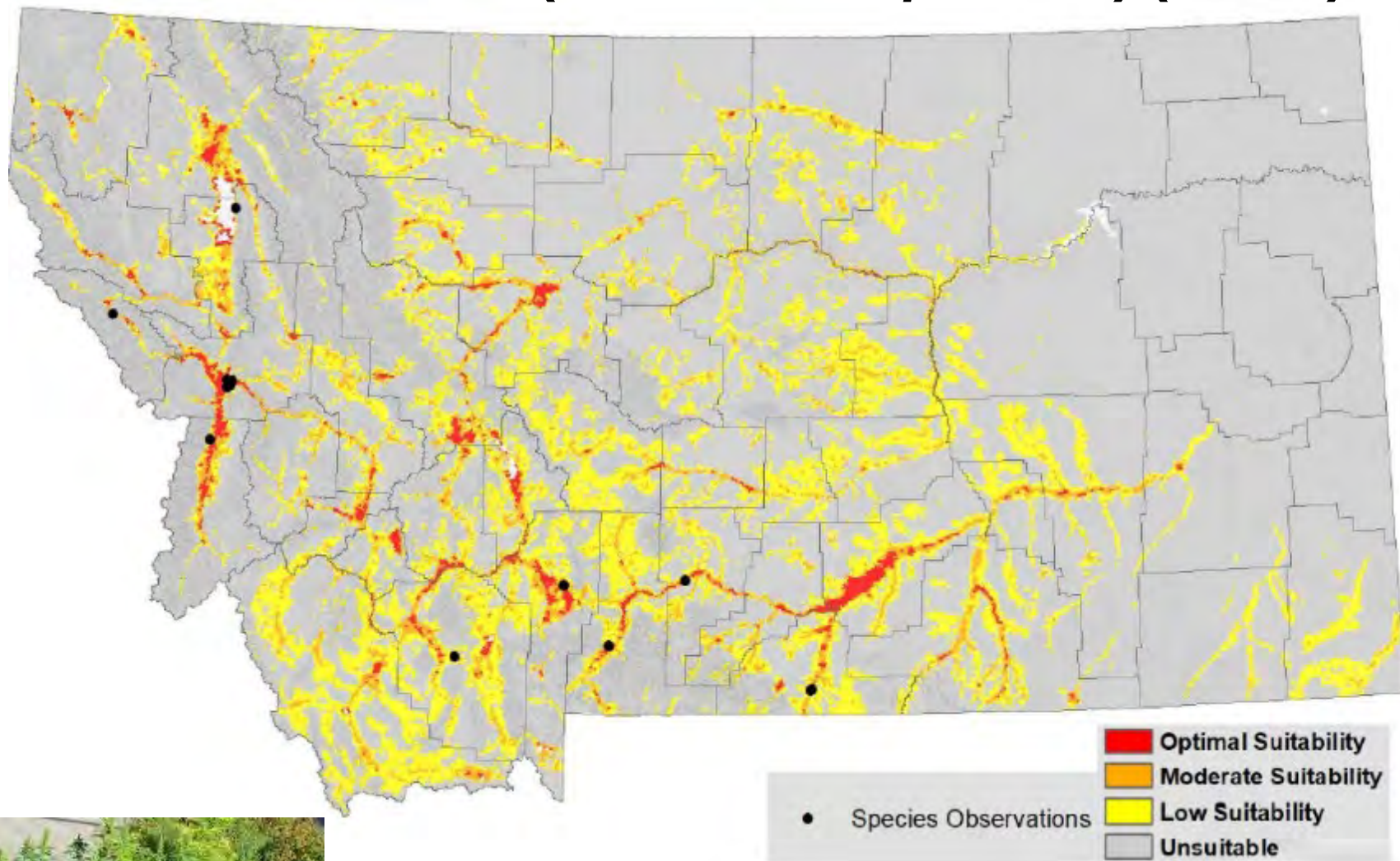
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.026	74,606	20%
Moderate	0.092	23,744	6%
Optimal	0.243	8,329	2%

Garden Orache (*Atriplex hortensis*) (6/1/26)



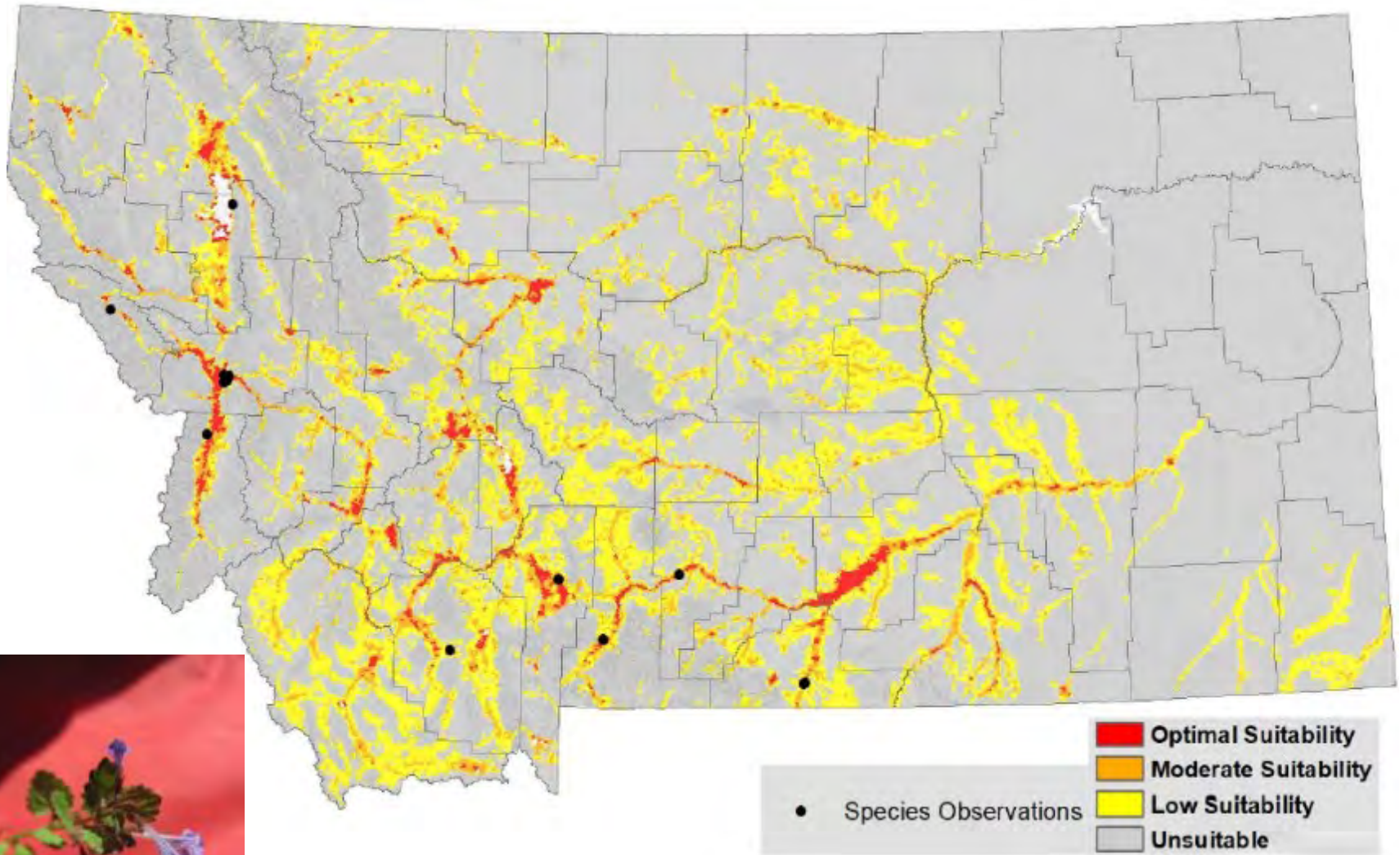
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.085	14,726	4%
Moderate	0.120	125,919	33%
Optimal	0.872	253	<1%

Green Amaranth (*Amaranthus powellii*) (6/9/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.014	37,947	10%
Moderate	0.098	9,424	2%
Optimal	0.270	6,129	2%

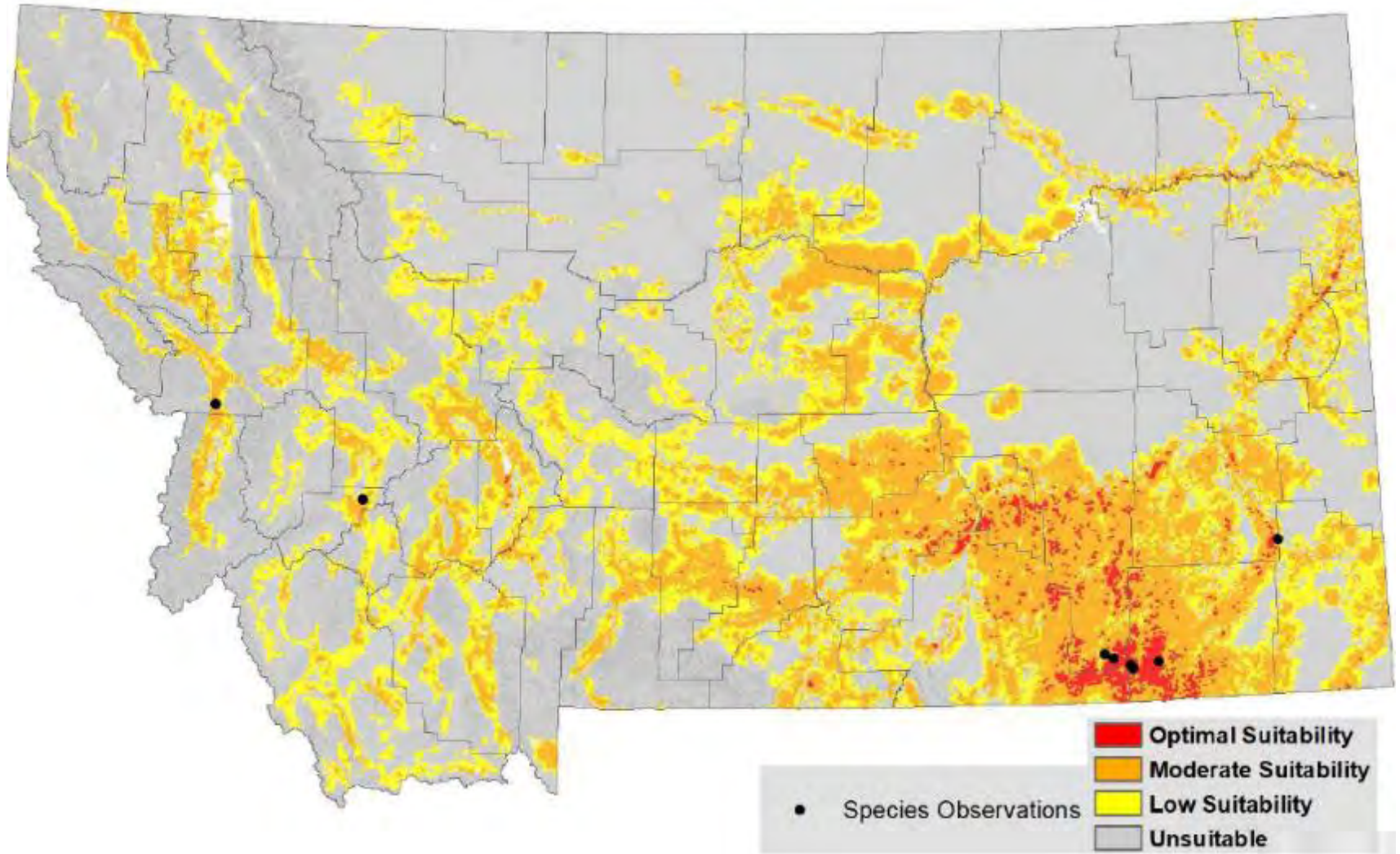
Ground-ivy (*Glechoma hederacea*) (5/27/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.010	29,904	8%
Moderate	0.085	8,922	2%
Optimal	0.212	5,474	1%

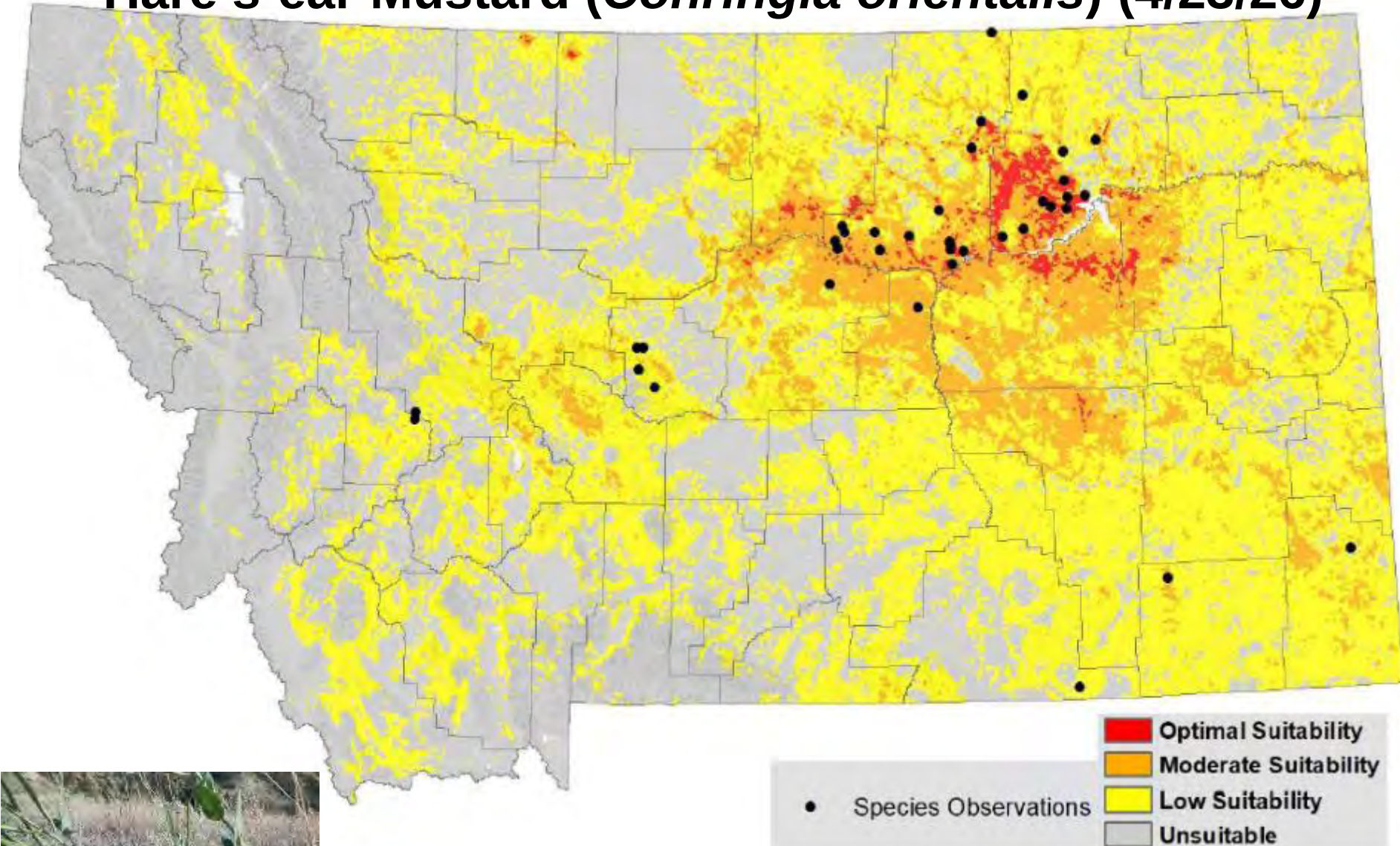


Hairy-pod Hedge Mustard (*Sisymbrium officinale*) (6/2/26)



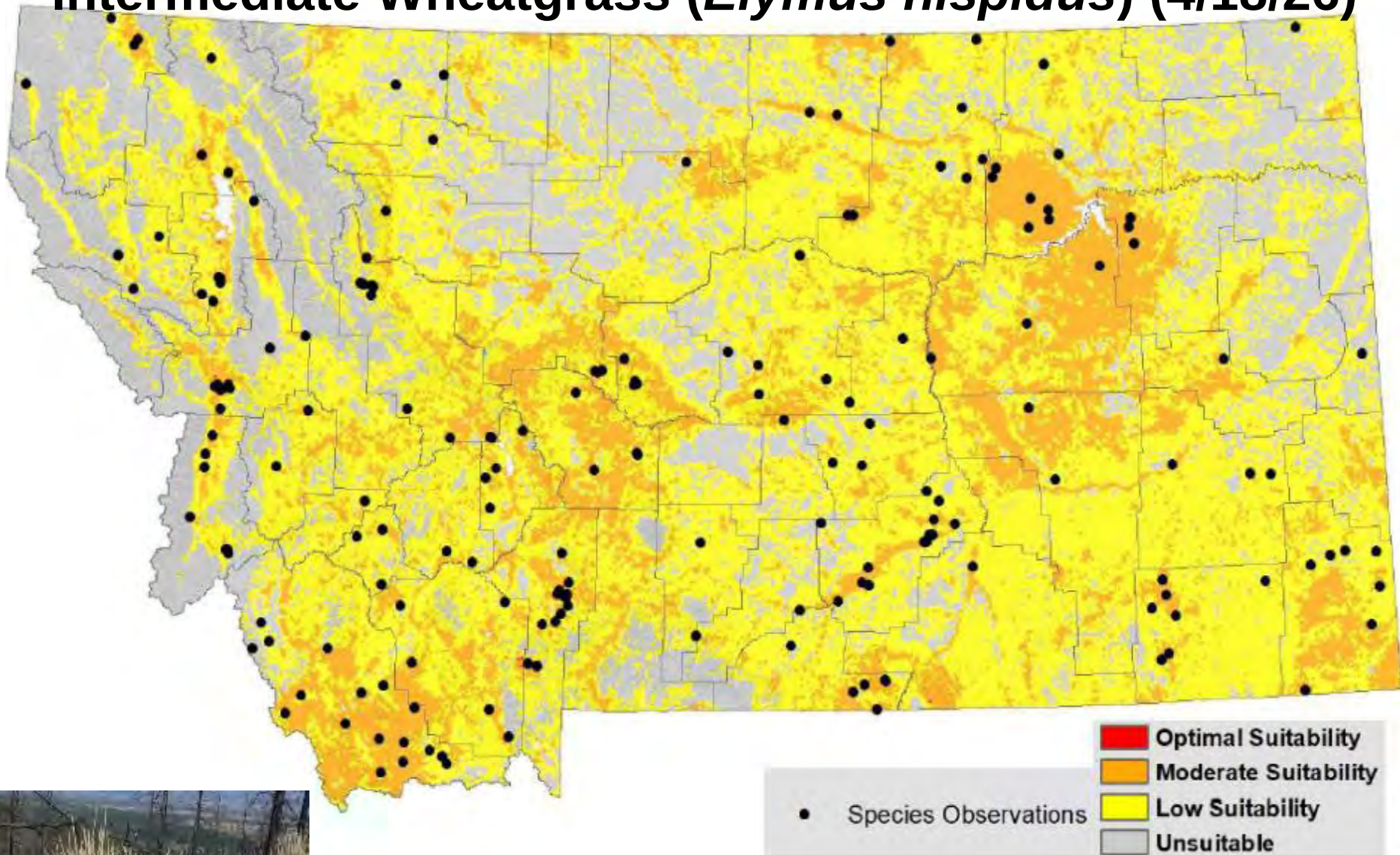
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.069	47,905	13%
Moderate	0.194	55,524	15%
Optimal	0.583	10,023	3%

Hare's-ear Mustard (*Conringia orientalis*) (4/23/26)



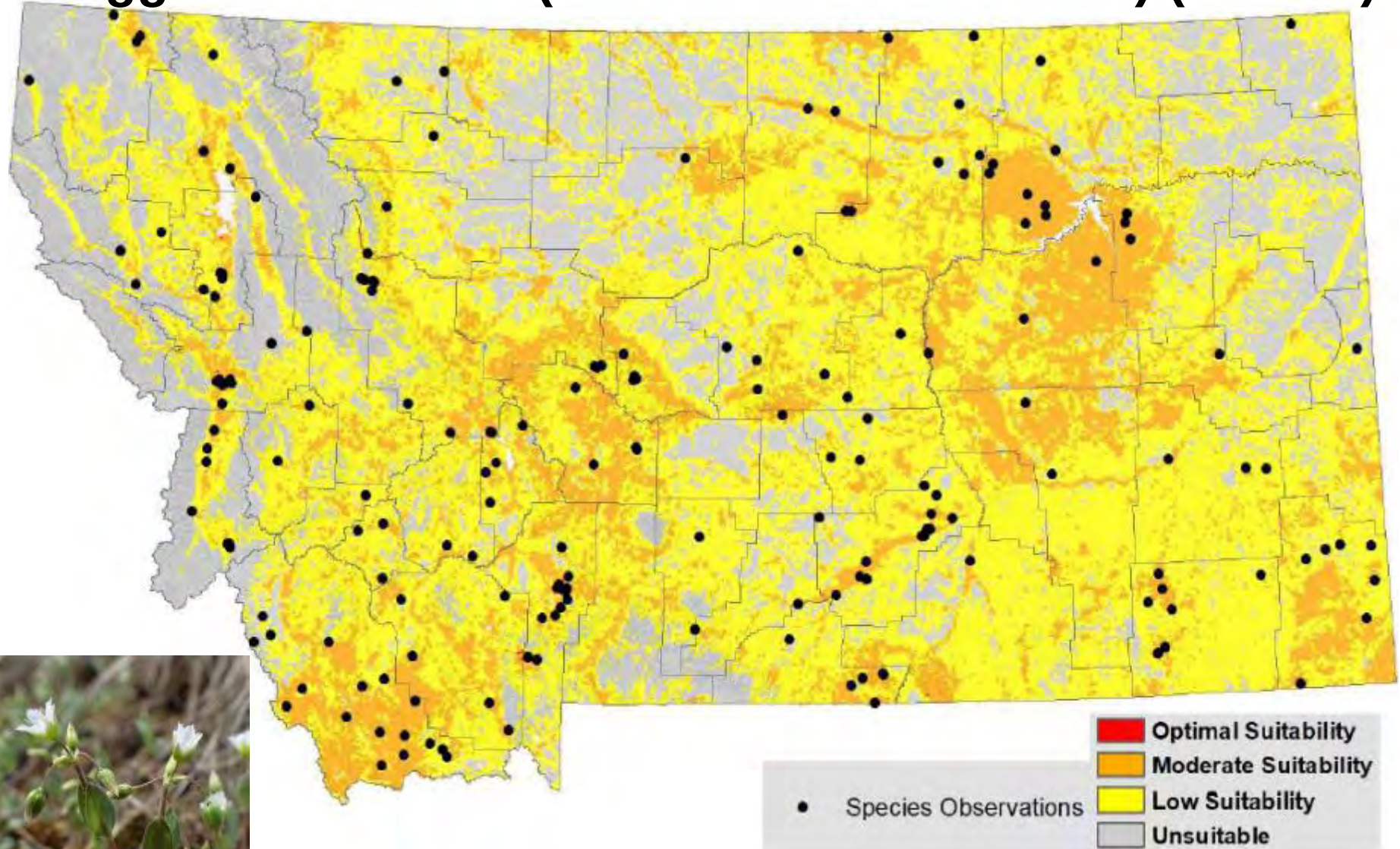
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.017	108,480	29%
Moderate	0.203	36,490	10%
Optimal	0.566	9,035	2%

Intermediate Wheatgrass (*Elymus hispidus*) (4/18/26)



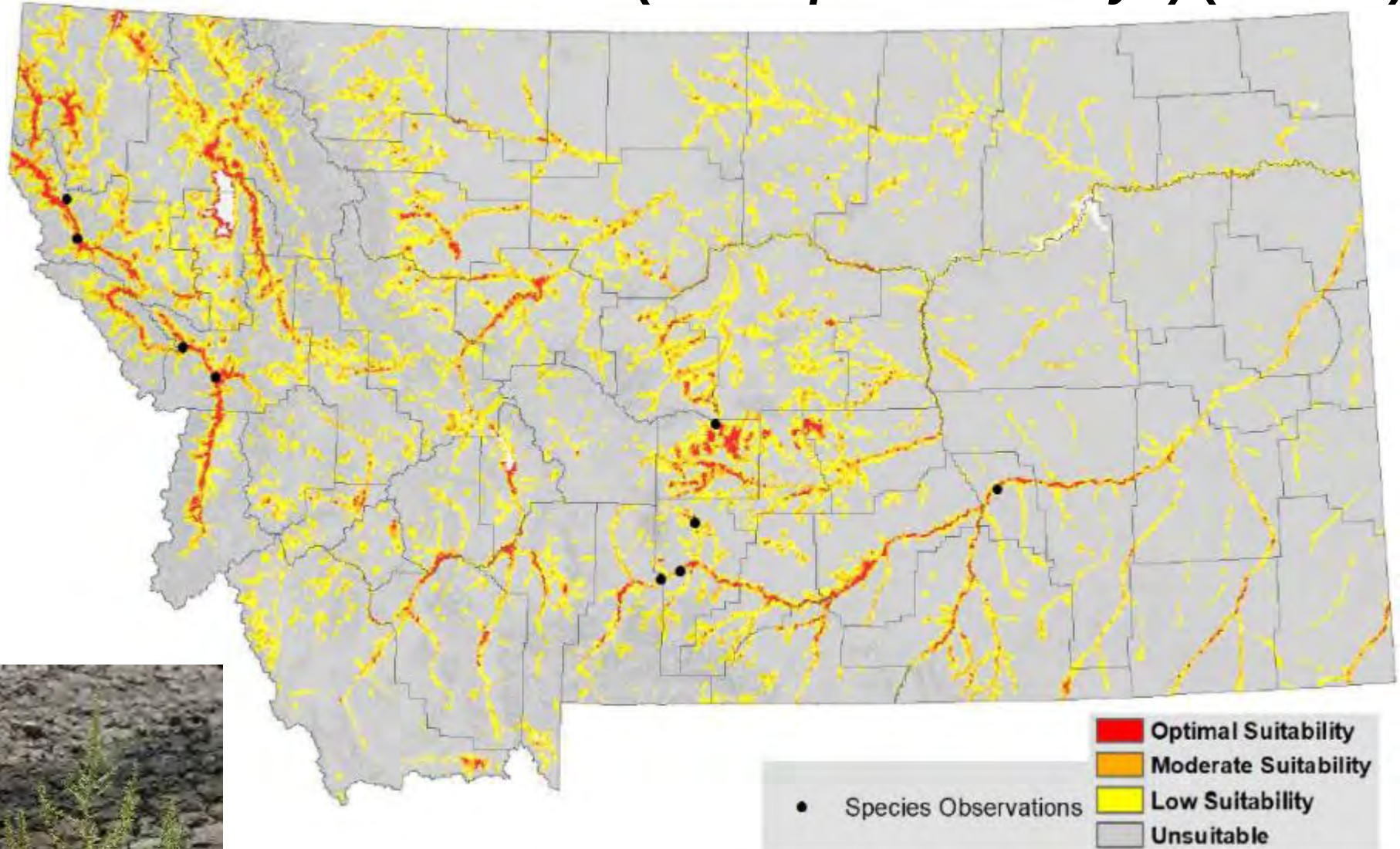
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.051	132,999	35%
Moderate	0.229	78,068	21%
Optimal	0.808	1,549	<1%

Jagged Chickweed (*Holosteum umbellatum*) (4/23/26)



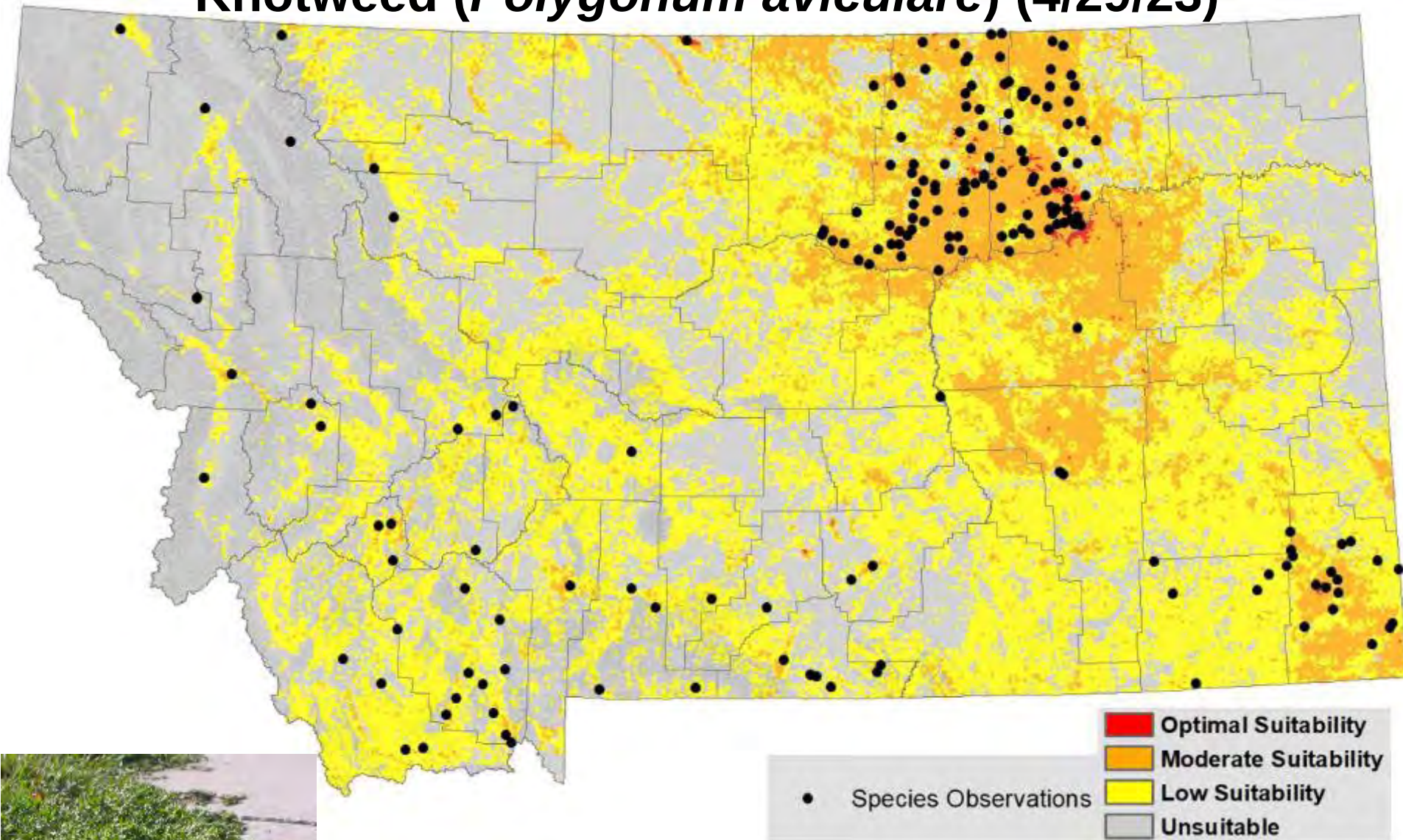
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.019	59,523	16%
Moderate	0.097	16,977	4%
Optimal	0.288	5,509	1%

Jerusalem-oak Goosefoot (*Chenopodium botrys*) (5/28/26)



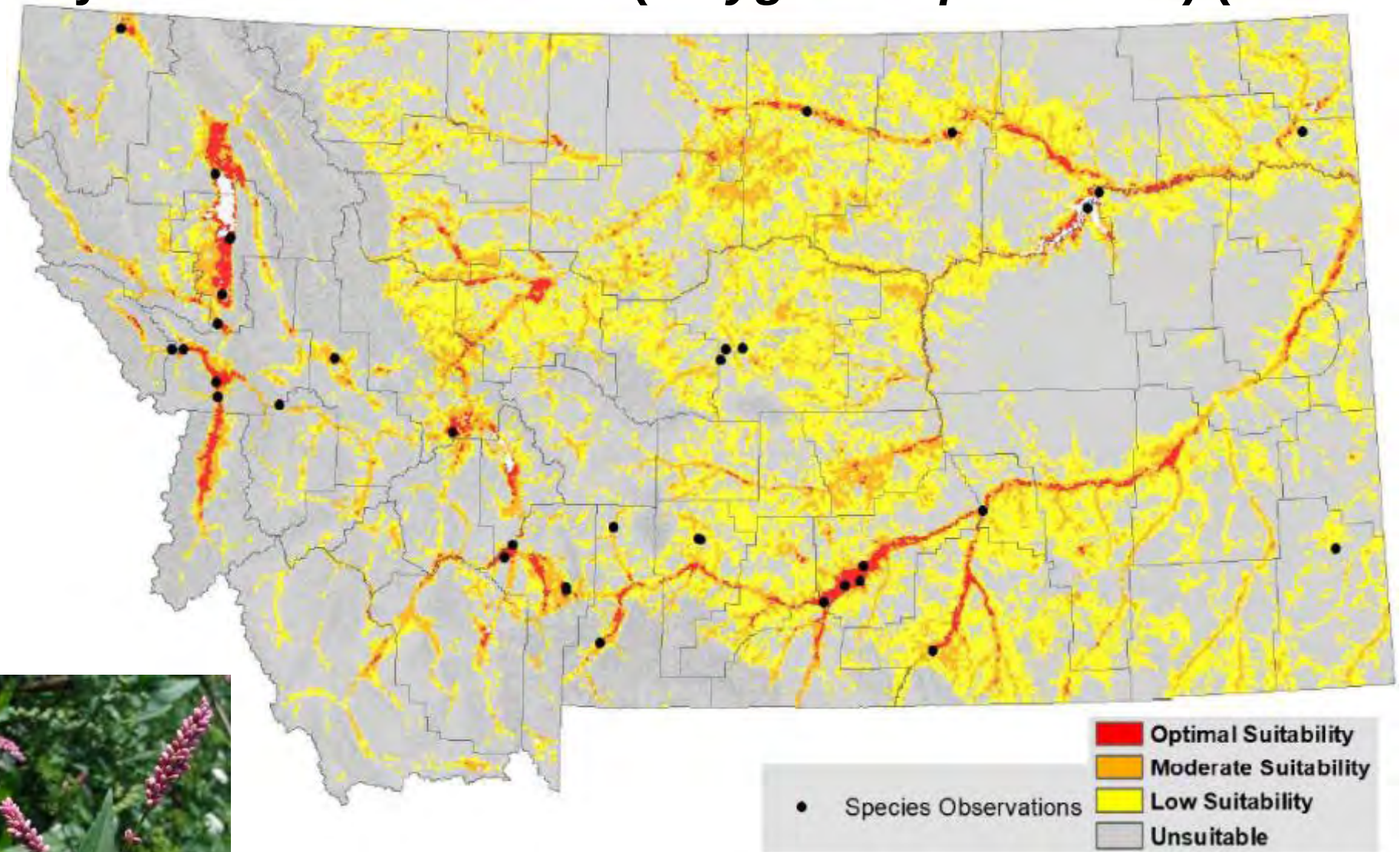
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.014	34,028	9%
Moderate	0.099	8,179	2%
Optimal	0.246	7,108	2%

Knotweed (*Polygonum aviculare*) (4/29/23)



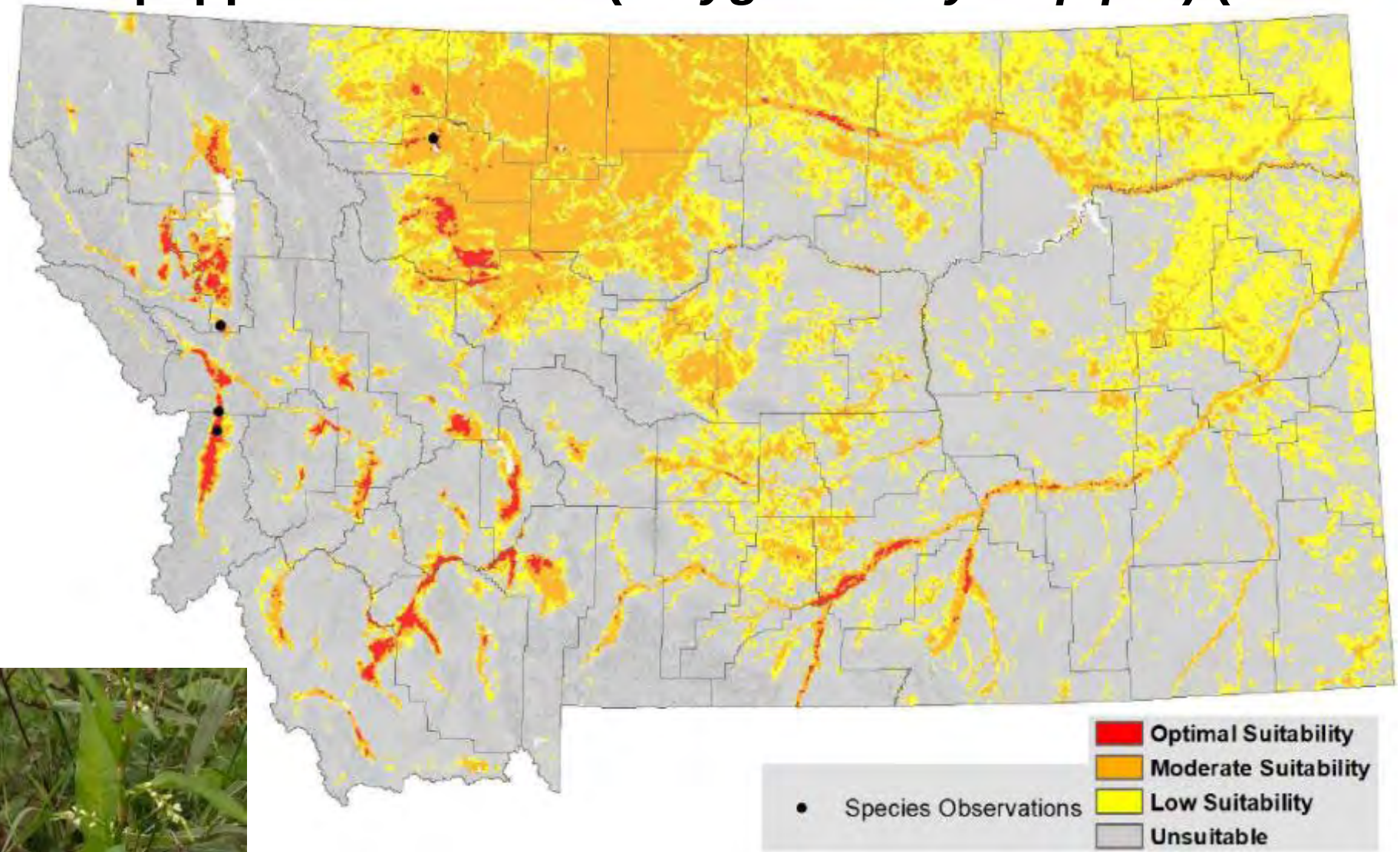
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.024	94,591	25%
Moderate	0.145	44,980	12%
Optimal	0.594	4,977	1%

Lady's Thumb Smartweed (*Polygonum persicaria*) (4/22/26)



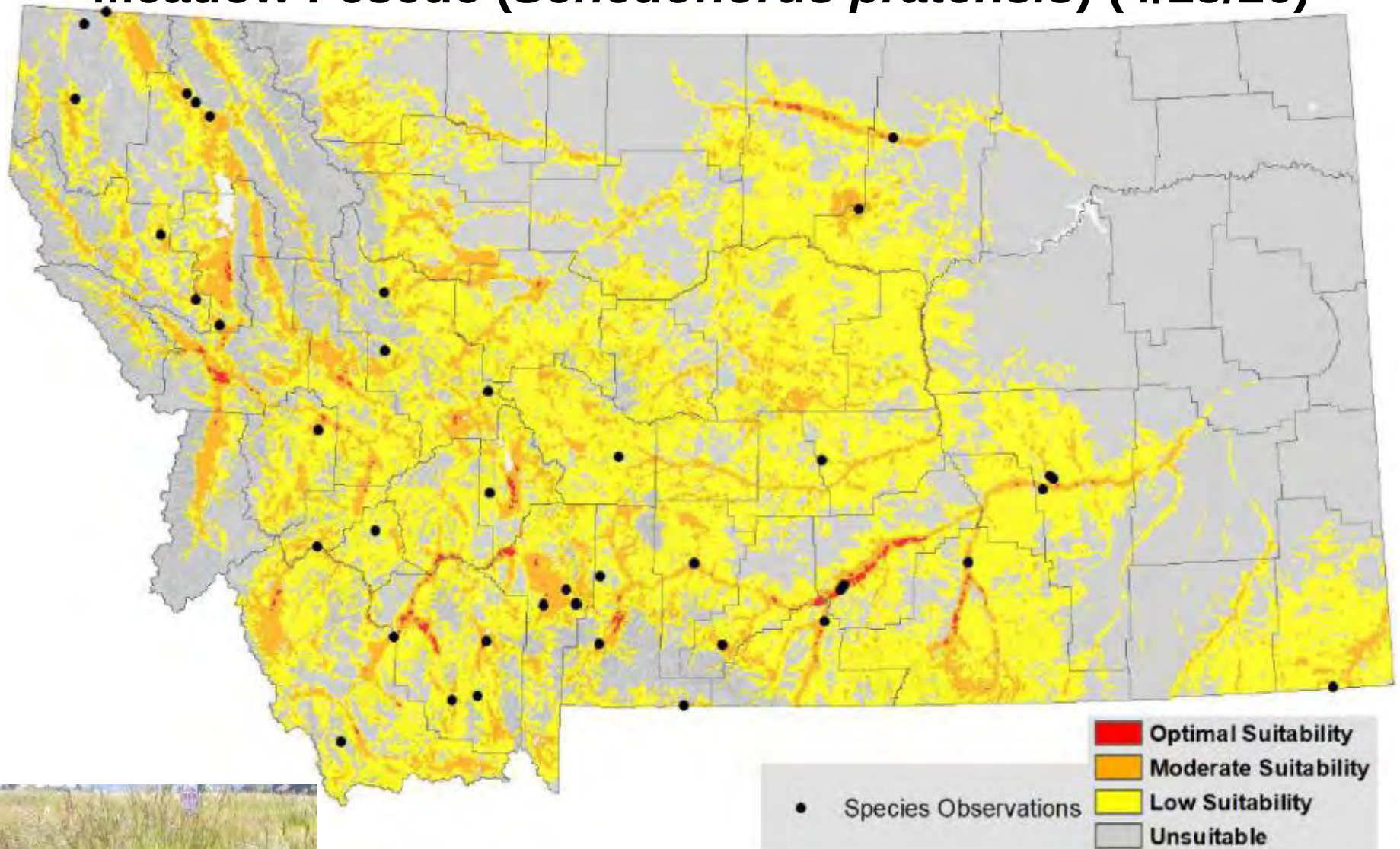
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.040	67,181	18%
Moderate	0.136	26,602	7%
Optimal	0.407	9,907	3%

Marshpepper Smartweed (*Polygonum hydropiper*) (5/27/26)



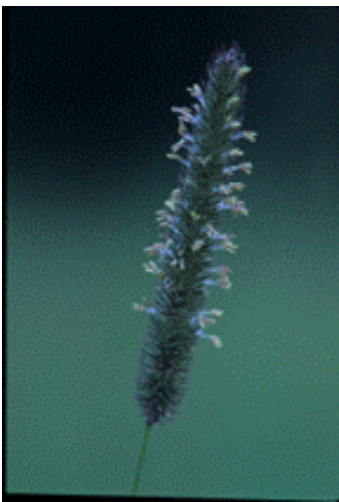
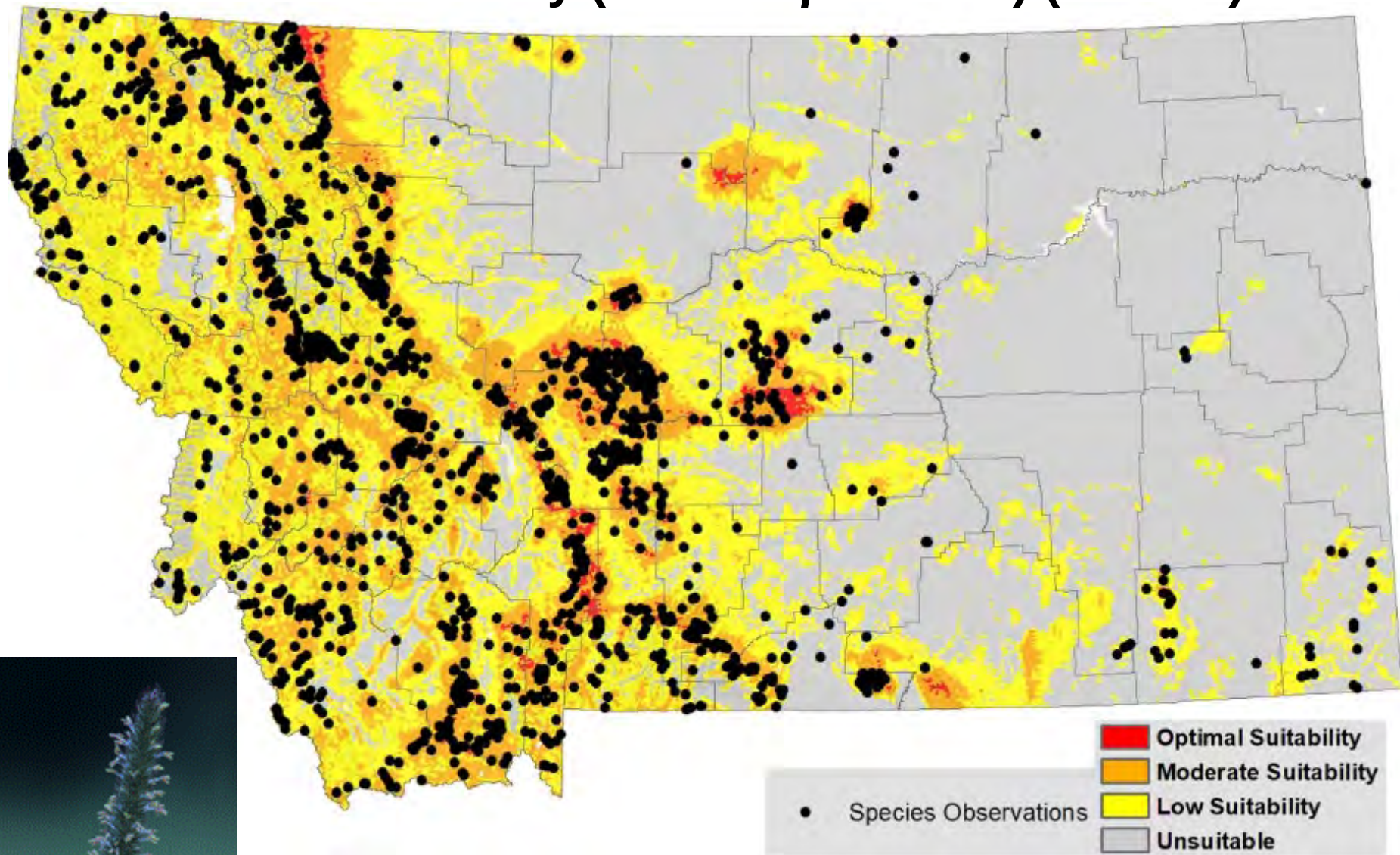
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.030	41,268	11%
Moderate	0.097	55,304	15%
Optimal	0.301	6,497	2%

Meadow Fescue (*Schedonorus pratensis*) (4/18/26)



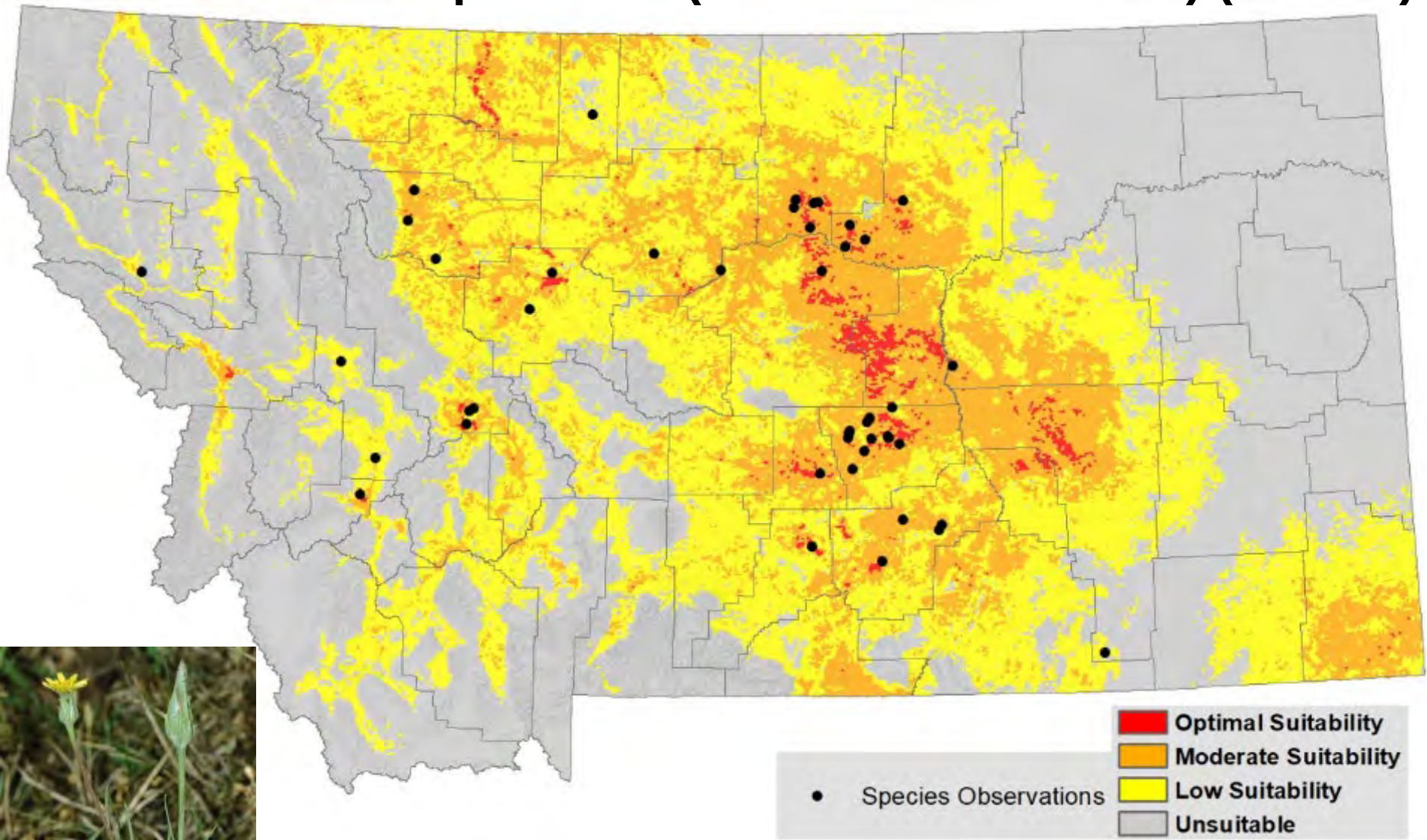
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.079	106,419	28%
Moderate	0.281	36,402	10%
Optimal	0.687	5,400	1%

Meadow Timothy (*Phleum pratense*) (6/11/25)



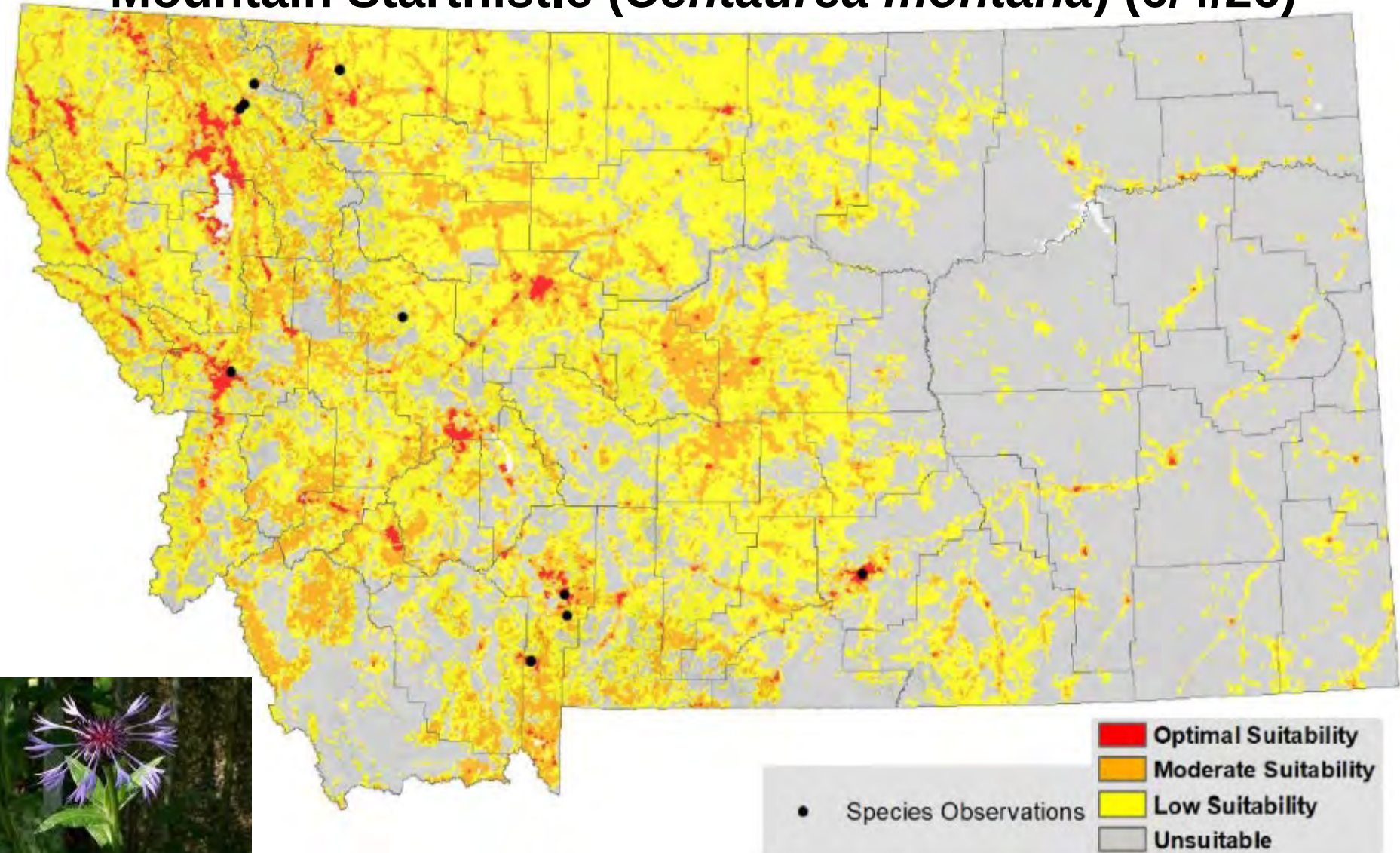
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.030	99,118	26%
Moderate	0.169	45,469	12%
Optimal	0.540	11,587	3%

Mediterranean Serpent-root (*Scorzonera laciniata*) (4/28/23)



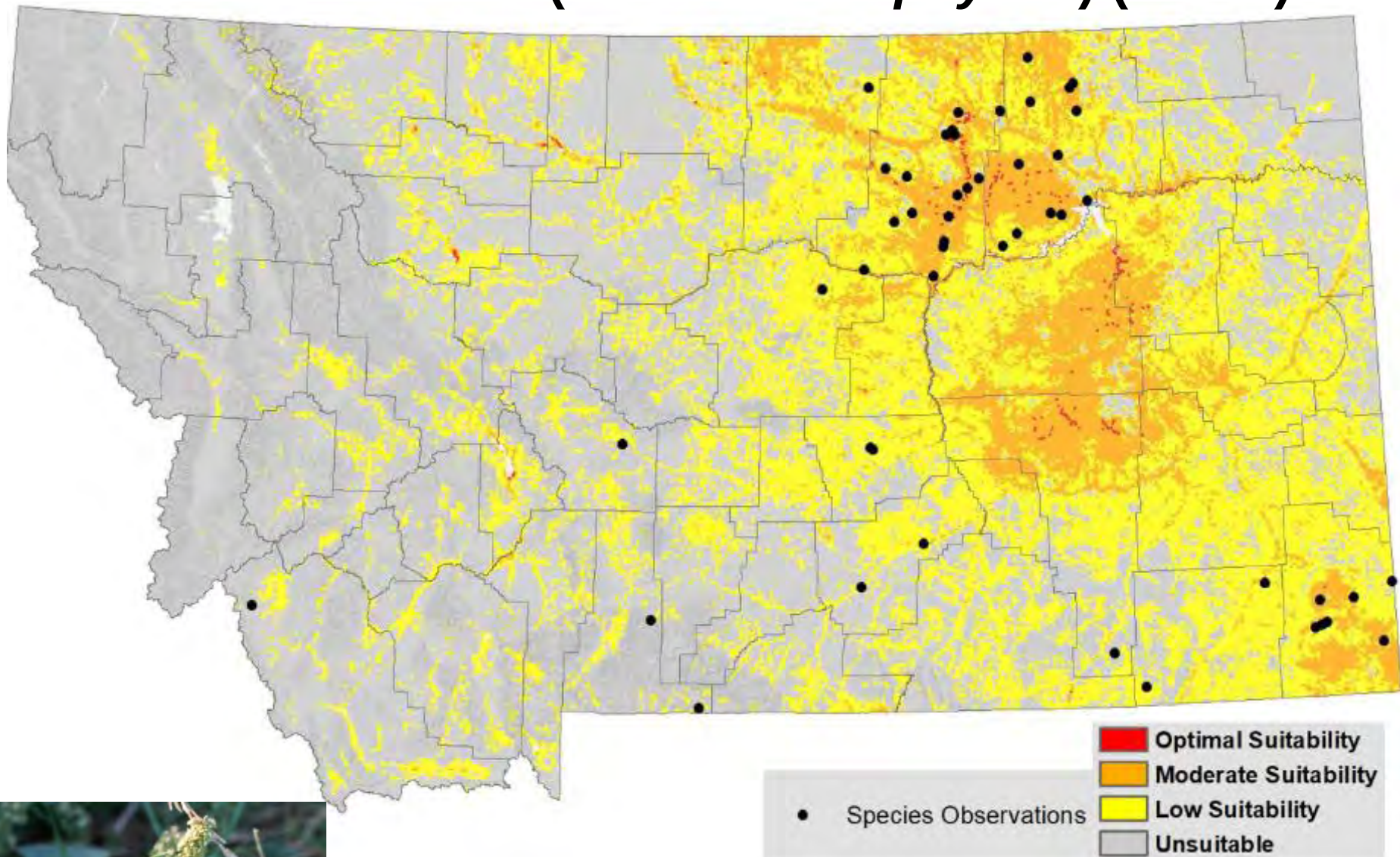
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.019	101,688	27%
Moderate	0.159	51,461	14%
Optimal	0.572	8,690	2%

Mountain Starthistle (*Centaurea montana*) (6/4/26)



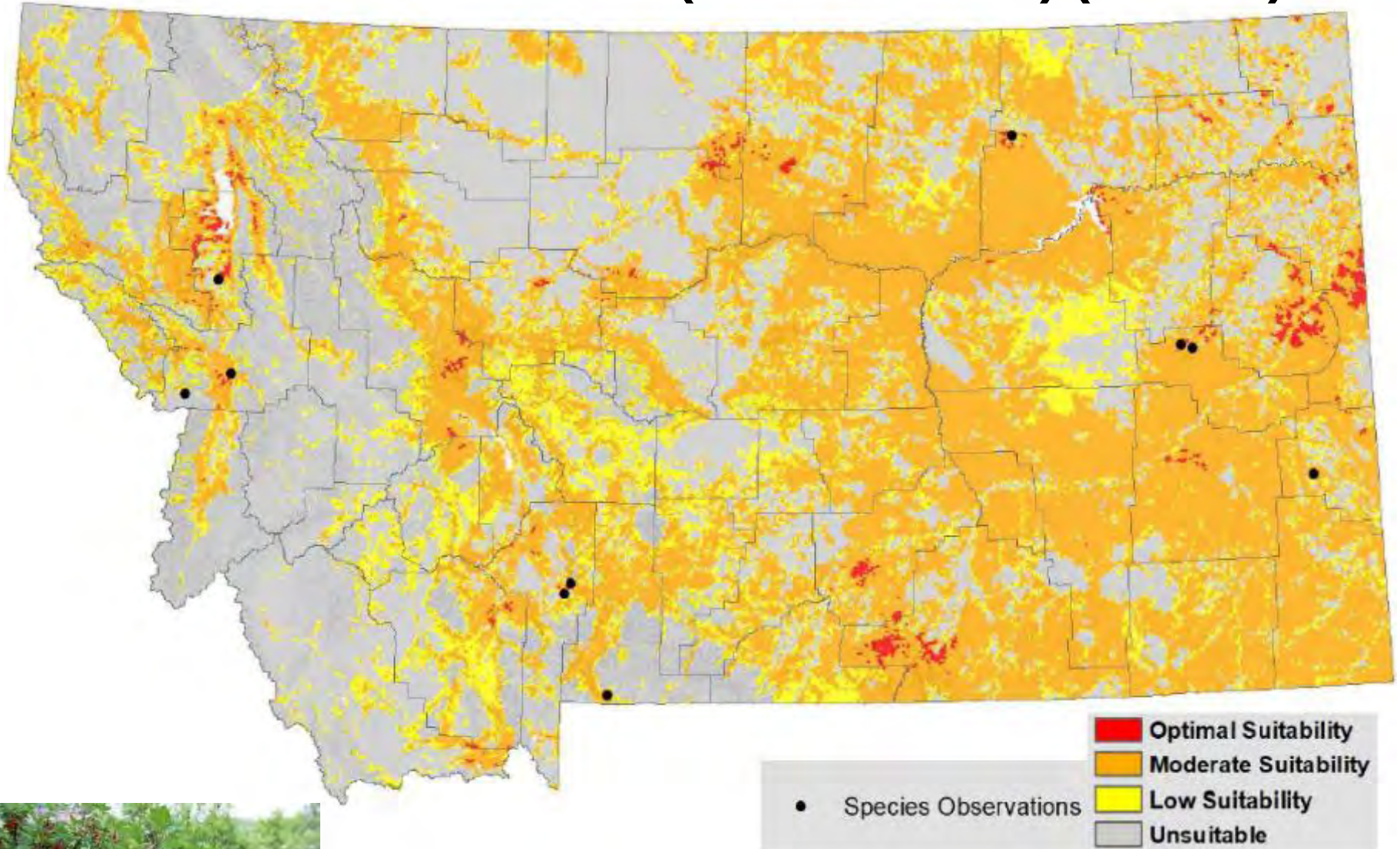
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.072	109,487	29%
Moderate	0.206	52,494	14%
Optimal	0.549	5,950	2%

Narrowleaf Dock (*Rumex stenophyllus*) (6/9/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.035	81,571	21%
Moderate	0.213	33,224	9%
Optimal	0.615	5,314	1%

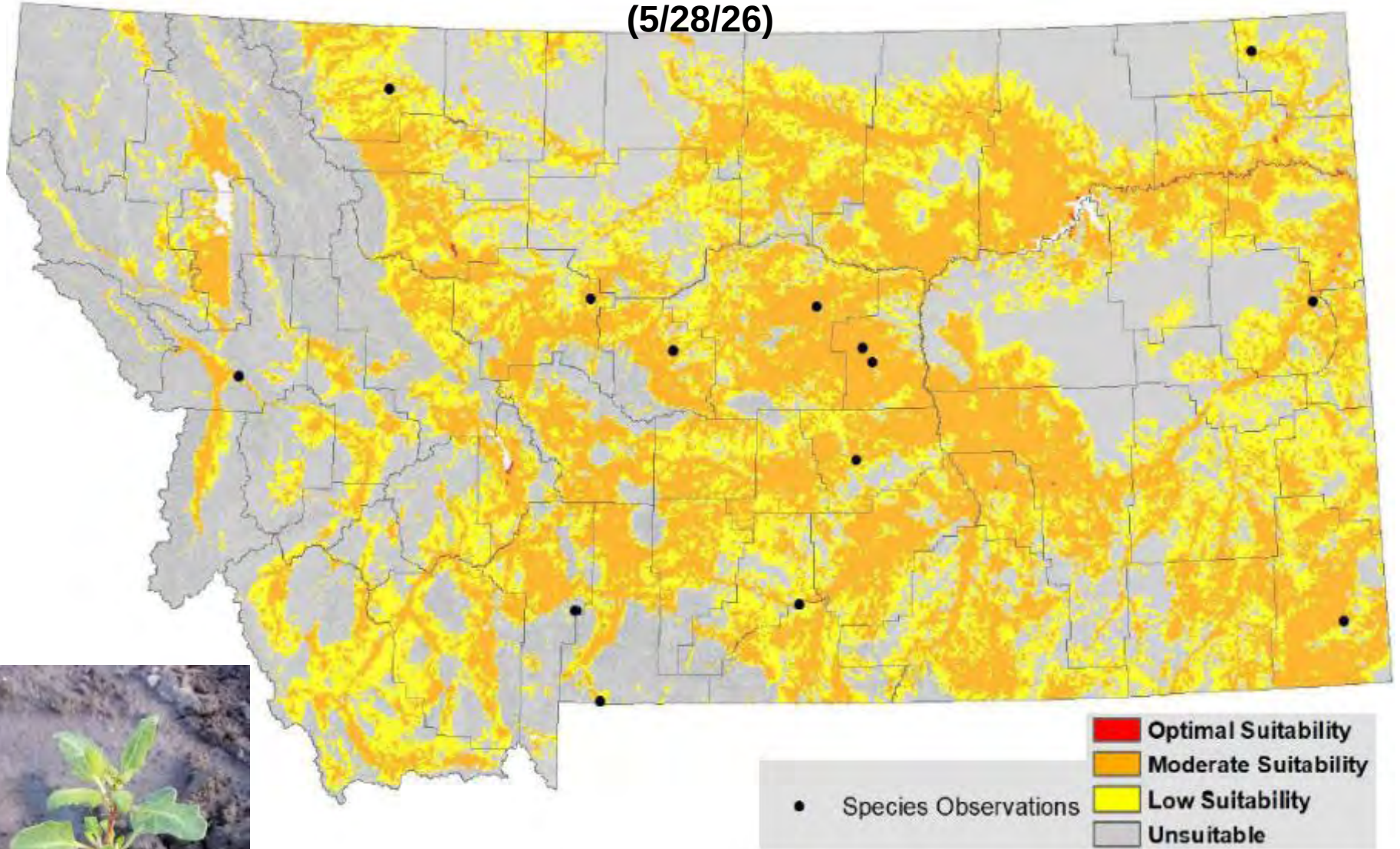
Northern Red Currant (*Ribes rubrum*) (5/27/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.145	33,872	9%
Moderate	0.242	153,284	40%
Optimal	0.634	9,647	3%

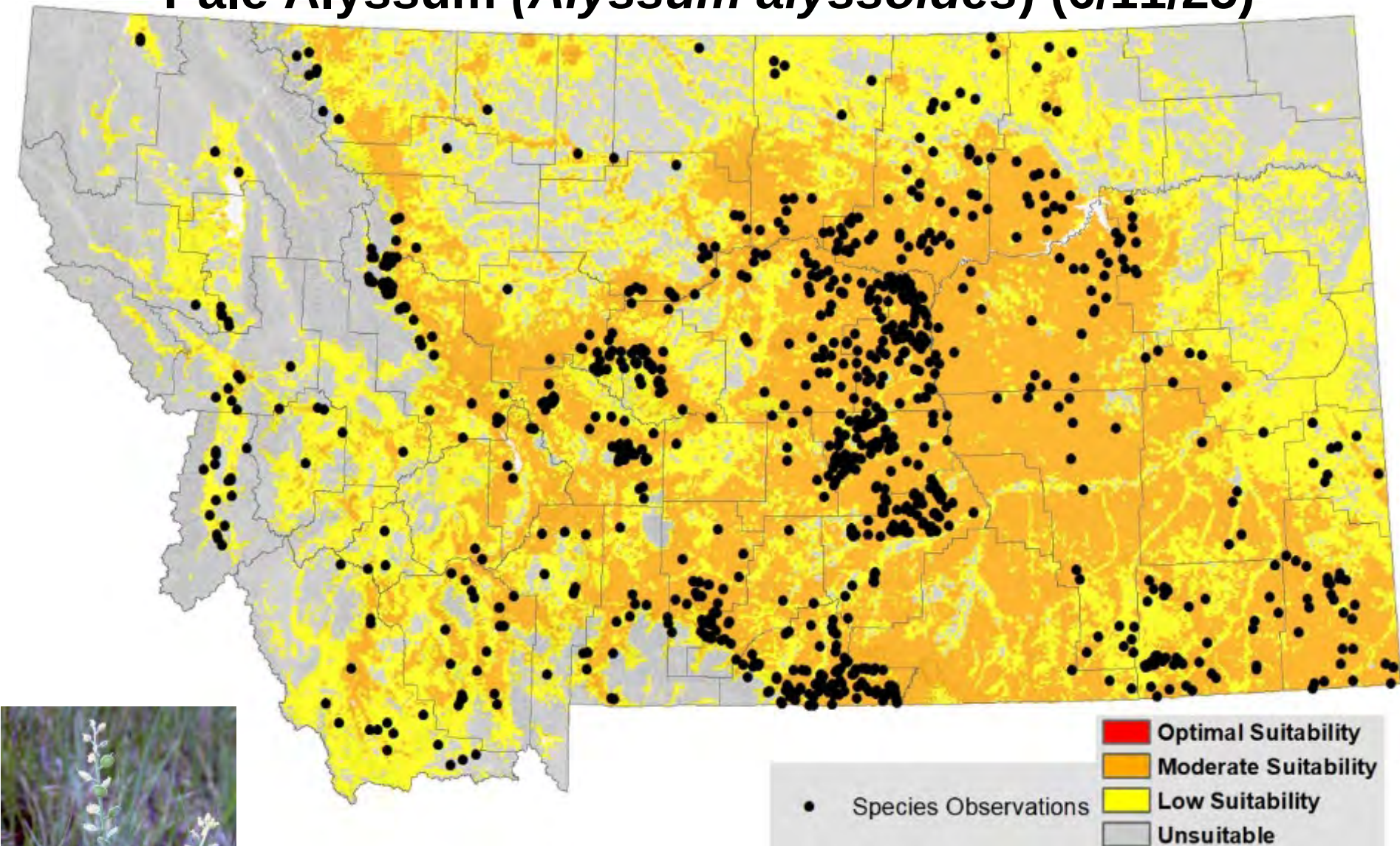
Oakleaf Goosefoot (*Chenopodium glaucum* var. *glaucum*)

(5/28/26)



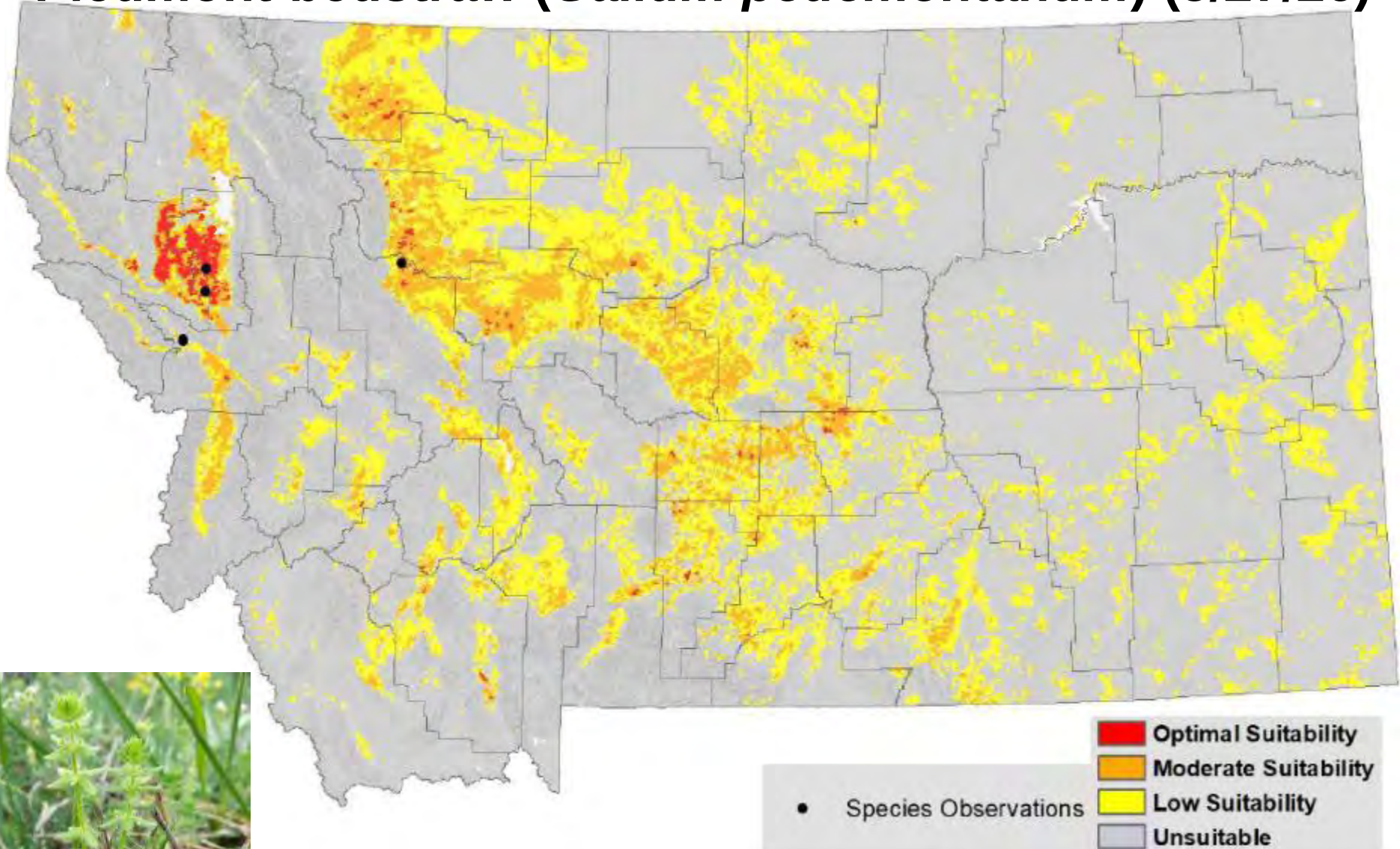
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.124	73,151	19%
Moderate	0.255	109,949	29%
Optimal	0.807	1,798	<1%

Pale Alyssum (*Alyssum alyssoides*) (6/11/25)



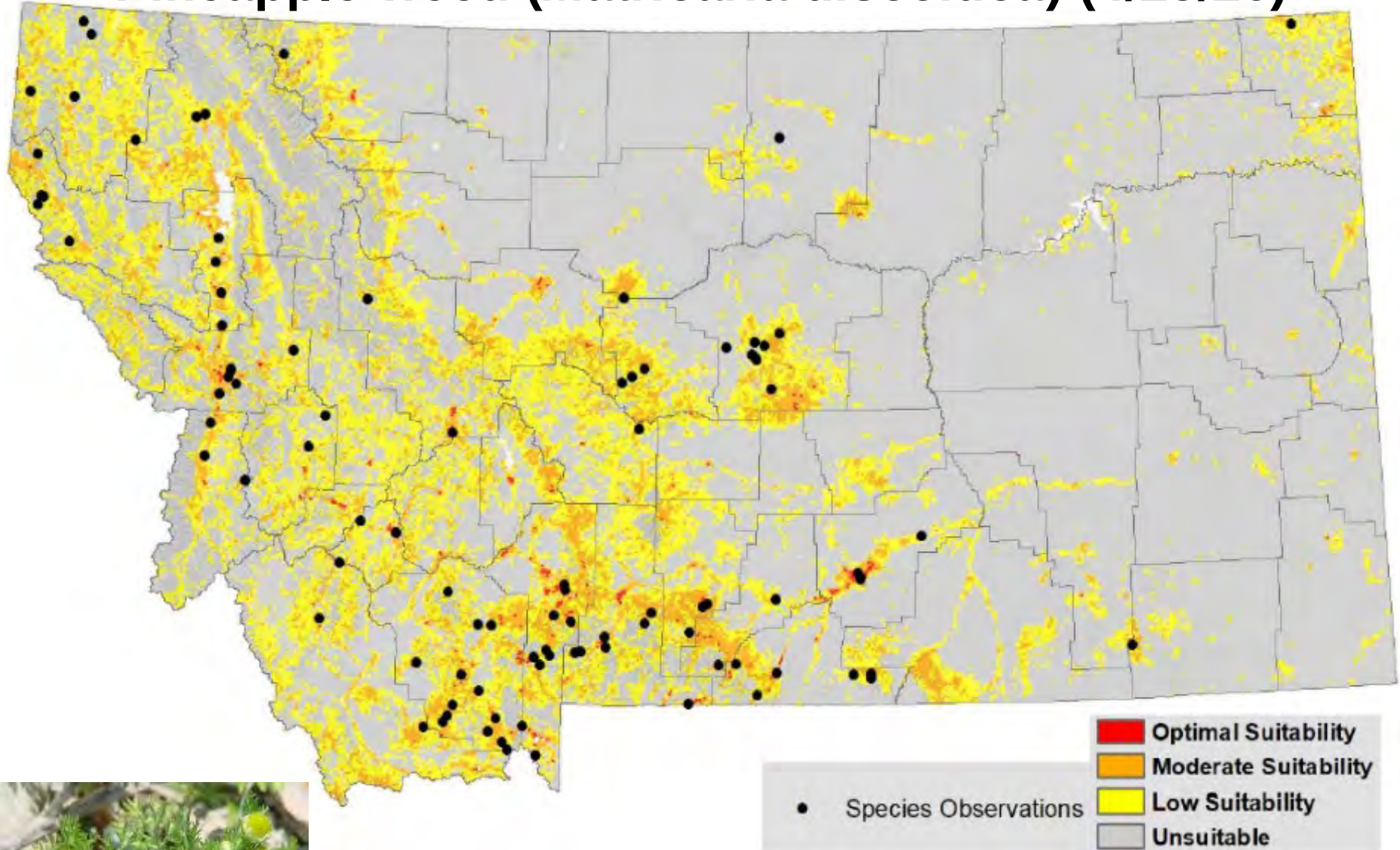
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.057	139,336	37%
Moderate	0.256	97,880	26%
Optimal	0.989	2.3	<1%

Piedmont-bedstraw (*Galium pedemontanum*) (5/27/26)



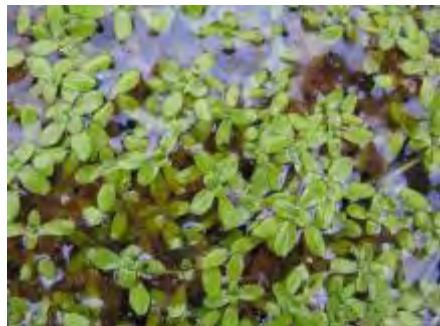
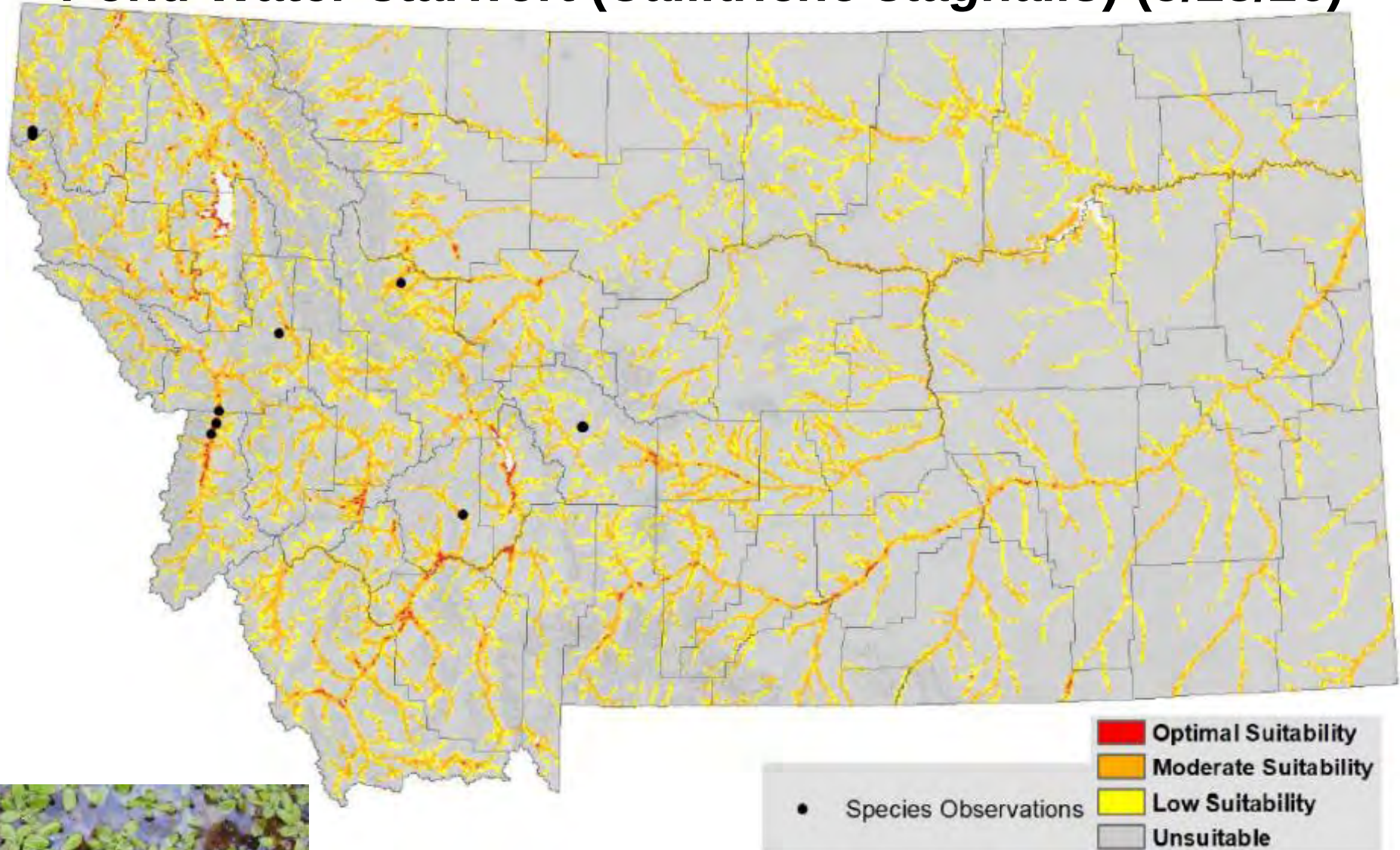
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.015	34,201	9%
Moderate	0.097	18,034	5%
Optimal	0.331	4,409	1%

Pineapple-weed (*Matricaria discoidea*) (4/25/26)



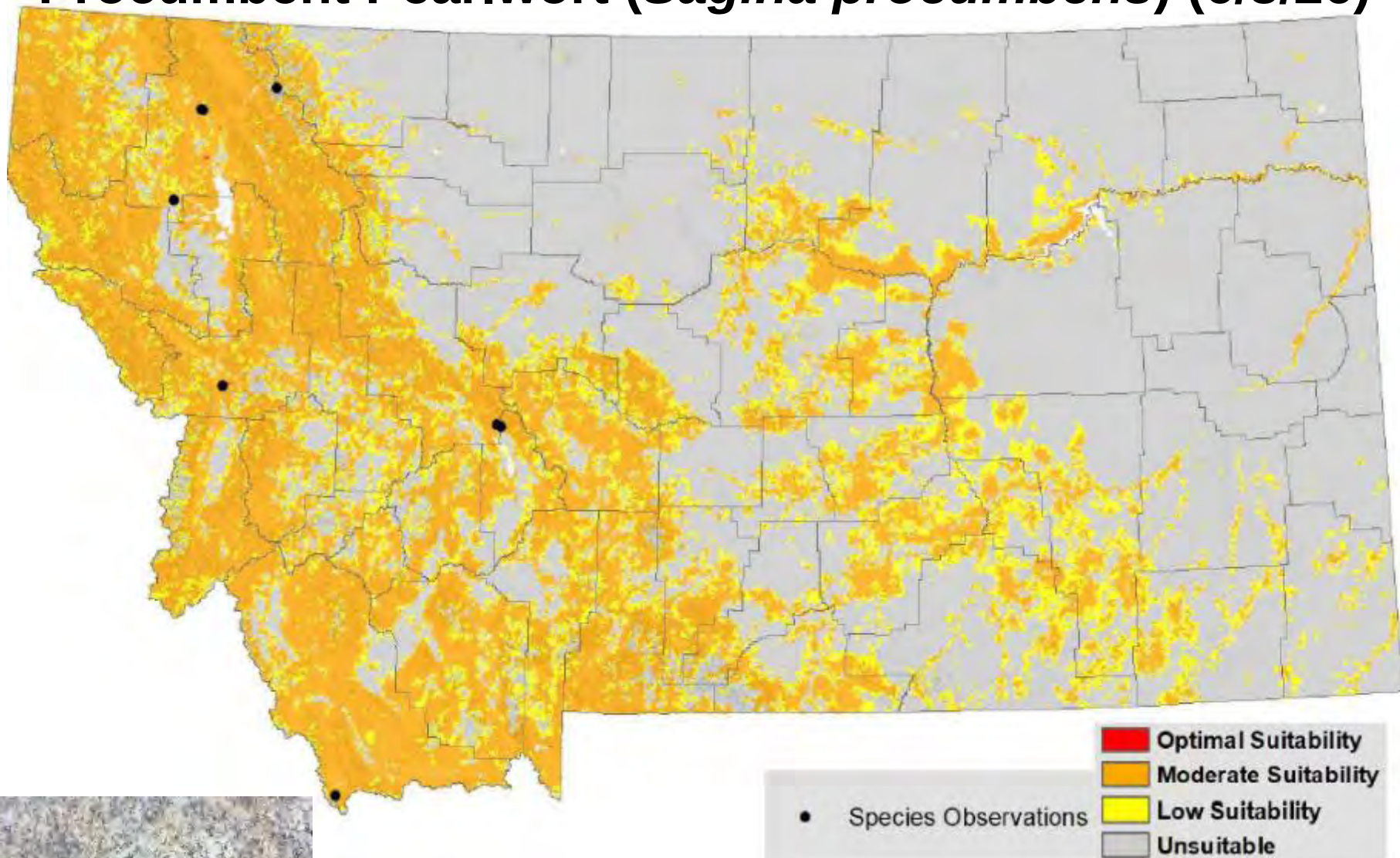
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.010	35,727	9%
Moderate	0.061	14,053	4%
Optimal	0.291	4,483	1%

Pond Water-starwort (*Callitriche stagnalis*) (5/28/26)



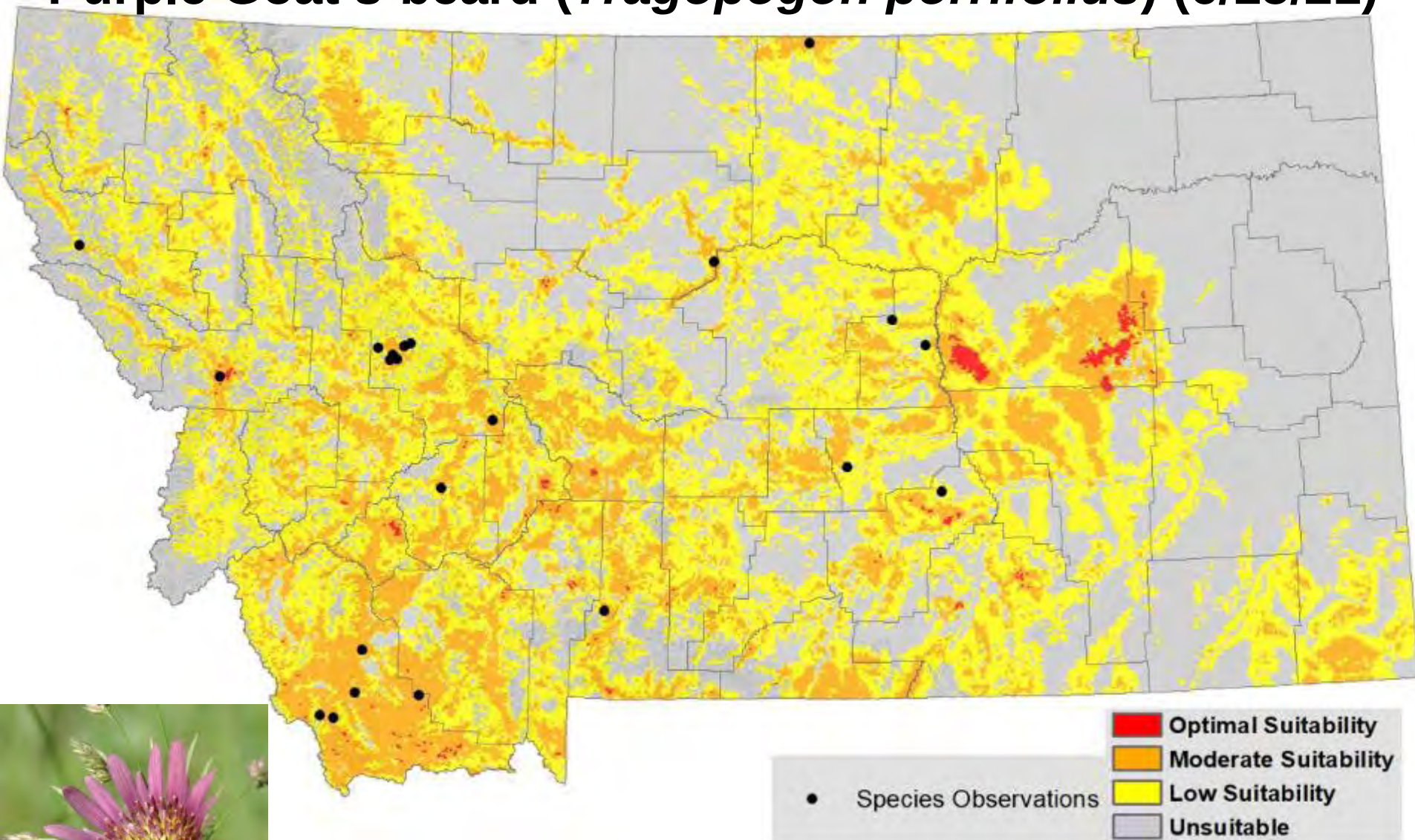
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.015	27,550	7%
Moderate	0.081	19,963	5%
Optimal	0.389	4,275	1%

Procumbent Pearlwort (*Sagina procumbens*) (6/3/26)



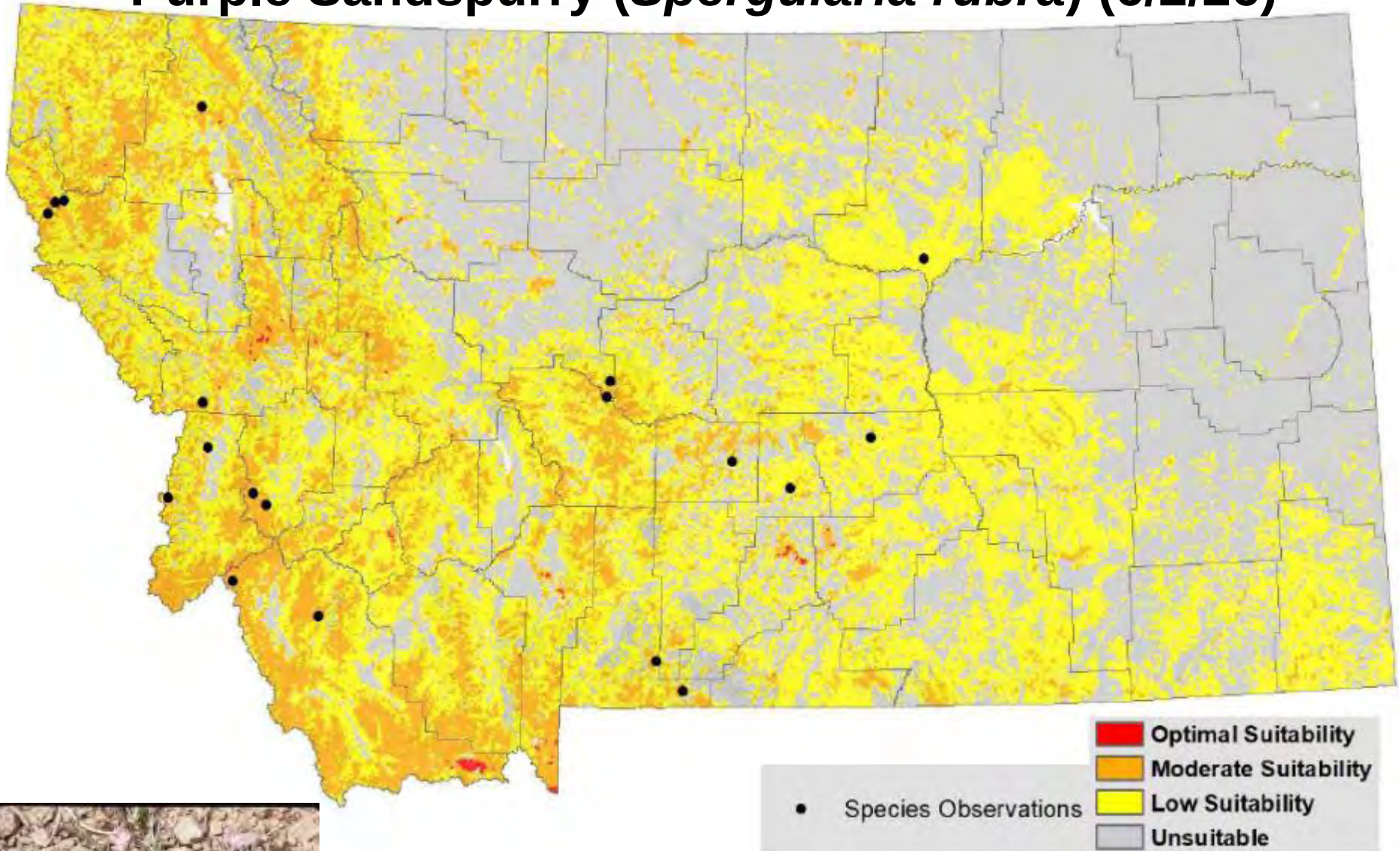
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.082	33,287	9%
Moderate	0.160	94,763	25%
Optimal	0.755	1,151	<1%

Purple Goat's-beard (*Tragopogon porrifolius*) (6/15/21)



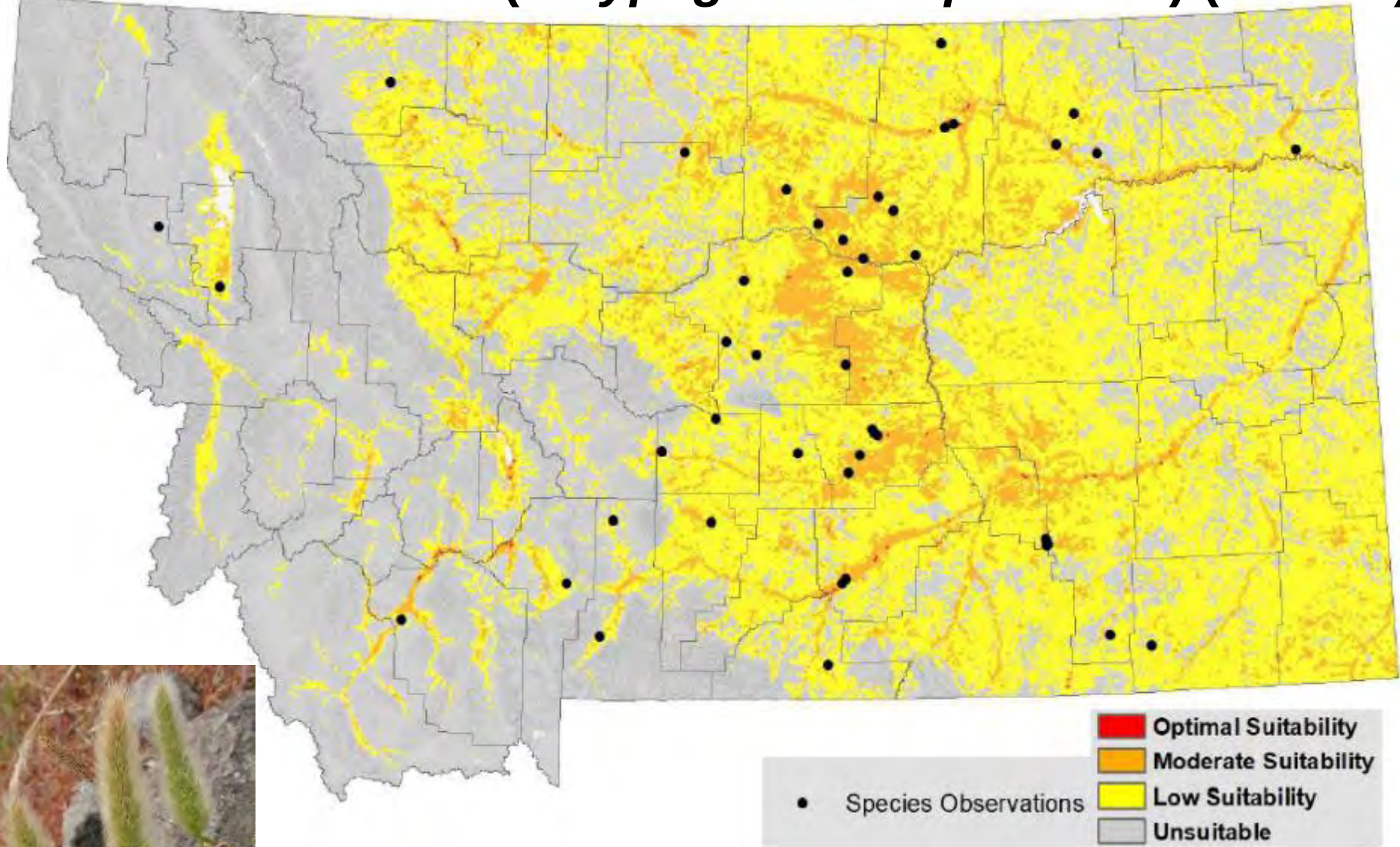
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.069	97,885	26%
Moderate	0.255	62,002	16%
Optimal	0.673	3,583	1%

Purple Sandspurry (*Spergularia rubra*) (6/2/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.090	93,506	25%
Moderate	0.259	57,092	15%
Optimal	0.680	4,937	1%

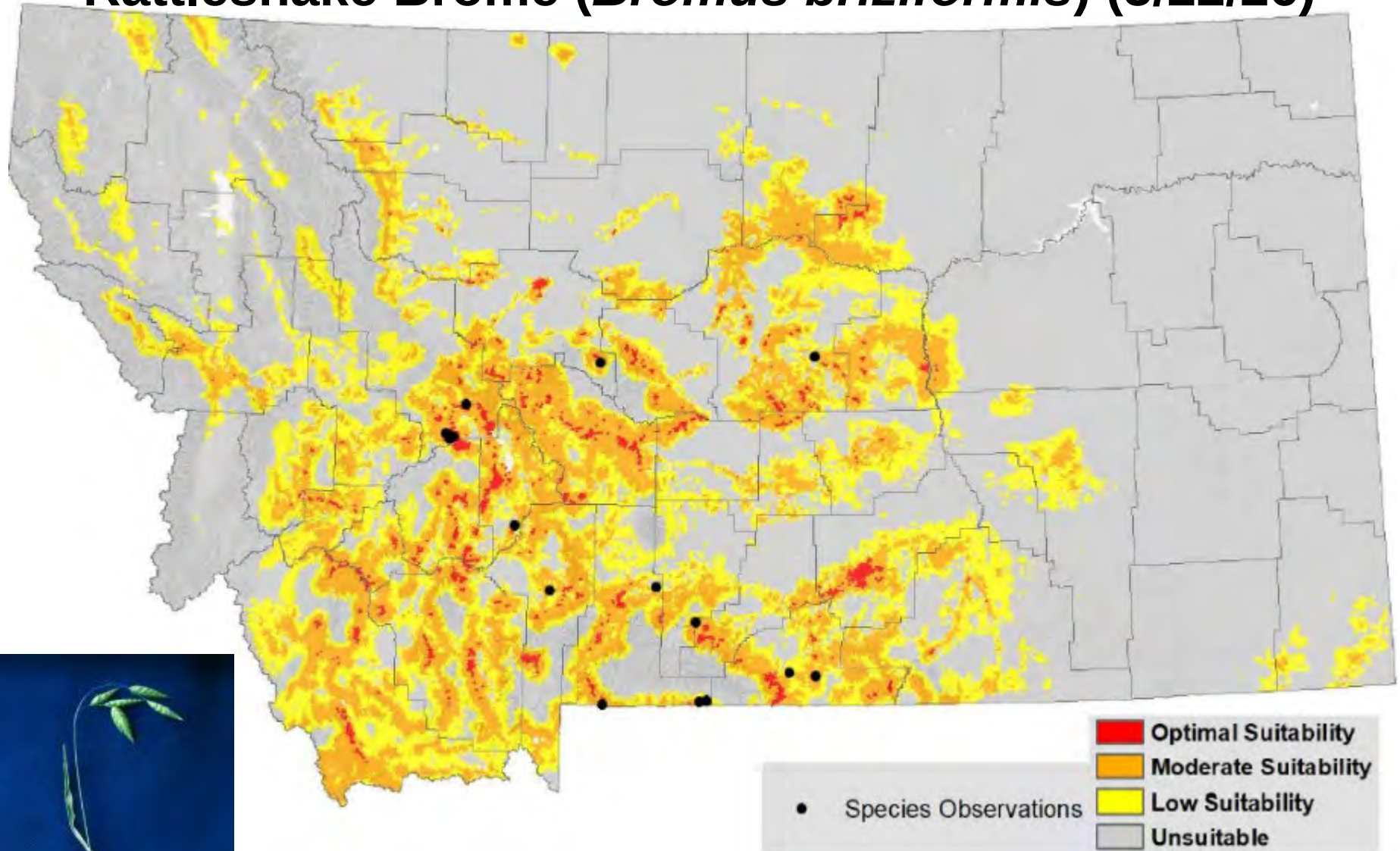
Rabbit's-foot Grass (*Polypogon monspeliensis*) (4/17/26)



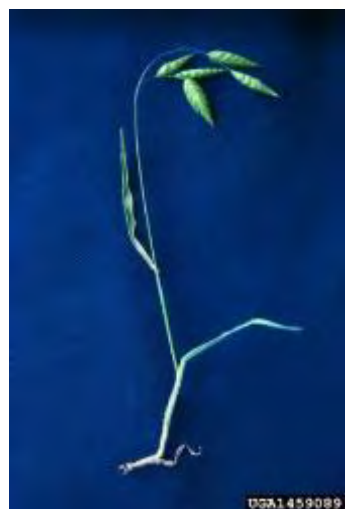
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.059	102,854	27%
Moderate	0.244	35,589	9%
Optimal	0.638	6,410	2%



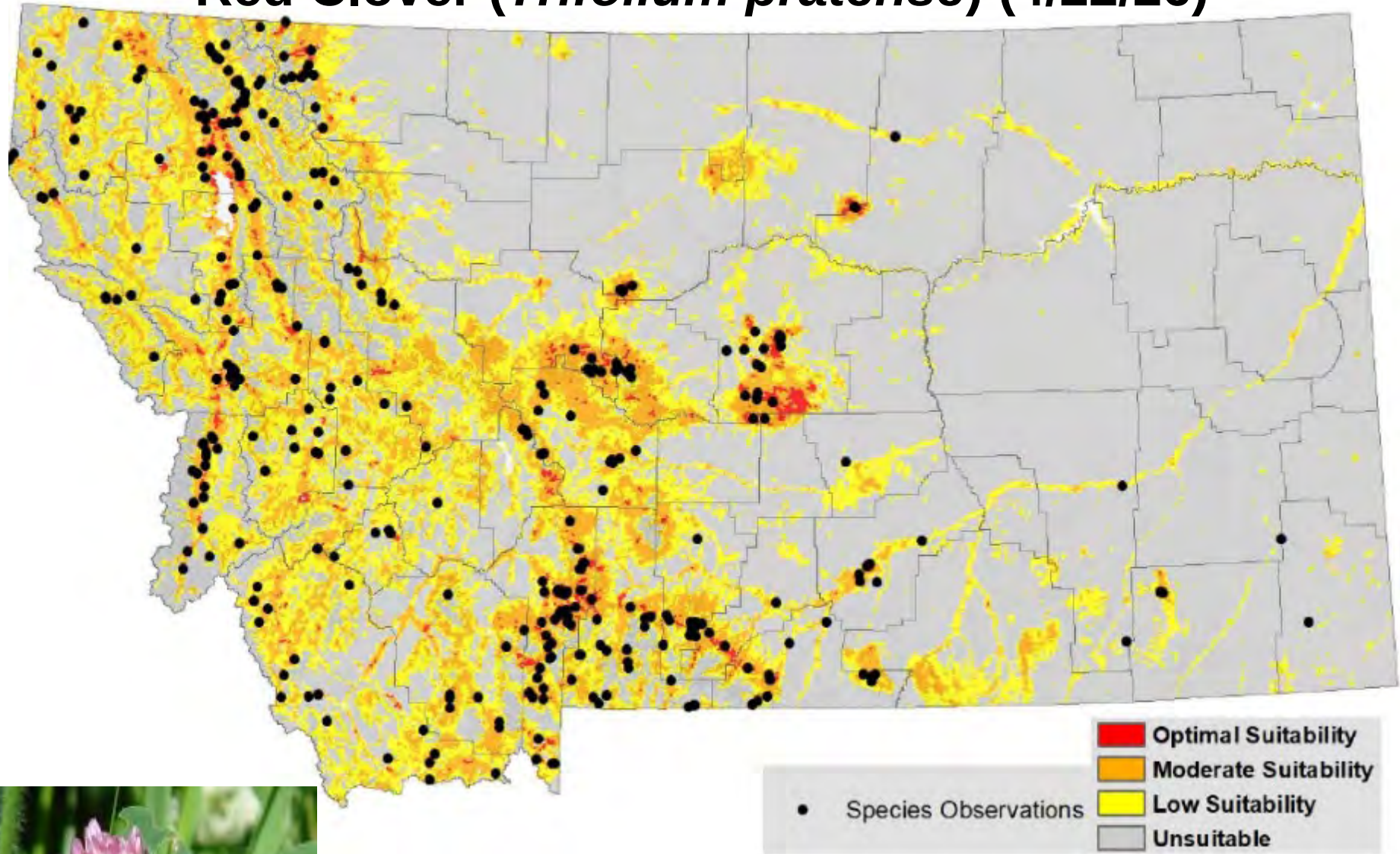
Rattlesnake Brome (*Bromus briziformis*) (5/22/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.058	50,842	13%
Moderate	0.213	42,299	11%
Optimal	0.580	7,571	2%



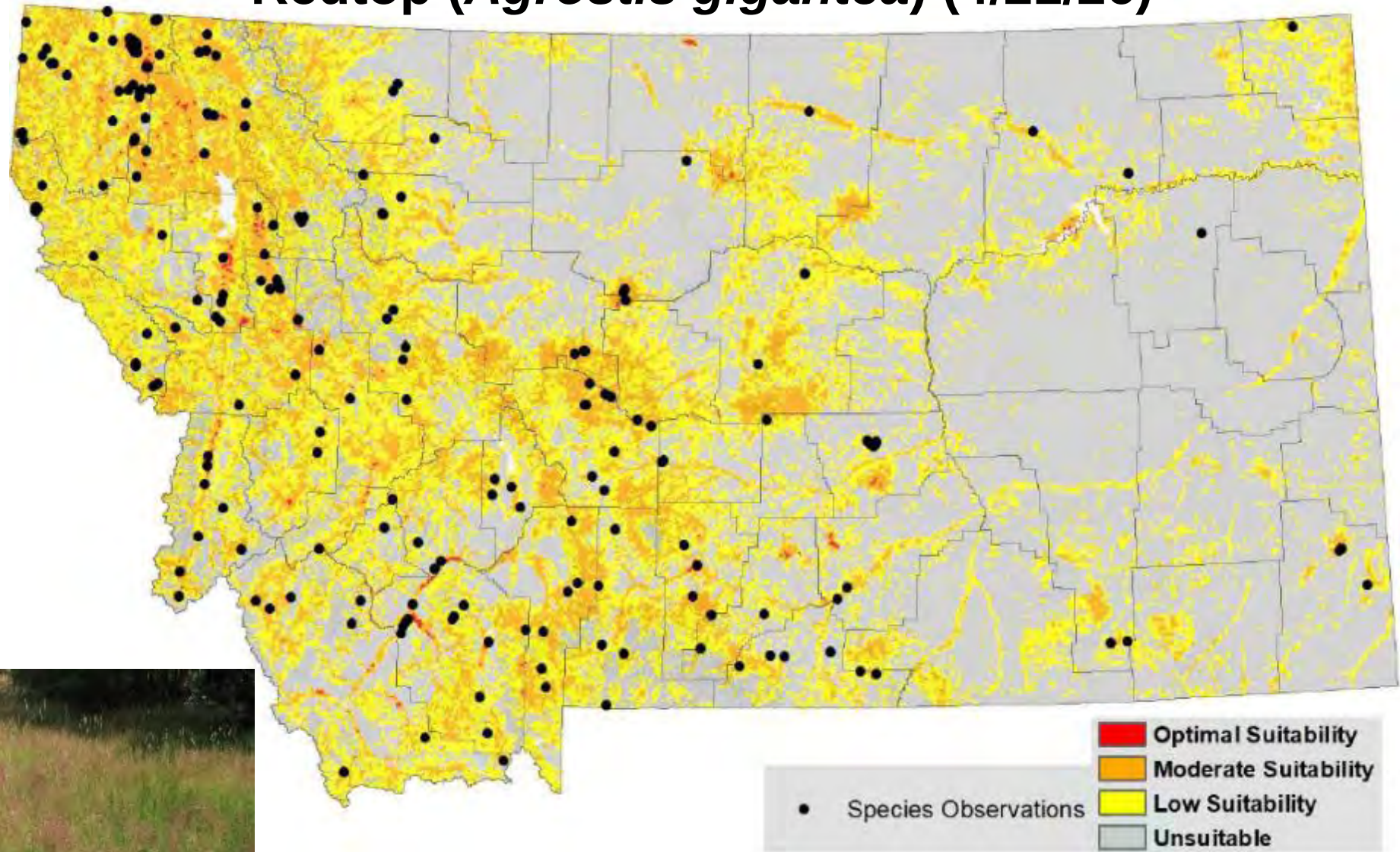
Red Clover (*Trifolium pratense*) (4/22/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.026	55,644	15%
Moderate	0.122	29,479	8%
Optimal	0.414	10,003	3%

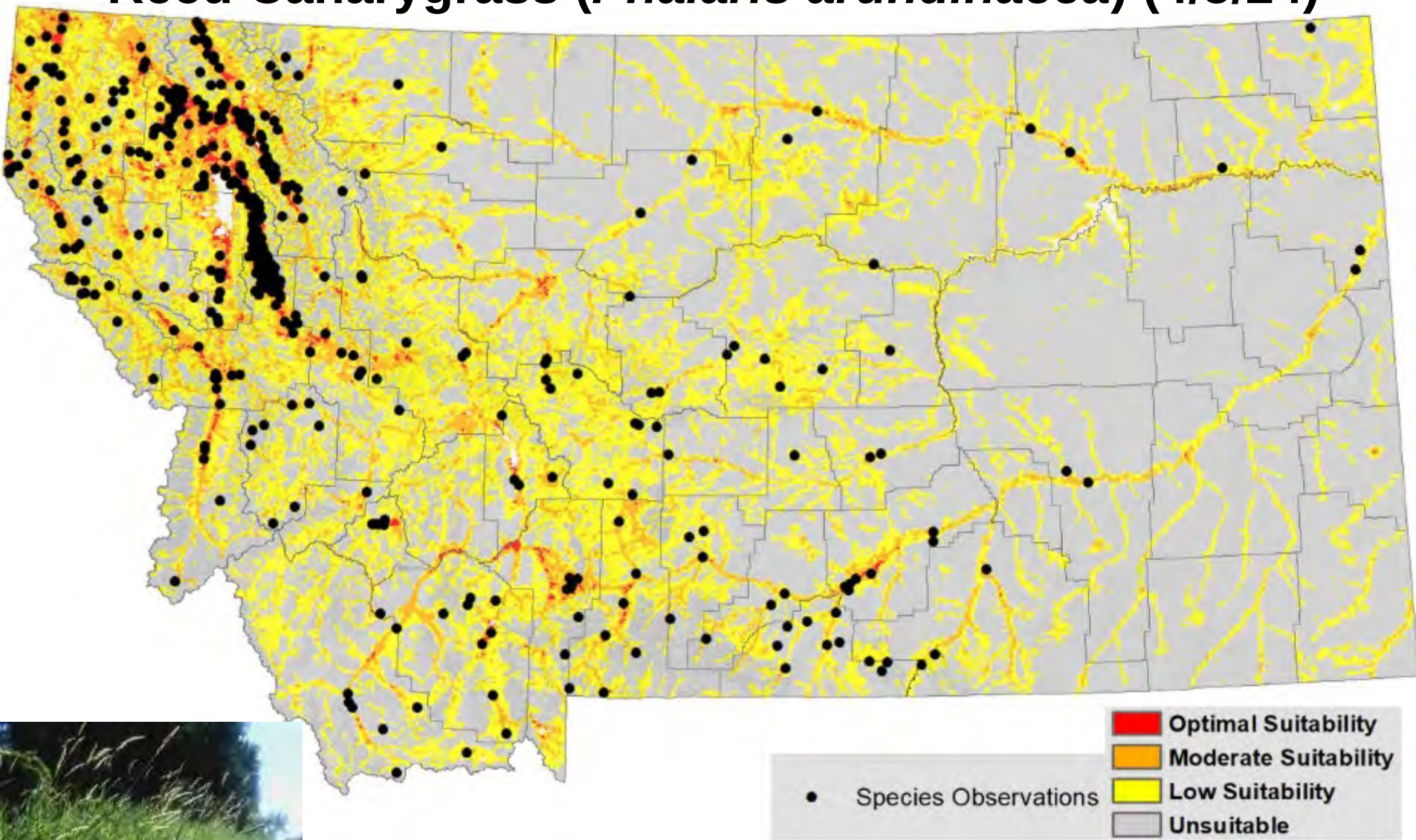


Redtop (*Agrostis gigantea*) (4/21/26)



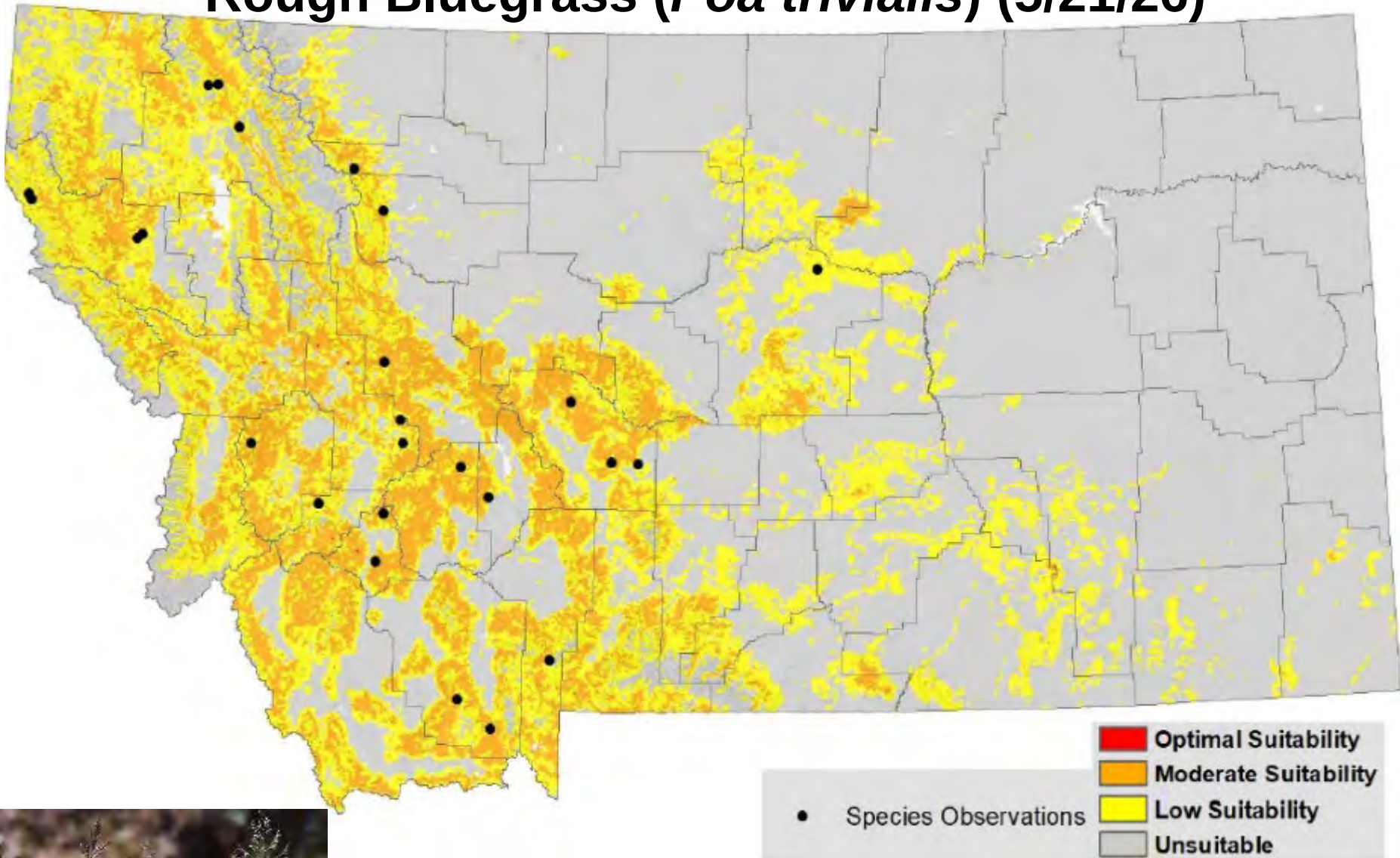
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.020	61,523	16%
Moderate	0.094	32,143	8%
Optimal	0.407	7,805	2%

Reed Canarygrass (*Phalaris arundinacea*) (4/5/24)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.021	66,064	17%
Moderate	0.130	19,851	5%
Optimal	0.391	9,724	3%

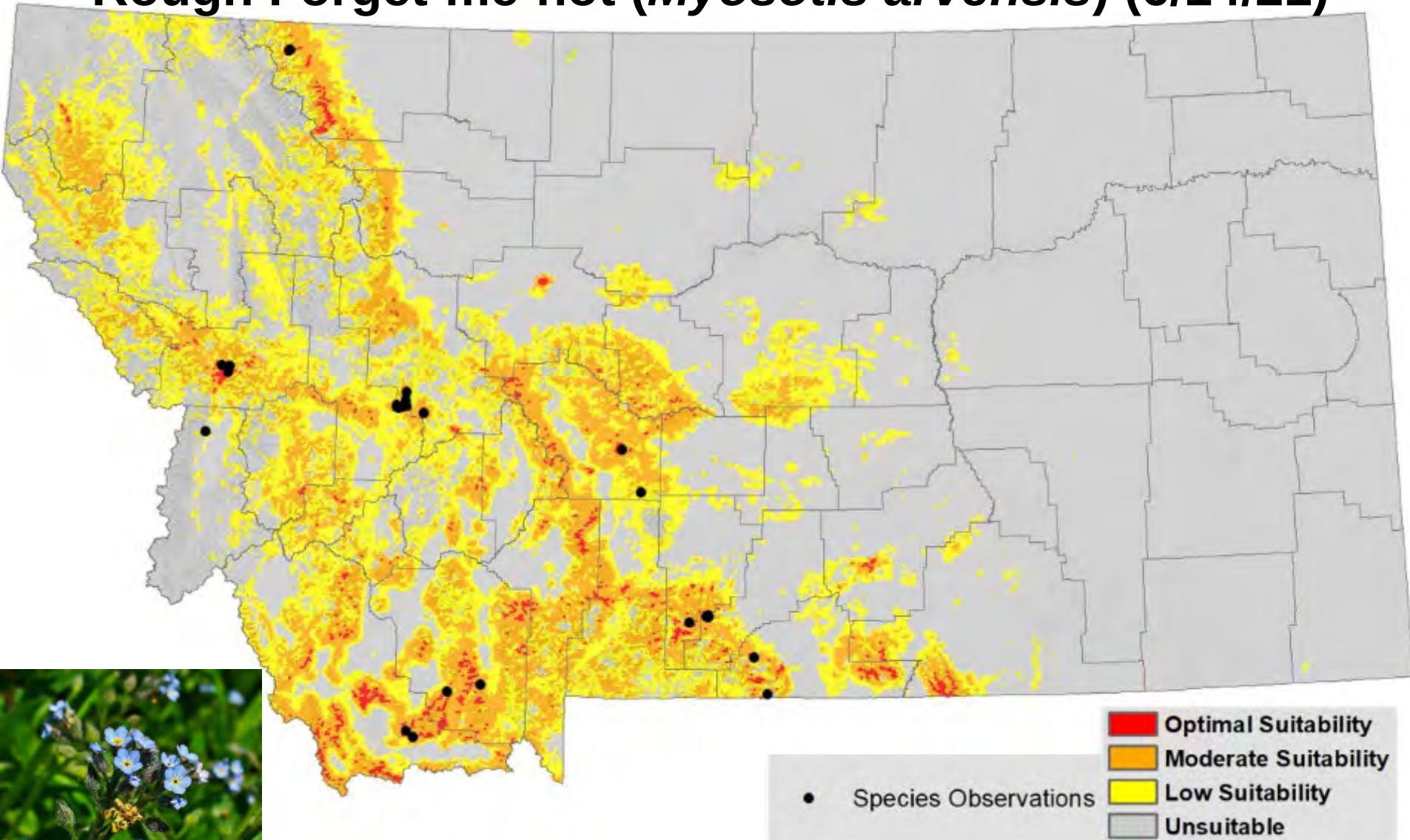
Rough Bluegrass (*Poa trivialis*) (5/21/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.040	67,165	18%
Moderate	0.171	30,796	8%
Optimal	0.523	5,291	1%

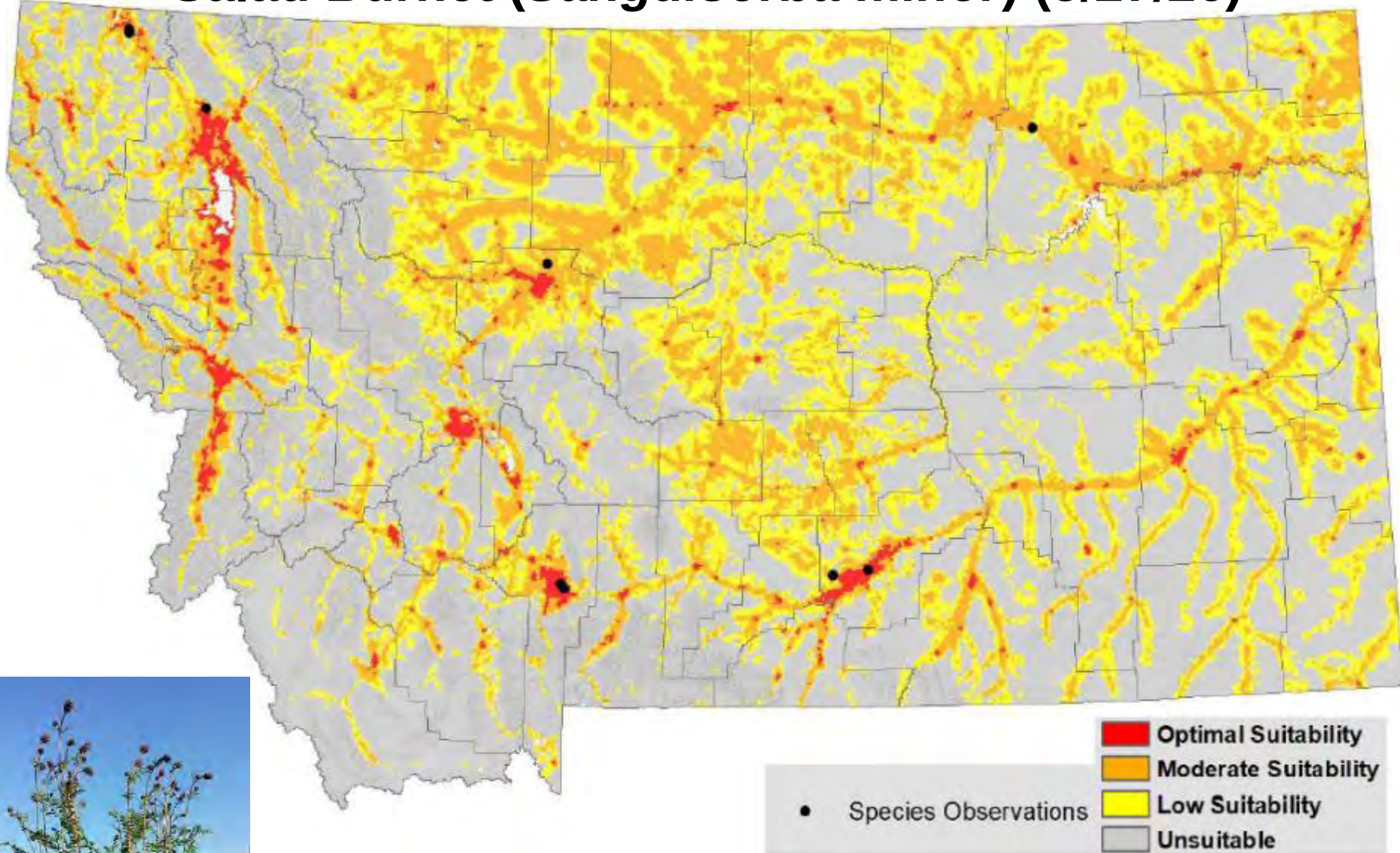


Rough Forget-me-not (*Myosotis arvensis*) (6/14/21)



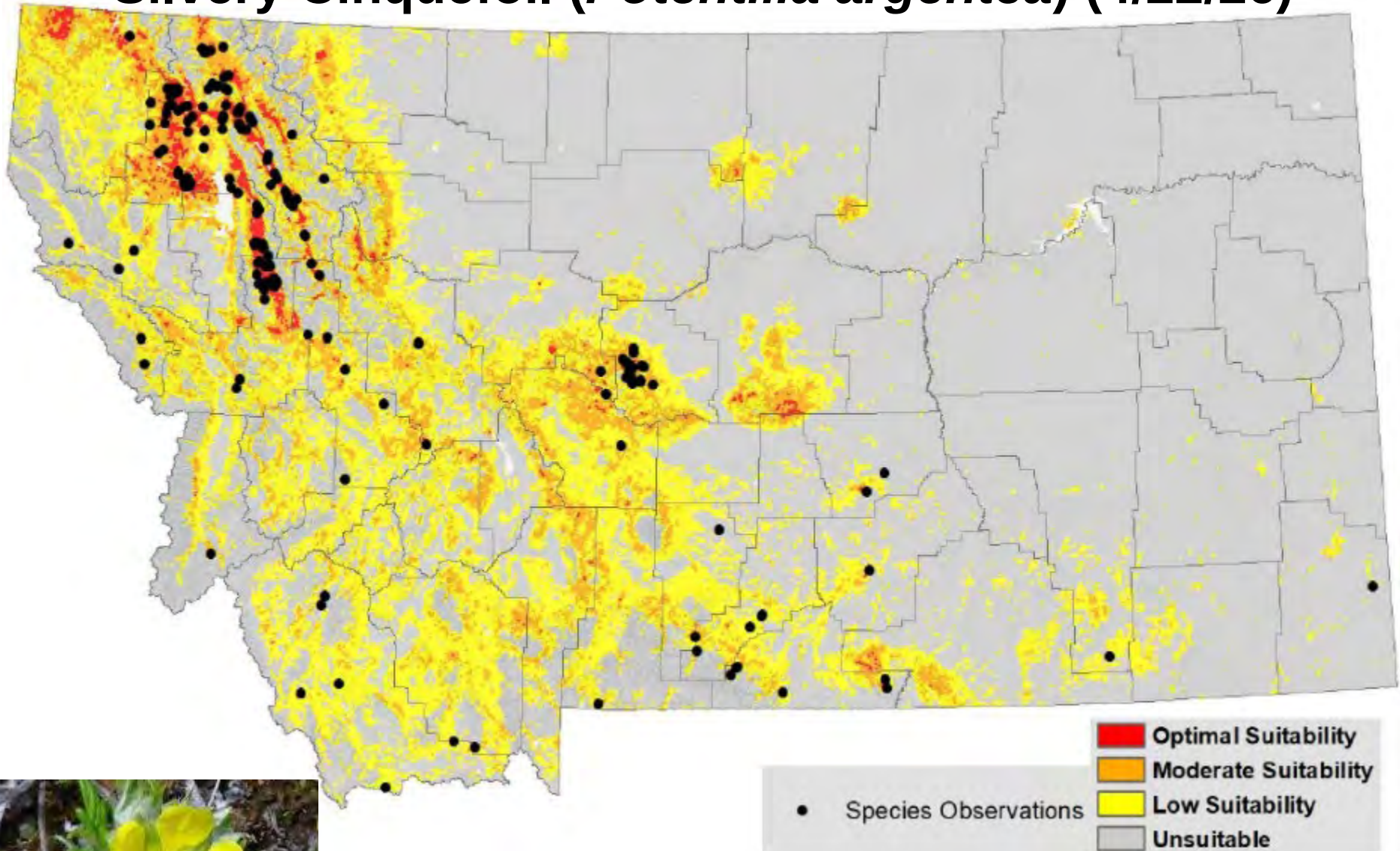
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.036	49,839	13%
Moderate	0.166	29,401	8%
Optimal	0.522	7,064	2%

Salad Burnet (*Sanguisorba minor*) (5/27/26)



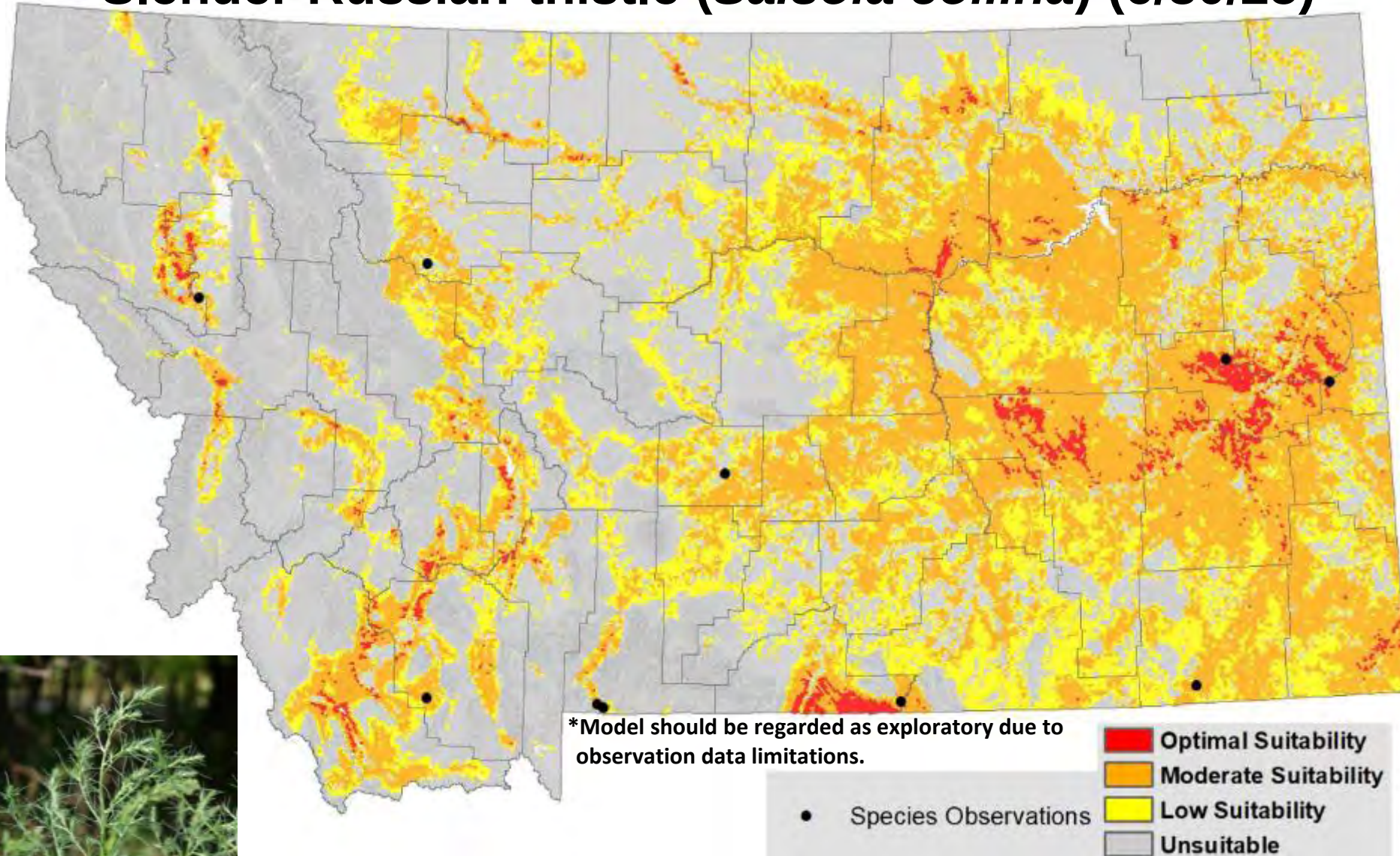
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.079	91,833	24%
Moderate	0.189	62,232	16%
Optimal	0.565	6,546	2%

Silvery Cinquefoil (*Potentilla argentea*) (4/22/26)



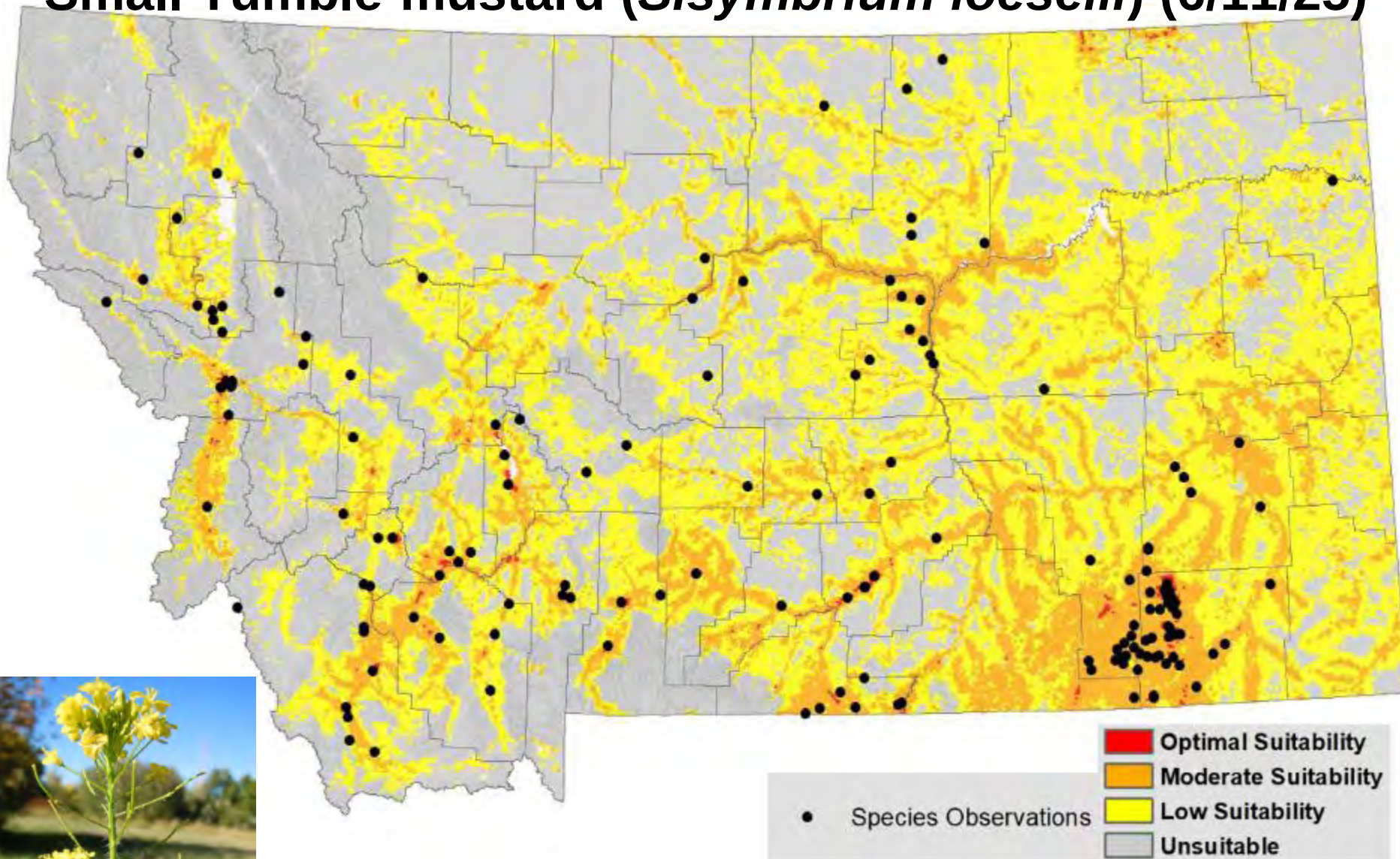
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.015	56,046	15%
Moderate	0.109	17,554	5%
Optimal	0.345	7,905	2%

Slender Russian-thistle (*Salsola collina*) (6/30/25)



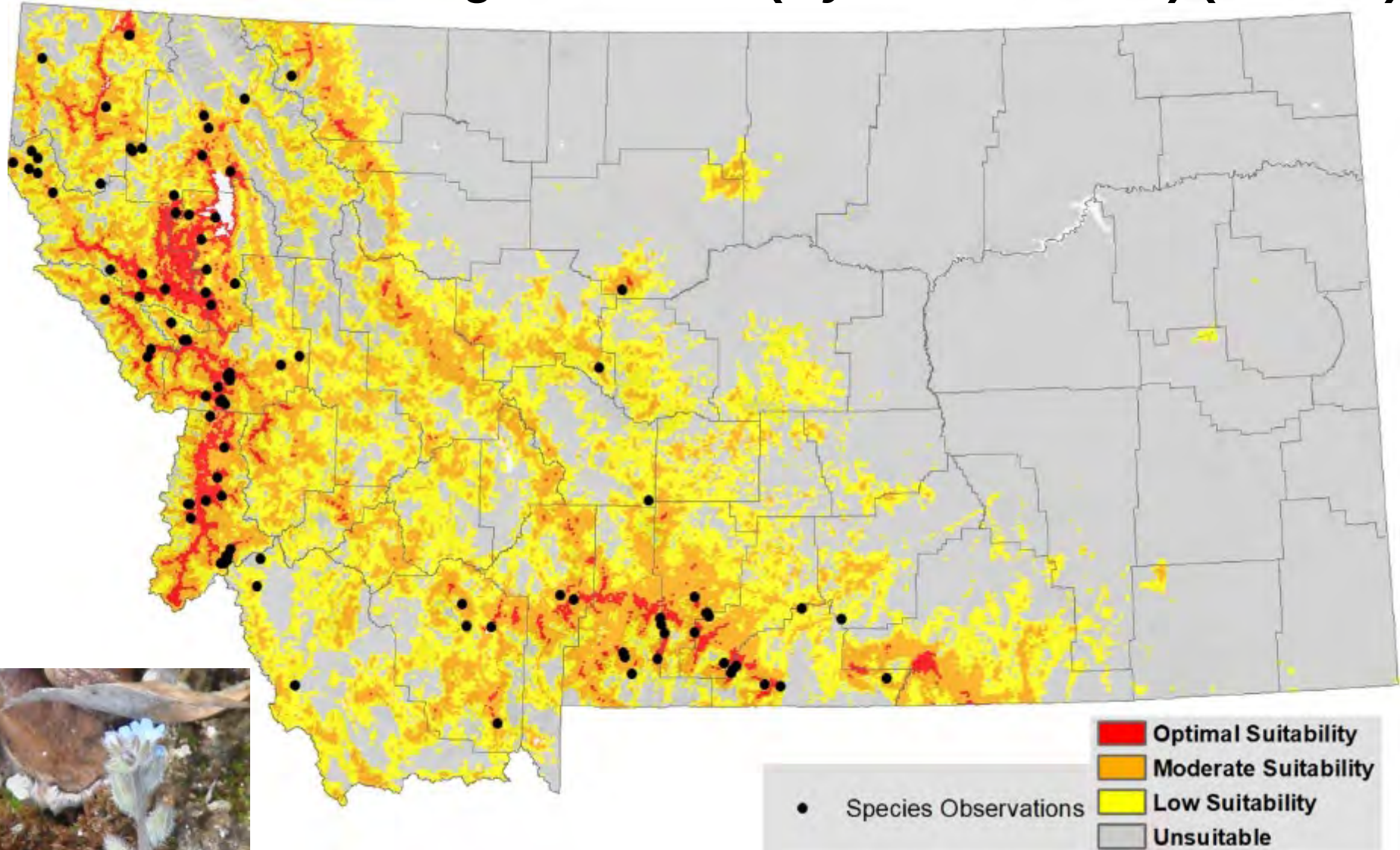
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.107	50,240	13%
Moderate	0.231	97,436	26%
Optimal	0.599	12,957	3%

Small Tumble-mustard (*Sisymbrium loeselii*) (6/11/25)



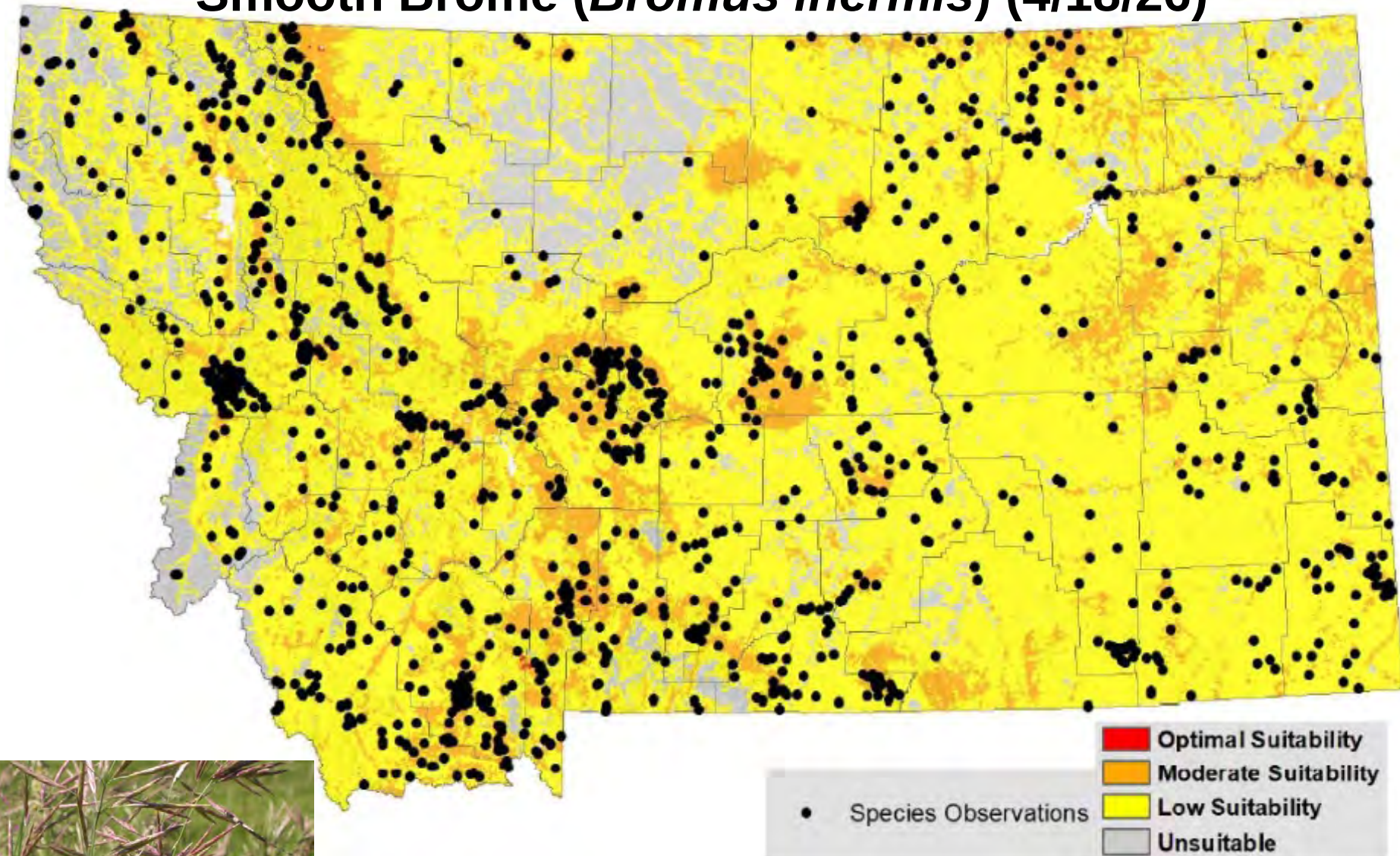
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.033	103,877	27%
Moderate	0.169	50,096	13%
Optimal	0.580	4,324	1%

Small-flowered Forget-me-knot (*Myosotis stricta*) (6/30/25)



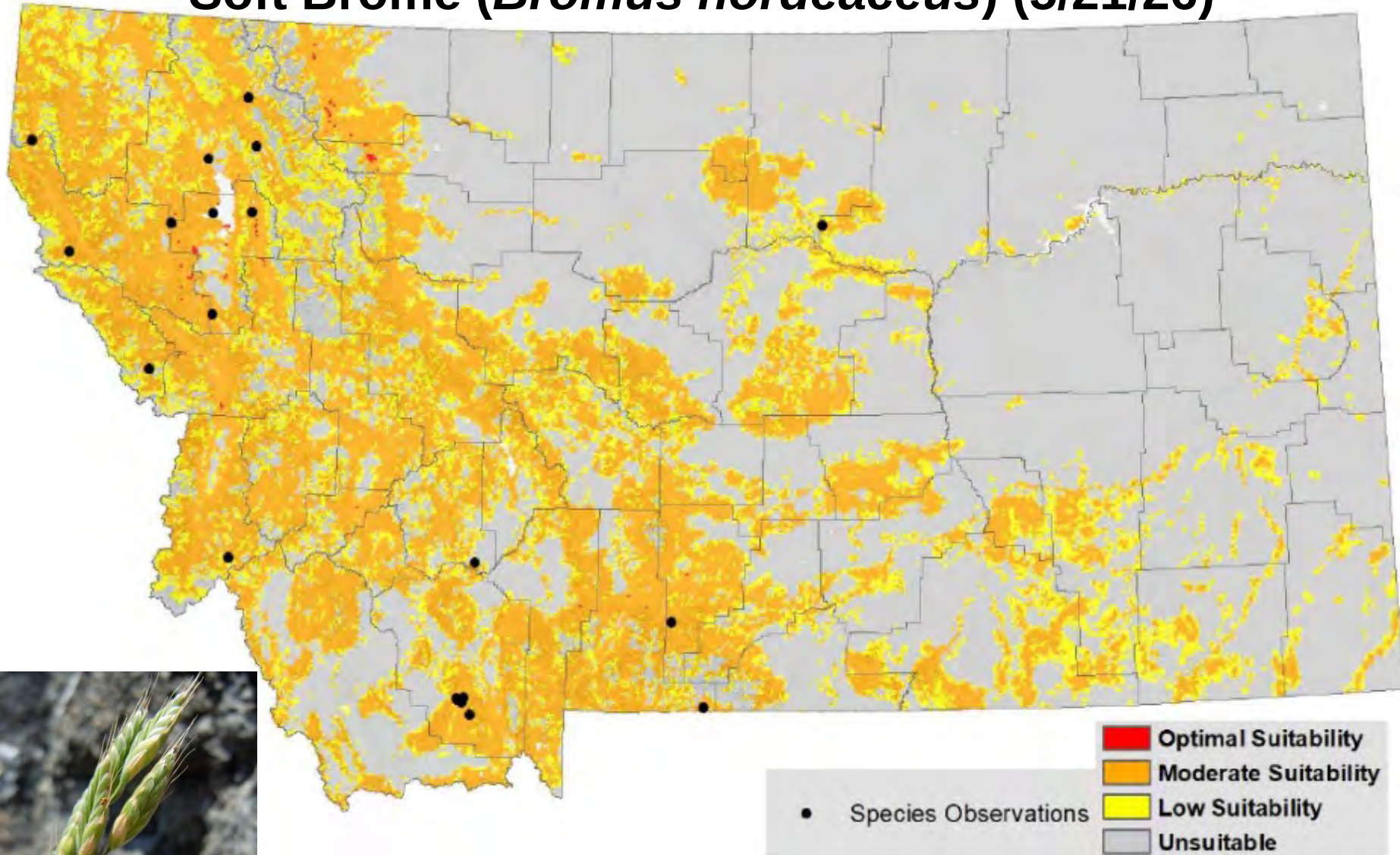
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.056	69,647	18%
Moderate	0.166	45,902	12%
Optimal	0.507	10,380	3%

Smooth Brome (*Bromus inermis*) (4/18/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.084	211,384	56%
Moderate	0.366	68,223	18%
Optimal	0.765	5,229	1%

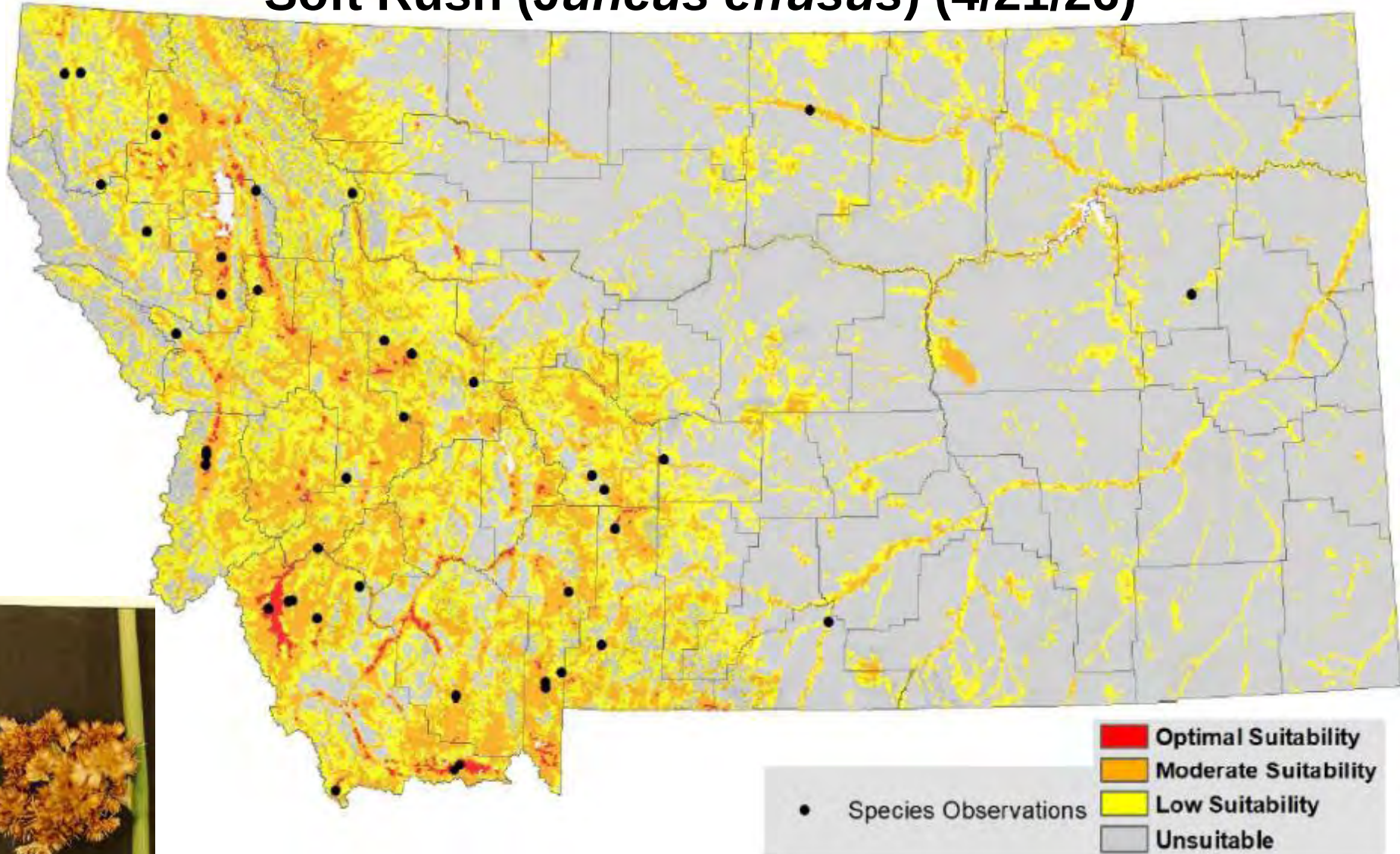
Soft Brome (*Bromus hordeaceus*) (5/21/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.082	33,057	9%
Moderate	0.174	92,193	24%
Optimal	0.767	1,678	<1%

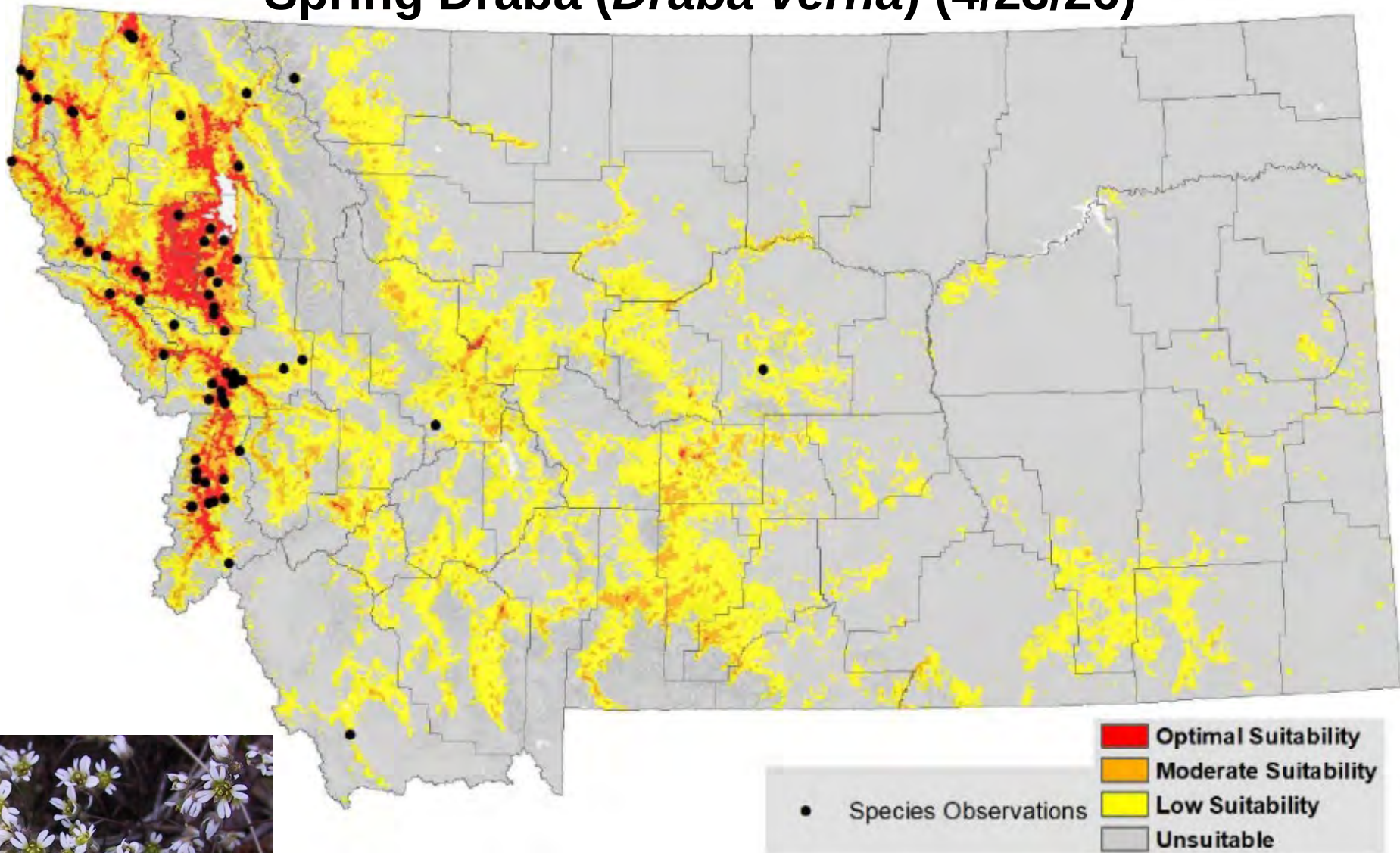


Soft Rush (*Juncus effusus*) (4/21/26)



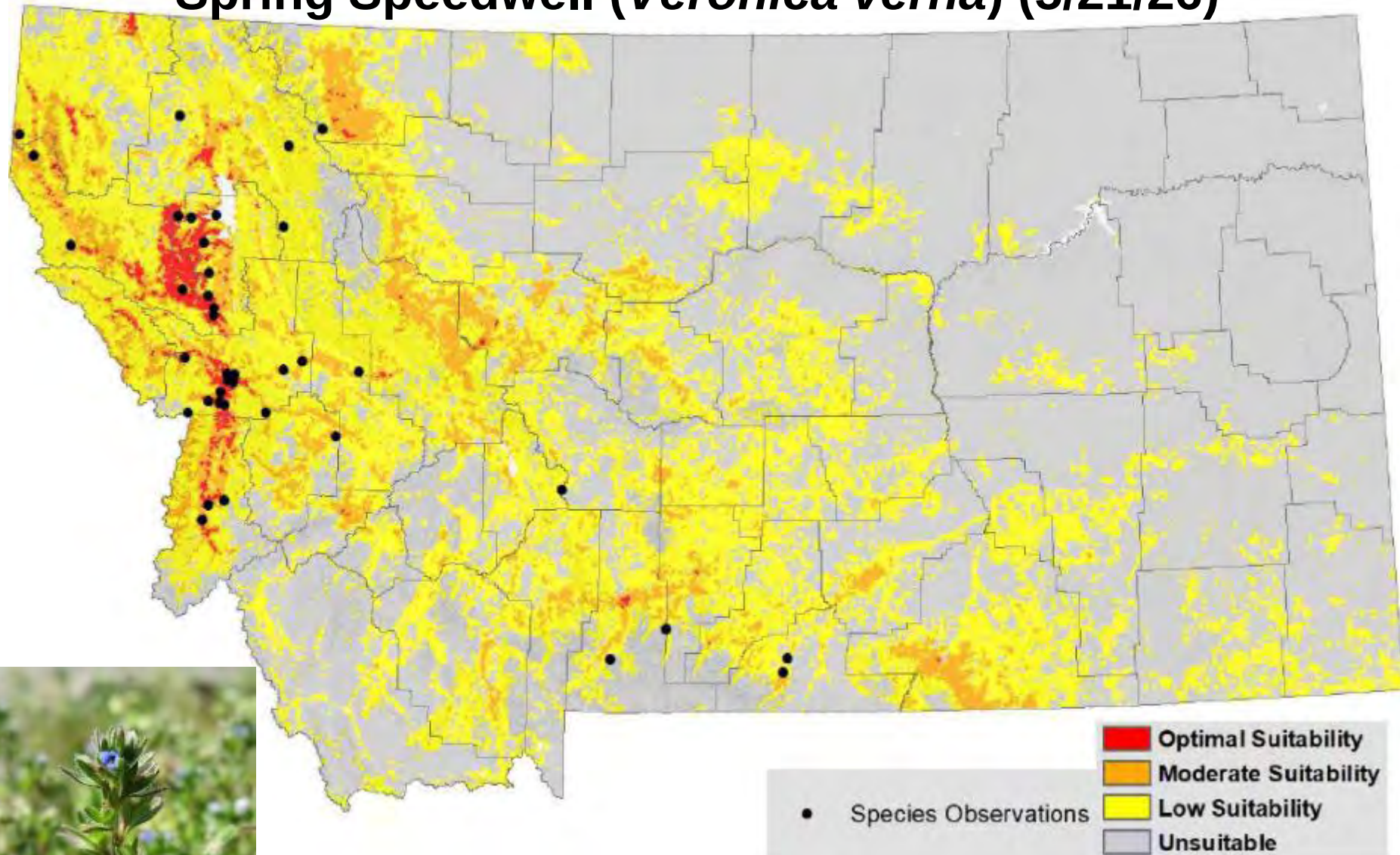
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.041	55,800	15%
Moderate	0.123	38,277	10%
Optimal	0.461	8,733	2%

Spring Draba (*Draba verna*) (4/23/26)



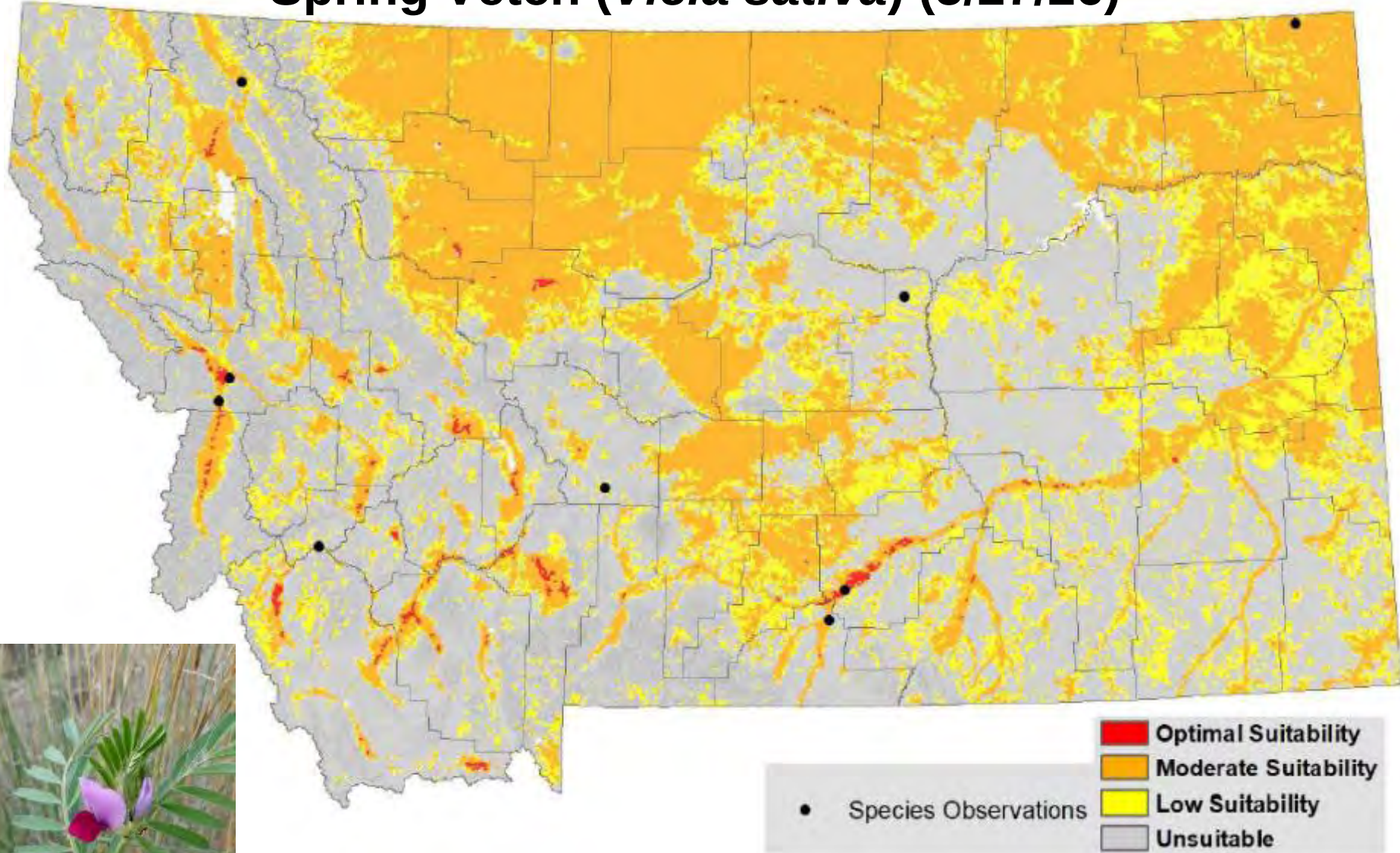
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.013	59,408	16%
Moderate	0.093	12,774	3%
Optimal	0.306	7,028	2%

Spring Speedwell (*Veronica verna*) (5/21/26)



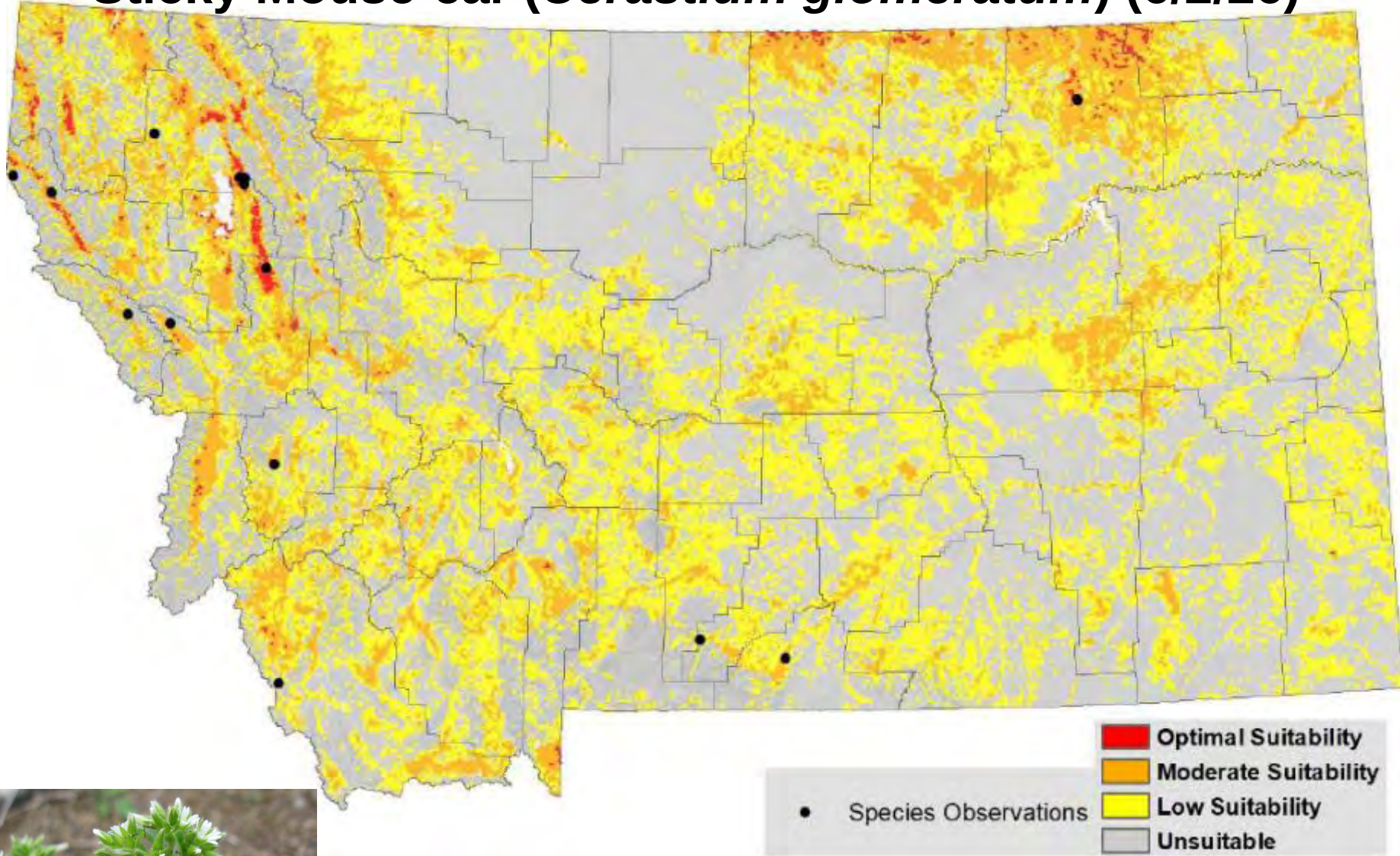
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.036	93,055	24%
Moderate	0.196	26,351	7%
Optimal	0.544	5,347	1%

Spring Vetch (*Vicia sativa*) (5/27/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.127	45,797	12%
Moderate	0.264	128,006	34%
Optimal	0.680	4,223	1%

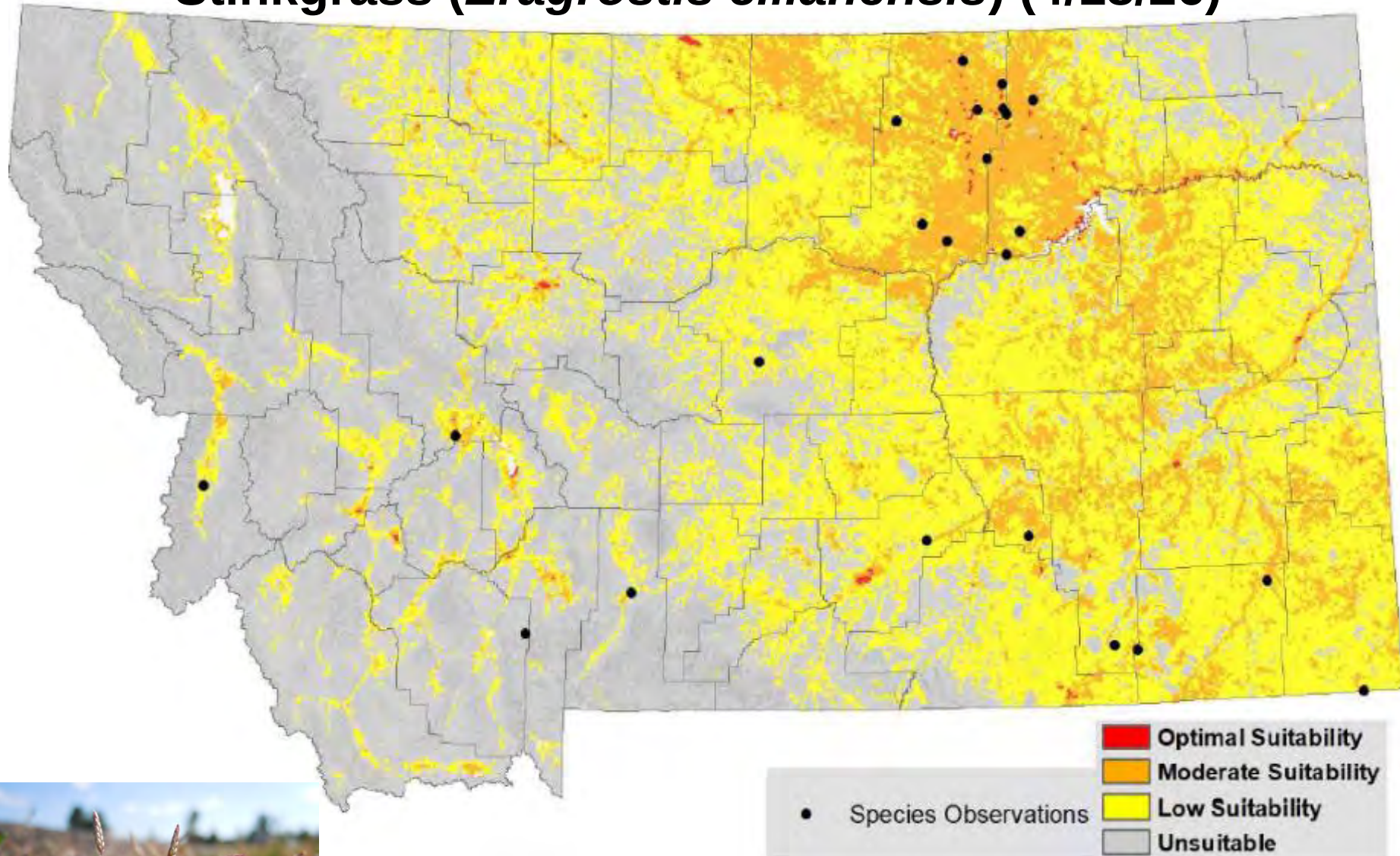
Sticky Mouse-ear (*Cerastium glomeratum*) (6/2/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.071	84,589	22%
Moderate	0.191	48,051	13%
Optimal	0.578	7,430	2%



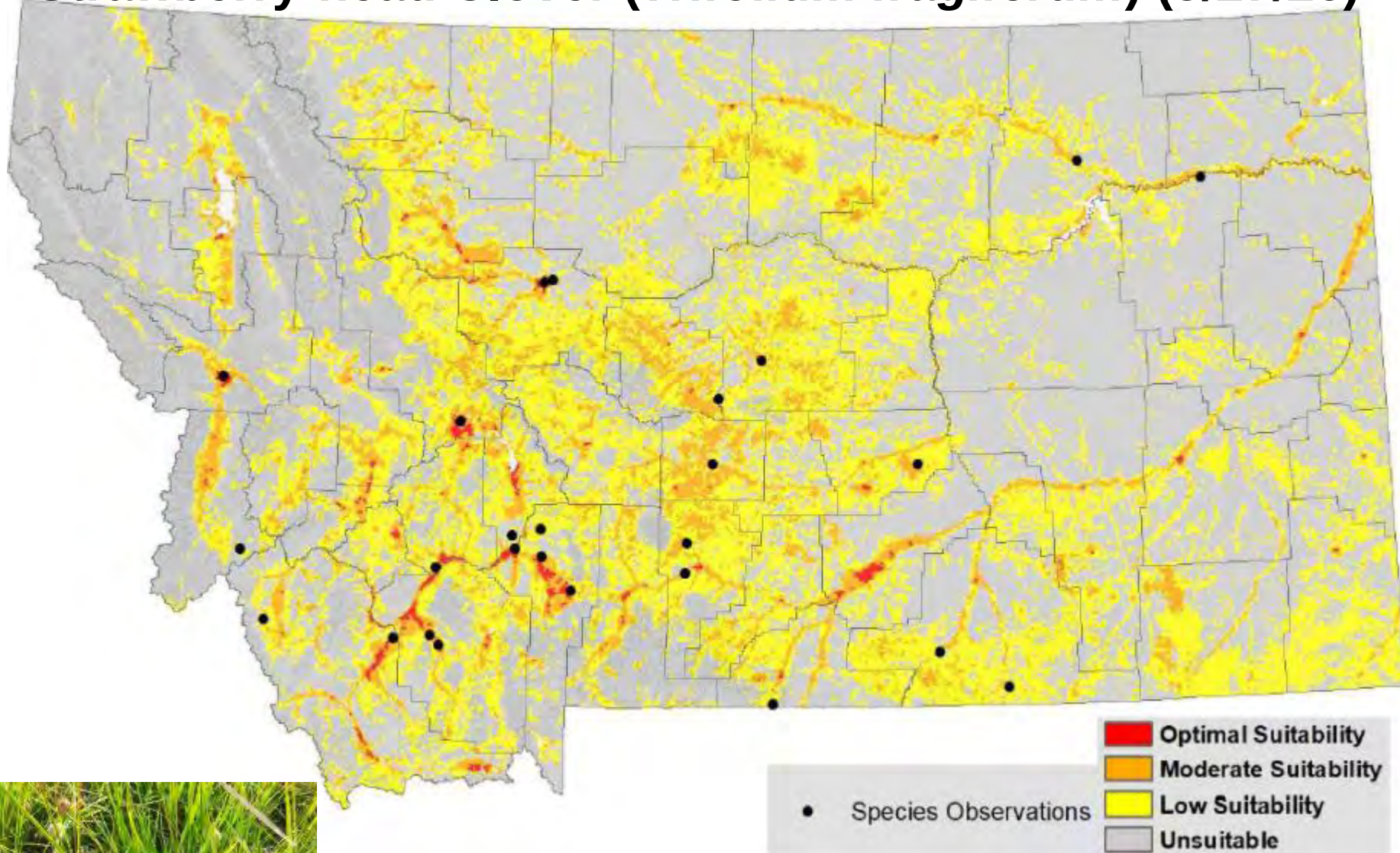
Stinkgrass (*Eragrostis cilianensis*) (4/18/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.084	95,600	25%
Moderate	0.270	50,108	13%
Optimal	0.676	4,620	1%

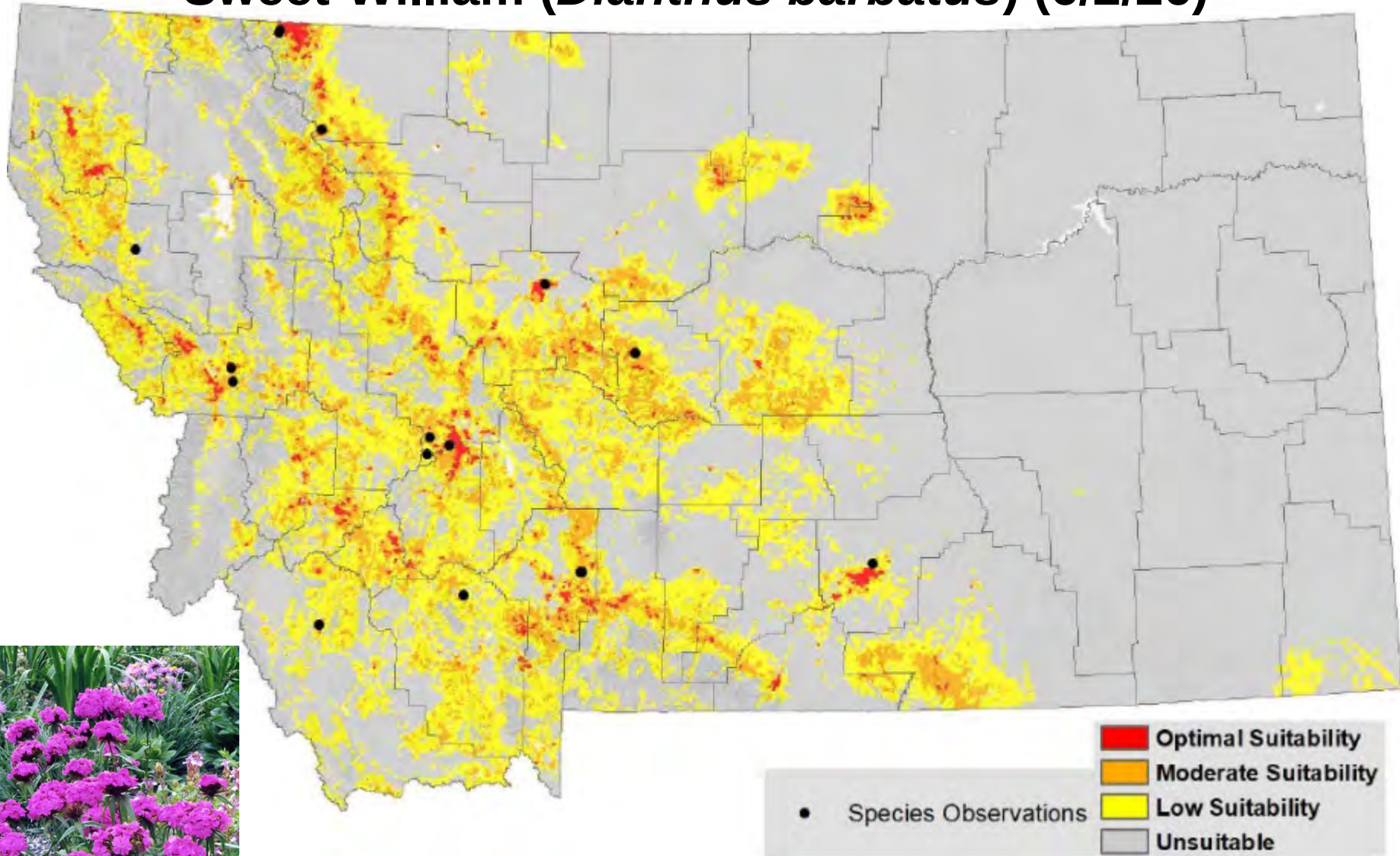


Strawberry-head Clover (*Trifolium fragiferum*) (5/27/26)



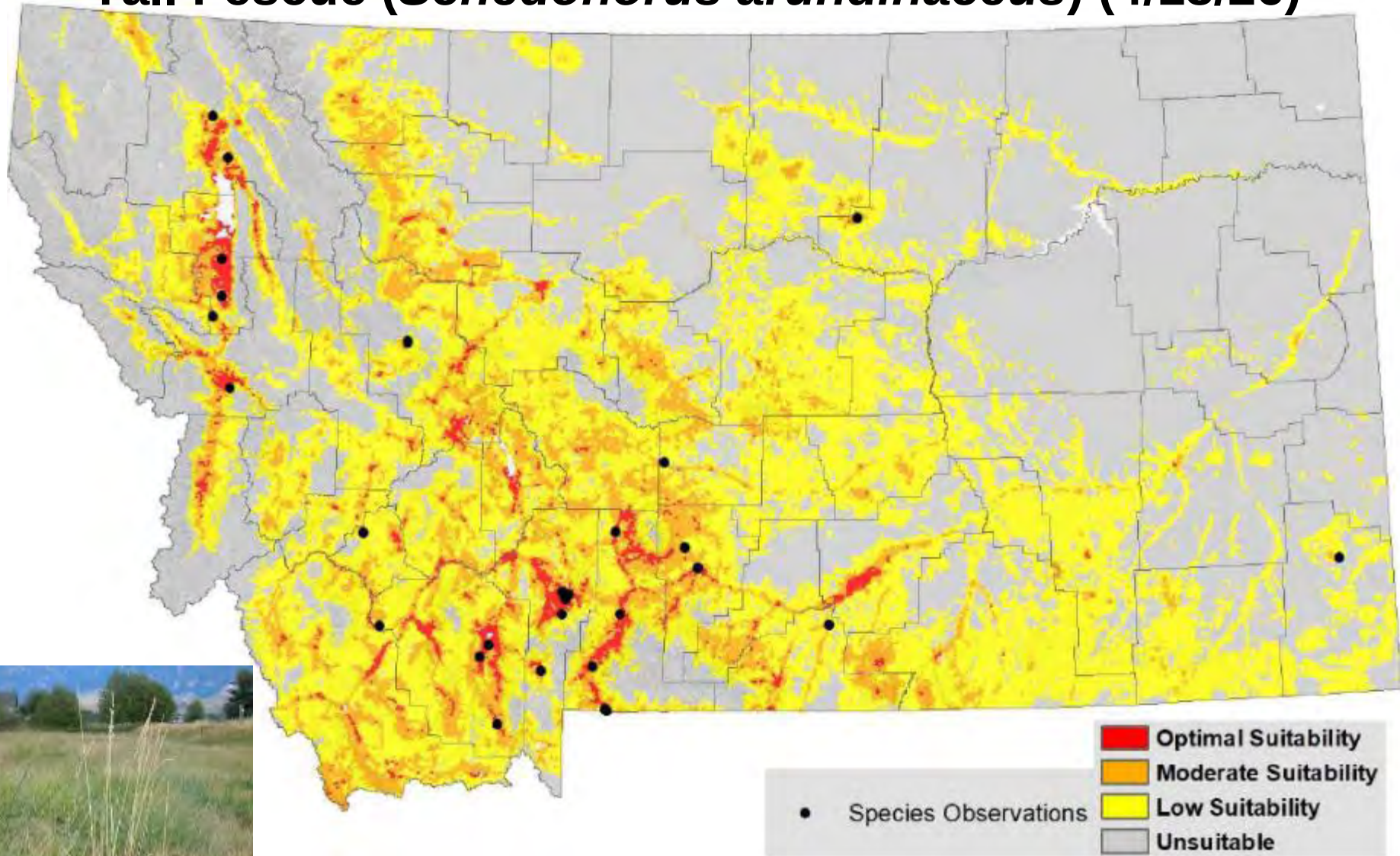
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.049	77,167	20%
Moderate	0.189	29,388	8%
Optimal	0.589	5,046	1%

Sweet-William (*Dianthus barbatus*) (6/2/26)



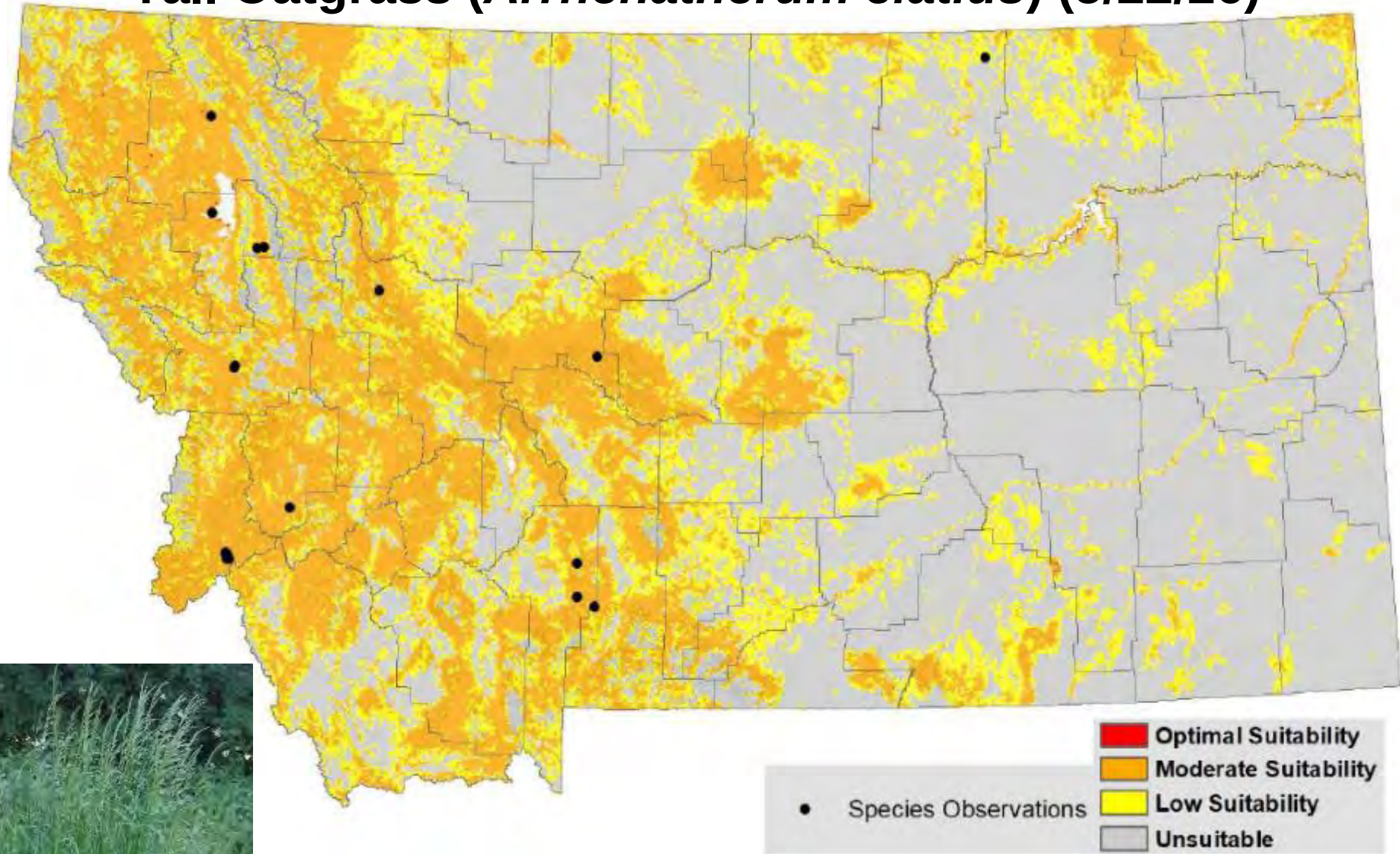
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.021	50,203	13%
Moderate	0.113	16,711	4%
Optimal	0.309	7,465	2%

Tall Fescue (*Schedonorus arundinaceus*) (4/18/26)



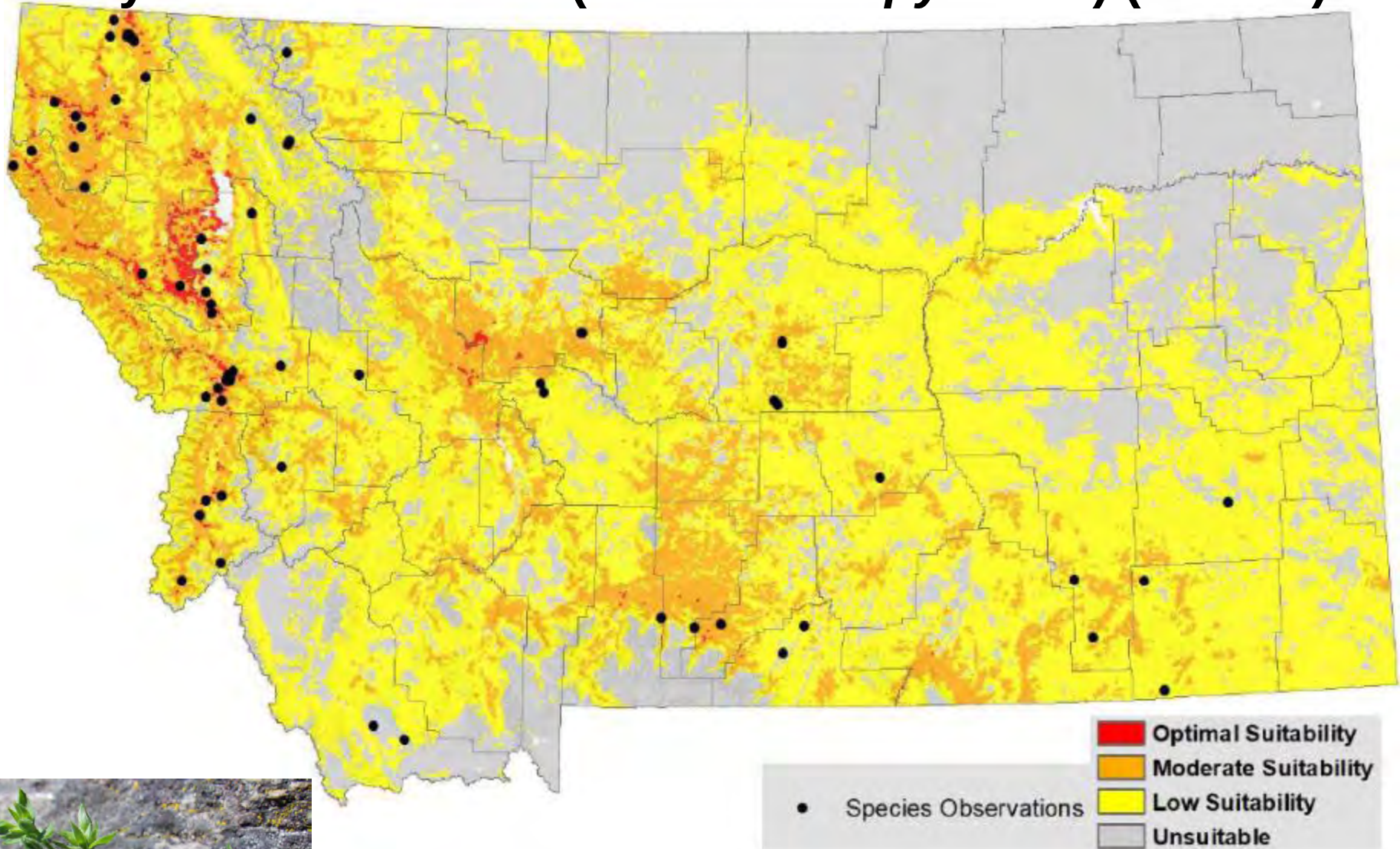
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.015	103,124	27%
Moderate	0.137	28,256	7%
Optimal	0.386	9,573	3%

Tall Oatgrass (*Arrhenatherum elatius*) (5/22/26)



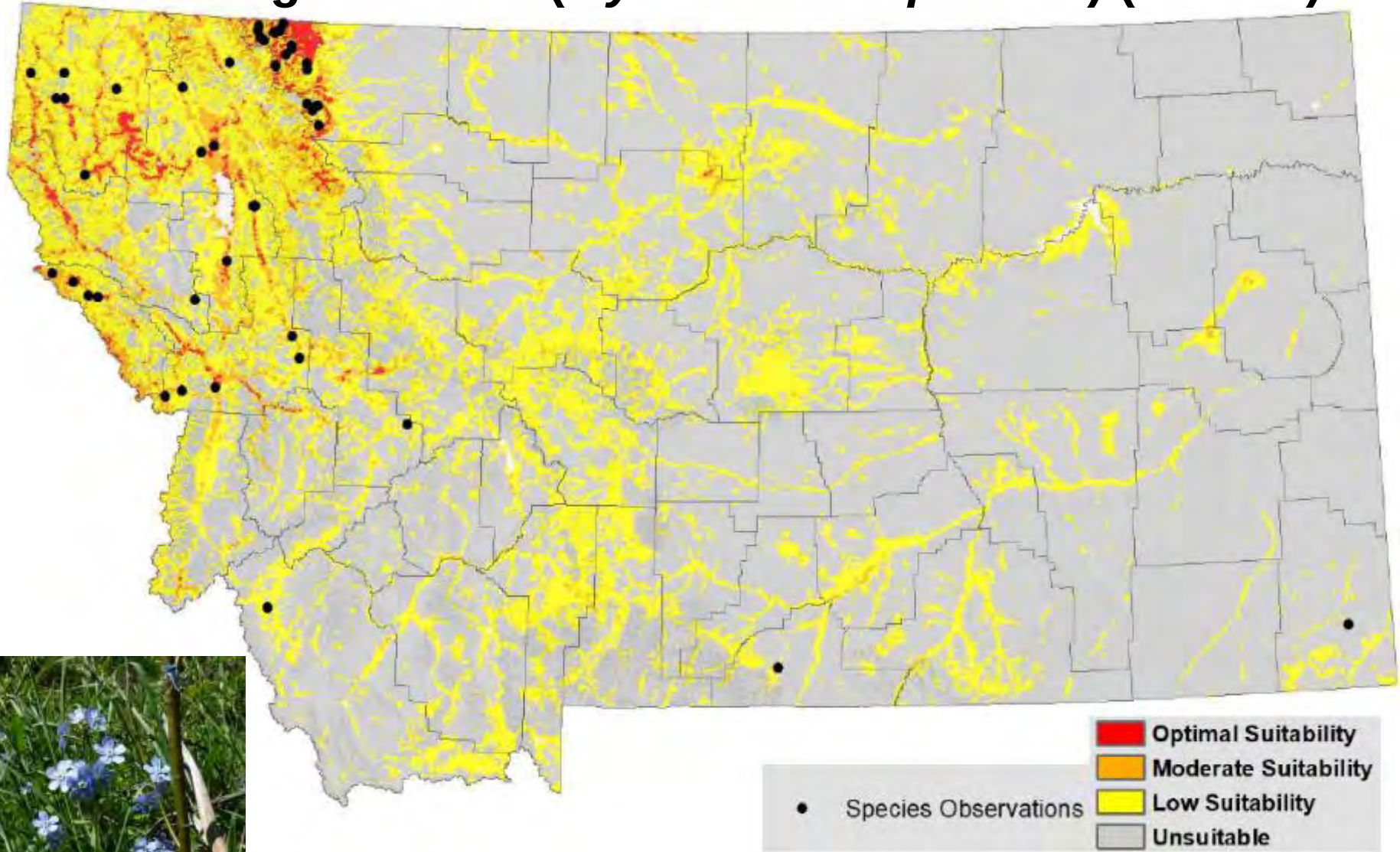
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.094	63,379	17%
Moderate	0.186	84,954	22%
Optimal	0.834	876	<1%

Thymeleaf Sandwort (*Arenaria serpyllifolia*) (4/23/26)



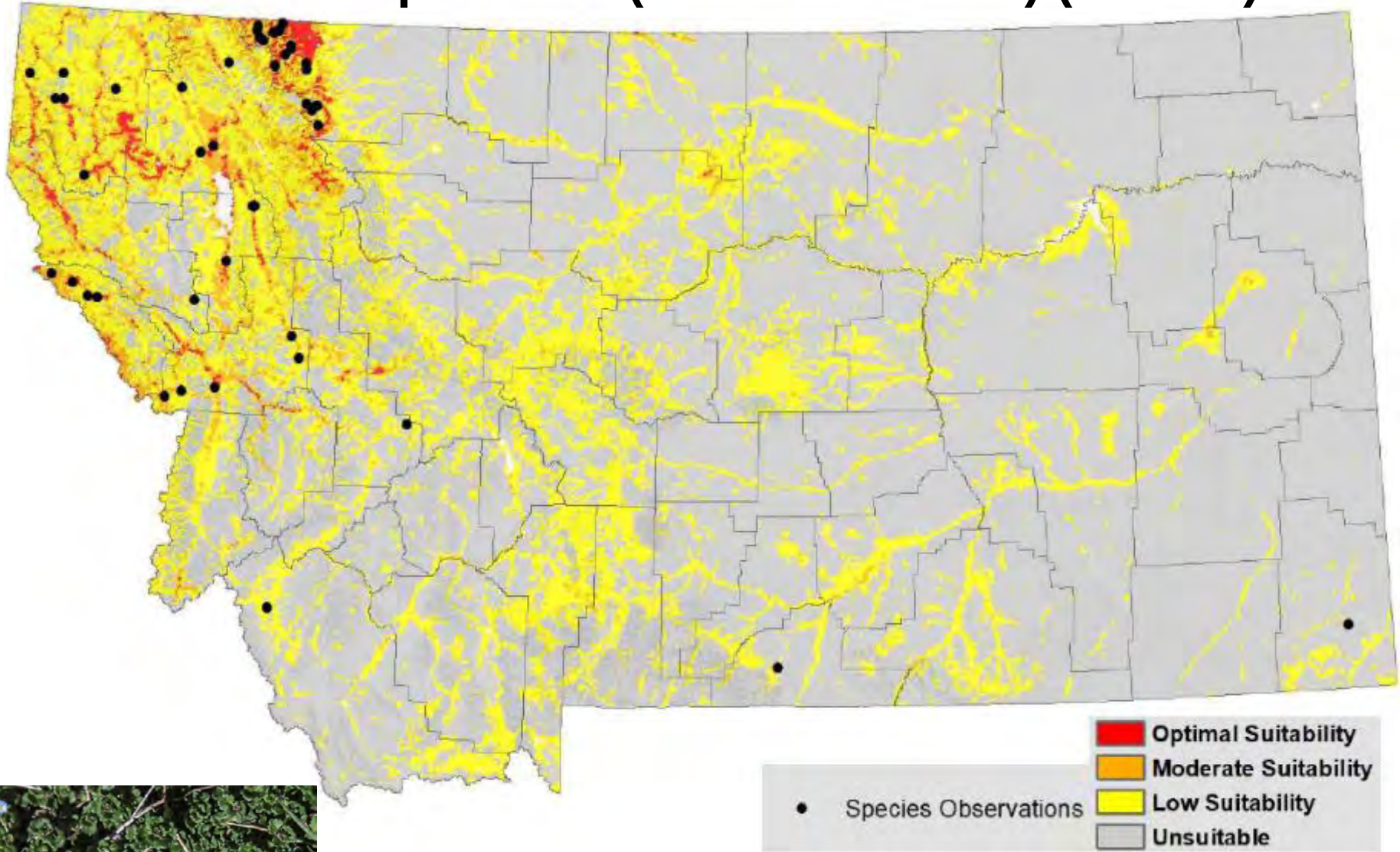
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.048	157,598	41%
Moderate	0.281	54,345	14%
Optimal	0.697	5,796	1%

True Forget-me-not (*Myosotis scorpioides*) (4/24/26)



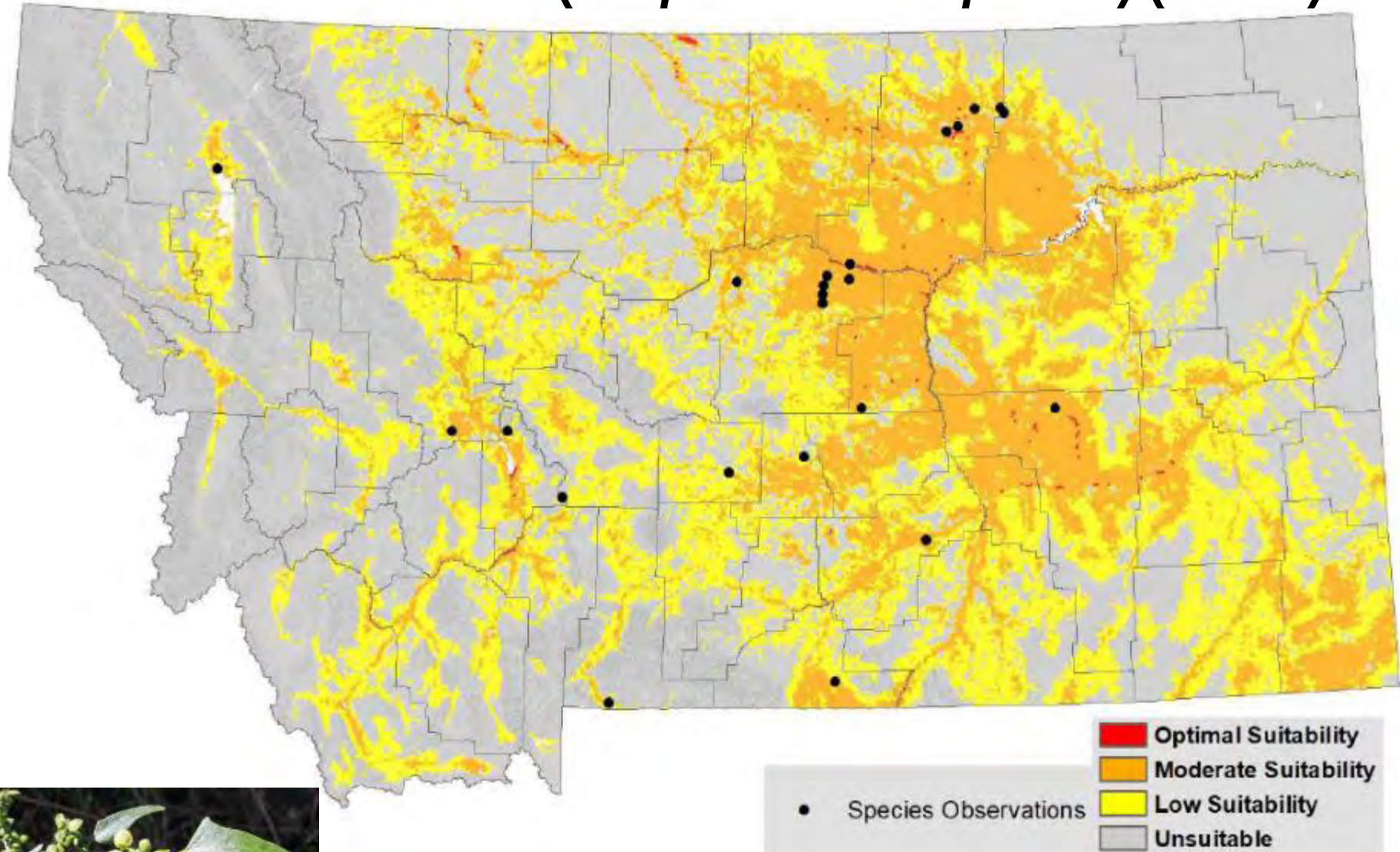
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.009	59,176	16%
Moderate	0.096	8,468	2%
Optimal	0.271	4,685	1%

Two-lobed Speedwell (*Veronica biloba*) (5/26/26)



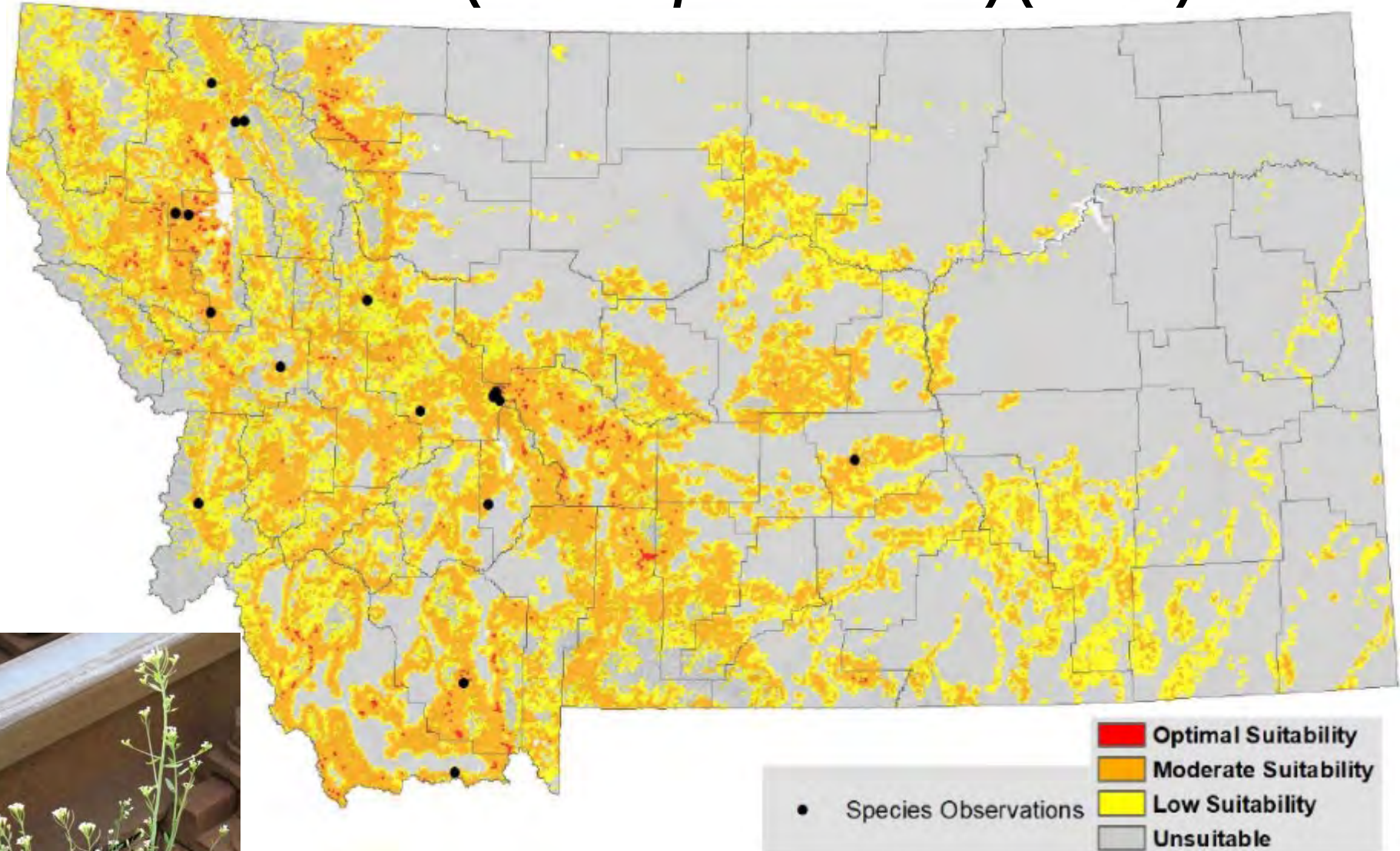
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.031	44,252	12%
Moderate	0.118	28,585	8%
Optimal	0.406	9,673	3%

Two-scale Saltbush (*Atriplex heterosperma*) (6/1/26)



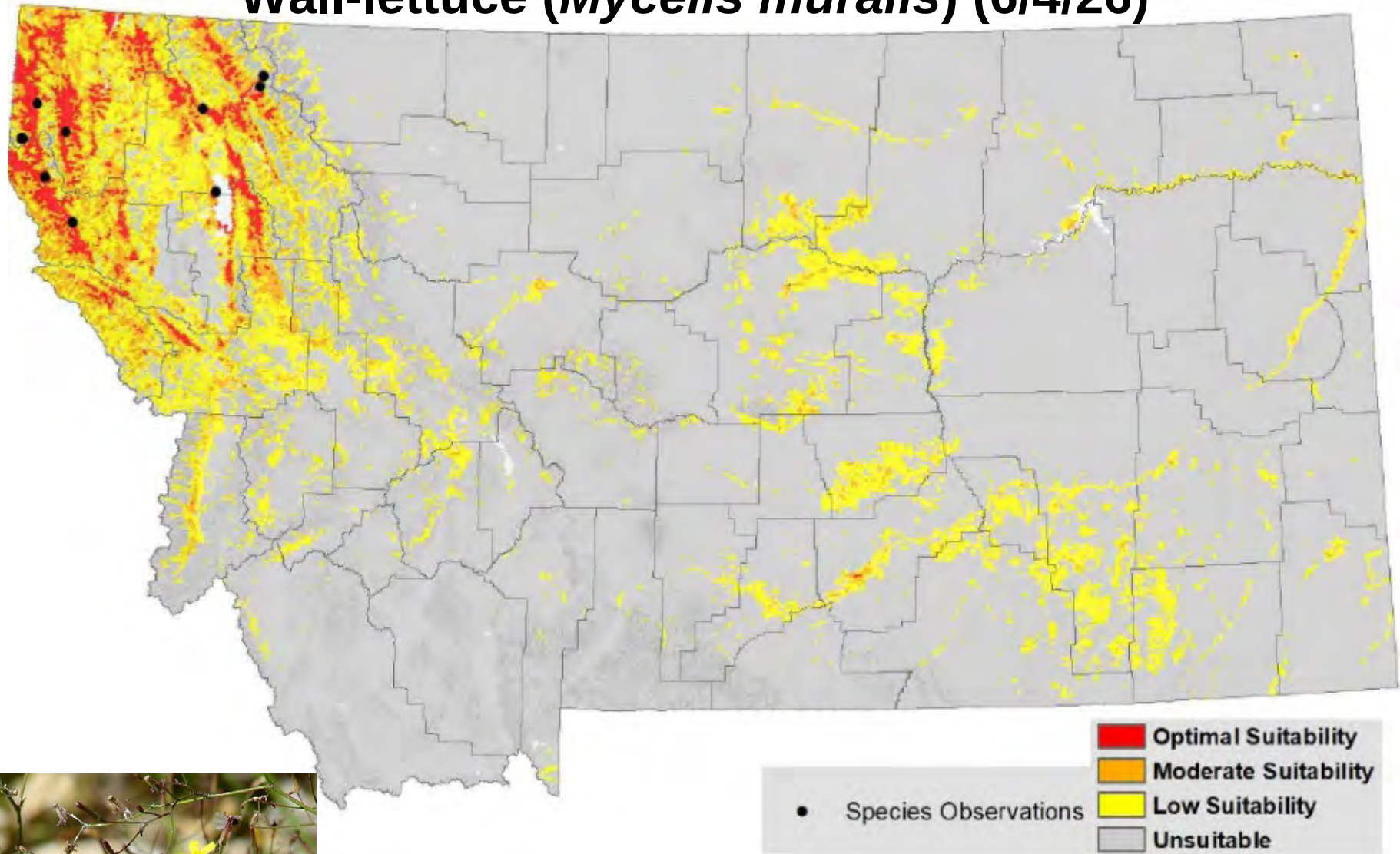
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.062	80,171	21%
Moderate	0.203	65,586	17%
Optimal	0.709	3,046	1%

Wall-cress (*Arabidopsis thaliana*) (6/4/26)



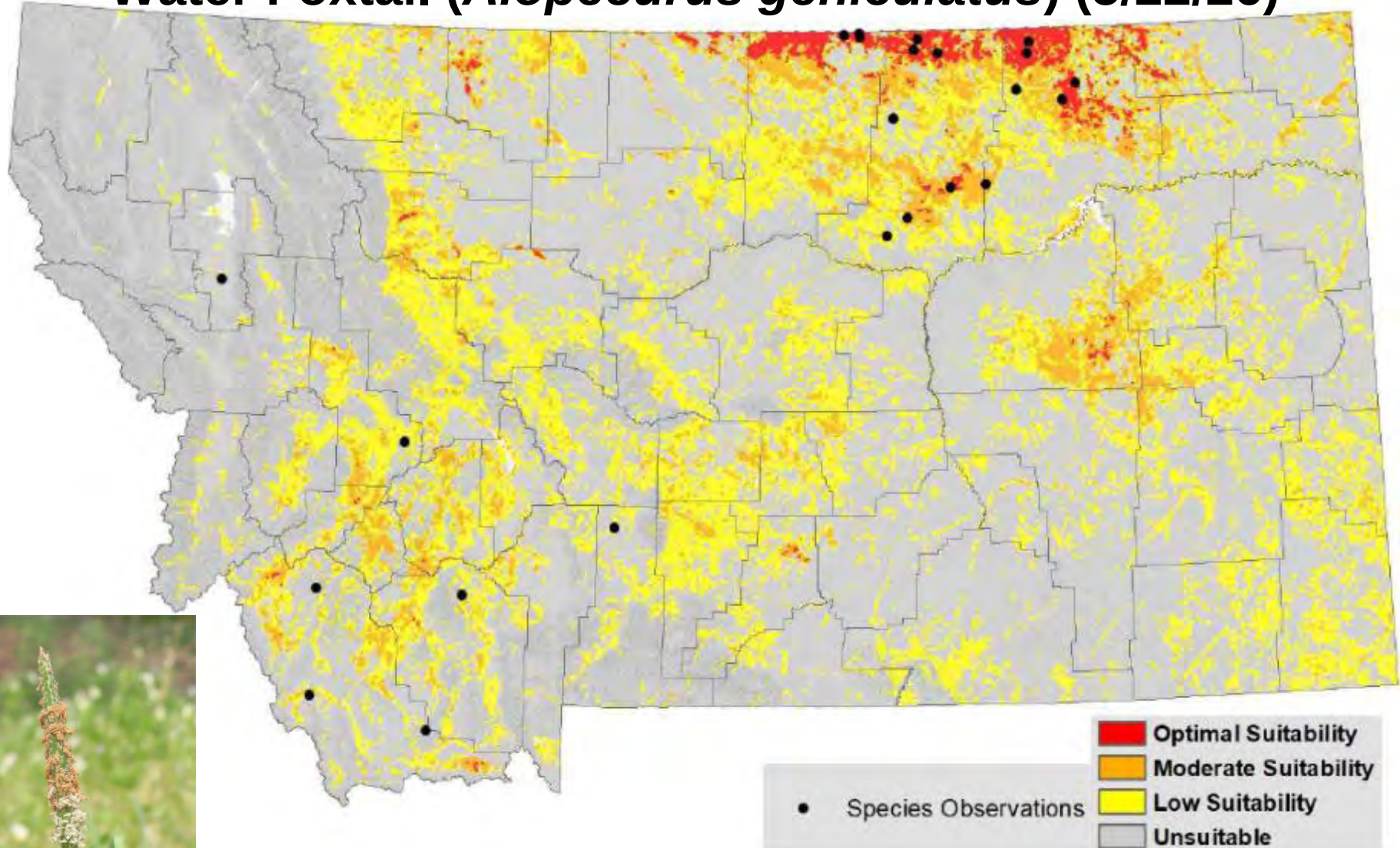
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.072	52,861	14%
Moderate	0.196	61,078	16%
Optimal	0.619	8,384	2%

Wall-lettuce (*Mycelis muralis*) (6/4/26)



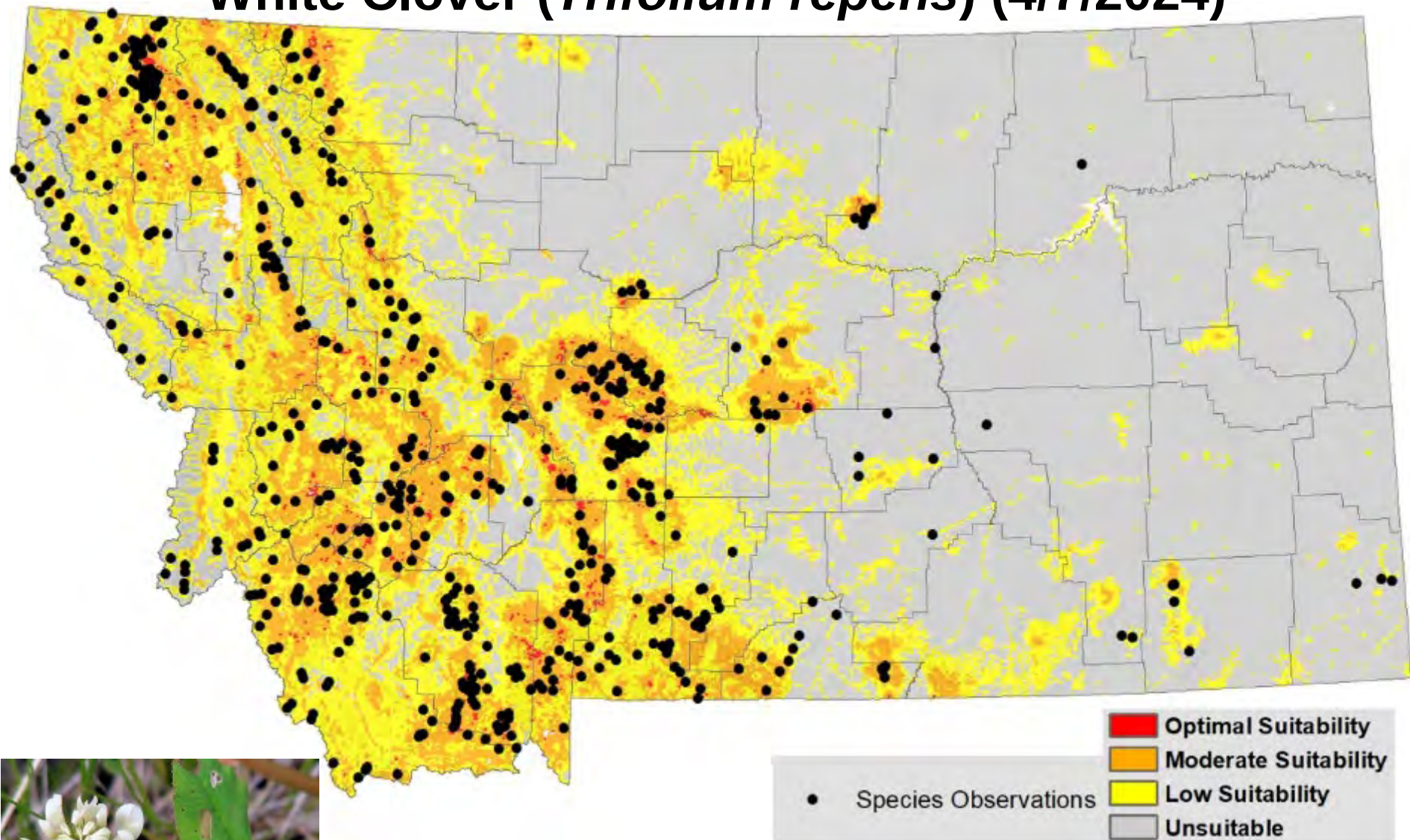
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.013	32,308	8%
Moderate	0.088	8,948	2%
Optimal	0.235	6,489	2%

Water Foxtail (*Alopecurus geniculatus*) (5/22/26)



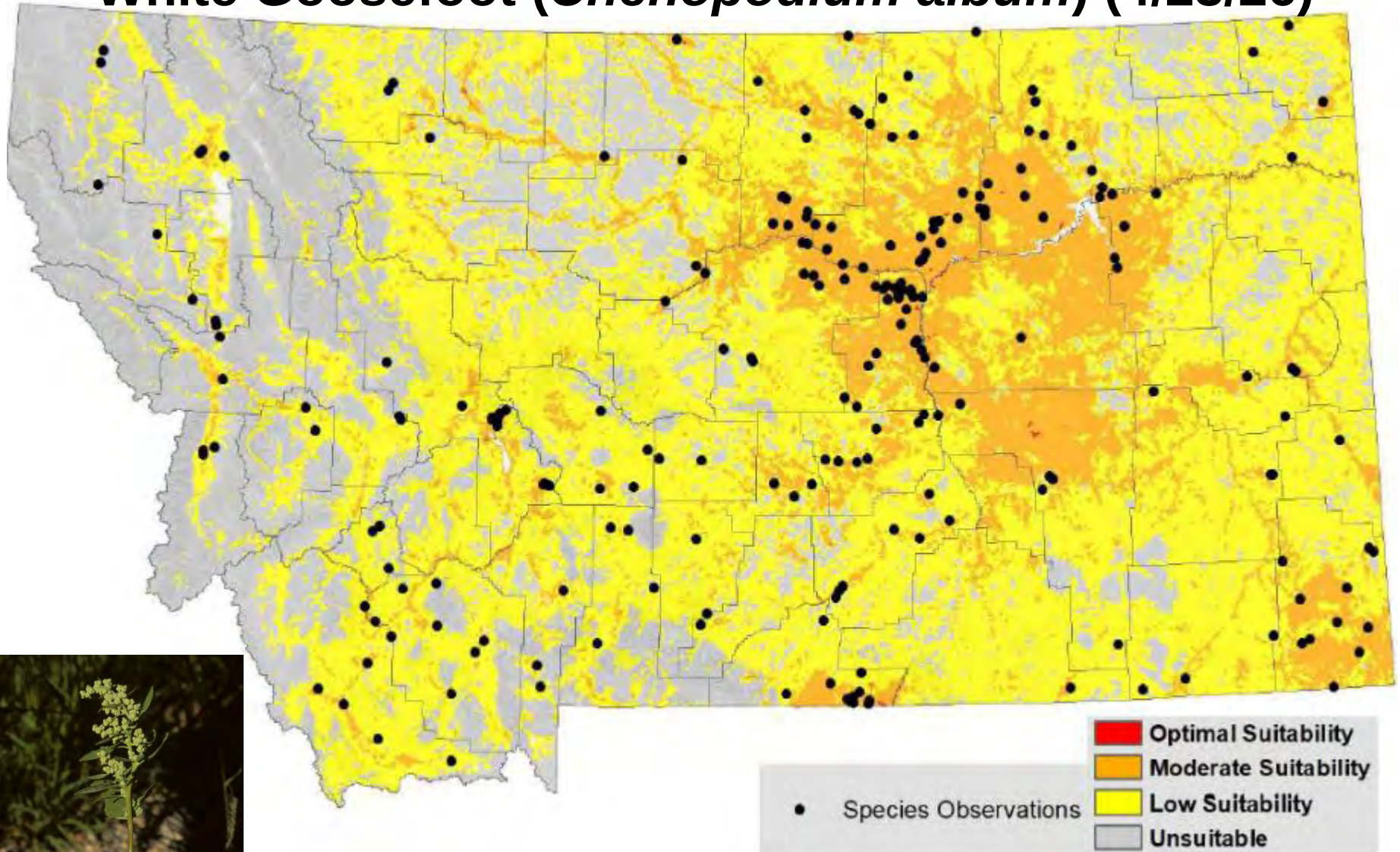
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.025	58,556	15%
Moderate	0.098	23,504	6%
Optimal	0.330	7,442	2%

White Clover (*Trifolium repens*) (4/7/2024)



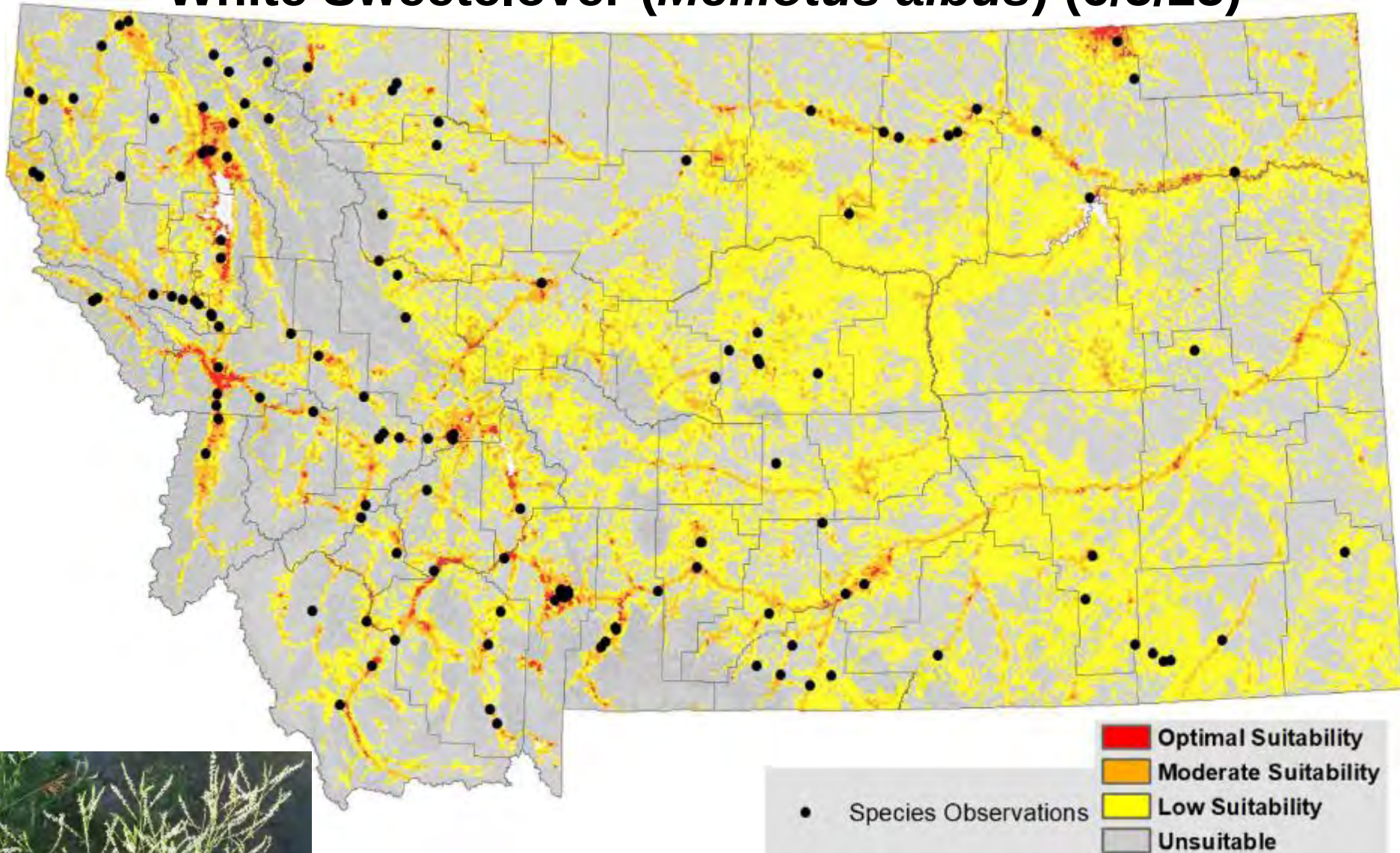
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.032	79,706	21%
Moderate	0.158	37,522	10%
Optimal	0.475	10,993	3%

White Goosefoot (*Chenopodium album*) (4/23/26)



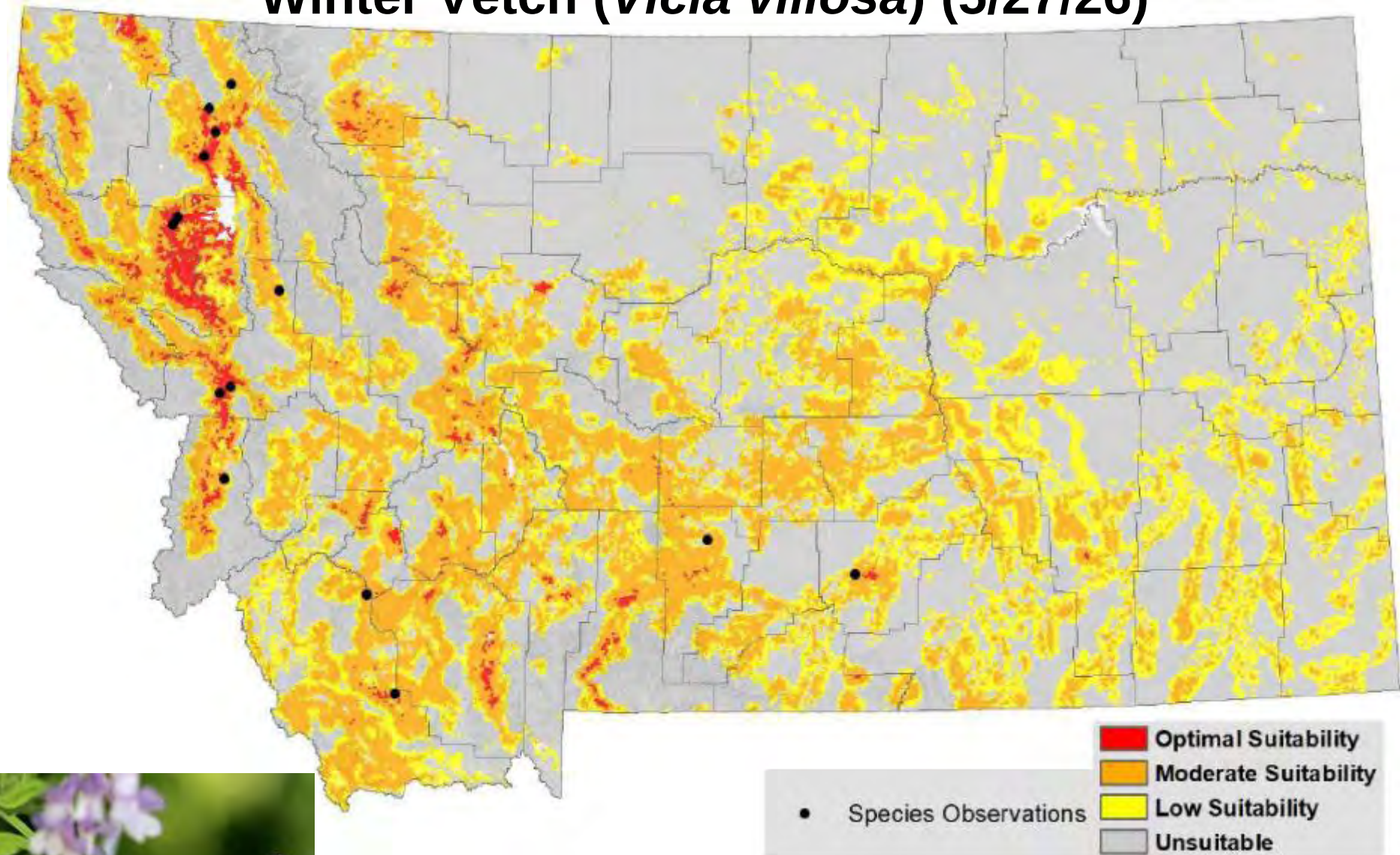
Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.032	140,385	37%
Moderate	0.240	67,090	18%
Optimal	0.726	3,846	1%

White Sweetclover (*Melilotus albus*) (6/5/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.014	88,670	23%
Moderate	0.078	17,316	5%
Optimal	0.301	6,584	2%

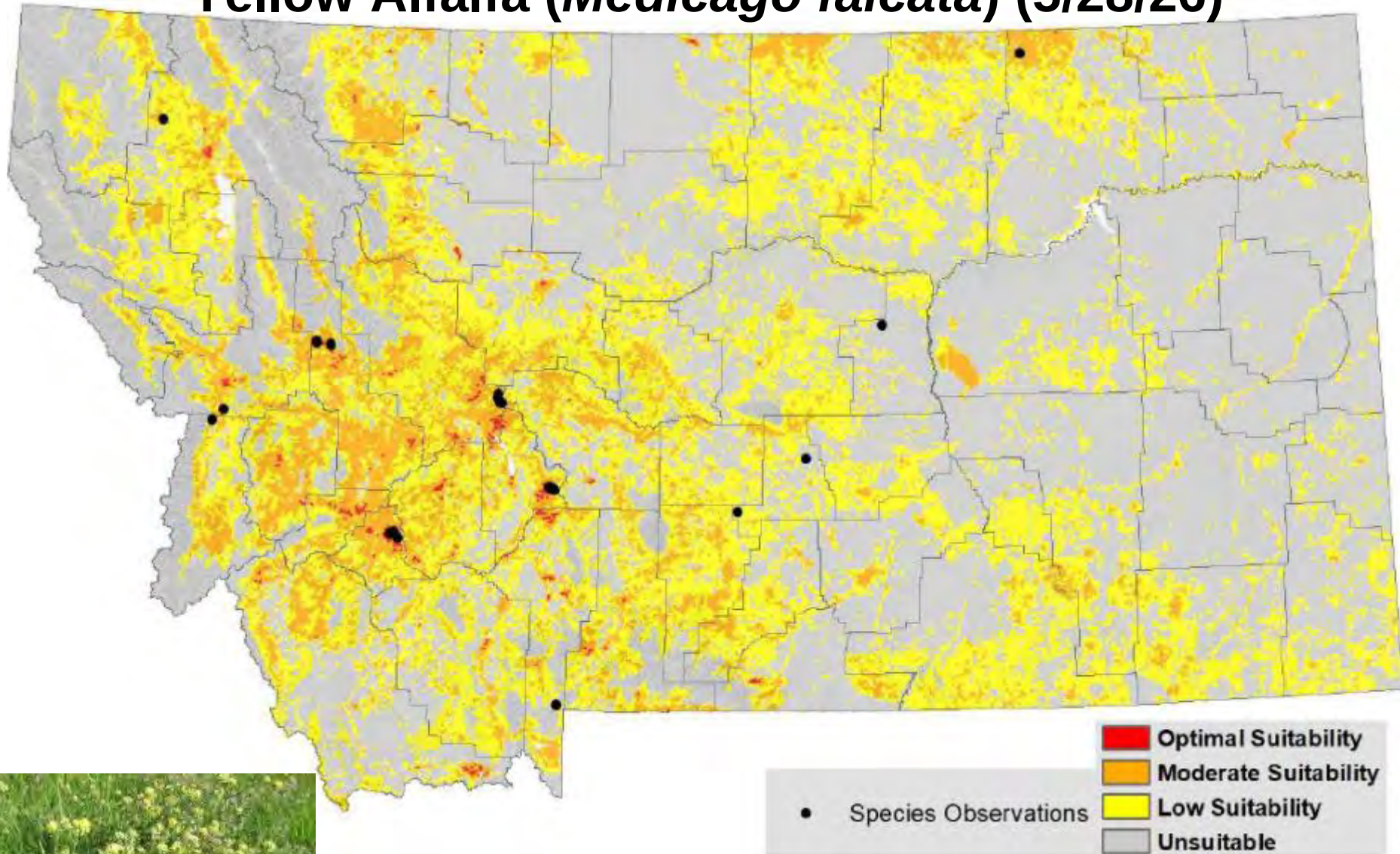
Winter Vetch (*Vicia villosa*) (5/27/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.075	55,521	15%
Moderate	0.182	72,895	19%
Optimal	0.548	9,341	2%

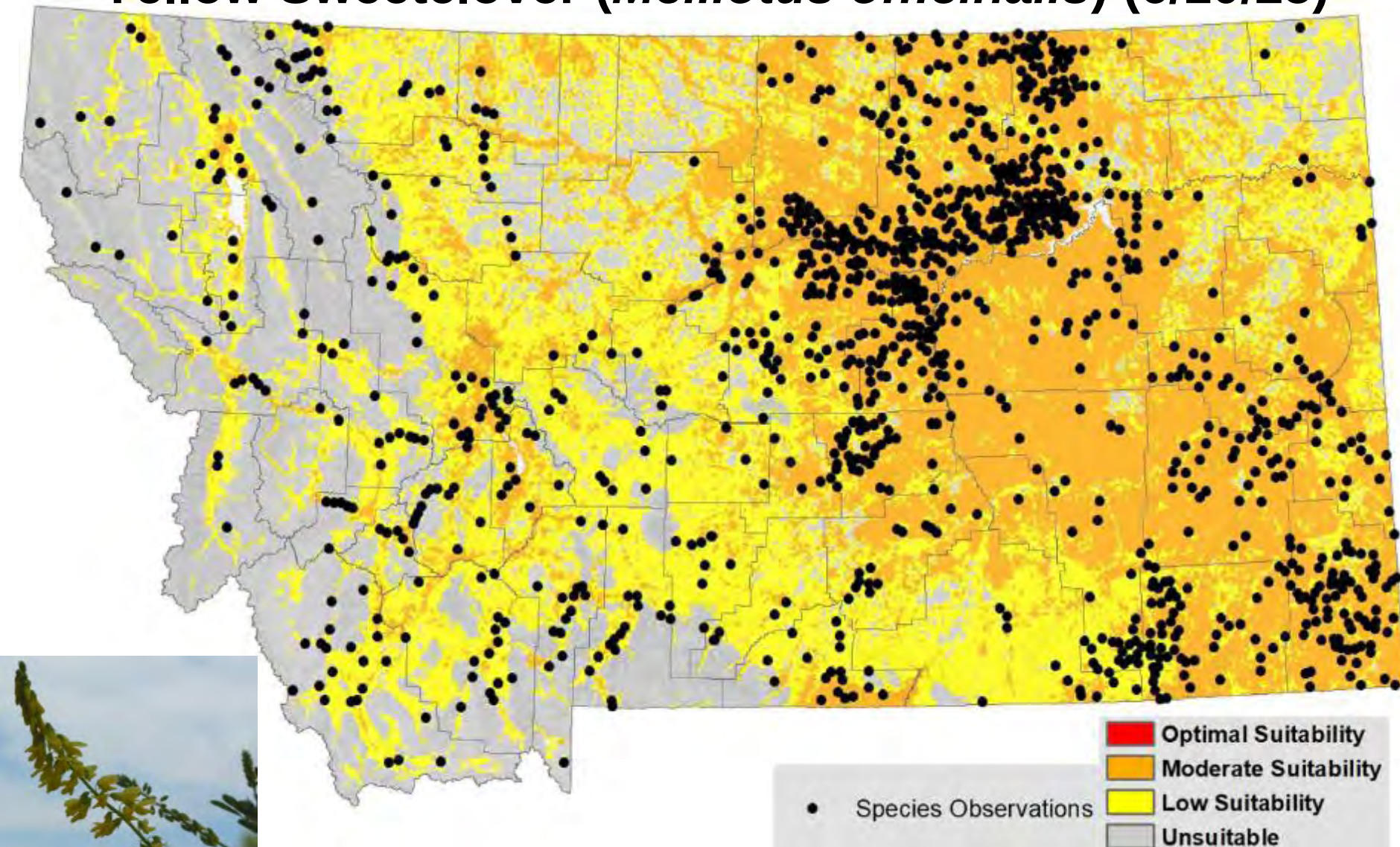


Yellow Alfalfa (*Medicago falcata*) (5/28/26)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.057	73,233	19%
Moderate	0.210	38,692	10%
Optimal	0.590	6,440	2%

Yellow Sweetclover (*Melilotus officinalis*) (6/10/25)



Suitability	Logistic Cutoff	Area in Km ²	% of MT
Low	0.056	91,707	24%
Moderate	0.242	139,602	37%
Optimal	0.829	683	<1%

Questions on Modeling, Model Needs, or Data/Model Access via Map Viewer

Bryce Maxell, bmaxell@mt.gov (406) 444-3989

Requests for Model Outputs for Use in GIS

Braden Burkholder, bburkholder@mt.gov (406) 444-0202

Botanical and Herbarium Specimen Collection Questions

Andrea Pipp, apipp@mt.gov (406) 444-3019

