FWS Partnerships

Annabelle Stanley, Gwen Iacona, Becky Epanchin-Niell

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# Objective:

Explore the presence and activities of partnerships between players that are engaged in threatened species conservation actions

# Background:

1. Threatened species recovery often relies on the formation of partnerships between agencies. These partnerships contribute to recovery through providing resources, performing actions that they are suited to, and encouraging behavior or learning.
2. Efficient recovery planning needs to be able to consider existing partnerships and know when to strategically develop new ones.
3. This is hard, because we currently do not have a good idea of how common partnerships are, whether they are more or less common across different types of species/recovery initiatives, or who the partners are. In addition, we do not know what the different partners contribute to the recovery effort
4. One situation where partners are explicitly acknowledged is when species are precluded from listing because of proactive conservation measures. This is likely not representative of how partnerships work across the bulk of ESA listed species, but it gives us an opportunity to start to think about how to explore partnerships so they can be better incorporated into conservation planning.
5. In this study we aim to characterize partnerships within precluded species and begin to explore how conservation actions are distributed across partnering agencies. We do so by answering the following questions:

* what are the characteristics of partnership for species that are precluded from listing?
* who are the organizations partnering with FWS?
* what are the roles of different partners?

# Methods

For XXX species that have been precluded from listing due to conservation actions:

We collected data from Federal Register documents, recovery plans, and YYY (need description of data sources) on - How many partners were involved in the recovery - Who the partners were, (subset) - What the partners were doing (subset of subset)  - Categorized to Salafsky action headings + a few categories (?)

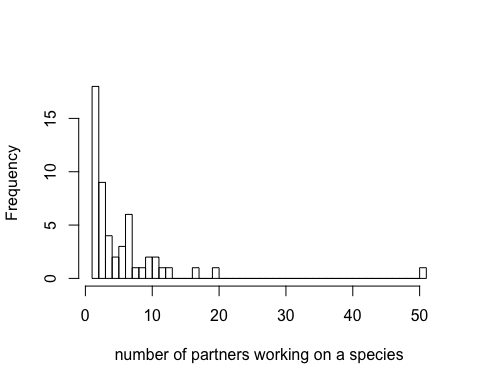
We use these data to answer: 1) what are the characteristics of partnership for species that are precluded from listing? a) How many partners are there? - Total number of partners

## [1] 199

* the number of partners working on each species

## [1] 2 1 3 2 2 7 1 20 4 2 11 10 4 6 1 17 3 7 11 2 9 2 7  
## [24] 1 2 3 7 1 8 5 3 51 6 2 2 12 4 2 3 6 7 3 4 2 13 3  
## [47] 3 10 1 3 7 5 2

## # A tibble: 53 x 2  
## common\_name TotalPartners  
## <chr> <dbl>  
## 1 "GOODING'S ONION" 2  
## 2 "PACKARDS MILKVETCH" 1  
## 3 "ARCTIC GRAYLING- UPPER MISSOURI RIVER DPS" 3  
## 4 "ARIZONA BUGBANE" 2  
## 5 "ASHLAND LUPINE" 2  
## 6 "BEAVER CAVE BEETLE" 7  
## 7 "BLUE DIAMOND CHOLLA" 1  
## 8 "BRAND'S PHACELIA" 20  
## 9 "CAMP SHELBY BURROWING CRAYFISH" 4  
## 10 "CHRIST\xcdS PAINTBRUSH" 2  
## # … with 43 more rows

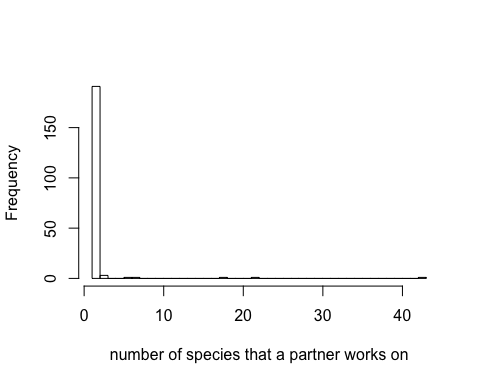


## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 1.000 2.000 3.000 5.943 7.000 51.000

* Per agreement/species (?) # skip for now… revisit later

1. Does number of partners relate to species/recovery programs characteristics?  - taxonomic groups, FWS region, threats, # agreements, form of agreements?  - Test performing regression of form • # of partners = a + B1(species characteristics) + B2(program characteristics) + B3(threats) + u(random effects) + error
2. who are the organizations partnering with FWS?

* List of all the organizations involved
* Which partners are most commonly working with others
* Histogram of partnerships/partner
* Max, min, median, and 1st and 3rd quantiles partners/partner

1. How many species each partner is involved in projects on 

##   
## 1 2 3 6 7 18 22 43   
## 172 19 3 1 1 1 1 1

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 1.000 1.000 1.000 1.583 1.000 43.000

1. Network representation of who works with who. Partners as nodes (weighted by number of species they work on), edges between partners weighted by number of species they work on together

adjacency matrix \*\*\*check that df is correct

Partner <- as.matrix(PartnerData[,-c(1:3)])  
#Data <- t(Partner)  
#View(Data)  
adjmat <- t(Partner) %\*% Partner ## matrix multiplcation between the transpose of our matrix and the original matrix  
#View(adjmat)  
colSums(Partner) ##use to check numbers in adj matrix

## USFS   
## 18   
## USFWS   
## 43   
## BLM   
## 22   
## Montana Department of Fish Wildlife and Parks   
## 1   
## Kentucky Ecological Services Field Office   
## 1   
## Owner of the Beaver Cave property   
## 1   
## Kentucky Department of Fish and Wildlife Resources   
## 2   
## Natural Resources Conservation Service   
## 2   
## Farm Service Agency   
## 2   
## Kentucky State Nature Preserves Commission   
## 1   
## Kentucky Division of Forestry   
## 1   
## California Department of Fish and Game   
## 6   
## California Department of Forestry and Fire Protection   
## 1   
## California Department of Parks and Recreation   
## 2   
## Center for Natural Lands Management   
## 1   
## City of Riverside Park and Recreation Department   
## 1   
## Metropolitan Water District   
## 1   
## Riverside County Environmental Programs Department   
## 1   
## Riverside County Habitat Conservation Agency   
## 1   
## Riverside County Regional Park and Open-Space District   
## 1   
## Riverside Land Conservancy   
## 1   
## San Diego State University Field Stations Program   
## 1   
## The Nature Conservancy   
## 3   
## University of California Riverside   
## 1   
## US Navy   
## 2   
## US Marine Corps   
## 2   
## US Customs and Border Protection   
## 1   
## California State Parks   
## 2   
## Mississippi Army National Guard   
## 1   
## Mississippi Department of Wildlife Fisheries and Parks   
## 1   
## Nevada Department of Conservation and Natural Resources   
## 1   
## Clark County   
## 1   
## NPS   
## 7   
## Nevada Department of Wildlife   
## 3   
## Nevada Department of Transportation   
## 1   
## Nevada Division of State Parks   
## 2   
## U.S. Air Force   
## 1   
## Boulder City   
## 1   
## Illinois Department of Natural Resources   
## 1   
## Indiana Department of Natural Resources   
## 1   
## Kentucky Coal Association   
## 1   
## Kentucky Coal Country Association   
## 1   
## Kentucky Farm Bureau   
## 1   
## Kentucky Natural Resources and Environmental Cabinet   
## 1   
## Western Kentucky Coal Association   
## 1   
## Office of Surface Mining Reclamation and Enforcement   
## 1   
## Utah Division of Parks and Recreation   
## 1   
## Kane County   
## 1   
## private landowners of Cow Head Lake Cow Head Slough and California reach of Barrel Creek (four owners all CA signatories)   
## 1   
## principal permittees on BLM lands within the drainage   
## 1   
## California and Modoc County Cattlemen's Associations   
## 1   
## the California Farm Bureau Federation   
## 1   
## California Department of Fish and Wildlife Natural Heritage Division Endangered plant program   
## 1   
## Center of Excellence for Hazardous Materials Management   
## 1   
## NRCS   
## 2   
## Texas A&M University   
## 1   
## Texas Comptroller of Public Accounts   
## 1   
## Texas Interagency Task Force on Economic Growth and Endangered Species   
## 1   
## Texas Department of Agriculture   
## 1   
## Texas Parks and Wildlife Department   
## 1   
## Railroad Commission of Texas   
## 1   
## University of Texas System - University Lands   
## 1   
## Texas Farm Bureau   
## 1   
## Texas Oil and Gas Association   
## 1   
## Texas Royalty Council   
## 1   
## Texas and Southwestern Cattle Raisers Association   
## 1   
## Texas Wildlife Association   
## 1   
## Texas Association of Business   
## 1   
## California Department of Fish and Wildlife   
## 3   
## Nevada Natural Heritage Program   
## 2   
## Desert Research Institute   
## 2   
## Anza-Borrego State Park   
## 1   
## Arizona Game and Fish   
## 1   
## Ocotillo Wells   
## 1   
## US Bureau of Reclamation   
## 1   
## US Naval Air Facility   
## 1   
## Tohono Oodham Nation   
## 1   
## Clemson University   
## 1   
## Georgia Department of Natural Resources   
## 2   
## Georgia Department of Transportation   
## 1   
## Georgia Power   
## 1   
## Mecklenburg County Park and Recreation North Carolina   
## 1   
## North Carolina Department of Agriculture & Consumer Services Plant Conservation Program   
## 1   
## Uintah County   
## 2   
## Rio Blanco County   
## 2   
## Utah School and Institutional Trust Lands Administration   
## 2   
## Utah Governors Public Lands Policy Coordination Office   
## 2   
## Utah Division of Wildlife Resources   
## 2   
## Utah Department of Natural Resources   
## 1   
## Bureau of Reclamation   
## 1   
## Utah Reclamation Mitigation and Conservation Commission   
## 1   
## Confederated Tribes of the Goshute Reservation   
## 1   
## Central Utah Water Conservancy District   
## 1   
## Southern Nevada Water Authority   
## 1   
## John Hancock Mutual Life Insurace Company   
## 1   
## Bob McIntsh (Private landowner)   
## 1   
## Sierra Pacific Industries   
## 1   
## Hearest Corporation   
## 1   
## Siskiyou County Board of Supervisors   
## 1   
## California Department of Transportation (caltrans)   
## 1   
## Pacific Gas and Electric   
## 1   
## Department of Forest and Rangeland Stewardship Colorado State University   
## 1   
## USGS   
## 1   
## Mashpee Wampanoag Tribe   
## 1   
## Lyme Land Conservation Trust   
## 1   
## American Forest Foundation   
## 1   
## Woodcock Limited   
## 1   
## WCS Queens Zoo   
## 1   
## Wells National Esturarine Research Reserve   
## 1   
## Roger Williams Park Zoo   
## 1   
## Audubon Connecticut   
## 1   
## Connecticut Audubon Society   
## 1   
## Open Space Institute   
## 1   
## Audubon New York   
## 1   
## Quail Forever   
## 1   
## Pheasants Forever   
## 1   
## Doris Duke Charitable Foundation   
## 1   
## Wildlife Conservation Society   
## 1   
## Amrican Bird Conservancy   
## 1   
## Quality Deer Management Association   
## 1   
## Sustainable Forestry Initiative   
## 1   
## White Memorial Foundation   
## 1   
## National Fish and Wildlife Foundation   
## 1   
## Ruffed Grouse Society/American Woodcock Society   
## 1   
## National Wild Turkey Federation   
## 1   
## Wildlife Management Institute   
## 1   
## New Engalnd Cottontail Conservation Initiative   
## 1   
## Northeast Forest and Fire Management   
## 1   
## Lyme Timber Company   
## 1   
## Monterey Preservation Land Trust   
## 1   
## Narrow River Land Trust   
## 1   
## Nantucket Conservation Foundation   
## 1   
## Scarborough Land Trust   
## 1   
## Avalonia Land Conservancy   
## 1   
## Orenda Wildlife Land Trust   
## 1   
## Trustees of Reservations   
## 1   
## Berkshire Natural Resources Council   
## 1   
## York Land Trust   
## 1   
## Becket Land Trust   
## 1   
## Trust for Public Land   
## 1   
## Massachusetts National Guard   
## 1   
## New York Division of Fish Wildlife and Marine Resources   
## 1   
## Northeast Association of Fish and Wildlife Agencies   
## 1   
## Rhode Island Division of Fish and Wildlife   
## 1   
## Connecticute Department of Energy and Environmental Protection   
## 1   
## Massachusetts Division of Fisheries and Wildlife   
## 1   
## New Hampshire Fish and Game Department   
## 1   
## Maine Department of Inland Fisheries and Wildlife   
## 1   
## University of Rhode Island College of Envionment and Life Sciences   
## 1   
## University of New Hampshire   
## 1   
## University of New Hampshire Cooperative Extenson   
## 1   
## City of NCCP   
## 1   
## City of Carlsbad   
## 1   
## City of San Marcos   
## 1   
## California Resources Agency   
## 1   
## Arizona Game and Fish Department   
## 2   
## Colorado Parks and Wildlife   
## 1   
## New Mexico Department of Game and Fish   
## 1   
## Mescalero Apache Nation   
## 1   
## Jicarilla Apache Nation   
## 1   
## Taos Pueblo   
## 1   
## Trout Unlimited   
## 1   
## Vermejo Park Ranch   
## 1   
## Colorado Division of Parks and Wildlife   
## 1   
## Otero County   
## 1   
## Village of Cloudcroft   
## 1   
## Newhall Land and Farming Company   
## 1   
## San Diego Gas and Electric Company   
## 1   
## North Carolina Wildlife Resources Commission   
## 1   
## Duke Energy Carolinas   
## 1   
## Eastern Band of Cherokee Indians   
## 1   
## Tennessee Valley Authority   
## 1   
## Office of Species Conservation   
## 1   
## Idaho Department of Fish and Game   
## 2   
## Idaho Department of Lands   
## 1   
## Idaho Army National Guard   
## 1   
## Nongovernmental Cooperator Representative   
## 1   
## US Air Force   
## 1   
## Nevada Division of Wildlife   
## 1   
## Idaho Governor's Office of Species Conservation   
## 1   
## Soulen Livestock Company Inc. (Soulen Livestock)   
## 1   
## California State Lands Commission   
## 1   
## California Tahoe Conservancy   
## 1   
## League to Save Lake Tahoe   
## 1   
## Nevada Division of Forestry   
## 1   
## Nevada Division of State Lands   
## 1   
## Tahoe Lakefront Owners's Association   
## 1   
## Tahoe Regional Planning Agency   
## 1   
## USDA   
## 1   
## Montana State University   
## 1   
## Montana Fish Wildlife and Parks   
## 1   
## Foster Creek Conservation District   
## 1   
## Threemile Canyon Farms   
## 1   
## Portland General Electric   
## 1   
## Washington State Department of Fish and Wildlife   
## 1   
## Washington State Department of Natural Resources   
## 1   
## University of Hawaii   
## 1   
## Utah State Office   
## 1   
## Alcoa Power Generating Inc   
## 1

#write.csv(RawData,paste(DataSource,"/PartnersData.csv", sep = ""))  
write.csv(adjmat, "/usr/local/bin/store/partner\_rff/output/adjacencymatrix.csv")

1. How are actions distributed across partners?
2. Frequency distribution (histogram) of how many partners are participating in each type of action
3. Look at distribution of actions across partners (e.g., what proportion of recovery is enacted by FWS?)
4. I haven’t figured out how to do this yet? Maybe % of actions performed for a species as a response = partner identity + characteristics of species?….