**Table S1: Technical advisory committee members**

| *Last Name* | *First Name* | *Agency* |
|---|---|---|
| Admundsen | Ole | The Conservation Fund |
| Arens | Hilary | UT Department of Environmental Quality, Division of Water Quality |
| Beck | Ryan | Envision Utah |
| Brown | David | U.S. Department of Agriculture, Natural Resources Conservation Service |
| Buchi | Douglas | School and Institutional Trust Lands |
| Crowell | Grant | Morgan County |
| Damery | Bill | UT Department of Environmental Quality |
| DeMillion | Marcy | U.S. Department of the Interior, National Park Service |
| Ewert | Charles | Morgan County |
| Farnsworth | Jamie | University of Utah, City and Metropolitan Planning Student |
| Ferebee | Brian | U.S. Forest Service, Wasatch-Cache National Forest |
| Gaines | Michelle | University of Utah, City and Metropolitan Planning Student |
| Gillen | Sylvia | U.S. Department of Agriculture, Natural Resources Conservation Service |
| Goodrich | Kerry | U.S. Department of Agriculture, Natural Resources Conservation Service |
| Gragg | Jimi | UT Department of Natural Resources, Division of Wildlife Resources |
| Granberg | Bert | Utah Automated Geographic Reference Center |
| Hansen | Ross | UT Department of Natural Resources, Division of Water Rights |
| Harja | John | UT Public Lands Policy Coordination |
| Herbert | Robert | UT Department of Environmental Quality, Division of Water Quality |
| Hess | Scott | Davis County |
| Johnson | Kate | UT Department of Environmental Quality, Division of Drinking Water |
| Knight | Robert | U.S. Army, Dugway Proving Ground |
| Lawrence | Russell | U.S. Air Force, Camp Williams |
| Lehman | Todd | University of Utah, City and Metropolitan Planning Student |
| Licon | Carlos | UT State University, Swaner Green Space Institute |
| Maynard | Paul | Utah Trust for Public Lands |
| Mermejo | Lauren | U.S. Bureau of Land Management |
| Montague | Chris | The Nature Conservancy |
| Norman | John | Colorado State University |
| Oostema | Christie | Envision Utah |
| Page | Kent | Tooele County |
| Perry | Barbara | UT Department of Natural Resources, Division of Water Resources |
| Roberts | Mike | The Nature Conservancy |
| Scott | Rob | Weber County |
| Romberg | Ryan | UT Association of Conservation Districts |
| Weston | Brandon | UT Department of Transportation |
| Stromness | Rebecca | UT Department of Transportation |
| Ward-Thompson | Catharine | University of Edinburg |
| Wilhelmsen | Teresa | UT Department of Natural Resources, Division of Water Rights |
| Yoshinaga | Rolen | Salt Lake County |

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**Table S3: GIS dataset source and name list**

| Source | Description | Data Layer Name |
|---|---|---|
| AGRC | 2009 NAIP orthophotography | Aerial |
| AGRC | Agricultural conservation easements | Agricultural Cons. Easements |
| AGRC | Aquifer recharge area | Aquifer Recharge/Discharge Area |
| AGRC | Artificial canals for water management distribution (irrigation, flood controls, etc.) | Canals |
| AGRC | All cemeteries (point) | Cemeteries |
| AGRC | Important community locations (polygon) | Community Areas |
| AGRC | Frontrunner transit line | Commuter Rail (Routes) |
| AGRC | Frontrunner stops (point) | Commuter Rail (Stops) |
| AGRC | County boundaries | County Boundaries |
| AGRC | All cultivated land | Cultivated Land (All) |
| AGRC | Dams and Reservoirs | Dams |
| AGRC | Includes high, medium, & low intensity development & developed open space | Developed Land |
| AGRC | All eldery care facilities (point) | Elderly Care Facility |
| AGRC | Geohazard fault lines | Fault Lines |
| AGRC | Geohazard fault lines | Fault Lines |
| AGRC | FEMA floodplain | Floodplain - Davis County |
| AGRC | 100 year floodplain | Floodplain - Great Salt Lake |
| AGRC | | Game Species Habitat |
| AGRC | Vegetation communities | Gap Data |
| AGRC | Golf courses (Polygon) | Golf Courses |
| AGRC | Great Salt Lake boundary | Great Salt Lake |
| AGRC | Geologic hazard areas | High Liquifaction Potential |
| AGRC | HAFB | Hill Air Force Base |
| AGRC | Various districts of historical value | Historic Districts |
| AGRC | Various historic trails, incl. Pony Express, Mormon Pioneer, Donner/Clymen/Mormon | Historic Trails |
| AGRC | All hospitals (point) | Hospitals |
| AGRC | Impaired Water Bodies | Impaired Waters |
| AGRC | Types of land use that are irrigated or subirrigated (farming lands) | Irrigated Land Use |
| AGRC | Lakes and Ponds | Lakes |
| AGRC | Designated areas of critical concern on Public Lands managed by the BLM. | Land Ownership |
| AGRC | Geologic hazard areas | Landslide Areas |
| AGRC | All libraries (point) | Libraries |
| AGRC | Major cities (self-defined) | Major Cities |
| AGRC | All marinas (point) | Marinas |
| AGRC | Mining Lease Lands | Mining Areas |
| AGRC | Noxious weed locations | Noxious Weeds |
| AGRC | Locations of local parks, excluding state & federally owned parks | Parks - Local |
| AGRC | Location of all state parks | Parks - State |

| | | |
|---|---|---|
| AGRC | Pasture and Rangelands | Pasture and Hay Landscape |
| AGRC | Areas (from land ownership) that are strictly public - excludes private, tribal & DOD | Public Lands |
| AGRC | Railroads (active and inactive) | Railroads |
| AGRC | Manmade lakes for drinking water and irrigation uses (different from lakes) | Resevoirs |
| AGRC | Major rivers | Rivers |
| AGRC | Interstate highways | Roads - Major |
| AGRC | Interstate and state highways | Roads - Major & Secondary |
| AGRC | FEMA Floodplain | Salt Lake County Floodplain |
| AGRC | All schools (point) | Schools |
| AGRC | 0 foot depth to groundwater | Shallow Groundwater |
| AGRC | Ski areas and lifts | Ski Lifts |
| AGRC | Major streams only | Streams (Major) |
| AGRC | All streams major & minor | Streams (Major & Minor) |
| AGRC | Sub-watershed (level 5) | Sub-watershed Areas |
| AGRC | Tribal Territories | Tribal Lands |
| AGRC | All universities (point) | Universities |
| AGRC | Watershed (basins - level 4) | Watershed Areas |
| AGRC | Priority areas that are protected to assist in Utah's watershed restoration initiave | Watershed Restoration Initiative Areas |
| AGRC | Areas that prohibit development & resource extraction to protect native wildlife and areas under higher management practices | Wildlife Reserves & Management Areas |
| AGRC, BLM, & USFS | Areas under the wildnerness designation - typically do not allow resource extraction or development | Wildland Urban Interface Areas |
| AGRC & UDWR | Various types of land protected from development | Conservation Easements (All) |
| AGRC & UDWR | Historic conservation easements only | Historic Conservation Easements |
| AGRC & UDWR | Conservation easements (water-related only) | Water Related Cons. Easements |
| AGRC, UDWR, & | Action areas meant to inform the decision-making process associated with the Wildlife | Wildlife Action Plan Conservation Areas |
| AGRC, WFRC, | Parkways and hiking trails | Regional Trails |
| Audubon Society | Sites that provide essential habitat for one or more species of bird | Important Bird Areas |
| BLM | Designated areas of critical concern on Public Lands managed by the BLM. | BLM Areas of Critical Concern |
| BLM | BLM Designated grazing allotment & pastures | Grazing Allotments - BLM |
| BLM - Nevada | Nevada grazing allotment boundaries | Grazing Allotments - Nevada |
| CGID | Points of interest for contextual reasons | Interest Points |

| | | |
|---|---|---|
| FEMA | FEMA floodplain | Floodplain - Davis County |
| NRCS | Actual land cover (9 built, forest, etc. | Land Cover |
| NRCS | Areas with soil that has high value for farming use | Prime Farmland Soil |
| NRCS | Farmland of statewide importance | Soils of Statewide Importance |
| SITLA | SITLA designated grazing leases | Grazing Leases - STILA |
| SL County Flood Control & Water | Ecosystem restoration sites on the Jordan River in Salt Lake County | Restoration Salt Lake County (Completed) |
| Tooele | Per Utah's Agricultural Protection Act | Agricultural Protection Areas - Tooele County |
| UDFFSL | Priority watersheds for forest health objectives | Forest Priority Areas |
| UDFFSL | Hazard areas based on fuel type and proximity | Wildland Urban Interface Areas |
| UDWR | CWMUs as referred to in the 2010 Utah Big Game Guidebook | Cooperative Wildlife Management Units |
| UWDR | Various zones (determined by amount of time it takes water & pollutants to reach aquifers) for protection priorities | Drinking Water Source Protection Zones |
| UDWR | Sagegrouse brooding use areas | Greater Sagegrouse Brooding Habitat |
| UDWR | Sagegrouse winter use areas | Greater Sagegrouse Winter Habitat |
| UDWR | Point localities masked to within one square mile | Greater Sagegrouse Masked Locations |
| USFWS | Wetlands perUSFWS National Wetlands | Wetlands |
| Weber | Per Utah's Agricultural Protection Act | Agricultural Protection Areas - Ogden Valley |
| Weber | Per Utah's Agricultural Protection Act | Agricultural Protection Areas - Western Weber |
| WFRC | Areas of a certain fire hazard risk | Fire Hazard |
| WFRC | Areas where soil expands when mixed with water (geologic hazard areas) | Problem Soils (Expansive Soils) |
| WFRC | All trailheads | Regional Trailheads |

**Table S4: Green infrastructure network criteria and GIS modeling**

## ECOLOGICAL NETWORK CRITERIA

| CORES | SIGNIFICANCE/EXPLANATION |
|---|---|
| 1. Protected lands or public lands with ecological assets within them | Protected lands have a higher likelihood of providing permanent GI services. Inclusion of protect lands is well-documented[1]. |
| 2. High quality wetlands – min. size of 50 m in diameter and not "too" isolated | Based off the American white pelican and black-necked stilt habitats. Based on literature and conversations with UDWR staff. Working with UDWR staff to identify a freshwater wetlands species. |
| 3. High quality uplands – lands indicated by UDWR as crucial for the mule deer and potential habitat for the northern goshawk | These species are listed as indicator species by UDWR (mule deer) and USFW (northern goshawk in the Uinta-Cache National Forest). See end of document for specific criteria. |
| 4. High quality riparian areas – all streams with documented occurrences of the Bonneville Cutthroat Trout (with a 50 foot buffer), and potential beaver habitat (open water, permanent streams adjacent to woody vegetation). | Recommended by UDWR and used by the Uinta-Cache National Forest as an indicator species. Based on discussions with UDWR and USFS. |
| 5. High quality scrub/shrub areas – lands indicated as critical or substantial for the Greater Sage Grouse | Based off the greater sage grouse habitat layer provided by UDWR. |
| 6. Areas of Critical Environmental Concern | A BLM designation – includes the Bonneville Salt Flats and Horseshoe Springs within this study area. |
| **Exclusion Factors:** | |
| 1. For priority saline wetlands – remove areas of high human disturbance | Includes marinas, recreational trails, fishing areas, etc. Conversation with John Neill, UDWR – 9/13/2010 |
| 2. Remove areas affected by development | Buffer recommendations – 180 m (Odell and Knight 2001), Bock 1999 – 200 m (see Lenth 2006 paper for reference) |
| 3. Remove areas affected by invasive species | Based on data downloaded from AGRC, including invasive species and dominant vegetation shapefiles. |

| | |
|---|---|
| 4. Remove riparian areas with diversions, dams, culverts and de-watered reaches; For beavers remove recreational areas and mineral developments. | These areas serve as barriers to BCT migration (pers. comm. with UDWR 2010). As per the USFS Suitability analysis, beavers will not establish colonies where significant human disturbance is located. |
| 5. Exclude major roads. | Species will be negatively affected by roads, through mortality or avoidance. |
| **HUBS** | **SIGNIFICANCE/EXPLANATION** |
| 1. Reservoirs | American white pelican utilizes these areas. |
| 2. High priority forest lands | DFFSL completed a planning process in 2010 that identified priority forest lands. |
| 3. For upland habitats – lands indicated as substantial habitat for mule deer and areas with aspen as dominant vegetation cover for goshawks. | Substantial mule deer habitat based on data from UDWR. Based on breeding and foraging requirements (from USFS), aspen is important for the northern goshawk (USFS). |
| 4. Wildlife Action Areas within the study area & important wildlife areas | As per the Wildlife Action Plan developed by UDWR and Ogden Valley important wildlife areas |
| 5. For scrub/shrub habitat for sagegrouse - all areas of sagebrush within 1 mile of masked species locations | Habitat data provided by UDWR was masked up to 1 mile, as per confidentiality reasons, these hub areas would encompass all possible habitats. As this species is a sagebrush-obligate species, hubs should include areas with sagebrush as the dominant vegetation species. |
| 6. Riparian areas - all permanent streams that have surrounding forest land cover. | Beaver criteria reviewed by USFS. |
| 7. Important Bird Areas | Areas identified as important for a suite of bird species throughout the region (UDWR, pers. comm. 2010) |
| **Exclusion Factors:** | |
| 1. Exclude roads that create barriers for species travel, e.g. major highways | Species will be negatively affected by roads, through deaths in crossing or avoidance. |
| 2. Remove areas affected by development | Buffer recommendations – 180 m (Odell and Knight 2001), Bock 1999 – 200 m (see Lenth 2006 paper for reference) |
| **CORRIDORS** | **SIGNIFICANCE/EXPLANATION** |

| | |
|---|---|
| 1. For riparian areas -Least-cost path analysis between the core areas, using acceptable habitat types, e.g. the streams in the cores/hubs listed above, with preferred connections between higher quality streams and streams with woody riparian vegetation. | Based off the Bonneville cutthroat trout and Beaver, based on discussions with UDWR and USFS. |
| 2. For shrub/scrub and mule deer habitat areas, prioritize connections between summer and winter ranges (e.g., for mule deer and Greater Sage Grouse) and connections via preferred habitat | Based on conversations with UDWR staff, species need connections between winter and summer ranges first, then other connections. |
| 3. Least-cost path analyses between the core and hub areas, using acceptable habitat types. | See least cost path analysis process below. |
| 4. For wetlands, utilize discharge areas, hydric soils and shallow aquifer areas for connections. | Emphasize hydrological connections to support wetland connectivity. |

# ECOLOGICAL NETWORK GIS MODELLING PROCESS

## Ecological Cores

1. Create a new toolbox in ArcCatalog for Ecological modeling - ~EcologicalAssets
    A. #1 Core Criteria – protected and public lands with ecological assets
        i. Select all lands with protection designation – BLM Wilderness, US Forest Service Wilderness, National Conservation Association parcels, Division of Natural Resources wildlife reserves, and ecological easements. Merge into one layer→ecolands_protected2
        ii. Convert to raster→prot_ecoland1
        iii. Reclassify to 0 and 1 for analysis→***rc_ecoprot1***
    B. #2 Core Criteria – high priority wetlands
        i. Select those wetlands (from USFWS National Wetland Inventory) greater or equal to .6 acres (as per species habitat information and conversations with UDWR staff)→ NWI_wetlands_over6ac
        ii. Remove tailings ponds south of the Great Salt Lake (as per conversations with water quality experts)
        iii. Convert to raster→all_wetlands1
        iv. Reclassify to 0 and 1 for analysis→***rc_wetlands4***
    C. #3 Core Criteria – high quality uplands
        i. Select crucial mule deer habitat from data received from UDWR → MuleDeerHabitat_Crucial, convert to raster → mdeer_crucial, reclassify → rc_mdeer_cruc

ii. Extract vegetation used by the northern goshawk from the SWreGAP data → Goshawk_GAP_veg2, convert to raster→ goshawk1, reclassify → rc_goshawk1
iii. Use single output map algebra to add the above two layers → uplandhab2
iv. Reclassify to 0 and 1 for analysis→***rc_uplandhab1***

D. #4 Core Criteria – high quality riparian
i. Buffer by 50 feet streams where Bonneville Cutthroat Trout occur and streams with permanent woody riparian vegetation and merge together → riparianforcore_50ftbuff , convert to raster →riparian50ft, reclassify to 0 and 1 for analysis → rc_ripar50ft
ii. Extract from SWreGAP data all riparian vegetation types, open water and wet meadow → beaver_water; merge with streams_perm2_pgon → beaver_water2; extract from SWreGAP data all vegetation types useable by the beaver → beaver_usable_veg; select by location all features within beaver_water2 that are within 600 feet of beaver_usable_veg (per USFS beaver habitat criteria) →beaver_habitat; merge this layer with beaver_water2 → beaver_habitat2; convert to raster → beaver_hab1; reclassify to 0 and 1 for analysis → rc_beaverhab1
iii. Buffer rivers by 50 ft → rivers_50ft_buff, convert to raster → rivers_50ft, reclassify → rc_rivers50ft
iv. Use single output map algebra to add the above three layers → ripcore, reclassify to 0 and 1 → ***rc_ripcore3***

E. #5Core Criteria – high quality scrub/ shrub areas
i. Merge together sagegrouse brooding and winter habitat from AGRC →sagegrouse_habitat
ii. Convert to raster → sagegrse_hab
iii. Reclassify to 0 and 1 for analysis→***rc_sagehab***

F. #6 Core Criteria – areas of environmental concern
i. Select BLM Areas of Critical Environmental Concern →BLM_areasenvtalconcernt
ii. Convert to raster→BLM_AEC
iii. Reclassify to 0 and 1 for analysis→***rc_blm_aec2***

2. Merge together the core criteria 1 – 6
A. Use single output map algebra to add the above final, reclassified rasters together → eco_cores5
B. Use the reclassify tool to change any value above 1 to a 1, and then all nodata values to 0 → ***rc_ecocores5***

3. Create exclusion layers
A. Create exclusion factor #1 – areas of high human disturbance – marinas (note: marinas to be included with recreational areas, see exclusion factor #4), trails
i. Buffer trails and regional trails by 50 meters and merge → all_trails_50ftbuff, convert to raster → trails_50m, reclassify for analysis → ***rc_trails50m***

B. Create exclusion factor #2 – areas affected by development
i. Select developed lands from AGRC land cover →developed_land_all
ii. Buffer by 200 m →dev_land_all_200mbuff
iii. Convert to raster → urbanareas2
iv. Reclassify to 0 and 1 for analysis→***rc_urban6***

C. Create exclusion factor #3 – areas affected by invasive spp.
i. Clip noxious weeds layer from AGRC to project boundary →noxiousweeds_AGRC
ii. Select noxious weeds from dominant vegetation shapefile (from AGRC, include cheatgrass, which is not on the noxious weed list but has significant ecological and productivity ramifications)→noxiousweeds_cheatgrass
iii. Merge the noxious weeds layer →noxiousweeds_all
iv. Convert the noxiousweeds_all layer to raster (noxiousweeds) and reclassify for analysis→***rcnoxweeds1***

D. Create exclusion factor #4 – riparian barriers and human disturbance
    i. Buffer dams by 50 feet →dams_50ftbuffer, merge buffered dam layer with mining lands → dams_mines, and convert to raster → dams_mines
    ii. Reclassify to 0 and 1 for analysis → ***rc_mine_dam1***
    iii. Use reclassified recreation area file from Recreational Core Criteria #5 (includes ski areas, marinas and golf courses) →***Rc_recareas1***
    iv. Conduct single output map algebra to add these two areas → ***Rc_recmindam1***
E. Create exclusion factor #5 – road creating barriers for species travel
    i. Select major roads from AGRC Roads shapefile → Roads_Major
    ii. Buffer by 40 m (Forman 1995) → MajorRoads_40mbuff
    iii. Convert to raster → roads_40mbuff
    iv. Reclassify to 0 and 1 for analysis → ***rc_roads40m1***
F. Use single output map algebra to multiply the 5 exclusion layers together → ***ecocoreexfac2***

4. Remove exclusion layers
    A. Use single output map algebra to multiply the final cores layer with the exclusion layer → ***eco_cores6*** – vector file is ecocores7

## Ecological Hubs

1. Develop hub criteria
    A. #1 Hub Criteria – reservoirs
        i. Select the reservoirs layer → reservoirs_clip
        ii. Convert to raster → reservoirs
        iii. Reclassify to 0 and 1 for analysis → ***rc_reservoir***
    B. #2 Hub Criteria – high priority forest lands
        i. Select all Tier 1 lands from DFFSL priority areas layer→priority_areas
        ii. Convert to raster→fs_priority
        iii. Reclassify to 0 and 1 for analysis→***rc_fs_prior1***
    C. #3 Hub Criteria – substantial mule deer habitat and areas dominated by aspen
        i. Select areas dominated by aspen→aspen_dominant, convert to raster→aspen, reclassify to 0 and 1 for analysis→***rc_aspen***
        ii. Extract substantial mule deer habitat from data received from UDWR → MuleDeerHabitat_Substantial, convert to raster → mdeer_subst, reclassify → rc_mdeer_subs
        iii. Use single output map algebra to add the above two layers → upland_hub, reclassify → ***rc_uplandhub***
    B. #4 Hub Criteria – Wildlife Action Areas and Important Wildlife Areas
        i. Merge the Wildlife Action Areas as designated by the Wildlife Action Plan with Ogden Valley's Important Wildlife Habitat→wildact_impwild
        ii. Convert to raster→wildact_imp1
        iii. Reclassify to 0 and 1 for analysis→***rc_wild_imp3***
    D. #5 Hub Criteria – shrub habitat
        i. Select all shrub lands (from GAP data) within 1 mile of masked species locations→sagebrush_adjtomaskedlocations
        ii. Convert to raster →shrub_hub1
        iii. Reclassify to 0 and 1 for analysis→***rc_shrb_hub2***
    E. #6 Hub Criteria – riparian areas
        iv. Select all permanent streams adjacent to forest lands → perm_streams_adjacenttoforests
        v. Convert to raster →stream_forest

vi. Reclassify to 0 and 1 for analysis → ***rc_stm_fores2***

F. #7 Hub Criteria – Important Bird Areas

i. Convert the ImportantBirdAreas shapefile to raster → IBAs1

ii. Reclassify to 0 and 1 for analysis → ***rc_IBAs2***

2. Merge together the hub criteria 1 – 7
   A. Use single output map algebra to add the above final, reclassified rasters together → eco_hubs3
   B. Use the reclassify tool to change any value above 1 to a 1, and then all nodata values to 0 → ***rc_eco_hubs2***
3. Create exclusion layers
   A. Use single output map algebra to multiply the hub exclusion factors together (rc_urban4 and rc_roads40m1) → ***ecohubexfact1***
4. Remove exclusion layers from hubs
   A. Use single output map algebra to multiply the final hubs with the hub exclusion layer → ***ecohubs_excl4***

## Ecological Corridors – Least Cost Path Analysis

1. Create the cost surface raster
   a. Convert the ecocores_exc4 raster to vector → ecocores5
      i. Dissolve by value field → eco_cores_dissolve
      ii. Add field – label; start editing session – add "Cores" to the one attribute field under "label"
   b. Convert the ecocores_exc4 raster to vector → ecohubs1
      i. Erase the cores from the hubs (erase tool only available with ArcInfo license) → ecohubs_erase
      ii. Dissolve by value field → eco_hubs_erase_dissolve
      iii. Add field – label; start editing session – add "Hubs" to attribute field under label
   c. Merge together hydric soils (hydric70pct), shallow groundwater areas (grndh20_0ft) and aquifer recharge zones (aquifer_10km_boundary) → hydric_shallow_recharge
      i. Dissolve by value field → hydshallowrecharge_dissolve
      ii. Add label field; start editing session – add "Hydric soils, shallow groundh2o, aquifer recharge" to attribute field
   d. Buffer all streams by 15 m → streams_15mbuff
      i. Dissolve by buffer distance → streams_15mbuff_dissolve
      ii. Add label field; start editing session – add "All Streams" to attribute field
   e. Select all developed land from land cover layer → developed_land_all
      i. Dissolve by buffer value field → developed_land_dissolve
      ii. Add label field; start editing session – add "Developed Land" to attribute field
   f. Select appropriate habitat land cover types from NLCD layer – all forest, shrub, grassland and wetland types → forest_shrub_grass_wetland
      i. Dissolve by value field →all_habitat_dissolve
      ii. Add field – label; start editing session – add "Habitat Landcover" to the one attribute field under "label"
   g. Select permanent streams adjacent to woody vegetation (from Hydrological criteria) → permstreams_adjtoforest_50ftbuff
      i. Dissolve by value field → streams_forestadj_dissolve
      ii. Add field – label; start editing session – add "Permanent Streams adjacent to Forests" to attribute field
   h. Select parks from Community Criteria → all_parks
      i. Dissolve by value field → all_parks_dissolve
      ii. Add field – label; start editing session – add "Parks" to attribute field

i. Select major roads → major roads
    i. Dissolve by value field → major_roads_dissolve
    ii. Add field – label; start editing session – add "Roads" to attribute field

j. Select impaired water bodies
    i. Dissolve by value field → impaired_waters_dissolve
    ii. Add label field; start editing session – add "Impaired Waters" to attribute field

k. Merge eco_cores_dissolve, eco_hubs_erase_dissolve, hydshallowrecharge_dissolve, streams_15mbuff_dissolve, developed_land_dissolve, all_habitat_dissolve, streams_forestadj_dissolve, all_parks_dissolve, major_roads_dissolve, and impaired_waters_dissolve together → eco_corridor_perm (note, this should be the cost surface file – to be renamed in raster classification)
    i. Under value field, insert the following values (values assigned to dictate which layers will override other layers):

| Value | Label |
|---|---|
| 1 | Habitat Landcover |
| 2 | Hydric soils, shallow groundh20, aquifer recharge |
| 3 | Cores |
| 4 | Hubs |
| 5 | Developed Land |
| 6 | Parks |
| 7 | Roads |
| 8 | Streams |
| 9 | Permanent Streams adjacent to Forests |
| 10 | Impaired Waters |

    ii. Convert file to raster→***eco_costsurf***
    iii. Add PermValue field with the following values:

| OBJECTID | Value | Label | PERMVALUE |
|---|---|---|---|
| 0 | 1 | Habitat Landcover | 0.6 |
| 1 | 2 | Hydric soils, shallow groundh2o, aquifer recharge | 0.7 |
| 2 | 3 | Cores | 1.0 |
| 3 | 4 | Hubs | 0.9 |
| 4 | 5 | Developed Land | 0.1 |
| 5 | 6 | Parks | 0.5 |
| 6 | 7 | Roads | 0.1 |
| 7 | 8 | Streams | 0.7 |
| 8 | 9 | Permanent Streams adjacent to Forests | 0.8 |

| | | | |
|---|---|---|---|
| 9 | 10 | Impaired Waters | 0.0005 |

## Ecological Corridors – Design Process

1. Create study map with cores, hubs, least cost paths and linear ecological features that could serve as corridors
    a. Add cores → ecocores5 and hubs → ecohubs_erase
    b. Add least cost paths to map → movement_prob
        i. In Symbology, select "Classified"; compute histogram; exclude data between 0 – 0.5686 (retains highest value paths)
    c. Add waterways → streams_rivers
2. Create new shapefile → Eco_Corridors_Existing
    a. Trace waterways that serve as connecting corridors between core and hub areas
3. Create new shapefile → Eco_Corridors_Proposed
    a. Assess areas where connectivity is lacking and draw in corridors using the following criteria
        i. Trace existing waterways first, even if they do not completely connect two core patches – such partial corridors are included in the existing corridor shapefile – draw in proposed corridors to complete these connections
        ii. Secondly, use least cost paths to draw in corridors where connectivity is still lacking

## Final Shapefiles for Agencies & Organizations

| | |
|---|---|
| Merged Cores | Ecological_Cores |
| Merged Hubs | Ecological_Hubs |
| Existing Corridors | Ecological_Corridors_Existing |
| Proposed Corridors | Ecological_Corridors_Proposed |

*Note – merged files have been dissolved by layer – data is extremely simplified.*

| | |
|---|---|
| Core #1 – Protected lands with ecological assets | Protected_Ecological_Lands |
| Core #2 – High quality wetlands | Wetlands_Over_6Ac |
| Core #3 – High quality uplands | Upland_Core |
| Core #4 – High quality riparian areas | Riparian_Core |
| Core #5 – High quality scrub/shrub areas | ShrubSteppe_Core |
| Core #6 – Areas of Critical Environmental Concern | BLM_AreasofEnvironmentalConcern |
| | |
| Core Exclusion #1 – Disturbed saline wetland areas *(marinas included in core exclusion #5)* | Trails_50ftbuffer |
| Core Exclusion #2 – Areas affected by development | Developed_Land_200mbuffer |
| Core Exclusion #3 – Invasive species | Noxious_Weeds |
| Core Exclusion #4 – Disturbed riparian areas | Disturbed_Areas |
| Core Exclusion #5 – Major roads | MajorRoads_40mbuffer |
| | |
| Hub #1 – Reservoirs | Reservoirs |
| Hub #2 – DFFSL high priority forest lands | DFFSL_Priority_Forest_Lands |
| Hub #3 – Substantial mule deer habitat & aspen-dominated areas | Upland_Hub |
| Hub #4 – Wildlife Action Plan areas and Ogden Valley important wildlife areas | WAP_Important_Wildlife_Areas |

| | |
|---|---|
| Hub #5 – Sagebrush areas with 1mile of masked sage grouse locations | ShrubSteppe_Hub |
| Hub #6 – Permanent streams with surrounding forest landcover | Riparian_Hub |
| Hub #7 – Important Bird Areas (IBAs) | Important_Bird_Areas |
| | |
| Hub Exclusion #1 – Major roads | MajorRoads_40mbuffer |
| Hub Exclusion #2 – Areas affected by development | Developed_Land_200mbuffer |

# HYDROLOGICAL NETWORK CRITERIA

| CORES | SIGNIFICANCE/EXPLANATION |
|---|---|
| 1. Protected lands with hydrological assets within them | Permanently protected lands have a higher likelihood of providing permanent GI services. Inclusion of protect lands is well-documented[1]. |
| 2. High quality water bodies -includes reservoirs, streams, lakes, rivers | See exclusion factors below, e.g., impaired waters (303d) are removed from core areas; Buffers are incorporated as hubs (see below). |
| 3. Important wetlands within the Wasatch Front | As wetlands within Utah only consist of 0.2% of the entire state, all of the wetlands are critical to water quality and quantity. |
| 4. Floodplains, where available | Incorporated in multiple green infrastructure planning efforts, including, but not limited to, the Maryland GI Plan (2003), the Travis County Greenprint for Growth Plan (2006), Cecil County, MD GI Plan (2007) |
| 5. Restored landscapes within the Wasatch Front | Areas where counties and municipalities have actively restored hydrological assets; polylines were buffered by 50 ft as per discussion with SL County staff. |
| **Exclusion Factors:** | |
| A. Remove 303(d) listed waters | 303(d) listed waters are considered impaired by federal standards, and thus, would not provide a high level of services to the region's GI network. |
| B. Impervious areas greater than 10% (would include roads, highways, and heavily urbanized areas) | Arnold and Gibbons 1996; Schueler 1994; Schueler, Fraley-McNeal and Cappiella 2009 all list impervious areas greater than 10% as being impacted |
| **HUBS** | **SIGNIFICANCE/EXPLANATION** |
| 1. Watershed Restoration Areas | These areas could be considered core areas when restoration is complete. |

| | |
|---|---|
| 2. Groundwater discharge areas, aquifers, & drinking water source protection zones | Incorporated in multiple green infrastructure planning efforts, including, but not limited to, the Maryland GI Plan (2003), the Travis County Greenprint for Growth Plan (2006) |
| 3. Buffers around streams<br>a. in urban areas – min. buffer of 50' on either side; expand width to include adjacent wetlands, land covers, etc.<br>b. In nonurban areas – recommendation of 100–300' for species biodiversity;<br>c. Cutthroat trout streams 30.5 m buffers<br>d. Major Rivers – 150’ | a. Brown (2000) suggests this minimum width, see also Heraty (1993);<br>b. ELI (2003);<br>c. Hickman and Raleigh (1982), see Castelle et al. (1994)<br>d. Morgan County standards for Weber River |
| 4. Buffers around wetlands:<br>a. In urban areas – min. buffer of 50’ for water quality;<br>b. In nonurban areas – min. of 100–300' for species diversity | a. Standards within Morgan & Salt Lake County (for planned developments) require 50’ buffers around wetlands. According to the ELI (2008), a min. of 30’ is needed for water quality (phosphorous and sediments). For nitrogen, a min. of 100’ is needed.<br>b. ELI (2008) |
| 5. Hydric soils or areas with shallow groundwater (0’) | Hydric soils (a component of wetlands) & shallow groundwater areas support groundwater/surface water interactions and could support the region's hydro assets. |
| 6. Appropriate land covers that can serve as riparian vegetation for the high priority riparian areas | Appropriate land covers would include non-urbanized land covers (e.g., forests, grasslands, shrub/scrub, etc.) within 300 m of the surrounding core areas to reduce edge effects (ELI 2003). |
| **Exclusion Factors:** | |
| B. Impervious areas greater than 25% | Schueler, Fraley-McNeal and Cappiella (2009) list impervious areas greater than 25% as being nonsupporting or urban drainage |
| **CORRIDORS** | **SIGNIFICANCE/EXPLANATION** |
| 1. High quality streams and rivers – from core analysis above | The hydrology system identified in the core and hub areas will be used as corridors, given the linear nature of the systems. |
| 2. Canals | Serve as conduits for hydrological systems within the Wasatch Front |

| Suitability Factors | Significance/explanation |
| --- | --- |
| 1. Impaired water bodies would be rated less than higher quality water bodies | 303(d) listed waters are considered impaired by federal standards, and thus, would not provide a high level of services to the region's GI network. |

# Hydrological Asset Network Criteria – Design Process

## Hydrological Cores

1. Create a new toolbox in ArcCatalog for Hydrology modeling - HydroAssets
2. Create Cores
    A. #1 Core Criteria – protected lands with hydrological assets within them
        i. Merge vector files H20ConvEasementst, Easements_hydrology and SaltLakeprotectedarea together → hydro_protected_lands
        ii. Convert to raster → hyd_protland
        iii. Reclassify to 0 and 1 for analysis → ***rc_hydprotect***
    B. #2 Core Criteria – high quality water bodies, including reservoirs, lakes, streams and rivers
        i. Add lakes from National Hydrological Dataset (includes reservoirs), manually remove tailings ponds sound of the Great Salt Lake (lakes), convert to raster → lakes2, reclassify → rc_lakes1
        ii. Add major rivers (majorrivers), convert to raster → majorriver3, reclassify → reclass_majorriv2
        iii. Add permanent and intermittent streams, convert to raster → streams_perm1, streams_int1, reclassify → reclass_stre1, reclass_stre_int
        iv. Using single output map algebra, add the above 4 reclassified rasters together →all_hydro5
        v. Reclassify all values greater than 1 as 1 → ***rc_allhydro1***
    C. #3 Core Criteria – important wetlands
        i. Add wetlands as defined by the USFWS in the National Wetlands Inventory, clip to 10km project boundary → NWI_wetlands_clip
        ii. Convert to raster → NWI_wetlands
        iii. Reclassify → ***rc_NWIwetland***
    D. #4 Core Criteria – floodplains
        i. Merge together floodplains for counties with accessible data (Floodplains_SaltLakeCty, Floodplains_Weber, Davis_Floodplains, Floodplains_GSLclip) → Floodplains_All1
        ii. Convert to raster → floodplains1
        iii. Reclassify → ***rcfloodplain1***
    E. #5 Core Criteria – restored hydrological landscapes
        i. Add Restoration_SLCty_completed to map
        ii. Convert to raster and reclassify to 0 and 1 for analysis → ***rcslrestor***
3. Merge cores together
    A. Using single output map algebra, add together the above 6 reclassified rasters → hydro_cores35
    B. Reclassify all values above 1 as 1 and NoData as 0 → rchydrocores4
4. Merge core exclusion factors
    A. Merge exclusion layers – impervious surfaces (imp_grt10pct) & 303(d) impaired waters (impair_h20) → ***hydro_excl***
    B. Reclassify ***hydro_excl*** where 1 values are now no data and nodata values are now 1→ ***rc_hydroexcl***
5. Complete core analysis
    A. Using single output map algebra, multiply the hydro_cores35 layer with the rc_hydroexcl layer → ***hydro_cores36*** – vector file is ***hydrocores5***

## Hydrological Hubs

1. Create hubs
    A. #1 Hub Criteria – Watershed Restoration Areas

i. Clip Watershed Restoration Focus Areas (UDWR Watershed Restoration Initiative) to project boundary → watershed_restoration_areas
ii. Convert to raster → h20_restor
iii. Reclassify → ***rc_h20restor***

B. #2 Hub Criteria – groundwater discharge areas, aquifers and drinking water source protection zones
i. Clip USGS aquifer file (includes recharge and discharge areas of principle aquifers) to new boundary → aquifer_10km_boundary
ii. Add drinking water source protection zones (DWSPzones), select protection zones 1 through 3 (1=100-foot radius from margin of collection area, 2=area within 250-day ground water time of travel to margin of collection area, 3=area within a 3-year ground water time of travel to margin of collection area) → DWSP_Zones1-3
iii. Merge together the aquifer_10kmboundary layer and the DWSP_Zones1-3 layer → DWSPzones_aquifer, convert to raster → DWSP_aquifer, reclassify to 0 and 1 for analysis →***rc_DWSP_aquif***

B. #3 Hub Criteria – buffered streams
i. Transform the streams (permanent and intermittent) into urban and non-urban areas to perform buffer analyses
ii. Buffer according to criteria → majorrivers_buffer150ft, streams_perm_urban_Buffer50ft, streams_perm_nonurban2_Buffer100ft, streams_intermittent_nonurban_buffer100ft, streams_intermittent_urban_Buffer_50ft, BCT_streams_100ftbuff
iii. Merge the above 6 shapefiles together → all_streams_buffered
iv. Convert to raster → allstreamsbuf
v. Reclassify to 0 and 1 for analysis → ***rc_buffstream***

C. #4 Hub Criteria – buffered wetlands
i. Transform wetlands into urban and non-urban areas to perform buffer analyses (using select by location – those wetlands that intersect with developed_land_all1) → NWI_wetlands_UrbanIntersect; NWI_wetlands_nonurban_ByIntersectSwitch
ii. Buffer according to criteria → NWI_wetlands_urban_50ftbuff; NWI_wetlands_nonurban_100ftbuff
iii. Merge the above 2 shapefiles together → NWI_wetlands_buffered
iv. Convert to raster → wetlandsbuff1
v. Reclassify to 0 and 1 for analysis → ***rc_wetlanbuf1***

D. #5 Hub Criteria – shallow ground water and hydric soils
i. Hydric soils with percentage greater than 70% hydric components (as per conversation with NRCS State Soil Scientist) → hydric70pct
ii. Use single output map algebra to merge together the hydric70pct layer with the rchydrodist300 layer to select all hydric soils within 300 m of core areas → hydric70pt300
iii. Reclassify → rc_hydric300
iv. Select ground water at a depth of 0 feet → grndh20_0ft
v. Convert to raster → shal_grndh20
vi. Reclassify → rc_shalgrh20
vii. Use single output map algebra to add the rc_hydric300 layer and the rc_shalgrh20 layer → hyd_shallow
viii. Reclassify all values above 1 as 1 → ***rc_hydshallow***

E. #6 Hub Criteria – supporting riparian land covers
i. Select appropriate land covers, including forested (mixed, evergreen, and deciduous), grassland, wetland (herbaceous and woody), and shrub/scrub cover → hydro_landcover

ii. Use the single part to multipart tool to "undissolve" all of the land cover areas in individual parts (polygons)
iii. Buffer the hydro_cores layer by 30 m →hydro_cores_30mbuffer
iv. Select by location all of those areas in the hydrolandcover_multipart that intersect the hydro_cores_30mbuffer (captures all polygons in the adjacent cells) →hydro_landcover_adjacenttocores
v. Buffer the hydro_cores7 layer by 300 m (total of 300 m) →hydro_cores_300mbuffer;
vi. Intersect the hydro_landcover_adjacenttocores with the hydro_cores_300mbuffer→hydrocoveradj
vii. Convert each of the above layers to raster (output = hydrocoveradj and rchydrodist300); perform a single map output algebra to merge together those areas that are overlapping →hydrocovadj300
viii. Reclassify hydrocovadj300 to include "nodata" values in the analysis (change from NoData to 0)→***rccovadj300***

2. Merge hubs together
   A. Using single output map algebra, add the six reclassified raster riles together → hydro_hubs14
   B. Reclassify all values greater than 1 as 1 → ***rc_hydrohubs2***
3. Create hub exclusion factors
   A. Select impervious surfaces greater than 25% → ImperviousSurfacegrtthan25pct
   B. Convert to raster → imp_grt25pct
   C. Reclassify so all 1 values are 0 and NoData is 1 → ***rc_imperv25_1***
4. Complete hub analysis
   A. Using single output map algebra, multiply the rc_hydrohubs2 layer with the rc_imperv25_1 layer → ***hydro_hubs15***

## Hydrological Corridors

Hydrological corridors (streams and canals) are inherent in the core areas and required no additional mapping or design process.

## Final Shapefiles for Agencies and Organizations

| | |
|---|---|
| Merged Cores | Hydrological_Cores |
| Merged Hubs | Hydrological_Hubs |

*Note – merged files have been dissolved by layer – data is extremely simplified.*

| | |
|---|---|
| Core #1 – Protected lands with hydrological assets | Protected_Hydro_Lands |
| Core #2 – High quality streams, rivers, lakes & reservoirs | Streams_Rivers_Lakes |
| Core #3 – Important wetlands | Wetlands |
| Core #4 – Floodplains | Floodplains |
| Core #5 – Restored landscapes | SaltLakeCounty_Restoration |
| | |
| Core Exclusion #1 – 303(d) listed waters | Impaired_Water |
| Core Exclusion #2 – Impervious areas greater than 10% | Impervious_Surfaces_Over10Percent |
| | |
| Hub #1 – Watershed restoration areas | Watershed_Restoration_Areas |
| Hub #2 – Aquifers & drinking water source protection zones | DWSP_Zones_Aquifer_Recharge |

| | |
|---|---|
| Hub #3 – Stream buffers | Buffered_Streams |
| Hub #4 – Wetland buffers | Buffered_Wetlands |
| Hub #5 (1) – Hydric soils | Hydric_Soils_AdjacentToCores |
| Hub #5 (2) – Shallow groundwater areas (0') | Shallow_Groundwater_0ft |
| Hub #6 – Riparian vegetation buffering core areas | Supporting_Landcover |
| | |
| Hub Exclusion #1 – Impervious areas greater than 25% | Impervious_Surfaces_Over25Percent |

# WORKING LANDS NETWORK CRITERIA

| CORES | SIGNIFICANCE/EXPLANATION |
|---|---|
| 1. Protected lands with working land assets within them | Protected lands have a higher likelihood of providing permanent GI services. Inclusion of protected lands is well-documented[1]. Includes county-based Agricultural Protection Areas (Tooele, Davis, and Weber County), and agricultural-related conservation easements. |
| 2. Working lands (agricultural production) on prime farmland soil | Working lands in the US are rapidly disappearing[2]; thus, agricultural lands on prime farmland soil, as determined by NRCS, should be prioritized |
| 3. Ranching and grazing lands | Includes state trust grazing leases, those lands identified as pasture/hay lands under the National Land Cover dataset, and BLM grazing allotments. |
| **Exclusion Factors:** | |
| 1. Future and existing roads that cut through - remove with buffer | Roads affect water quality and cause erosion, affecting the quality of working lands (conversation with NRCS, 10.18.10). Most studies focus on ecological effects, but sedimentation and pollution issues have been documented at 40 m (Forman 1995). |
| 2. Unmanaged/unused working lands | Existing agricultural lands left fallow should not be included in core areas (but should be listed as hubs) |
| 3. Working lands next to noxious weeds | Noxious weeds have a detrimental effect on high quality farmlands. |
| 4. Saline soils | Exclude saline soils due to hindrance on productivity (NRCS 10.18.10). |
| 5. T&E Species areas | Remove areas with T&E species within them to protect their habitat. |
| 6. Remove working lands in proximity to core hydrology areas, esp. streams (for water quality protection). | Remove based on hydrology core areas; similar buffers used in the hydrology criteria |
| **HUBS** | **SIGNIFICANCE/EXPLANATION** |
| 1. All soils of statewide importance – prime, prime if irrigated, soils of statewide and local importance | Prime farmland soils should be protected for working lands purposes, even though they may not have working lands on them at present |

| | |
|---|---|
| 2. Other working lands | Other working lands not identified in the core areas, i.e. working lands not on prime farmland soil, non-irrigated agricultural lands. |
| 3. Related land-covers adjacent to working lands, e.g. grasslands, forests, and other land covers that support ecological services provided by the working lands systems, i.e. pollination, biodiversity, etc. | Grasslands and other land covers support ecosystem services, e.g. water quality, pollination, biodiversity that assist working lands in functioning. Forests provide soil stability and agro-forestry related services (see DFFSL 2010). |
| **Exclusion Factors:** | |
| 1. Aquifer discharge areas | Working lands adjacent to an aquifer discharge area can have a negative impact on water quality (NRCS 10.18.10). |
| 2. Those forest lands within the Wildland Urban Interface | Higher fire frequency, due to urban encroachment, will lower the eventual value of these forests to providing ecosystem services to working lands. |
| **CORRIDORS** | **SIGNIFICANCE/EXPLANATION** |
| 1. Irrigation canals | Canals support working land productivity within the Wasatch Front. |
| 2. Major roads | Roads support transportation of products. |

## Working Land Asset Network Criteria – Design Process

## Working Land Cores

1. Create a new toolbox in ArcCatalog for Working Lands modeling – WorkingLandsAssets
2. Create cores
    A. #1 Core Criteria – protected lands with working lands assets within them
        i. Merge together county-based Agricultural Protection Areas and ag-related conservation easements → workinglands_protectedareas
        ii. Convert to raster → wkingprotect
        iii. Reclassify to 0 and 1 for analysis → ***RcWkingprot***
    B. #2 Core Criteria – Agricultural lands on prime farmland soil
        i. Merge cultivated land from AGRC dominant vegetation layer (AGRC_cultivatedland_Multipart), cultivated land from the National Land Cover Dataset (landcover_cultivated_land), and agricultural land from SWreGAP data (GAP_agriculture) → all_cultivated_land

ii. Intersect all_cultivated_land with NRCS Prime_and_Unique_Farmland → cultivatedland_on_primefarmland
iii. Convert to raster → aglandprime1
iv. Reclassify to 0 and 1 for analysis → ***rc_ag_prime1***

C. #3 Core Criteria – Ranching and grazing lands
i. Select pasture and hay lands from National Land Cover Dataset →NLCD_PastureHayLands_multipart
ii. Merge above layer with SITLA_Graze_Leases, Grazingallotments_BLM_activestatus, and Nevada_allotments → grazing_ranching_lands1
iii. Convert to raster → grazingranch4
iv. Reclassify → ***rc_ranchland1***

3. Merge cores together
A. Using single map algebra output, add each of the above 3 reclassified rasters together → wkngcores4
B. Reclassify so that only 0 or 1 value are present→***rcwkingcores3***

4. Create core exclusion layers
A. #1 Core Exclusion Factor – future and existing roads with 40 meter buffer
i. Clip major road data to project boundary (MajorRoads_buffer10km), merge with proposed road areas (Highway_newconstruction)→merged_roads
ii. Buffer merged_roads by 40 meters → MergedRoads_40mbuff1
iii. Convert to raster → roads_40mbuf1
iv. Reclassify 1 values to 0 and NoData to 1 → ***rc_roads40m***

B. #3 Core Exclusion Factor – working lands next to noxious weeds
i. Clip noxious weeds layer from AGRC to project boundary →noxiousweeds_AGRC
ii. Select noxious weeds from dominant vegetation shapefile (from AGRC, include cheatgrass, which is not on the noxious weed list but has significant ecological and productivity ramifications)→noxiousweeds_cheatgrass
iii. Merge the above two noxious weeds layers →noxiousweeds_all
iv. Convert the noxiousweeds_all layer to raster → noxiousweeds1
v. Reclassify 1 values to 0 and NoData to 1 → ***rc_noxweeds1***

C. #4 Core Exclusion Factor – saline soils
i. Dissolve all soils layer by name →allsoils_dissolve
ii. Select those soil layers that are saline (MUKEY= 482121,482149, 482166, 482167, 482169, 482181, 482186, 482881, 482888, 482889, 483285, 482899, 483308, 483310, 483322, 483335, 482549, 503899, 483395) →soils_saline
iii. Convert saline soils to raster for analysis → salinesoils1
iv. Reclassify 1 values to 0 and NoData to 1 → ***rcsalinesoil1***

D. #5 Core Exclusion Factor – working lands adjacent to hydrological cores
i. Add core hydrology areas (hydro_cores24) to the map
ii. Reclassify 1 values to 0 and 0 values to 1 → ***rc_hydrocores***

E. Using single output map algebra, multiply all of the exclusion layers together → ***wkcoreexfact***

5. Complete core analysis
A. Using single output map algebra, multiply the rcwkingcores2 layer with the wkcoreexfact layer → ***wkingcores5***

## Working Land Hubs

1. Create hubs
A. #1 Hub Criteria – all soils of statewide importance

i. Clip all important soils layer to the project boundary → Soils_allimportant
ii. Convert to raster →importantsoils
iii. Reclassify to 0 and 1 for analysis → ***rc_importsoil***

B. #2 Hub Criteria – other working lands
i. Convert all_cultivated_land feature to raster → all_cult_land
ii. Reclassify to 0 and 1 → rc_allagland
iii. Using single output map algebra, add together rc_allagland and rc_ranchland2 reclassified rasters → allwkngland3
iv. Reclassify to 0 and 1 → ***rcallwkngland2***

C. #3 Hub Criteria – related land covers
i. Merge related land covers together into a single layer (same land cover types as in hydrology) → hydro_landcover
ii. Use the single part to multipart tool to "undissolve" all of the land cover areas into individual parts (polygons) →hydro_landcover_multipart
iii. Use the Euclidean distance tool to calculate distance from the working land cores layer (wkngcores1)→tmpwkngcordis
iv. Reclassify the Distance layer to have 0-30 values as 1, and all other values to NoData→wkngcor30mbuf
v. Export this layer to .gdb file→wkngcores_30mbuf
vi. Select by location all of those polygons within the hydro_landcover_multipart that intersect the wngcores_30mbuf→wkng_landcover_adj30m
vii. Buffer the working cores layer by 300 m →wkngcores_300mbuf
viii. Intersect the wkng_landcover_adj30m with the wkngcores_300mbuf to select all land cover areas adjacent to the cores→wkngcover_adjacenttocores2
ix. Convert each the above layers to raster (output = wkngcoveradj); reclassify for analysis: rcwkngcoveradj;
x. Remove WUI areas from this layer (as per hub exclusion factor #3)
1. Clip WUI areas to project boundary→WUI_areas
2. Convert to raster and reclassify to only include areas that should be included within the analysis→wui_areas and rcwui_incl;
3. Conduct single output map algebra multiplying rc_wui_incl to rcwkngcoveradj to only select those land cover areas not in the WUI→ ***rcwkngcovadj1***

2. Merge hubs together
A. Using single output map algebra, merge the rcimportsoils, rc_allwkngland, and rcwkngcovadj1→wkng_hubs2
B. Reclassify so that only 0 or 1 values are present→***rc_wknghubs2***

3. Create exclusion layers
A. #1 Hub Exclusion Factor – aquifer discharge areas
i. Clip aquifer discharge areas to project boundary → dischargeareas_projectboundary
ii. Convert to raster → dischargearea
iii. Reclassify for analysis→rcdischargearea
iv. Reclassify 1 values to 0 and 0 to 1 (to exclude these areas in the final analysis)→discharge_incl

B. #2 Hub Exclusion Factor – wildland urban interface
i. Convert Wildland Urban Interface file to raster → WUI_area
ii. Reclassify 1 values to 0 and NoData to 1 → rc_wui_incl

C. Using single output map algebra, multiply the discharge_incl layer and the rc_wui_incl layer together → ***wkhubexfact***

4. Complete hub analysis
    A. Using single output map algebra, multiply the final hubs layer (rc_wknghubs2) with the hub exclusion factor layer (wkhubexfact) → ***wkng_hubs3***

## Working Land Corridors

Irrigation canals serve as corridors supporting the working lands within the Wasatch Front. Least cost paths analysis was deemed an unsuitable process for working lands corridor design, as plant pollination and particle movement corridors cannot be defined by least cost paths.

## Final Shapefiles for Agencies & Organizations

| | |
|---|---|
| Merged Cores | Working_Lands_Cores |
| Merged Hubs | Working_Lands_Hubs |
| Merged Corridors | Working_Lands_Corridors |

*Note – merged files have been dissolved by layer – data is extremely simplified.*

| | |
|---|---|
| Core #1 – Protected lands with working lands assets | Protected_Working_Lands |
| Core #2 – Working lands on prime farmland soil | CultivatedLands_PrimeFarmlandSoil |
| Core #3 – Grazing and ranchlands | Grazing_Ranching_Lands |
| | |
| Core Exclusion #1 – Future & exiting roads | Roads_40mbuffer |
| Core Exclusion #2 – Unused/unmanaged working lands | Not mapped |
| Core Exclusion #3 – Noxious weeds | Noxious_Weeds |
| Core Exclusion #4 – Saline soils | Saline_Soils |
| Core Exclusion #5 – Threatened & endangered species areas | Not mapped |
| Core Exclusion #6 – Working lands in proximity to hydrology cores | Hydro_Cores |
| | |
| Hub #1 – Soils of statewide importance | Soils_Statewide_Importance |
| Hub #2 – Other working lands | All_Cultivated_Land |
| Hub #3 – Related landcovers adjacent to working lands | Adjacent_Supporting_Landcover |
| | |
| Hub Exclusion #1 – Aquifer discharge areas | Aquifer_Discharge_Areas |
| Hub Exclusion #2 – Forests within the Wildland-Urban Interface | Wildland_Urban_Interface |
| | |
| Corridor #1 – Irrigation canals | Irrigation_Canals |
| Corridor #2 – Major roads | Major_Roads |

## RECREATIONAL NETWORK CRITERIA

| CORES | SIGNIFICANCE/EXPLANATION |
|---|---|
| 1. Protected lands or public lands with recreational assets within them (includes the public lands that allow recreation, e.g., hunting, skiing, hiking etc. within them). | Protected lands have a higher likelihood of providing permanent GI recreational services. Inclusion of protected lands is well-documented[1]. Includes public lands that allow recreational-related access, including US Forest Service, BLM, State-owned lands that allow recreation, etc. |
| 2. Regional trail Assets and Priorities | Regionally significant trails provide the backbone for the region's recreational GI network[2] Includes national historic trails, national recreation trails, and the respective trailheads. |
| 3. Regional Park Assets and Priorities | Regionally significant parks provide the backbone for the region's recreational GI network[3]; If regionally significant parks were not available, minimum park sizes were incorporated. Community parks classification (over 20 acres) were employed within this study. Also includes all state parks. |
| 4. Regional Natural Lands Assets and Priorities | Regionally significant open spaces provide the backbone for the region's recreational GI network[4] Also includes the Great Salt Lake, Jordan River, Ogden River, Antelope Island as per discussions with county planners and others for open space priorities. |
| 5. Other regional amenities that provide significant value, e.g., golf courses, marinas, and ski hills. | |
| 6. Major waterways, permanent streams, and lakes | Serve as wildlife viewing areas, fishing, boating, etc. opportunities. |
| 7. Scenically-rich areas of the Wasatch Front, e.g., ridgelines, scenic byways and backways, etc. | The Wasatch Front represents one of the most scenically-rich areas in the country. |
| **Exclusion Factors:** | |
| 1. T&E Species areas | Remove areas with T&E species within them to protect their habitat. |

| HUBS | SIGNIFICANCE/EXPLANATION |
|---|---|
| 1. Suitable land surrounding the core areas that allow recreational uses | Developed, open space areas and public lands that allow recreation. |
| 2. Other trails, parks, and open space, not identified as core areas, that connect into the core areas | Connectivity into the core system strengthens the overall recreational opportunities for the region. |
| 3. Intermittent streams, washes, canyons, etc. | Washes and intermittent streams are used for recreational access. |
| 4. Crucial or substantial habitat areas for popular game species (more than 1 species). | Includes all habitat data for areas within the Wasatch Front that is available, based on UDWR publications. |
| 5. Cooperative wildlife management units within the Wasatch Front | UDWR works with private landowners to maintain private lands for wildlife habitat. While these areas are not permanently protected, they do offer significant indirect value to the area's recreational opportunities. |
| **Exclusion Factors:** | |
| 1. T&E Species areas | Remove areas with T&E species within them to protect their habitat. |
| **CORRIDORS** | **SIGNIFICANCE/EXPLANATION** |
| 1. Regional trails | Prioritize regional trail connections first. |
| 2. Other trails, public lands, open spaces, and parks | Second, connect recreational asses through other trails, public lands, etc. |
| 3. Waterways | Third, connect recreational opportunities via waterways (water-based recreational activities; drainages often used as links for hiking, etc.). |
| 4. Major Roads | Fourth, connect recreational opportunities via major roadways for driving and biking. |
| 5. Least cost path analyses between the core areas, using acceptable land cover types. | See least cost path analysis process below. |
| **Suitability Factors** | |
| 1. Habitat corridors – rank these less than other potential corridors | Many species are sensitive to recreation and thus, habitat corridors should be designed around when possible. |

# Recreational Asset Network Criteria – Design Process

## Recreational Cores

1. Create a new toolbox in ArcCatalog for Recreational modeling - ~RecreationalAssets
    A. #1 Core Criteria – protected and public lands with recreational assets
        i. Select all public lands that allow recreation – BLM, US Forest Service, State Parks, etc. Merge into one layer→recreationallandowners_all
        ii. Merge the recreationallandowners_all with the easements_recreational layer→recreationallands_protected
        iii. Convert to raster→prot_reclands
        iv. Reclassify to 0 and 1 for analysis→***rc_protreclan***
    B. #2 Core Criteria – regional trails
        i. Merge together the historic trails, urban trails, cross country ski trails and priority trails (in footnote 2)→ all_trails
        ii. Buffer by 50 feet → all_trails_50ftbuff
        iii. Convert to raster→ trails_50ft
        iv. Reclassify to 0 and 1 for analysis→***rc_trails50ft***
    C. #3 Core Criteria – regional parks
        i. Select those parks that meet the core criteria described above and in footnote 3 →all_parks_over20ac1
        ii. Convert to raster→reg_parks2
        iii. Reclassify to 0 and 1 for analysis→***rc_regparks3***
    D. #4 Core Criteria – regional open spaces
        i. Merge together those parks listed in core criteria #4 and those listed in footnote 4→regionalopenspace4
        ii. Convert to raster→reg_open1
        iii. Reclassify to 0 and 1 for analysis→***rc_regopen1***
    E. #5Core Criteria – other regional amenities
        i. Merge together golf courses, marinas, ski lifts and ski hills→important_recareas
        ii. Convert to raster→recareas1
        iii. Reclassify to 0 and 1 for analysis→***rc_recareas1***
    F. #6 Core Criteria – major waterways, permanent streams, and lakes
        i. Merge together major waterways, permanent streams, and lakes →rec_waterways
        ii. Convert to raster→rec_waterway
        iii. Reclassify to 0 and 1 for analysis→***rc_recwater***
2. Merge together the core criteria 1-6
    A. Use single output map algebra to add the above final, reclassified rasters together→rec_cores3
    B. Use the reclassify tool to change any value above 1 to a 1 and 0 values to NoData→***rc_reccores3***

## Recreational Hubs

1. Develop hub criteria
    C. #1 & #2 Hub Criteria – public lands and open space areas that allow for recreation and remaining parks and trails
        i. Convert rc_protreclan to vector→rc_protectland
        ii. Merge rc_protectland with the trails_6ft, regionalopenspace3, Parks_OpenSpace and NLCD_openspace layers→ prot_rechub1

iii. Convert to raster→ rec_prothub1
iv. Reclassify to 0 and 1 for analysis→***rcprotrechub1***

D. #3 Hub Criteria – intermittent washes, streams, etc.
i. Convert intermittent streams, washes, etc. (all_hydrology_hubs) to raster→recwater_int
ii. Reclassify to 0 and 1 for analysis→rc_rech20int
iii. Use single output map algebra to add the rc_rech20int to the rc_recwater layer →allhydro_hubs
iv. Reclassify to 0 and 1 for analysis→***rc_allhydro***

E. #4 Hub Criteria – wildlife habitat
i. Game birds – use single map algebra to add each of the game birds species together, includes California Quail, Blue Grouse, Chukar, Hungarian Partridge, Ruffed Grouse, Sage Grouse, Sharp-tailed grouse, ring-necked pheasant and wild turkey→uplandgame1
1. Reclassify the uplandgame1 to only include areas with 2 or more values as 1 →rc_uplndgme
ii. Big game – use single output map algebra to add each of the big game species together, including bison, black bear, elk, bighorn sheep, pronghorn, moose, mountain goat, mule deer and snowshoe hare→biggame
1. Reclassify the biggame to only include areas with 2 or more values as 1 →rc_biggame
iii. Merge rc_uplndgme with rc_biggame→wildlifehab2;
iv. Reclassify to only include values of 0 and 1→***rc_wildlife***

F. #5 Hub Criteria – Cooperative Wildlife Mgmt Units
i. Convert the CoopWMUs shapefile to raster→CWMUs
ii. Reclassify to 0 and 1 for analysis→***rc_CWMUs***

3. Merge together hub criteria
A. Use single output map algebra to add the above final, reclassified rasters together→rec_hubs1
B. Use the reclassify tool to change any value above 1 to a 1, and then all nodata values to 0→***rc_rechubs1***

## Recreational Corridors – Least Cost Path Analysis

1. Create the cost surface raster - Merge recreational cores with all the remaining recreational features
a. Convert the rc_reccores2 layer to vector → reccores2
i. Dissolve reccores2 by value field → rec_core_dissolve
ii. Add field – label; start editing session – add "Cores" to the one attribute field under "label"
b. Convert the rc_rechubs1 layer to vector → rechubs3
i. Erase the reccores2 layer from the rechubs3 layer, leaving only hub areas that do not overlap with cores (erase function only possible with ArcInfo license) → rechubs_erase2
ii. Dissolve by value field → rechubs_erase_dissolve
iii. Add field – label; start editing session – add "Hubs" to attribute field under label
c. Buffer regionaltrails3 by 15 m (for one pixel cell size)→regionaltrails_15mbuff;
i. Dissolve the regionaltrails_15mbuff by buffer distance →reg_trails_15mbuff_dissolve
ii. Add field – label; start editing session – add "Regional Trails" to the one attribute field under "label"
d. Select local trails → trails
i. Buffer by 15 meters (for one pixel size) → LocalTrails_15mbuff
ii. Dissolve by buffer distance → LocalTrails_15mbuff_dissolve
iii. Add field – label; start editing session – add "Local Trails" to the one attribute field under "label"
e. Convert rc_allhydro raster (from Hub Criteria # 3) to vector → rec_waterways_forcorridors
i. Select by attribute all areas where GRIDCODE = 1 → rec_waterways_forcorridors1
ii. Dissolve by value field→ rec_waterways_dissolve

iii. Add field – label; start editing session – add "Waterways" to the one attribute field under "label"

f. Select UDOT roads with codes 1 and 2 (state and interstate highways) → roads_1and2
   i. Dissolve by value field → major_roads_dissolve
   ii. Buffer by 15 meters (for one pixel size) → major_roads_15mbuff_dissolve
   iii. Add field – label; start editing session – add "Roads" to the attribute field under label

g. Select hazards (fault lines, fire hazard areas, liquefaction areas, problem soils, landslide areas) → rec_hazards3
   i. Dissolve by value field → rec_hazards_dissolve
   ii. Add field – label; start editing session – add "Hazards" to the attribute field under label

h. Merge the rec_core_dissolve, rechubs_erase_dissolve, reg_trails_15mbuff_dissolve, LocalTrails_15mbuff_dissolve, rec_waterways_dissolve, major_roads_dissolve and rec_hazards_dissolve → rec_corridor_permeability4 (note, this should be the cost surface file – to be renamed in raster classification)
   i. Under value field, insert the following values:

| Value | Label |
|---|---|
| 1 | Cores |
| 2 | Hubs |
| 3 | Regional Trails |
| 3 | Roads |
| 4 | Local Trails |
| 5 | Waterways |
| 6 | Hazards |

   ii. Convert to raster → ***rec_costsurf1***
   iii. Add PermValue field, start editing session and insert the following values:

| OBJECTID | Value | Label | PERMVALUE |
|---|---|---|---|
| 0 | 1 | Cores | 1.0 |
| 1 | 2 | Hubs | 0.9 |
| 2 | 3 | Regional Trails | 0.8 |
| 3 | 3 | Roads | 0.8 |
| 4 | 4 | Local Trails | 0.7 |
| 5 | 5 | Waterways | 0.6 |
| 6 | 6 | Hazards | 0.1 |

## Recreational Corridors – Design Process

1. Create study map with cores, hubs, least cost paths and linear recreational features that could serve as corridors
   a. Add cores → rec_cores2 and hubs → rechubs_erase2
   b. Add least cost paths to map → movement_prob

i. In Symbology, select “Classified”; compute histogram; exclude data between 0 – 0.653 (retains highest value paths)

c. Add trails → all_trails; waterways → streams_rivers; major roads → roads_1and2

2. Create new shapefile → Rec_Corridors_Existing
    a. Trace existing linear recreational features that serve as connecting corridors between core areas (hub areas not considered in this connectivity analysis because they represent supporting recreational land types, not destinations – many corridors are present in hub areas)
3. Create new shapefile → Rec_Corridors_Proposed
    a. Assess areas where connectivity is lacking and draw in corridors using the following criteria
        i. Trace existing corridor features first, even if they do not completely connect two core patches – such partial corridors are included in the existing corridor shapefile – draw in proposed corridors to complete these connections
        ii. Secondly, use least cost paths to draw in corridors where connectivity is still lacking

## Final Shapefiles for Agencies & Organizations

| | |
|---|---|
| Merged Cores | Recreational_Cores |
| Merged Hubs | Recreational_Hubs |
| Existing Corridors | Recreational_Corridors_Existing |
| Proposed Corridors | Recreational_Corridors_Proposed |

*Note – merged files have been dissolved by layer – data is extremely simplified.*

| | |
|---|---|
| Core #1 – Protected lands with recreational assets | Protected_Recreational_Lands |
| Core #2 – Recreational trail assets | Trails_50ftbuffer |
| Core #3 – Regional park assets | Parks_Over_20Ac |
| Core #4 – Regional natural lands assets | Regional_Open_Space |
| Core #5 – Golf courses, marinas, ski hills | Golf_Ski_Marina |
| Core #6 – Major waterways, permanent streams, lakes | Recreational_Waterways_Lakes |
| Core #7 – Scenically-rich areas | Not mapped |
| | |
| Hub #1 – Land around cores allowing recreation | Not mapped |
| Hub #2 – Other trails, parks & open space not included in core designations | Other_Parks_OpenSpace |
| Hub #3 – Intermittent streams & washes | Intermittent_Streams_Washes |
| Hub #4 – Game species habitat | Wildlife_Habitat |
| Hub #5 – Cooperative wildlife management units | Coop_Wildlife_Mgmt_Units |

## COMMUNITY AND CULTURAL LANDSCAPE NETWORK CRITERIA

| CORES | SIGNIFICANCE/EXPLANATION |
|---|---|
| 1. Protected lands with community assets within them (Hill Air Force Base, tribal lands) | Protected lands have a higher likelihood of providing permanent GI services. Inclusion of protected lands is well-documented.[1] These lands are significant to the sense of community and the cultural (diversity of the region. |
| 2. Historic districts and historic easements | Significantly noted history of the area |
| 3. Transit stops | Transit nodes - significant means to connect humans to community resources with reduced impacts |
| 4. Parks and open space (includes rivers and cemeteries) | These elements contribute to the physical and psychological health of residents. |
| 5. Viewsheds and ridgelines | Provide aesthetic benefits to communities and residents |
| 6. Community institutions – libraries, zoos, schools, etc. | Community institutions promote health and learning and provide gathering locations, all of which benefit communities [2]. |
| **Exclusion Factors:** | |
| 1. Exclude areas with T&E species present | Remove areas with T&E species within them to protect their habitat. |
| 2. Hazard areas (fire hazard, problem soils, landslide areas, fault lines) | Hazard areas should be avoided in future GI investment efforts[3]. |
| **HUBS** | **SIGNIFICANCE/EXPLANATION** |
| 1. Protected lands not listed above with community assets within them – SITLA, BLM, and remainder of military lands. | These lands contribute significantly to the economic health of the communities and region. |
| **Exclusion Factors:** | |
| 1. Exclude areas with T&E species present | Remove areas with T&E species within them to protect their habitat. |
| 2. Hazard areas (same as above) | See above. |
| **CORRIDORS** | **SIGNIFICANCE/EXPLANATION** |

| | |
|---|---|
| 1. Transit lines and other mass transit connections, including all highways and major roads | Significant means to connect humans to community resources |
| 2. Multi-modal connections, including trail corridors from recreational assets | Regional trails and other connecting trails |
| 3. Canals | Important landscape corridors |
| **Exclusion Factors:** | |
| 1. Hazard areas (same as above) | See above. |

## Community Asset Network Criteria – Design Process

## Community Cores

1. Create a new toolbox in ArcCatalog for Recreational modeling - CommunityAssets
    A. #1 Core Criteria – Protected and Public Lands with Community Assets
        i. Merge Hill Airforce Base, Tribal Lands and Easements→ Cult_prot_lands_cores
        ii. Convert to raster→ comprotland
        iii. Reclassify to 0 and 1 for analysis→***rc_commprot***
    B. #2 Core Criteria – Historic Elements
        i. Merge Historic Districts with Historic Easements → Hist_Districts_Easements, convert to raster → hist_areas, reclassify to 0 and 1 for analysis → ***rc_histareas1***
    C. #3 Core Criteria – Transit Stops
        i. Merge together Commuter Rail Stops and Light Rail Stations → commuter_light_rail_stops, buffer by 400 meters (.25 mile) → transitstops_400mbuff, convert to raster → transstop_buf, reclassify to 0 and 1 for analysis → ***rc_stop_buf1***
    D. #4 Core Criteria – Parks and Open Space
        i. Merge together local parks and state parks → all_parks1, convert to raster →all_parks3, reclassify to 0 and 1 for analysis → rc_allparks4
        ii. Buffer cemeteries by 400 meters → cemeteries_400mbuff, convert to raster → cemetery_buff, reclassify to 0 and 1 for analysis → rc_cem400m
        iii. Buffer rivers by 100 meters → rivers_100mbuff, convert to raster → rivers_100m, reclassify to 0 and 1 for analysis → rc_rivers100m
        iv. Convert AGRC Great Salt Lake shapefile to raster → gsaltlake, reclassify → rc_saltlake
        v. Use single output map algebra to add the above 4 layers→opencore, reclassify so all values 1 or higher equal 1 → ***rc_opencore8***
    E. #6 Core Criteria – Community Institutions
        i. Merge together all buffered points from footnote 2 →placepointsbuffer_all, convert to raster → placepoints4, reclassify to 0 and 1 for analysis → rc_plcpoints2

ii. Merge together all polygons from footnote 2 → Comm_Areas, convert to raster → comm_areas, reclassify to 0 and 1 for analysis → comm_areas1
iii. Use single output map algebra to add the above 2 layers → ***rc_cultcores4***

2. Merge together the core criteria 1 – 6
   A. Use single output map algebra to add the above final, reclassified rasters together → cc_cores4
   B. Use the reclassify tool to change any value above 1 to a 1, and then all nodata values to 0 → ***rc_cc_cores4***

## Community Hubs

1. Develop hub criteria
   A. #1 Hub Criteria – protected lands not covered in core #1 with community assets within them (BLM, SITLA, military lands other than Hill AFB)
      i. Merge together all lands listed above →comm_protland_hub
      ii. Convert to raster → protland_hub2
      iii. Reclassify to 0 and 1 for analysis → ***rc_prot_hub4***

## Community Corridors

1. Develop corridor criteria
   A. #1 Corridor Criteria – transit lines, highways and major roads
      i. Merge together Commuter Rail Routes, Light Rail Lines and Railroads →commuter_lightrail_railroad_routes, buffer by 200 meters → transitlines_200mbuff, convert to raster →translinebuf, reclassify to 0 and 1 for analysis → rc_trlinebuf1
      ii. Select major roads from AGRC (includes interstate highways, state highways, and local major roads) → roads500K_newboundary, buffer by 200 meters → major_roads_200mbuff, convert to raster → majroads_200m, reclassify → rc_mroads200m
      iii. Add the above two layers using single output map algebra → transitcorr, reclassify so all values above 1 equal 1 → ***rc_transcorr***
   C. #2 Corridor Criteria – Multi-modal connections, including regional and local trails
      i. Buffer trails by 50 meters → trails_50mbuff
      ii. Buffer regional trails by 50 meters → reg_trails_50mbuff
      iii. Merge the above two layers together → all_trails_50mbuff, convert to raster → alltrails_50m, reclassify → ***rc_trails50m***
   D. #3 Corridor Criteria – Canals
      i. Buffer canals by 50 meters → canals_50mbuff, convert to raster → canals50m, reclassify to 0 and 1 for analysis → ***rc_canals50m***
2. Merge together the corridor criteria 1 – 3
   A. Use single output map algebra to add the above final, reclassified rasters together → cc_corridor
   B. Use the reclassify tool to change any value above 1 to a 1, and then all nodata values to 0 → ***rc_cc_corr***

## Final Shapefiles for Agencies and Organizations

| | |
|---|---|
| Merged Cores | Community_Cores |
| Merged Hubs | Community_Hubs |
| Merged Corridors | Community_Corridors |

*Note – merged files have been dissolved by layer – data is extremely simplified.*

| | |
|---|---|
| Core #1 – Protected lands with community assets | Protected_Cultural_Lands |

| | |
|---|---|
| Core #2 – Historic districts & historic easements | Historic_Districts_Easements |
| Core #3 – Transit stops | Transit_Stops_400mbuffer |
| Core #4 – Parks & open space | Open_Space_Areas |
| Core #5 – Viewsheds & ridgelines | *Not mapped* |
| Core #6 – Community sites | Community_Sites |
| | |
| Hub #1 – Other protected lands with community assets | Hub_Other_Protected_Lands |
| | |
| Corridor #1 – Transit lines & major roads | Transit_Lines_200mbuffer |
| Corridor #2 – Trails | Trails_50mbuffer |
| Corridor #3 – Irrigation canals | Canals_50mbuffer |