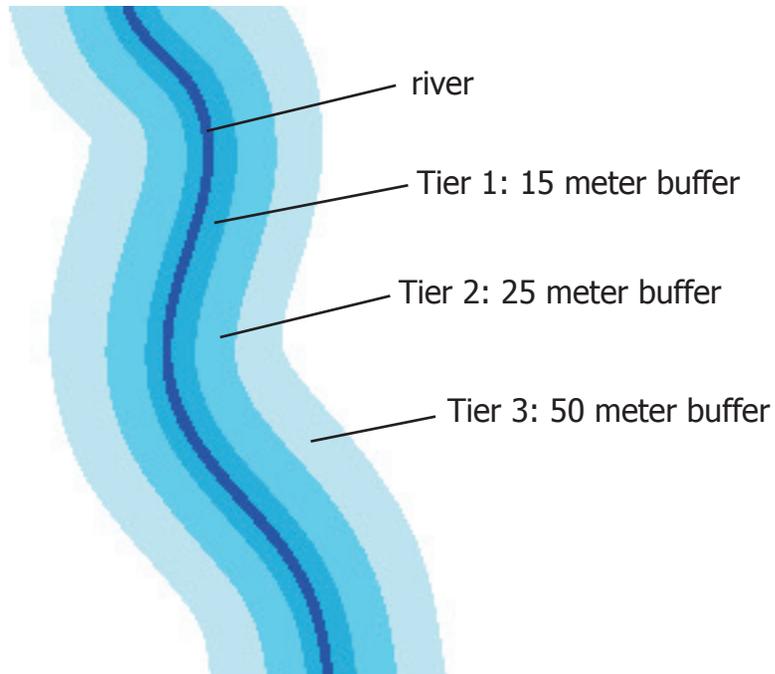


gis mapping tool

## gis tool introduction



example of tiering for the river indicator

A Geographic Information System (GIS), combines digital layers of map-based information about a geographic location to better understand relationships between the various characteristics of that location. The GIS in this Toolkit combines layers of data that deal with critical lands and produces a composite "critical lands map." The tool uses six critical lands indicators or layers to produce the map. The critical lands indicators are:

- Steep Slopes
- Prime Agricultural Land
- Wildlife Habitat
- Streams
- Lakes
- Wetlands

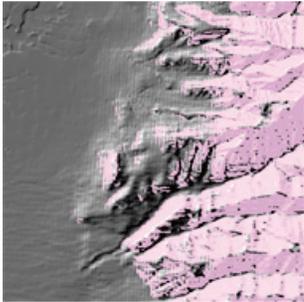
Each indicator has three "tiers" or levels of protection. Tier 1 encompasses the least amount of physical area or restriction for an indicator, while Tier 3 encompasses the most area. For example, consider the river indicator shown to the left. Tier 1 is the river itself, with a 15-meter buffer. Tier 2 is the river and a 25-meter buffer. Tier 3 is the river and a 50-meter buffer.

When creating a critical lands map one would choose the tier level of an indicator based on the level at which they want to see the indicator protected. For instance, if a large part of the economy of a community is comprised of hunting they may want to protect wildlife habitat at a Tier 3 level to ensure that plenty of land is conserved for habitat and hunting purposes. A community whose economy is influenced by recreation on its waterways may protect its streams at a Tier 3 level as well.

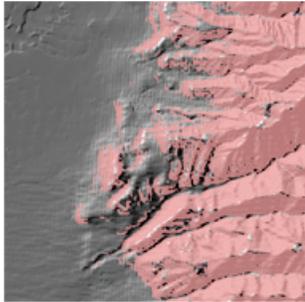
The tiering system allows a community to have choices and experiment with different indicator levels when creating a critical lands map.

## gis tool indicators

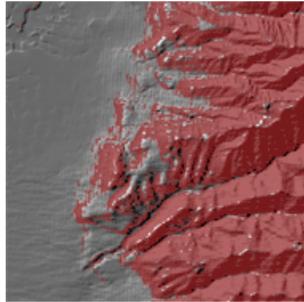
### steep slopes



Tier 1: 30% or greater



Tier 2: 25% or greater

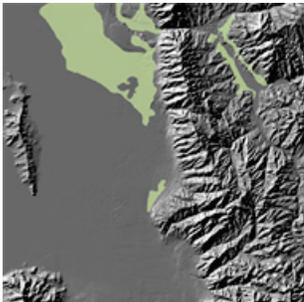


Tier 3: 15% or greater

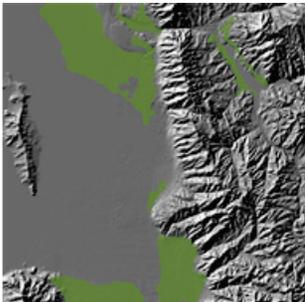
Steep slope indicators are based on observations of standard development practices across the United States. A steep slope is generally defined as a land with a 20 - 25% or greater slope. Tier 1 is land with a 30% slope or greater, Tier 2 is land with a 25% slope or greater, and Tier 3 is land with a 15% slope or greater.

Data Source: a state-wide slope map can be created from the Digital Elevation Models found at: <ftp://ftp.agrc.state.ut.us/DEM/>

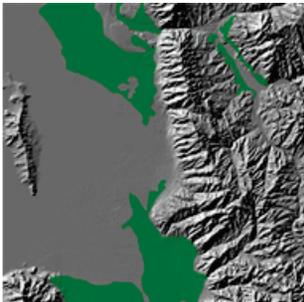
### prime farmland



Tier 1: NRCS category 1



Tier 2: NRCS categories 1 & 4



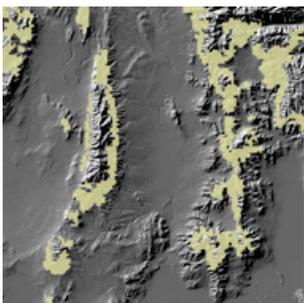
Tier 3: NRCS categories 1, 4, & 6

The prime farmland indicators are based on the Natural Resources Conservation Service's (NRCS) prime farmland designations within the STASGO Soil Survey for Utah. Three categories of NRCS prime farmland are found in Utah: 1, 4, and 6. Several factors are used by the NRCS to designate prime farmland including; soil type, available water, and erodibility. For more information refer to the technical information below.

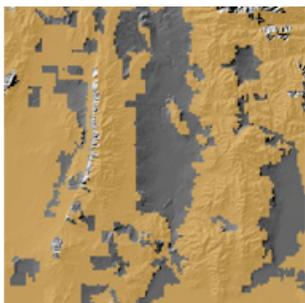
Data Source: [www.ncgc.nrcs.usda.gov/branch/ssb/products/statsgo/data/ut.html](http://www.ncgc.nrcs.usda.gov/branch/ssb/products/statsgo/data/ut.html)

Technical Information: [www.nrcs.usda.gov/technical/techttools/statsgo\\_dp.pdf](http://www.nrcs.usda.gov/technical/techttools/statsgo_dp.pdf)

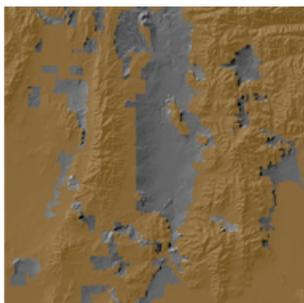
### habitat



Tier 1: 7 - 13 species



Tier 2: 4 - 13 species



Tier 3: 1 - 13 species

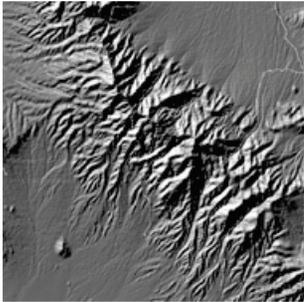
Wildlife habitat indicators were created by making a species richness model using the "Utah State Sensitive Species List" from the Utah Division of Wildlife Resources. Habitat was determined using data from the GAP (Geographic Approach to Planning) Analysis Program of the USGS. Tier 1 consists of 7-13 species overlapping each other, Tier 2 is 4-13 species overlapping, and Tier 3 is 1-13 species overlapping.

Data Source: [www.gis.usu.edu/downloadabledata/UtahGAPAnalysis.html](http://www.gis.usu.edu/downloadabledata/UtahGAPAnalysis.html)

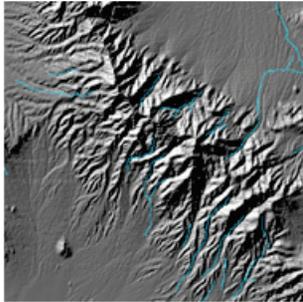
Technical Information:

GAP Analysis: <ftp://ftp.gap.uidaho.edu/products/Utah/report/UT-GAP.pdf>  
Utah Sensitive Species List: [www.wildlife.utah.gov/pdf/utsoclist.pdf](http://www.wildlife.utah.gov/pdf/utsoclist.pdf)

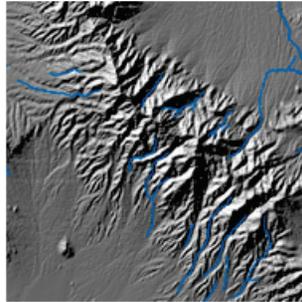
### streams



Tier 1: 15-meter buffer



Tier 2: 25-meter buffer

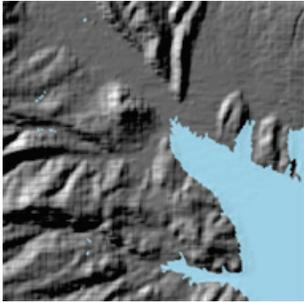


Tier 3: 50-meter buffer

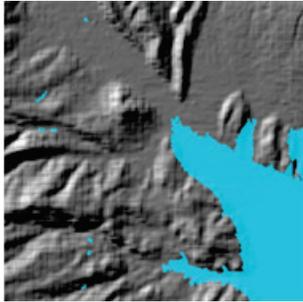
Stream indicators are based on "braided streams" as identified by the State Automated Geographic Reference Center. The streams were buffered to create three different tiers. Tier 1 is a 15-meter stream buffer, Tier 2 is a 25-meter stream buffer, and Tier 3 is a 50-meter stream buffer.

Data Source: [ftp://ftp.agrc.state.ut.us/NAD83/Hydrology/Streams/state\\_wide/shape\\_file/SGID024/SGID024\\_Streams.zip](ftp://ftp.agrc.state.ut.us/NAD83/Hydrology/Streams/state_wide/shape_file/SGID024/SGID024_Streams.zip)

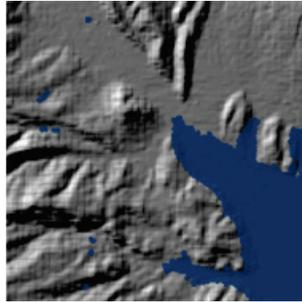
### lakes



Tier 1: 15-meter buffer



Tier 2: 25-meter buffer

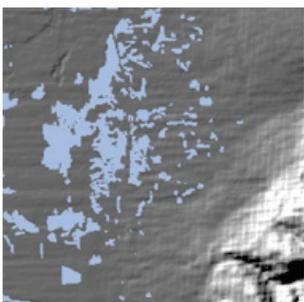


Tier 3: 50-meter buffer

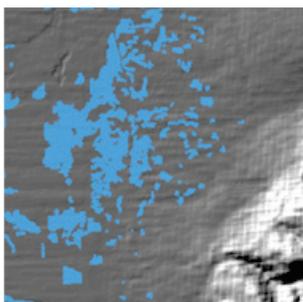
The lake indicators are based on "lakes or ponds" and "reservoirs" as identified by the State Automated Geographic Reference Center. The lakes were buffered to create three different tiers. Tier 1 is a 15-meter lake buffer, Tier 2 is a 25-meter lake buffer, and Tier 3 is a 50-meter lake buffer.

Data Source: [ftp://ftp.agrc.state.ut.us/NAD83/Hydrology/Lakes/state\\_wide/shape\\_file/SGID024/SGID024\\_Lakes.zip](ftp://ftp.agrc.state.ut.us/NAD83/Hydrology/Lakes/state_wide/shape_file/SGID024/SGID024_Lakes.zip)

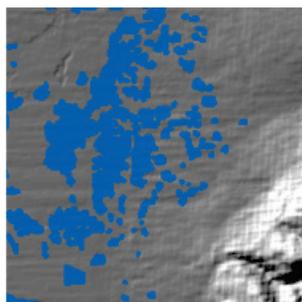
### wetlands



Tier 1: 15-meter buffer



Tier 2: 25-meter buffer

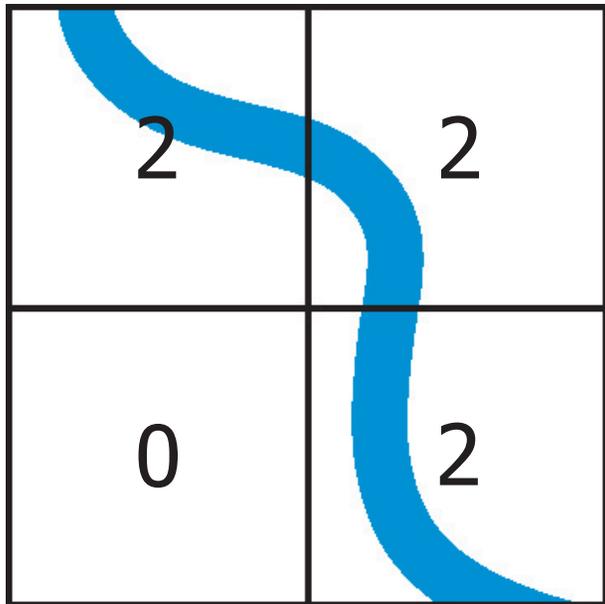


Tier 3: 50-meter buffer

The wetland indicators are based on "saturated, seasonally flooded, seasonally flooded/well-drained, seasonally flooded/saturated, semi-permanently flooded, permanently flooded, and saturated/semi-permanent/seasonal wetlands" as identified by the State Automated Geographic Reference Center. The wetlands were buffered to create three different tiers. Tier 1 is a 15-meter wetland buffer, Tier 2 is a 25-meter wetland buffer, and Tier 3 is a 50-meter wetland buffer. It should be noted that a statewide wetlands survey has not yet been completed.

Data Source: [ftp://ftp.agrc.state.ut.us/NAD83/Hydrology/Wetlands/state\\_wide/shape\\_file/SGID024/SGID024\\_Wetlands.zip](ftp://ftp.agrc.state.ut.us/NAD83/Hydrology/Wetlands/state_wide/shape_file/SGID024/SGID024_Wetlands.zip)

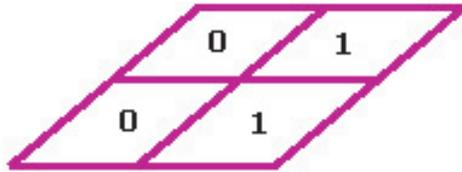
## how the gis tool works



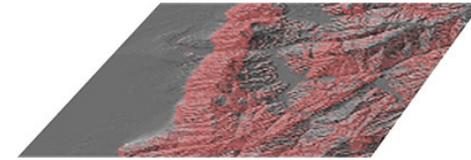
example of grid or raster data

The output of the Critical Lands Mapping Tool is a composite map of all of the indicators or layers selected by the user to be included in the map. The tool works with data converted to a grid or raster format. Each cell of the grid is 30 meters by 30 meters. Every indicator or layer used in creating the map is divided into the same type of grid. Each cell of the grid has a value. The value of the cell is based on what tier was chosen for each indicator. For instance, in the example to the left, the Tier 2 river indicator is running through the top two cells and the bottom right cell. Therefore, those cells with the river running through them are given a value of "2" and the cell without the river is given a value of "0."

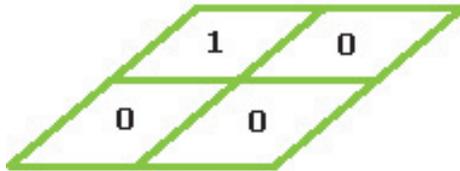
The indicators are layered one on top of one another. The model, simply adds layers of indicators together and puts the information on an output digital map. The higher the value of each cell, the more indicators overlapped and/or a higher tier was chosen. A green color ramp is associated with the calculation. The higher the number, the darker the green and thus a higher priority for conservation. An example of this calculation process is provided on the following pages.



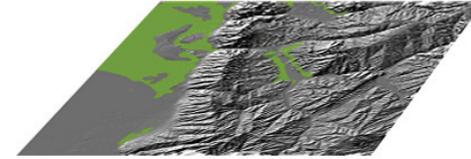
steep slopes - Tier 1



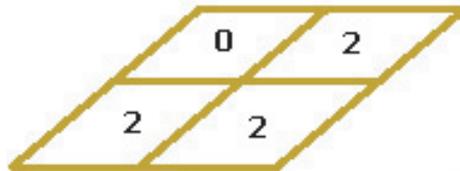
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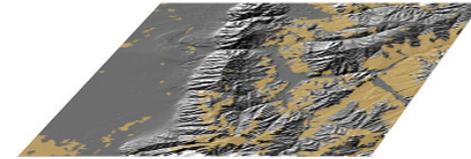
prime farmland - Tier 1



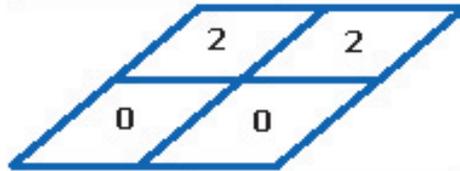
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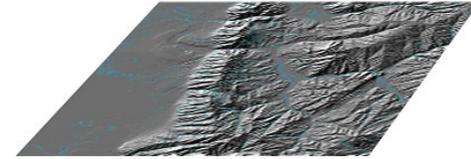
habitat - Tier 2



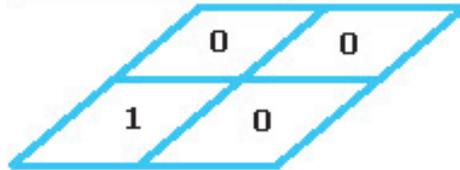
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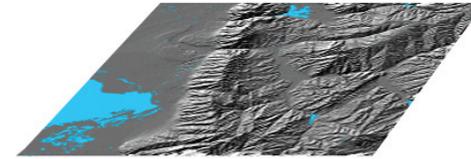
streams - Tier 2



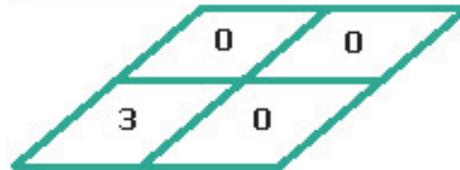
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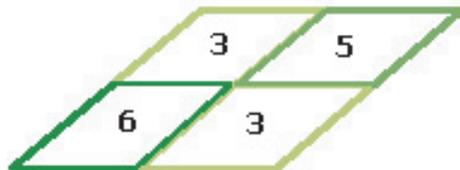
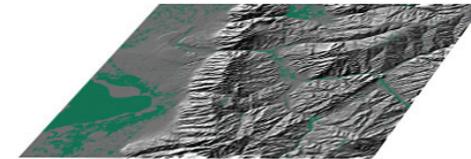
lakes - Tier 1



+

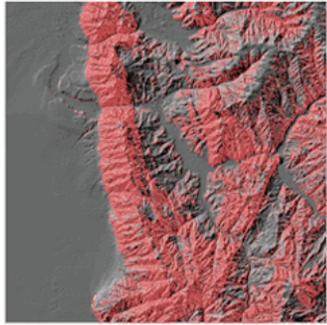


wetlands - Tier 3

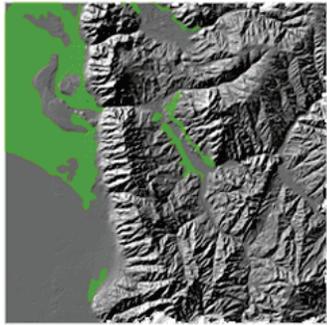


critical lands map

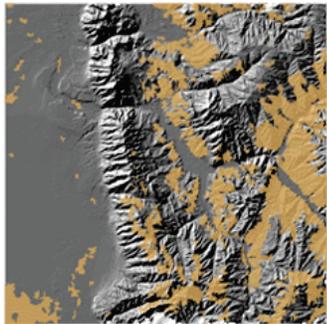




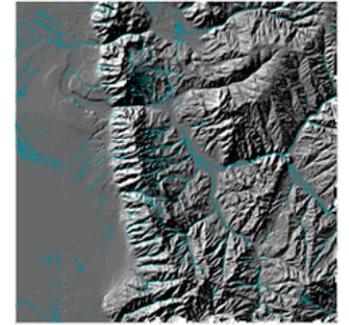
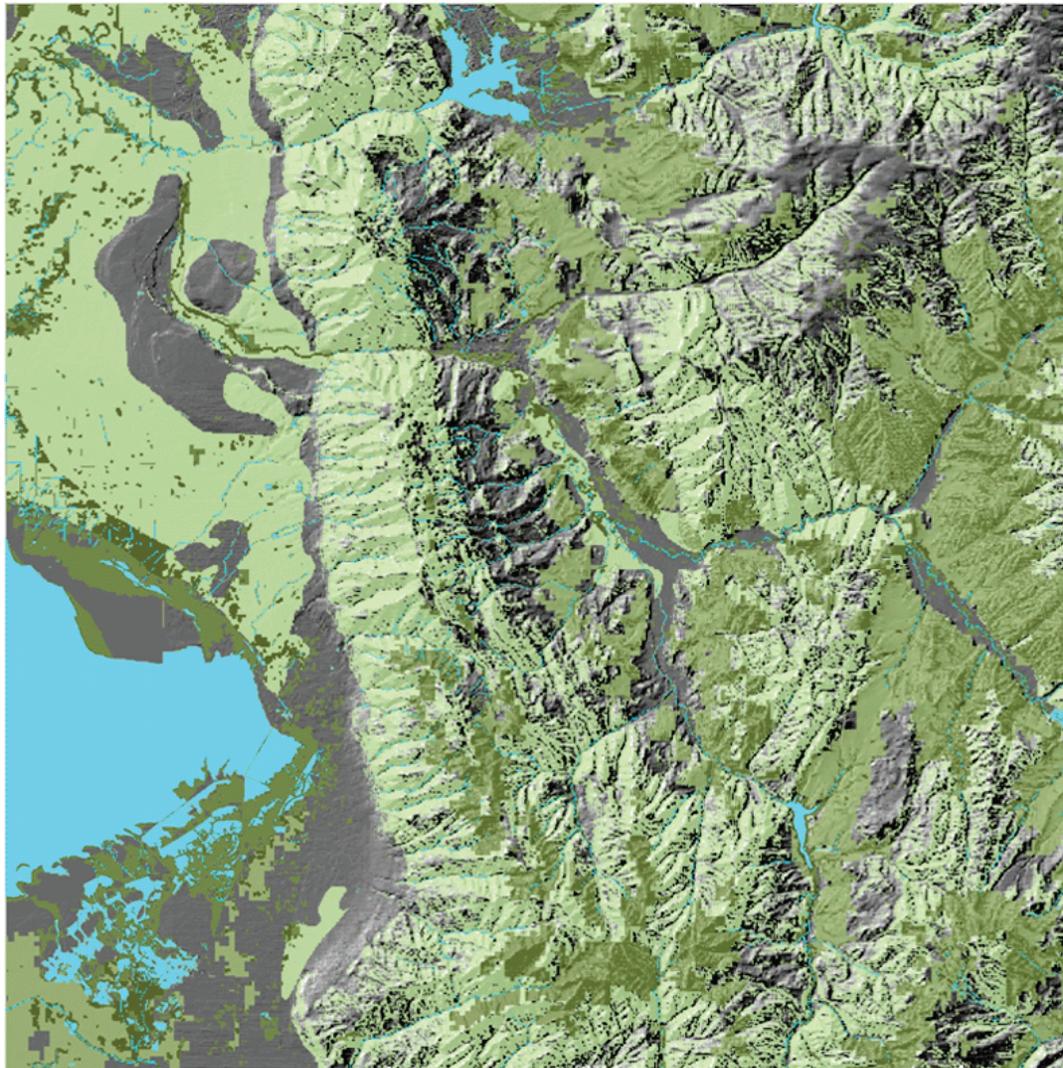
**Steep Slopes Tier 1**



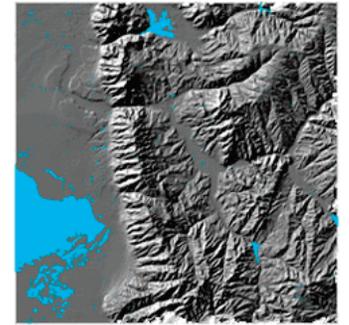
**Prime Agland Tier 1**



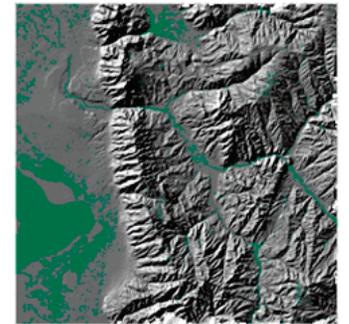
**Wildlife Habitat Tier 2**



**Streams Tier 2**



**Lakes Tier 2**



**Wetlands Tier 3**



**Indicator**

**High Indicator**