Designing Evolving Landscapes:
Creating a Synergy between a Research Project and a GeoDesign Studio

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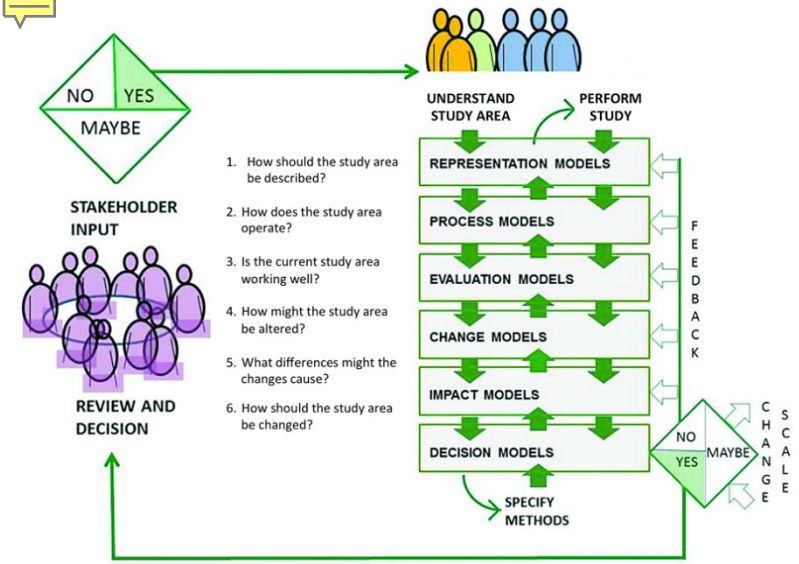
University of Idaho

IMPACT GROWTH
RENDEZVOUS 2019
IDAHO | MONTANA ASLA
BOISE, IDAHO

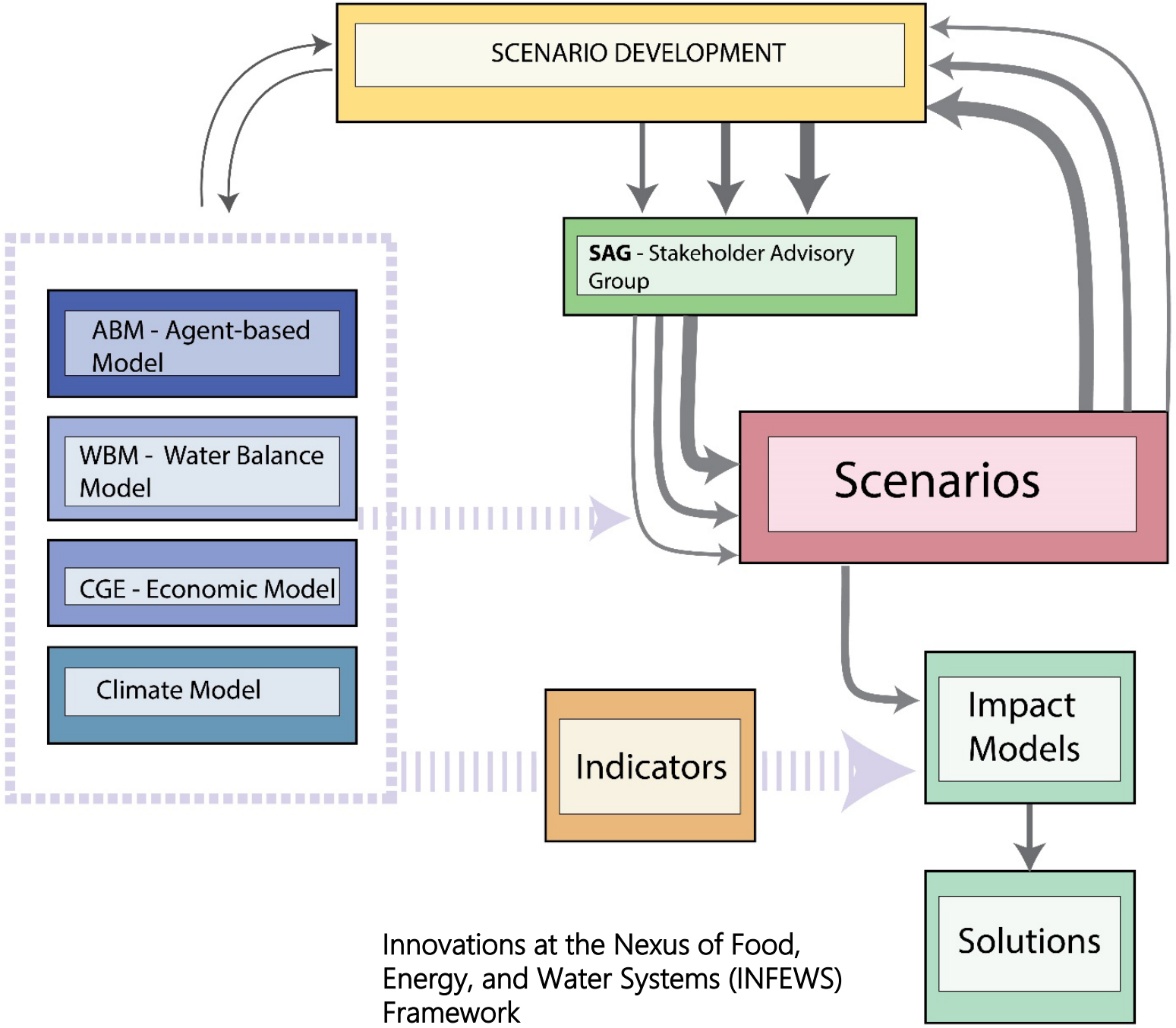
University of Idaho
CRC CENTER FOR RESILIENT COMMUNITIES

NSF



Steinitz, Carl. *A Framework for Geodesign: Changing Geography by Design*. First ed. Redlands, Calf.: Esri, 2012

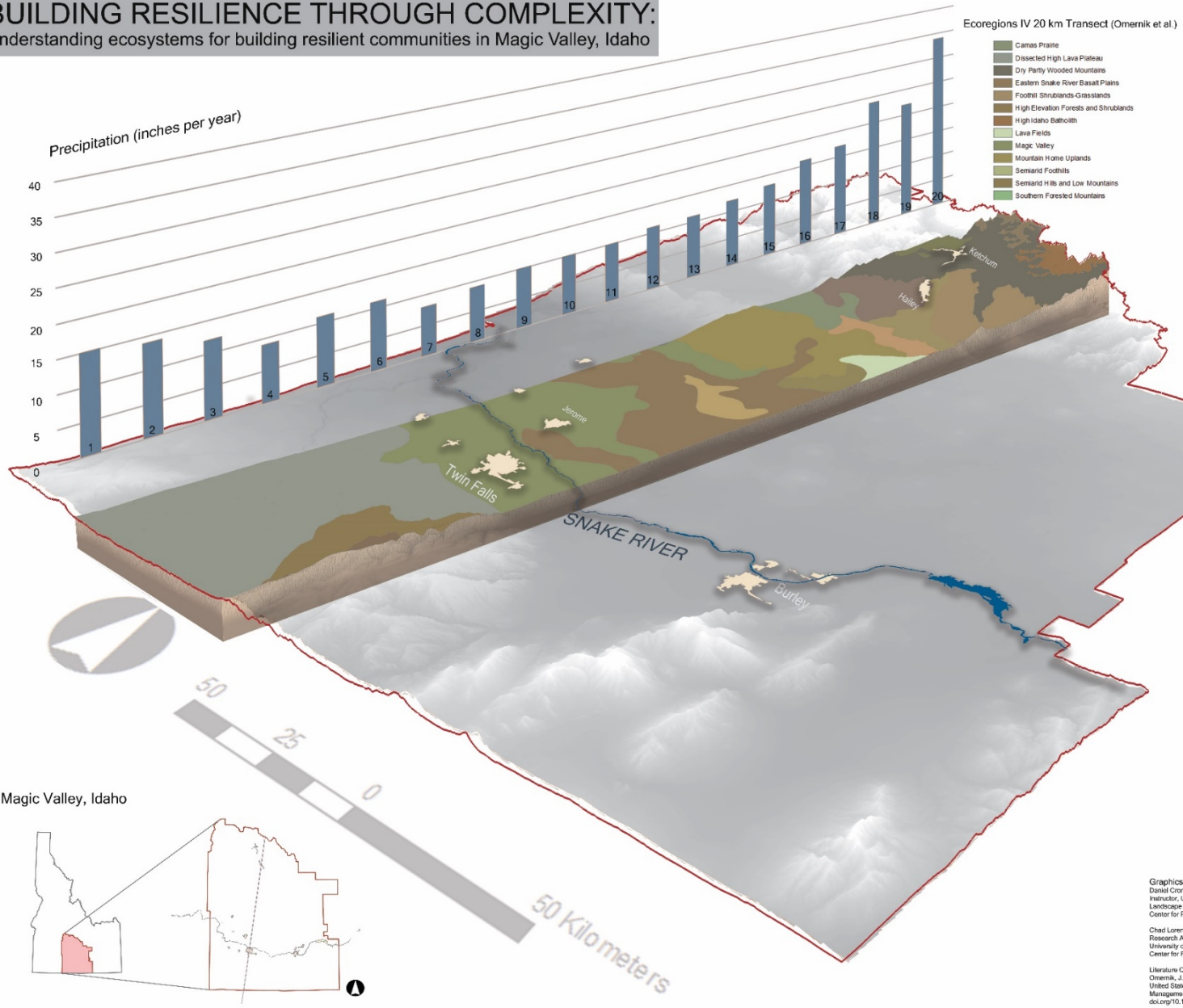
PROJECT PURPOSE



Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS) Framework

BUILDING RESILIENCE THROUGH COMPLEXITY:

Understanding ecosystems for building resilient communities in Magic Valley, Idaho



Magic Valley, Idaho

Overview:

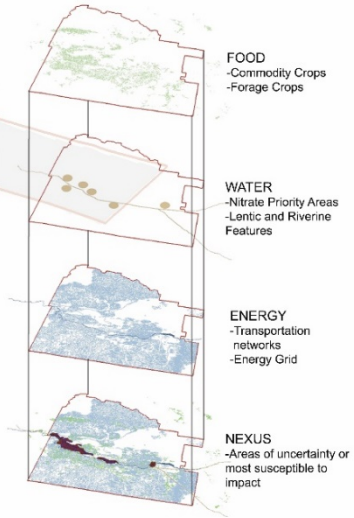
- Technologies to reclaim food and agricultural waste are just one part of a food (nutrients), energy, and water systems (FEWS) landscape.

-Systems approaches offer solutions that stakeholders and researchers can use to move toward more optimized FEWS.

-Before defining problems to address resilient solutions, drivers of landscape change must be understood and categorized. Precipitation, ecosystems, and terrain define this landscape as depicted in the diagram.

-The landscape was divided into 10 km slices along a 200 km transect of Magic Valley, Idaho. Ecoregions (Omernik et al.) were used to categorize the landscape into spatially explicit geographical sections to help define existing ecosystems.

- Precipitation was quantified using the Northwest climate tool-box produced by the Climate Impacts Research Consortium (CIRC) to help define a baseline for future projections.



FOOD
-Commodity Crops
-Forage Crops

WATER
-Nitrate Priority Areas
-Lentic and Riverine Features

ENERGY
-Transportation networks
-Energy Grid

NEXUS
-Areas of uncertainty or most susceptible to impact

As part of an Alternative Futures Research Project, Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS), baseline data will help to project future assumptions driven by an expert stakeholder group and a research team.

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Literature Cited:
Omernik, J.M., and G.E. Griffith. 2014. Ecoregions of the conterminous United States: evolution of a hierarchical spatial framework. Environmental Management 54(6):1249-1266. http://dx.doi.org/10.1007/s00267-014-0364-1.

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University of Idaho

Landscape Architecture

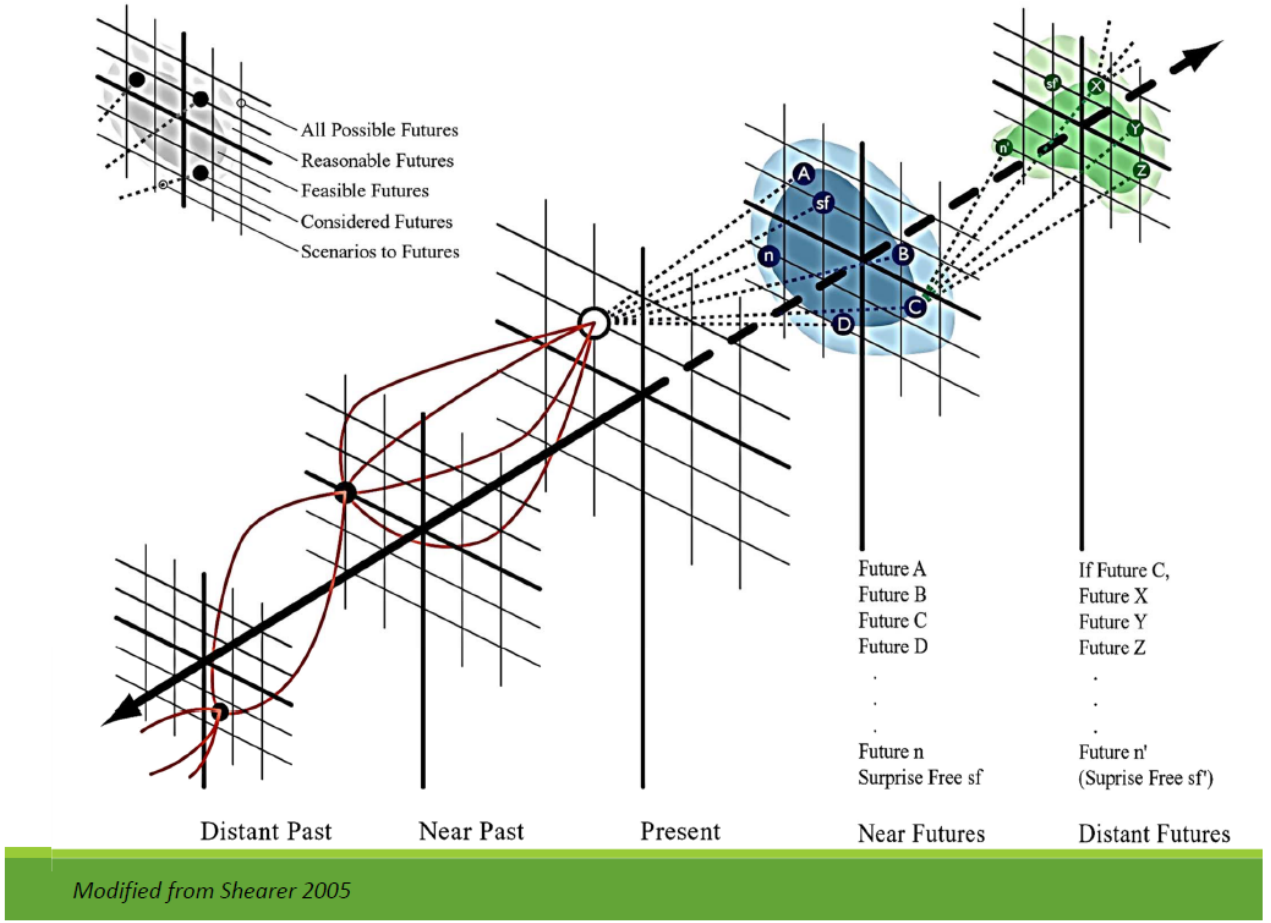
INFEWS and Magic Valley, Idaho

Process

Issues & Decisions
[Fall 2017]

Actors & Uncertainties
[Spring 2018]

Scenario Narratives
[Spring 2018]



Modified from Shearer 2005

Scenarios are decisions and management actions that hypotheically could take place over time, thus altering the landscape (Hulse, Branscomb & Payne, 2004).

KEY ISSUES, STAKEHOLDER ENGAGEMENT, and PROCESS

Sufficient Water Supply for Demand

Will there be sufficient water supply for demand?

Water Quality Regulations

Will water quality regulations change?

Resources Impacting Growth

Will allocation of resources impact growth?

Water Highest and Best Use

Will highest and best use (HBU) be the driver for change?

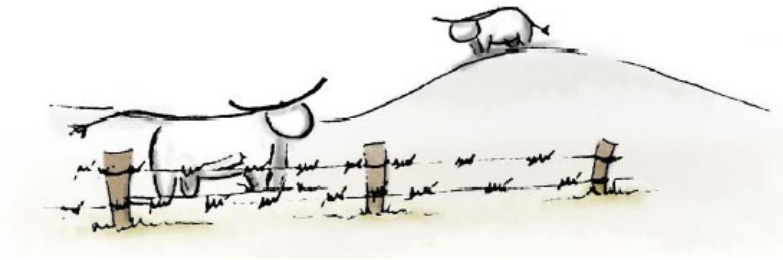
Agriculture as a National Security Tool

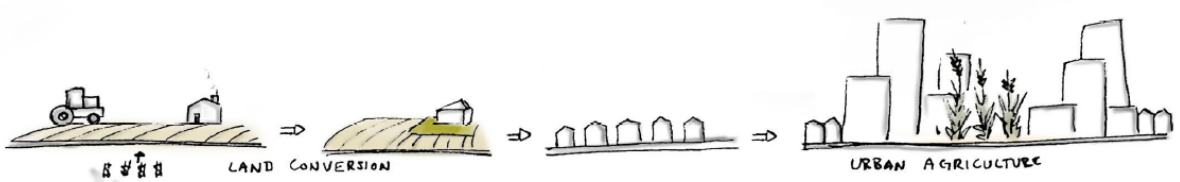
Will agriculture continue to be used as a national security tool?

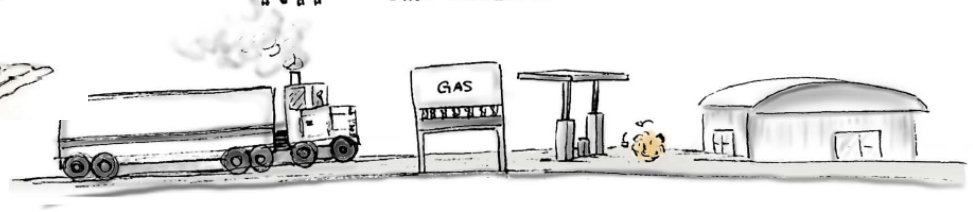
STAKEHOLDER-DRIVEN CRITICAL UNCERTAINTIES

Scenario 5 – “MegaDrought”

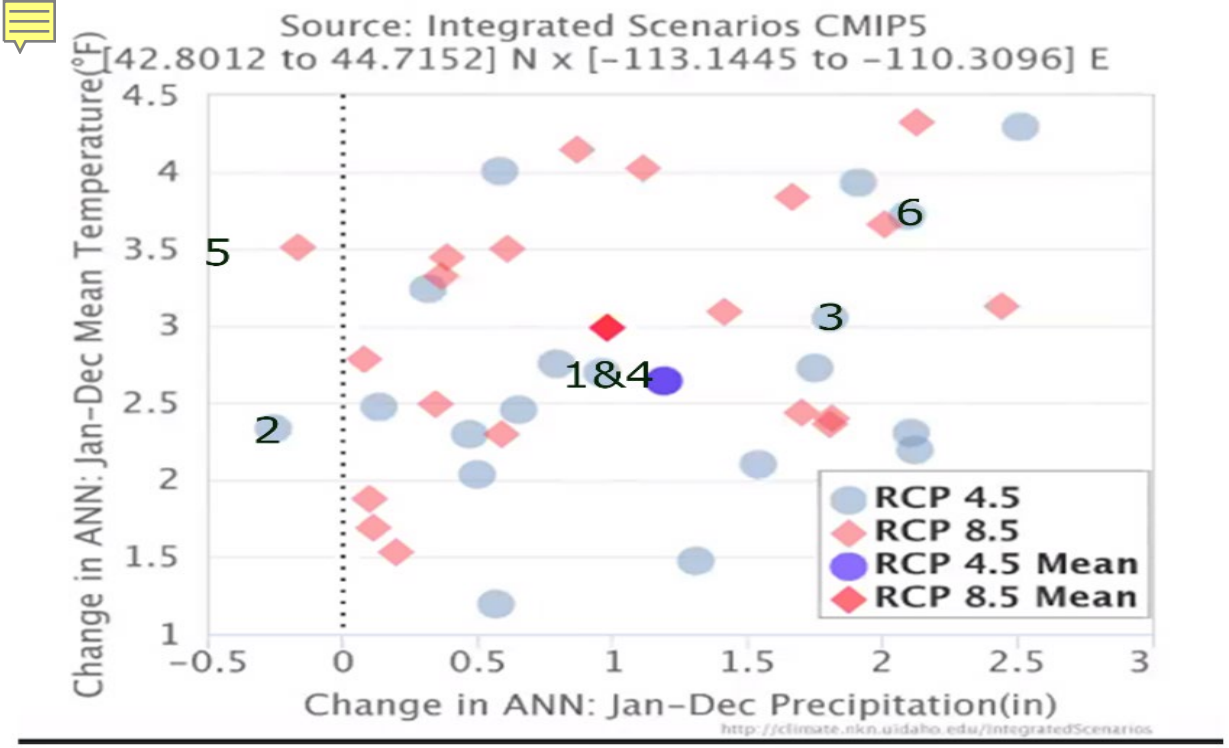
Drought is the new normal. Far surpassing anything seen in the late 20th century, water supply is the lowest it has ever been since statehood. Additionally, retaliatory tariffs from 2018-2025 have caused major disruptions to the global food systems, and the Magic Valley (MV) has not yet recovered. **Rising fuel prices and unstable international markets have encouraged food produced in the MV to stay within the region. These droughts have forced both urban and agricultural systems to reduce consumptive demand through a variety of methods.** Residential and municipal water demands have increased and areas with higher population densities are prioritized over areas with lower population densities. Due to the extreme drought, **irrigated agricultural land is decommissioned**, leading to an abundant land inventory and decreased land prices. As a result of affordable land, alternative industries relocate to the Magic Valley. Twin Falls begins to grow, leading to increased demand and innovative water reuse strategies to maximize efficiency of metropolitan consumptive use. Water quality regulations, linked to increased human consumption, have expanded. The Underground Injection Control program tightens regulations and requires treatment prior to reinjection. foreign oil imports while tariffs have reduced the regional agricultural industry's global competitiveness.

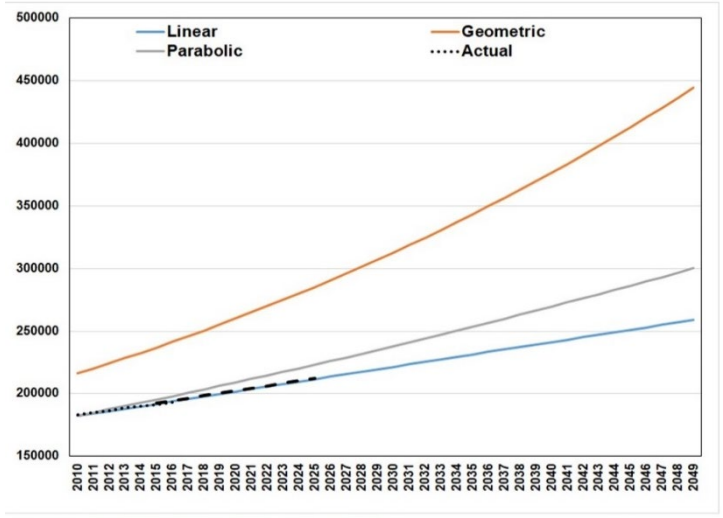




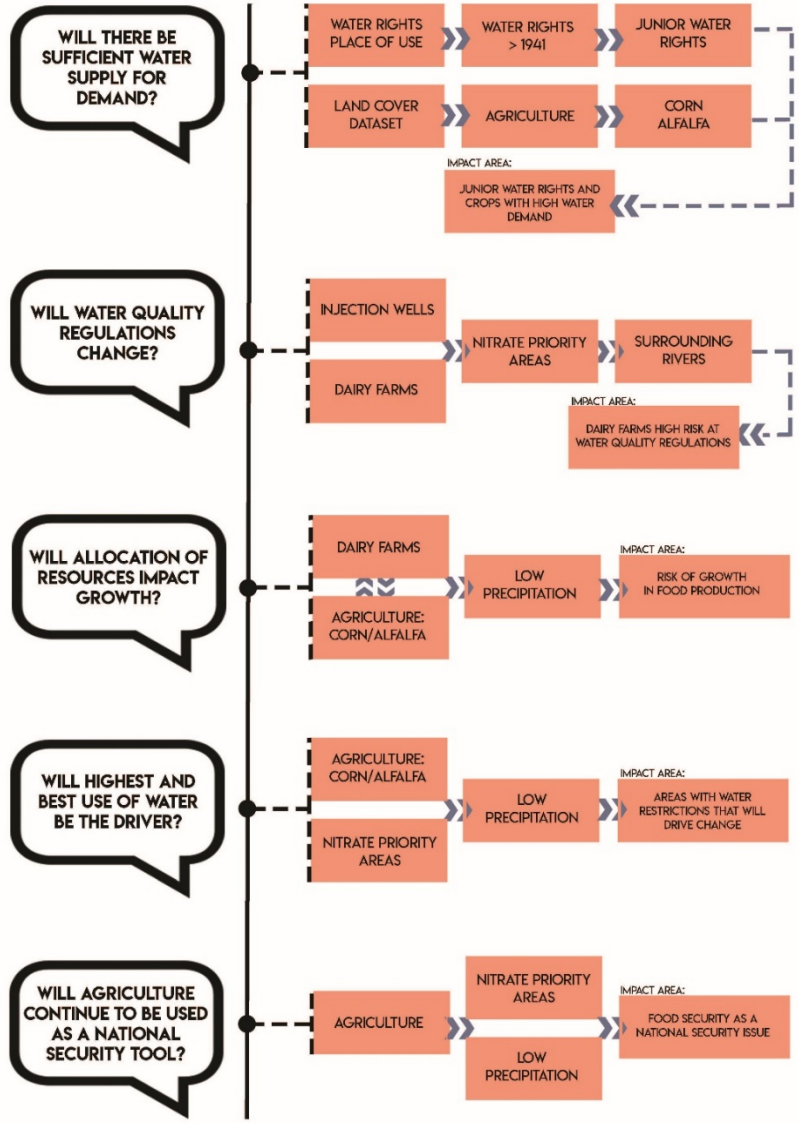


INFEWS NARRATIVE EXAMPLE





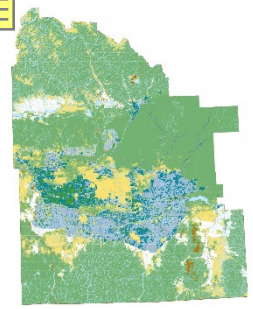
Population Projections
(2010-2050)

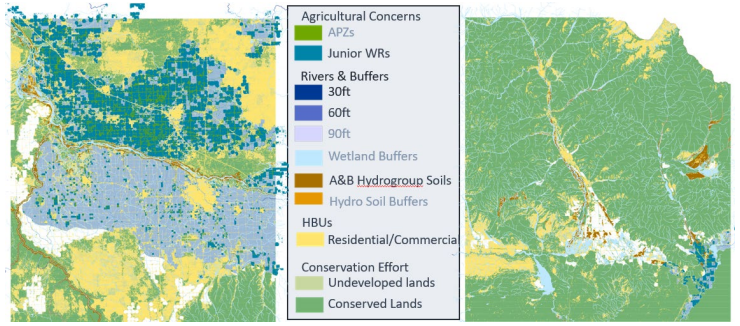


Student representation models
(stakeholder uncertainties to initial designs)

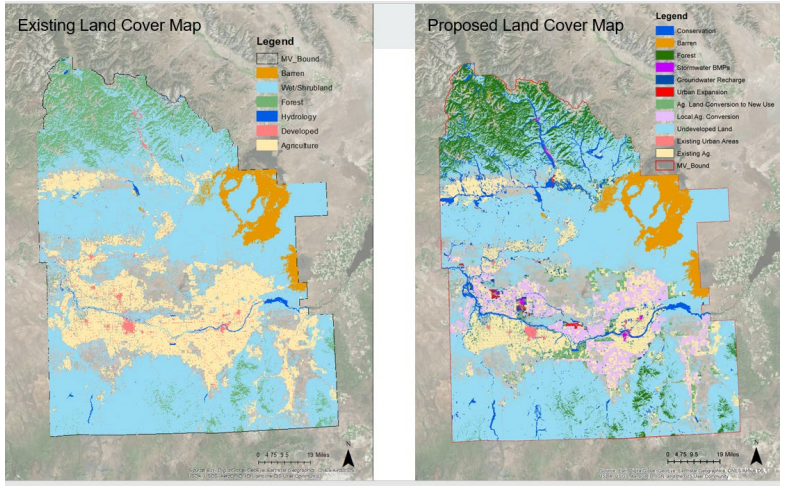
REPRESENTATION MODELS

Scenario 1

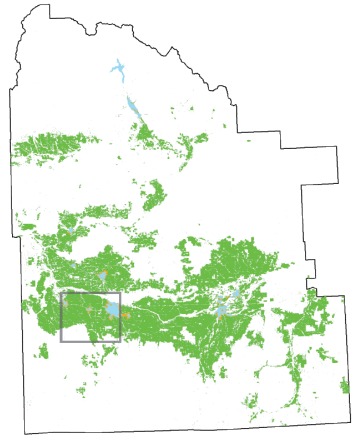


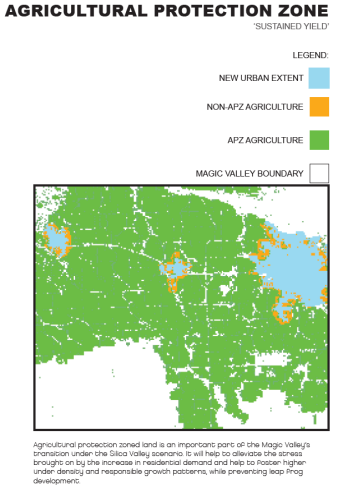


Scenario 2

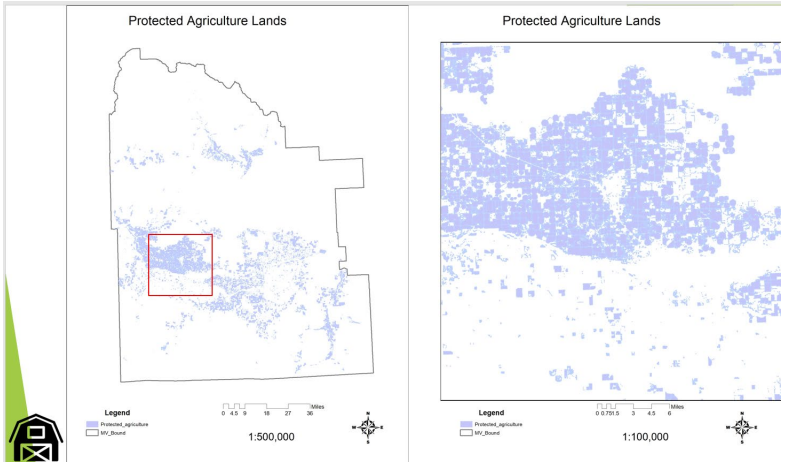


Scenario 3



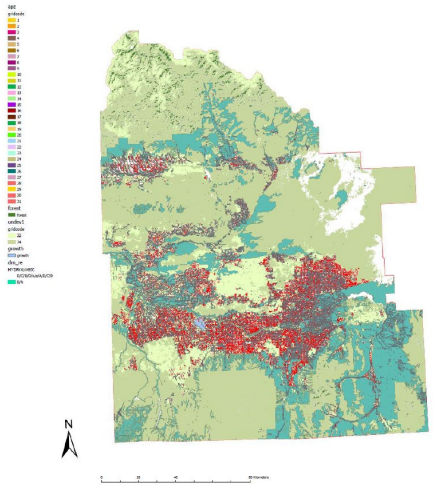


Scenario 4

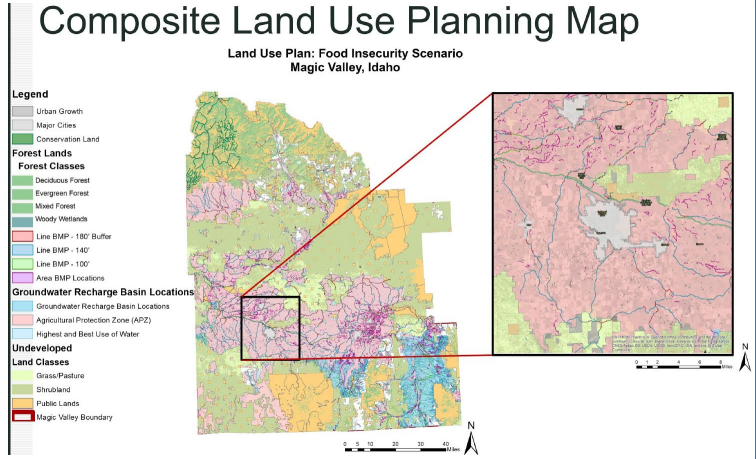


Scenario 5

Forest Land, Undeveloped, APZ and Groundwater Recharge



Scenario 6



CHANGE MODELS

What makes a landscape good?

IMPACT MODELS

RESILIENT

What makes a landscape ~~good~~?

EQUITY	ENVIRONMENT	ECONOMY	EDUCATION	AESTHETICS
Environmental justice	Biodiversity	Local Food Production	To & From Stakeholders	Visual Resource Diversity
Cultural diversity	Air/Water Quality	Access to food	History	Perception
Food production	Ecosystem Services	Economic Diversity	Adaptive and current	
Safety	Management	Ecosystem Services	Land management practices	
Health/Wellness --Clean Water --clean air --Access to green spaces --Access to healthy food	Stewardship	Labor	Technology and practices	
Proper Living conditions & Diversity	Water Availability	Import/Export	Stewardship for future generations	
Balance User Needs	Protection			
Freedom of Movement	Biproduct Management			

IMPACT MODELS

SURVEY QUESTIONS	KEY COMPETENCIES IN SUSTAINABILITY
1) Which role would you identity with for solving the planning and design components of the project?	Interpersonal Competence - Functions, types, and dynamics of collaboration - Concepts of solidarity - Concepts of leadership and team dynamics
2) How reasonably professional of a knowledge base do you think you have for intergrating terrain-related patterns of land-use type, planning systems related solutions, and land-use suitability for available and potential spaces?	Systems Thinking Competence - Complex cause-effect chains - Across/multiple/coupled domains: Environment, Equity, Economy - People and social systems: values, preferences, needs, perceptions, (collective) actions, decisions
3) Please describe how well you think you understand how to integrate systems- related factors of land-use interventions at the site and landscape scale.	Anticipatory Competence - Concepts of time including temporal phases - Concept of uncertainty, possibility, probability, desirability of future - Concepts of consistency and plausibility of future developments
4) With your current understanding, what are some viable and probable solutions that you expect to plan and design?	Strategic Competence - Obstacles and synergies - Success factors - Intentionality, Success factors, feasibility, effectiveness, efficiency
5) What are the key uncertainties to address in landscape planning for the given site? 6) Please list some land-use conflicts that you expect to model for Magic Valley, Idaho.	Normative Competence - Sustainability principles (Un-)sustainability of current states and future states - Concept of risk, harm, damage

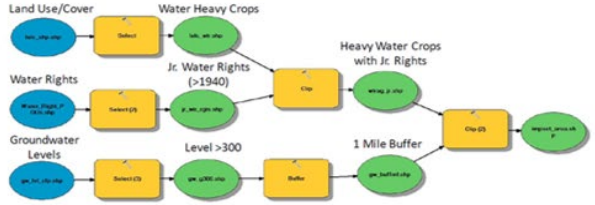
SELF-REPORTED EVALUATION METRICS

Key Competencies in Sustainability
(Wiek et al., 2011)

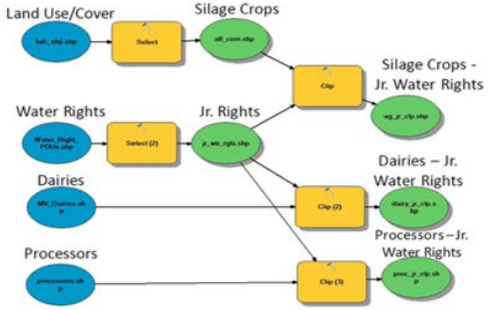
IMPACT MODELS (Landscape Scale)

SPATIALLY EXPLICIT EVALUATION METRICS

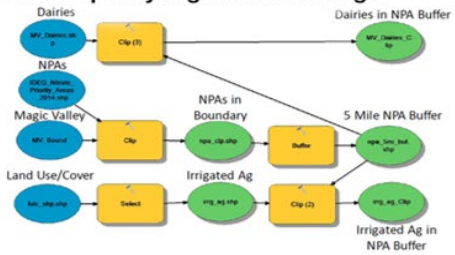
Key Uncertainty 1:
Will there be sufficient water supply for demand?



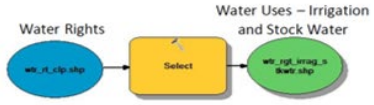
Key Uncertainty 3:
Will allocation of resources impact growth?



Key Uncertainty 2:
Will water quality regulations change?



Key Uncertainty 4:
Will highest and best use be the driver of change?



Key Uncertainty 5:
Will highest and best use be the driver of change?

Figure 3. Spatially explicit evaluation instrument

RESILIENT

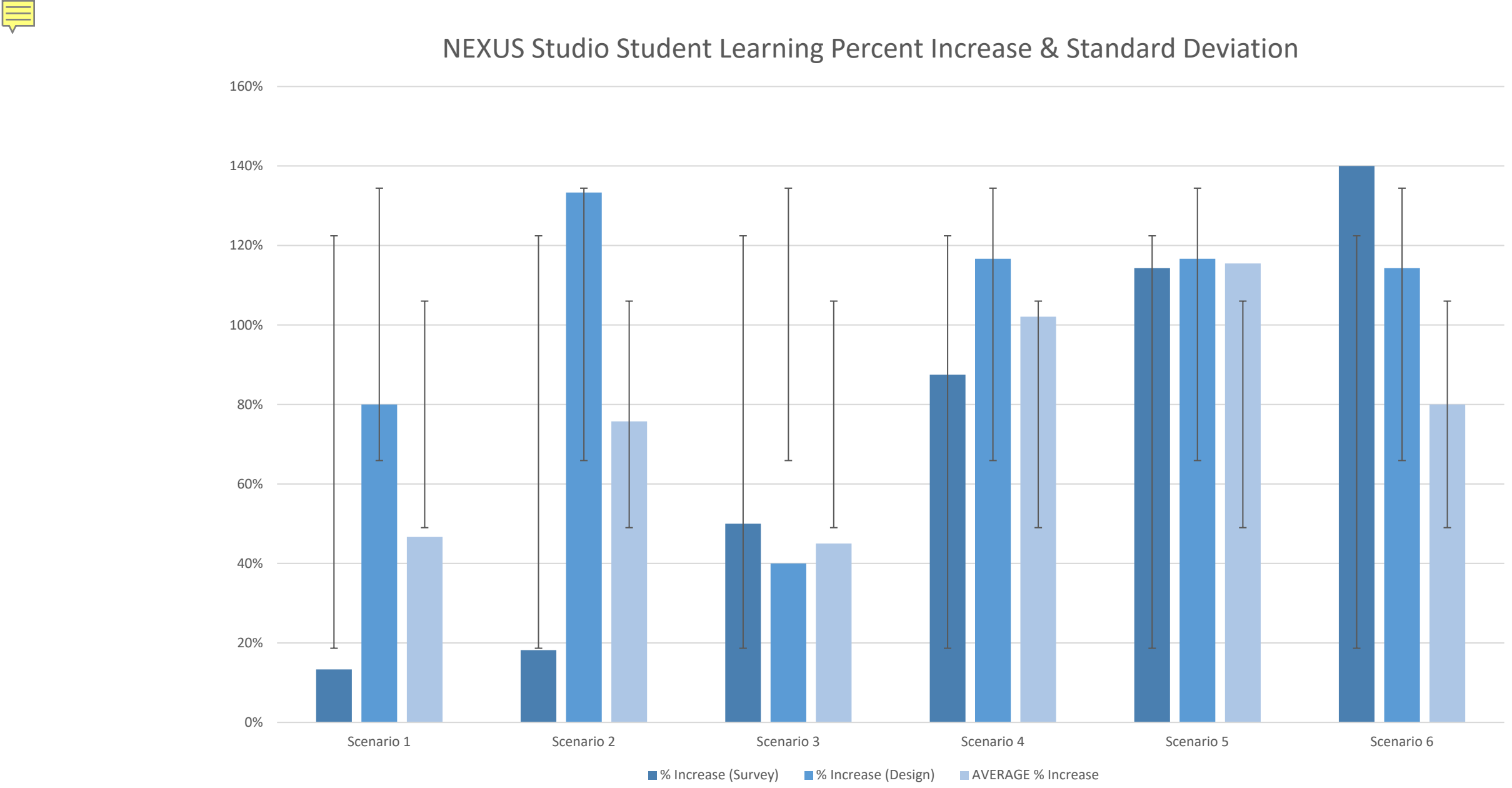
What makes a landscape ~~good~~?

EQUITY	ENVIRONMENT	ECONOMY	EDUCATION	AESTHETICS
Environmental justice	Biodiversity	Local Food Production	To & From Stakeholders	Visual Resource Diversity
Cultural diversity	Air/Water Quality	Access to food	History	Perception
Food production	Ecosystem Services	Economic Diversity	Adaptive and current	
Safety	Management	Ecosystem Services	Land management practices	
Health/Wellness --Clean Water --clean air --Access to green spaces --Access to healthy food	Stewardship	Labor	Technology and practices	
Proper Living conditions & Diversity	Water Availability	Import/Export	Stewardship for future generations	
Balance User Needs	Protection			
Freedom of Movement	Biproduct Management			

Environment	Requirement	Availability (Y/N)	Present	Weight
Does not develop on previously undeveloped floodplain	Y	Y	N	3.0
Re-establishes previously developed wetland	N	N	N	3.0
Conserves aquatic ecosystems	Y	Y	Y	5.0
Manages precipitation on site	Y	Y	N	4.0
Reduces outdoor water use	N	Y	N	2.0
Restores aquatic ecosystems	N	N	N	4.0
Conserves and restores native plant communities	N	Y	Y	2.0
Reduces the risk of catastrophic wildfires	Y	N	N	3.0
Uses renewabe sources of energy	Y	N	N	4.0
Aquatic buffer system present	Y	Y	Y	5.0
Conserves habitats for threatened species	N	Y	Y	3.0
Equity				
Creates or connects to multi-modal transit networks	N	N	N	2.0
Protects and maintains cultural and historic places	N	N	N	3.0
Provides optimum site accessibility, safety, and wayfinding	N	Y	Y	3.0
Promotes equitable site use	N	Y	Y	3.0
Supports social connections and mental restoration	N	Y	Y	2.0
Promotes sustainability awareness and education	Y	Y	N	4.0
Economy				
Mitigates development on farmland	Y	Y	Y	5.0
Locates new development within existing developed areas	Y	Y	Y	5.0
Designates vegetation and soil protection zones	Y	Y	Y	5.0
Reduces water use for landscape irrigation	N	Y	N	3.0
Optimizes biomass	N	Y	N	4.0
Provides on site food production	N	Y	N	2.0
Supports the local economy	N	N	N	2.0
Aesthetic				
Redevelops degraded sites	N	N	N	4.0
Designs functional stormwater features as amenities	N	N	N	4.0
Reduces urban heat island effect	N	Y	Y	2.0

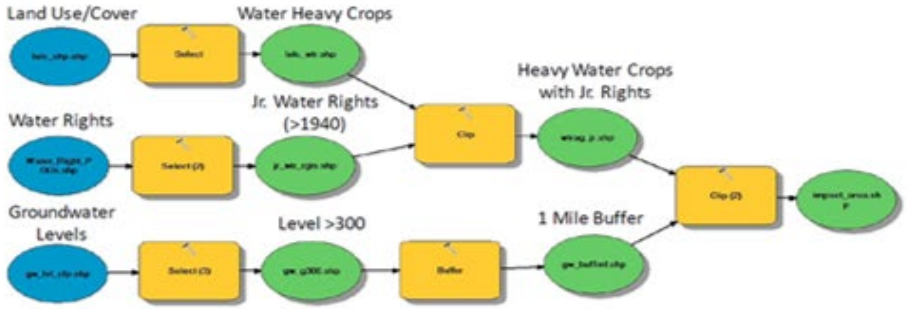
IMPACT MODELS (Site Scale)

Table 3. Student Site Scale Evaluation Example

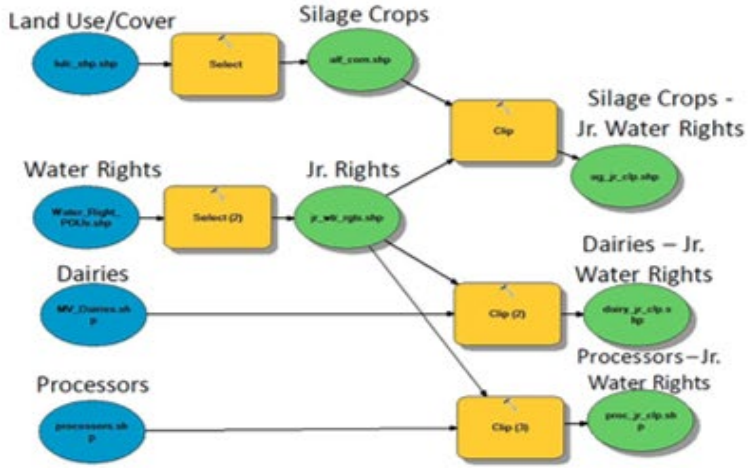


IMPACT MODELS

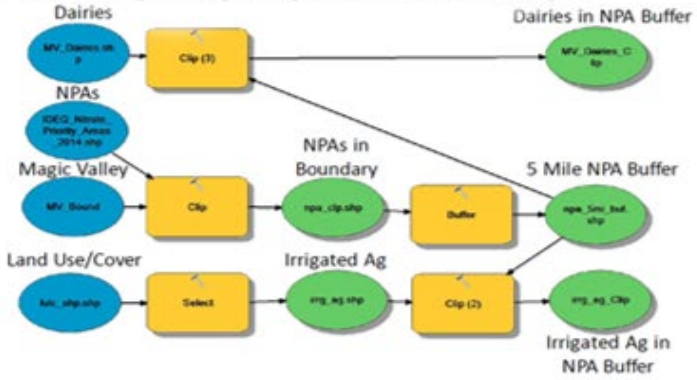
Key Uncertainty 1:
Will there be sufficient water supply for demand?



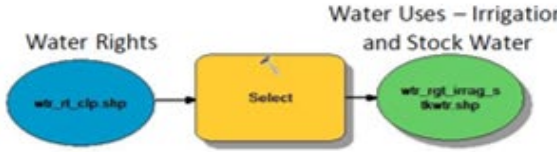
Key Uncertainty 3:
Will allocation of resources impact growth?



Key Uncertainty 2:
Will water quality regulations change?



Key Uncertainty 4:
Will highest and best use be the driver of change?



Key Uncertainty 5:
Will highest and best use be the driver of change?

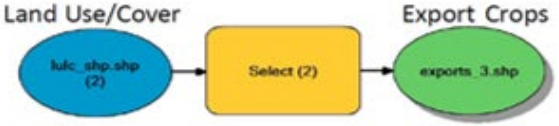
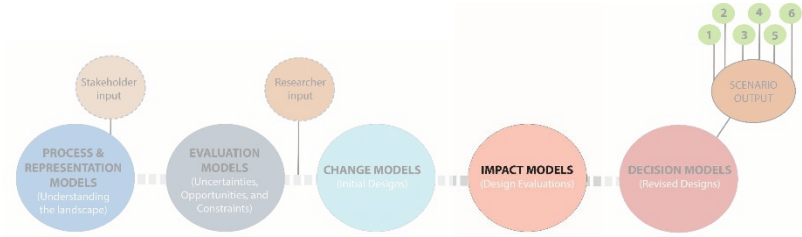


Figure 3. Spatially explicit evaluation instrument



IMPACT MODELS

Table 2-4. Default criteria for BMP suitable locations used in BMP Siting Tool

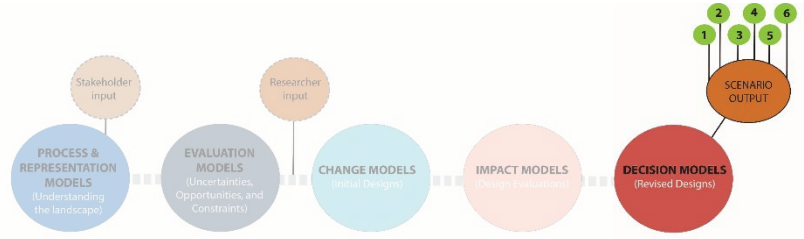
BMP type	Drainage area (acre)	Drainage slope (%)	Impervious (%)	Hydrologic soil group	Water table depth (ft)	Road buffer (ft)	Stream buffer (ft)	Building buffer (ft)
Bioretention	< 2	< 5%	> 0%	A–D	> 2	< 100	> 100	--
Cistern	--	--	--	--	--	--	--	< 30
Constructed Wetland	> 25	< 15%	> 0%	A–D	> 4	--	> 100	--
Dry Pond	> 10	< 15%	> 0%	A–D	> 4	--	> 100	--
Grassed Swale	< 5	< 4%	> 0%	A–D	> 2	< 100	--	--
Green Roof	--	--	--	--	--	--	--	--
Infiltration Basin	< 10	< 15%	> 0%	A–B	> 4	--	> 100	--
Infiltration Trench	< 5	< 15%	> 0%	A–B	> 4	--	> 100	--
Porous Pavement	< 3	< 1%	> 0%	A–B	> 2	--	--	--
Rain Barrel	--	--	--	--	--	--	--	< 30
Sand Filter (non-surface)	< 2	< 10%	> 0%	A–D	> 2	--	> 100	--
Sand Filter (surface)	< 10	< 10%	> 0%	A–D	> 2	--	> 100	--
Vegetated Filterstrip	--	< 10%	> 0%	A–D	> 2	< 100	--	--
Wet Pond	> 25	< 15%	> 0%	A–D	> 4	--	> 100	--

'SUSTAIN' Criteria for siting BMPs.

This table depicts siting suitability criterion used by 'SUSTAIN' to site, evaluate, and rank areas for stormwater facilities.

Muthukrishnan, S.; "The Use of Best Management Practices (BMPs) in Urban Watersheds." EPA. Environmental Protection Agency, Sept. 2004.

URBAN BMPs

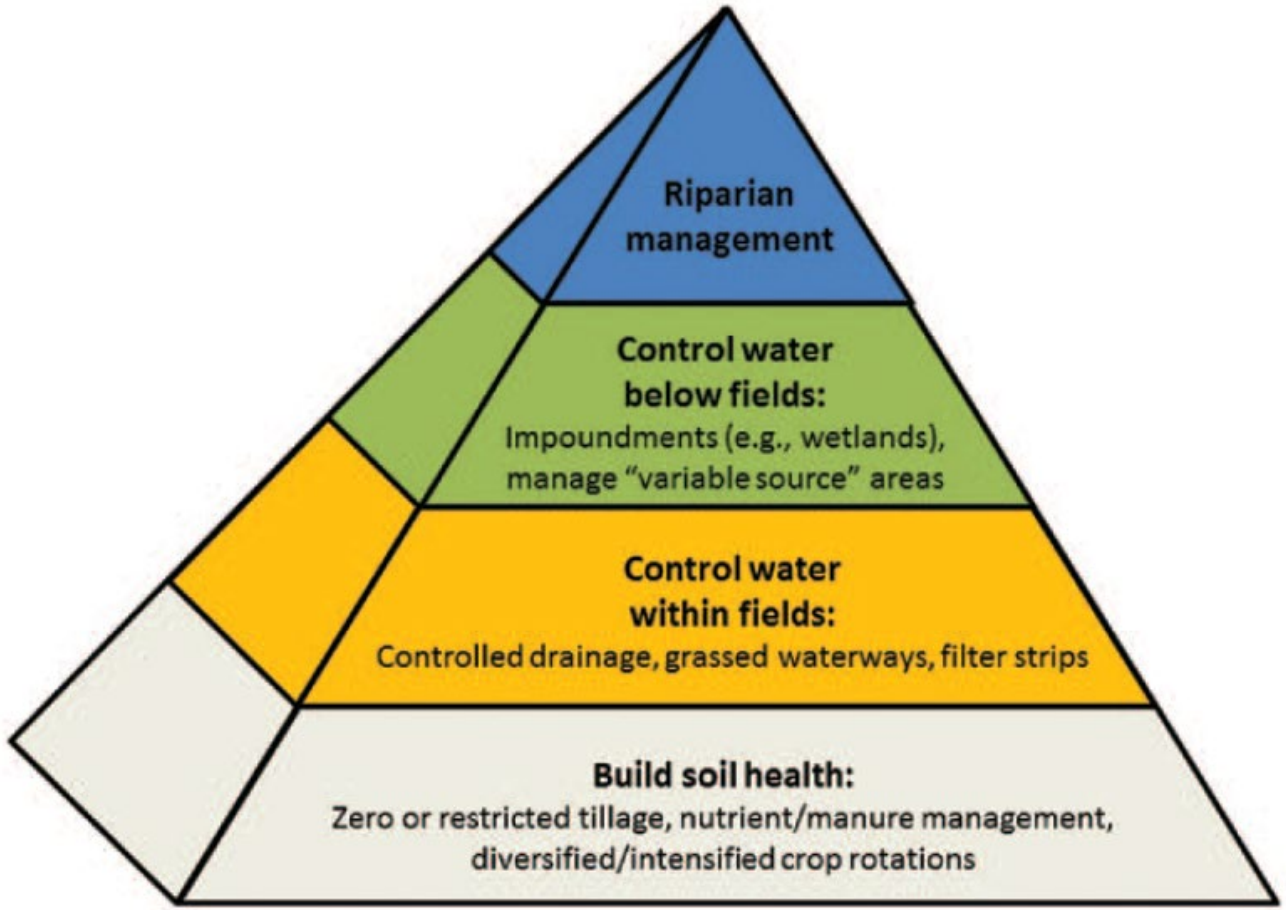


Combining precision conservation technologies into a flexible framework to facilitate agricultural watershed planning

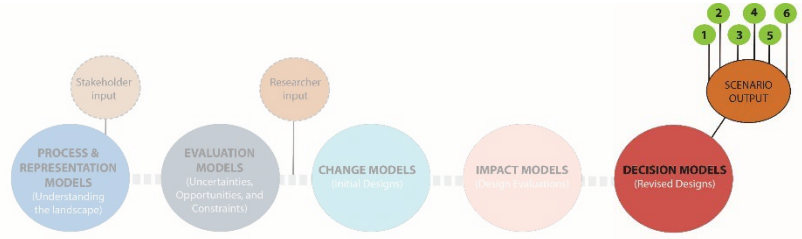
Mark D. Tomer, Sarah A. Porter, David E. James, Kathleen M.B. Boomer, Jill A. Kostel, and Eileen McLellan

doi:10.2489/jswc.68.5.113A

Conservation practices in a watershed, conceptualized as a pyramid. Healthy agricultural soils will improve the effectiveness of practices placed within fields, below fields, and in riparian



Agricultural Conservation PLANNING FRAMEWORK



AGRICULTURAL BMPs

Photo courtesy of USDA NRCS.

Contour Buffer Strips

Purpose:

- reduce sheet and rill erosion
- slow runoff and trap sediment
- remove sediment, nutrients, pesticides, and other contaminants
- provide food and nesting cover for wildlife

Description:

Contour buffer strips are rows of perennial vegetation alternated down a slope with wider cultivated rows farmed on the contour. Contour buffers strips are usually narrower than the cultivated strips. Vegetation in the strips consists of adapted species of grasses or a mixture of grasses and legumes.

Photo courtesy of USDA NRCS.

Grassed Waterways

Purpose:
- solution for gully erosion
- convey runoff from terraces, diversions, or other sources of water concentrations to a stable outlet

Description: Grassed waterways are constructed graded channels seeded to grass or other suitable vegetation. During a rain event, the permanent vegetation slows the water and the grassed waterway brings the water to a stable outlet, ideally at a slower, non-erosive velocity.

Photo courtesy of USDA NRCS.

Stripcropping

Purpose: - reduces sheet and rill erosion
- reduce soil loss as much as 75% depending on the type of crop rotation and the steepness of a slope
- can provide food and cover for wildlife

Description: Stripcropping is a system of growing crops in approximately even width strips or bands on the contour to reduce soil erosion. A strip of permanent grass or close growing crop alternates with a strip of row crop .

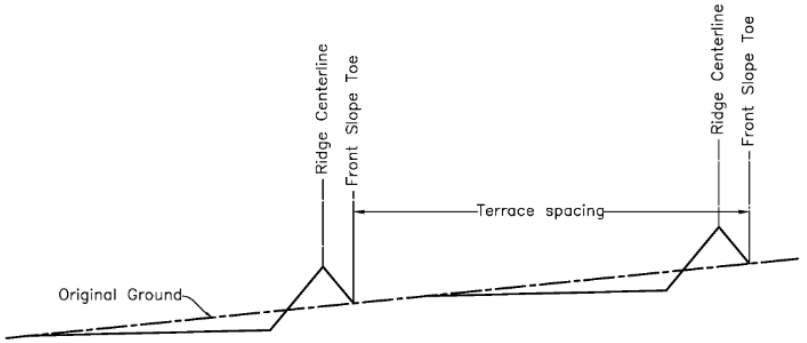


Photo courtesy of USDA NRCS.

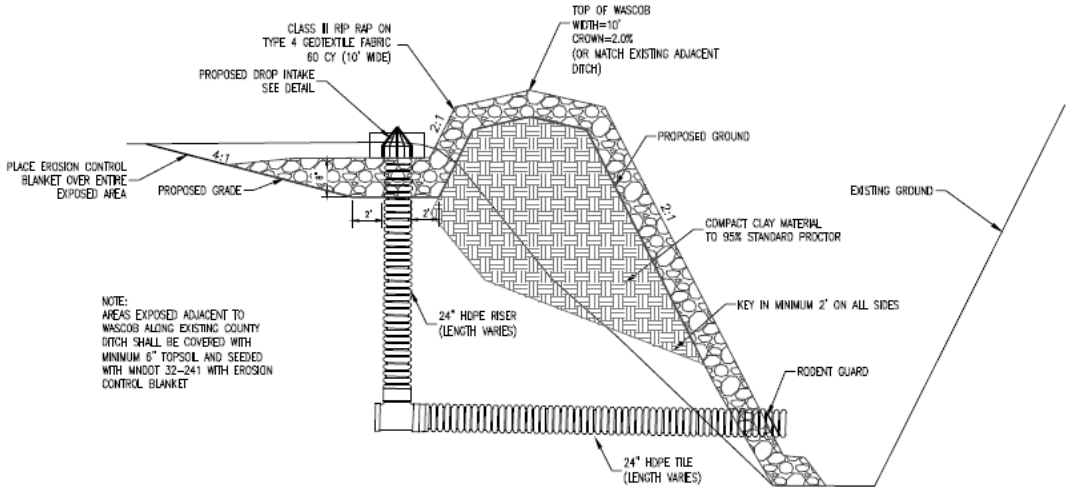
Terraces

Purpose:

- reduces sheet and rill erosion and prevent gully development
- reduces sediment pollution of lakes and streams, and traps phosphorus attached to sediment particles
- collect water and store it until it can infiltrate into the ground or be released through a stable outlet
- slow runoff water and carry it to a stable outlet like a grassed waterway

Description:

Terraces are earthen structures that intercept runoff on moderate to steep slopes. They transform long slopes into a series of shorter slopes. Terraces reduce the rate of runoff and allow soil particles to settle out. The resulting cleaner water is carried off the field in a non-erosive manner.



WASCOB SIDE INLET DETAIL
N.T.S.

Water and Sediment Control Basins (WASCOBs)

Photo courtesy of USDA NRCS.

Purpose: - control water on the land and prevent gully erosion
- reduces sediment pollution of lakes and streams
- collects runoff

Description: An earth embankment or a combination ridge and channel constructed across the slope of minor watercourses to form a sediment trap and water detention basin with a stable outlet.

AGRICULTURAL LAND USE RANKING

Method diagram

Grade assessment of agricultural production factors

Water righrt

Soil types

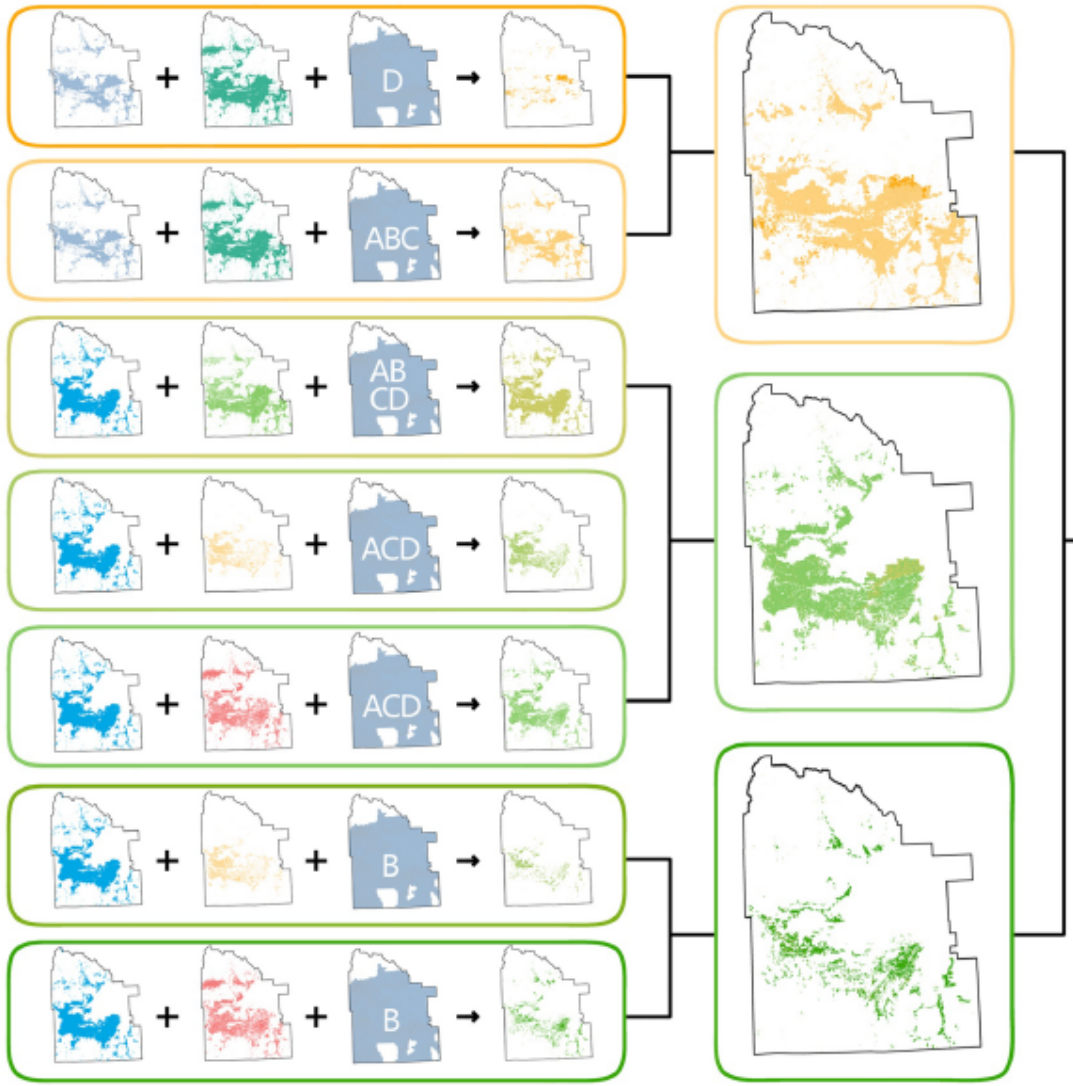
Crop types

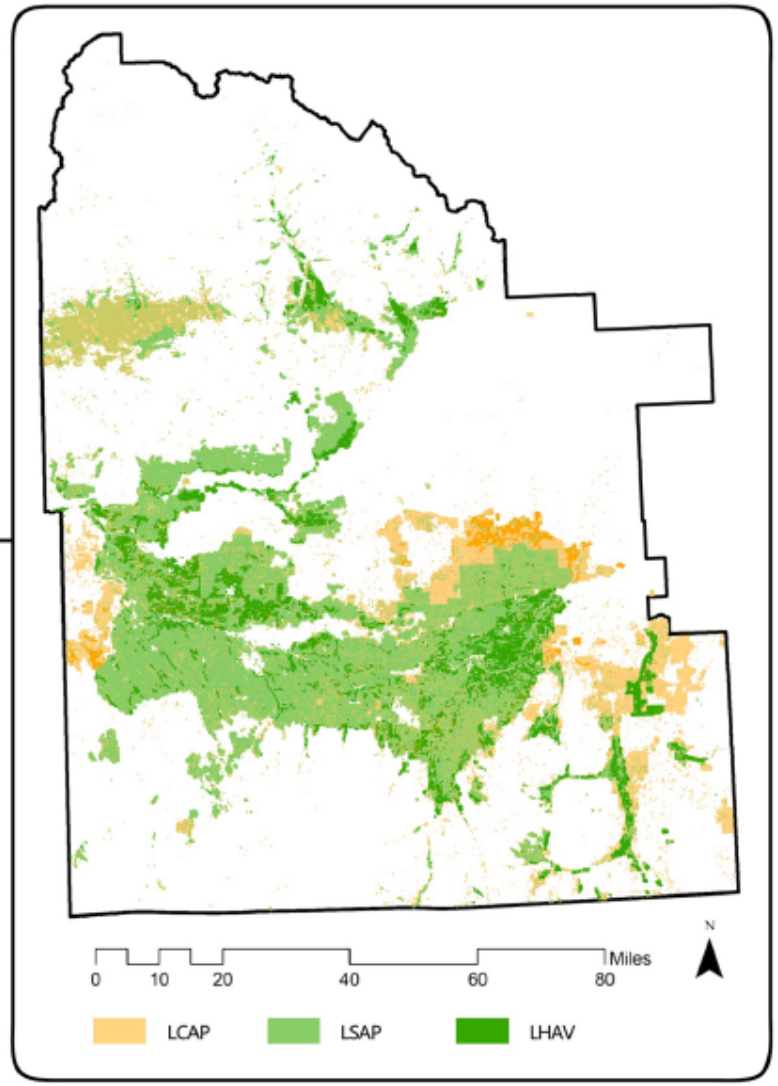
Lands capable of agricultural production

Lands suitable of agricultural production

Lands have the highest agricultural value

Agricultural classification map



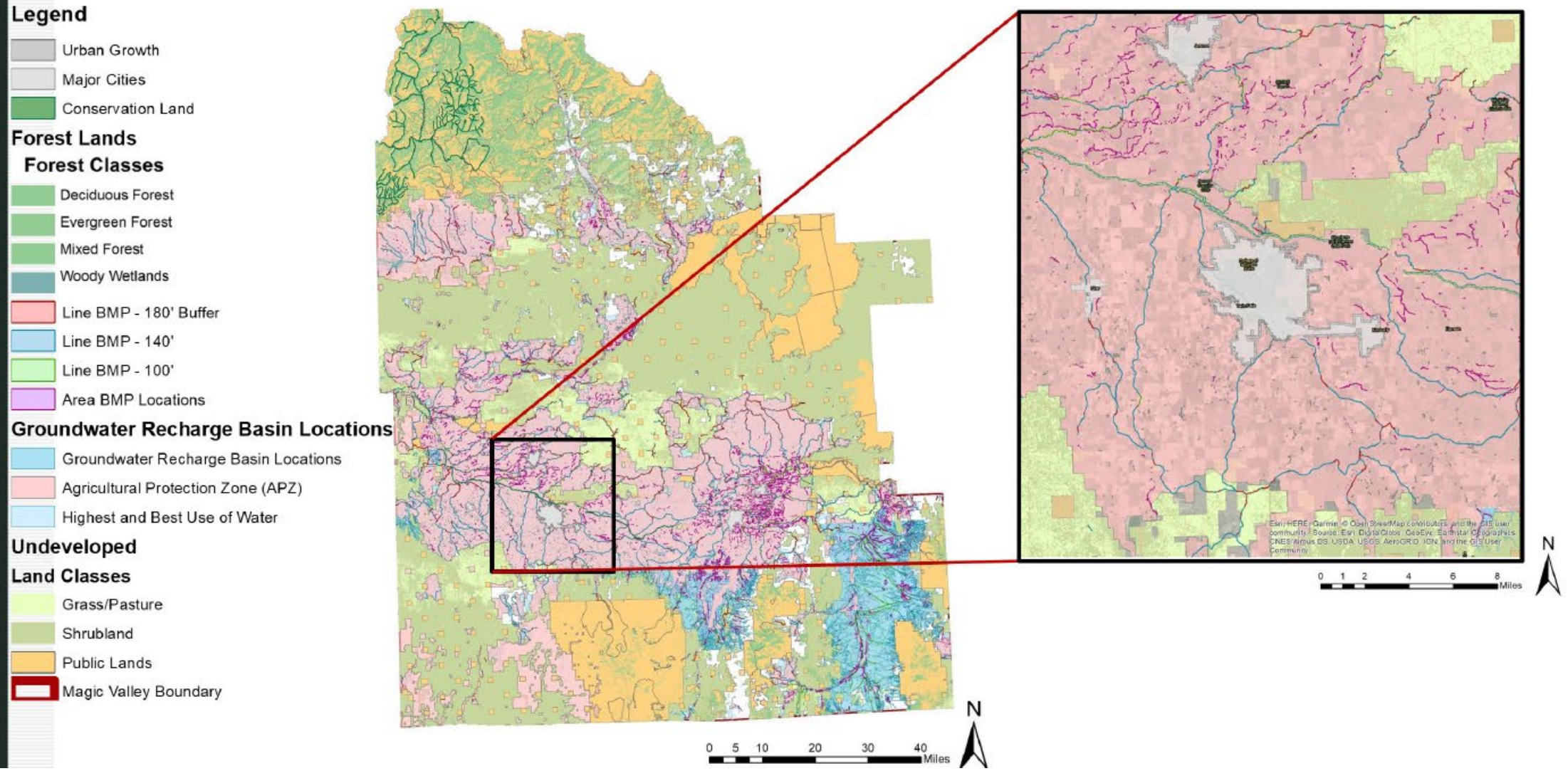


DECISION MODELS

Landscape Planning Phase

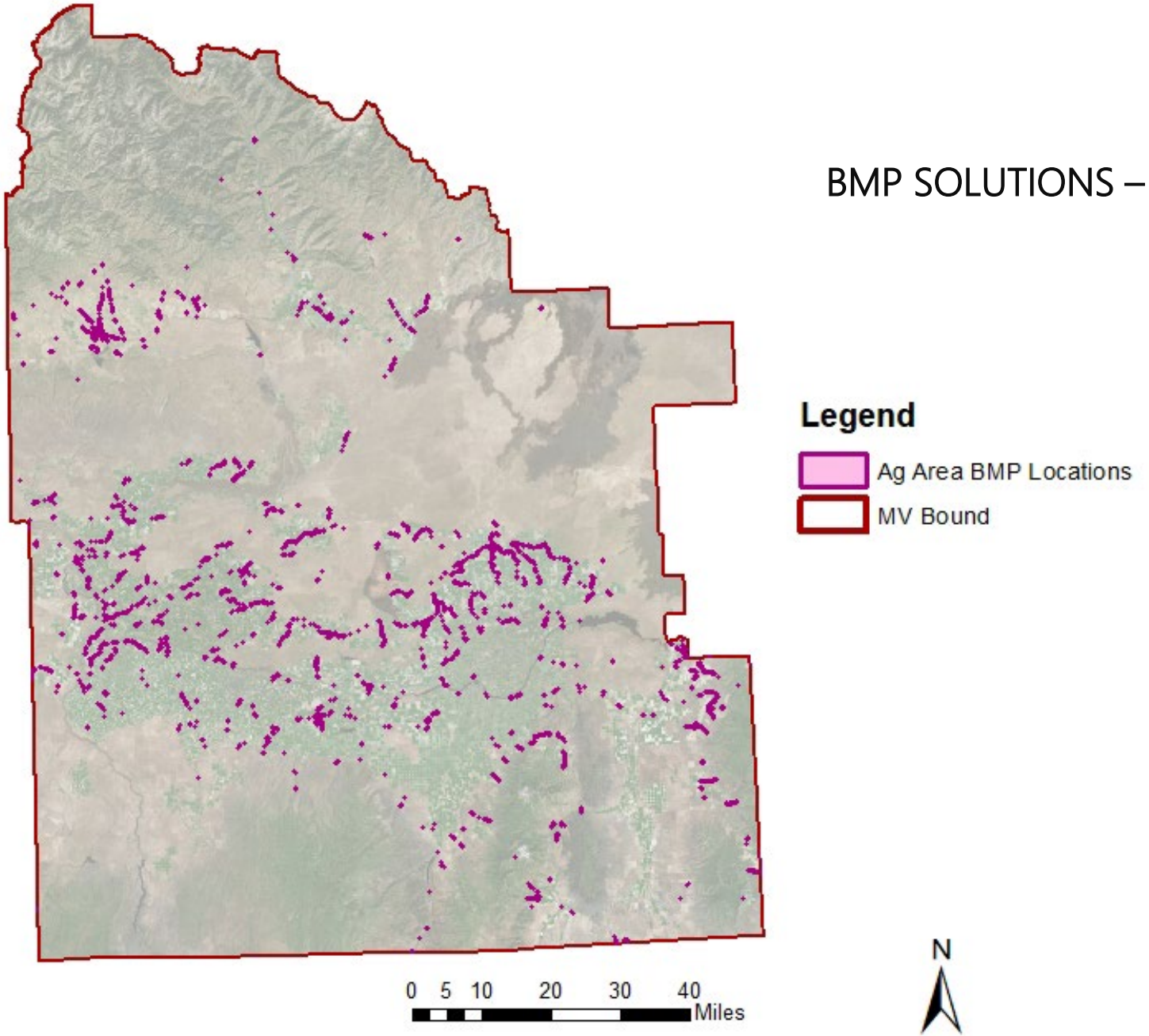
Composite Land Use Planning Map

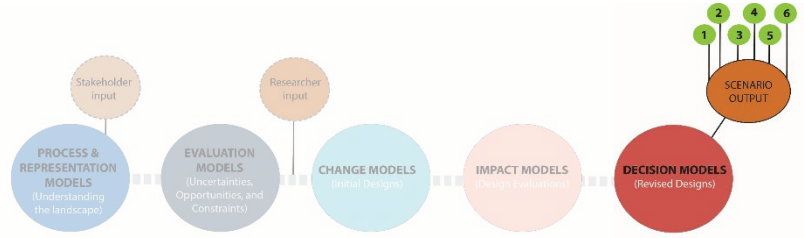
Land Use Plan: Food Insecurity Scenario
Magic Valley, Idaho



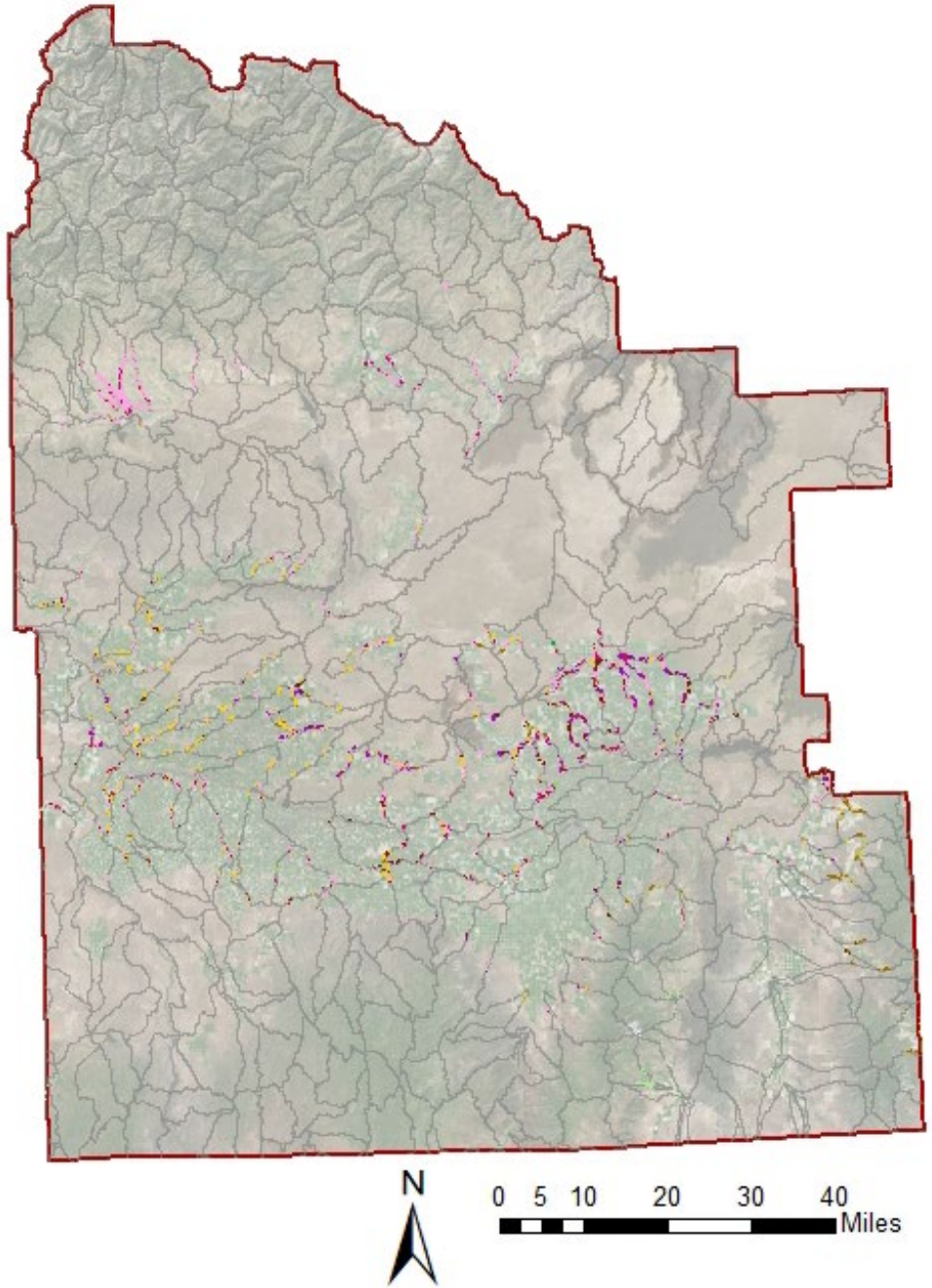
DECISION MODELS

BMP SOLUTIONS – Potential Effective areas for Infiltrations BMPs
i.e. WASCOBs, Pond Dams





DECISION MODELS

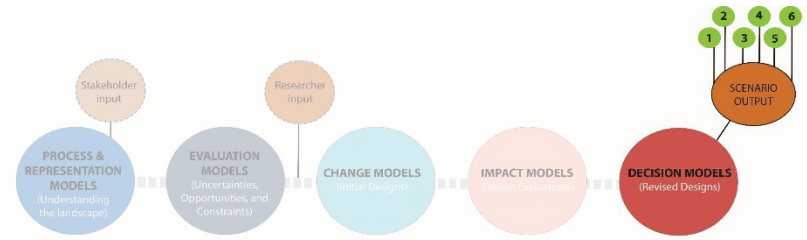


Crop Classes

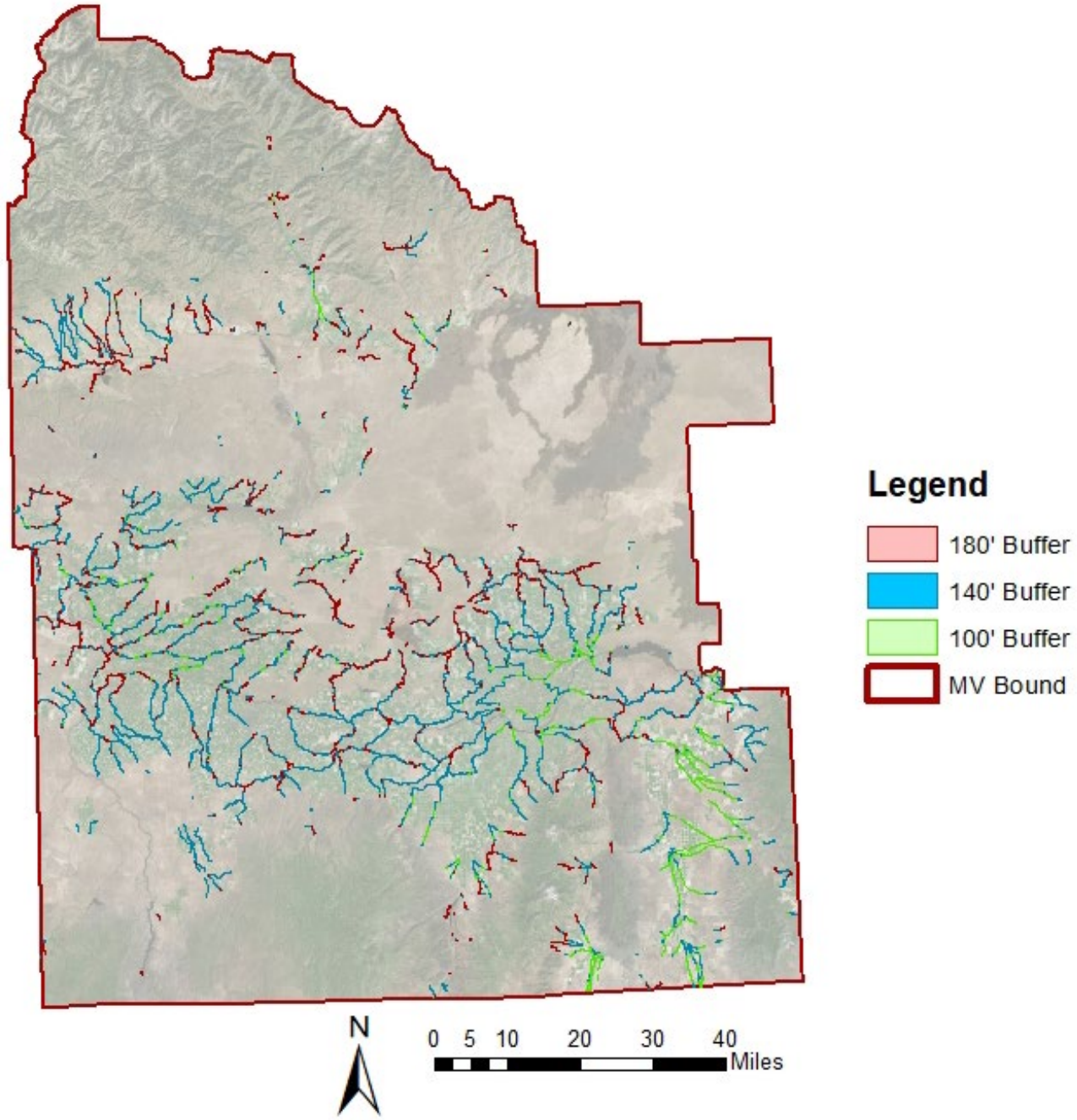
- Corn
- Sorghum
- Barley
- Spring Wheat
- Winter Wheat
- Other Small Grains
- Rye
- Oats
- Clover/Wildflowers
- Fallow/Idle Cropland
- Christmas Trees
- Triticale
- Carrots
- Turnips
- Safflower
- Mustard
- Alfalfa
- Other Hay/Non-Alfalfa
- Sugarbeets
- Dry Beans
- Potatoes
- Other Crops
- Onions
- Peas
- MV Bound
- huc12_line

BMP SOLUTIONS – Potential Effective areas for Infiltrations BMPs

SUITABILITY Criteria based on slope, runoff potential, hydrogroup soil (A & B) and proximity to outlet of subcatchment (HUC 12)



DECISION MODELS

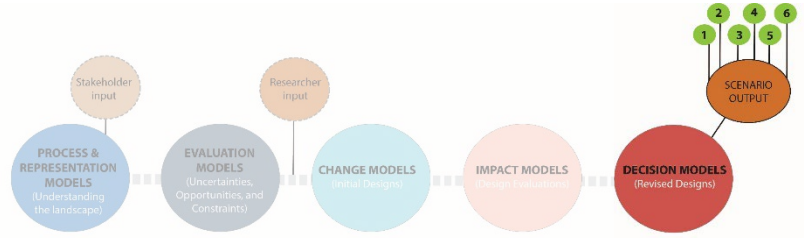


DECISION MODELS

BMP SOLUTIONS – Potential Effective areas for filtration, buffer, and conveyance BMPs

(i.e. Contour Buffer Strips, Grassed Waterways, Terraces, Strip Cropping, etc)

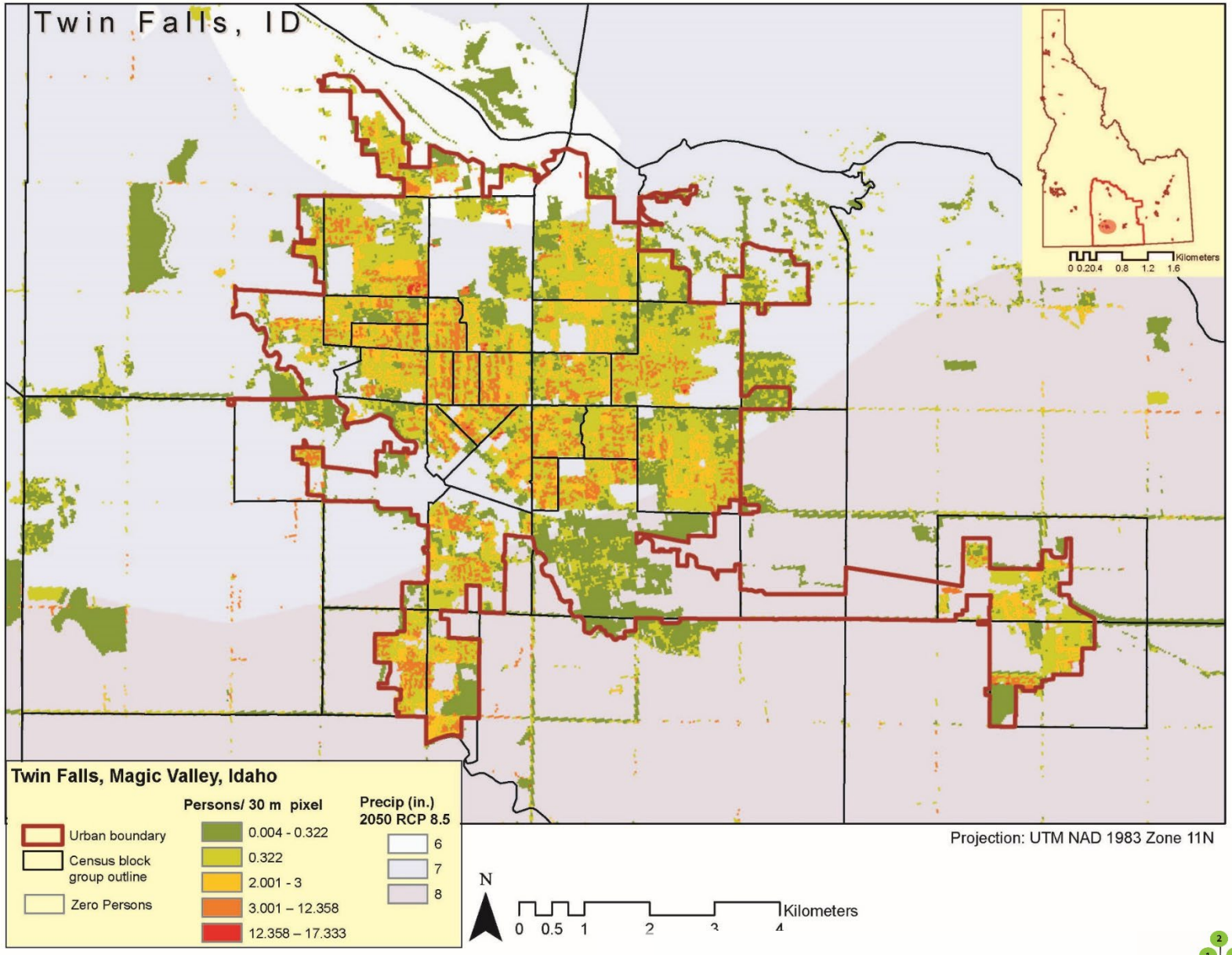
SUITABILITY Criteria based on slope, runoff potential, hydrogroup soil (C & D) and proximity to outlet of subcatchment (HUC 12)

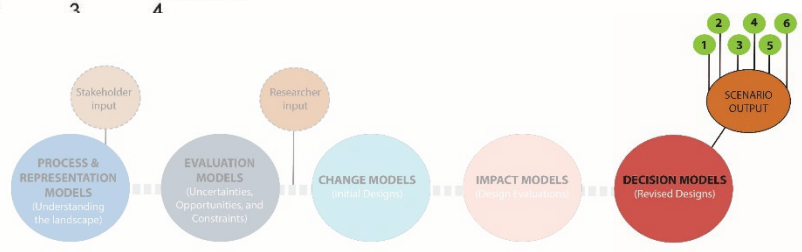


Dasymetric Mapping Analysis:
Twin Falls, Idaho 2050 Projection

"The purpose of this analysis is volumetric mapping of landuse change over time paired with population growth.

--Sleeter, USGS, 2011





DECISION MODELS

Urban and Agriculture BMP Network-

Dasymetric Mapping Analysis (population and landuse)

+

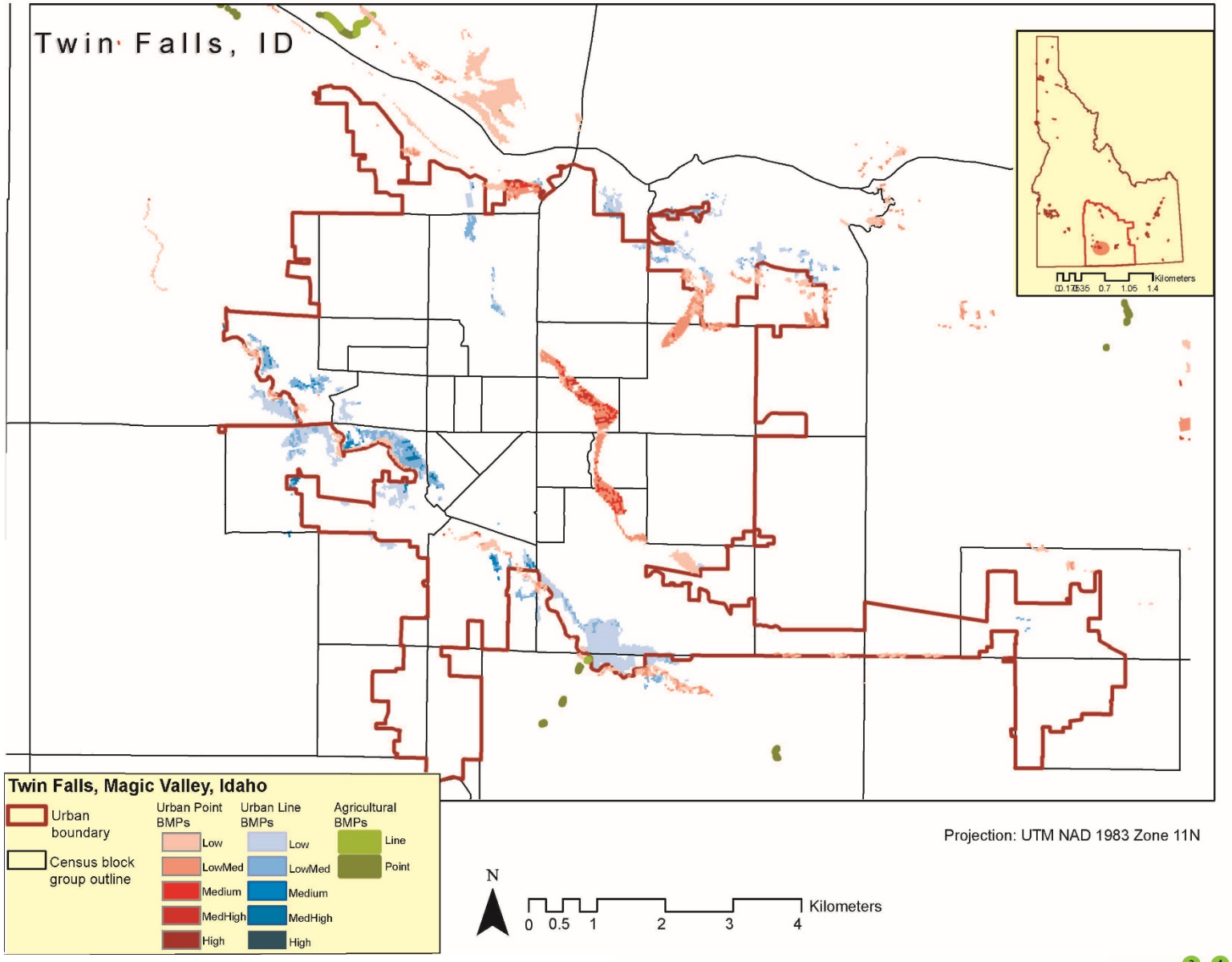
Agricultural BMP Weighted Suitability Criteria

(*based on slope, runoff potential, hydrogroup soil (A & B) and proximity to outlet of subcatchment (HUC 12)*)

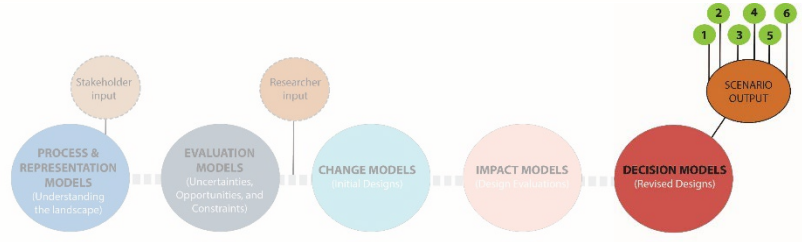
+

Urban BMP Weighted Suitability Criteria

(*based on slope, hydrogroup, depth to bedrock, depth to water table, distance to streams, distance to roads)*



DECISION MODELS

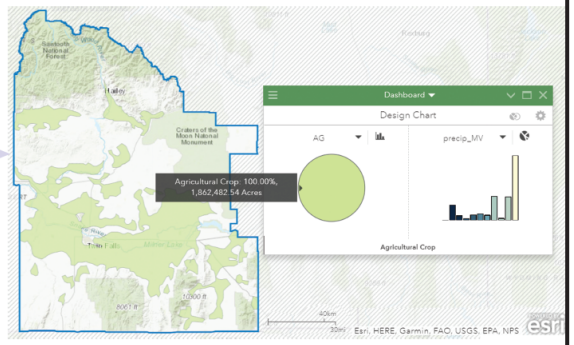


Scenario 1 (BAU)

Uncertainty	Rates of Change
Sufficient Water Supply for Demand	Trend
Water Quality Regulations	Trend
Resources impacting growth	Trend
Water Highest and Best Use	Trend
Agriculture as national security tool	Trend

- Agriculture has significant political and social support so production increases and food processors move into area

- Water supply has remained relatively consistent
- Best Management Practices (BMPs) have met the planned recharge targets
- Food prices and demand are high
- Legislature continues to place residential water use outside of "highest and best use" analysis
- Water quality regulations enforced by IDEQ
- Moderate increase in demand for water by urban
- Emphasis on agriculture helps maintain the sense of place developed in the region in the late 20th century
- Low energy costs, a resilient hydrological system, public support, and favorable legislative rulings encourage processors to relocate to the Magic Valley.
- Regional processing increases, making region more resilient

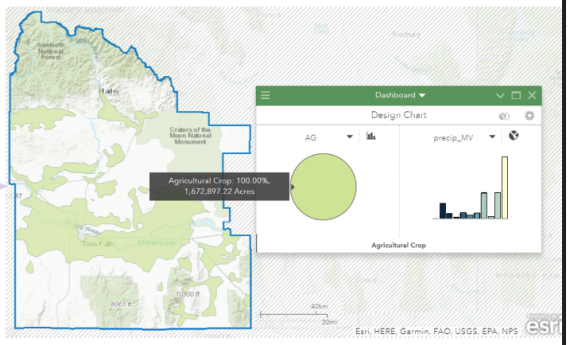


Scenario 2

Uncertainty	Rates of Change
Sufficient Water Supply for Demand	Insufficient supply and increased demand
Water Quality Regulations	No change
Resources impacting growth	Urban growth accelerates slightly
Water Highest and Best Use	Redefined based on tribal rights
Agriculture as national security tool	No impact to MV

- Courts rule that other users (i.e. tribes) can have increased access to water, so supply is not sufficient to meet demand. Agricultural land converts to other industries

- Short water years increase slightly
- Redefinition of highest and best use to support tribal rights
- Water supply is limited rendering some crops unsustainable
- Regional population has grown, but small lots = less demand
- Increased summer temperatures, labor shortfalls, and reduced water supply from water calls
- Agricultural land has been increasingly converted to different industrial uses
- Out-migration of farmers since 2030
- Industry responded by purchasing many of the senior water rights
- Limiting the incidental aquifer recharge, further straining groundwater storage

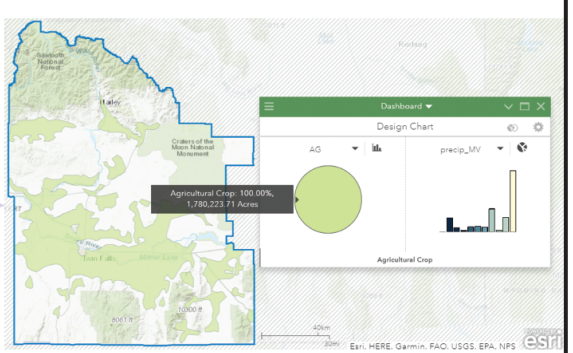


Scenario 3

Uncertainty	Rates of Change
Sufficient Water Supply for Demand	Supply is sufficient for demand
Water Quality Regulations	Significant increase in regulations
Resources impacting growth	High rates of urban growth
Water Highest and Best Use	Redefinition to ecosystems and food
Agriculture as national security tool	No change (but fuel prices increase)

- Ecosystem health, eat local food production, and population growth have all combined to push water quality regulations. Residential and agricultural industries have adopted water quality BMPs.

- Water supply increasingly stable
- Increased residential development, exceeding projections developed in 2015
- Fueled by the labor shortage and cleaner water than in other western states
- A broader segment of the agricultural industry is now considered point-source polluters
- Water quality regulations are focused on protecting both residential and agricultural applications
  - "local foods for local people"
- New residents help offset labor shortfalls
- Smaller agricultural operations have chosen to focus purely on supporting local demand, or they have consolidated into larger operations
- Clean water and food production are defined as the highest and best uses of water by 2040

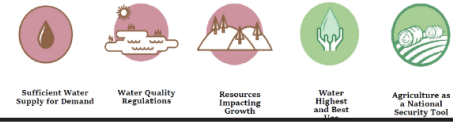


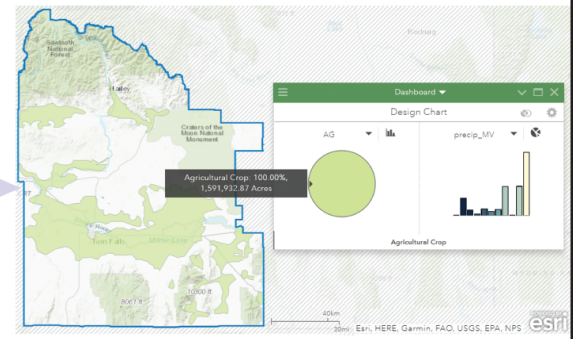
Scenario 4

Uncertainty	Rates of Change
Sufficient Water Supply for Demand	Supply is sufficient for demand
Water Quality Regulations	Substantial increase for urban and tech
Resources impacting growth	Highest rate of urban growth
Water Highest and Best Use	Increased priority for industrial uses
Agriculture as national security tool	No impact to MV

- Rural and urban development combined with new industries like technology data centers create increased land cost and force economy-of-scale consolidations of agricultural plots (particularly dairy).

- Very stable water supply
- Premier destination for climate refugees
- Increase in housing demand = higher water and land values
- Water quality regulations increased to support increased residential water use
- Labor shortage filled, then overshot
- Economic drivers favor the conversion of land from irrigated agriculture
- Allocation of land is now decided by market prices and sustained yield
- Data centers have moved to the region, attracted by cheap labor
- Water temperature a primary water quality regulation
- Underground Injection Controls (UICs) maintained for groundwater recharge



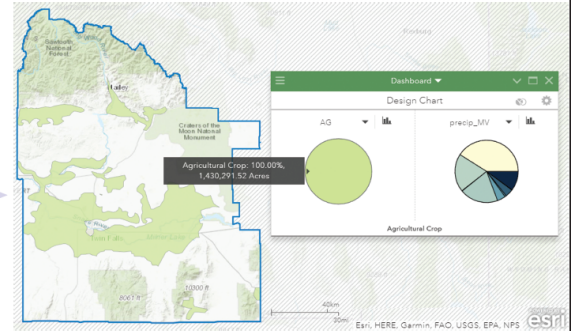


Scenario 5

Uncertainty	Rates of Change
Sufficient Water Supply for Demand	Significant decrease in supply, very high demand
Water Quality Regulations	Increase in regulations
Resources impacting growth	Low water supply is prioritized for urban
Water Highest and Best Use	Energy is elevated as a HBU
Agriculture as national security tool	Ag is used as national security tool

- International markets have disrupted Magic Valley food production and inter-basin water transfers to urban centers (like Twin Falls & Boise) have increased water demand.

- Drought is the new normal
- Tariffs from 2018-2025 have caused major disruptions to the global food systems
- Food produced in the MV to stay within the region
- Higher population densities are prioritized over areas with lower population densities for water
- Cheap land because of ag abandonment
- Urban water use is efficient
- Water quality regulations have expanded
- The UIC requires treatment prior to reinjection
- State emphasizes maximum hydroelectric energy generation
- More oil needs to be imported due to less fracking

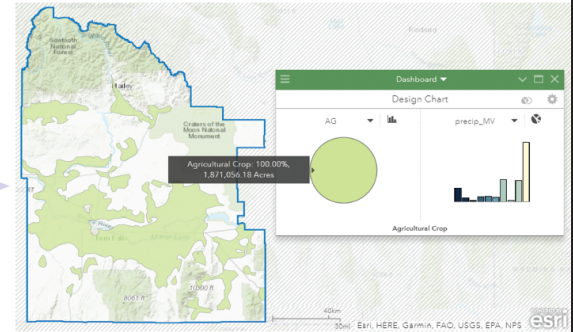


Scenario 6

Uncertainty	Rates of Change
Sufficient Water Supply for Demand	Supply is sufficient for demand, esp. ag demand
Water Quality Regulations	Less regulations
Resources impacting growth	Growth is spatially limited due to ag importance
Water Highest and Best Use	Agriculture is moved up in priority
Agriculture as national security tool	Ag is globally important, but not used as a tool

- Drought has occurred across the US and world but the Magic Valley has not been as impacted. Increased food production from the valley has met the international demand.

- MV has been able to avoid most of the drought conditions
- Food production from the MV has increased in both economic and political value
- Wetter winters and increased reservoir storage
- Less water quality regulations to increase regional food yields and profits
- Urban growth has increased to support the agricultural development
- State has prioritized food production in recent years (2040s)
- Very low per-capita water use in residential areas
- MV receives significant infrastructure investment



POTENTIAL EXPANSION OF TWIN FALLS

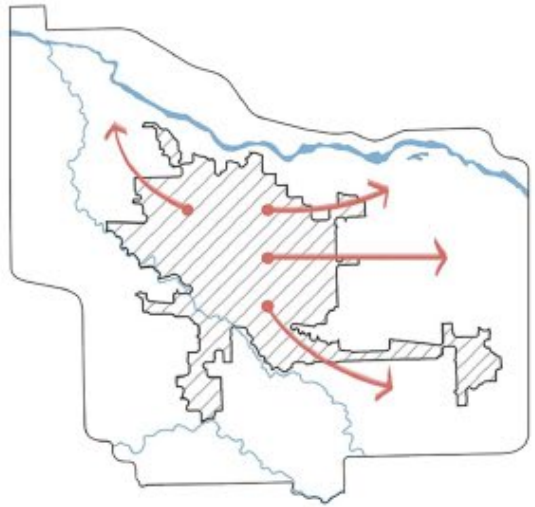
Method diagram

Observe the direction of urban expansion through historical images

Identify areas that meet topographic conditions for urban expansion

Remove conservation land and valuable agricultural land

Identify potential urban expansion areas



Urban Land

River

Urban Expansion Trend

Legend

Residents Per Acre

0.0-1.0

1.1-2.5

2.6-5.0

5.1-10.0

10.1-20.0

Potential Urban Land

Lands Suitable of Agricultural Production

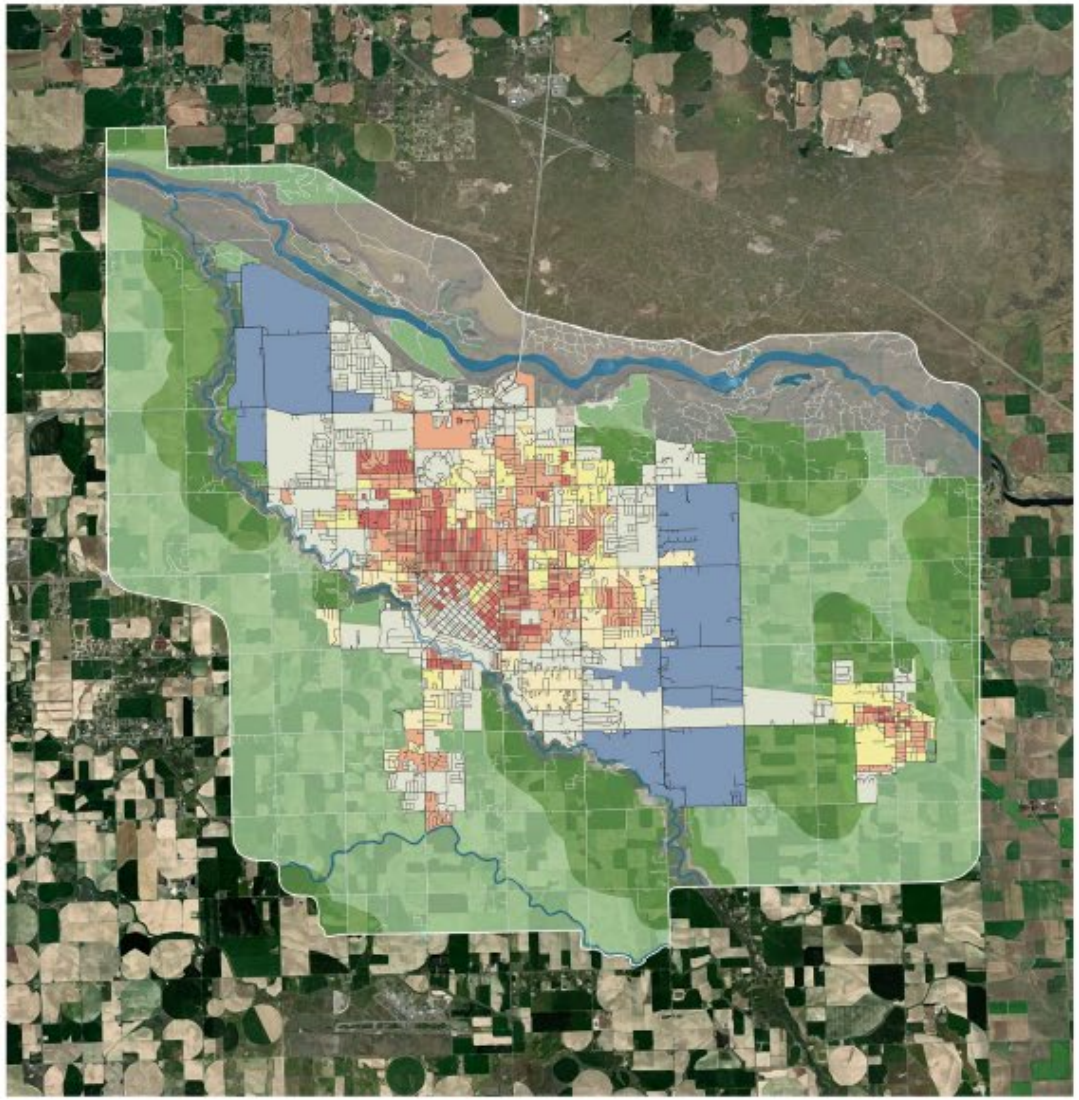
Lands Have the Highest Agricultural Value

River

Conservation Land

N

0 2 4 8 Miles



DECISION MODELS

SUB AREA PLAN

Legend

1. conservation area
2. plant belt
3. recreation area
4. children activity area
5. residents road
6. agriculture road
7. residential area
8. agricultural land

N

0 100 200 Meters

DECISION MODELS

PLANT BELT

Perspective of children's activity area

Pinus ponderosa
(Ponderosa Pine)

Populus tremuloides
(Aspen)

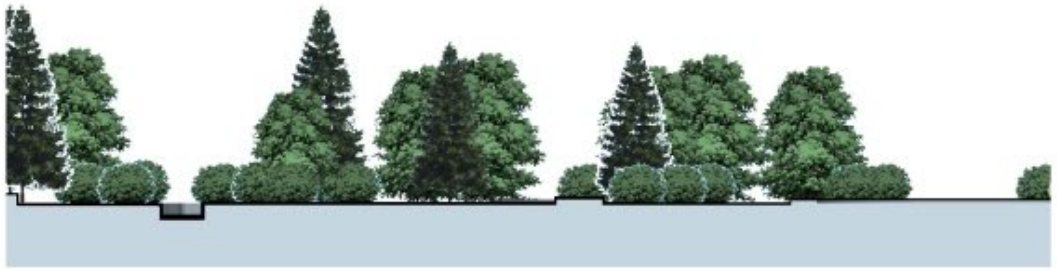
Purshia tridentata
(Bitterbrush)

Artemisia tridentata ssp.
wyomingensis
(Wyoming Big Sagebrush)

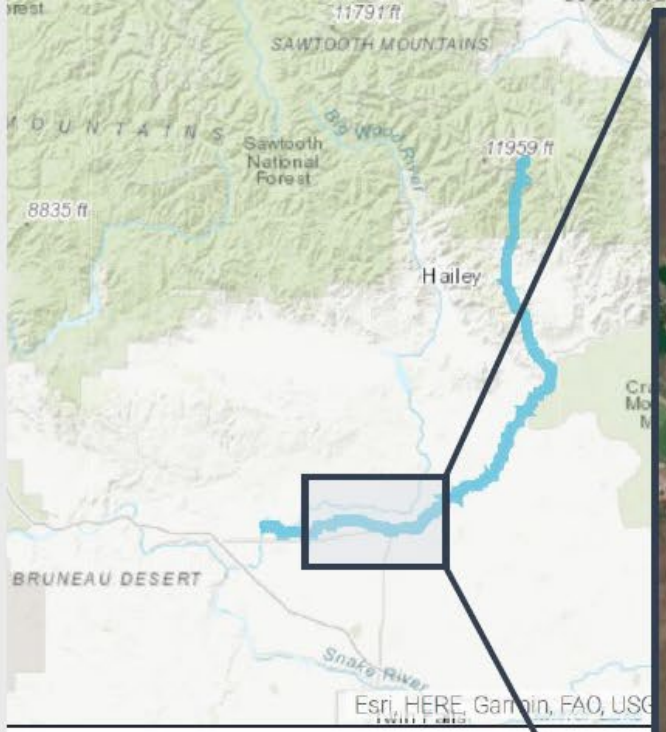
Penstemon venustus
(Blue Mountain Penstemon)

Celtis reticulata
(Netleaf Hackberry)

Section



DECISION MODELS



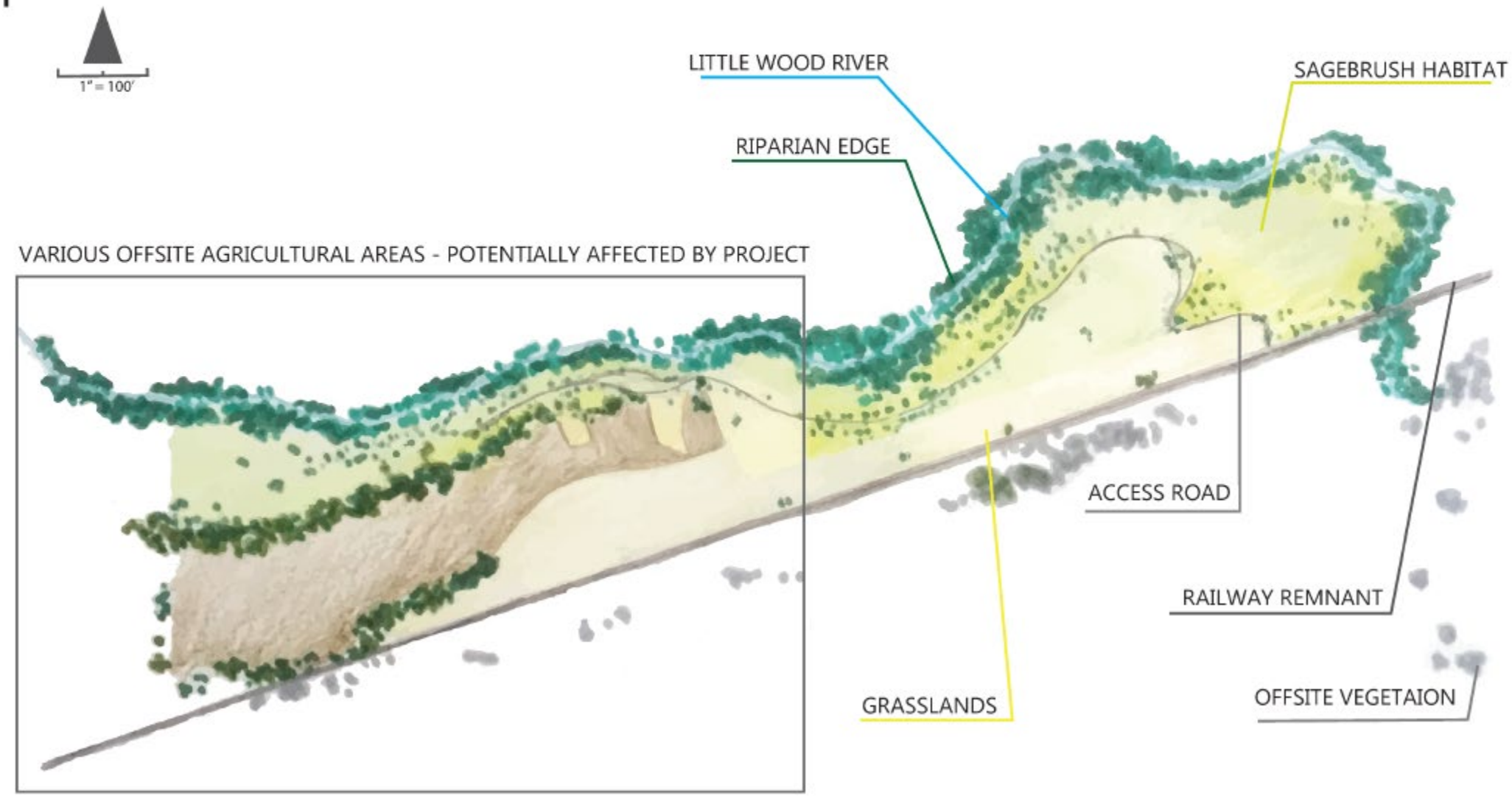
The Little Wood River begins on the edge of the Magic Valley between Standhope Peak and the White Mountains South of Broad Canyon in the Sawtooth National Forest and travels through the city of Shoshone before converging with the Big Wood River west of Gooding Idaho.

Shoshone: Neher Property

DECISION MODELS

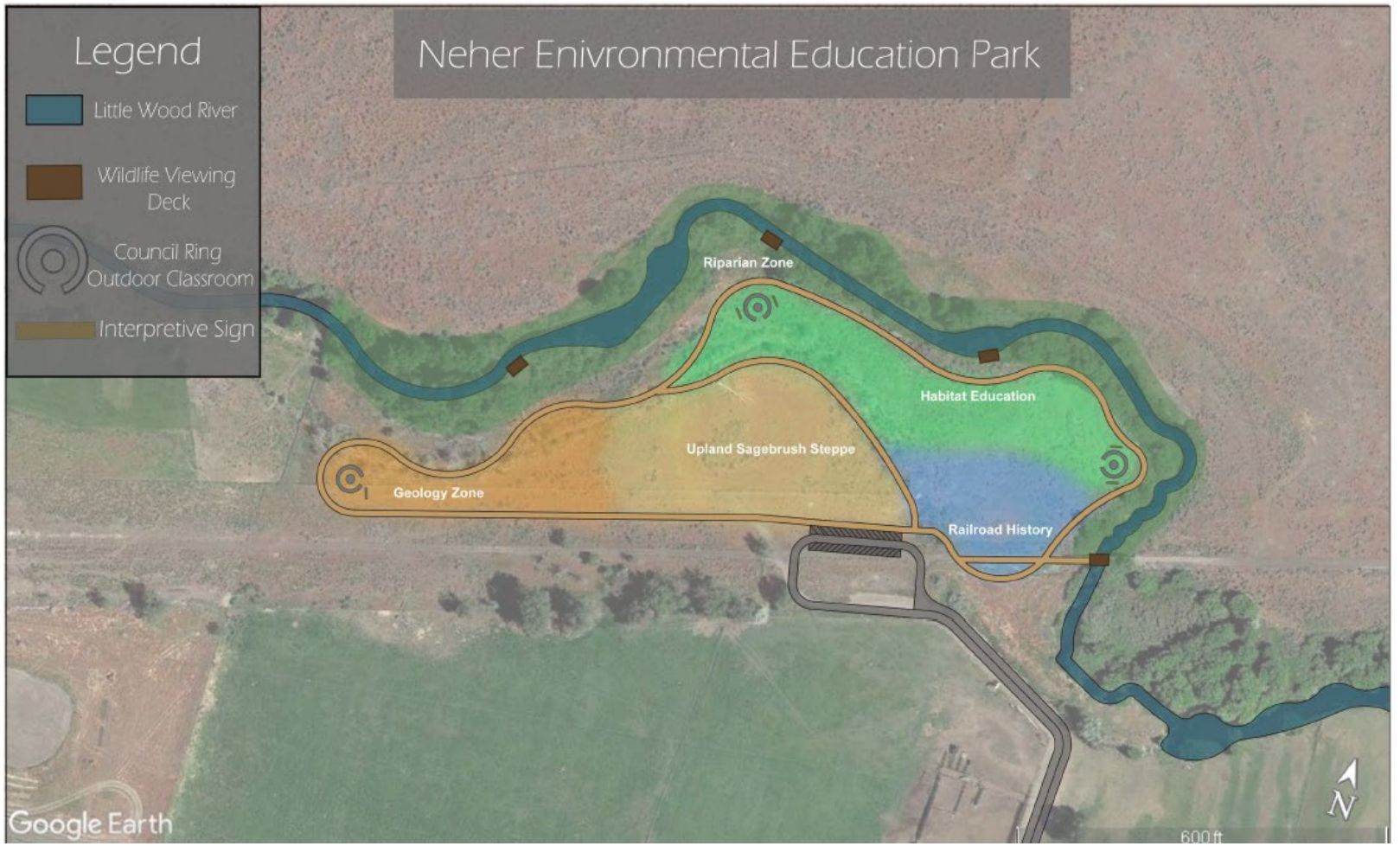
NEHER PROPERTY, SHOSHONE IDAHO RESTORATION/RESCREATION PROJECT NOV.2018

ANALYSIS OF EXISTING ELEMENTS

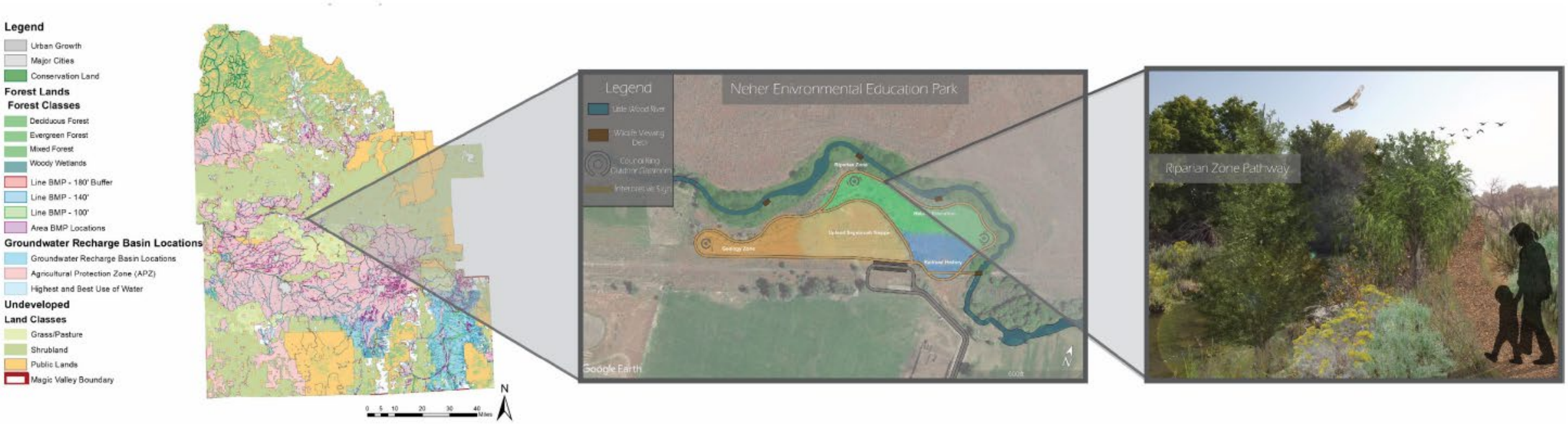


DECISION MODELS

Site Planning and Design



DECISION MODELS



DECISION MODELS

CITIATIONS:

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Dangermond, Jack. 2016. Returning to America's Green Planning Roots: Esri Green Infrastructure Tools Will Help People, Government, and Planners Design a Better Future. ESRI Press.

McNeely et al., 2017. IOWA BEST MANAGEMENT PRACTICES (BMP) MAPPING PROJECT HANDBOOK.

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Qiu, Z., Dosskey, G., 2016. Data on four criteria for targeting the placement of conservation buffers in agricultural landscapes

TOOLS:

https://climatetoolbox.org/tool/Climate-Mapper

https://nawqatrends.wim.usgs.gov/Decadal/

https://www.epa.gov/waterdata/water-quality-portal-data-discovery-tool

https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=OW&dirEntryId=23829

https://www.nrc.gov/docs/ML1018/ML101800248.pdf

http://nptwaterresources.org/wp-content/uploads/2014/01/bmp_april2013-sml.pdf

IMPACT GROWTH

RENDEZVOUS 2019
IDAHO | MONTANA ASLA
BOISE, IDAHO

University of Idaho

CRC CENTER FOR RESILIENT COMMUNITIES

NSF

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Center for Resilient Communities, University of Idaho
https://www.uidaho.edu/caa/galleries-centers-and-labs/crc

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