

HORT 432 Advanced Landscape Design Studio

LANDSCAPE DESIGN SCENARIOS FOR WATER CONSERVATION IN THE MIDDLE ROCKIES



Project Partner:



1 Understanding

2 Application

3 Communication



LANDSCAPE PERFORMANCE SERIES

by the Landscape Architecture Foundation

landscapeperformance.org

Sustainable SITES Initiative

sustainablesites.org

main. TIME	1	INVOLVEMENT			High Med Low		
Comments	EVERYONE VOTE	themes	performance targets	M+E	N+E	H-N-L	FINAL
	*	W	water (irrigation) ↓ %	90/60/30	50, 90%	50/75/100	
combine?	*	HH/VS	edible/med/therapeutic %	30/20/10		75/75/75	
Separate?	*	VS	natives %	90/60/30	↑ 50, 90%	100/50/66-75	
combine	*	? HH/VS	pollinators % <small>combine (human + ecological enhancements)</small>	90/60/30	25, 50	25	
combine	④ !	HH	open space % Active Playspace (Usable)	75/50/25	related to turf %	50/80/80	
	* Δ	E?	cost (up front)	↓/\$/\$/\$/\$		\$ \$ \$	
combine	④	VS	turf % <small>left on property * be combined with natives?</small>		10, 75	50, 20, 0	
heating/cooling	Δ	E	energy ↓ %		50, 90%		
define ?	X	HH	multi-use spaces %		25%	50%?	
materials?	X	W/HH	permeous/imperious		50, 90%	50%/100	
quantify?	④	HH	community enhancement				

raets

group

Maintenance

weir



INCREASED VALUE of investment in food and safety Food for Food Bank



show it. Montana showcases over 50 unique ecological systems throughout the state (MTNHP, 2015). Each system boasts a wide variety of plant materials that together create beautiful scenes in the Montana landscape. Explore the option of landscaping your own piece of Montana in a fashion that is true to Montana by rewilding your own back yard with these plants.

Credit: Maggie Crowley



DESIGN APPROACH

Making a case using landscape performance

WATER

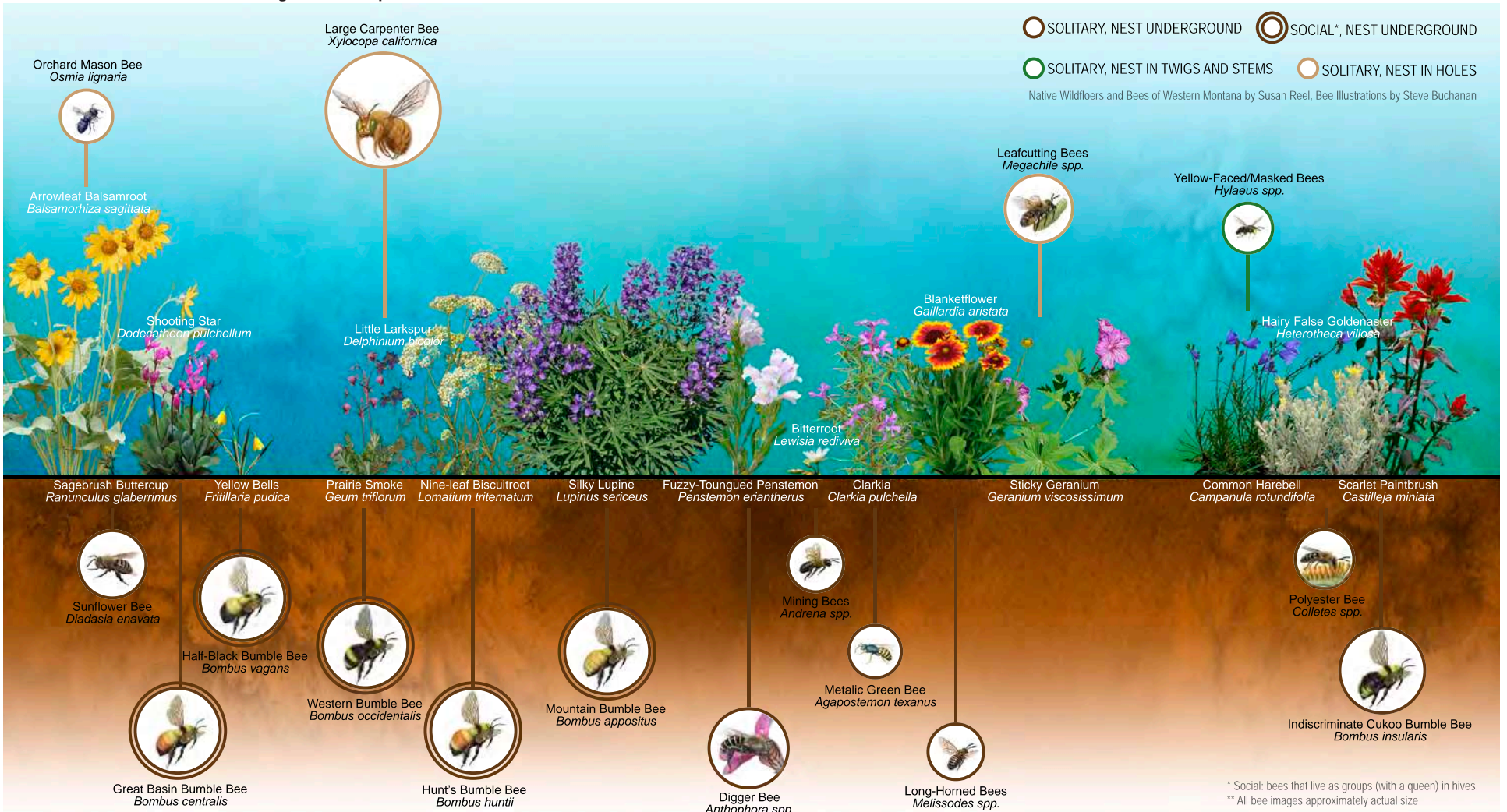
- Problem: water quantity is declining within the Bozeman watershed every year
- Sustainable Sites Approach: use of rain water that falls on the site; use of plant selection
- In 2015, consumption for single family homes from June - August was 540 million gallons of water
- Compared to September - May where 317 million gallons of water were used



Credit: Elizabeth Ritchie

VEGETATION & SOILS

- Problems: bee population is going down by 40-50% (in 2015 according to the USDA) an loss and compaction of productive top soil
- Sustainable Sites Approach:
 - use of native and drought tolerant plants to conserve water
 - create diverse habitat that contributes to seasonal interest
 - create stability for top soil



Credit: Elizabeth Ritchie

VEGETATION & SOILS

MORE THAN JUST GRASS GREEN...

TURF GRASS

SPRING

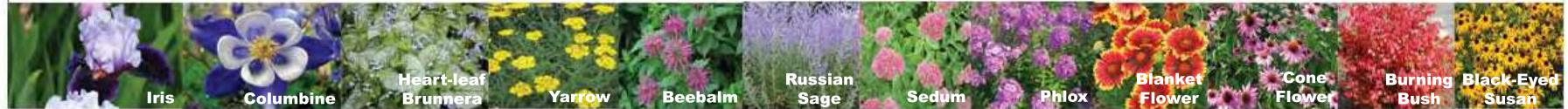


FALL



FULL/PART SUN

SPRING



FALL



PART SUN/SHADE

SPRING



FALL

Credit: Haley Craven

HUMAN HEALTH & WELL BEING

- Problem: there is not enough focus on restorative and stimulating spaces within landscapes
- Sustainable Sites Approach: aim to not just be aesthetically pleasing
- CASE STUDY: Elmer Avenue Neighborhood Retrofit, California
 - increased neighborhood satisfaction by 90%
 - increased property values and curb appeal
 - saved residents \$120-\$360 annually by being a self watering site
 - improves water quality by reducing concentrations of lead by 60%, copper of 33%, and total suspended solids by 18%



BEFORE



AFTER

MATERIALS & ENERGY

- Problem: the energy used for material acquisition and disposition deserves more thought

Going 500 miles to get materials requires 15 trees to sequester the amount of carbon produced by emissions...



Going 200 miles requires about 5 trees...



Going 50 miles requires about 2 trees...



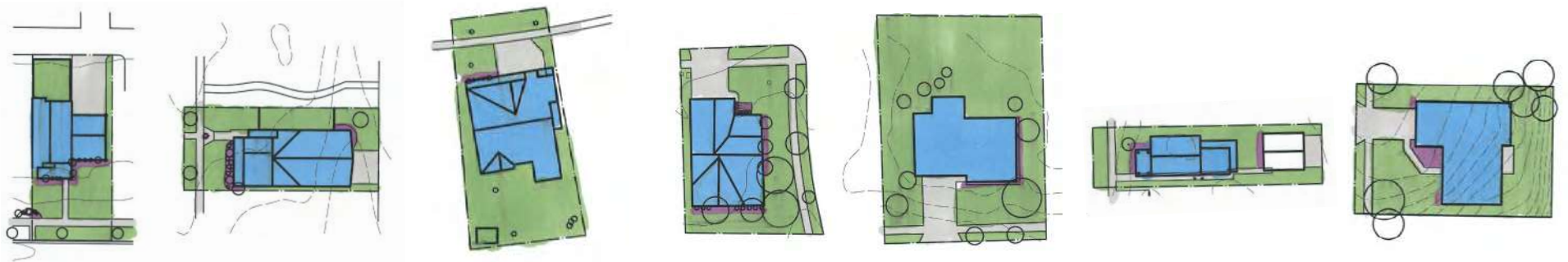
- Sustainable Site Approach:
 - Reduce the distance of where materials are coming from
 - Reuse materials on site
 - Use of recycled materials

BASELINE PERFORMANCE

METHOD

Analyzed Parcels

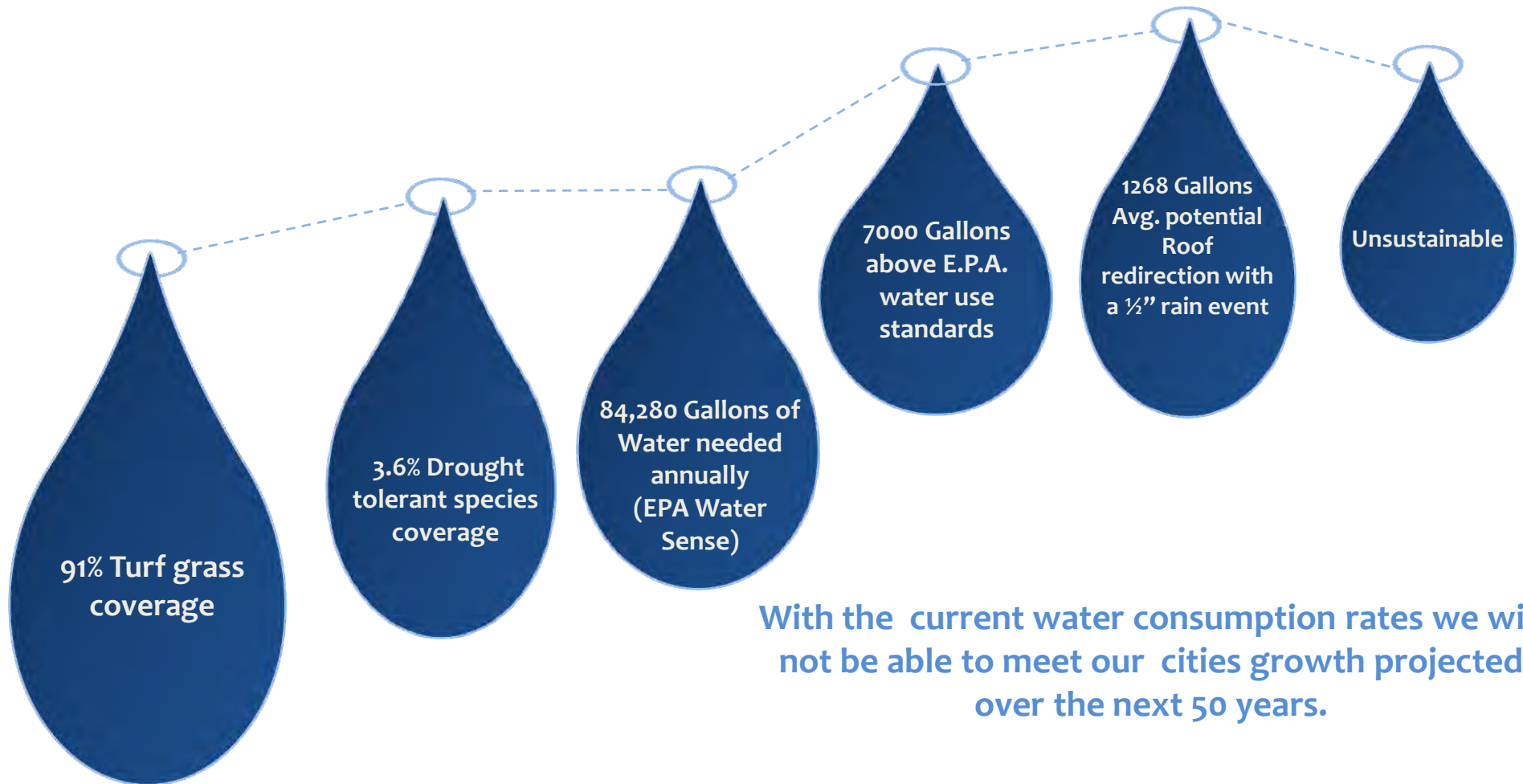
- Single Family Equivalent (SFE) properties
- Geographic variability in City of Bozeman
- Parcel layout typology - orientation, alley/street garage
- Median home value (\$350,000)



Data Collection

- On-site survey
- Mapping & drafting software
- Microsoft excel for four performance themes

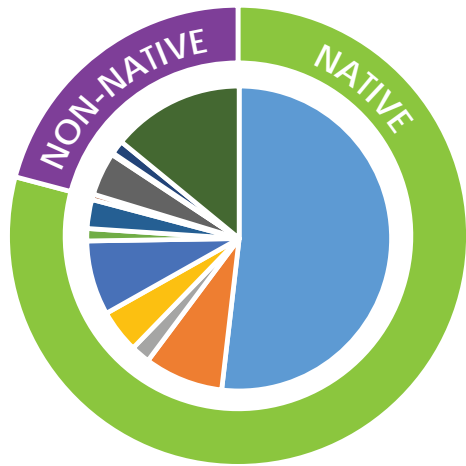
WATER



With the current water consumption rates we will not be able to meet our cities growth projected over the next 50 years.

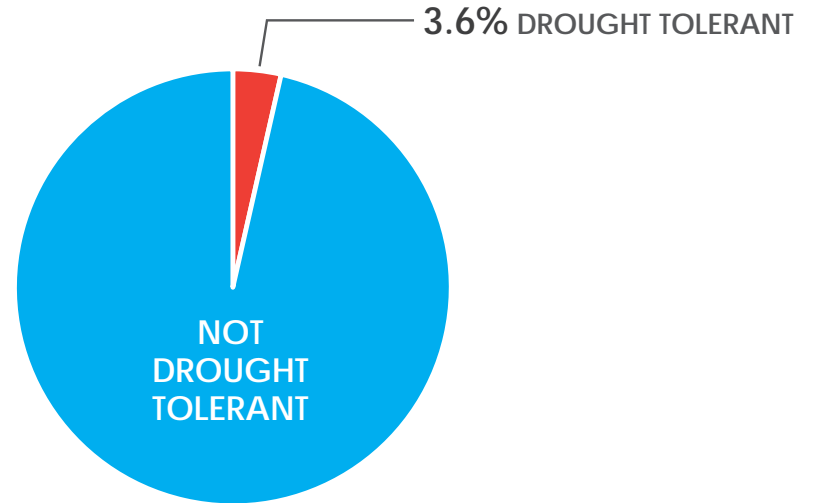
We need a more “sustainable solution”.....

VEGETATION & POLLINATORS

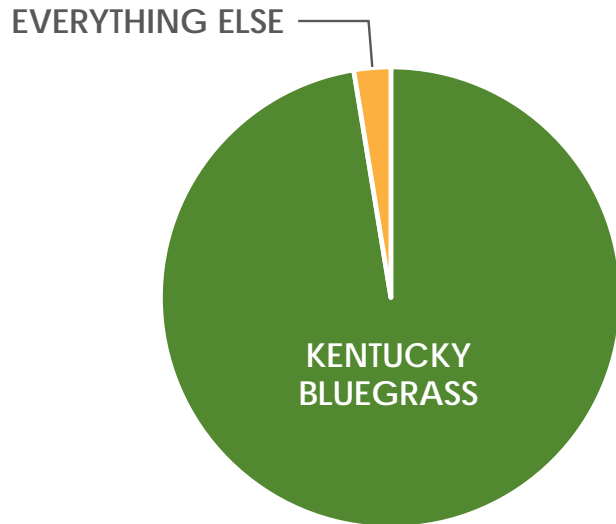


- Quaking Aspen
- Green Ash
- Chokecherry
- Paper Birch
- Rocky Mountain Juniper
- Purpleleaf Sandcherry
- Limber Pine
- Siberian Cedar
- Crabapple
- Colorado Blue Spruce
- Austrian Pine
- Japanese Tree Lilac

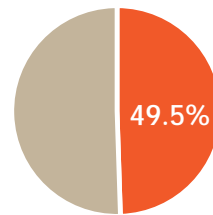
TREE COVERAGE PER SPECIES



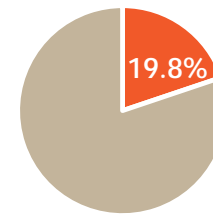
PERCENT OF TOTAL VEGETATIVE COVER THAT CAN **WITHSTAND DROUGHT**



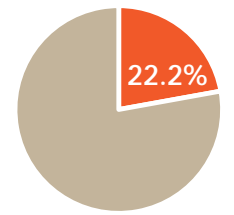
OTHER VEGETATIVE COVERAGE



BIRDS



BUTTERFLIES



BEEES

PERCENT OF TOTAL PLANTS INVENTORIED* WITH **WILDLIFE VALUE**

Human Health & Well-Being

Avg. property value increase due to trees in the front lawn is currently **\$344** (National Tree Benefits Calculator)

Year-round sensory experiences are **low** due to the extremely high amounts **turf** (97%)

Restorative spaces are **limited**. Primary engagement with landscape is through mowing & limited play






















Therapeutic & medicinal properties are limited due to the **uniformity** of turf



Jungles, Raymond. *1100 Block of Lincoln Road Mall*. Digital image. *Landscape Performance Series*. N.p., 2010. Web. 30 Nov. 2016.




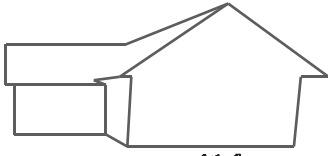
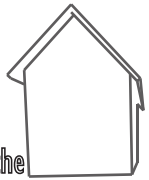
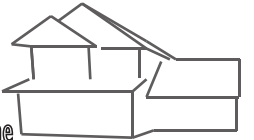
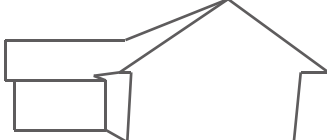
PERFORMANCE TARGETS & SCENARIO DEVELOPMENT

SCENARIO

THRESHOLD	FEATURES & PERFORMANCES						
HIGH	 % of water use reduction (gallons / season)	 % use of native plants as increase (square feet)	 % use of pollinator-friendly plants as increase (total cover - square feet)	 % use of edible/medicinal plants (total cover - square feet)	 total open space reduction (hardscape / turf) (square feet)	 post-establishment maintenance time (hours / week)	 average cost of new vegetation (dollars / square foot of plants)
MEDIUM	 % of water use reduction (gallons / season)	 % use of native plants as increase (square feet)	 % use of pollinator-friendly plants as increase (total cover - square feet)	 % use of edible/medicinal plants (total cover - square feet)	 total open space reduction (hardscape / turf) (square feet)	 post-establishment maintenance time (hours / week)	 average cost of new vegetation (dollars / square foot of plants)
LOW	 % of water use reduction (gallons / season)	 % use of native plants as increase (square feet)	 % use of pollinator-friendly plants as increase (total cover - square feet)	 % use of edible/medicinal plants (total cover - square feet)	 total open space reduction (hardscape / turf) (square feet)	 post-establishment maintenance time (hours / week)	 average cost of new vegetation (dollars / square foot of plants)
NOTES							
HIGH	90+	90+	90+	50+	75+	10+	2.50 - 4.00
MEDIUM	60+	60+	60+	35+	50+	4-10	1.30 - 2.50
LOW	30+	30+	30+	10+	25+	1-3	0 - 1.30

SCENARIO TRESHOLDS

FEATURES & PERFORMANCES

 <u>THE SURVIVOR</u>	 <u>URBAN</u> farmer	 native beauty	 KEEP MT wild	 <u>the minimalist</u>	 the entertainment zone	 FAMILY VALUES
