

Perfecting Field & GIS Protocols for Assessing the Sustainability of Campsites

Desolation Wilderness



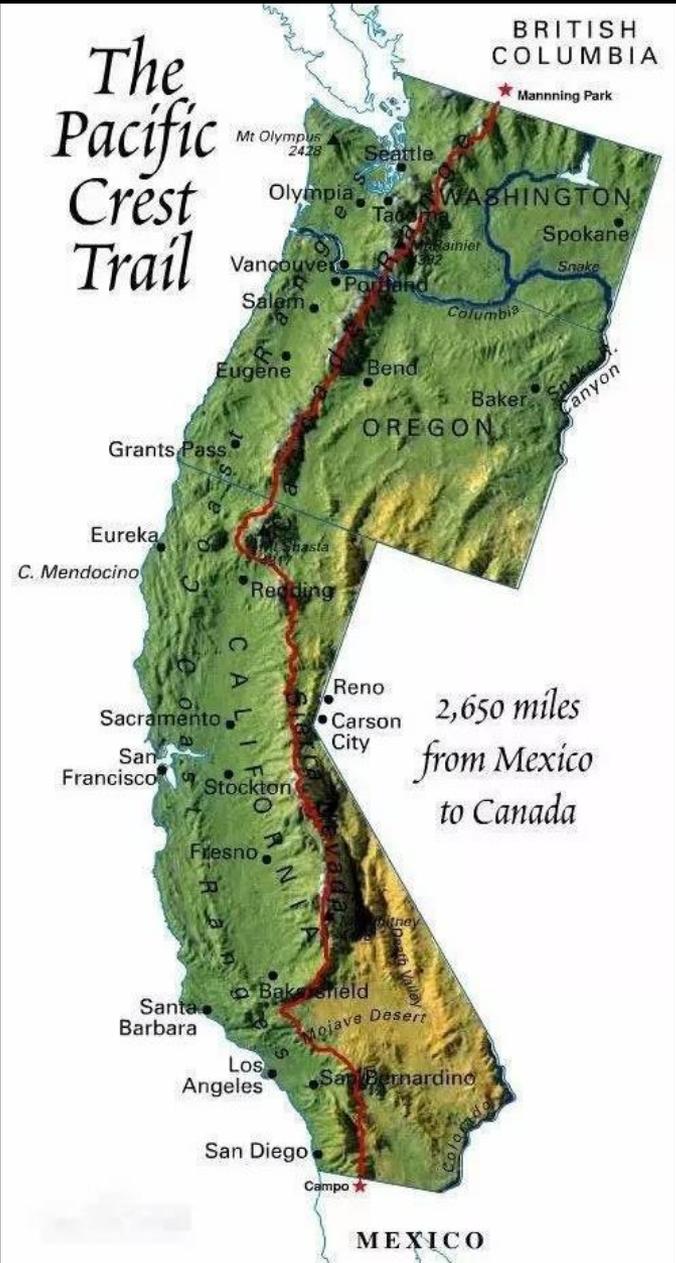
Dr. Jeff Marion
USGS Virginia Tech Unit

Johanna Arredondo
Virginia Tech Grad Student

Fletcher Meadema
Virginia Tech Grad Student

Dr. Jeremy Wimpey
Applied Trails Research

Pacific Crest Trail Research Team



Presentation Objectives

- 1. Review recreation ecology research findings on need to use sustainable campsites
- 2. Review methods for selecting sustainable campsites based on field and GIS surveys.

PCT Research Study
Ansel Adams Wilderness
1000 Island Lake
Inyo NF



Campsite Sustainability

- **Definition:** A “sustainable” campsite can: *accommodate the intended type and amount of use over time without unacceptable levels of expansion, degradation, maintenance, and social crowding or conflict.*
- Generally, a primary resource protection objective is to minimize the “aggregate” area of camping impact by minimizing campsite numbers and sizes.
- Sustainable campsites must be able to receive heavy use for decades while resisting expansion and unacceptable resource impacts.

Sequoia Kings Canyon NP, Mt Whitney area, Crabtree Meadows

Camping impacts:

21 campsites

21,921 ft² of disturbance



Large flat areas
encourage campsite
expansion and
proliferation...

Unconfined Camping Impacts on the Pacific Crest Trail

Twin Lakes Mega-site, OR
Mt. Hood Wilderness
48,142 ft² of impact

Problems:

Poor site selection – flat places!
Campsite proliferation
Campsite expansion
Resource – highly impacted
Social – crowding & conflicts

Camping Containment Strategy

Established or Designated Site Camping

Highly effective when camping is shifted to sustainable campsites, ineffective otherwise.



Camping Containment Strategy

Core Management Challenges:

- How can we minimize campsite proliferation, expansion, and degradation over time?
- How can we evaluate and select sustainable campsites?



Assessing Campsite Sustainability

Current AT and PCT Research

Investigated factors affecting sustainability and developed protocols to apply them in both GIS and field-based surveys.

Criteria based on recreation ecology research and visitor campsite preferences were integrated.

Protocols are developed and applied to rate the sustainability of existing and potential new campsites.

What characteristics contribute to a sustainable campsite?

Site Expansion Potential Rating:

- Count the number of possible new 10x10 tenting spots within 30 ft of existing site boundaries. Judge based on constraints imposed by terrain that is too sloped, uneven, or rocky, not on the presence of trees/shrubs.



What characteristics contribute to a sustainable campsite?

Tree Canopy Cover:

- Estimate the % of the site that is shaded by tree cover:

0-5%, 6-25%, 51-75%,
76-95%, 96-100%

Sustainable sites are at
the high and low ends.



What characteristics contribute to a sustainable campsite?

Bedrock:

- Estimate the % of the site that has usable bedrock surfaces:

0-5%, 6-25%, 51-75%,
76-95%, 96-100%

Sustainable sites have the most usable bedrock.



What characteristics contribute to a sustainable campsite?

Grass Cover

Estimate the % of the site that has grass cover.

0-5%, 6-25%, 51-75%,
76-95%, 96-100%

Sustainable sites have more grass and few herbs. A secondary selection factor when sites must be on vegetation (vs. barren areas).

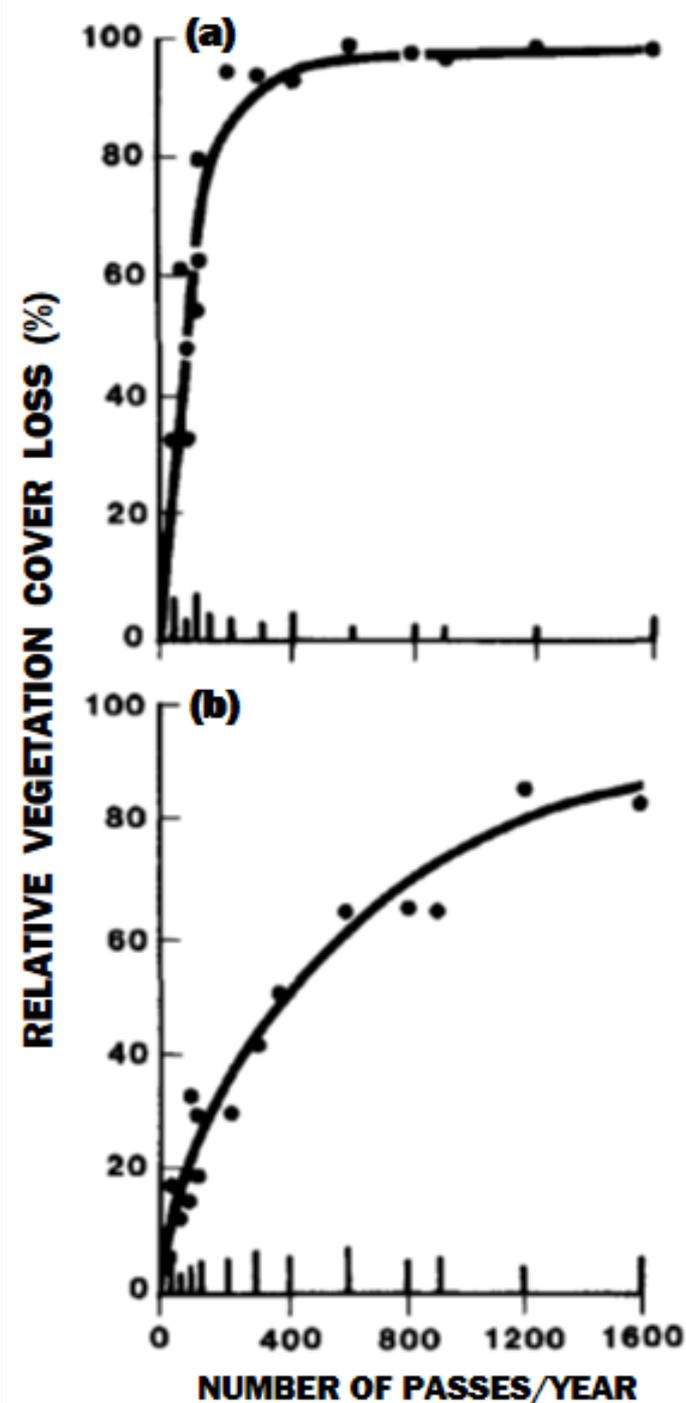


Science says: Grass is Good!

Experimental Trampling Research

W. Montana, Forest vs Grassland,
Cole, 1987

- 1) 50% of the forest plot (a) veg cover is removed by 40 passes, while 400 passes are required to remove 50% cover in the grassland plots (b),
- 2) 50% of the vegetation species are eliminated by 200 passes in most forest types while 600 passes are required to remove half the species in the grassland,
- 3) Max. # passes that still allow fall/spring recovery back to control conditions was 800 for the grassland and 25 for the forested plots.



Vegetation Resistance & Resilience

1000 passes



1 mo. later



- Forest forbs have low resistance to trampling and low and resilience (ability to recover).
- Grasses have high resistance and resilience in sunny locations.

1000 passes



1 mo. later



- Encourage camping in deep shade or sunny locations.

BWCAW Campsite Research: 1982-2014



Campsites lost substantial tree cover over 32 years...

Regeneration doesn't occur on campsites

1982



2014

BWCAW Campsite Research: 1982-2014

Shade-intolerant but resistant/resilient grasses and sedges invade campsites as tree cover is lost.

Benefits are increased camping resistance and reduced threat from hazard trees but at a cost of unnatural conditions. A Wilderness Character conundrum.



Select Sustainable Sites



Select Sustainable Campsites



Visitor Campsite Preferences

We must integrate resource and social/experiential sustainability.



Visitor Campsite Preferences

Attribute category	Campsite Attributes
Necessity Attributes	Level ground
	Adequate tent space (areas of denuded veg.)
	Proximity to water
	Proximity to trails
	Shelter from weather
Experience Attributes	Easy to Find.
	Good drainage, dry, well-drained
	Privacy -- Nobody walking through camp area
	Distance to other camping groups
	Not hearing sounds from other groups
	Less than 10 campsites present at a destination
	Screened from other campers
	Uncrowded/Unoccupied area
	Scenic features, View of scenery

Visitor Campsite Preferences

Attribute category	Campsite Attributes
Amenity Attributes	Log bench
	Shading
	Not much litter present
	Campfire ring
	Tree with nails
	Bare soil ("cleared" tent spots)
	Firewood Availability
	Sparse understory
	Free of horse manure
	Lack of dust
	Not prone to mosquitos

What characteristics contribute to a *sustainable* campsite?

Usable Tent Pads (#)
Good Tent Pads (#)
Ease of Water Access
Inter-site Visibility
Dead / Hazard Trees
Cat-hole Potential
Bear Bag Hang Trees
Attractiveness of Site
Scenery Around Site



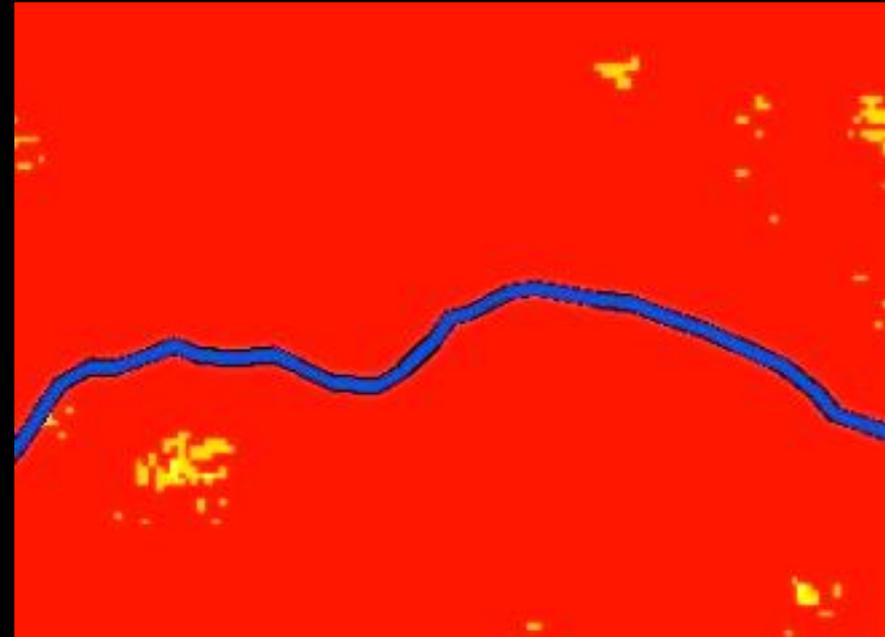
Current Research

PCT research is developing our ability to use GIS or field surveys to evaluate the sustainability of existing campsites and find “naturally occurring” side-hill campsites. Still working on a method to integrate the survey results.

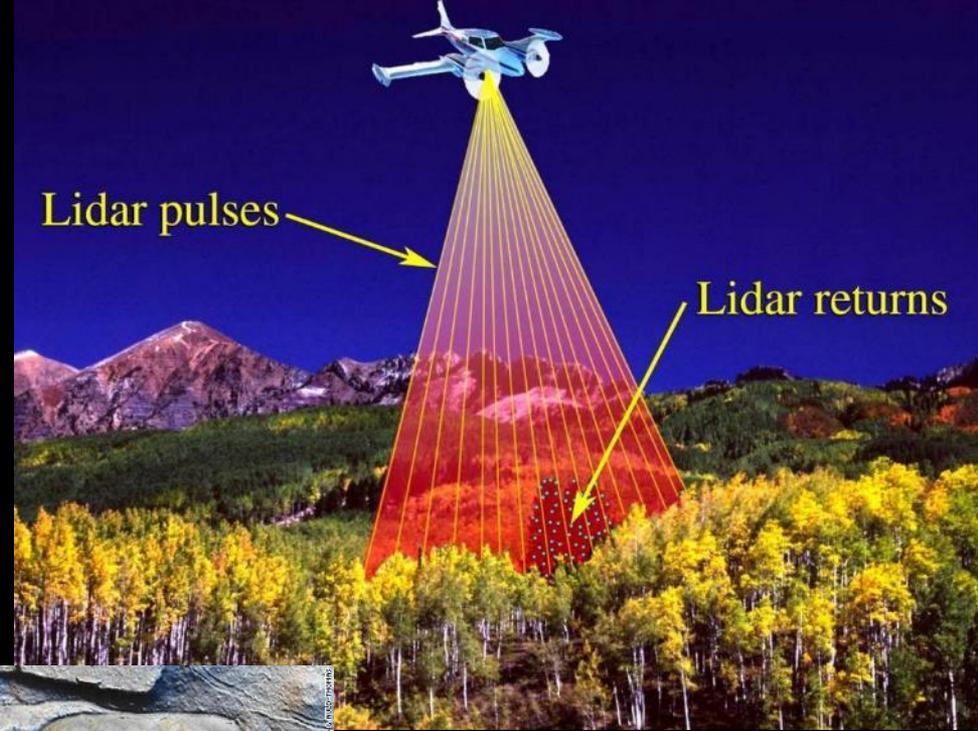
A “naturally occurring”
“side-hill” campsite



GIS analyses can easily
identify these locations!

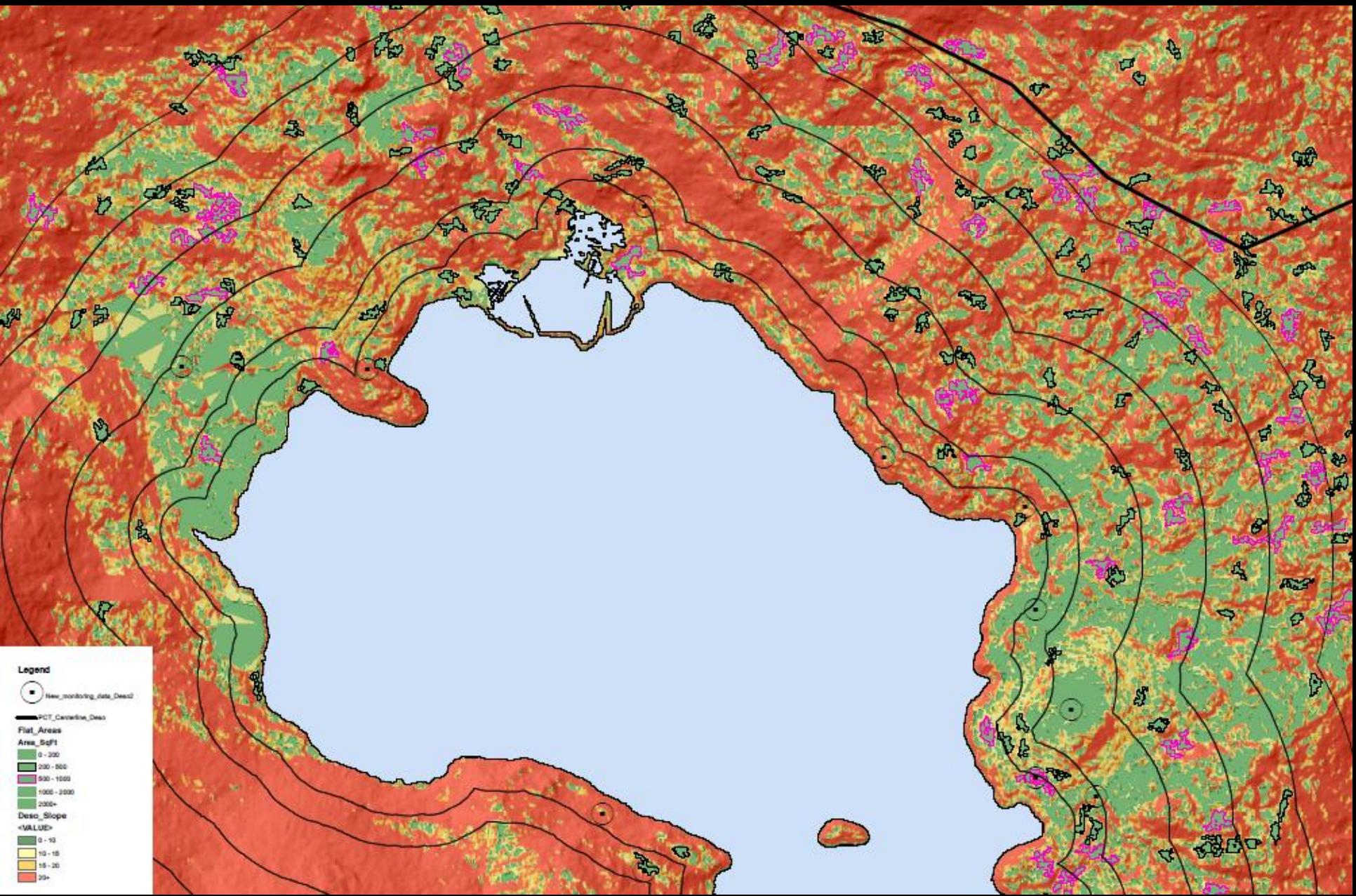


GIS Digital Surface Model from LiDAR Data



Mayan cities
detected thru
rainforest !

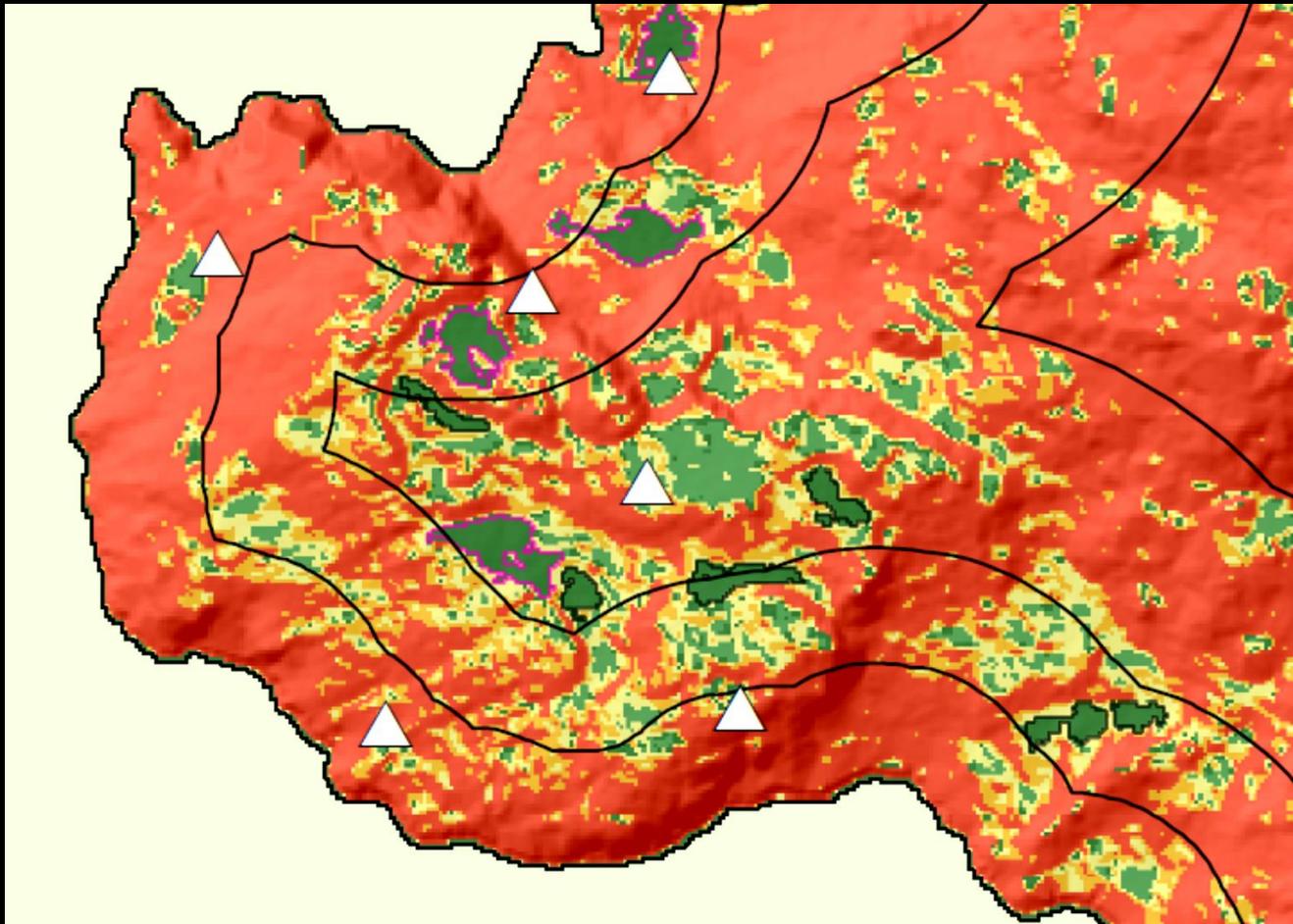
Desolation Wilderness, Tamarack Lake



- Legend**
- New_moving_date_Death
 - PCT_Coverline_Deac
 - Flat_Areas
 - Area_Soft
 - Deso_Slope
- Area_Soft
- 0 - 200
 - 200 - 500
 - 500 - 1000
 - 1000 - 2000
 - 2000+
- Deso_Slope
- <VALUE>
- 0 - 10
 - 10 - 15
 - 15 - 20
 - 20+

Current Research

Slope map: Existing campsites (triangles) with possible sustainable campsites in dark green (flat), surrounded by steeply sloped terrain (red).



A Prospective Sustainable Site from GIS



A Prospective Sustainable Site from GIS



A Prospective Sustainable Site from GIS





Questions?

➤ **Recreation ecology publications available on Google Drive link**