Managing Informal Trail Impacts

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USGS
Biological Resources
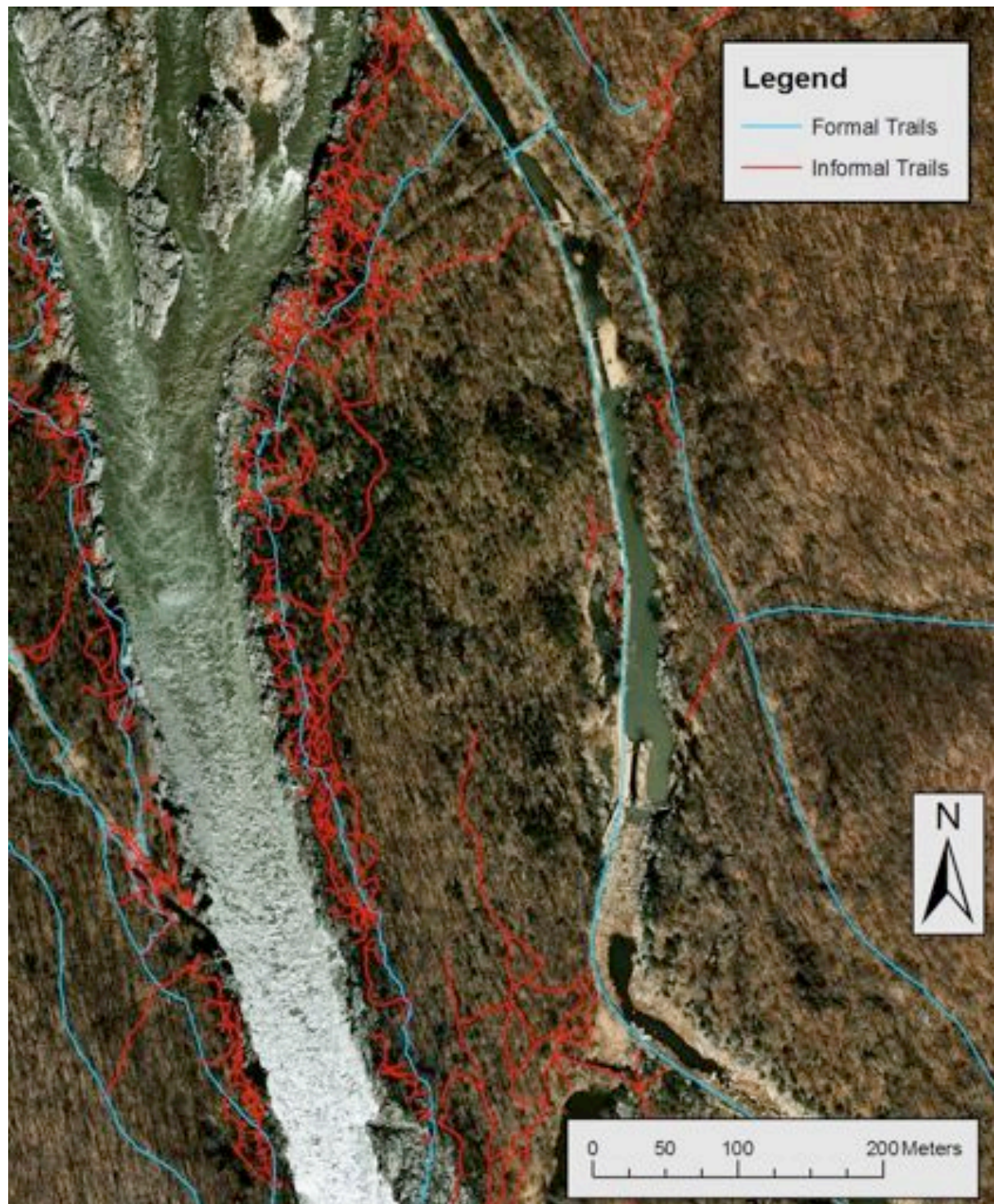
Presentation Objectives

Informal Trail Management

- **Decision Process**

- **Inventory & Monitoring**

- **Visitor Education (*Leave No Trace* practices)**

- **Site Management**

- **Research Studies**

Informal Trail Management:
A Decision Process

- **Problem Description – Collect Inventory & Monitoring Data**

- **Evaluate Impact Acceptability**

- **Evaluate Causes and Alternative Solutions**

- **Apply Site and/or Visitor Management Actions**

Collect I&M Data

Potomac Gorge, MD

Trail Survey Results

Formal
18.71 mi

Informal
16.73 mi

Shenandoah National Park

Study Area	Trails (#)	Trail Length (ft)	Trail Length (%)	Mean Trail Length (ft)	Mean Trail Width (in)	Area of Disturbance (ft²)
Betty's Rock Overlook	2	209	3	105	16.7	291
Blackrock Summit	3	451	6	150	36.0	1355
Calvary Rocks/Chimney Rocks	1	0	0	0	0.0	0
Crescent Rock	2	199	3	100	21.1	350
Franklin Cliffs Overlook	1	382	5	382	25.7	818
Gooney Manor Overlook	1	146	2	146	10.0	122
Hawksbill Summit	4	366	5	92	24.6	750
Little Stony Man	6	726	10	121	45.5	2755
Loft Mountain Summit	1	52	1	52	36.0	156
Mary's Rock Overlook	4	582	8	146	14.1	685
North Marshall Mtn.	9	938	12	104	15.9	1239
Old Rag: SE	2	896	12	448	14.5	1084
South Marshall	2	126	2	63	28.8	302
Stonyman Cliffs	4	233	3	58	17.7	343
Old Rag: Summit	17	2226	30	131	21.4	3963
Overall Falls Lookout	1	0	0	0	0.0	0
Totals:	60	7532	100	126		14,214

Shenandoah National Park

Study Area	Trails (#)	Mean Trail Depth (in)	Mean CSA (in²)	Trail Erosion Volume		
				(ft³/mi)	(ft³)	(%)
Betty's Rock Overlook	2	0.3	5	169	7	0
Blackrock Summit	3	3.4	124	4541	388	12
Calvary Rocks/Chimney Rocks	1	0.0	0	0	0	0
Crescent Rock	2	1.6	35	1273	48	1
Franklin Cliffs Overlook	1	0.9	23	858	62	2
Gooney Manor Overlook	1	0.0	0	0	0	0
Hawksbill Summit	4	0.4	11	402	28	1
Little Stony Man	6	8.8	401	14,715	2023	62
Loft Mountain Summit	1	0.0	0	0	0	0
Mary's Rock Overlook	4	0.2	3	122	13	0
North Marshall Mtn.	9	0.5	8	305	54	2
Old Rag: SE	2	0.0	0	0	0	0
South Marshall	2	1.9	55	2001	48	1
Stonyman Cliffs	4	0.3	6	208	9	0
Old Rag: Summit	17	1.8	38	1400	590	18
Overall Falls Lookout	1	0.0	0	0	0	0
Totals:	60		709	2293	3270	100

Informal Trail Management

- **Problem Description - Collect Inventory & Monitoring Data**

- **Evaluate Impact Acceptability**

- **Evaluate Causes and Alternative Solutions**

- **Site Management**

- **Visitor Management**

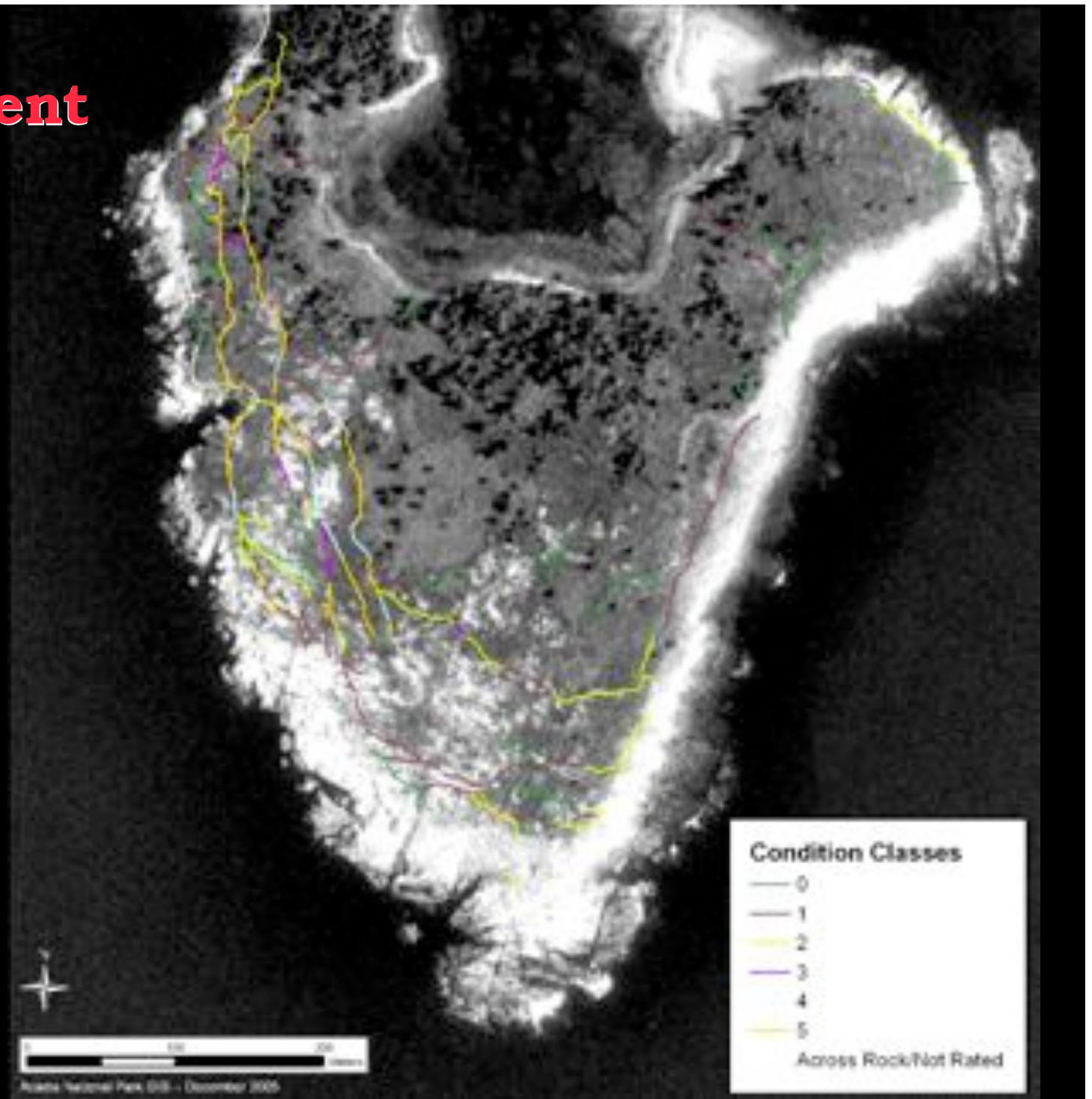# Evaluate Impact Acceptability

- **Consider the management zone and objectives:**

  - Impacts are less acceptable in pristine areas than in developed areas.

- **Consider resource sensitivity:**

  - Impacts are less acceptable when they affect R,T & E species or cultural resources.

  - Design attributes related to resistance (e.g., grade).

- **Consider use-related factors:**

  - Appropriateness of type, amount, or location of use.

  - User-behavior (e.g., short-cuts)

Management Zone

Acadia NP, Little Moose Island

Natural Zone

Condition Classes
- 0
- 1
- 2
- 3
- 4
- 5

Across Rock/Not Rated

Informal trails on Little Moose Island, Acadia NP

Condition Class	Length (ft) Percent	Condition Class Description
0	3,469 22.2	Trail barely distinguishable; no or minimal disturbance of vegetation and/or organic litter.
1	5,083 32.6	Trail distinguishable; slight loss of veg cover and/or minimal disturbance of organic litter.
2	2,988 19.1	Trail obvious; vegetation cover lost or disturbed.
3	583 3.7	Vegetation cover lost and organic litter lost in nearly all places, but little or no erosion.
4	631 4.0	Soil erosion or compaction in tread is beginning in some places.
5	2,864 18.3	Soil erosion or compaction is common; tread is obviously below ground surface.

Shenandoah NP

Resource Sensitivity

Informal trails are more susceptible to impacts due to:

- Steep grades
- Fall line alignments
- Lack of construction
- Lack of maintenance

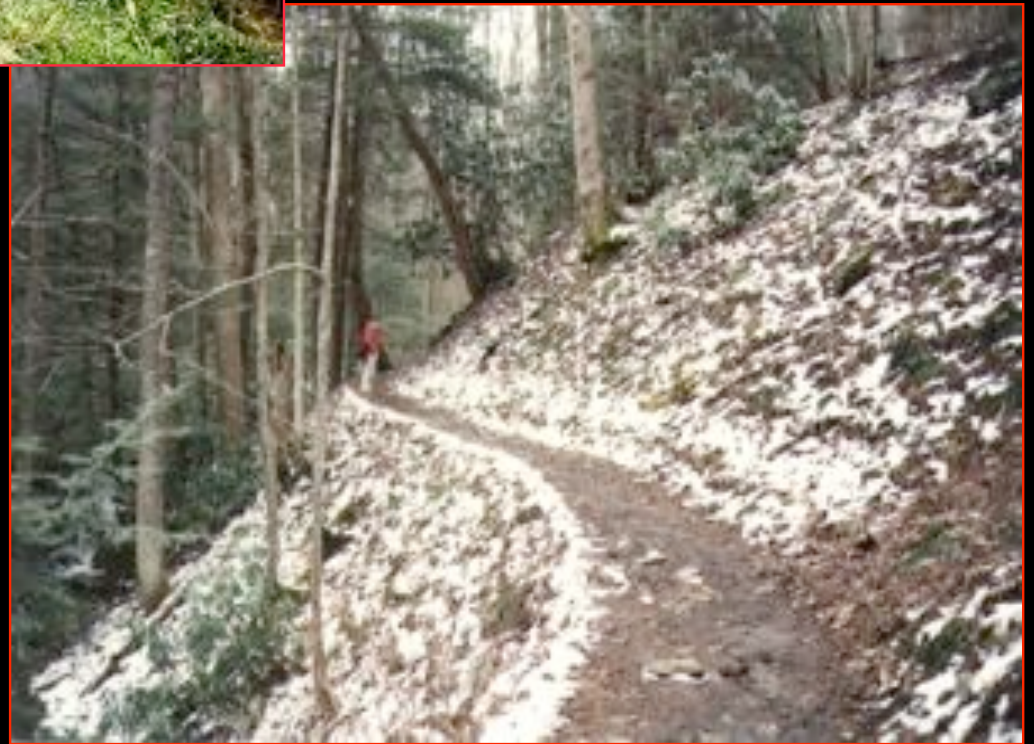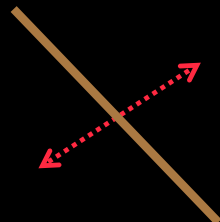# Trail Alignment Angle & Trail Grade
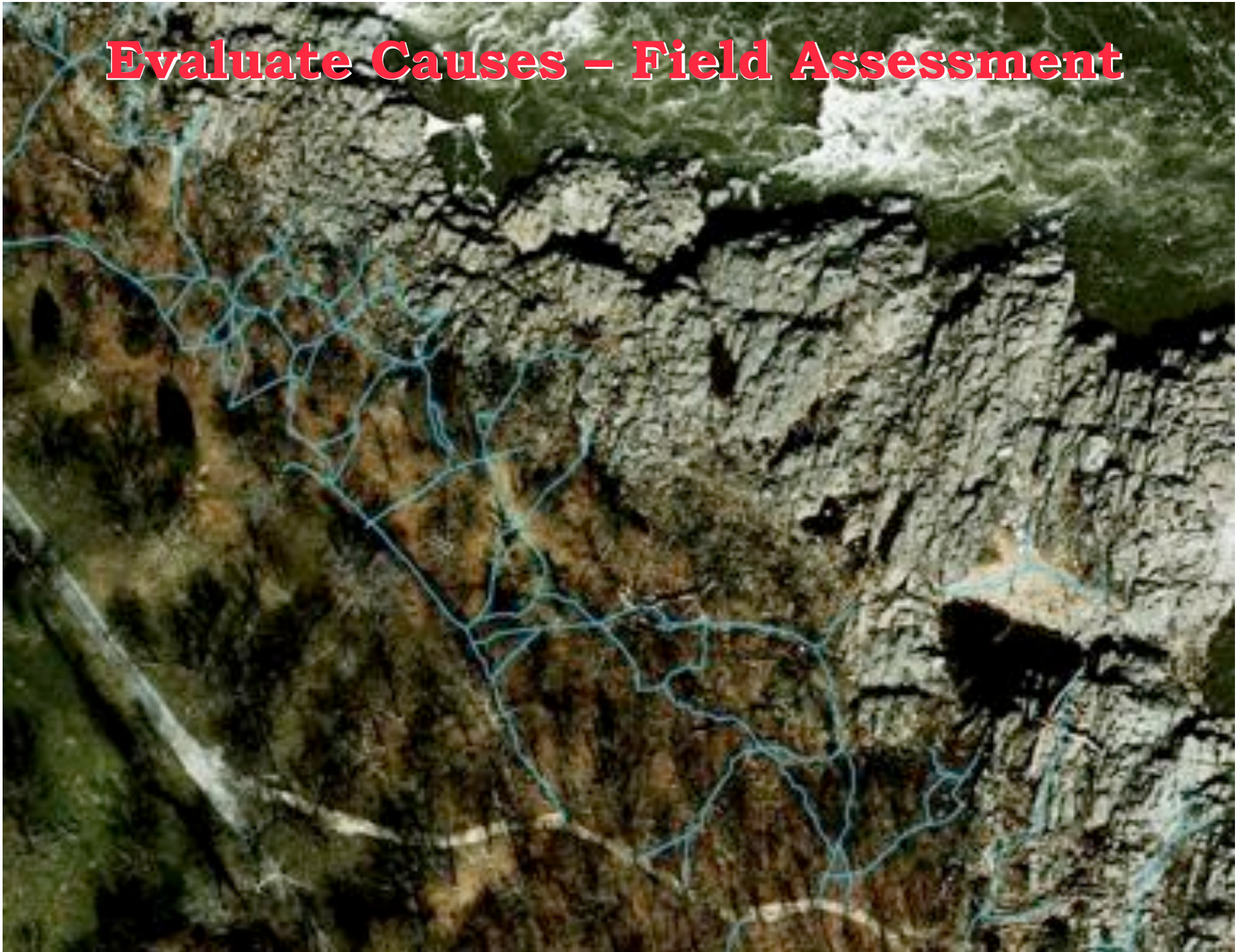
Low Alignment angle

High Alignment angle

Informal Trail Management

- **Problem Description - Collect Inventory & Monitoring Data**

- **Evaluate Impact Acceptability**

- **Evaluate Causes and Alternative Solutions**

- **Site Management**

- **Visitor Management**

Evaluate Causes – Field Assessment

Evaluate Causes:
Results from a Visitor Survey

Reasons for hiking off trail	Percent
To get to a scenic vista or area of interest	45.1
To move past others on the trail	39.5
Because there was an unmarked trail that already existed	38.8
To explore	34.7
Accidentally because the trail was poorly marked	33.9
To get around a difficult part of the trail	30.2
To get away from crowds on the trail	28.8
To get around poor trail conditions	28.4
To take a picture	20.6
To get to a rock climbing spot	15.7
To get to a picnic spot	12.2
To view wildlife/birds	11.5
To take a route you always use	9.4
To view wildflowers	7.7
To get to a fishing spot	0.7

Evaluate Alternative Solutions

- **No action needed for trails found to be acceptable - consider basic management:**

  - *Limited maintenance of tread/vegetation*

  - *Reroute non-sustainable/problem sections*

- **Close trails with unacceptable impacts, from illegal uses, and those representing avoidable impact.**

- **Implement actions and monitoring as part of an adaptive management program. Use a phased approach that applies indirect to more direct actions.**

- **Integrated site management and educational actions are always more effective than single actions.**

Informal Trail Management

- **Site Management**

  - *Improve Management of Formal Trails*

  - *Close & Restore Unacceptable Trails*

  - *Evaluate/Redesign Trails Left Open*

  - *Maintain Trails*

Improve Management of Formal Trails

- **Improve blazing**

- **Improve tread**

- **Add trail borders or fencing**

Close & Restore Unacceptable Trails

- **Close unacceptable informal trails**

- **Implement restoration work where possible**

Evaluate/Redesign Trails Left Open

For informal trails left open:

- **Evaluate the sustainability of alignments**

- **Consider reroutes of non-sustainable sections**

- **Consider designation as formal trails**

Maintain Informal Trails

For informal trails left open:

- **Consider minimal maintenance work where needed (e.g., influence route by rearranging large rocks to protect rare plants or prevent soil erosion)**

Informal Trail Management

- **Visitor Management**

    - *Education – Leave No Trace Practices*

    - *Regulation*

Visitor Education

Visitor Education – ensure that visitors are aware that:

- *off-trail trampling impacts are a problem,*

- *remaining on formal trails protects park resources,*

- *all formal trails are blazed/marked.*

Visitor Regulation – ensures that visitors know:

- *when off-trail hiking is permitted, discouraged, or prohibited.*

Educational Messages:

- *should clearly specify low impact behaviors,*

- *should provide a rationale when possible,*

- *Attribution message:*

  "Your feet have trampled the vegetation on this island. Please stay on the blazed formal trails"

- *Injunctive-proscriptive message:*

  "Please don't go off the designated trails in order to protect the rare vegetation in this park"

DO NOT

Tread, Mosey, Hop, Trample, Step, Plod, Tiptoe, Trot, Traipse, Meander, Creep, Prance, Amble, Jog, March, Stomp, Jump, Stumble Trod, Sprint, or Walk

On the Plants

Education

Leave No Trace Practices

Travel on Durable Surfaces:

- **Formal Trails**

- **Established informal trails (when appropriate)**

- **Rock/snow**

- **Naturally exposed sand/soil**

- **Grasses**

- **Organic litter**

Please help us preserve the natural and historic resources by staying on established trails

Restoration Area

Protect Our Rare Plants

Please Stay Off

Regulation

Restoration Area

Area closed for revegetation

- **Establish regulations and install signage stating that off-trail traffic is prohibited.**

Research: Education & Site Management

- **Effective educational messages:**

  - **Sanction (Swearingen & Johnson, 1994 & 1992)**

  - **Attribution (Bradford & McIntyre, 2007)**

  - **Injunctive-Proscriptive (Winter, 2005)**

- **Importance of sign location (Bradford & McIntyre, 2007)**

- **Uniformed employees often as effective as educational signs (Widner & Roggenbuck, 2000)**

- **Barriers in combination with signs (Park et al, 2008);**

Research: Potomac Gorge, Bear Island

Bear Island is the focus of this research

- 96 acres
- Home to over 50 of Maryland's R,T&E species
- Co-owned by the NPS & The Nature Conservancy
- Billy Goat Trail, Section A
- Formal trails = 3.5 mi; informal trails = 9.5 mi
- Very high visitation, 2000 hikers on some weekends

Research Studies
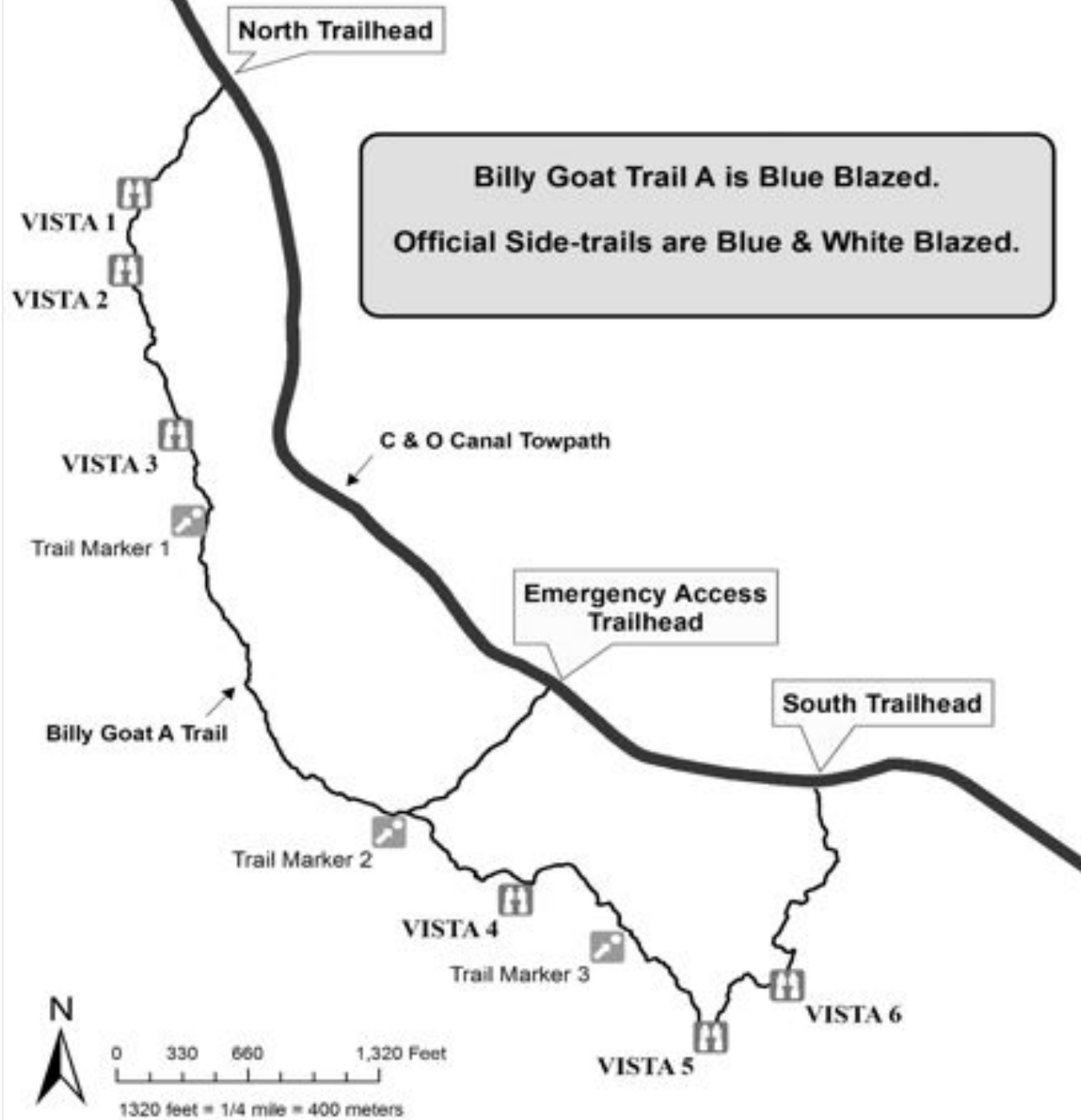
< **Additive treatments**

< **Unobtrusive observation**

- Intensive blazing
- Formalized side vista trails
- Trailhead educational signage
- Prompter signage at informal trailheads
- Informal trail brushing
- Symbolic fencing
- Informal trail site restoration
- Personal contact
- Threats: "Stay on Trail – Unexploded Ordinance"

Billy Goat Trail A

North Trailhead

VISTA 1

VISTA 2

Billy Goat Trail A is Blue Blazed.

Official Side-trails are Blue & White Blazed.

VISTA 3

C & O Canal Towpath

Trail Marker 1

Emergency Access
Trailhead

Billy Goat A Trail

South Trailhead

Trail Marker 2

VISTA 4

Trail Marker 3

VISTA 6

VISTA 5

N

0   330   660   1,320 Feet

1320 feet = 1/4 mile = 400 meters

Please Do Not Leave Paint-Blazed Trails

Protect Our Rare Plants

Your footsteps could be deadly:

Over 50 rare species call this island home.

Your off-trail footsteps have created miles of unofficial tracks that harm these species.

Managers want to close and restore these tracks.

What you can do:

Please do not leave paint-blazed trails.

To protect rare plants everyone's cooperation is needed.

Even a few footsteps can prevent recovery.

Please
Stay Off

Restoration Area

Protect Our Rare Plants

Please Stay Off

Research Results

Treatment	Stayed On-Trail	Went Off-Trail
Control	1899, 75.3%	623, 24.7%
Prompter	2303, 93.1%	171, 6.9%
Brushing	2205, 98.0%	44, 2.0%
Restoration	466, 97.1%	14, 2.9%
Stewards	182, 100.0%	0, 0.0%