Trail Map "Dos and Dont's"

Best practices for designing trail maps

Jeremy Apgar, Cartographer

International Trails Symposium 2019
Syracuse, New York

April 29, 2019

This presentation was presented on Monday, April 29, 2019 to a great "filled to capacity" audience of trail map lovers! If you were in attendance, thank you!!

I hope this presentation can be a helpful resource for considering trail map design choices.

Please contact me if you wish to incorporate this presentation or any of the slides into your own teaching tools, or if you wish to distribute it to others. Any feedback is also greatly appreciated!

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Session Overview

- Trail Conference background and map history
- Initial trail map considerations
- Map critiques and discussion of best practices

- **What will you walk away with today?**

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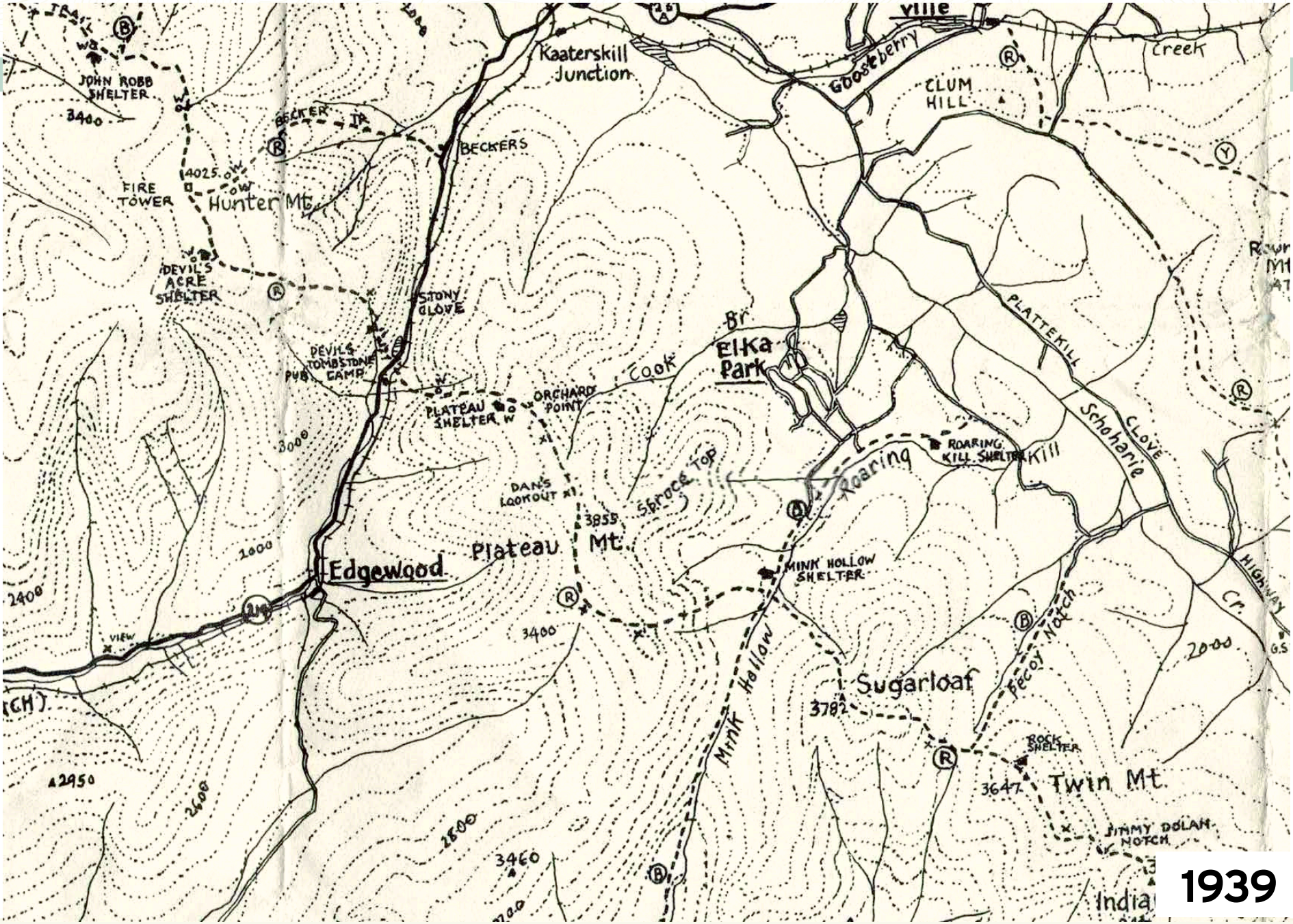
Who is the Trail Conference?

- The New York-New Jersey Trail Conference is a volunteer-powered organization that builds, maintains, and protects public trails.
- Together with our partners, we strive to ensure that the trails and natural areas we share are sustainable and accessible for all to enjoy, for generations to come.
- For decades, trail users have relied on our trail maps to help them navigate on and off the trails



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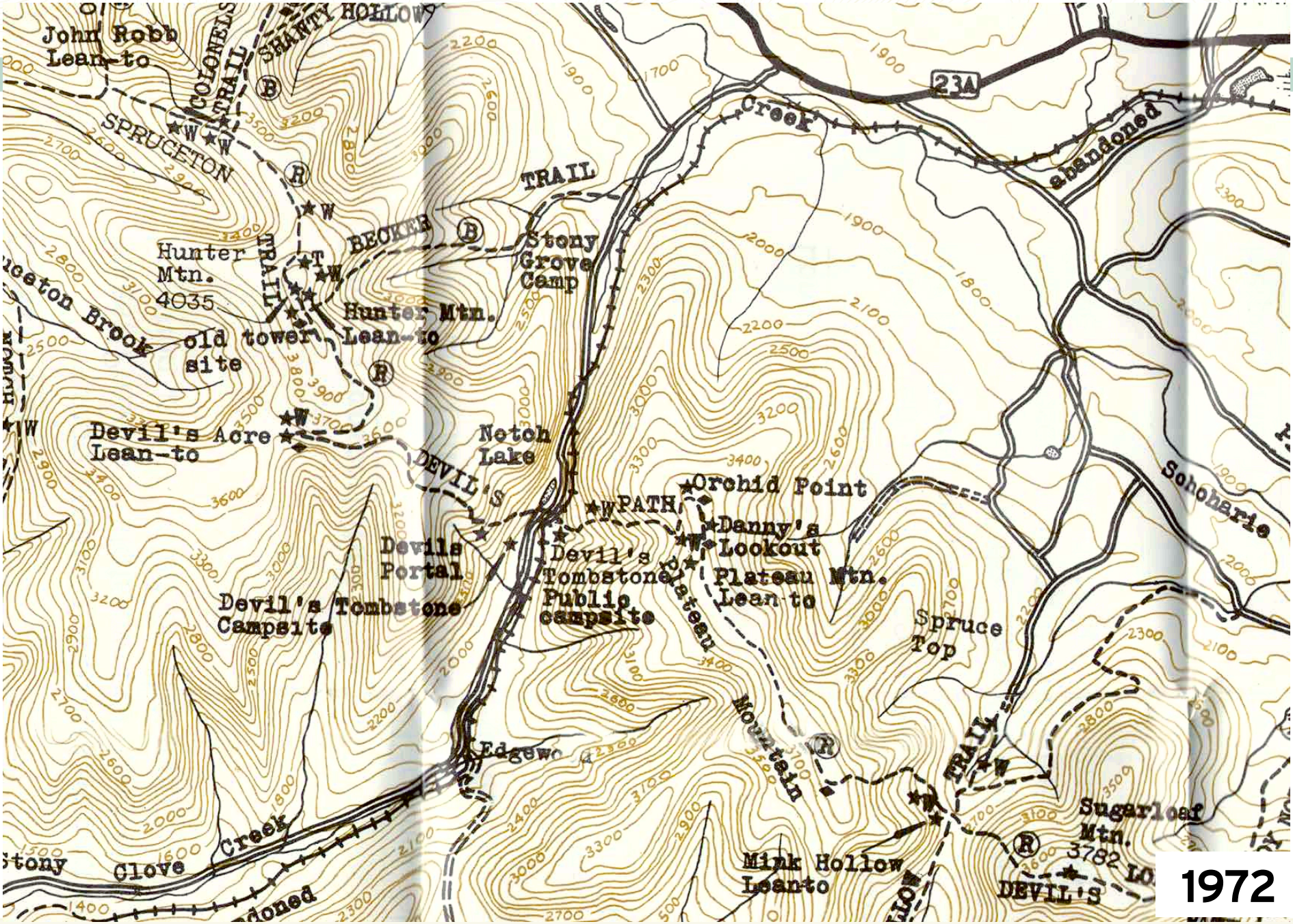

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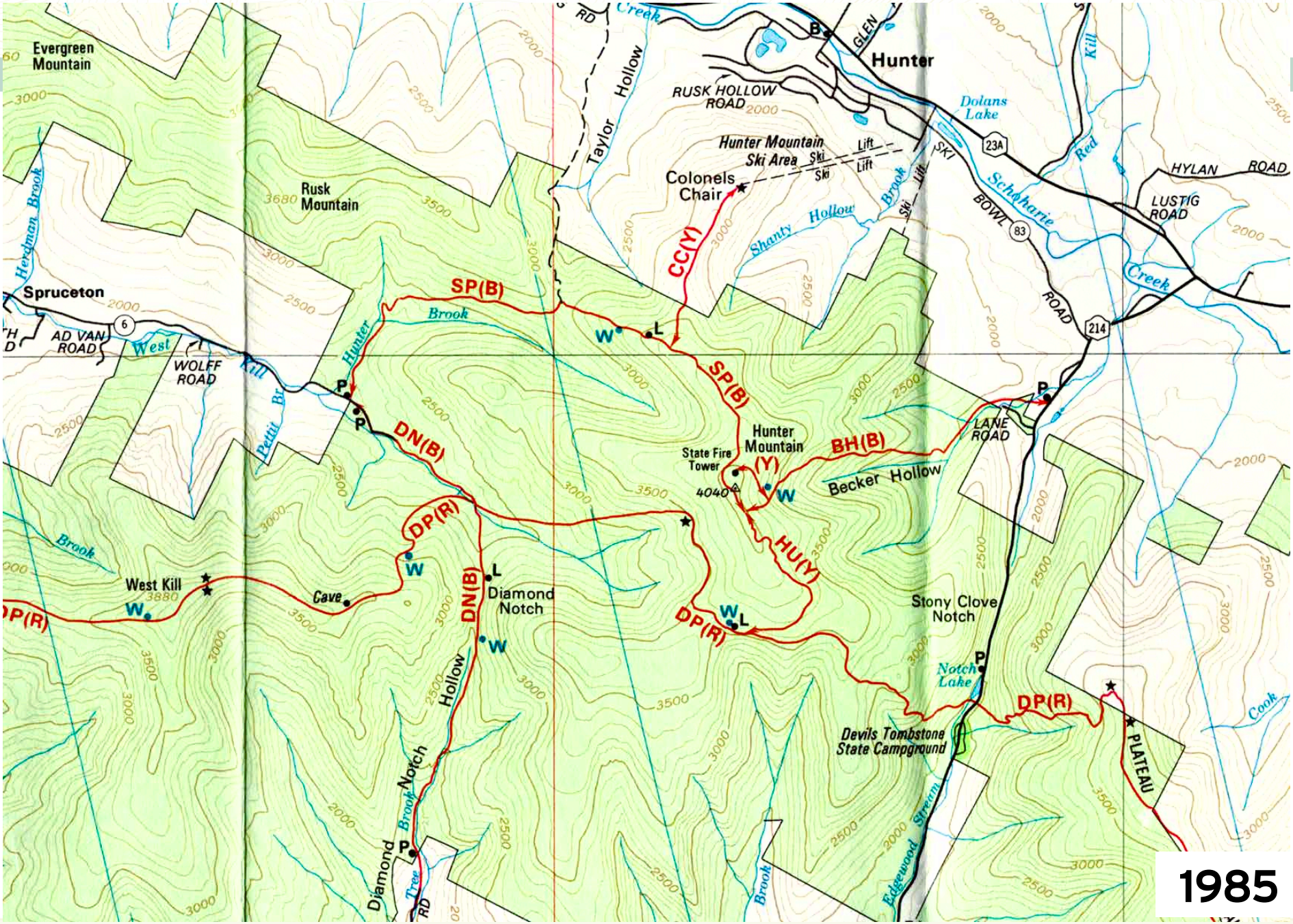

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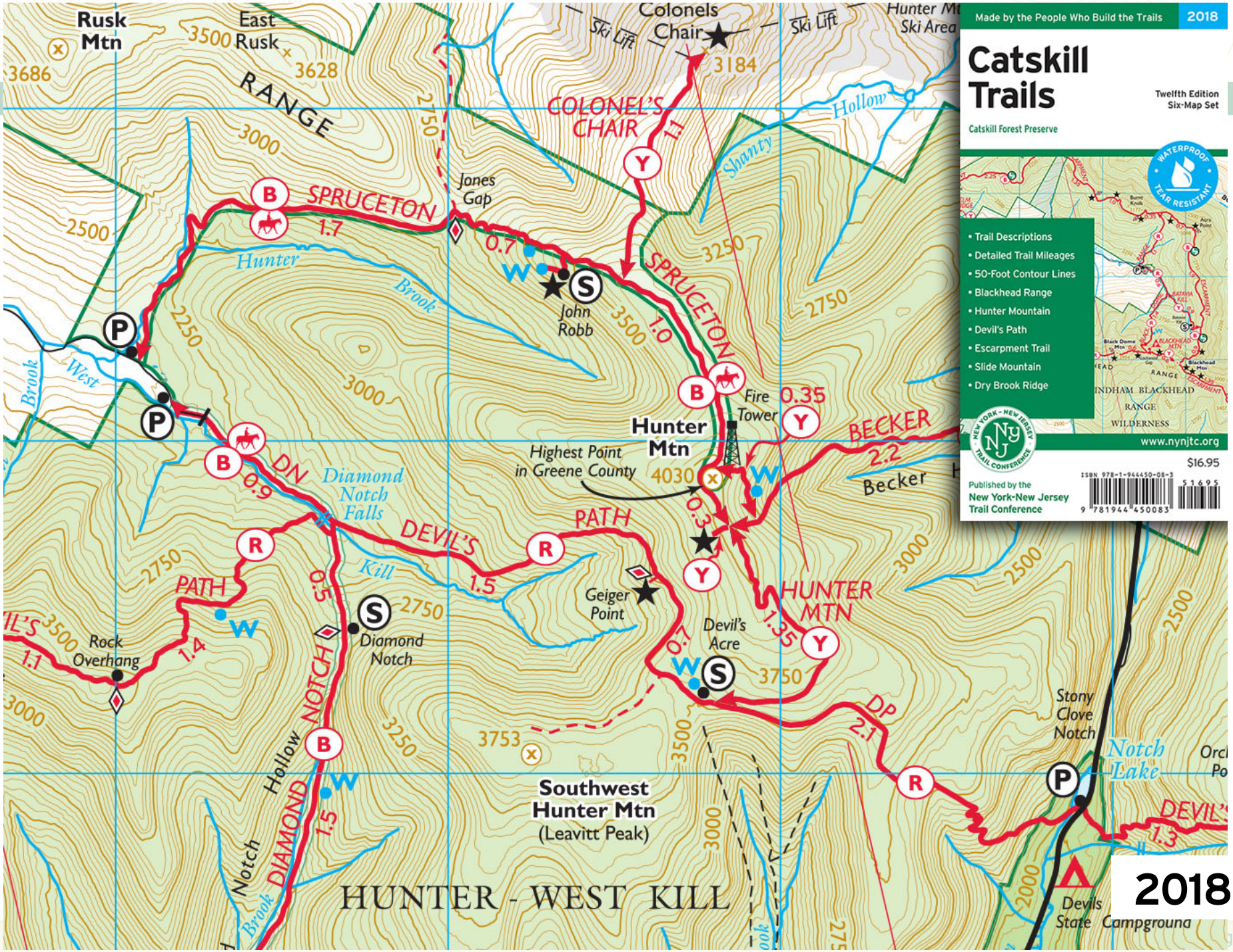
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Hunter Mtn
Highest Point in Greene County
BECKER
Becker
DN
Diamond Notch Falls
DEVIL'S PATH
Kill
Geiger Point
Devil's Acre
HUNTER MTN
Rock Overhang
Diamond Notch
DIAMOND NOTCH
Hollow
Notch Brook
Southwest Hunter Mtn
(Leavitt Peak)
HUNTER - WEST KILL
Stony Clove Notch
Notch Lake
DEVIL'S
Devils State Campground
Shanty Hollow
Brook West
2018

850,000 Maps printed by the Trail Conference

470 Miles of printed maps if placed end-to-end

47 Years of official Trail Conference maps

85 Years of unofficial and official Trail Conference maps

175,000+ App Maps downloaded on the Avenza Maps app

117 Map Printings since the early 1970s

Importance of a Good Trail Map

- Key qualities of ease of use, accuracy, and attractiveness should be addressed
- **Ease of Use:** Easy-to-understand trail maps are important for user safety
- **Accuracy:** Users will lose confidence in a map with incorrect items
- **Attractiveness:** Visually attractive maps draw in users and keep their attention

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What makes a Good Trail Map?

- "**Good**" can be subjective, but certain design choices can impact the quality of a trail map
- Please **circle answer choices** on front side of worksheet labeled "Before we get started"
- Some "best practices" **may not apply** to all circumstances
- Mapmakers should be open to **constructive criticism**

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Know Your Audience

- Answer "**Who will the map serve?**" before starting a map
- What is the **full spectrum** of potential end users?
- Which users may make up the **largest percentage of use**?
- Which users may be **most in need of easy-to-understand information**?
- What are the **needs and desires of whoever is commissioning** the map?

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Know Your Constraints

- What **length of time is available** to create the map?
- What **kind of software** will be used?
- What is the breakdown of **available trail data versus data that will need to be collected**?

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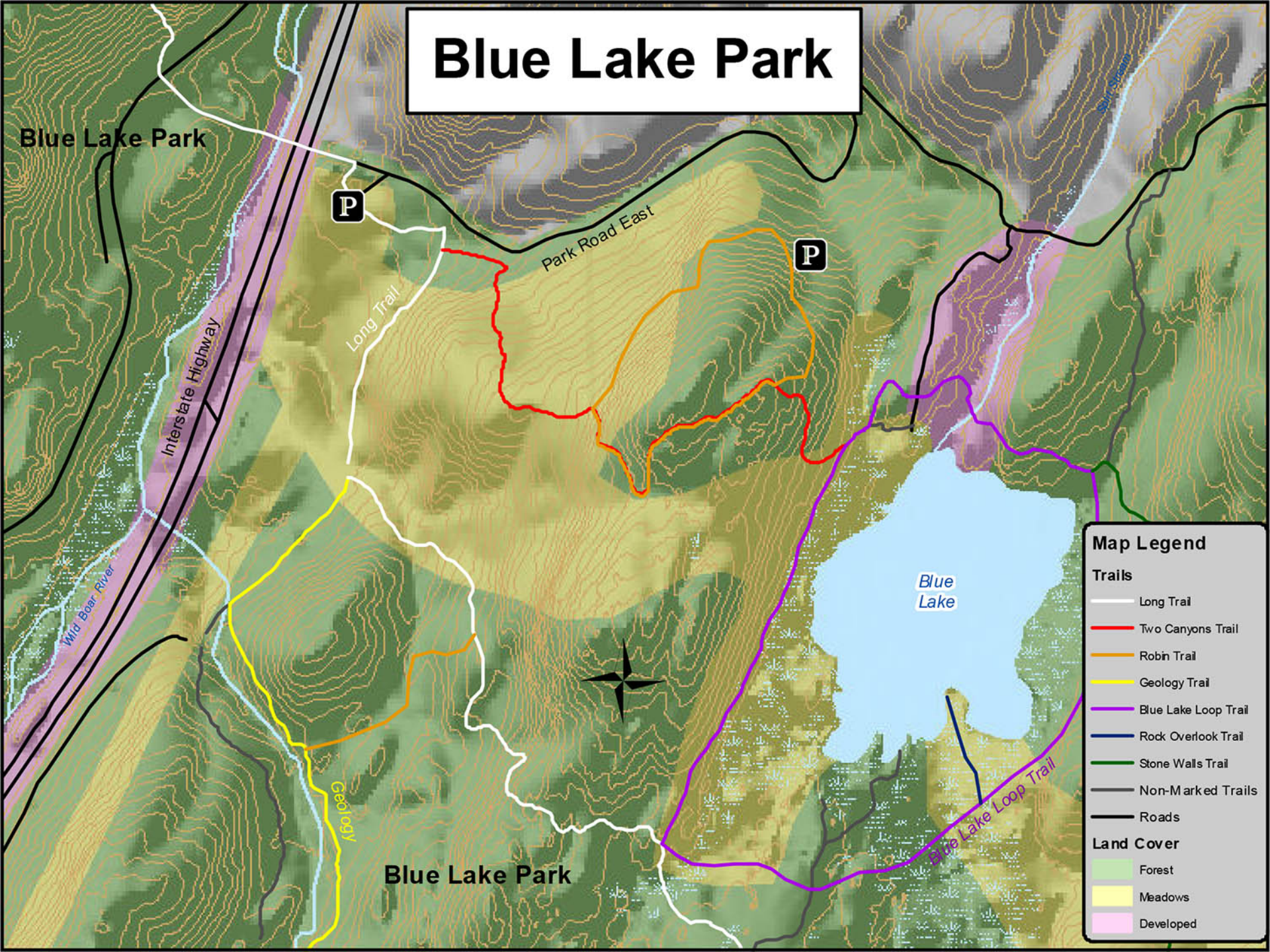
Map Critique #1

- Rapid Fire map critique:
  - Raise your hand
  - Keep answers very short
  - Keep response to 1 or 2 items
  - Don't worry about repeating answers
  - No wrong answers
  - Please speak up!


Blue Lake Park
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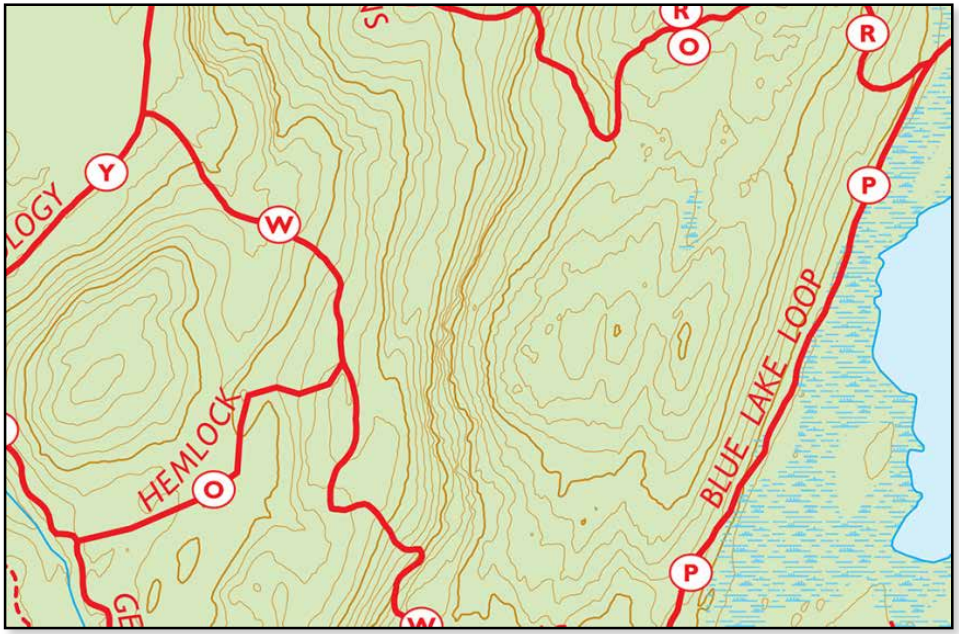
Park Road East
Long Trail
Interstate Highway
Wild Boar River
Geology
Blue Lake Park
Blue Lake
Blue Lake Loop Trail
Map Legend
Trails
Long Trail
Two Canyons Trail
Robin Trail
Geology Trail
Blue Lake Loop Trail
Rock Overlook Trail
Stone Walls Trail
Non-Marked Trails
Roads
Land Cover
Forest
Meadows
Developed

Best Practices for Designing Trail Maps

Broad Style Choices

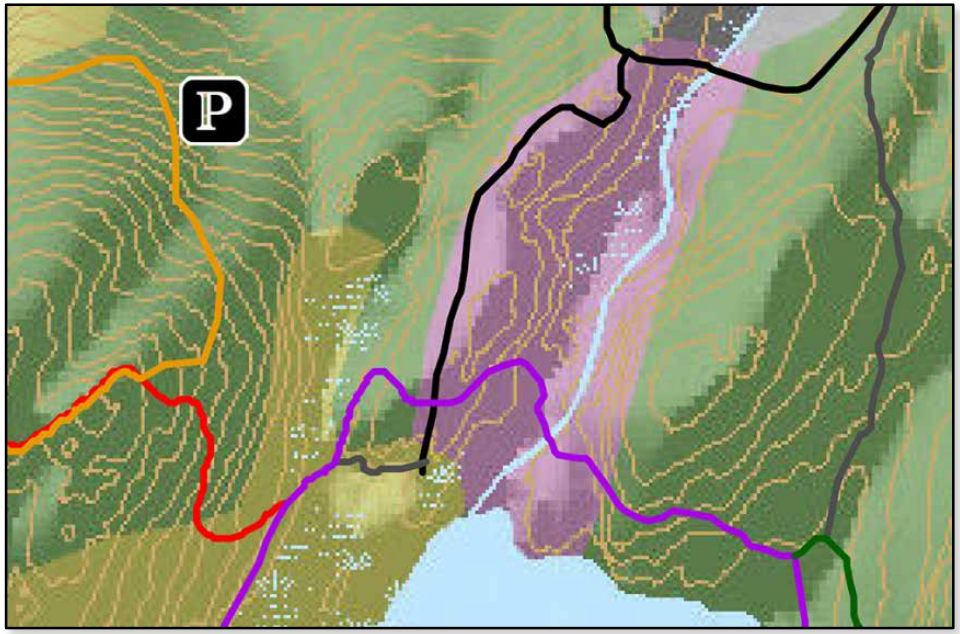
- Realism uses some combination of shaded relief, land cover, and potentially 3D oblique angles
- When done carefully and effectively, this style can be attractive
- Some find this style to be more helpful, while some find it to be less helpful

Realism vs. Simple Design



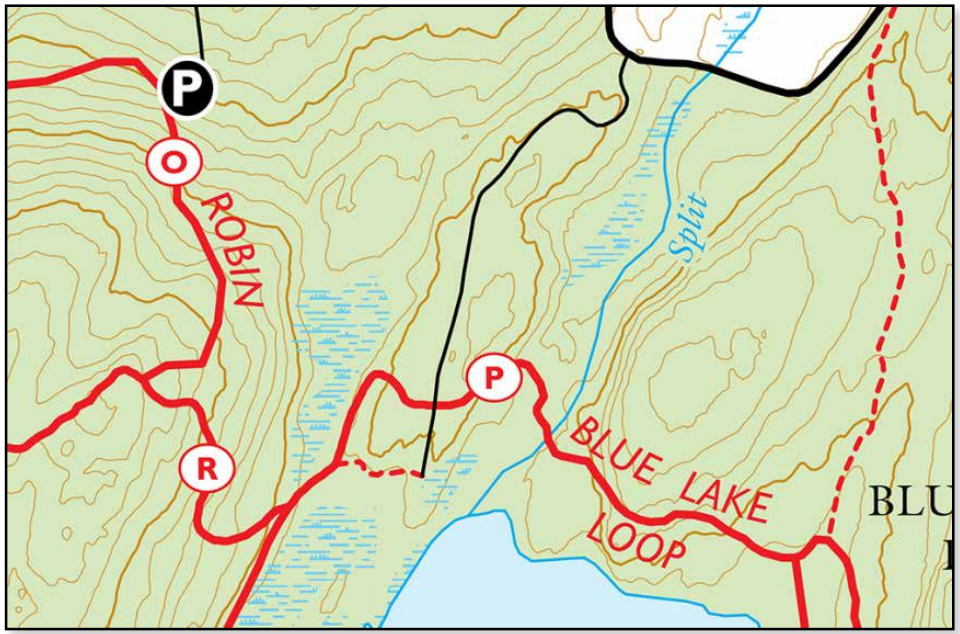
- A simple topographic design uses only faint contour lines
- A simple design map can be attractive as well
- The simple design is often easier for more users to read and understand

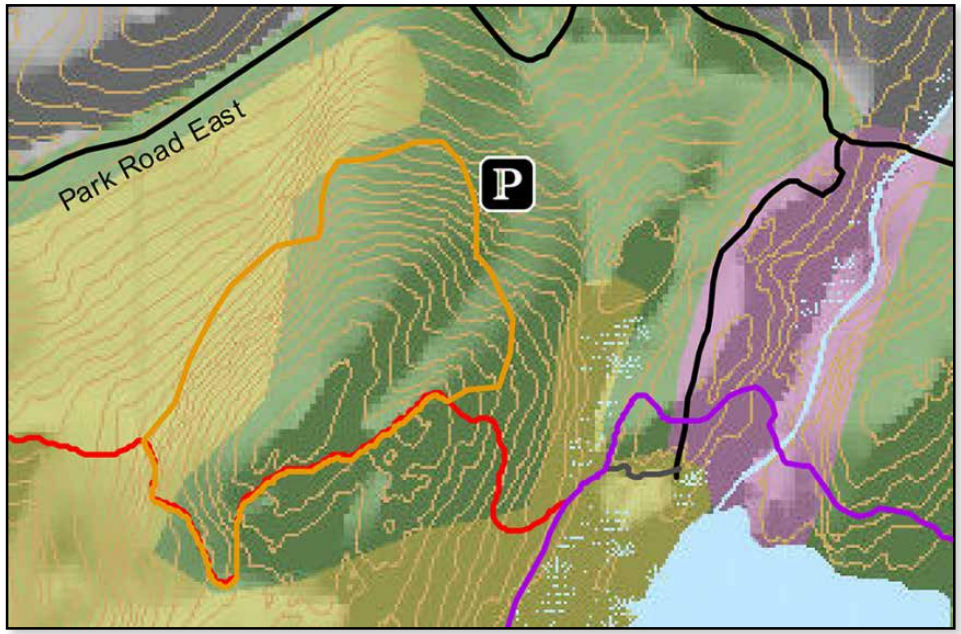
- Background includes 4 shades of land cover, shaded relief, elevation contour lines, and wetland fill
- The contrast is very low with many grayish shades
- Busy backgrounds can do more damage than good



Busy Backgrounds

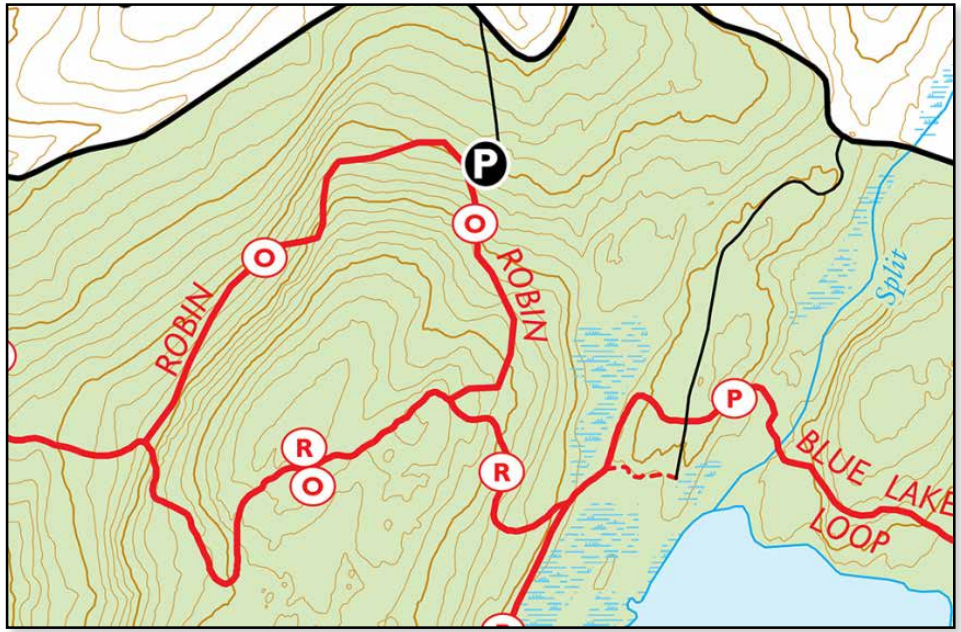
- Background includes 1 shade of parkland, elevation contour lines, and wetland fill
- Very high contrast, with clearer prominence of important information
- Cleaner map background makes it much easier to read for more users





- Adding shaded relief can be a ‘wow’ factor, but it can make the map harder to read for some
- Shaded relief and contours together can be difficult to design properly
- If not designed properly, novice users and experienced users can be negatively impacted

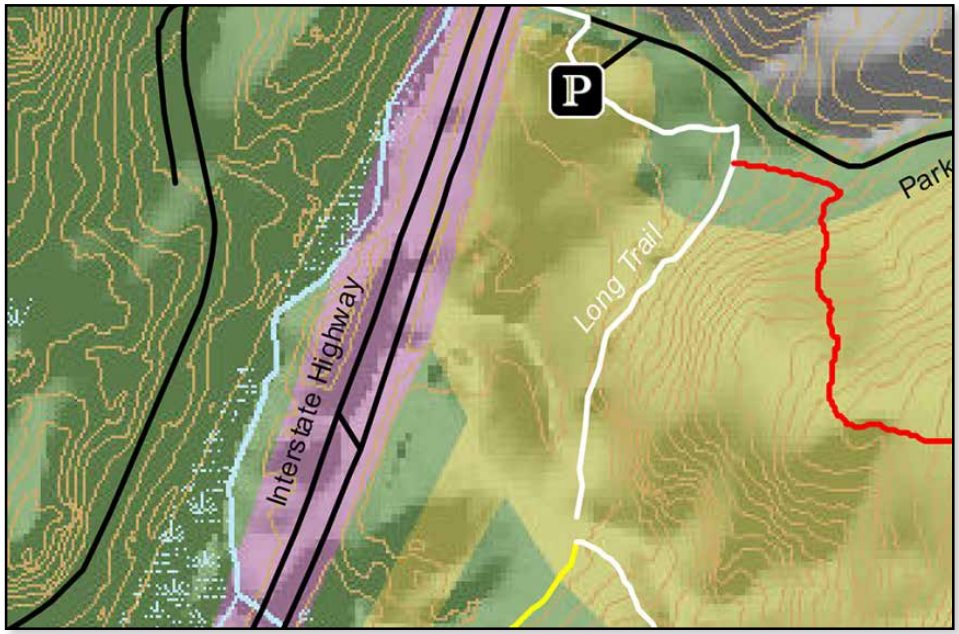
Contours & Shaded Relief



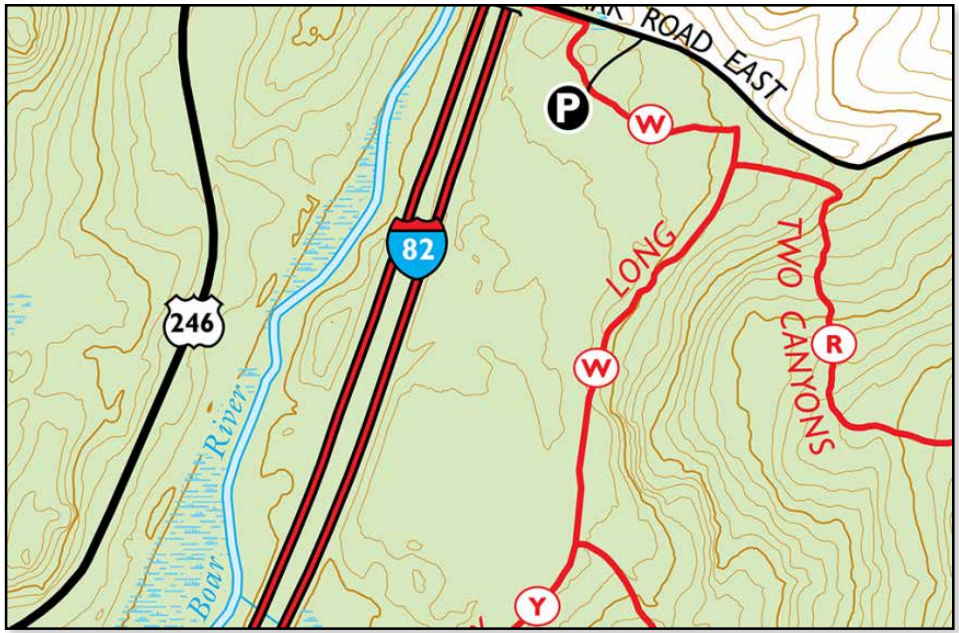
- Common misconception that contours are for experienced users and shaded relief is for novice users
- For many novice users, both can be difficult to interpret
- Elevation information should be visible enough for those who can interpret it, but not too prominent as to confuse other users

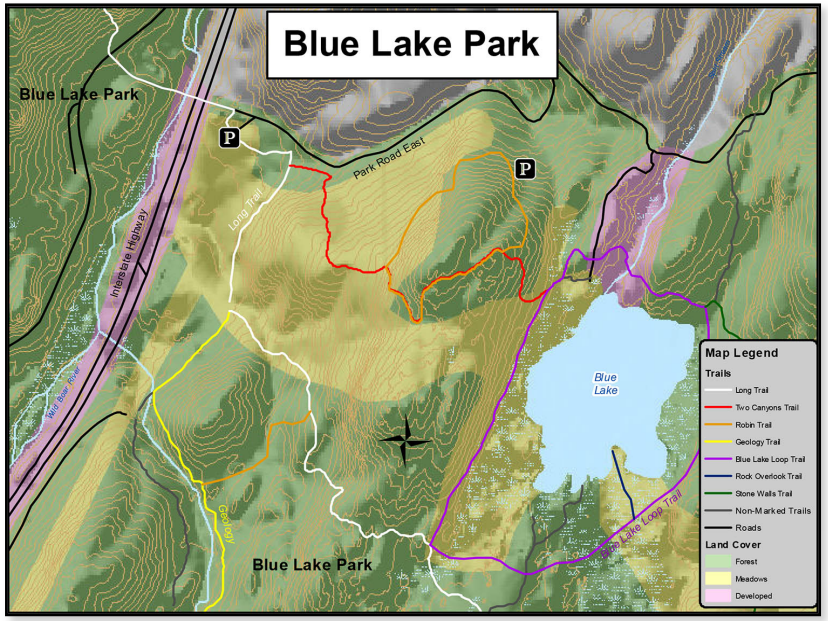
Visual Hierarchy

- Visual hierarchy refers to the way map elements are designed to be most effective for the intended use
- For a trail map, the trails should be the first thing a user notices
- If the background or other elements overpower the trail lines, the map can be more difficult to use



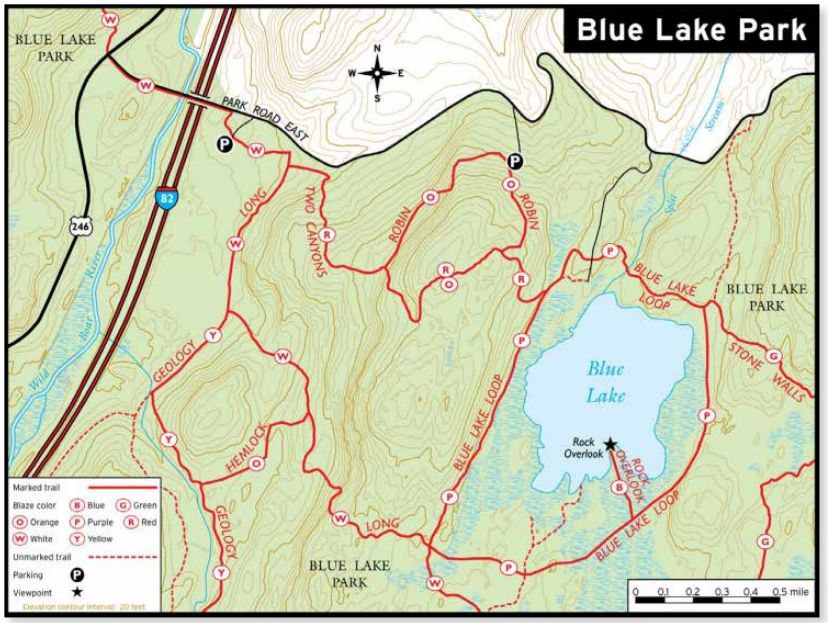
- A user's eyes should be drawn first to the trail network
- Prominent visual hierarchy can be established with high contrast colors, thick line widths, solid line styles, and special symbols



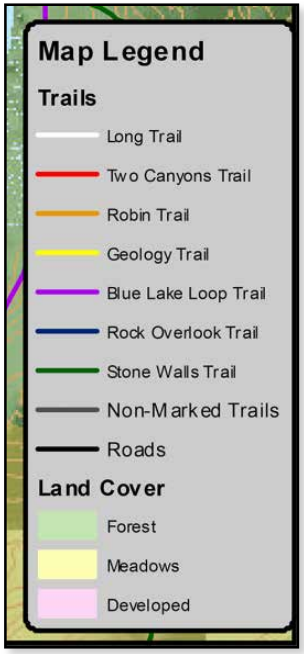


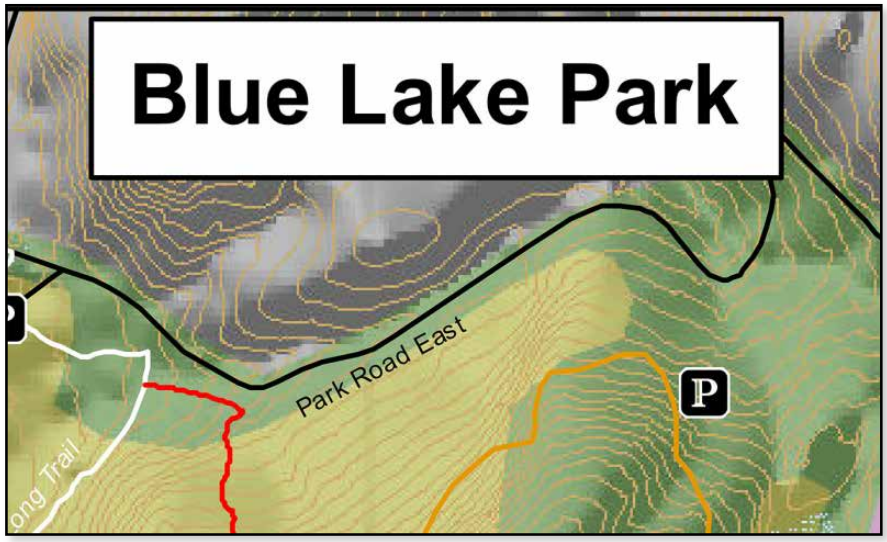
- Complex color palette of more than 30 different color shades
- No clear association of color with a specific type of information
- The map has an overall dark tone

Color Palette

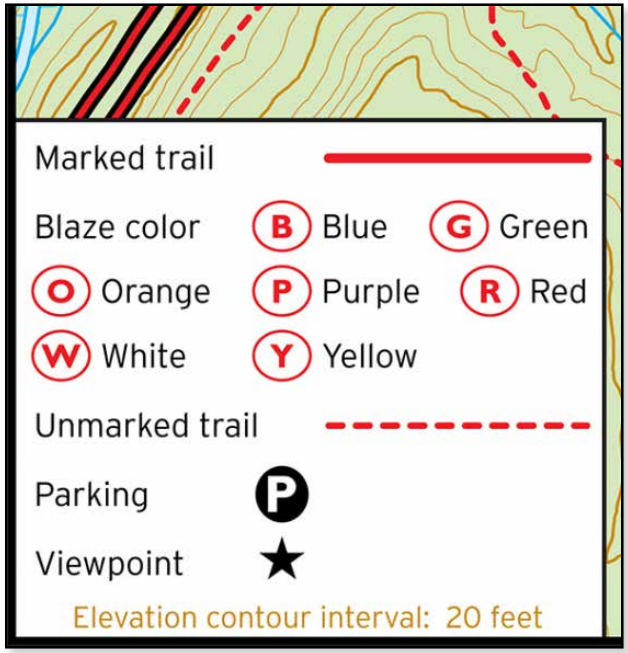


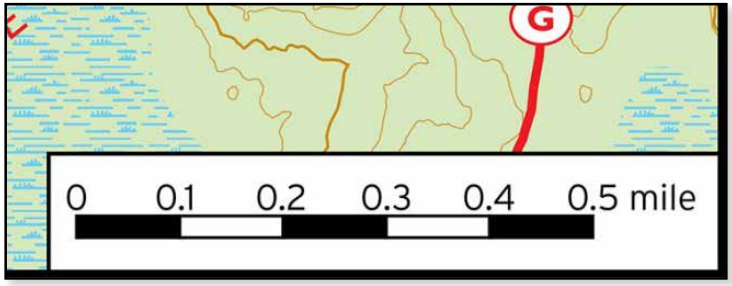
- Very limited color palette of only 7 different colors
- Clear association of color with types of information:
  - Red is trail-related
  - Blue is water-related
  - Brown is topography-related
- The map has an inviting, bright tone


Map Legend
Trails
Long Trail
Two Canyons Trail
Robin Trail
Geology Trail
Blue Lake Loop Trail
Rock Overlook Trail
Stone Walls Trail
Non-Marked Trails
Roads
Land Cover
Forest
Meadows
Developed


Blue Lake Park
Park Road East
P

Legend


Marked trail
Blaze color
B Blue
G Green
O Orange
P Purple
R Red
W White
Y Yellow
Unmarked trail
Parking
P
Viewpoint
Elevation contour interval: 20 feet


G
0
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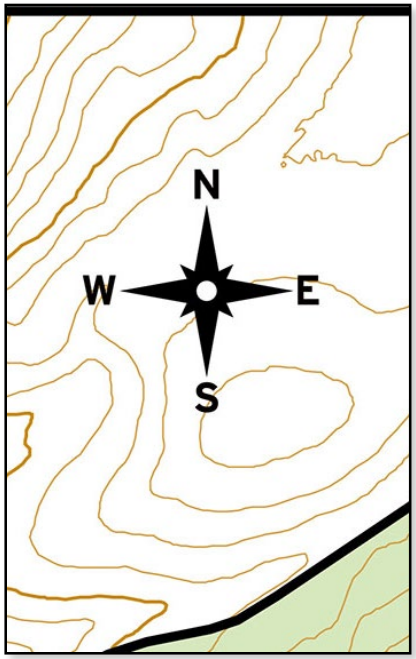
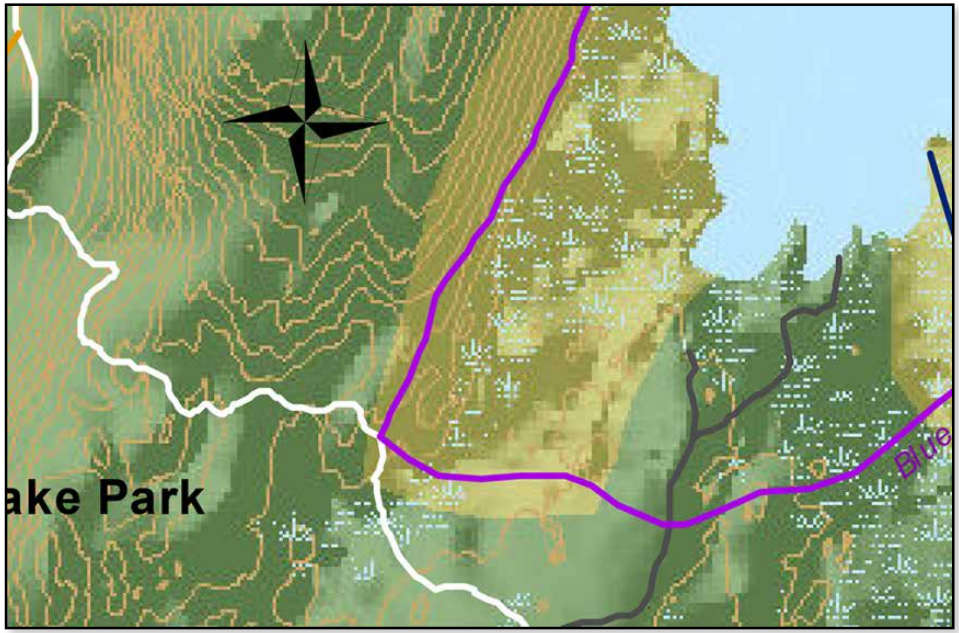
0.2
0.3
0.4
0.5 mile


N
W
E
S

- The methods used to save or export a map can greatly affect its quality

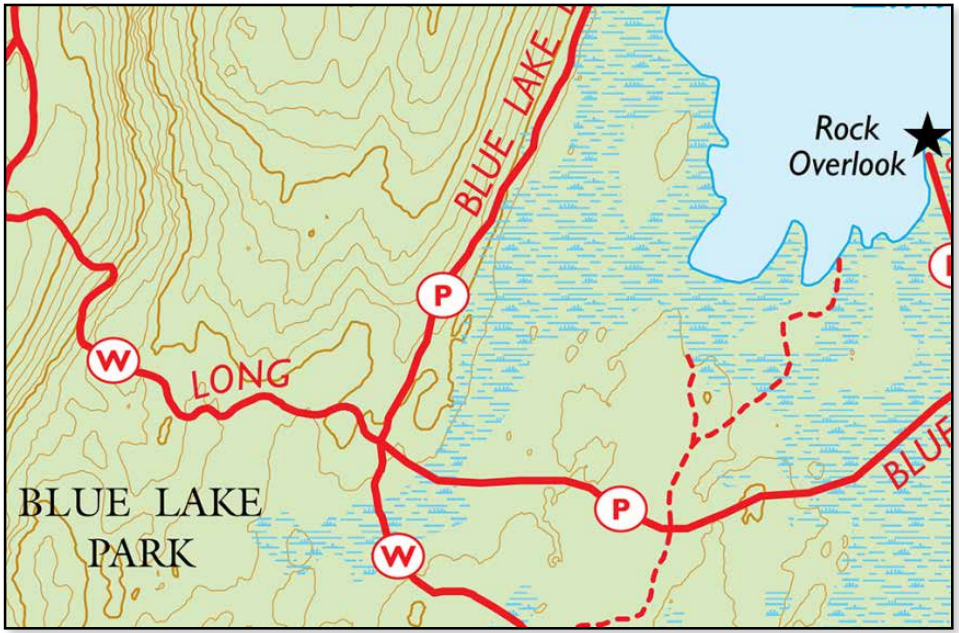
- If poor export options are selected, a low-resolution background can be produced with jagged contour lines, blocky lakes, and other unattractive issues



Map Output Resolution

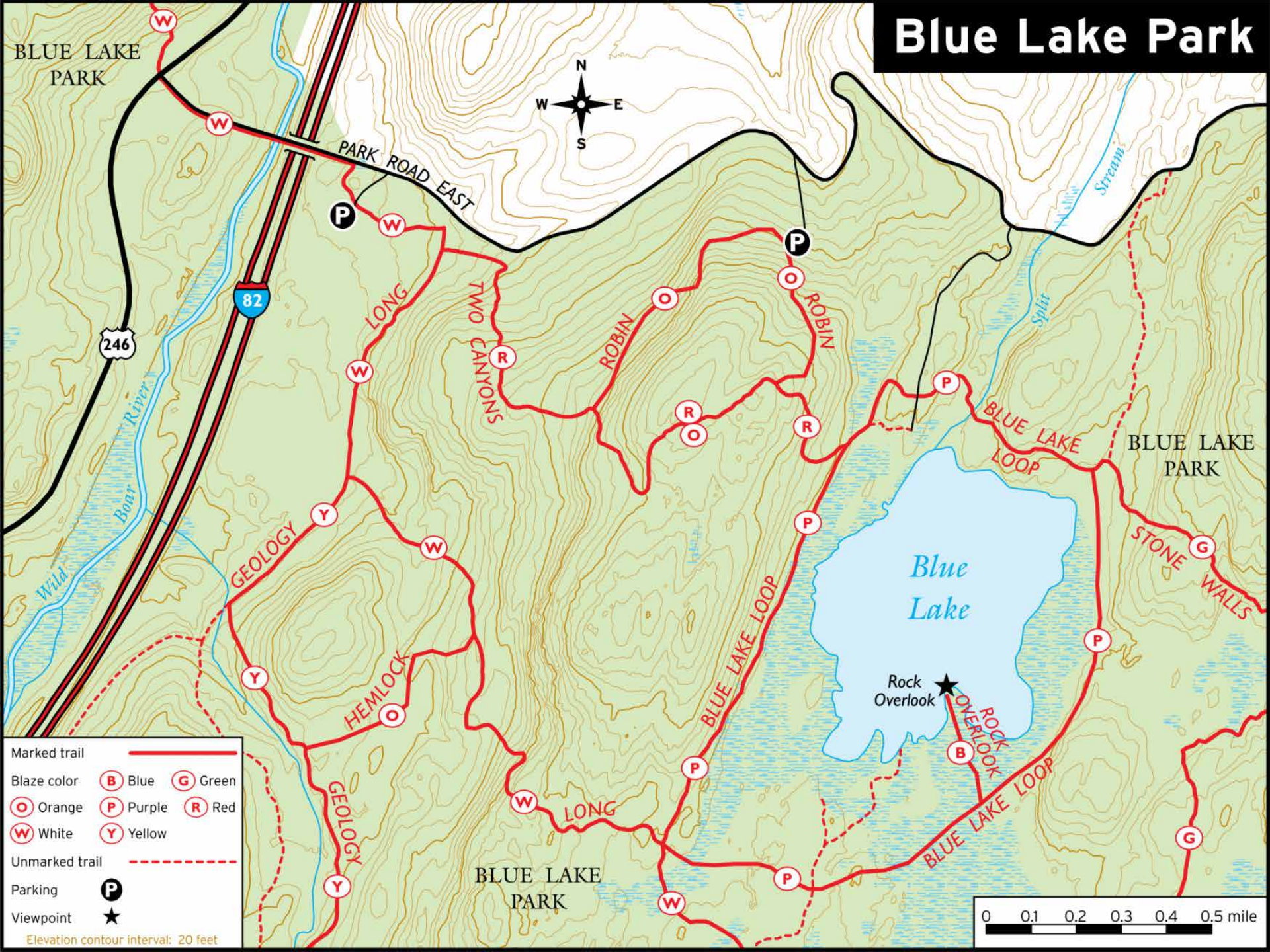
- All components of this simple design map, which was produced in Adobe Illustrator using Avenza's MAPublisher plug-in, are vector-based

- This format retains smooth lines and avoids jagged and blocky elements



Map Critique #2

- Rapid Fire map critique:
  - Raise your hand
  - Keep answers very short
  - Keep response to 1 or 2 items
  - Don't worry about repeating answers
  - No wrong answers
  - Please speak up!



Blue Lake Park
BLUE LAKE PARK
PARK ROAD EAST
N
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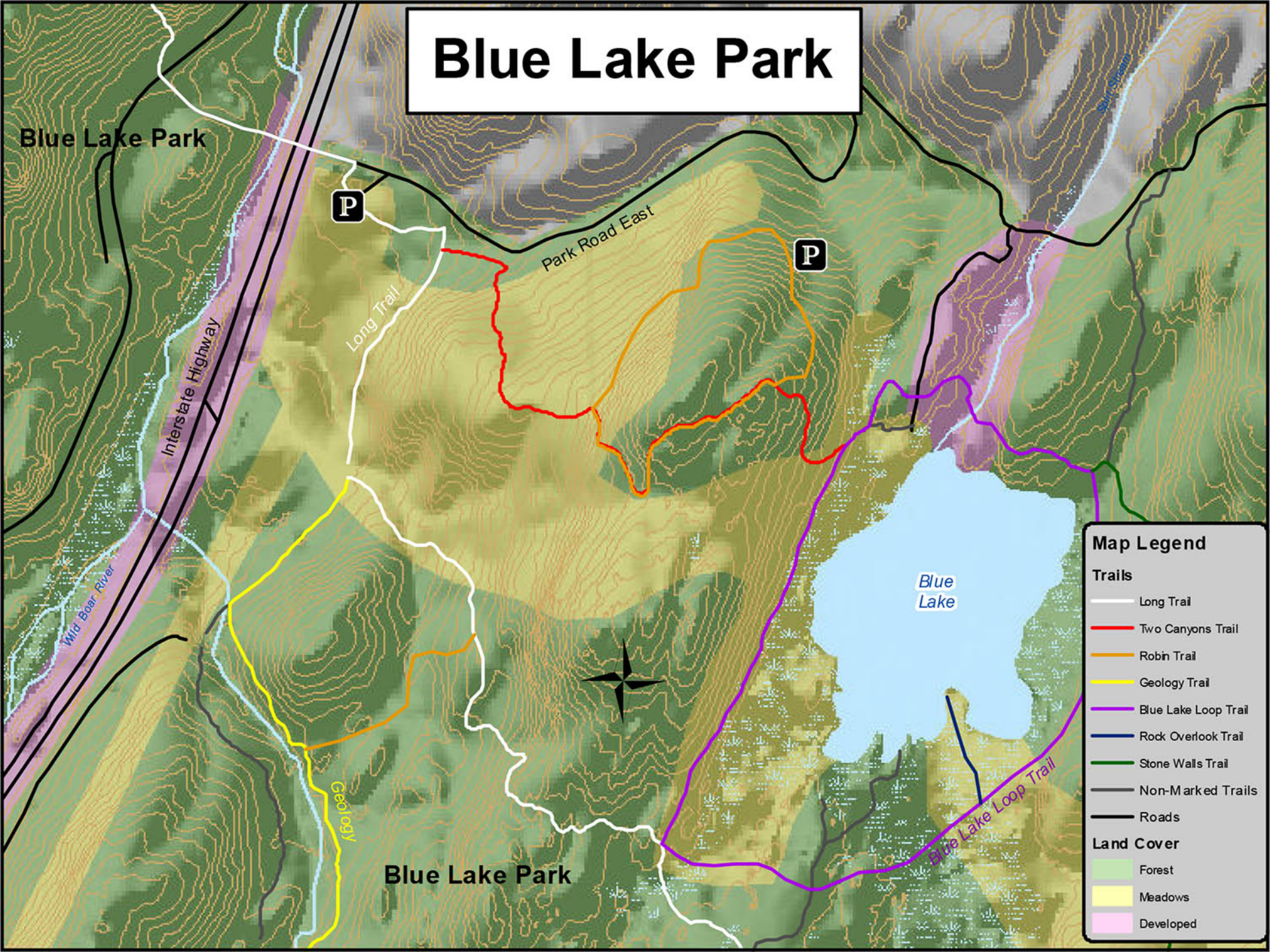
82
246
Wild Boar River
LONG
TWO CANYONS
ROBIN
ROBIN
Split Stream
BLUE LAKE LOOP
BLUE LAKE PARK
STONE WALLS
GEOLOGY
HEMLOCK
GEOLOGY
LONG
BLUE LAKE LOOP
Blue Lake
Rock Overlook
ROCK OVERLOOK
BLUE LAKE LOOP
BLUE LAKE PARK
Marked trail
Blaze color
B Blue
G Green
O Orange
P Purple
R Red
W White
Y Yellow
Unmarked trail
Parking
Viewpoint
Elevation contour interval: 20 feet
0 0.1 0.2 0.3 0.4 0.5 mile


Blue Lake Park
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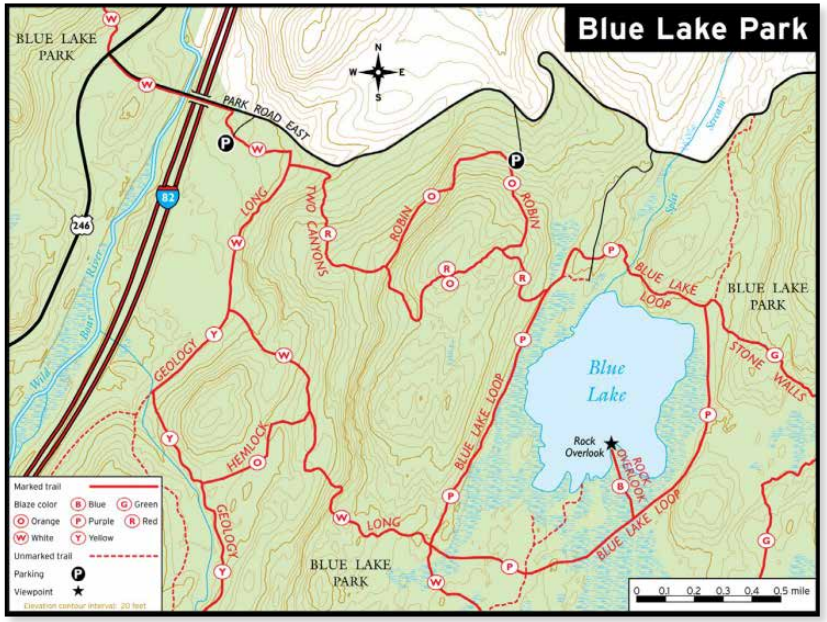
Park Road East
Long Trail
Interstate Highway
Wild Boar River
Geology
Blue Lake Park
Blue Lake
Blue Lake Loop Trail
Map Legend
Trails
Long Trail
Two Canyons Trail
Robin Trail
Geology Trail
Blue Lake Loop Trail
Rock Overlook Trail
Stone Walls Trail
Non-Marked Trails
Roads
Land Cover
Forest
Meadows
Developed

Best Practices for Designing Trail Maps

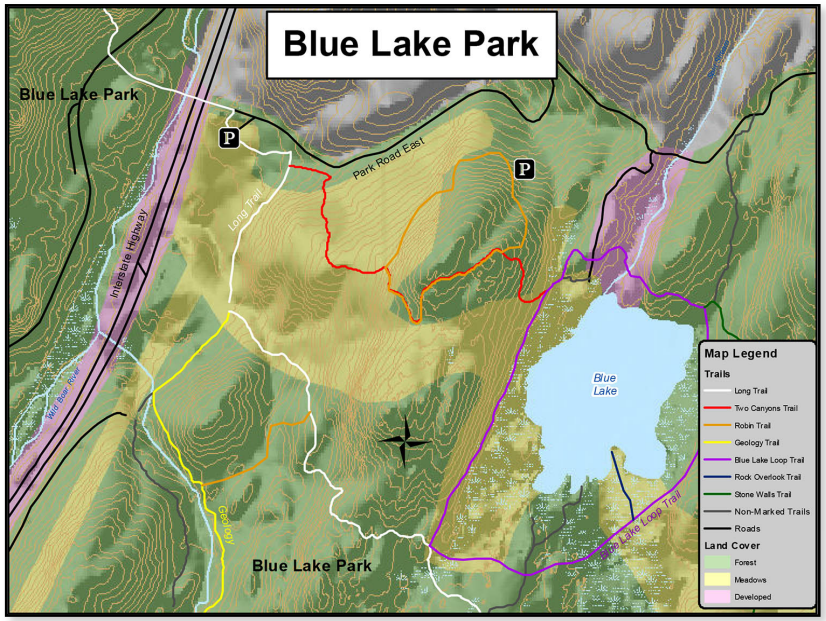
Trail Information Choices



- Using a single color for trails, regardless of their on-the-ground blaze color, can have many advantages

- Trail Conference maps use red for the color of trail lines fairly consistently, with blaze colors indicated with symbols

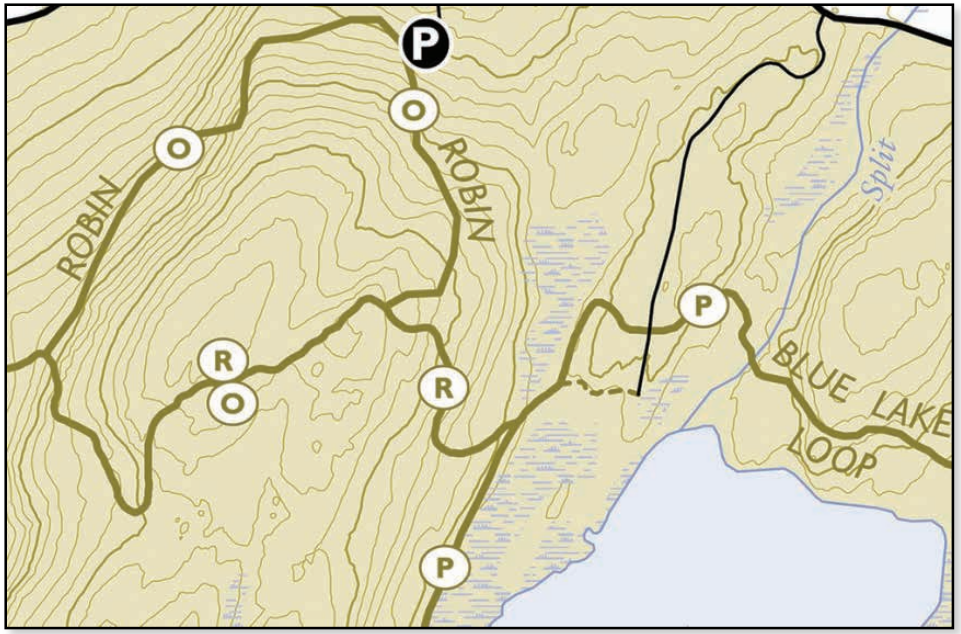
Trail Line Styles



- Using the color of the blaze color for the trail line is a common design choice

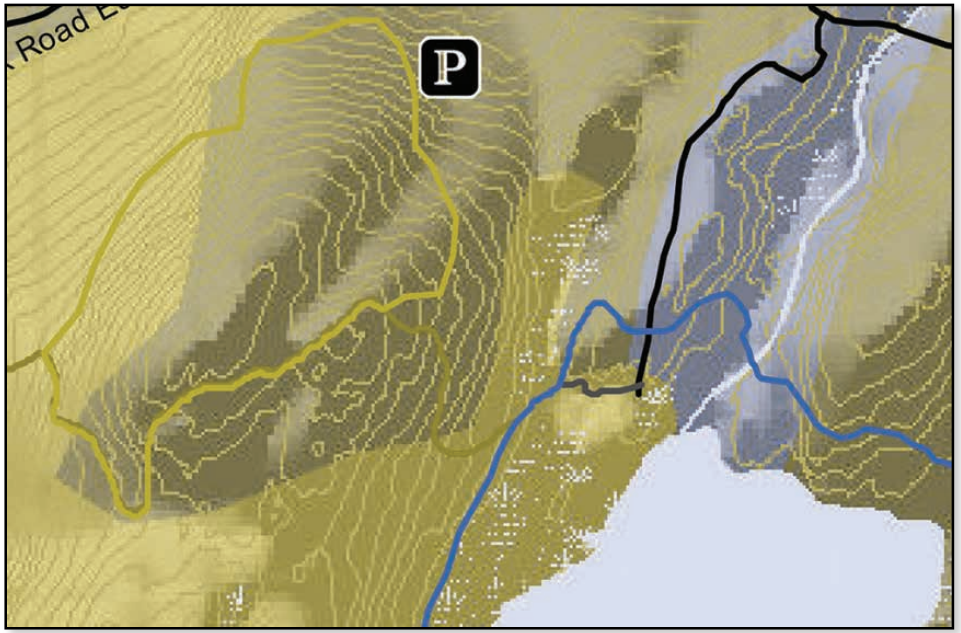
- For some users, this style may be preferred and more helpful, but for even more users, this style can negatively impact ease of use

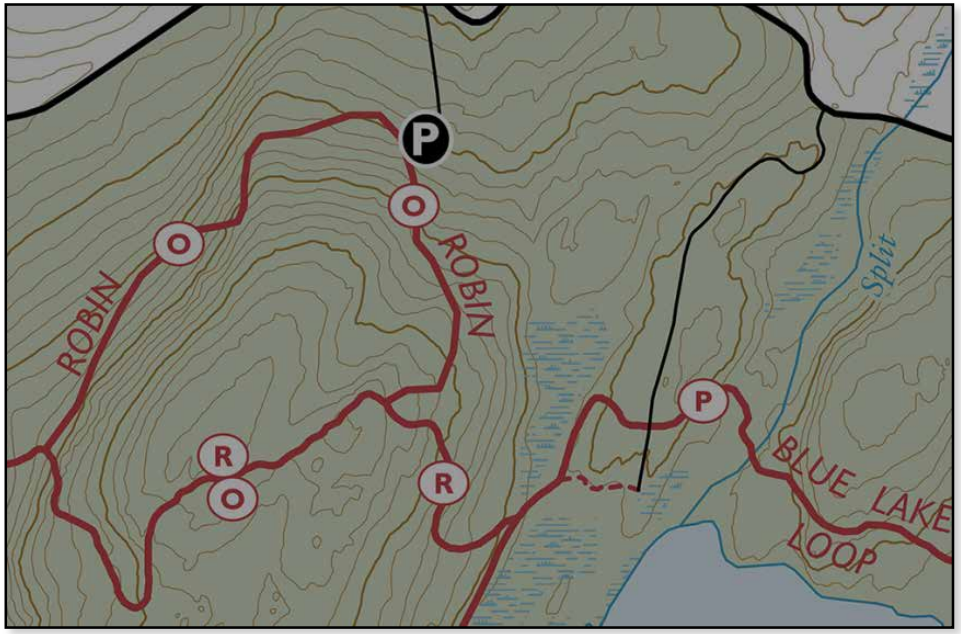
- Up to 8% of men may have some form of colorblindness
- Over 90% of people over the age of 65 have a cataract
- Using a consistent trail line color and consistent blaze color symbol provides easy reference for these users



Vision Issues

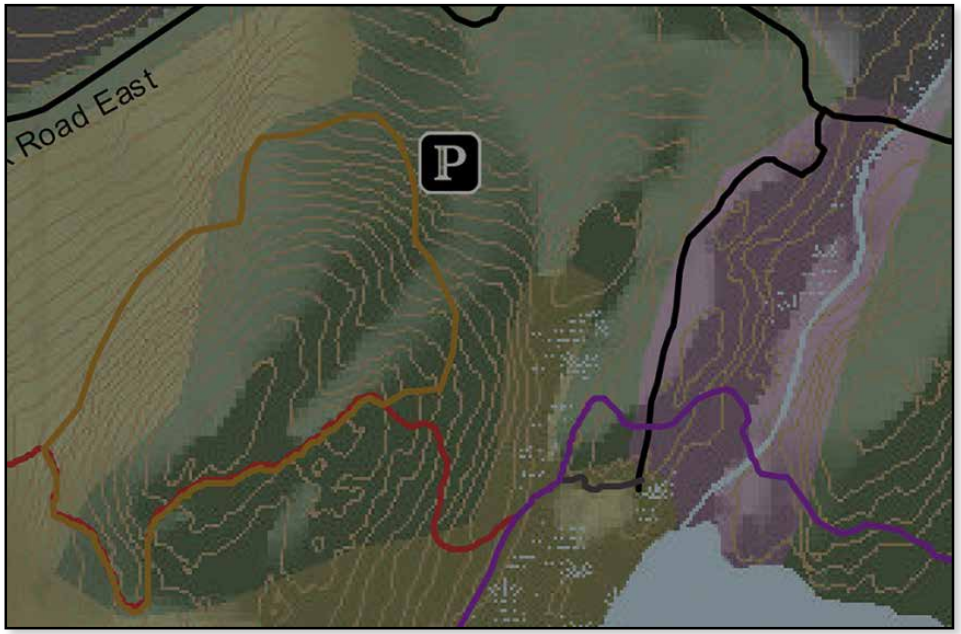
- Vision issues can make some maps very difficult or even impossible to use
- For maps with no additional blaze color information aside from the color of the line, the map is entirely unusable by these users





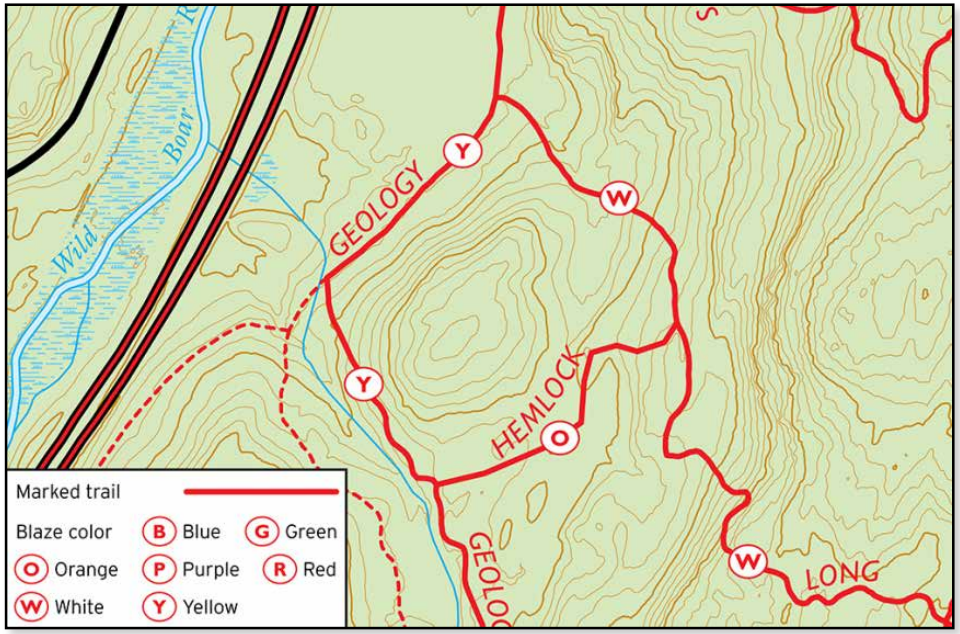
- Users may encounter low light conditions in a variety of ways
- When the map is darker and the contrast is reduced, it is important for trail information to still be easy to understand.

Low-Light Issues



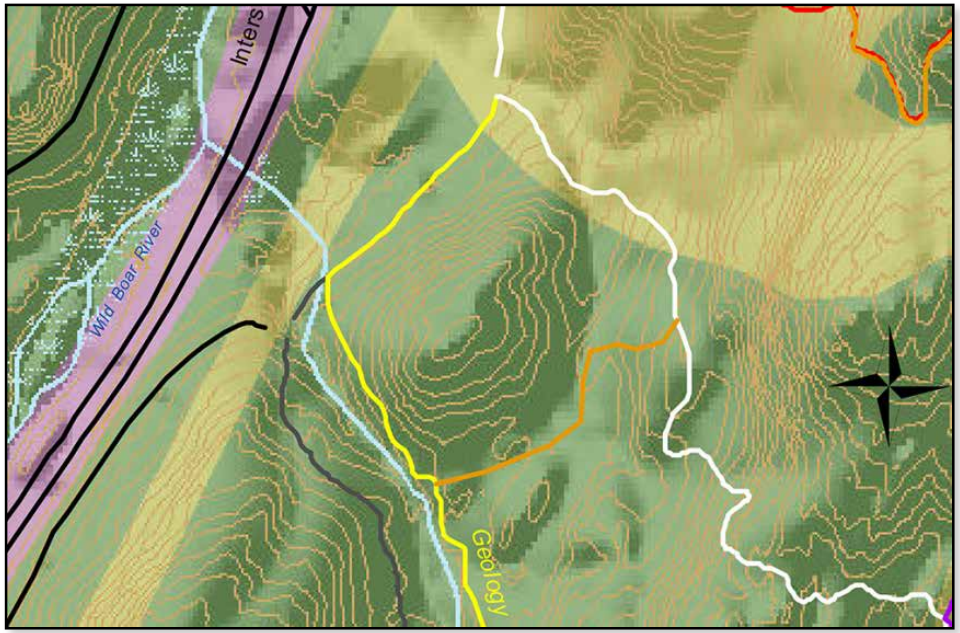
- When viewing a map using the blaze color for the line color, the color differences can be tough to discern
- For some users who may be lost as dusk approaches, this can be a safety concern
- Digital maps can suffer similar effects based on screen brightness

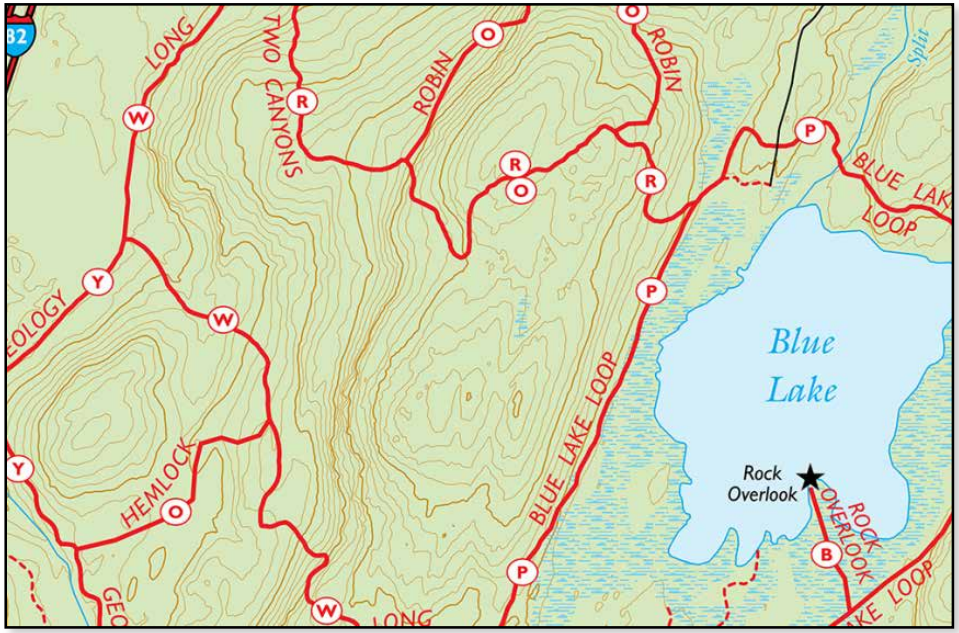
- Many trail systems have trails marked in similar colors
- This example includes a yellow trail, orange trail, and white trail
- The trail lines can be easily made out, and their blaze colors can be identified by blaze color symbols



Similar Colors

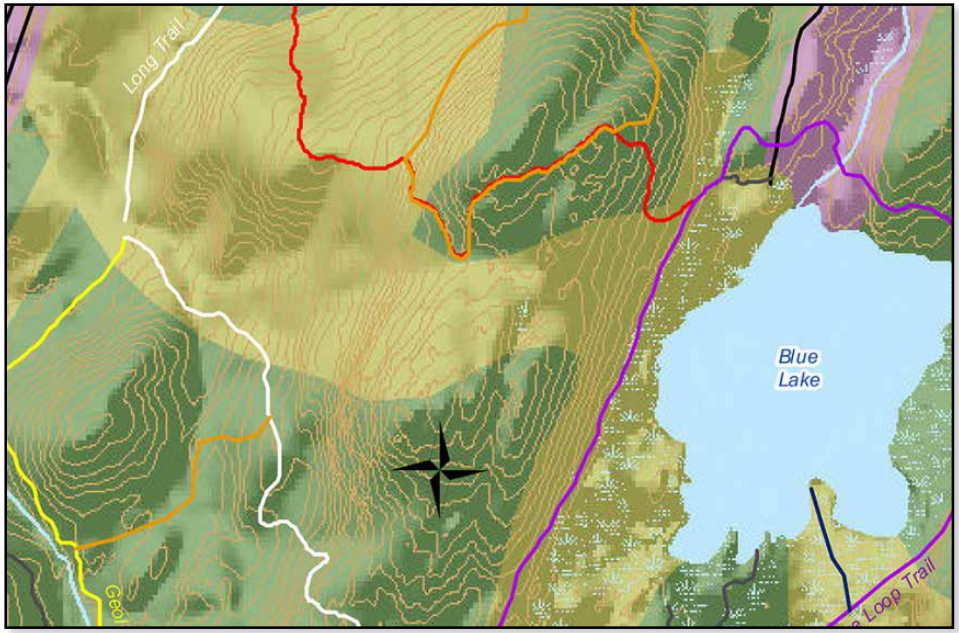
- For a map using the blaze color for the line color, it can be difficult to distinguish what color a trail is compared to others nearby
- Shades of yellow, orange, and red can look similar, as can shades of blue and green





- Using a single color for trail lines allows the trail network to have the same visual weight
- Our use of red for the trail lines helps to make the entire trail network pop out and be equally prominent

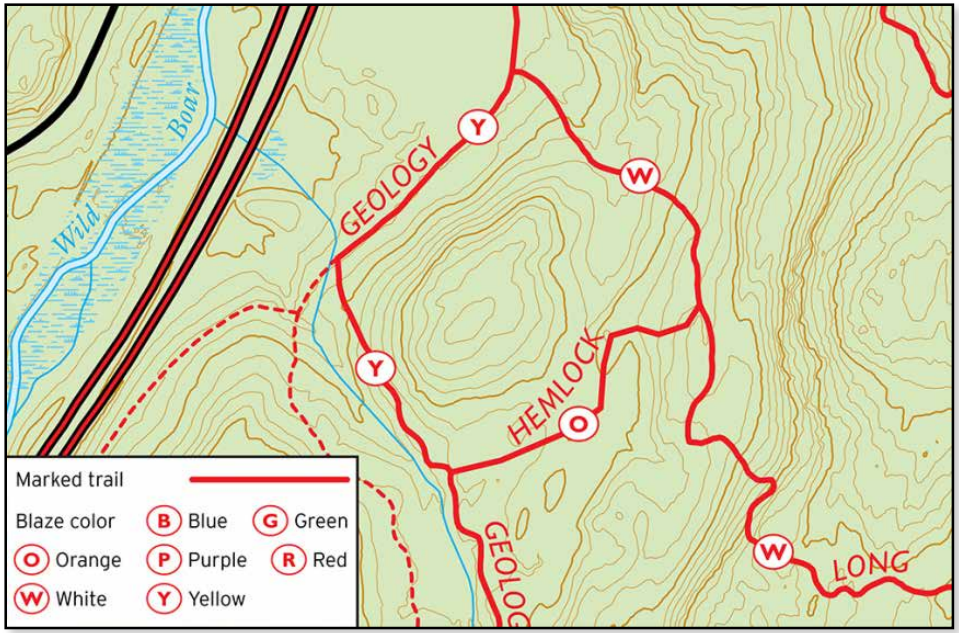
Unequal Trail Prominence



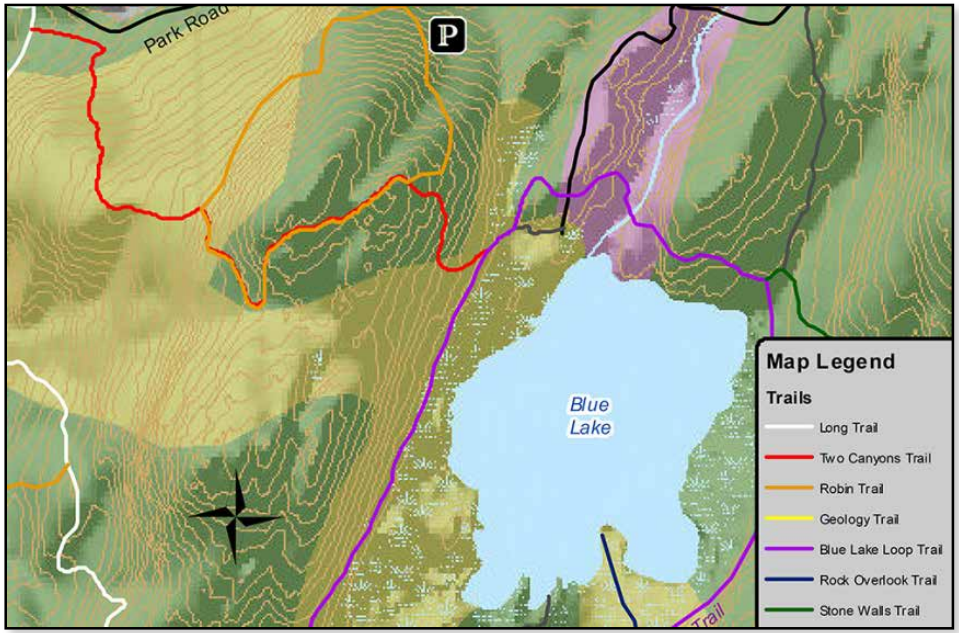
- On a map with each trail colored by its blaze color, certain trails are given more prominence
- A user's eyes are often drawn first to high-contrast trails, such as dark red and dark blue
- Colors that are similar to the background can often blend in

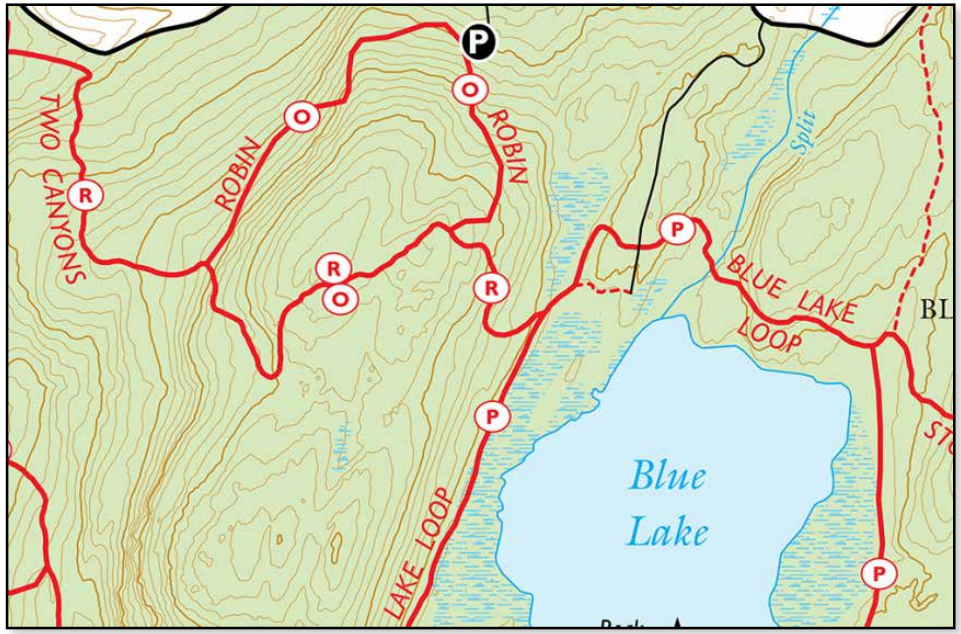
Trail Blaze Color

- It is best to include blaze color information directly on the trails
- This allows the blaze color to be easily identified by as many users as possible, under various conditions
- We have used these oval symbols as our primary blaze color symbols from the very beginning



- For maps that don't include the blaze color anywhere on the map, it can be difficult to use based on the reasons just mentioned
- Some maps may include the blaze color label in the legend, but the amount of back-and-forth referencing of the legend should be minimized

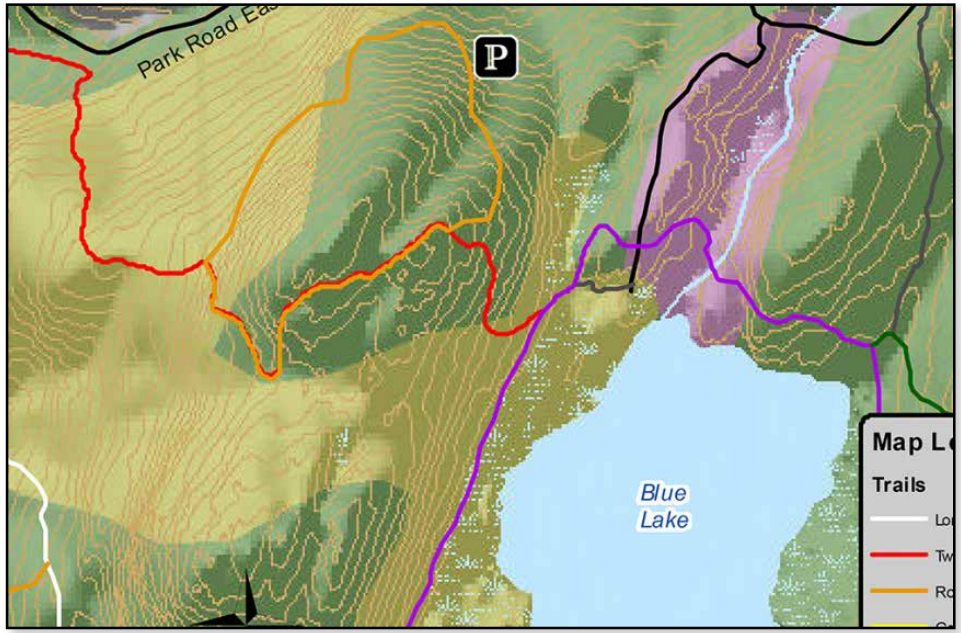




- Similar to blaze color symbols, it is beneficial to place trail name labels directly along the trails

- The combination of blaze color symbols and trail name labels allows a user to read the map without constant reference to the legend

Trail Name Labels



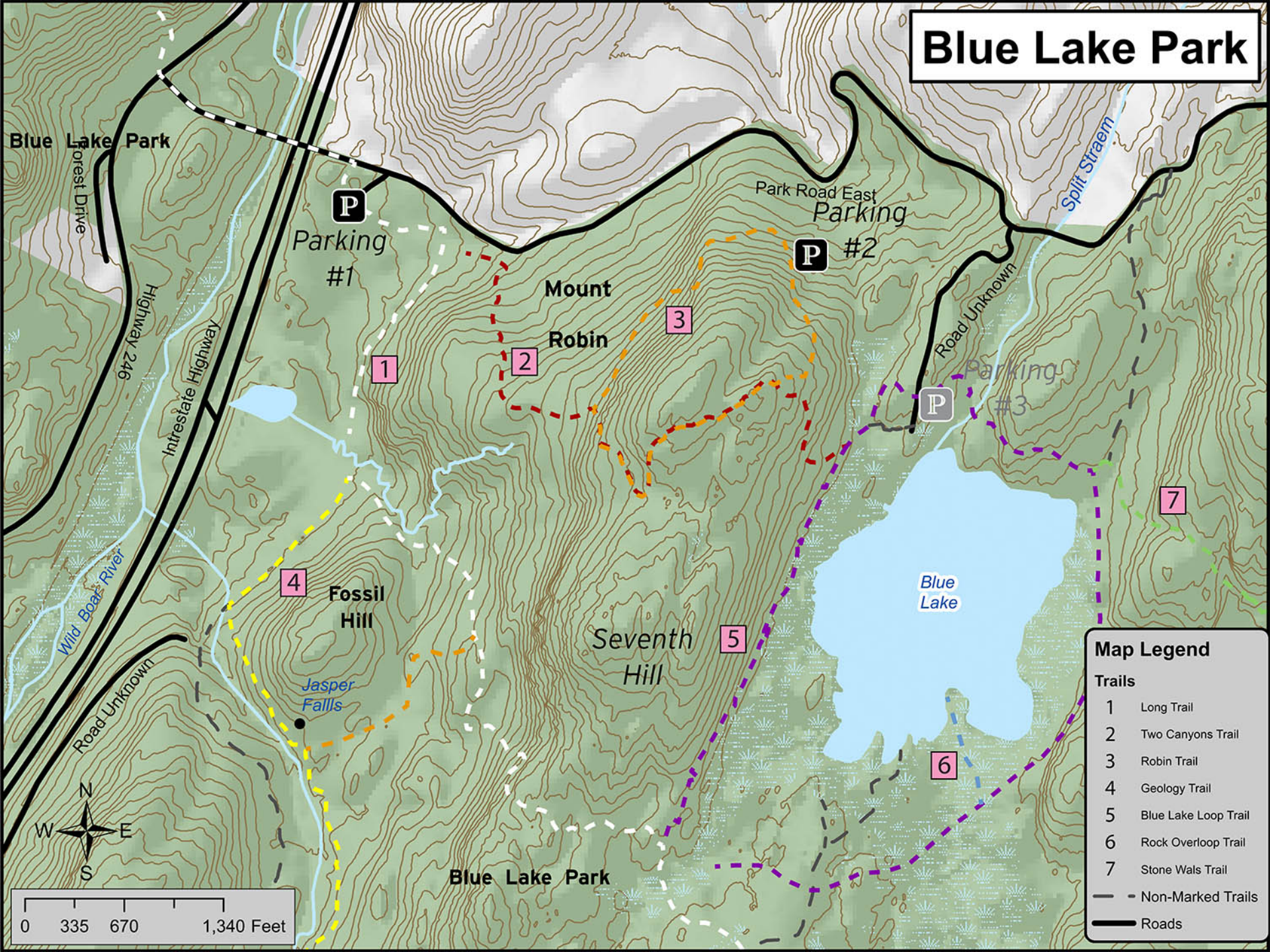
- In this example, trail names are inconsistently labeled

- Names are provided in the legend, but it can be a frustrating experience to need to reference the legend repeatedly

- When possible, trail name labels should accompany trail lines directly

Map Critique #3

- Rapid Fire map critique:
  - Raise your hand
  - Keep answers very short
  - Keep response to 1 or 2 items
  - Don't worry about repeating answers
  - No wrong answers
  - Please speak up!


Blue Lake Park
Blue Lake Park
Forest Drive
Highway 246
Intrestate Highway
Parking #1
Park Road East
Parking #2
Split Straem
Mount Robin
Road Unknown
Parking #3
Wild Boar River
Fossil Hill
Seventh Hill
Blue Lake
Jasper Fallls
Road Unknown
Blue Lake Park
N
W
E
S
0 335 670 1,340 Feet
Map Legend
Trails
1 Long Trail
2 Two Canyons Trail
3 Robin Trail
4 Geology Trail
5 Blue Lake Loop Trail
6 Rock Overloop Trail
7 Stone Wals Trail
Non-Marked Trails
Roads

Best Practices for Designing Trail Maps

Attention to Detail

Details Matter

- Don't sweat the small stuff…
- For trail maps, the small stuff can be quite important

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Building and Keeping Trust

- A map user is putting their trust in a map to guide them
- Every flaw or mistake a user notices decreases their trust in the map
- **"You can show 99 things on a trail map, but all people will remember is the 1 thing you did wrong"**

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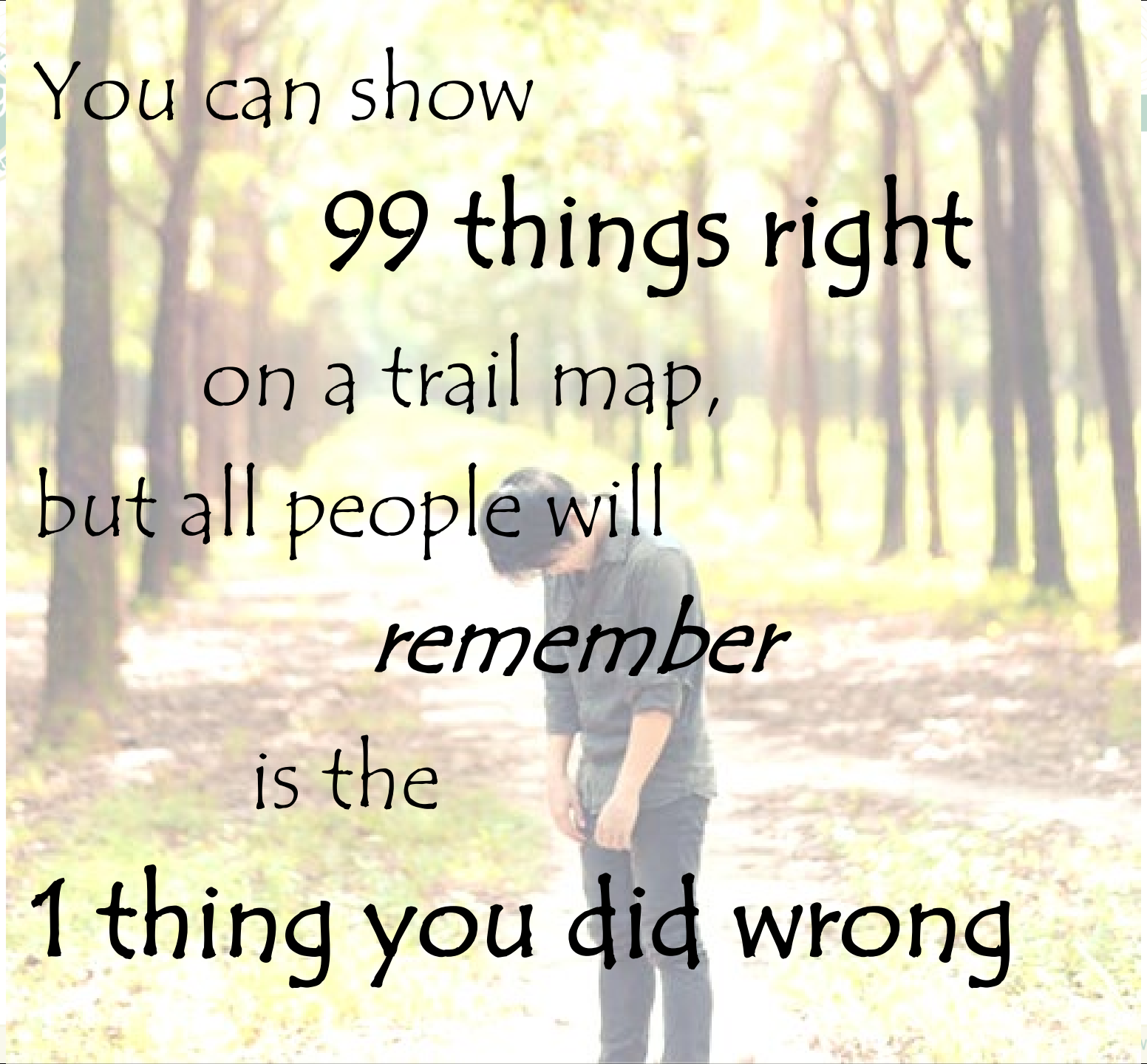
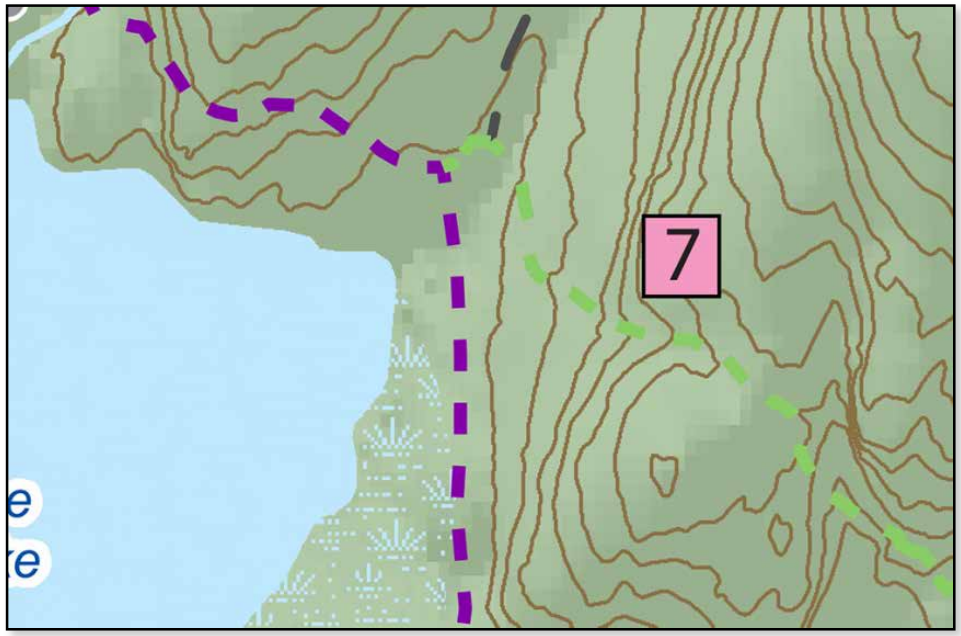
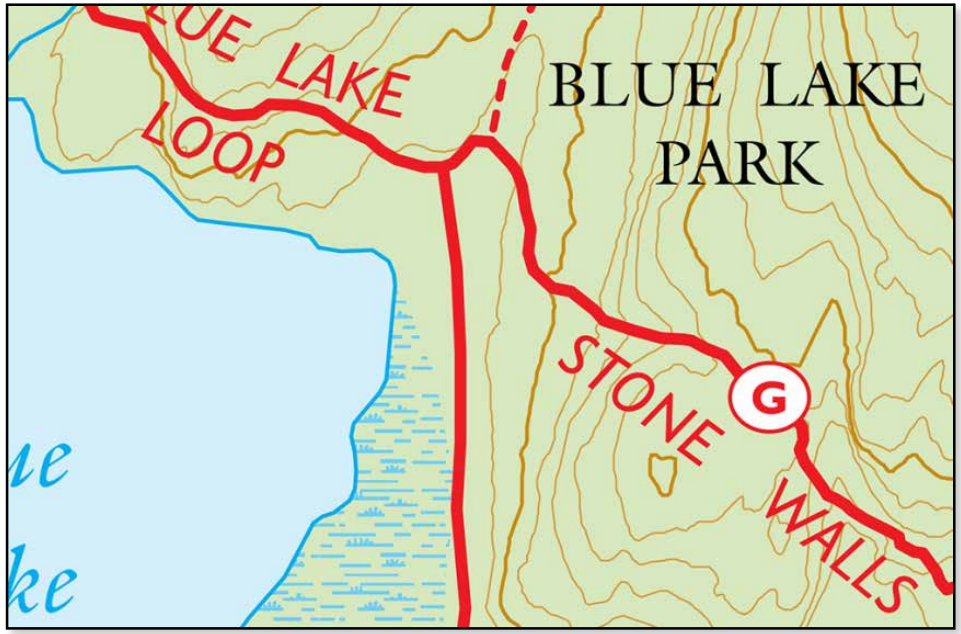

You can show
99 things right
on a trail map,
but all people will
remember
is the
1 thing you did wrong



- This example map uses dashed lines for trails
- The combination of dashed lines and some color choices make certain trails difficult to make out

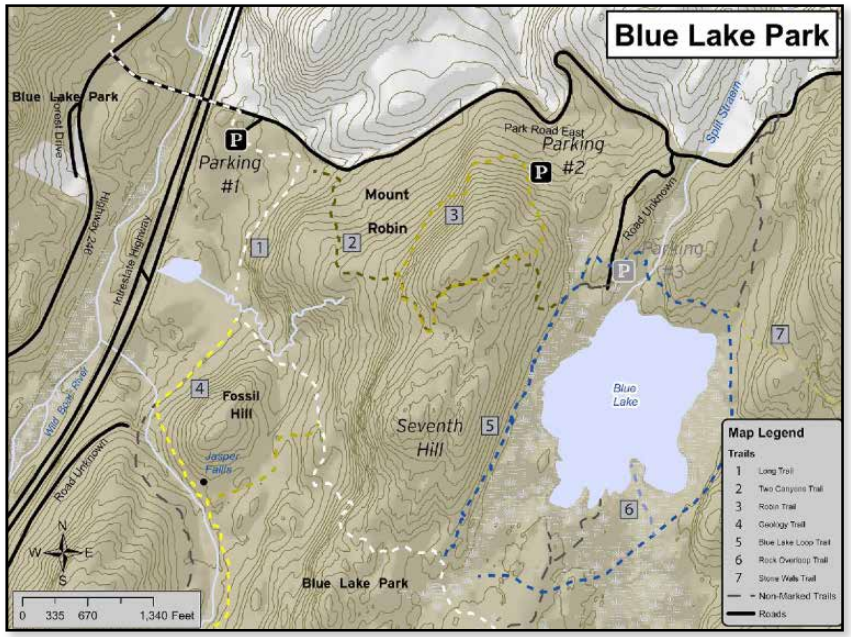
Trail Line Colors



- This map uses red solid lines to represent all trail lines
- The solid line width helps the trail lines stick out
- No trail lines are lost in the background

- The background of this latest map is less busy than the previous map, and the overall tone is lighter

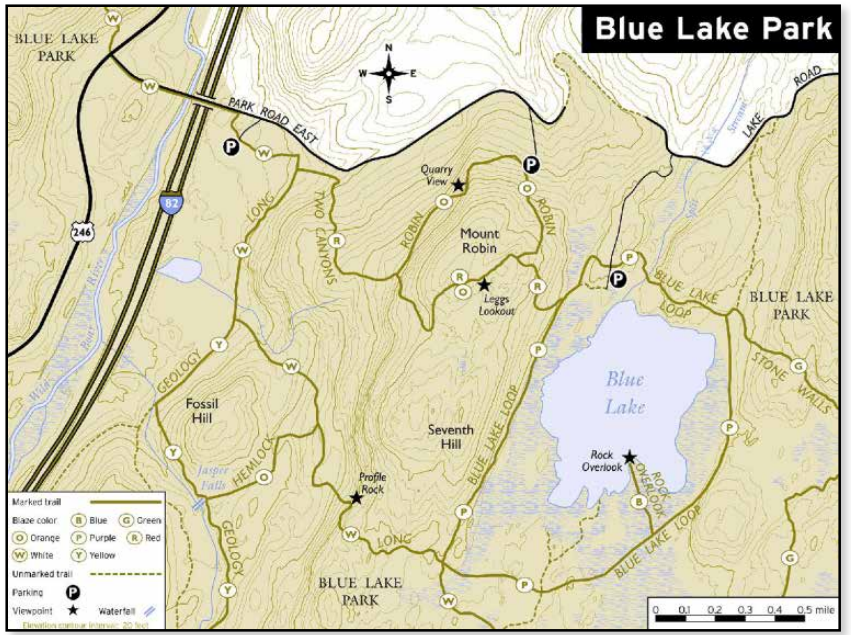
- Without any blaze color indications, the map remains unusable by some users

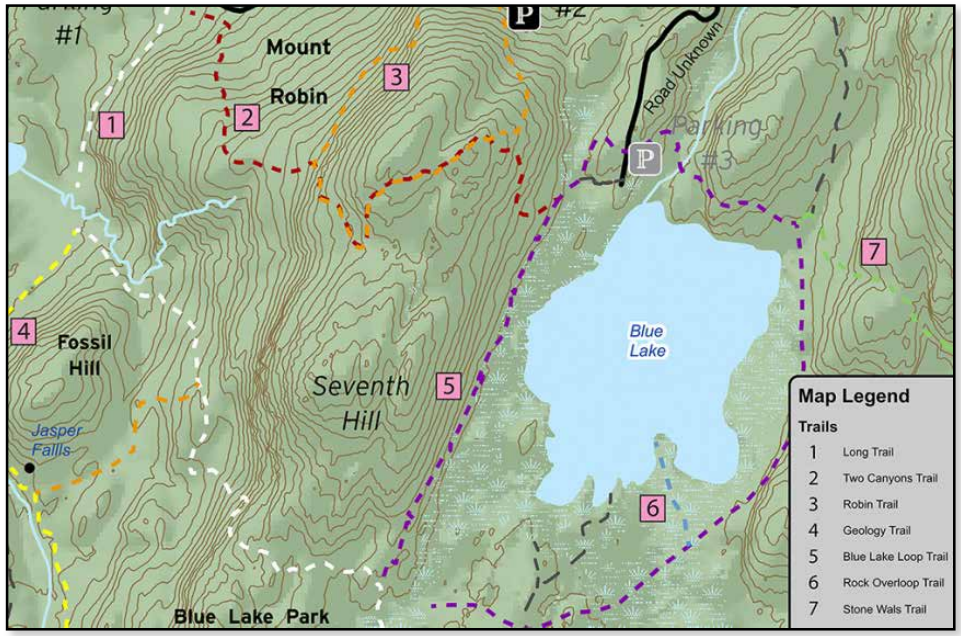


Vision Issues

- The red solid lines of this map are no longer red to a colorblind user

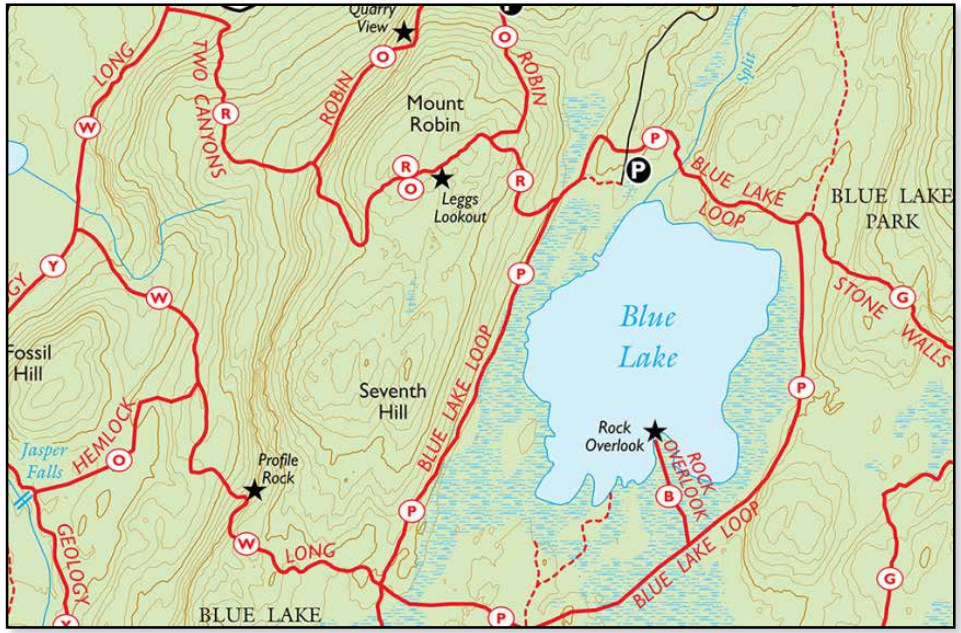
- Since all lines are a consistent color, and blaze colors are indicated, the map is still useable





- Trail names aren't directly labeled, but instead use number IDs linked to the legend
- It can be a frustrating experience to need to go back-and-forth between the map and legend

Trail Name Labels

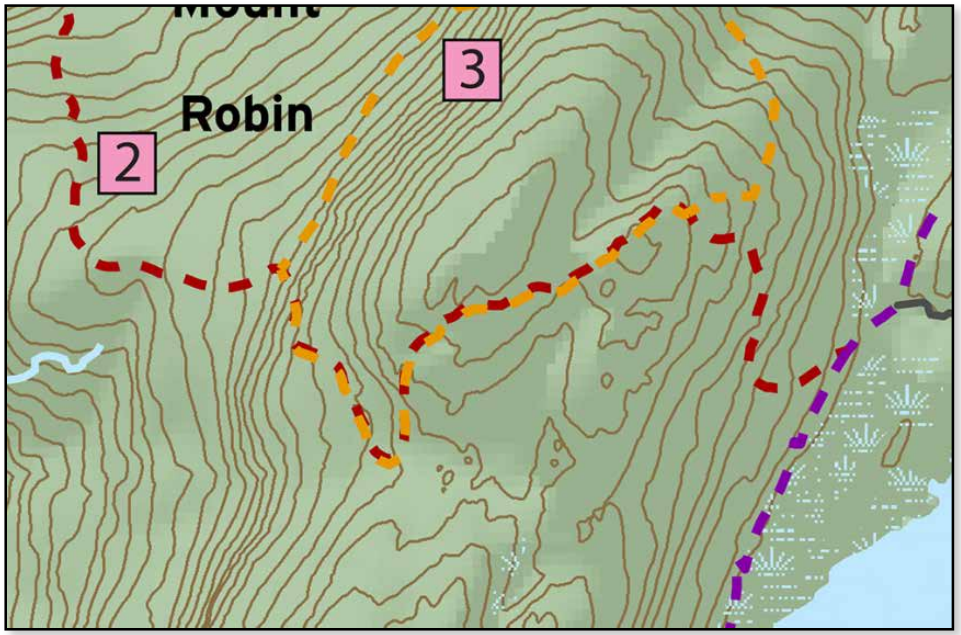


- Here, all trail names are included directly along the trail lines
- A user does not need to do any back-and-forth referencing of the legend

Coaligned Trails

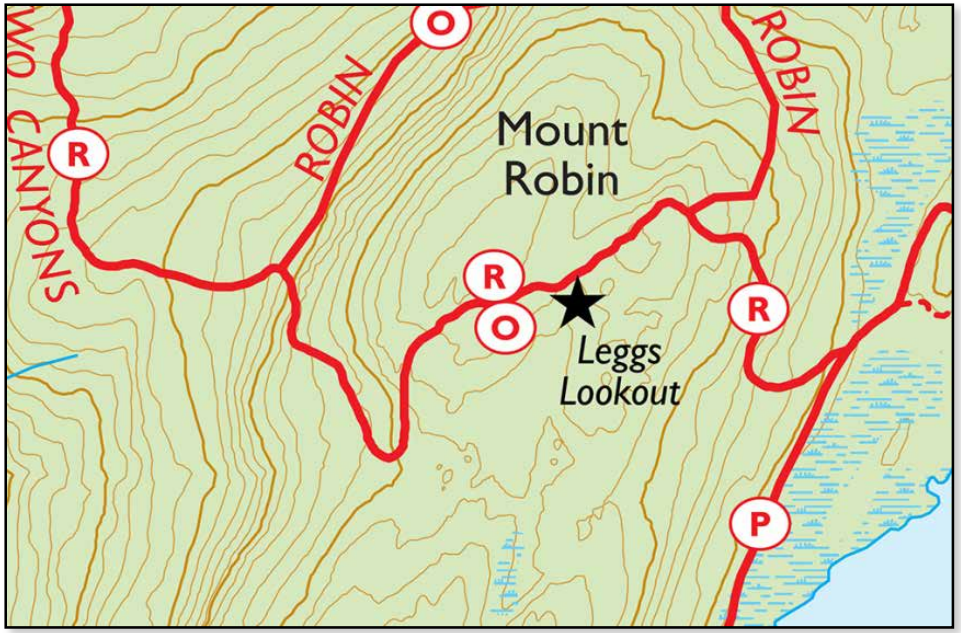
- Coaligned sections of trails can be difficult to represent when using blaze color as the line color

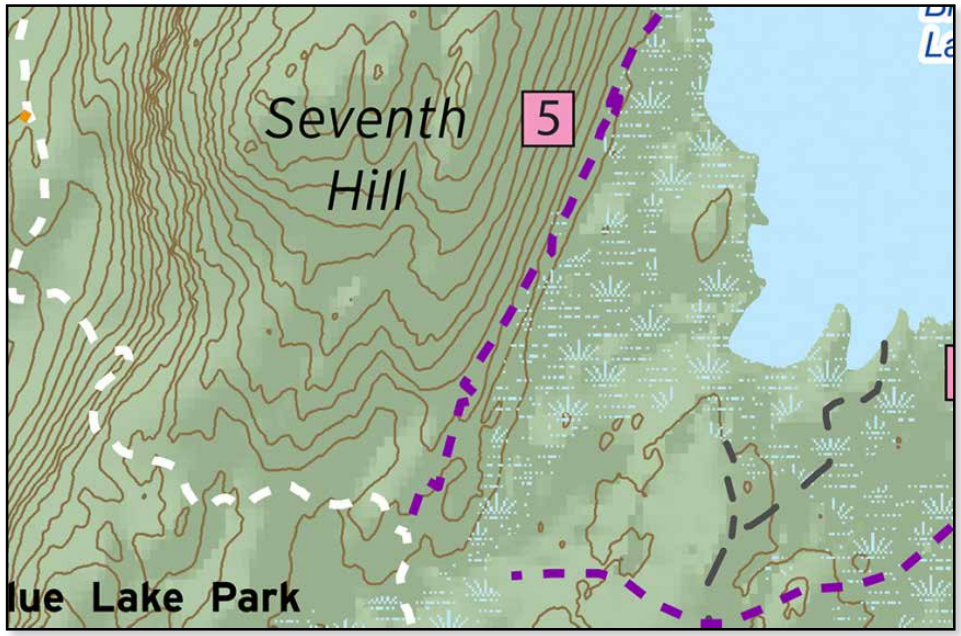
- For this map, the extra issue of using dashed lines makes the coaligned section messy



- Here, a single line represents the coaligned section

- Two blaze symbols are included to indicate the coalignment





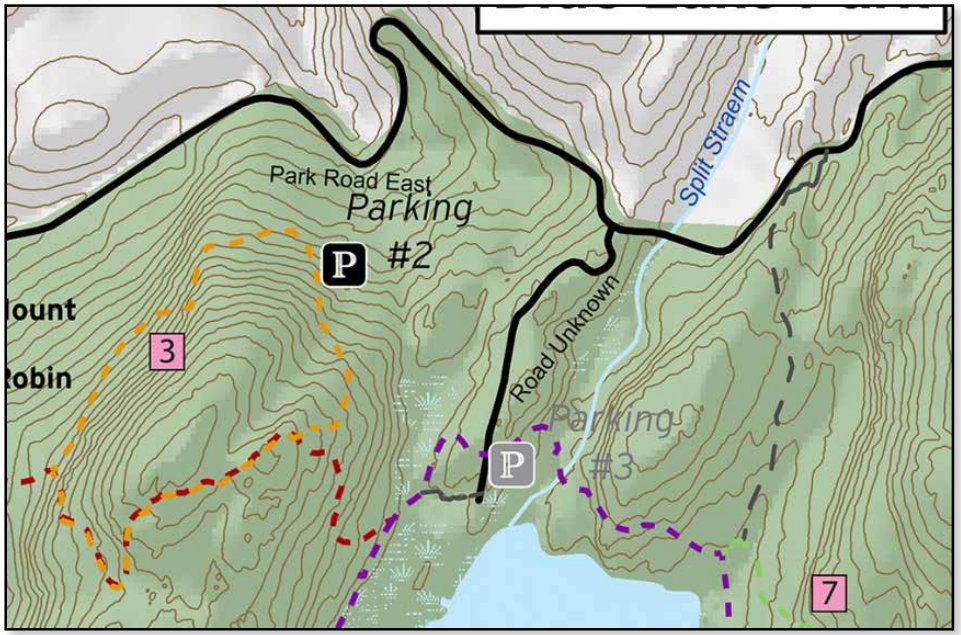
- Trail lines should typically not have sizeable gaps
- Trail lines should not be overly jagged or include extra GPS-derived noise

Trail Line Issues

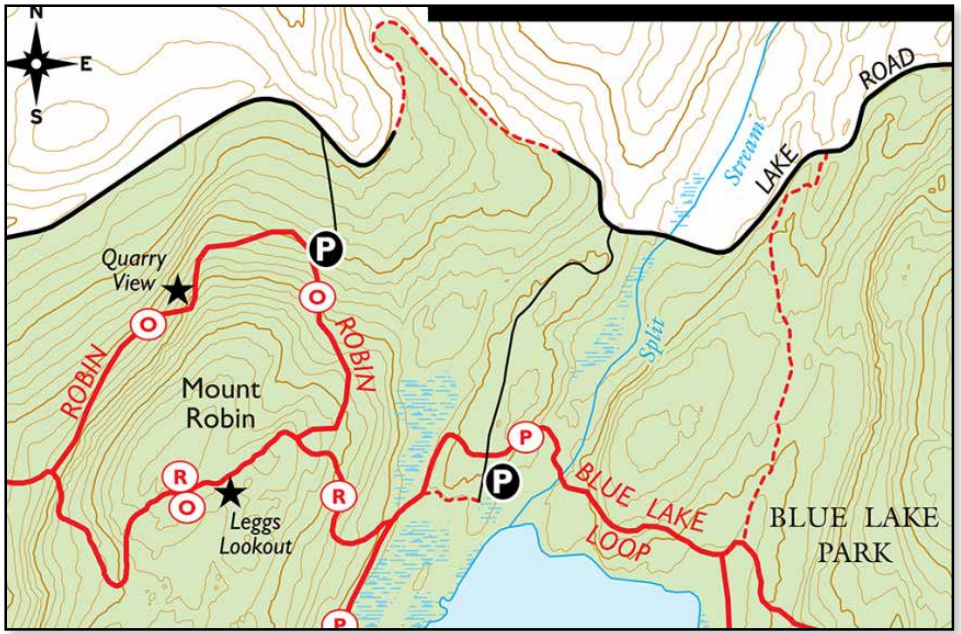
- Trail lines here are continuous
- All trail lines are smooth and not jagged
- Creating new lines based on GPS data is often time worth spent

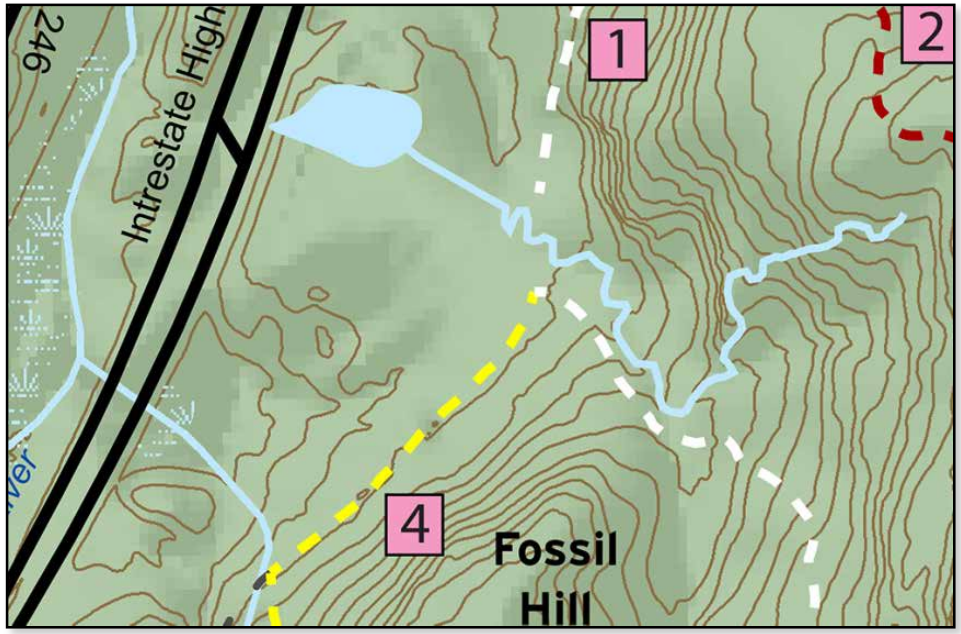
Road Lines

- Road lines should typically be at a similar visual hierarchy as trails
- It is often helpful to very the thickness of road lines based on their state/county/local designations



- Here, road lines do not dominate the map, and secondary roads use thinner line widths
- Publicly available road data should be double-checked, especially for internal park roads that guide users to parking areas

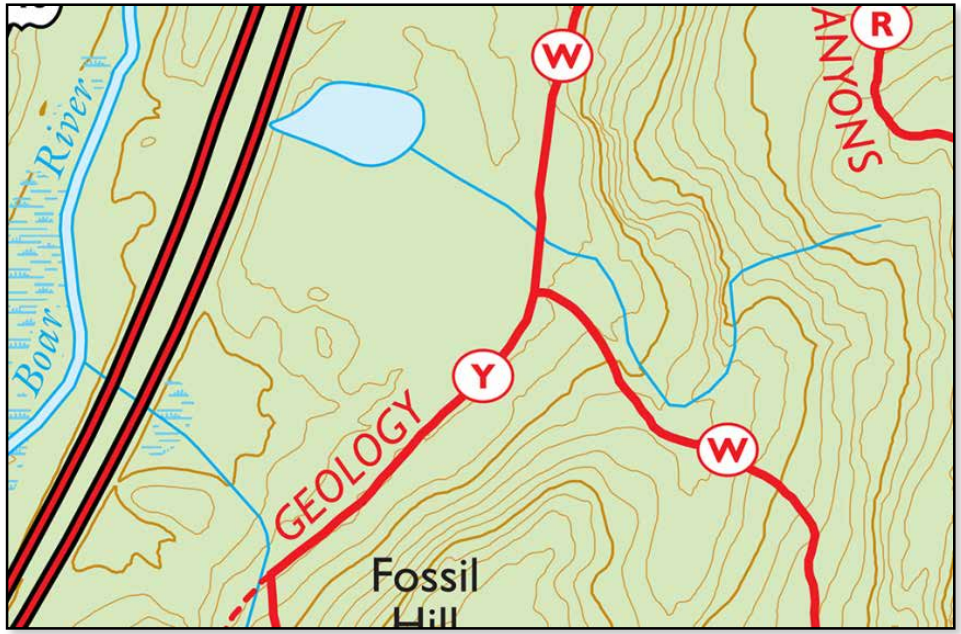




- A cartographer must often strike the right balance of detail and simplification

- Here, the stream is overly detailed and distracting, especially compared to other streams, trails, and roads

Simplifying Detail

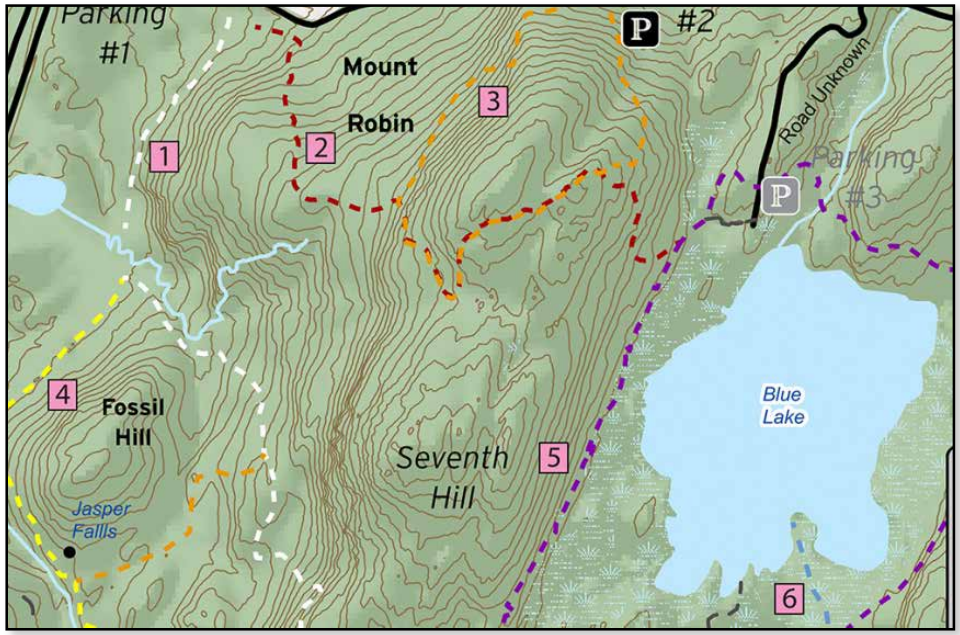


- Here, this stream has been simplified without sacrificing its relationship to the trails

- Maps should show accurate locations of features, but details can be sacrificed to improve ease of use

- Points of interest along trails can be a useful feature to include

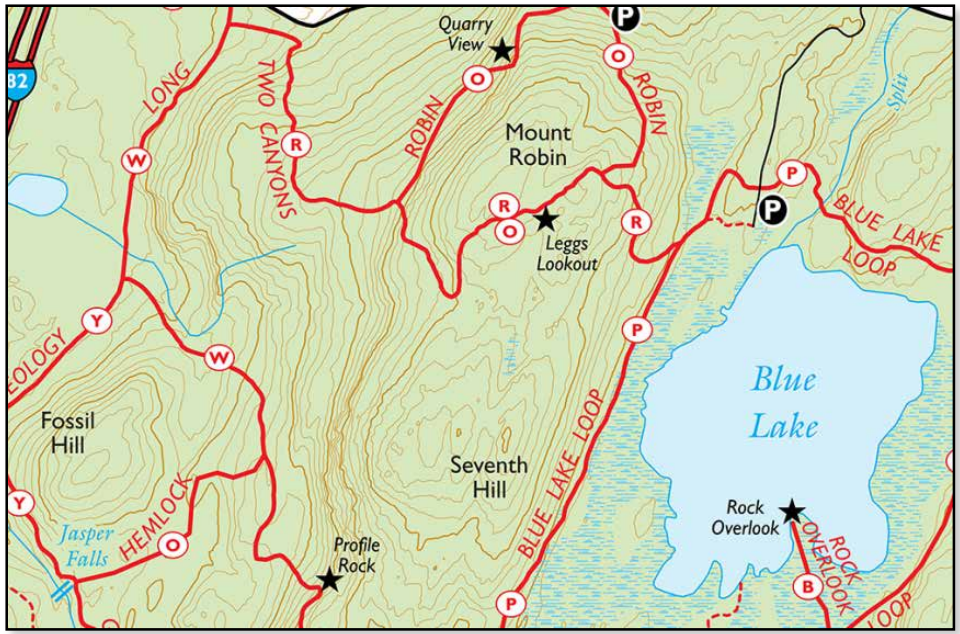
- This example map includes only one point of interest along the trails, Jasper Falls

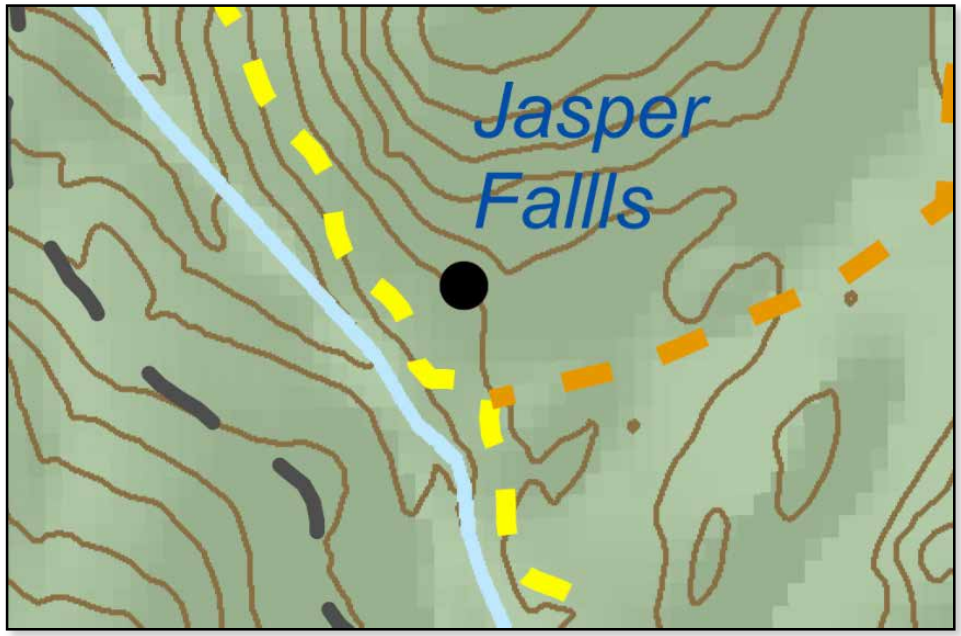


Points of Interest

- This map includes several additional named viewpoints

- Points of interest to include may vary depending on potential users

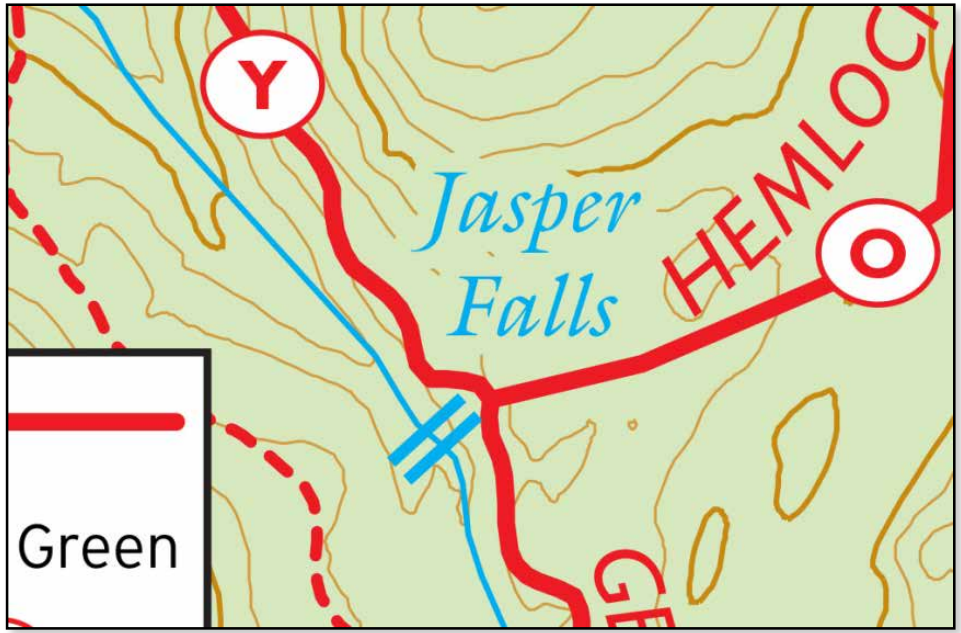




- Points of interest should be positioned correctly, especially in relation to the trail

- Here, a black dot for Jasper Falls is on the right side of the yellow trail, while the stream is on the left side

Placement of Points

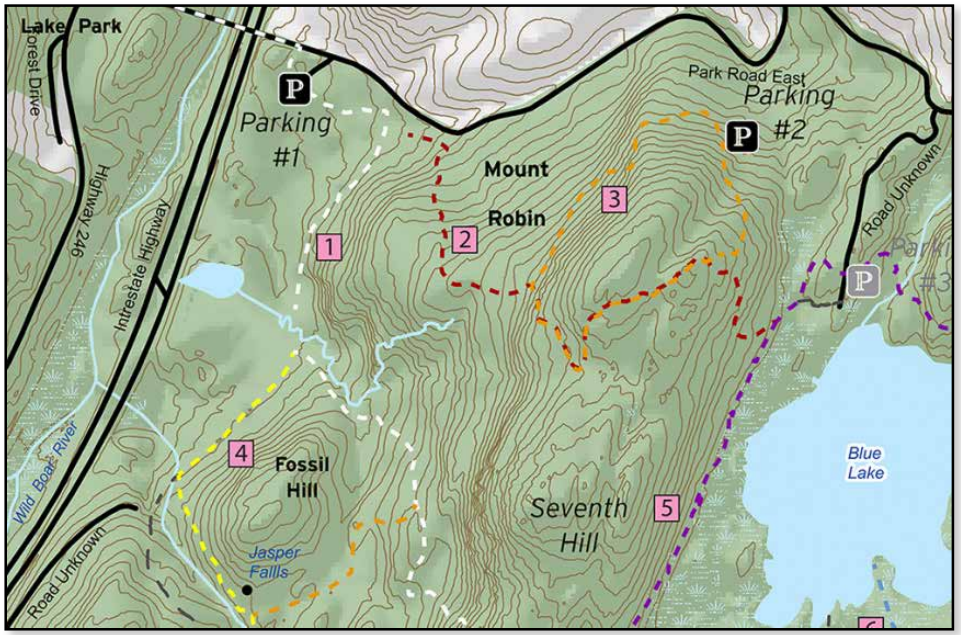


- On this map, the location of Jasper Falls is correctly identified along the stream, to the left of the yellow trail

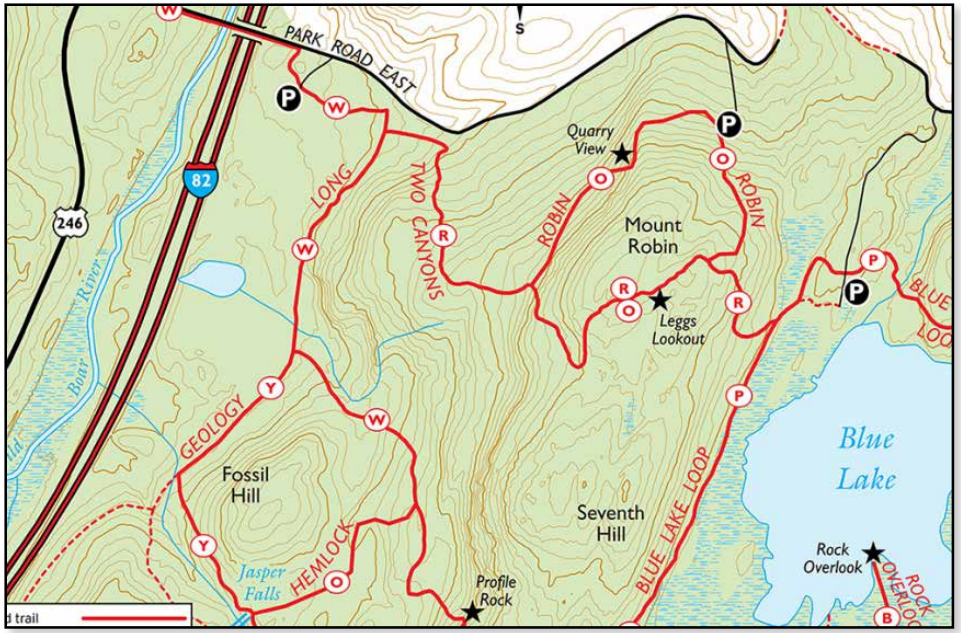
- A specific waterfall symbol is used, which is referenced in the legend

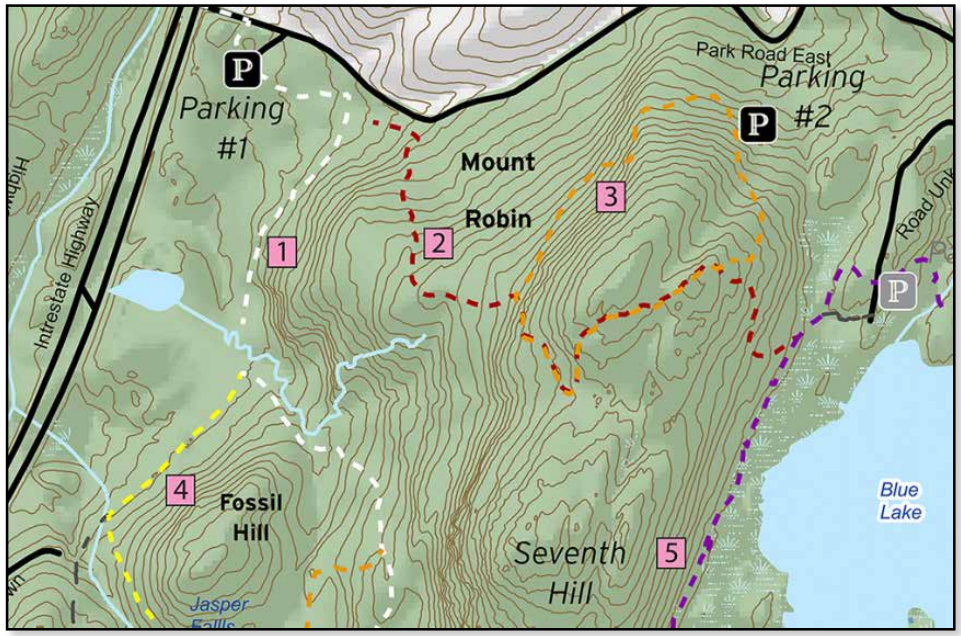
Automatic Labeling

- Automatic labeling of features is often used for maps
- When not done carefully, this can produce mistakes and unattractive labels
- Here, road names based on automatic labeling have various issues



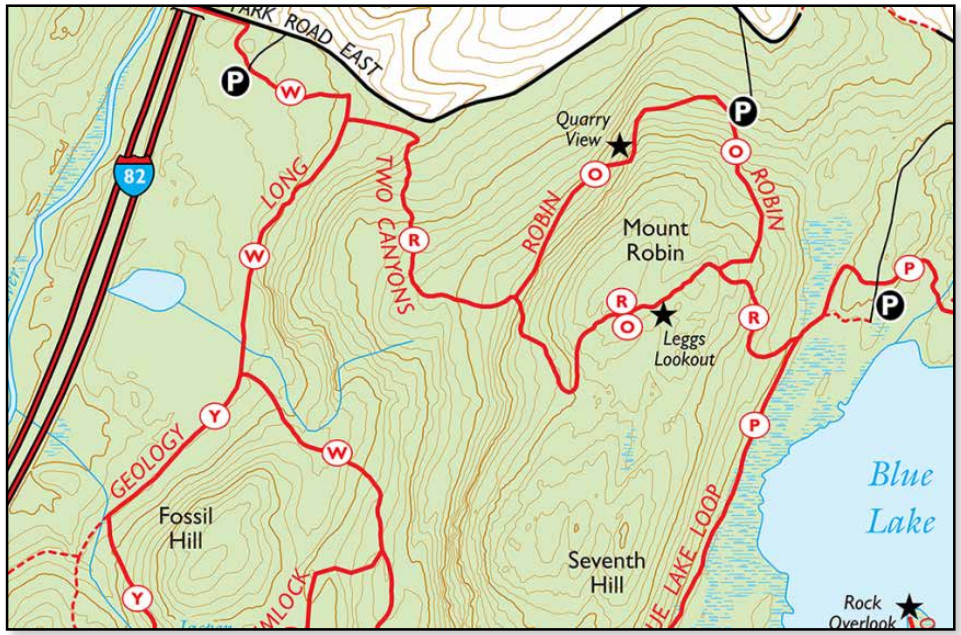
- On this map, all labels and symbols were manually placed
- Proper labeling can be a time-intensive task
- If automatic labeling is used, the results should be checked carefully and adjusted if necessary



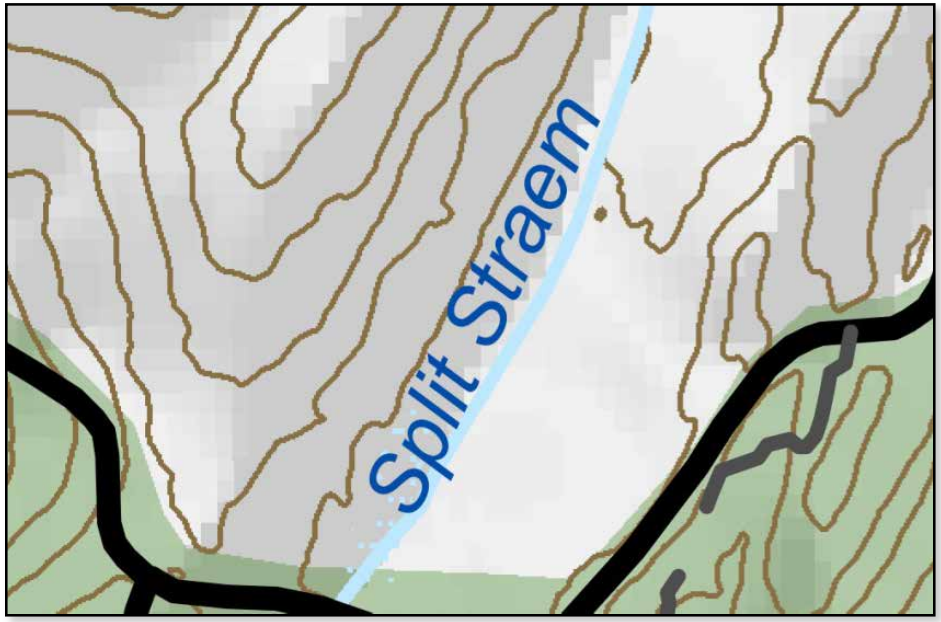


- A common way to associate similar features is to use the same font or color for the same type of feature
- In this map, the three summits are inconsistently labeled
- One summit also shares a label style with the parking areas

Label Style Sharing

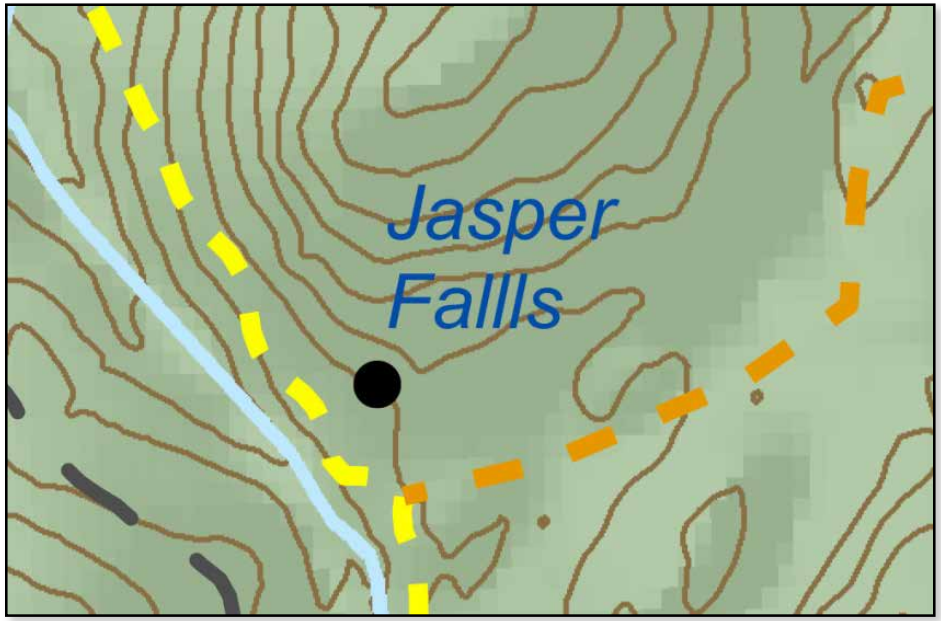


- Try to start with a design template that addresses as many potential features as possible
- On this map, specific fonts, font sizes represent different features
- Red is used almost exclusively for trail information


Split Straem

Intrestate Highw

Spelling


Jasper
Fallls

4 Geology Trail
5 Blue Lake Loop Trail
6 Rock Overloop Trail
7 Stone Wals Trail
Non-Marked Trails

Update Strategy

- It is best to develop a **planned update strategy**
- Trails really do **change all the time**!
- The Trail Conference tries to refresh maps on a **2-4 year cycle**
- If a map **hasn't been updated in 4+ years**, there is a good chance something may not be represented correctly

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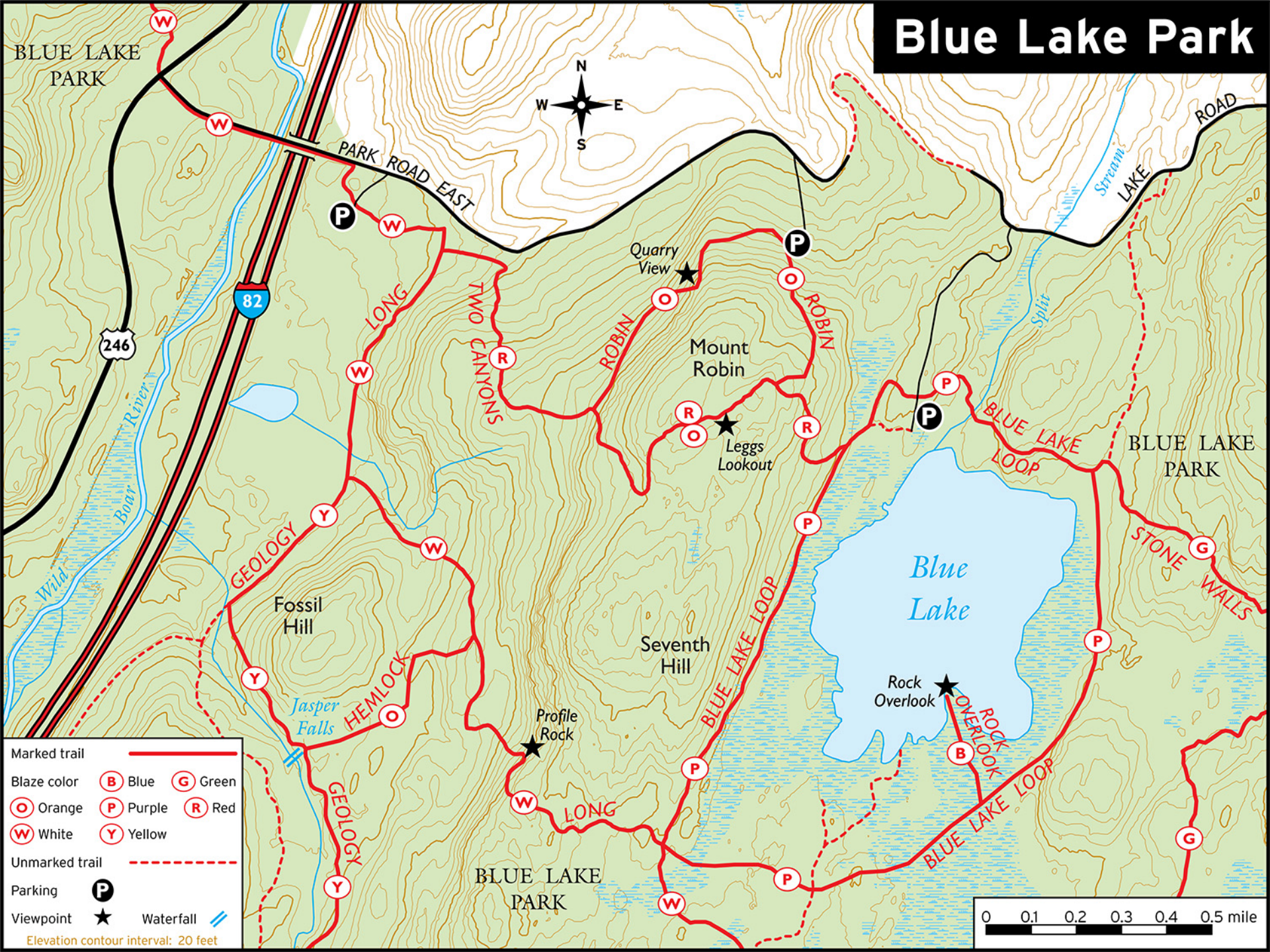
Map Critique #4

- Rapid Fire map critique:
  - Raise your hand
  - Keep answers very short
  - Keep response to 1 or 2 items
  - Don't worry about repeating answers
  - No wrong answers
  - Please speak up!


Blue Lake Park
BLUE LAKE PARK
N
W
E
S
PARK ROAD EAST
ROAD
Stream
LAKE
82
246
Boar
River
Wild
LONG
TWO CANYONS
ROBIN
ROBIN
Quarry View
Mount Robin
Leggs Lookout
Split
BLUE LAKE LOOP
BLUE LAKE PARK
STONE WALLS
GEOLOGY
Fossil Hill
Jasper Falls
HEMLOCK
Seventh Hill
Profile Rock
BLUE LAKE LOOP
Blue Lake
Rock Overlook
ROCK OVERLOOK
LONG
BLUE LAKE LOOP
GEOLOGY
BLUE LAKE PARK
Marked trail
Blaze color
Blue
Green
Orange
Purple
Red
White
Yellow
Unmarked trail
Parking
Viewpoint
Waterfall
Elevation contour interval: 20 feet
0
0.1
0.2
0.3
0.4
0.5 mile

Best Practices Recap

- Address **key qualities** of ease of use, accuracy, and attractiveness
- Understand the **full spectrum of potential end users**
- Consider **broad style designs** for the overall map style that ensure the key qualities are achieved
- Choose **trail information styles** that make the trail network prominent and easily understandable
- Pay **attention to the finer details** and avoid errors that can erode user trust in a map

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Worksheet Follow-up

- Take the worksheet from the beginning of the session and **flip it over to the back**
- Please **circle answer choices a second time**
- Feel free to **drop off your worksheet** at the back of the room

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Thank You!

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