LOST IN TIME

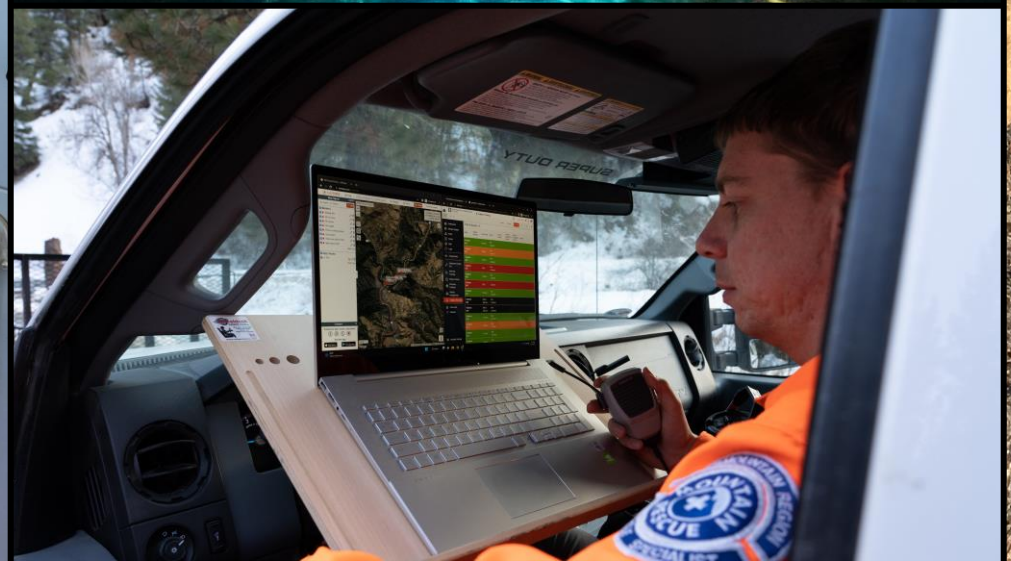
AND FOUND IN TIME

WELCOME

IDAHO MOUNTAIN RESCUE

MOUNTAIN RESCUE

About Me- Chris Brookman



About Me- Alex Deduck

LOST IN TIME

AND FOUND IN TIME

THE PAST, PRESENT, AND FUTURE OF SEARCH

IDAHO MOUNTAIN RESCUE

MOUNTAIN RESCUE

Disclosures

- None

Who Has Been Involved In A Search?

Who Has Been Involved In A Search?

Search Vs. Rescue

Search Is An Emergency!!

- 99% of subjects that are found alive are found within the first 50 hours of a search
- Untrained *rescuers* can kill people
- Untrained *searchers* can also kill people

Search Is An Emergency!!

- Many clues don't last long!
  - Heat signature ≈8 hrs
  - Scent trail ≈48 hrs
  - Tracks varies
  - Cell phone/web data ≈5 days
  - Surveillance video ≈30 days

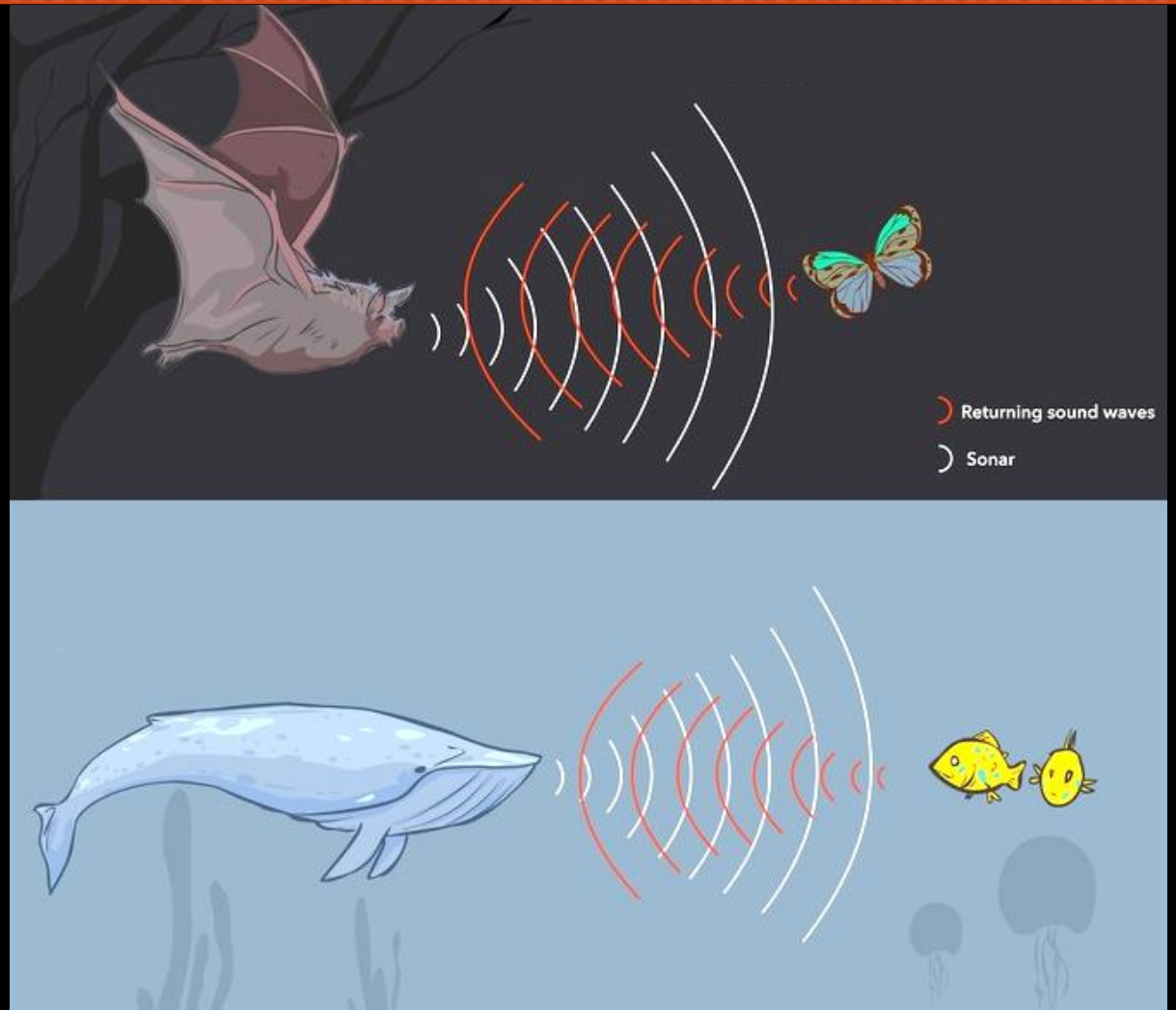
Search Is An Emergency!!

- The goal
  - Direct resources to the most likely area(s),
  - in the most efficient manner,
  - locating the subject as quickly as possible,
  - giving them the highest chance of survival

What Is A Search?

What Is A Search?

SEARCH SENSOR



SEARCH TARGET

What Does A Search Need to Succeed?

What Does A Search Need to Succeed?


*NOT TO SCALE

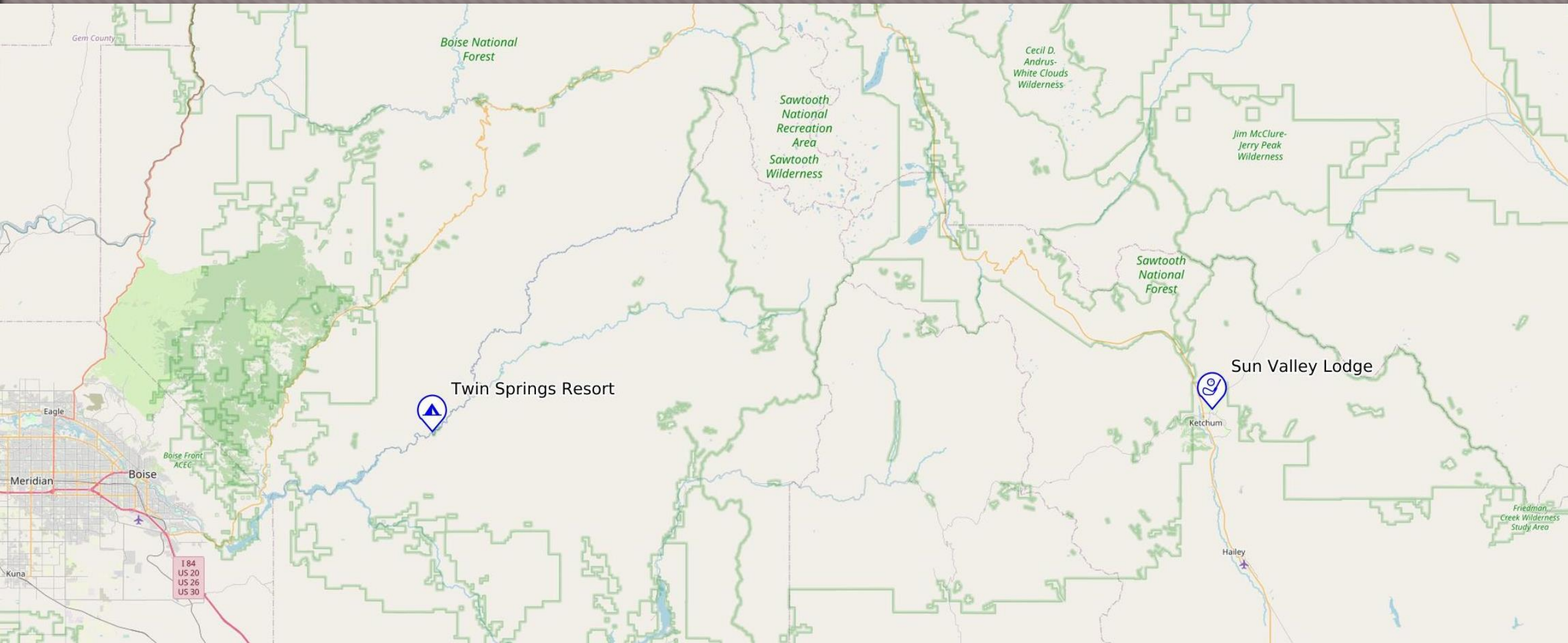
The Evolution of Search

- Search in the past
- Search in the present
- Search in the future

Day 0
November 9th, 2002

- Meet Russell Reed

Day 0
November 9th, 2002

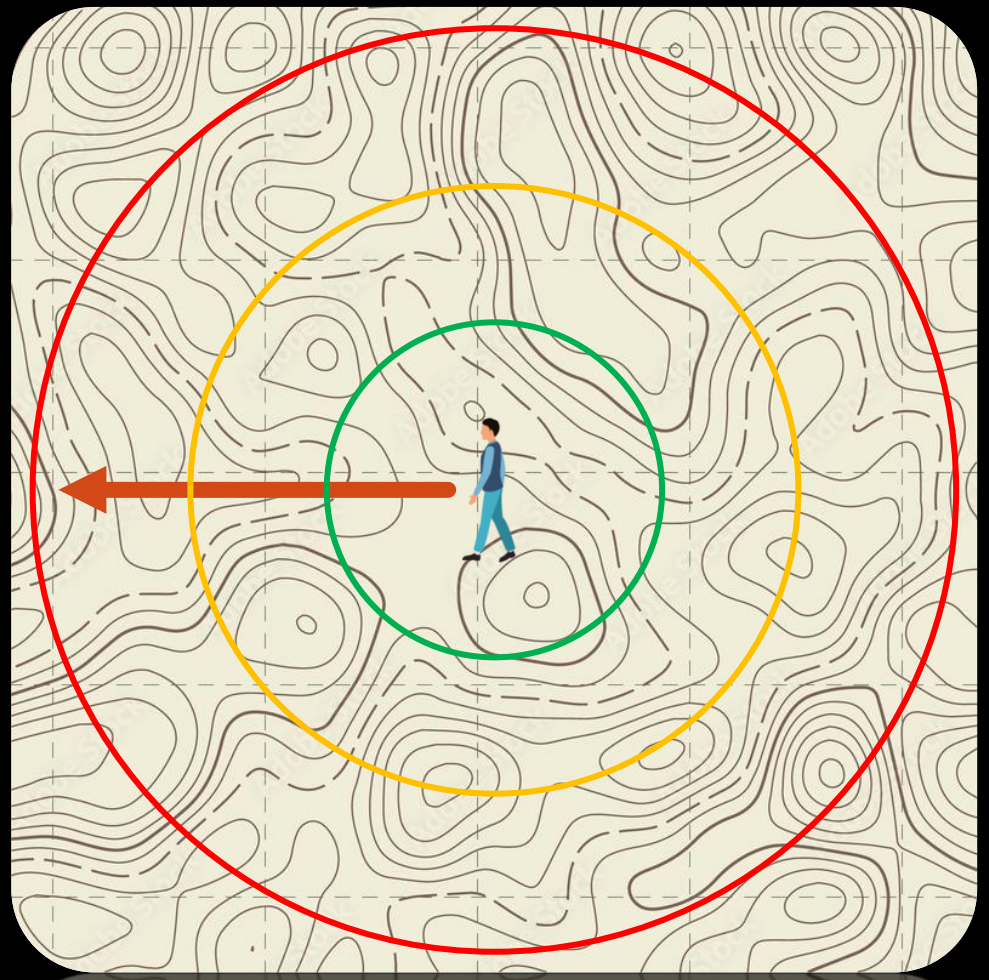


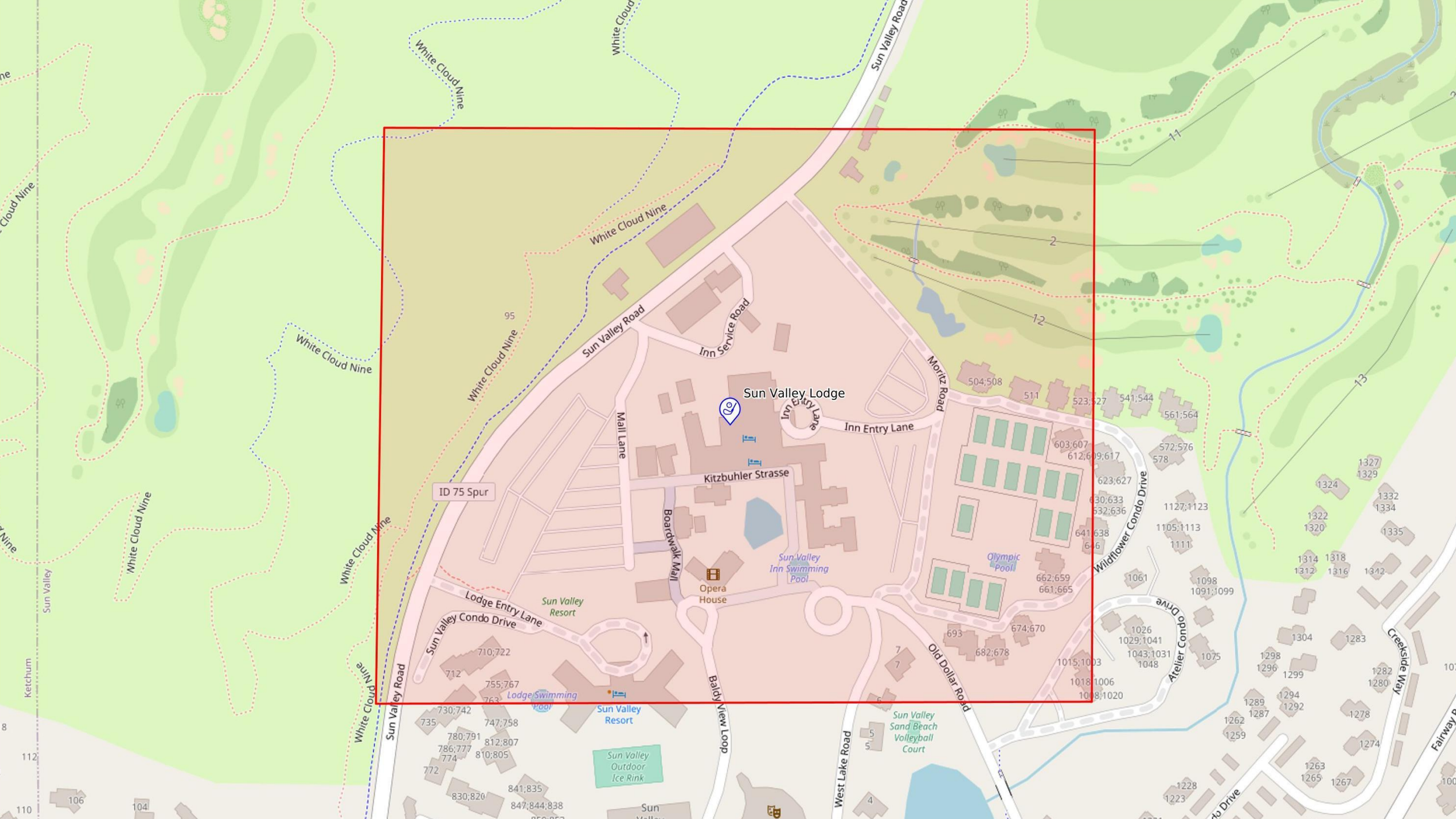
Why Is Search Hard? – Poll Question

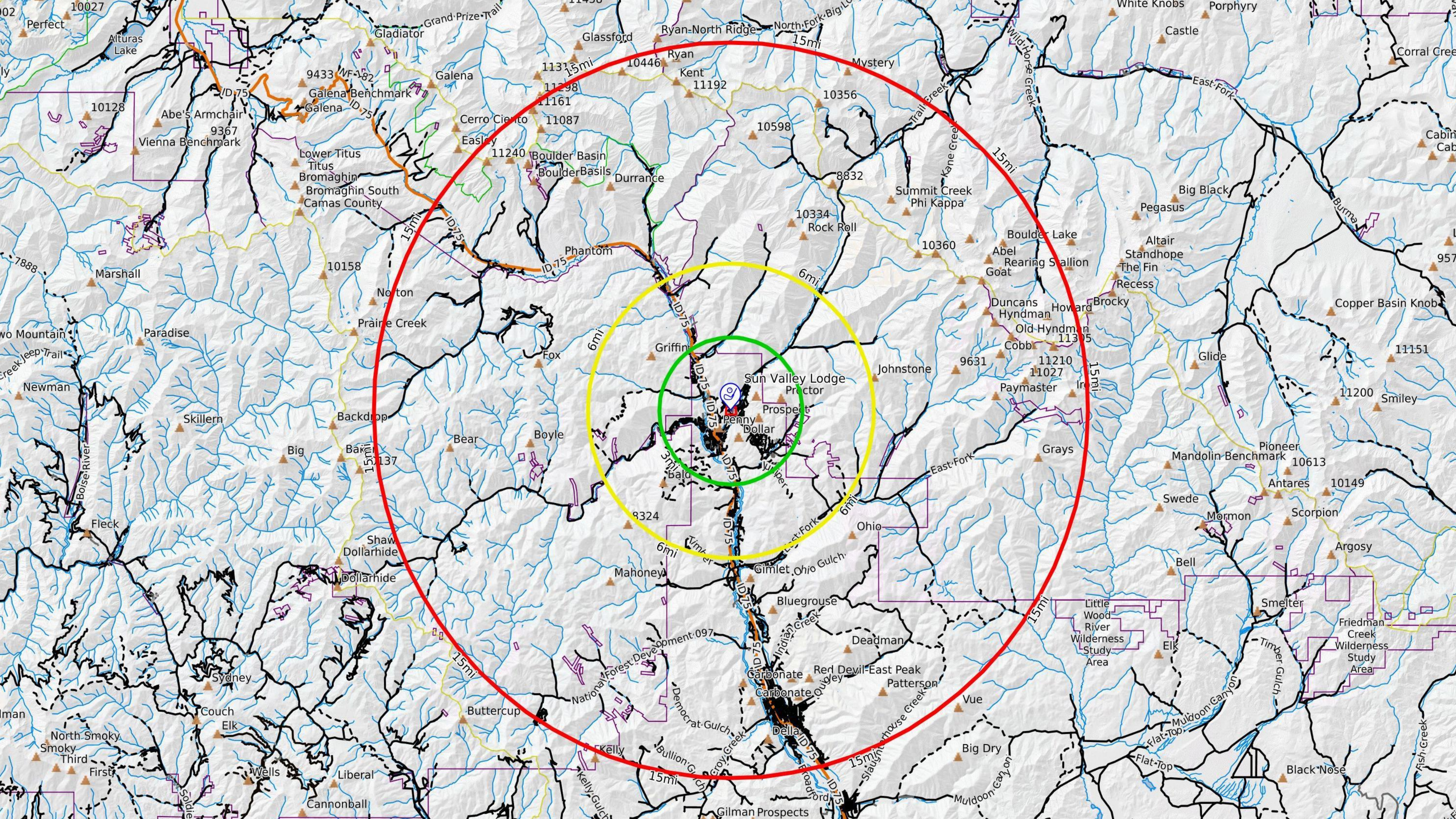
Why Is Search Hard?

- The average walking speed for adults is between 2.5-4 miles per hour

- 1hr: 3mi^{r} 28mi^{2}
  - 7,920ac = 224 ground teams
- 2hr: 6mi^{r} 113mi^{2}
  - 72,320ac = 904 ground teams
- 5hr: 15mi^{r} 706 mi^{2}
  - 451,840ac = 5,648 ground teams




Sun Valley Lodge
Sun Valley Road
Inn Service Road
Inn Entry Lane
Moritz Road
Mall Lane
Kitzbuhler Strasse
ID 75 Spur
Boardwalk Mall
Opera House
Sun Valley Inn Swimming Pool
Olympic Pool
Wildflower Condo Drive
Lodge Entry Lane
Sun Valley Condo Drive
Sun Valley Resort
Lodge Swimming Pool
Baldy View Loop
Old Dollar Road
West Lake Road
Sun Valley Sand Beach Volleyball Court
Sun Valley Outdoor Ice Rink
Atelier Condo Drive
Creekside Way
White Cloud Nine



15mi
6mi
3mi
Sun Valley Lodge
Proctor
Penny
Prospect
Dollar
Griffin
Bald
ID 75
Ketchum
Johnstone
Paymaster
Grays
East Fork
Ohio
Ohio Gulch
Gimlet
Bluegrouse
Deadman
Indian Creek
Carbonate
Red Devil-East Peak
Patterson
Quigley
Della
Vue
Big Dry
Slaughterhouse Creek
Broadford
Gilman Prospects
Bullion Gulch
Croy Creek
Democrat Gulch
National Forest Development 097
Kelly
Kelly Gulch
Buttercup
Mahoney
8324
Bear
Boyle
Fox
Backdrop
Baker
11137
Big
Skillern
Newman
Paradise
Prairie Creek
Norton
10158
Marshall
7888
Two Mountain
Creek Jeep Trail
Boise River
Fleck
Shaw
Dollarhide
Sydney
Couch
Elk
North Smoky
Smoky
Third
First
Wells
Liberal
Cannonball
Phantom
Durrance
Basils
Boulder
Boulder Basin
11240
Easley
Cerro Ciento
11087
11161
11298
11311
Glassford
Ryan-North Ridge
Ryan
10446
Kent
11192
Mystery
10356
10598
8832
10334
Rock Roll
Summit Creek
Phi Kappa
Kane Creek
Trail Creek
North Fork Big Lost
Wild Horse Creek
10360
Abel
Rearing Stallion
Goat
Duncans
Hyndman
Old Hyndman
Cobb
9631
11305
11210
11027
Boulder Lake
Altair
Standhope
The Fin
Recess
Brocky
Howard
Pegasus
Big Black
Glide
11151
11200
Smiley
Copper Basin Knob
Pioneer
Mandolin Benchmark
10613
Antares
10149
Scorpion
Swede
Mormon
Argosy
Bell
Smelter
Little Wood River Wilderness Study Area
Friedman Creek Wilderness Study Area
Timber Gulch
Muldoon Canyon
Flat Top
Black Nose
Fish Creek
Corral Creek
Cabin
Burma
East Fork
White Knobs
Porphyry
Castle
Gladiator
Grand Prize Trail
Galena
Galena Benchmark
9433
NF-182
Abe's Armchair
9367
Vienna Benchmark
10128
Lower Titus
Titus
Bromaghin
Bromaghin South
Camas County
Alturas Lake
Perfect
10027

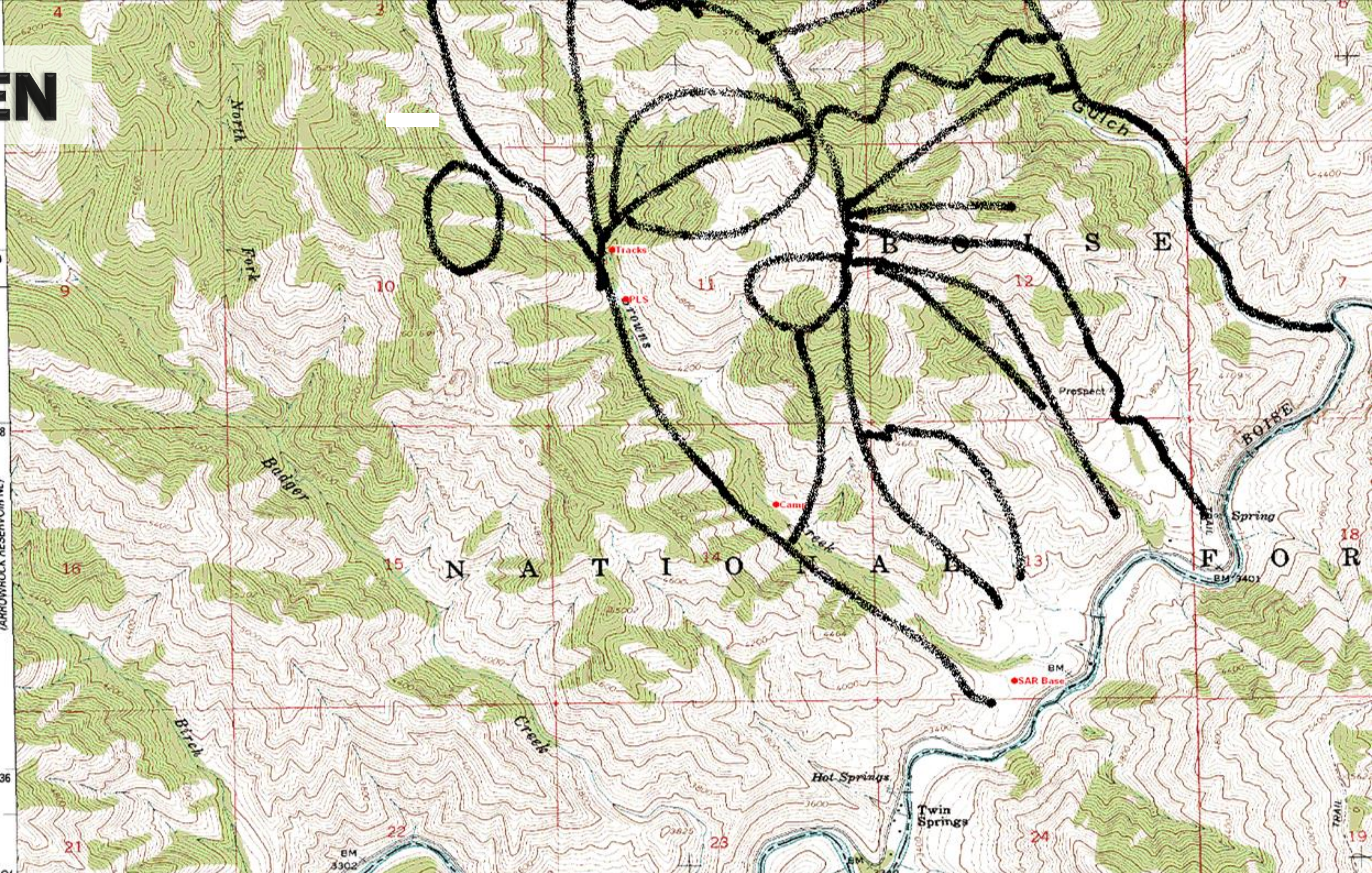
Day 1
November 10th, 2002

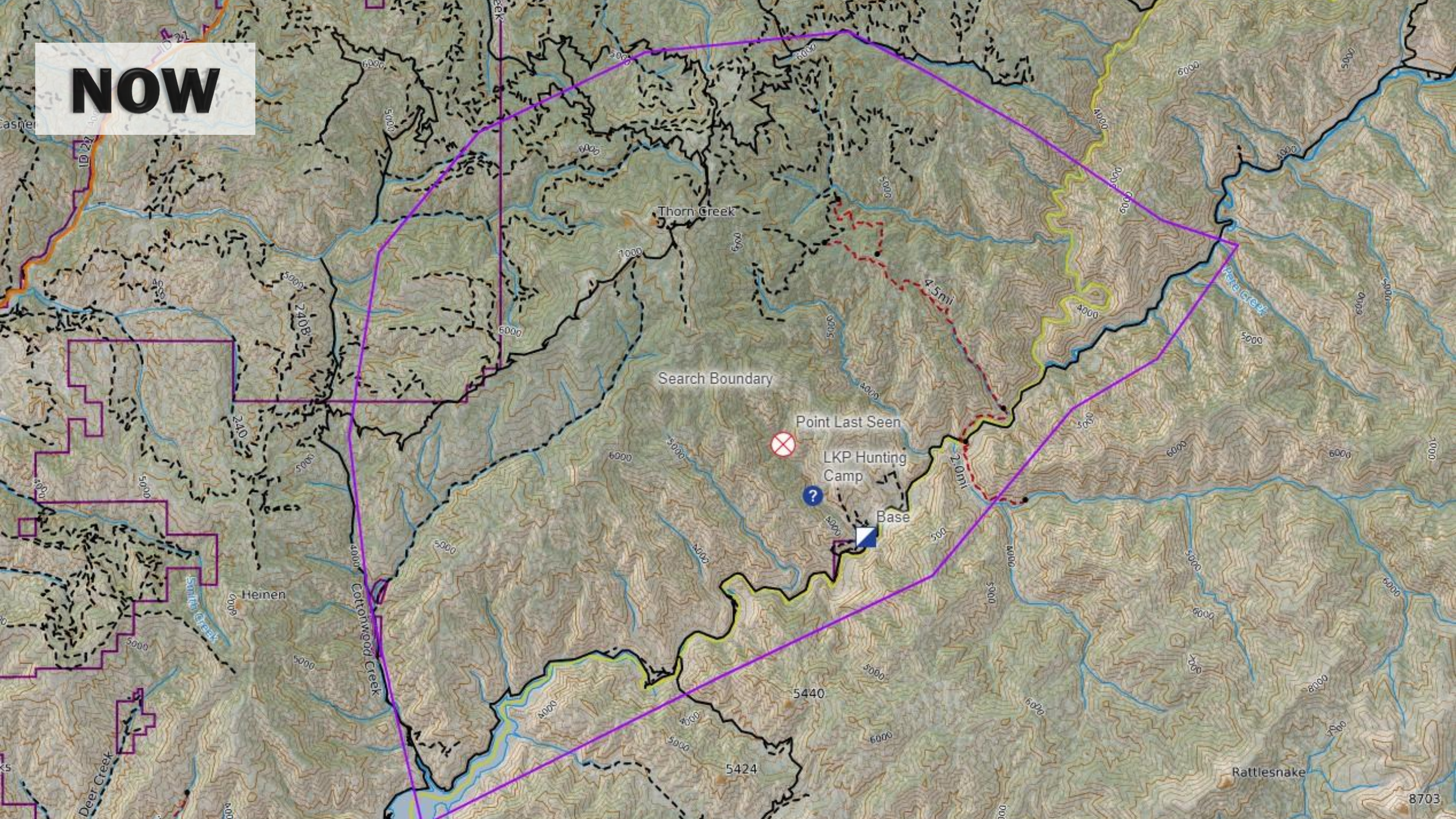
- IMSARU first requested
  - PLS
    - Reported by hunting partner
    - 11T 0603721E 4838933N
  - LKP
    - Camp
    - 11T 0604474E 4837704N

Let's Get This On the Map

- Planning Data
- Search Boundary

THEN

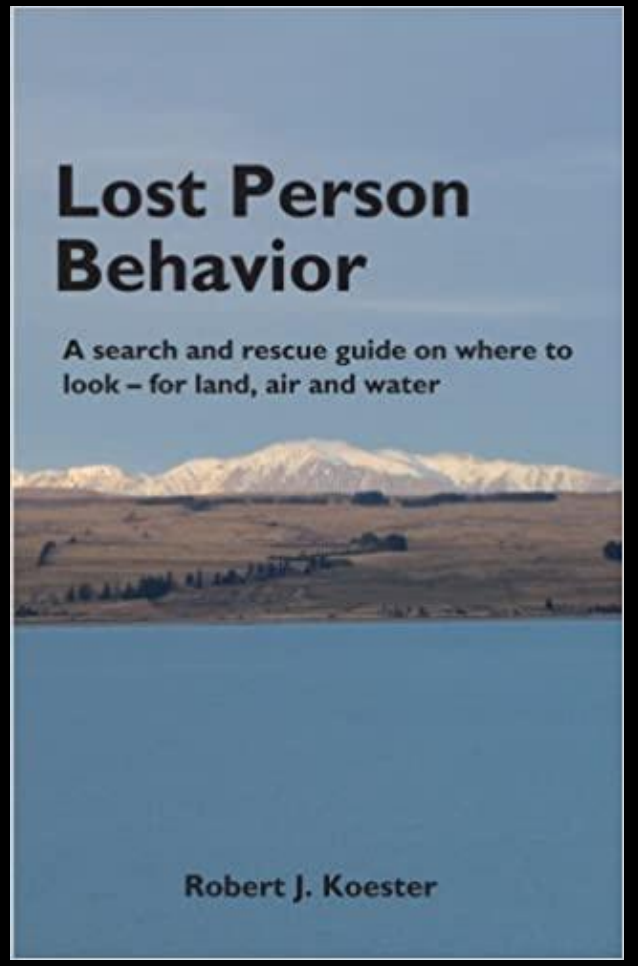

North Fork
Badger Creek
Birch Creek
Gulch
Tracks
PLS
Camp
SAR Base
Prospect
Spring
Hot Springs
Twin Springs
BOISE
NATIONAL
FOR
(ARROWROCK RESERVOIR NE)


NOW
Thorn Creek
4.5mi
Search Boundary
Point Last Seen
LKP Hunting Camp
2.0mi
Base
Heinen
Cottonwood Creek
Deer Creek
5440
5424
Rattlesnake
8703

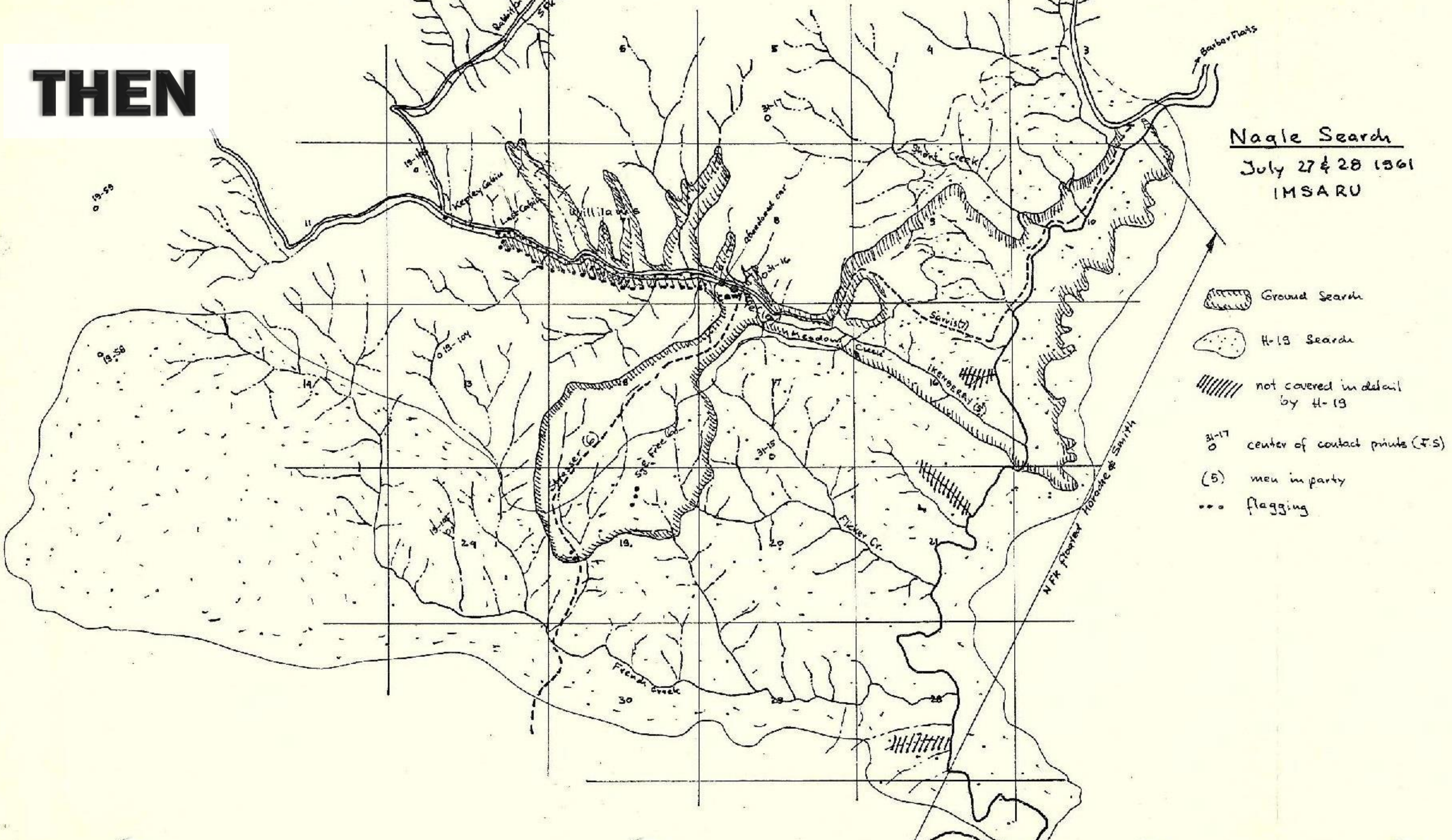
How Can We Narrow This Down?

How Can We Narrow This Down?

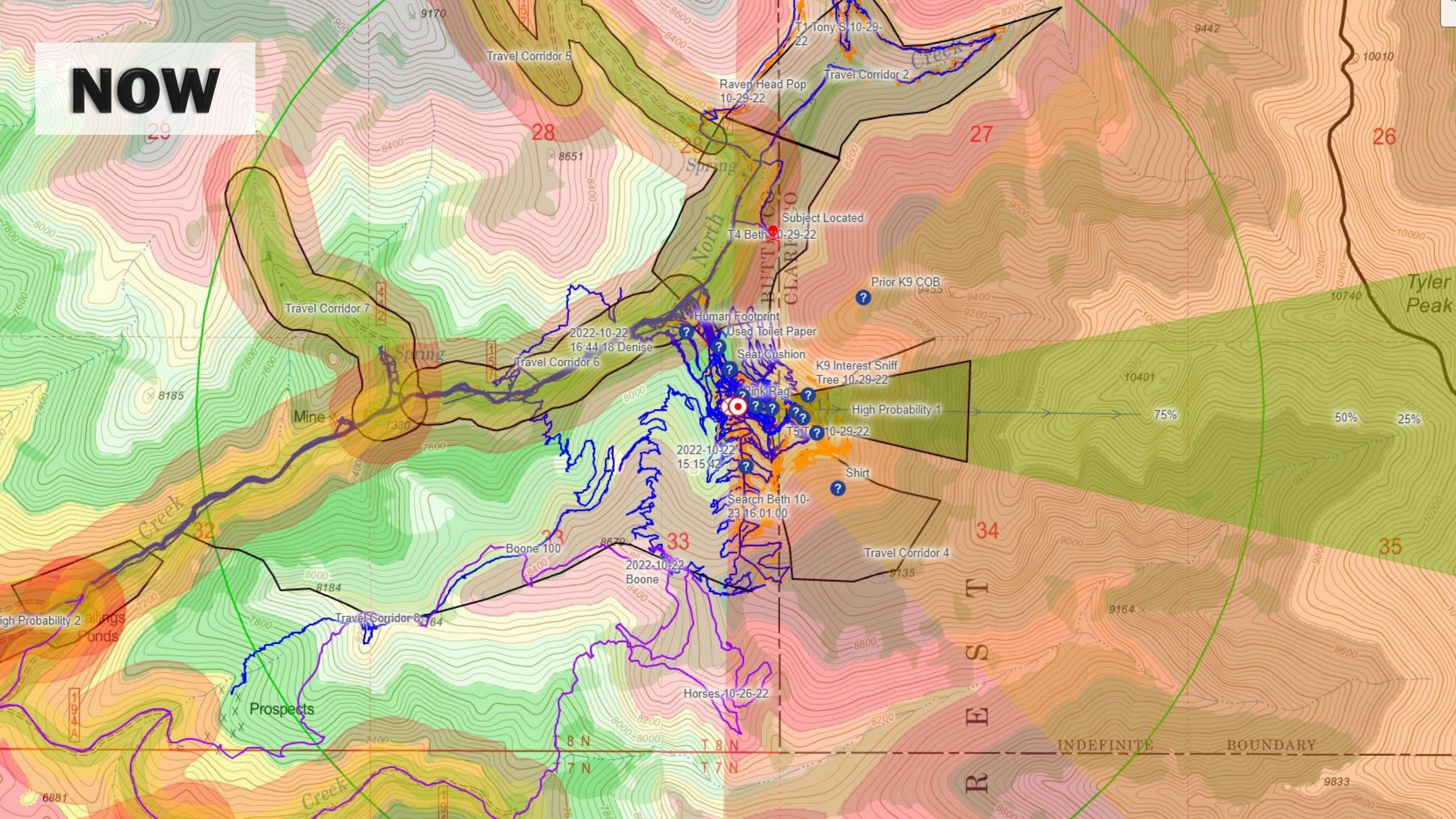
- We use algorithms and statistics
  - This saves lives!



THEN

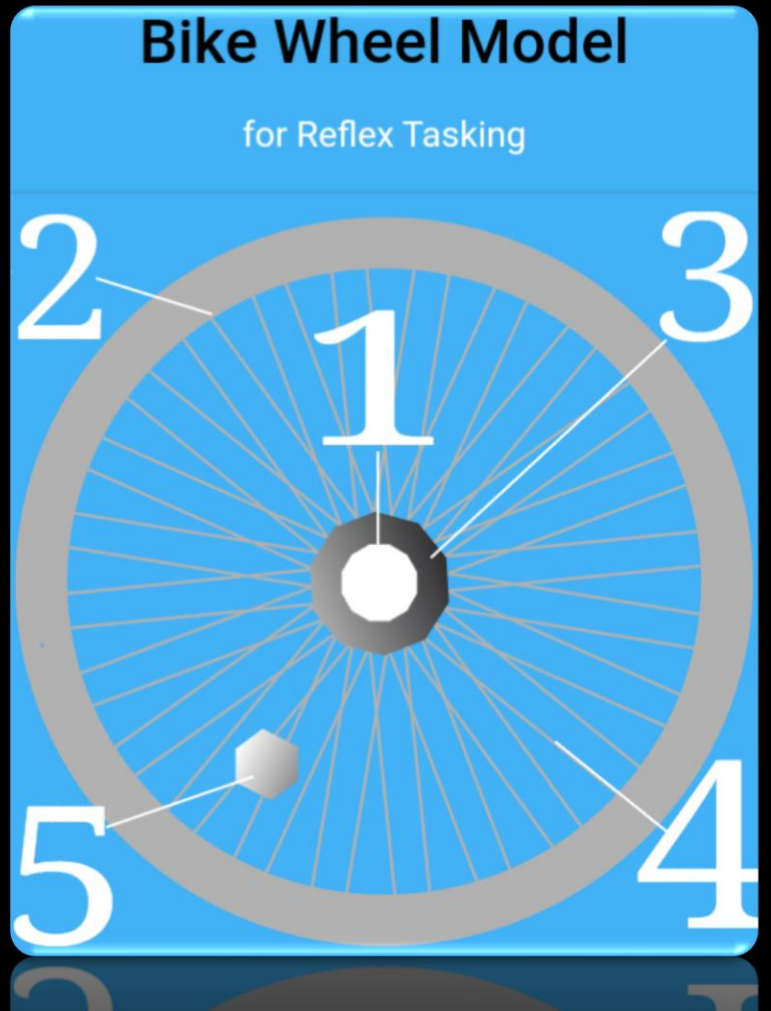


Nagle Search
July 27 & 28 1961
IMSARU
Ground Search
H-19 Search
not covered in detail by H-19
center of contact points (F.S)
(5) men in party
flagging
Barber Flats
Short Creek
Meadow Creek
Flicker Cr.
French Creek
Kepley Cabin
Lost Cabin
Williams
abandoned car


NOW
Travel Corridor 5
T1 Tony S 10-29-22
Travel Corridor 2
Raven Head Pop 10-29-22
Subject Located
T4 Beth 10-29-22
Prior K9 COB
Human Footprint
Used Toilet Paper
Seat Cushion
2022-10-22 16:44:18 Denise
Travel Corridor 6
K9 Interest Sniff Tree 10-29-22
Pink Rag
High Probability 1
75%
50%
25%
T5 T 10-29-22
2022-10-22 15:15:42
Shirt
Search Beth 10-23 16:01:00
Travel Corridor 7
Mine
Boone 100
2022-10-22 Boone
Travel Corridor 4
Travel Corridor 8
Horses 10-26-22
Prospects
Tyler Peak
INDEFINITE BOUNDARY
T 8 N
T 7 N
R E S T

Where Do We Send Our Teams?

- Reflex Tasks (in order of priority)
  - Investigation
  - Initial Planning Point
  - Containment
  - Hub/Immediate Area
  - Travel Corridors
  - High Probability Tasks



Day 2
November 11th, 2002

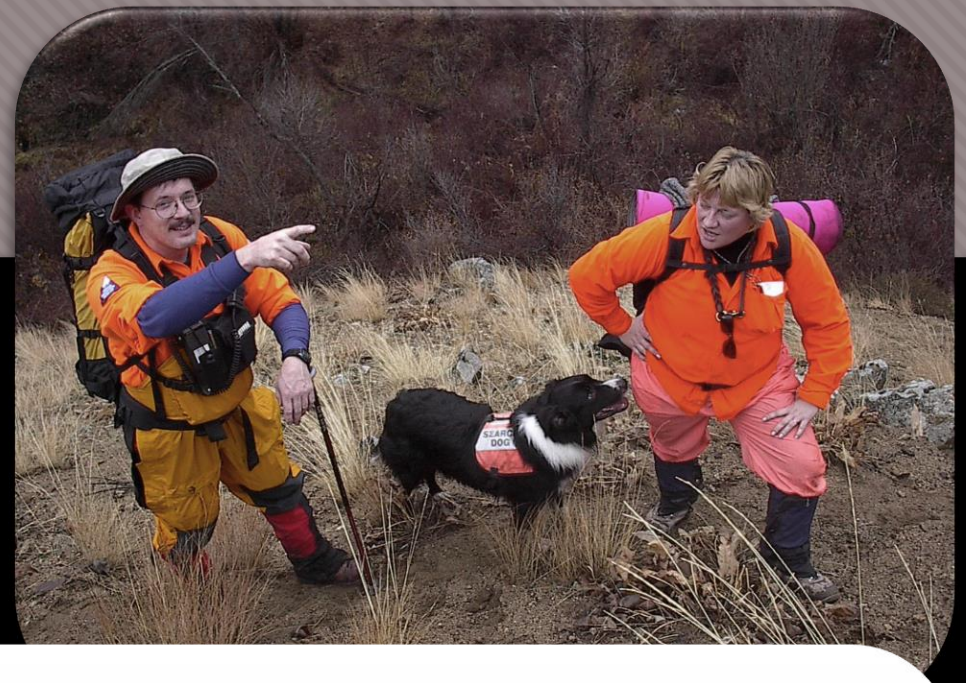
- Search efforts continue
- No significant clues found

Specialized Search "Sensors"

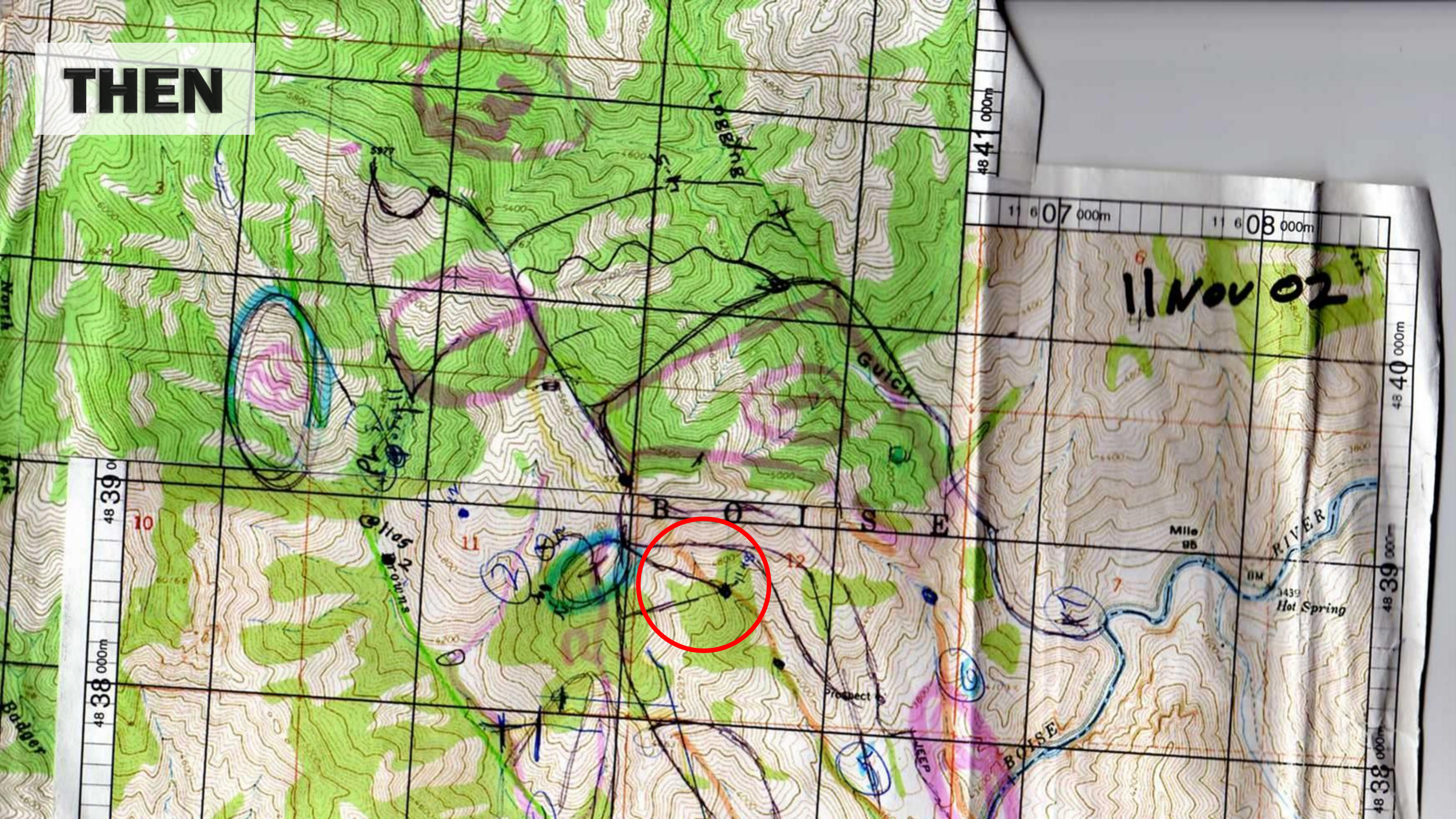
- K9 Teams
- Aircraft
- UAS
- Thermal/Optics
- Tracking Teams
- Mountain Bike Teams
- Radar/sonar
- etc…

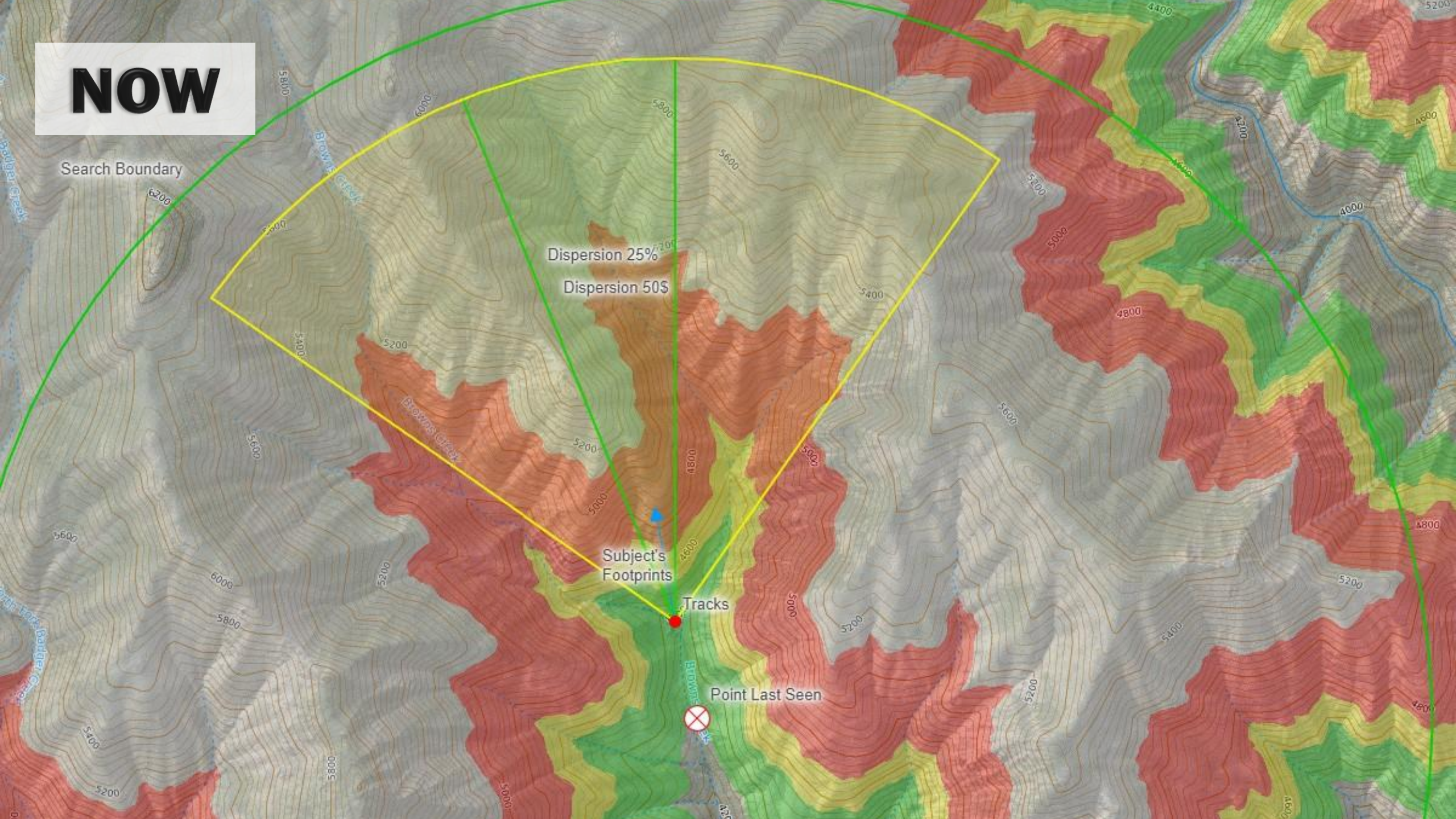
Day 3
November 12th, 2002

- Trackers believe they have located subject's tracks



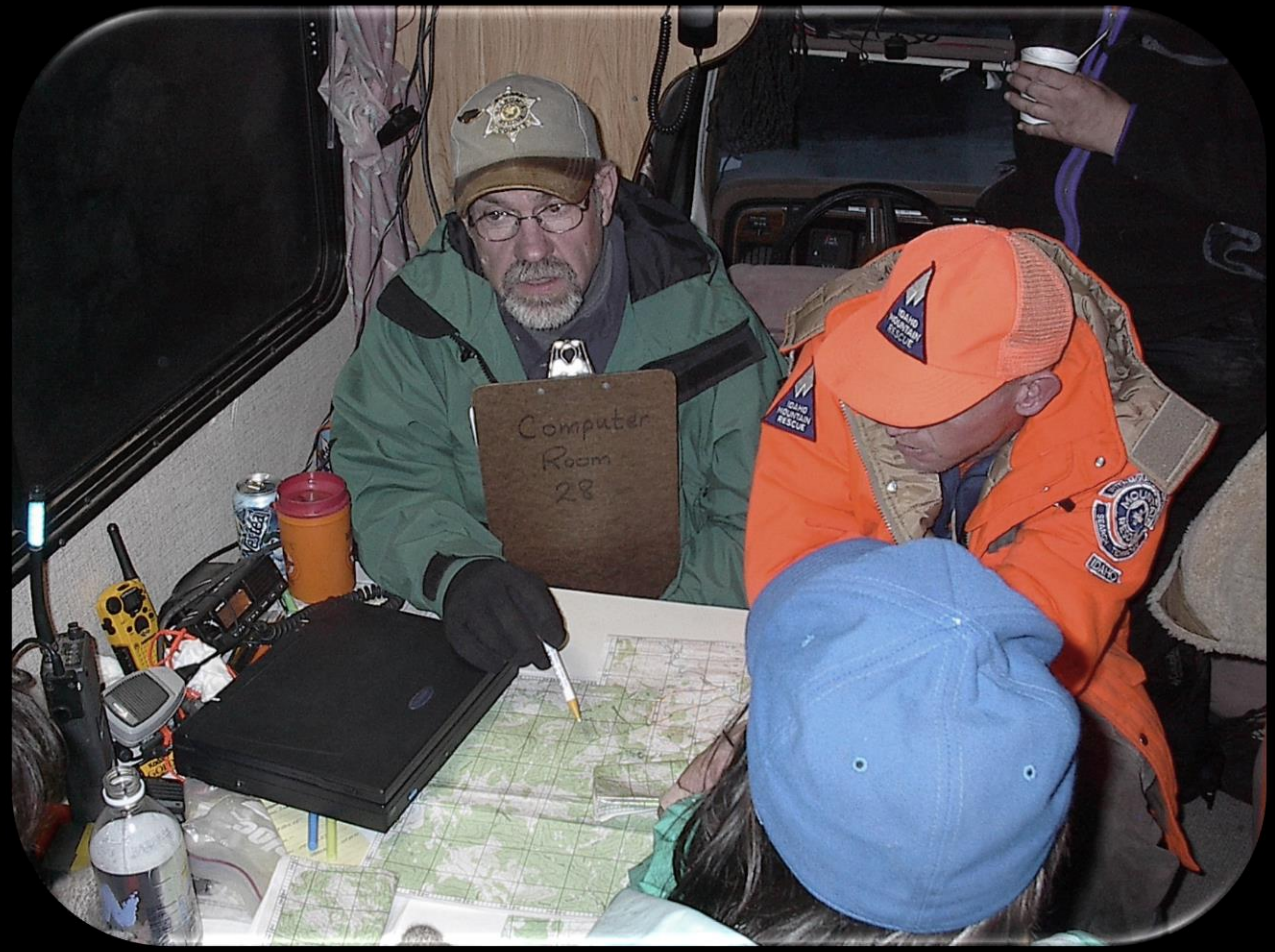
How Can We Use Data To Make Decisions?


THEN
11 NOV 02
B O I S E
RIVER
BOISE
Gulch
Mile
95
Hot Spring
Prospect
JEEP
Badger
North
Fork
11 6 07 000m
11 6 08 000m
48 41 000m
48 40 000m
48 39
48 38 000m
5977
10
11
12
7
6


NOW
Search Boundary
Dispersion 25%
Dispersion 50$
Subject's
Footprints
Tracks
Point Last Seen

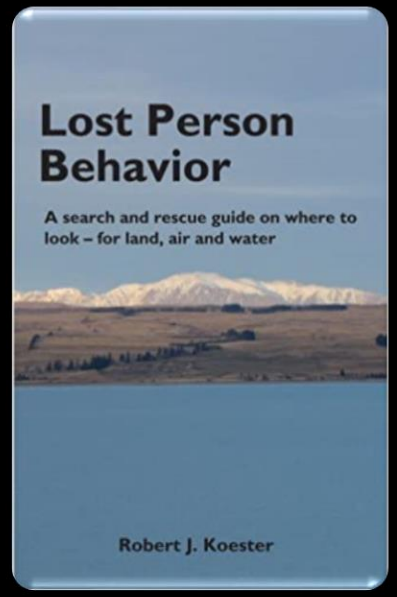
Day 4
November 13th, 2002

- No new clues

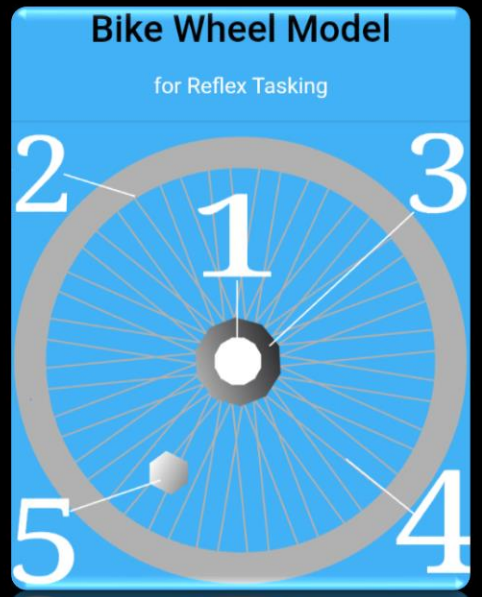


Lost Person Behavior & Reflex Tasking Success Rate? – Poll Question

Lost Person Behavior Data



+



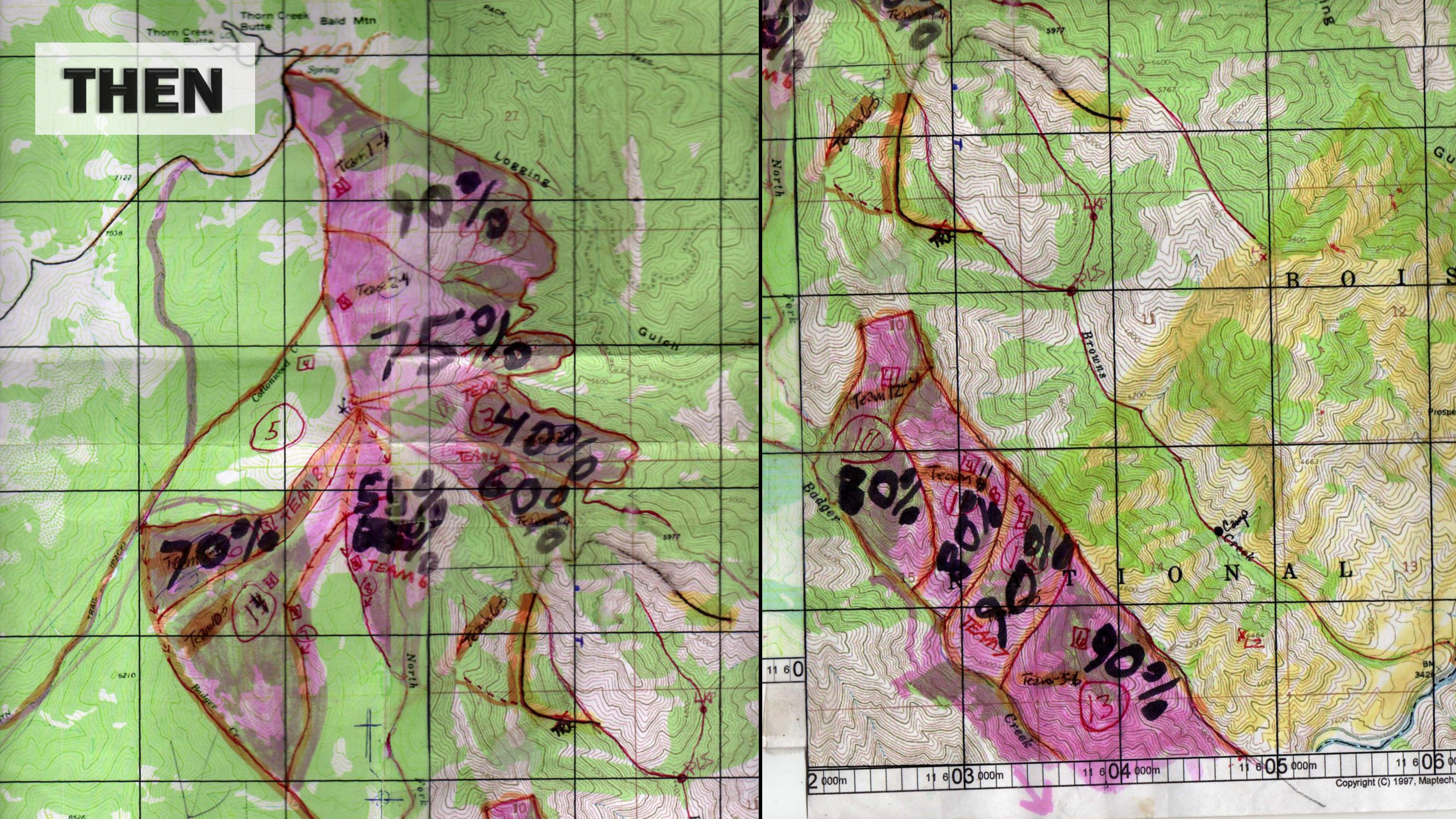
=

92% success rate

What Do We Do For The 8%?

What Do We Do for the 8%?

- What about the 8%?
  - This is where search theory revs up!
- POA x POD = POS
  - All are calculated values
  - Used predictively, retroactively, and in the midst of a search


THEN
Thorn Creek Butte
Thorn Creek Butte
Bald Mtn
Logging
Gulch
90%
75%
40%
60%
70%
TEAM 8
TEAM 6
North
Fork
Badger
B O I S
N A T I O N A L
Browns
80%
90%
90%
Creek
Copyright (C) 1997, Maptech

verall Search Area POS	58.37%	ROW Probability	58.37%		
Search 8		Search Area POA	41.63%		
POD	POS	New POA	POS After All Searches	POA After All Searches	Segment Area (ac)	Probability Density
	0.00%	0.60%	0.00%	0.60%	91	0.00006577951021
	0.00%	0.63%	0.00%	0.63%	95	0.00006657644172
	0.00%	0.46%	0.00%	0.46%	81	0.0000571682629
	0.00%	0.05%	0.72%	0.05%	60	0.000007646185445
	0.00%	0.66%	0.00%	0.66%	100	0.00006598196835
	0.00%	0.32%	0.34%	0.32%	97	0.00003265087093
	0.00%	0.26%	0.40%	0.26%	107	0.00002408740852
	0.00%	0.23%	0.43%	0.23%	79	0.00002927859296
	0.00%	0.62%	0.00%	0.62%	98	0.0000634117392
	0.00%	0.66%	0.07%	0.66%	89	0.00007421858311
	0.00%	0.29%	0.06%	0.29%	138	0.00002093168159
	0.00%	0.53%	0.59%	0.53%	96	0.00005539046318
	0.00%	0.69%	0.53%	0.69%	90	0.00007656004798
	0.00%	1.20%	0.25%	1.20%	100	0.0001200620089
	0.00%	1.41%	0.17%	1.41%	100	0.0001410674882
	0.00%	1.58%	0.00%	1.58%	92	0.0001718223065
	0.00%	1.36%	0.26%	1.36%	88	0.000154188636
	0.00%	1.23%	0.46%	1.23%	98	0.0001259766741
	0.00%	1.76%	0.00%	1.76%	104	0.0001689869552
	0.00%	1.57%	0.52%	1.57%	98	0.0001598120266
	0.00%	1.61%	1.37%	1.61%	92	0.0001749821909
	0.00%	1.26%	2.02%	1.26%	96	0.0001316692414
	0.00%	1.49%	2.72%	1.49%	98	0.0001518370999
	0.00%	0.70%	4.40%	0.70%	93	0.00007504612997
	0.00%	0.06%	4.46%	0.06%	109	0.000005777729009
	0.00%	0.24%	4.06%	0.24%	108	0.00002229822668
	0.00%	0.28%	3.54%	0.28%	88	0.00003127961106
	0.00%	2.14%	2.19%	2.14%	91	0.0002346513743
	0.00%	0.31%	1.42%	0.31%	104	0.00002989572872
	0.00%	1.24%	0.28%	1.24%	98	0.0001269343466
	0.00%	1.01%	0.29%	1.01%	102	0.00009869493593
	0.00%	1.03%	0.07%	1.03%	115	0.00008994244188
	0.00%	1.01%	0.00%	1.01%	110	0.00009189050026
	0.00%	0.55%	0.29%	0.55%	99	0.00005524431064

Day 6
November 15th, 2002

- Possible sighting

Why Is Search Hard?

- Search sensors can miss their targets

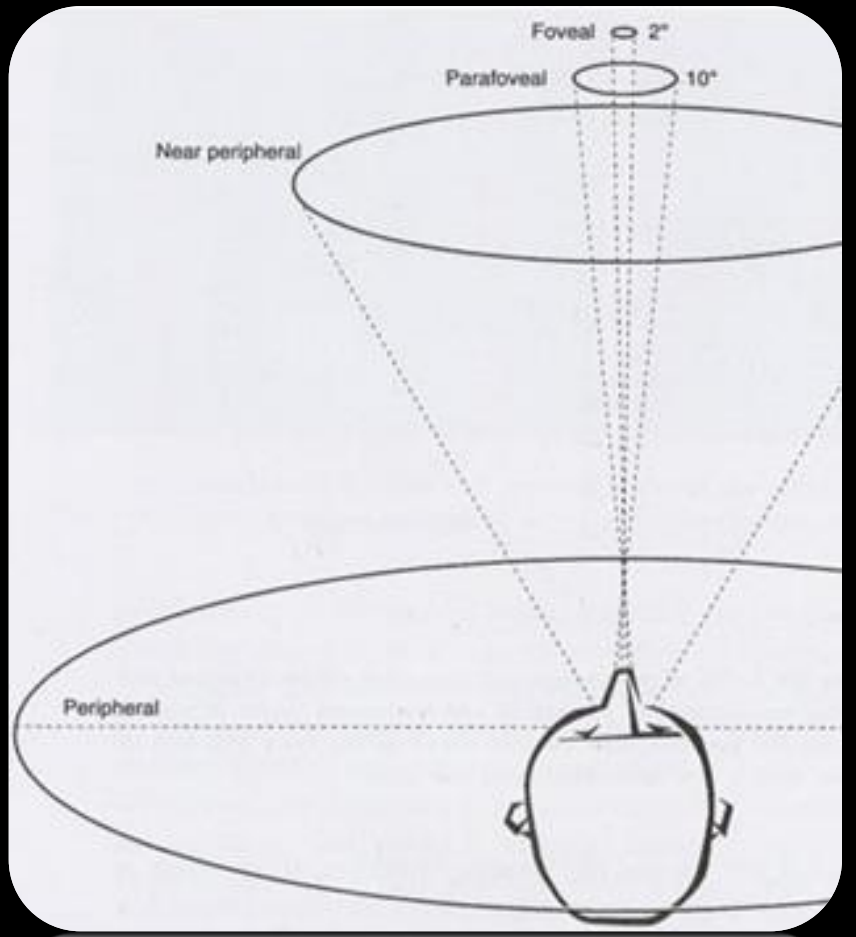
How Do We Optimize Our “Sensors”?

How Do We Optimize Our "Sensors"?

Foveal field of vision test

How Do We Optimize Our "Sensors"?

- Normal field of vision
  - About 135° vertically, and 160° horizontally
- Foveal field of vision
  - Cone shaped area of only about 1-2°
  - Only the fovea is able to see clear, sharp, focused images
  - Outside of a 10° cone, your perception reduces by 90%!



How Do We Optimize Our "Sensors"?

- What this means
  - DO NOT search in a moving/sweeping/scanning fashion
- DO
  - Take visual, focused snapshots as you search
    - About the size of your fist held in front of you
  - Regularly take a second look

IDAHO MOUNTAIN RESCUE

“Programming”


Paseo De Las
Americas
FedEx
Freight
fedex.com


Paseo De Las
Americas
FedEx
Freight
fedex.com

Day 7
November 16th, 2002

- Search efforts scaled back with no new developments

What Do We All Have That Russell Didn't?

Technology and Intelligence

- Interviews/Investigation
- Cellphone Forensics
- SMS Locators
- Social Media
- Satellite Communicators/PLBs
- Video Canvasing

Day 8
November 17th, 2002

- All formal search efforts suspended
  - No additional clues or information found
  - Total person hours: 2573
  - Aircraft hours: 19.1
  - Miles driven: 5754
  - Estimated cost: $138,450.75

Suspending a Search

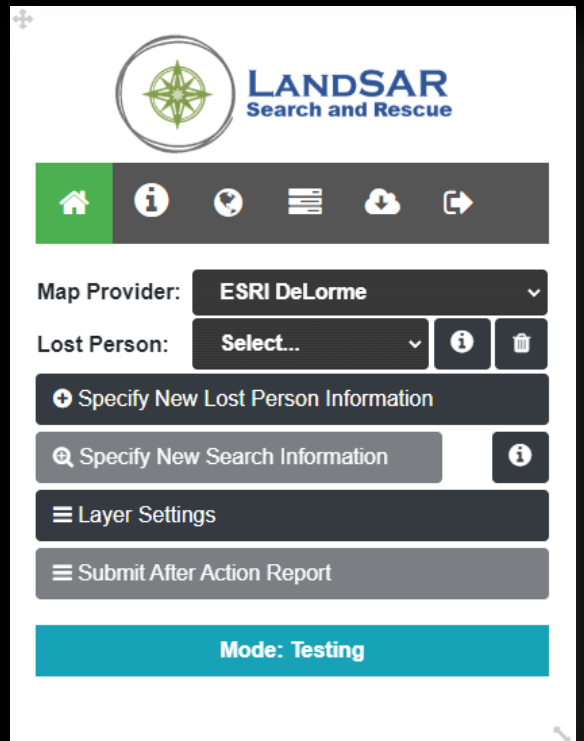
- One of the hardest decisions SAR leaders are tasked with
- Should not be made by one person
  - Calculate return on investment
  - Consensus process can be used to suspend
- Use a variety of input and factors

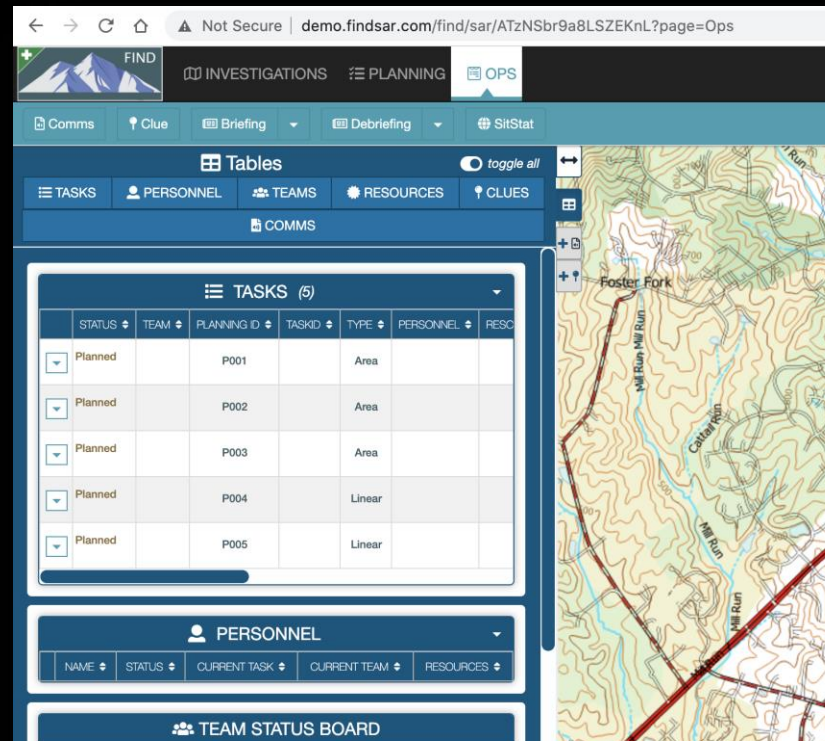
Suspending a Search

- One of the hardest decisions SAR leaders are tasked with
  - Considerations
    - Return on effort
    - Chance of finding a viable subject
    - All resorbable scenarios searched/ re-searched to a reasonable POS?
    - POS of overall efforts
    - Safety- risk vs reward
    - Weather
    - No clues, leads, or additional info developed
    - All known information follow up on

Where Are We Going?

- Satellite Internet
- New ISRID Data
- New Technology
- New Software and Ai





What About Russell Reed?

Day 1824
November 6th, 2007

Idaho Statesman

Remains found last week in Boise County are those of missing Boise man
Dental records positively identify elk hunter who disappeared in 2002.

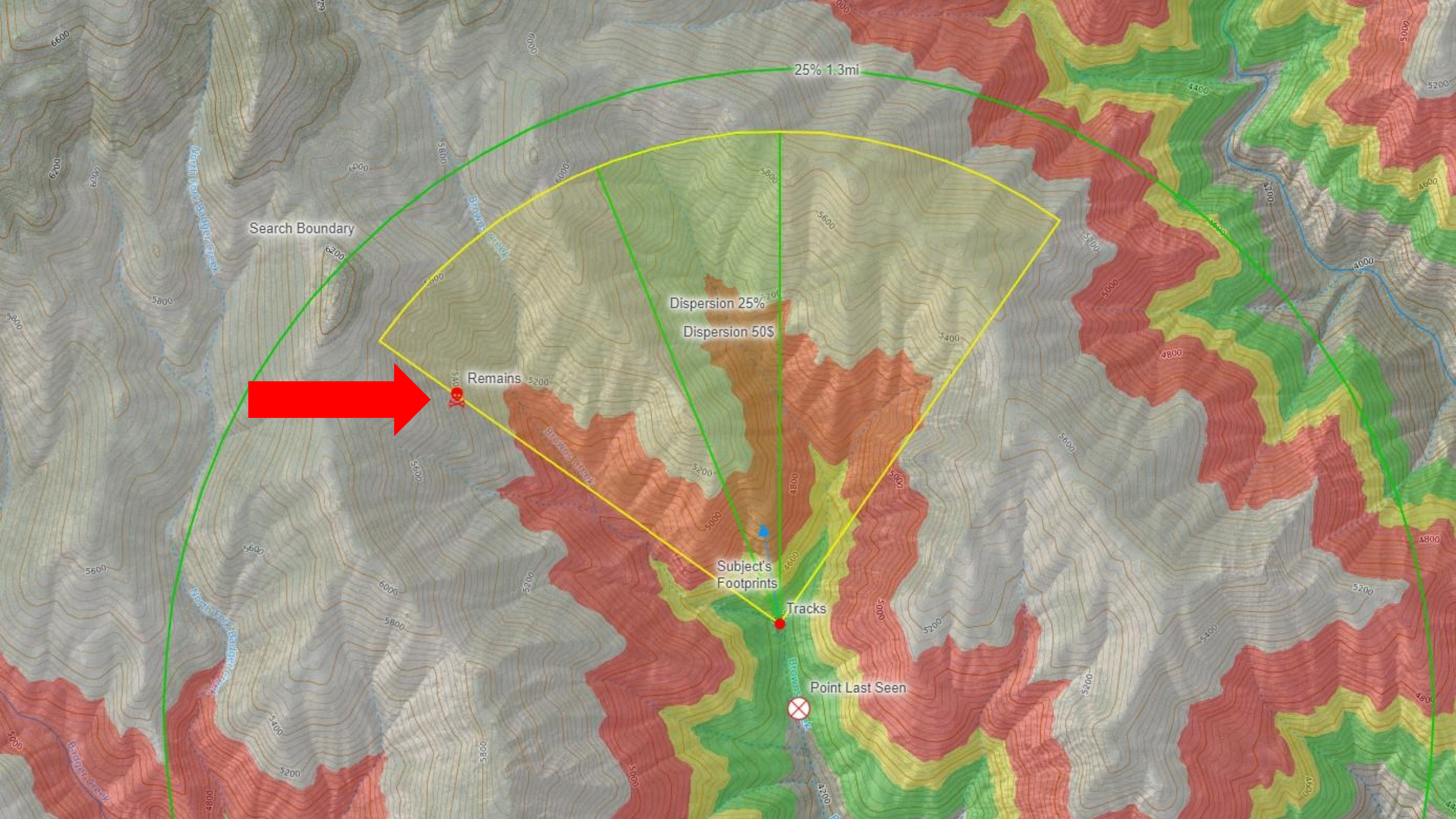
BY PATRICK ORR - porr@idahostatesman.com
Edition Date: 11/16/07

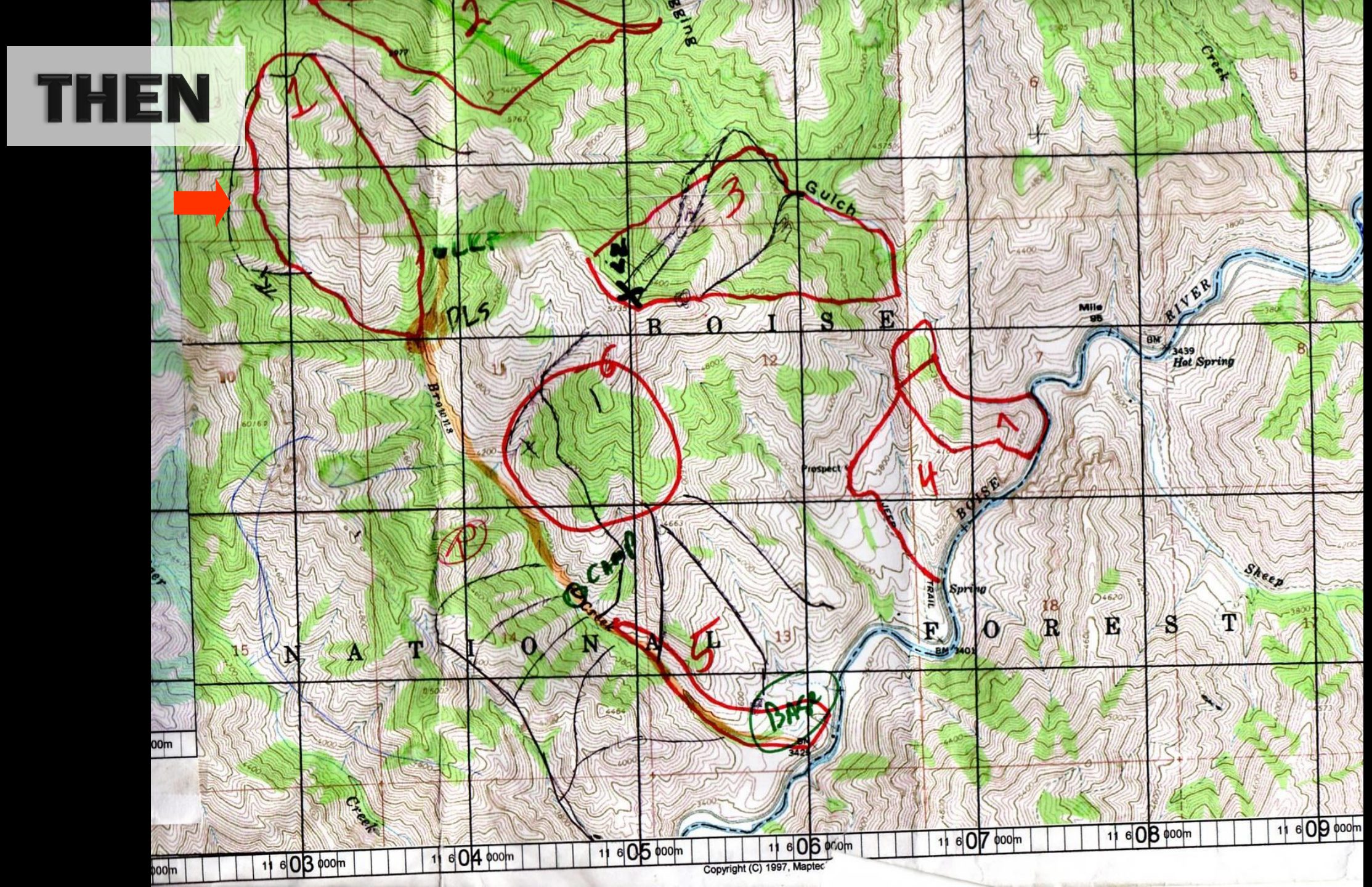
Boise County sheriff's officials identified the human remains found in the Badger Creek area last week as those of missing hunter Russell Reed of Boise.

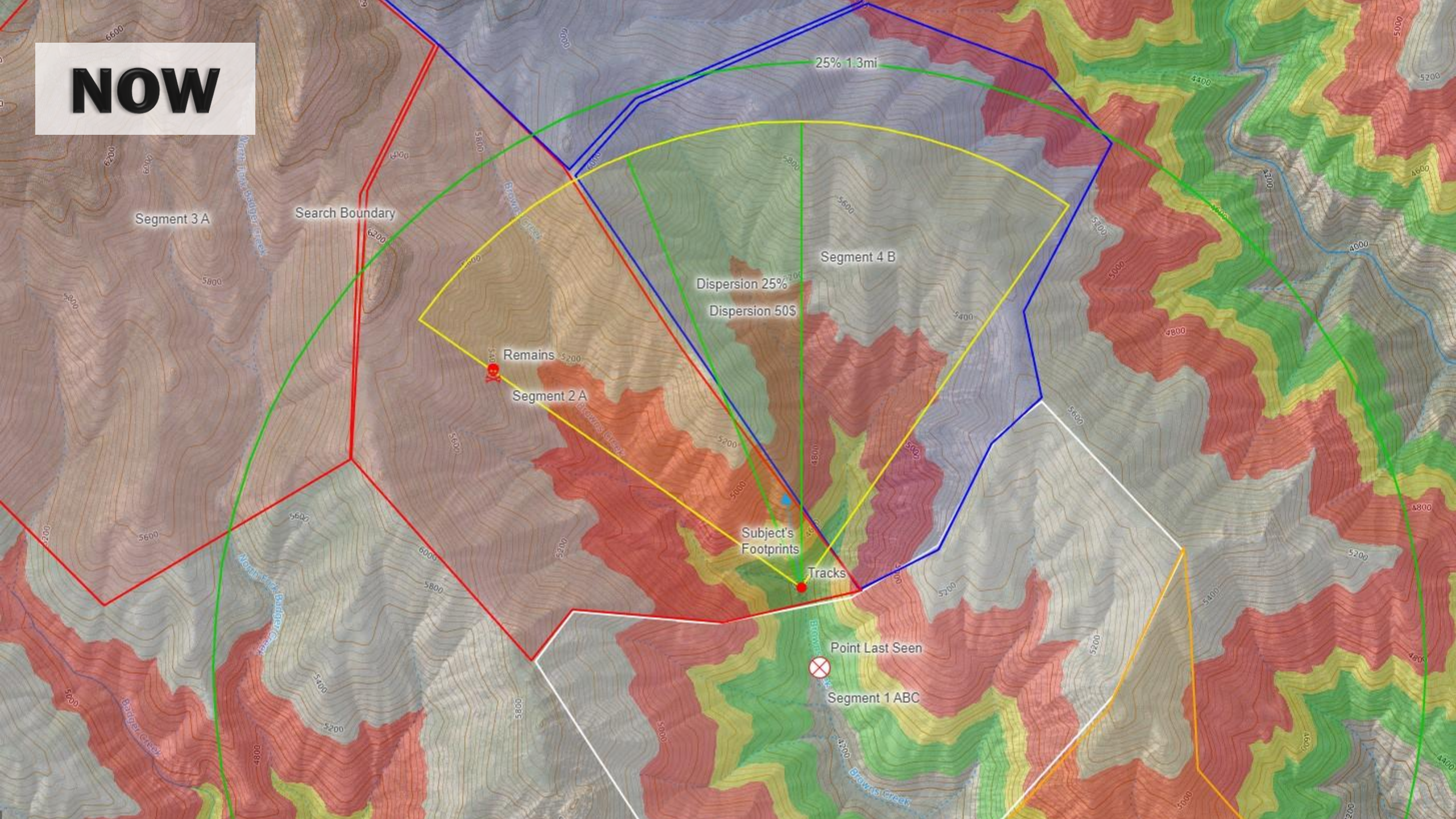
The 28-year-old Reed was last seen Nov. 9, 2002, when he was separated from his two elk hunting partners in the Foothills near Twin Springs in southeastern Boise County.

Reed's fate remained unknown until Thursday, when forensic dental tests on human remains found by a hunter in the Badger Creek area Nov. 6 were positively identified.

Boise County Sheriff Ben Roeber said he was glad to finally be able to provide an answer to Reed's family and friends, many of whom spent several days in 2002 searching the steep, snow-covered


25% 1.3mi
Search Boundary
Dispersion 25%
Dispersion 50$
Remains
Subject's
Footprints
Tracks
Point Last Seen


THEN
1
2
3
4
5
6
7
DLS
BOISE
NATIONAL
FOREST
Gulch
RIVER
Hot Spring
Sheep
Creek
Copyright (C) 1997, Maptec


NOW
25% 1.3mi
Segment 3 A
Search Boundary
Segment 4 B
Dispersion 25%
Dispersion 50$
Remains
Segment 2 A
Subject's
Footprints
Tracks
Point Last Seen
Segment 1 ABC

What We Can Offer

- Activating IMSARU
  - Call Idaho State Communications
  - 208-846-7610

Chris Brookman
cbrookman@imsaru.org
208-761-3390

Alex Deduck
adeduck@imsaru.org
908-447-6473

THANKS FOR WATCHING

IDAHO MOUNTAIN RESCUE

MOUNTAIN RESCUE