This presentation contains unpublished data and should not be cited without author permission.

# Sediment Tracer Studies at Walnut Gulch

Mark Nearing
Akitsu Kimoto
Mary Nichols
Jerry Ritchie
Victor Polyakov

# Tracers

## Objectives:

- Quanitfy erosion rates on hillslopes at Walnut Gulch
- Identify spatial distribution of erosion in small watersheds

## Methods:

- $^{137}Cs$

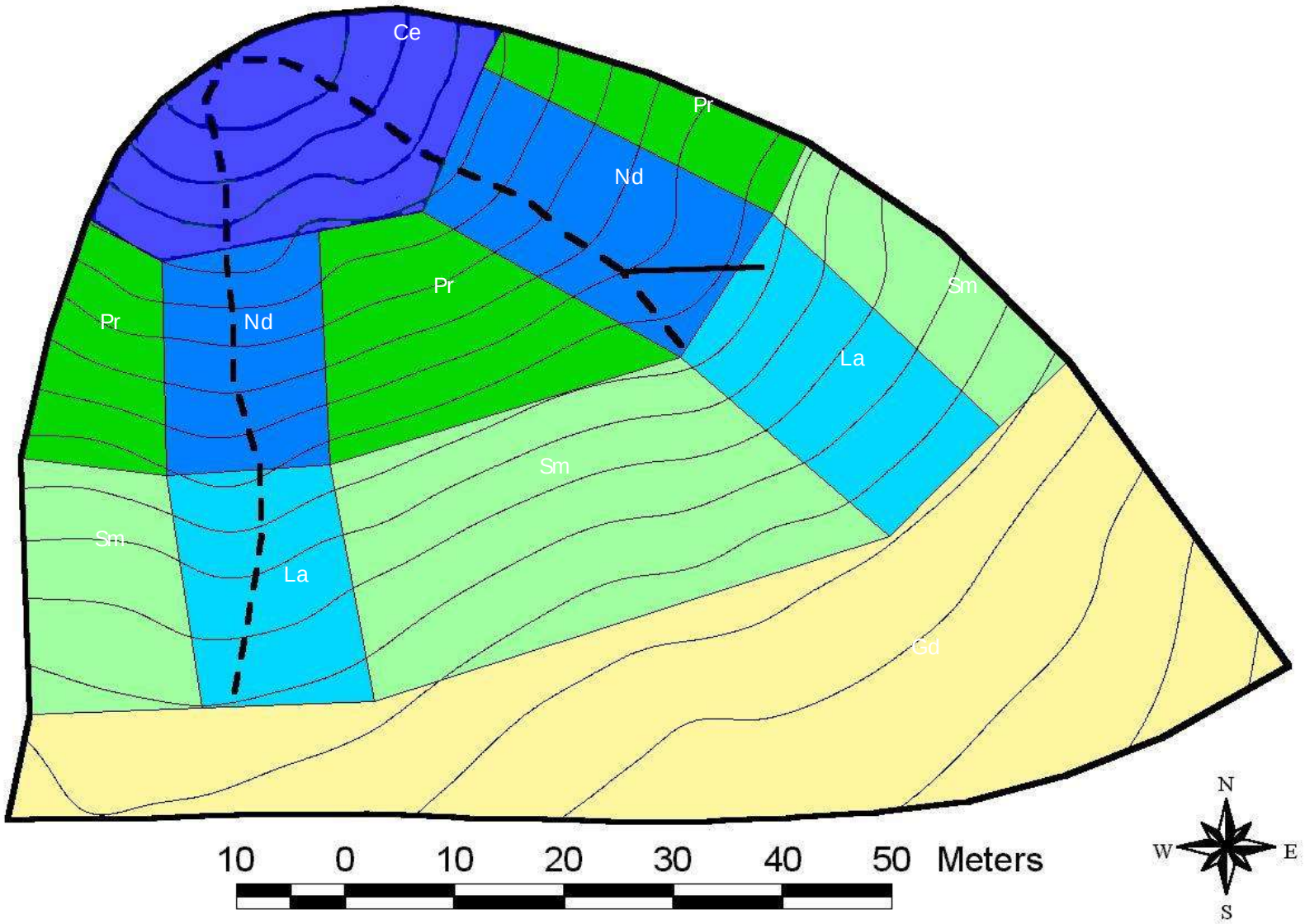
  *Lucky Hills 103, Kendall - with Jerry Ritchie*
- Rare Earth Elements

  *Lucky Hills 106*

Study site: North Appalachian Experimental Watershed, Coshocton, OH
Study period: 5/2/2001 - 11/8/2001
Rainfall: 940 mm/year
Area: 0.68 ha
Soil: Silt loam
Crop: corn, soy bean

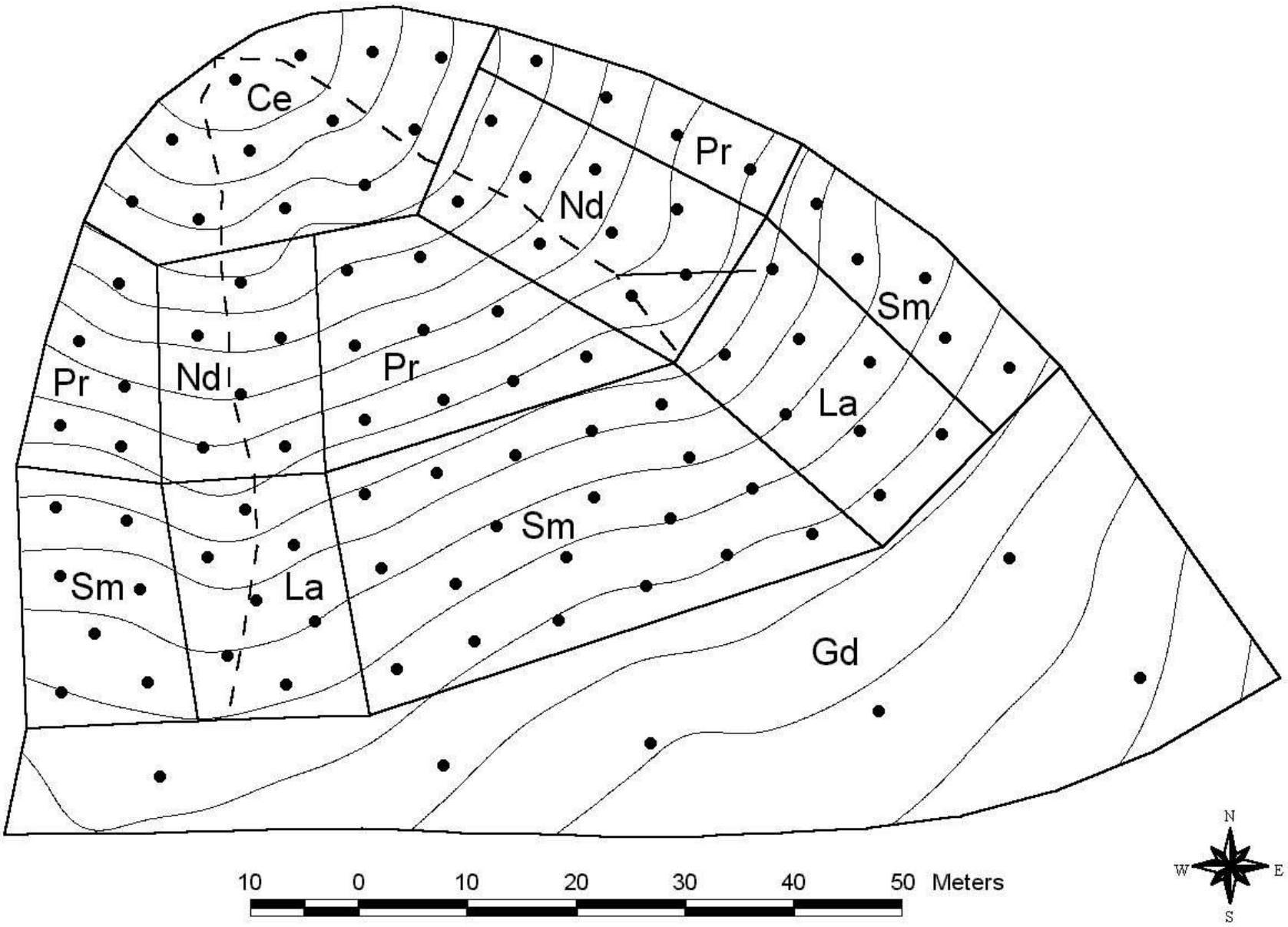
Rare Earth Element (REE) Study

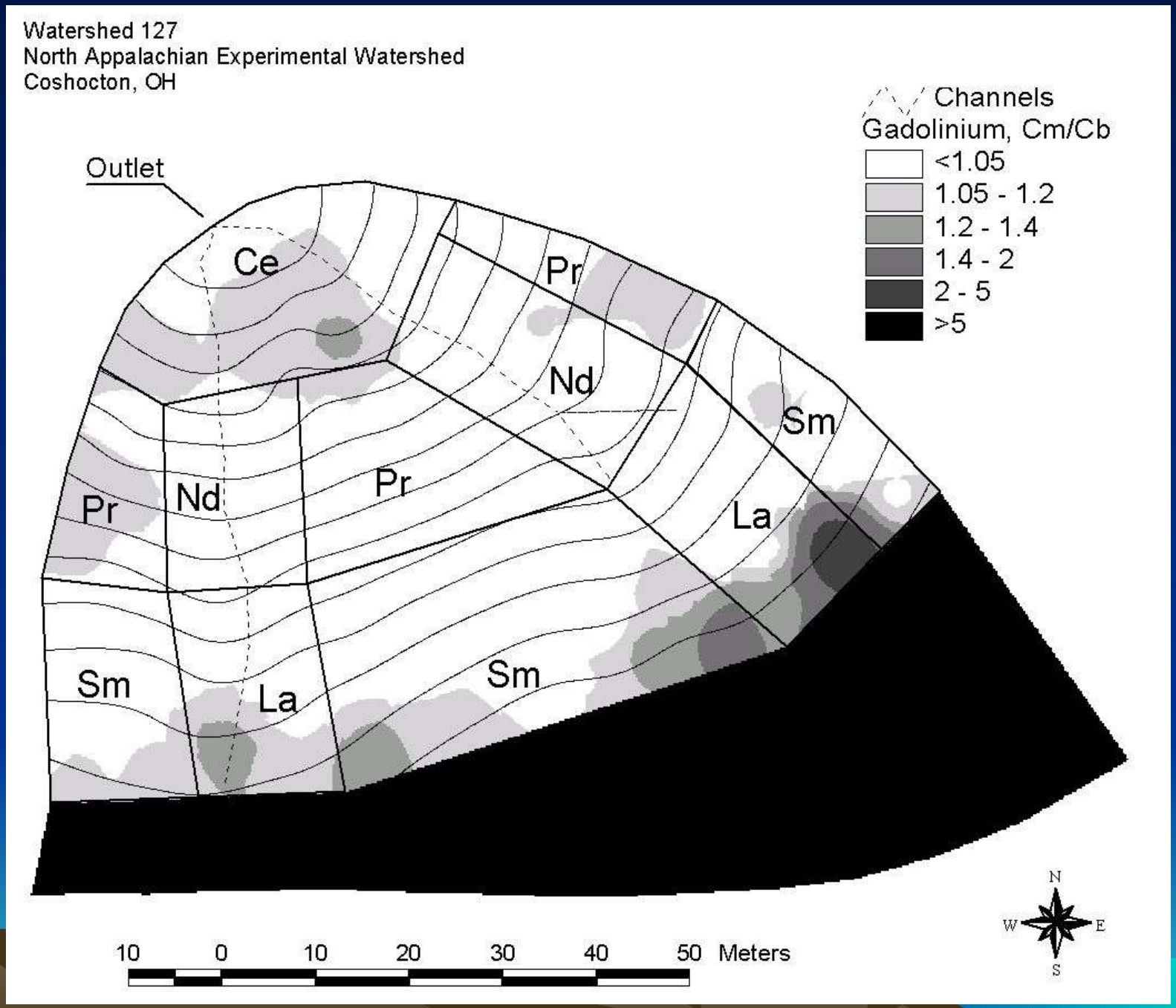
# Watershed 127

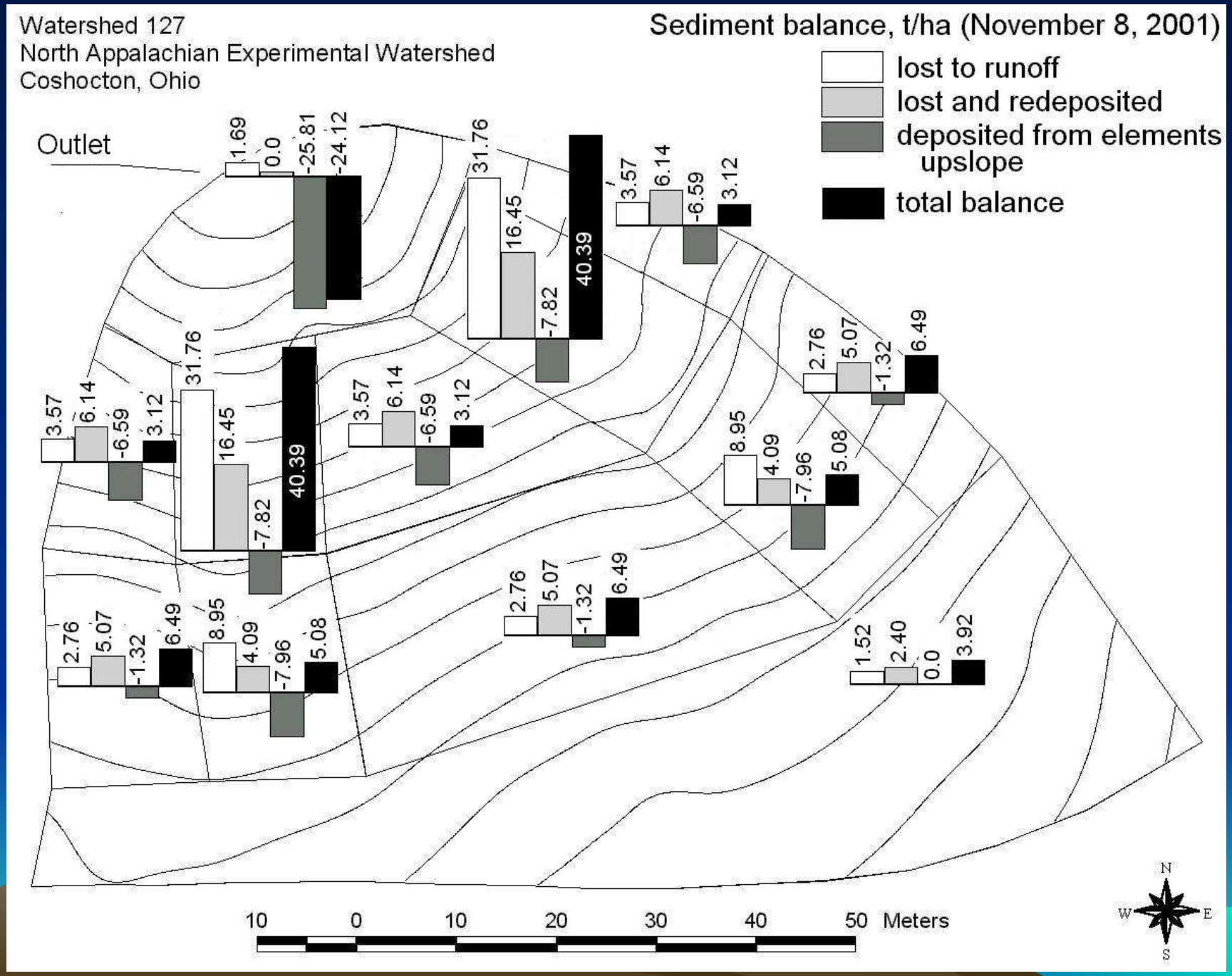


25. 7. 2001 08:56

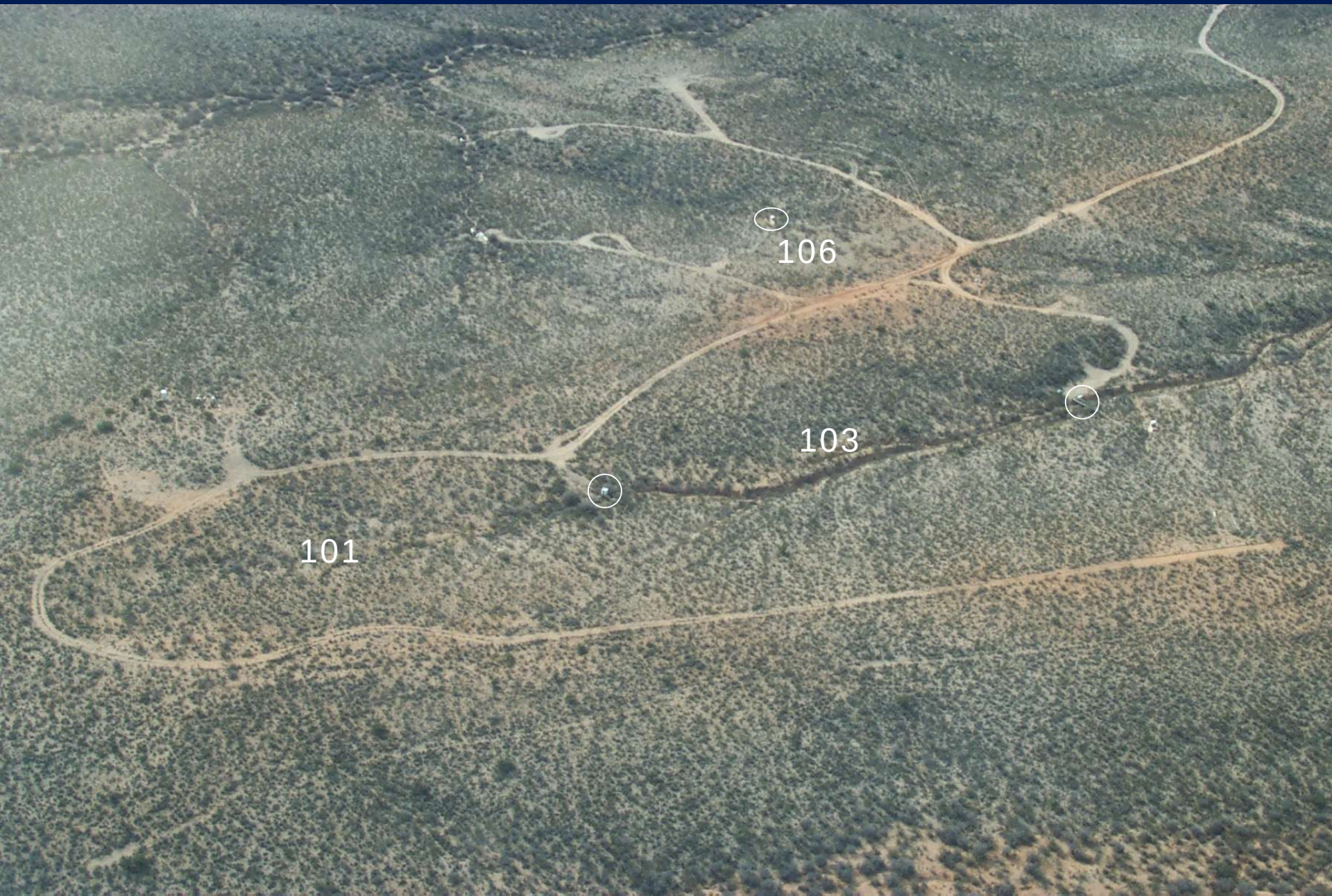
Watershed 127
North Appalachian Experimental Watershed
Coshocton, Ohio




Watershed 127
North Appalachian Experimental Watershed
Coshocton, OH
Channels
Gadolinium, Cm/Cb
<1.05
1.05 - 1.2
1.2 - 1.4
1.4 - 2
2 - 5
>5
Outlet
Ce
Pr
Nd
Sm
Pr
Nd
Pr
La
Sm
La
Sm
10
0
10
20
30
40
50
Meters
N
W
E
S

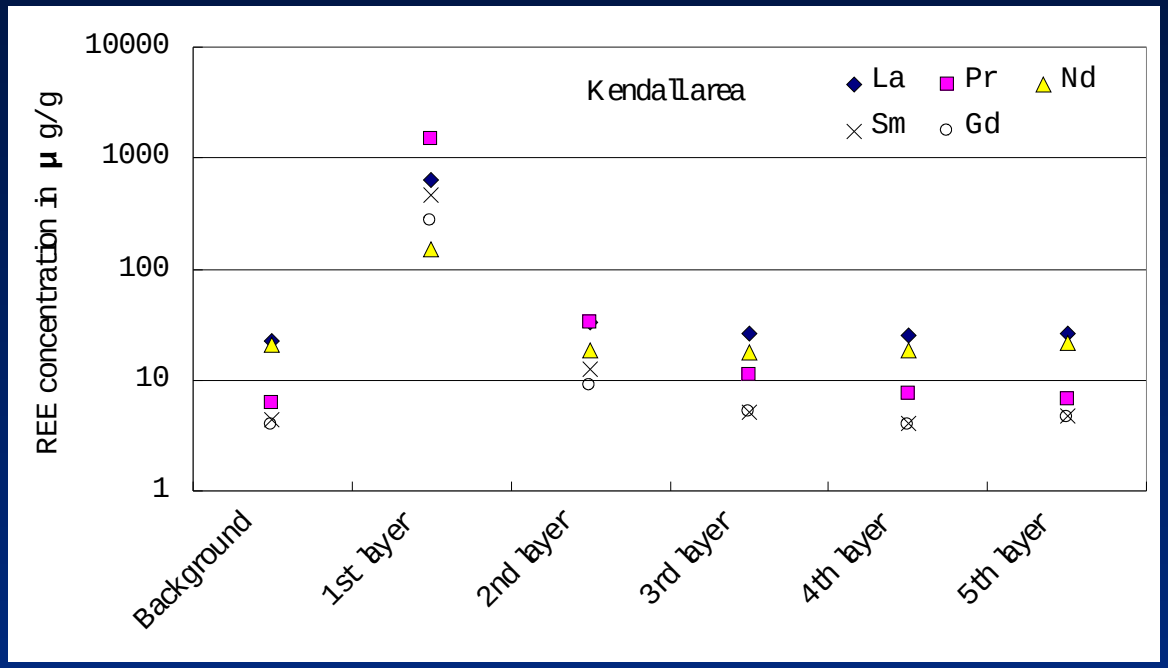

Watershed 127
North Appalachian Experimental Watershed
Coshocton, Ohio
Sediment balance, t/ha (November 8, 2001)
lost to runoff
lost and redeposited
deposited from elements upslope
total balance
Outlet
1.69
0.0
-25.81
-24.12
31.76
16.45
-7.82
40.39
3.57
6.14
-6.59
3.12
2.76
5.07
-1.32
6.49
8.95
4.09
-7.96
5.08
1.52
2.40
0.0
3.92
10
0
10
20
30
40
50
Meters
N
W
E
S

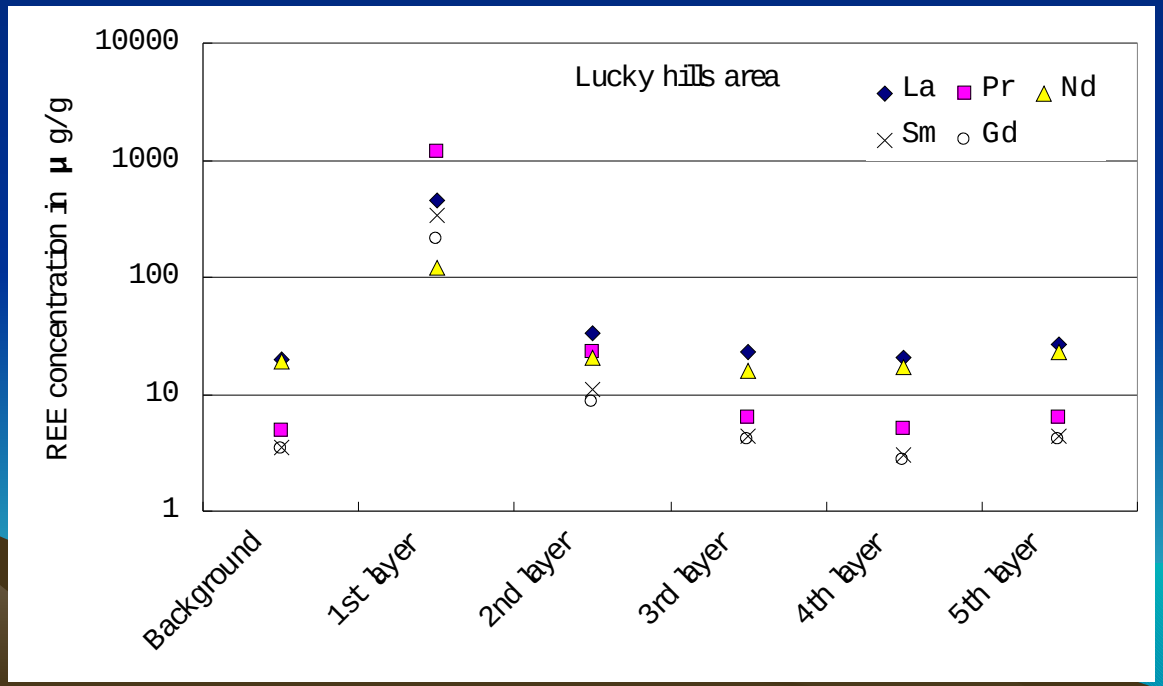
# Lucky Hills 106 – REE Experiment



# Good News

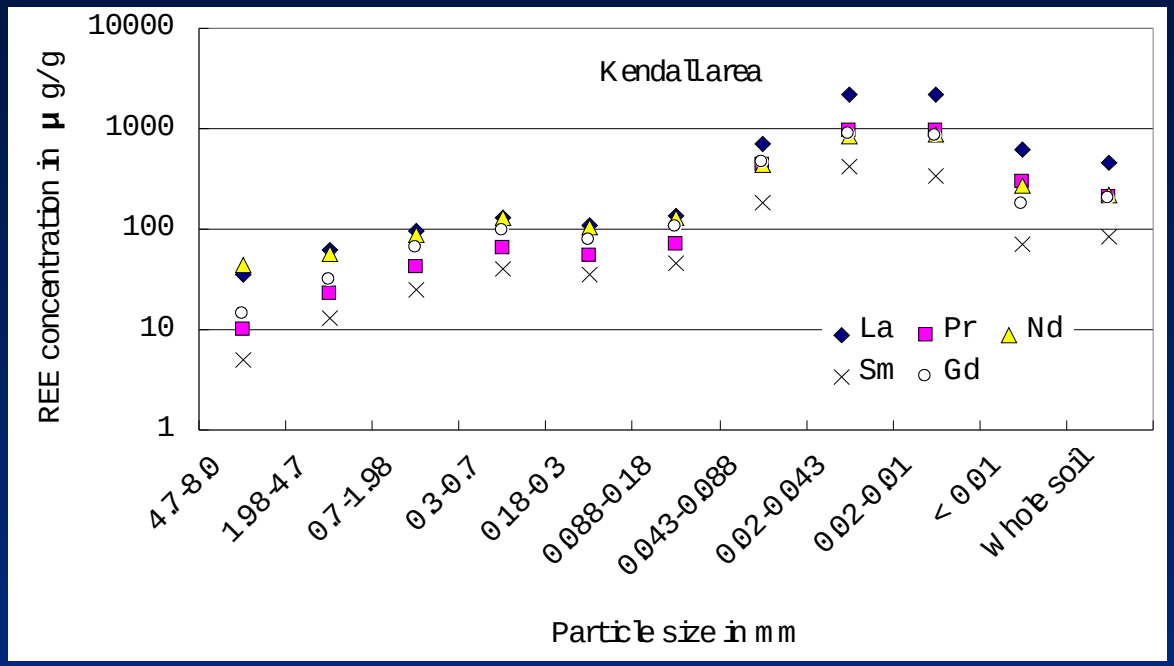
# Doesn't Leach

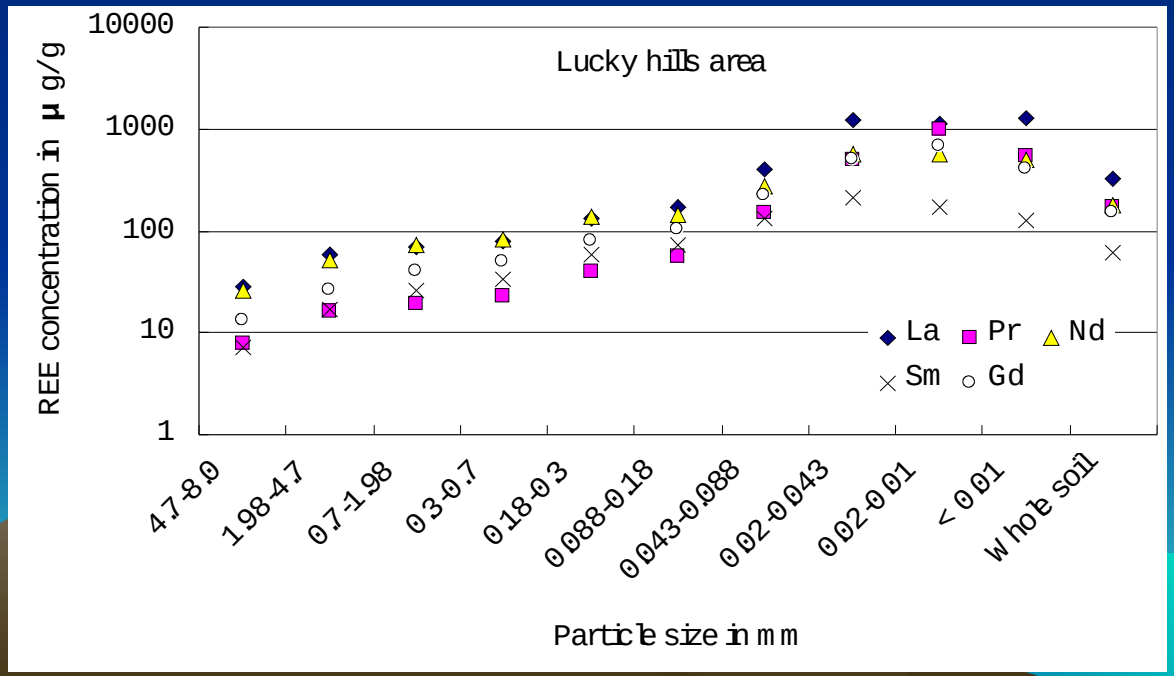


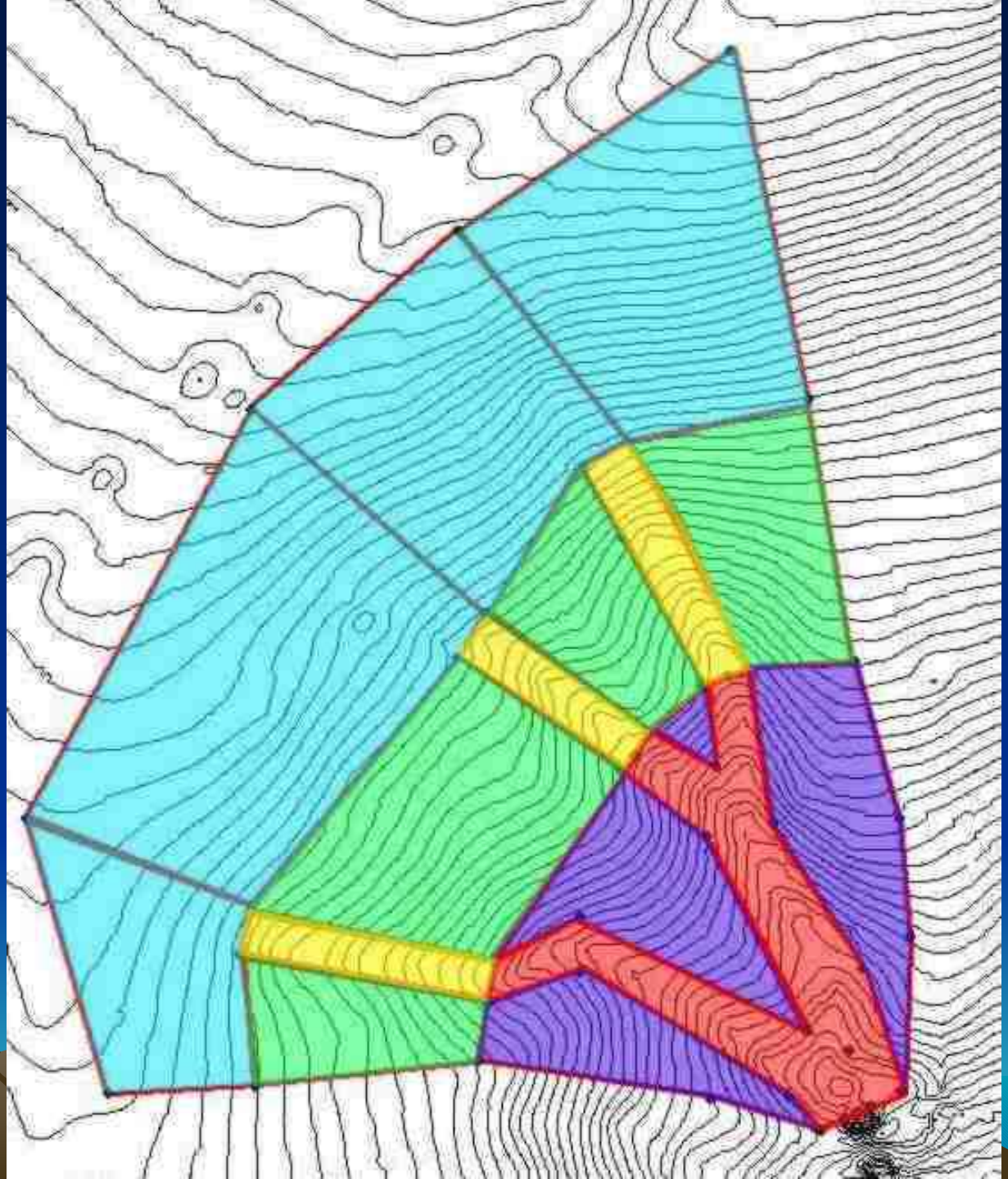



**Bad News**

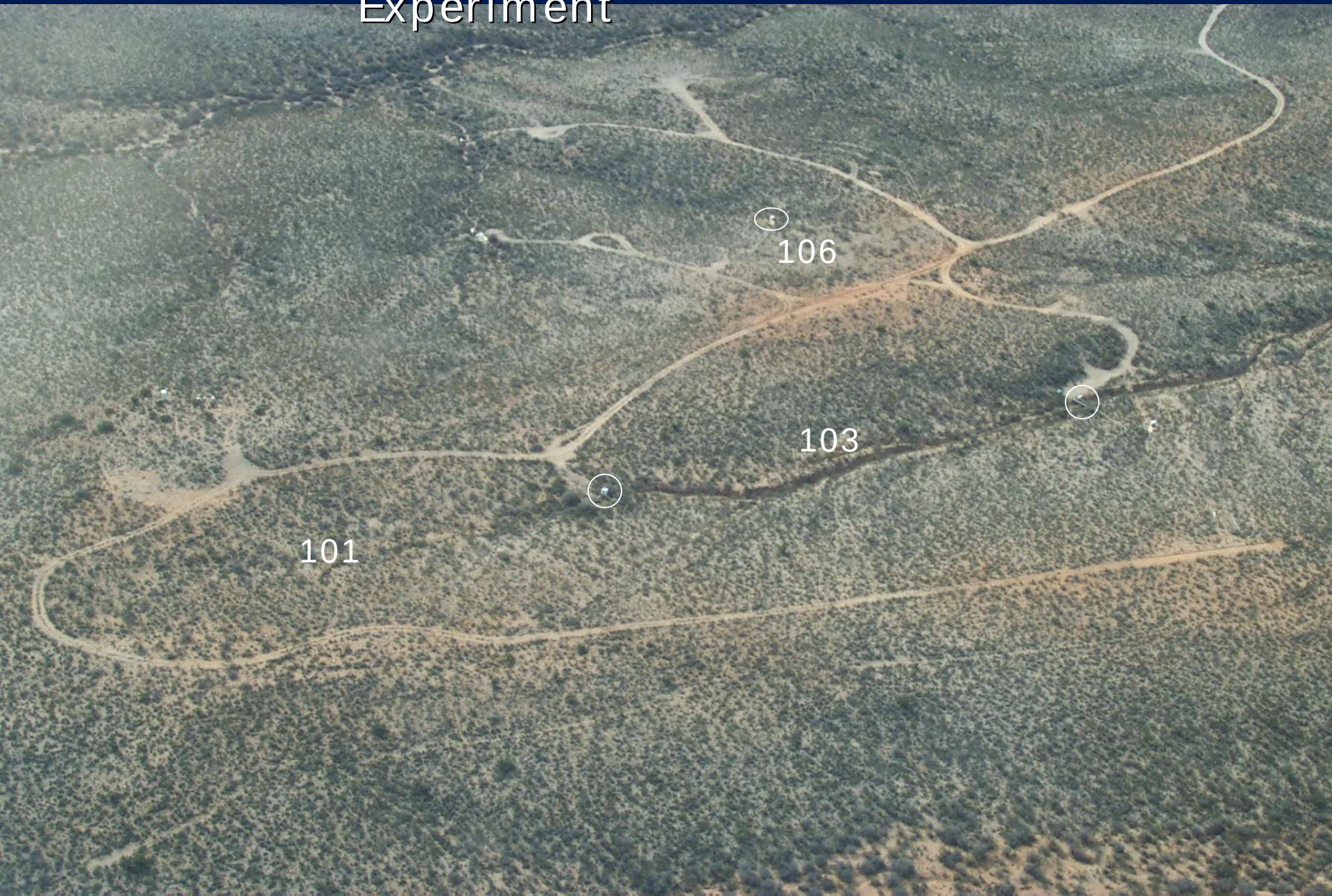
**REE Binds Preferentially**

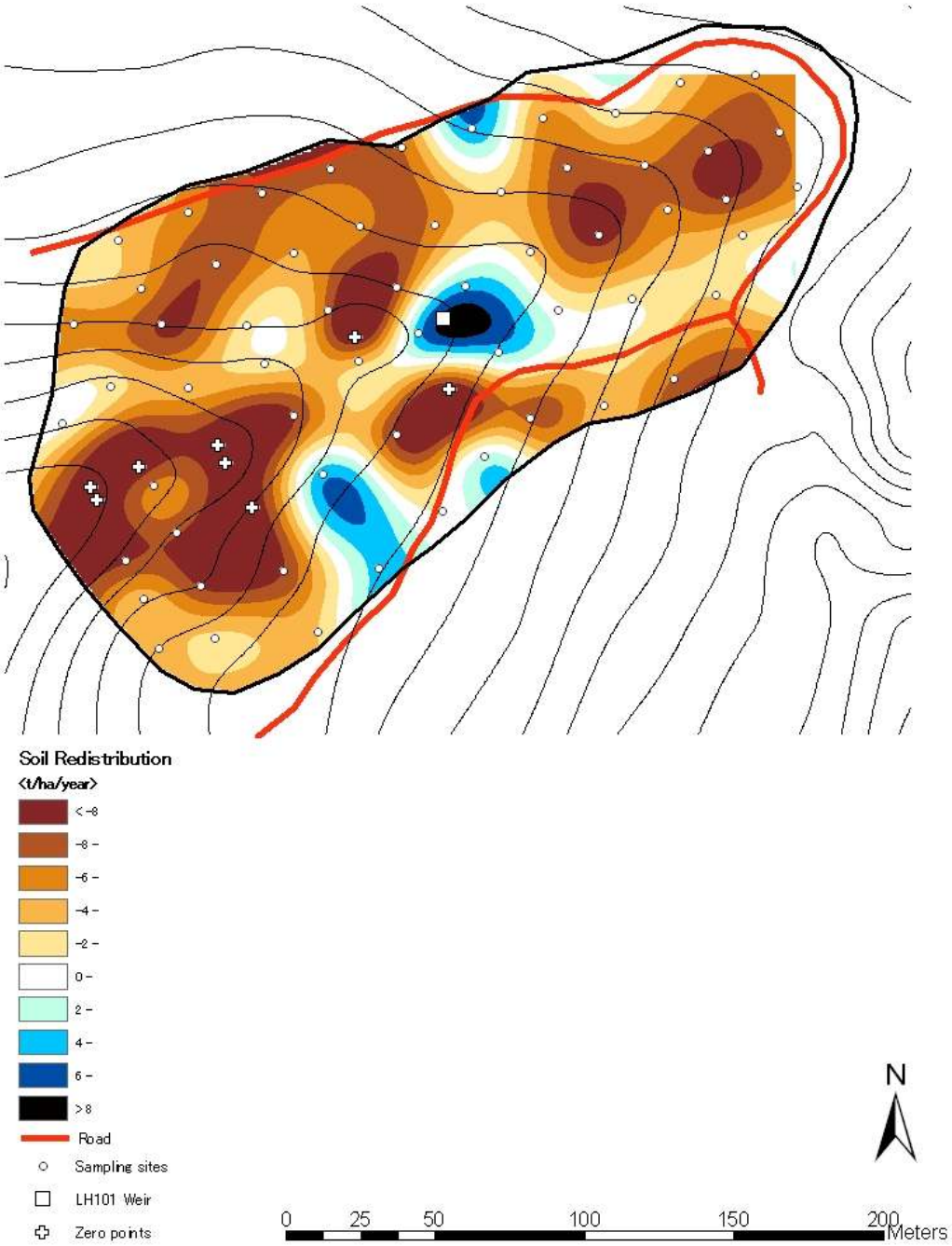


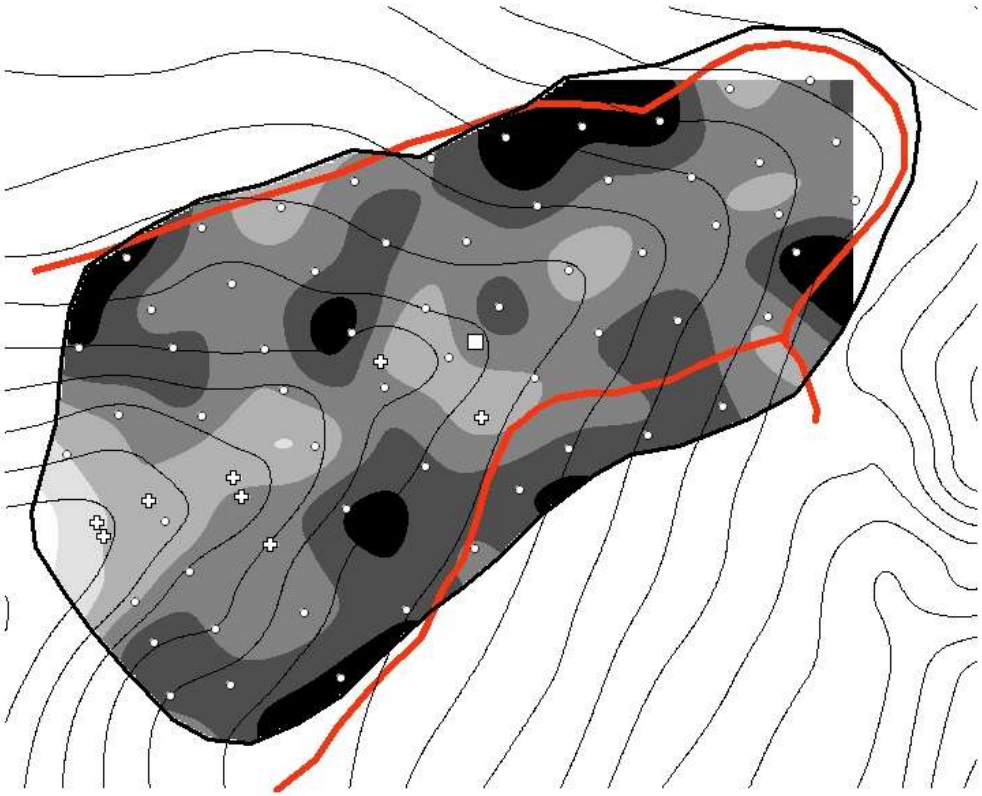





# Lucky Hills 103 – $^{137}Cs$ Experiment




Soil Redistribution
<t/ha/year>
< -8
-8 -
-6 -
-4 -
-2 -
0 -
2 -
4 -
6 -
> 8
Road
Sampling sites
LH101 Weir
Zero points
N
0
25
50
100
150
200
Meters



Rock Fragment
(%)

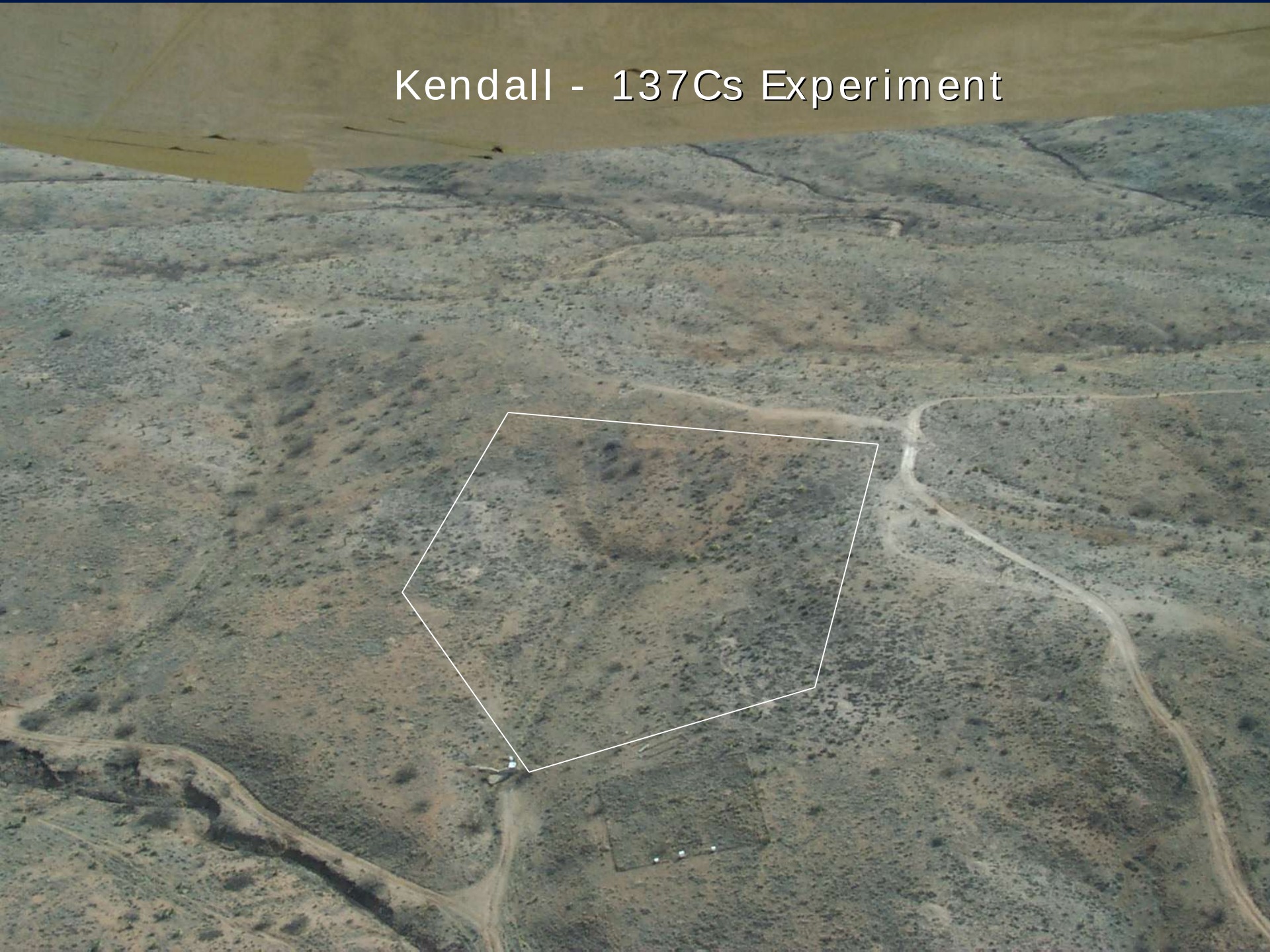
- < 10
- 10 –
- 20 –
- 30 –
- 40 –
- > 50
- Road
- Sampling sites
- LH101 Weir
- Zero points

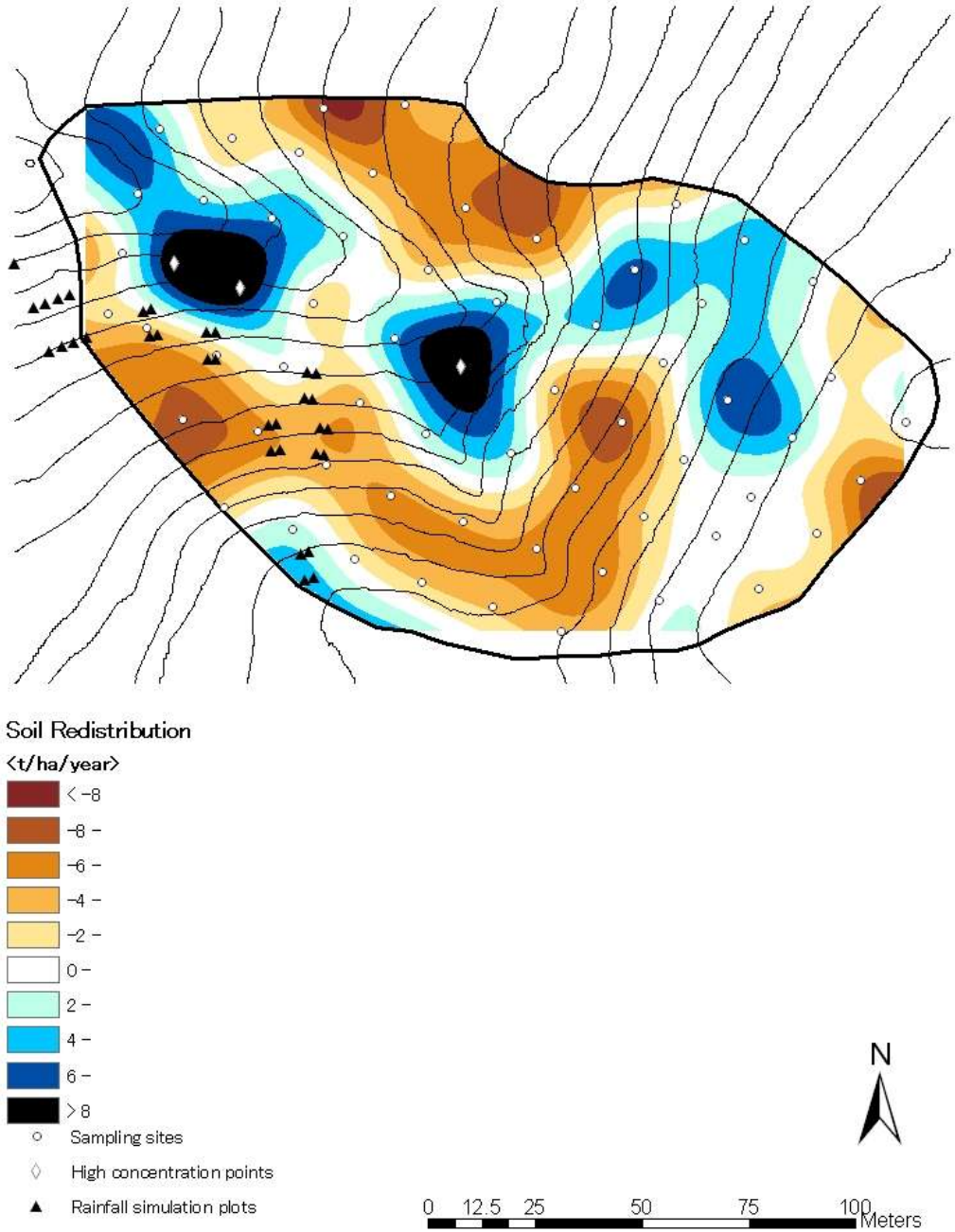
High Rock Content
Lower Erosion Rates

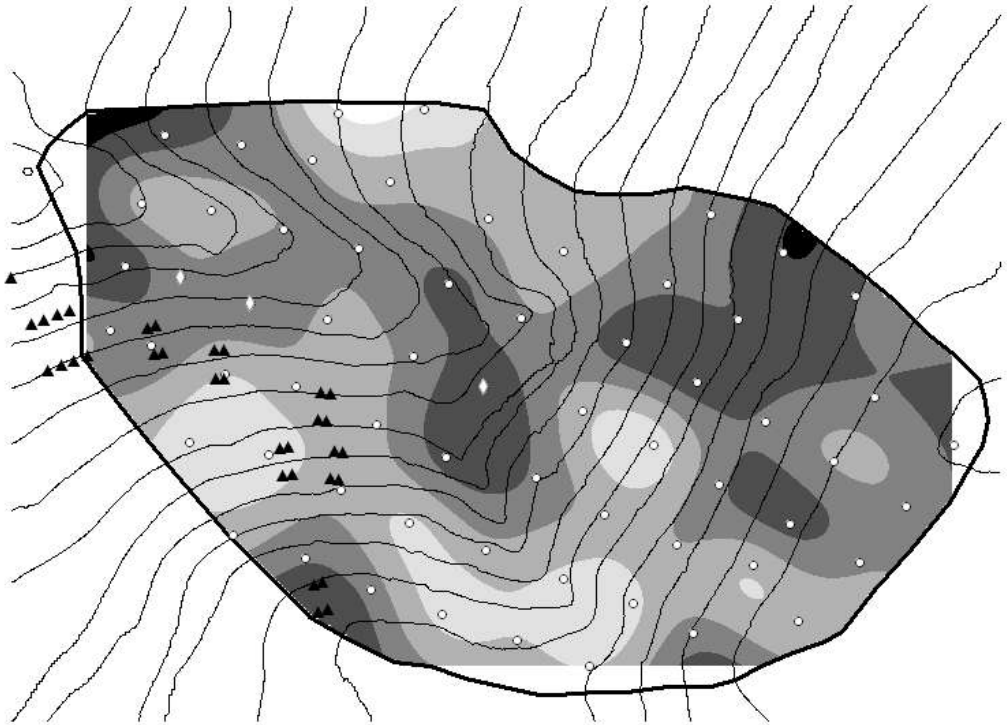
N

0 25 50 100 150 200 Meters

# Kendall - 137Cs Experiment




Soil Redistribution
<t/ha/year>
< -8
-8 -
-6 -
-4 -
-2 -
0 -
2 -
4 -
6 -
> 8
Sampling sites
High concentration points
Rainfall simulation plots
N
0 12.5 25 50 75 100
Meters



Rock Fragment
<%>

- <10
- 10 –
- 20 –
- 30 –
- 40 –
- >50
- Sampling sites
- High concentration points
- Rainfall simulation plots

High Rock Content
Lower Erosion
Rates

N

0 12.5 25 50 75 100 Meters

## Summary of soil redistribution rates

| | | Lucky Hills | Kendall |
|---|---|---|---|
| Soil redistribution | Mean (t $ha^{-1}$ $year^{-1}$) | - 4.27 | 0.12 |
| | Minimum (t $ha^{-1}$ $year^{-1}$) | - 9.83 | - 7.87 |
| | Maximum (t $ha^{-1}$ $year^{-1}$) | 5.74 | 10.12 |
| Erosion | Mean (t $ha^{-1}$ $year^{-1}$) | 5.9 | 3.2 |
| eposition | Mean (t $ha^{-1}$ $year^{-1}$) | .5 | 3.9 |

# Future Plans, Hopes, Dreams

- Rain on Lucky Hills –

  (preferably with lots of runoff, too!)
- Use of the data for evaluating models

  (WEPP, KINEROS)
- Use of $^{137}Cs$ to quantify rangeland erosion rates at more locations
- Photogrammetry for long-term monitoring