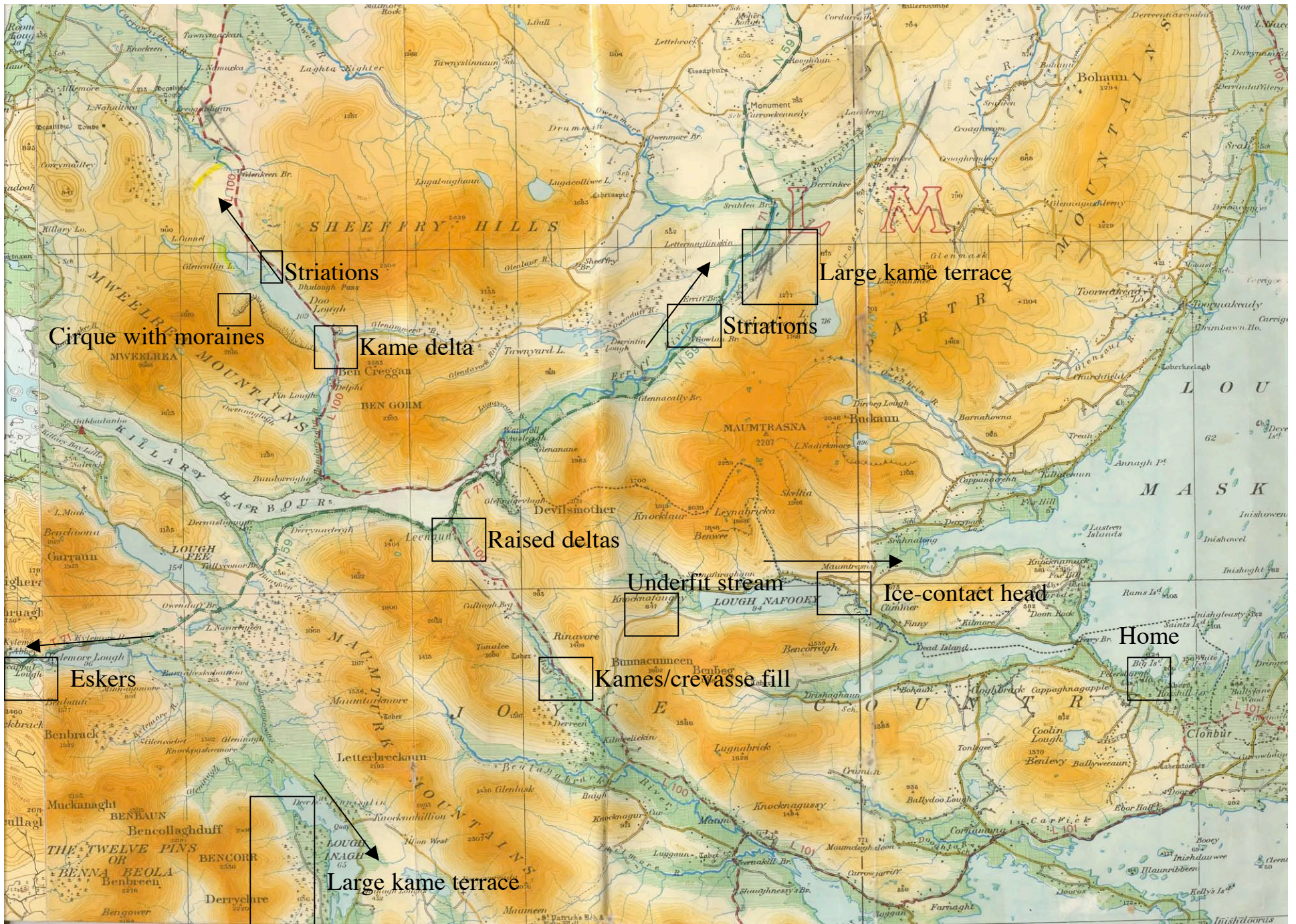


James Madison University
Field Course in western Ireland

Glacial Geomorphology Exercise

3-day road log (abbreviated)



Cirque with moraines

Striations

Kame delta

Raised deltas

Kames/crevasse fill

Underfit stream

Large kame terrace

Striations

Ice-contact head

Home

Eskers

Large kame terrace

Day 1 stops

- Kames below Tonalee
- Deltas at Leenane
- Eskers at Kylemore
- Kames at Lough Inagh (if time)
- Why? All of these ice-flow directions plotted on area map will show radial flow pattern. Shows rapid ice stagnation not a slow pull back to highlands.

Kames

- From Clonbur, take the road past L. Nafoeey and through the final project area. On the R336 parallel to Joyce River, cross small bridge to farm below Tonalee, talk to anybody there for permission. Stand of trees to north on R336 is too far.
- Chaotic mounds of unsorted drift, bedded flow tills, and sorted outwash. Note grain size - too fine for esker, sorted so not till, extensional soft-sed tectonics. Not Eskers - just a few kames in rows.
- Seds were atop stagnant ice; lowering of ice causes slumping and soft-sed faulting; topographic inversions are common - typical kames (also possible crevasse fill).
- Why? Big cirque to west may have had a glacier depositing moraines and/or outwash on top of the lowering ice in Joyce River valley.
- Ask about retreat style - stagnation rather than shrinking active glaciers.
- Does not show direction of flow.

Deltas at Leenane

- R336 from last stop leads north to village of Leenane. Stop at base of an old gravel pit just as you enter the village. Should be a fence to cross, maybe a gate.
- Look at seds in cuts - can find graded beds, flames, climbing ripples. These are bottom set beds of a delta.
- Climb to top - note flat surfaces. A parallel surface across valley. Note the steep margins on north sides. I saw four distinct surfaces, all visible from top. Three are nearby, one is much lower (part of village built on it).
- Why at this height? Sea-level rise v. isostatic rebound? You're about 70 m above sea level.
- Note how the river has cut and dissected the deltas.
- Ice gone from this spot while sea level still adjusting.

Delta top





A surface level with the one you're on

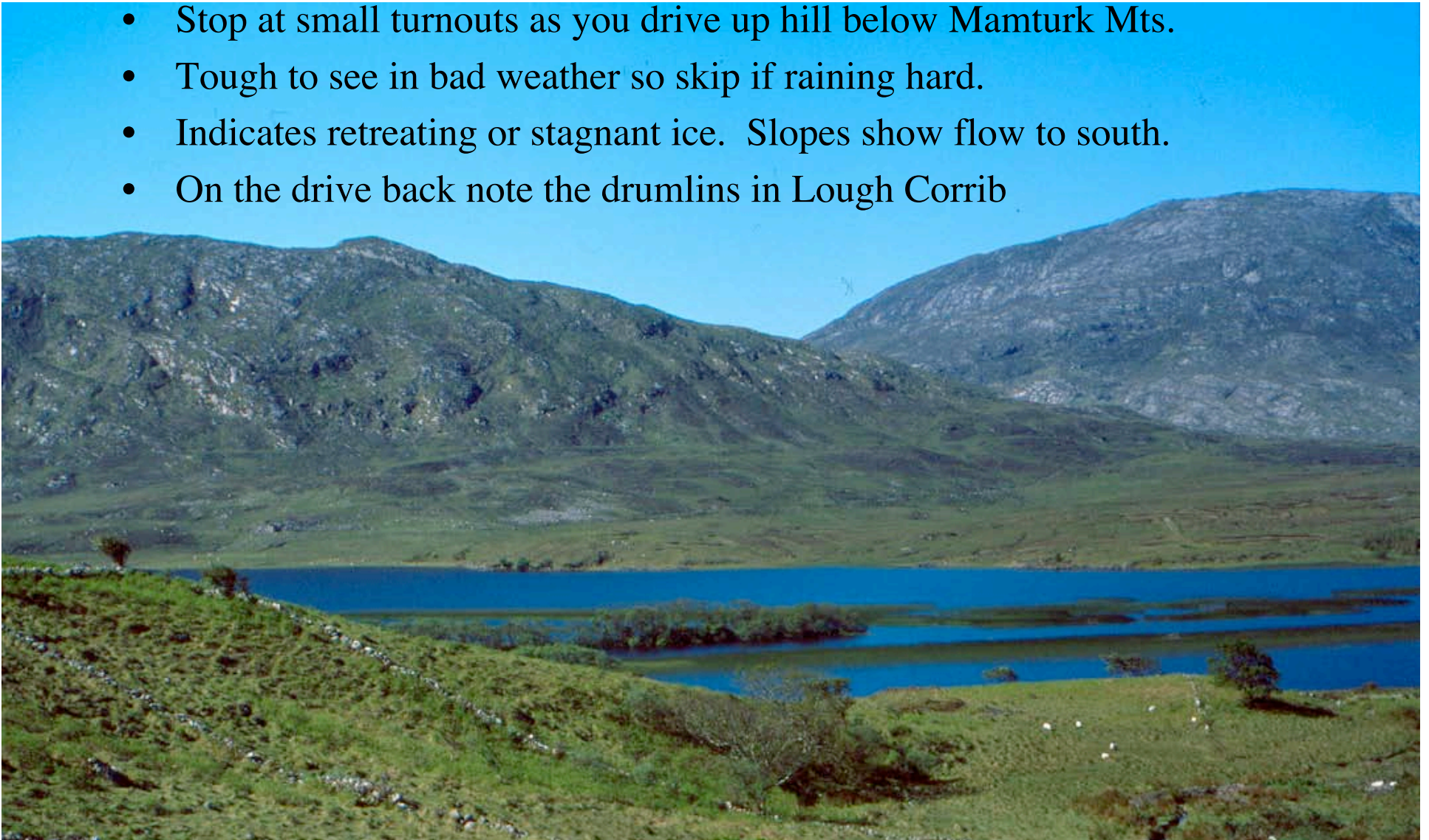
Eskers at Kylemore

- On the N59 past the abbey. A very large gravel pit. Ask permission if you see someone working there.
- In big cut (if it's still there) you can see gravel and cobble beds, cut-and-fill structures, and a few sandy beds.
- Climb up to top by going around to the south.
- Note the direction of branching - gives ice flow direction.
- Indicates thick ice flowing slowly or stagnant.



Kame terraces at L. Inagh

- On the R344 heading back to Clonbur by way of Maam Cross
- Stop at small turnouts as you drive up hill below Mamturk Mts.
- Tough to see in bad weather so skip if raining hard.
- Indicates retreating or stagnant ice. Slopes show flow to south.
- On the drive back note the drumlins in Lough Corrib



Day 2 stops

- Houston's Bridge
- Ben Creggan
- Big Daddy Cirque
- Why? First two give ice flow directions and style of retreat. BD Cirque is the only place in the region to see moraines.

Houston's Bridge

- Heading north on N59 out of Leenane, look for stone bridge on Erriff River, Bridge is on 1:50,000 map. Striated BR 10 m from bridge.
- Note crag and tail features.
- Look up to the northeast - you can see a long kame terrace.
- Two independent ice-flow directions. Both are opposite of river flow.



Terraces, looking to NE.

View to the south from
the striated BR.



Ben Creggan

- On the R335 heading north, just before Doo Lough, at the foot of Ben Creggan. Stop along the steep exposure of drift and bedrock. Walk through gate (be sure to close, had massive sheep escape last year).
- A kame delta situated where two valley glaciers met.
- Rivers flowing along the glacier margins filled a depression in the ice with sediment. Depression results from ice flow and/or from warm air descending down the mountain side.
- Look at the striated bedrock in road cut; walk up onto the flat delta top. Get an ice flow direction. Lots of bog oaks in the cut peat.
- Look NW to Doo Lough - may be a moraine out there, not sure.

Cirque

- Stop parallel to north shore of the lake. A small road leads down to shore - students can walk along this road and along the beach. A plank bridge crosses the stream or there are places to rock hop. Best walking is near the lake, a bog is higher up the hill but not bad last time we went.
- From the road you can see all of the moraines - a big outer with many moraine ridges stacked behind it and several laterals.
- In the cirque you can see protalus ramparts and some smaller moraines. Usually some fresh debris flows, too.
- Climb up both sides to look across at the laterals.
- From inside of cirque on the south rim you can clearly see the stacking of moraines against the big outer moraine. Maybe the steep front is because of ice thrusting as these were being stacked.
- In the stream cut you can find (very difficult to locate) old peat layers directly above till. Could be used to date the advance of ice - maybe Younger Dryas?
- Below Cirque is Str BR showing flow in main valley to NW. Probably from the icecap, predates ice in Cirque.

Doo Lough North

Nice laterals on this slope

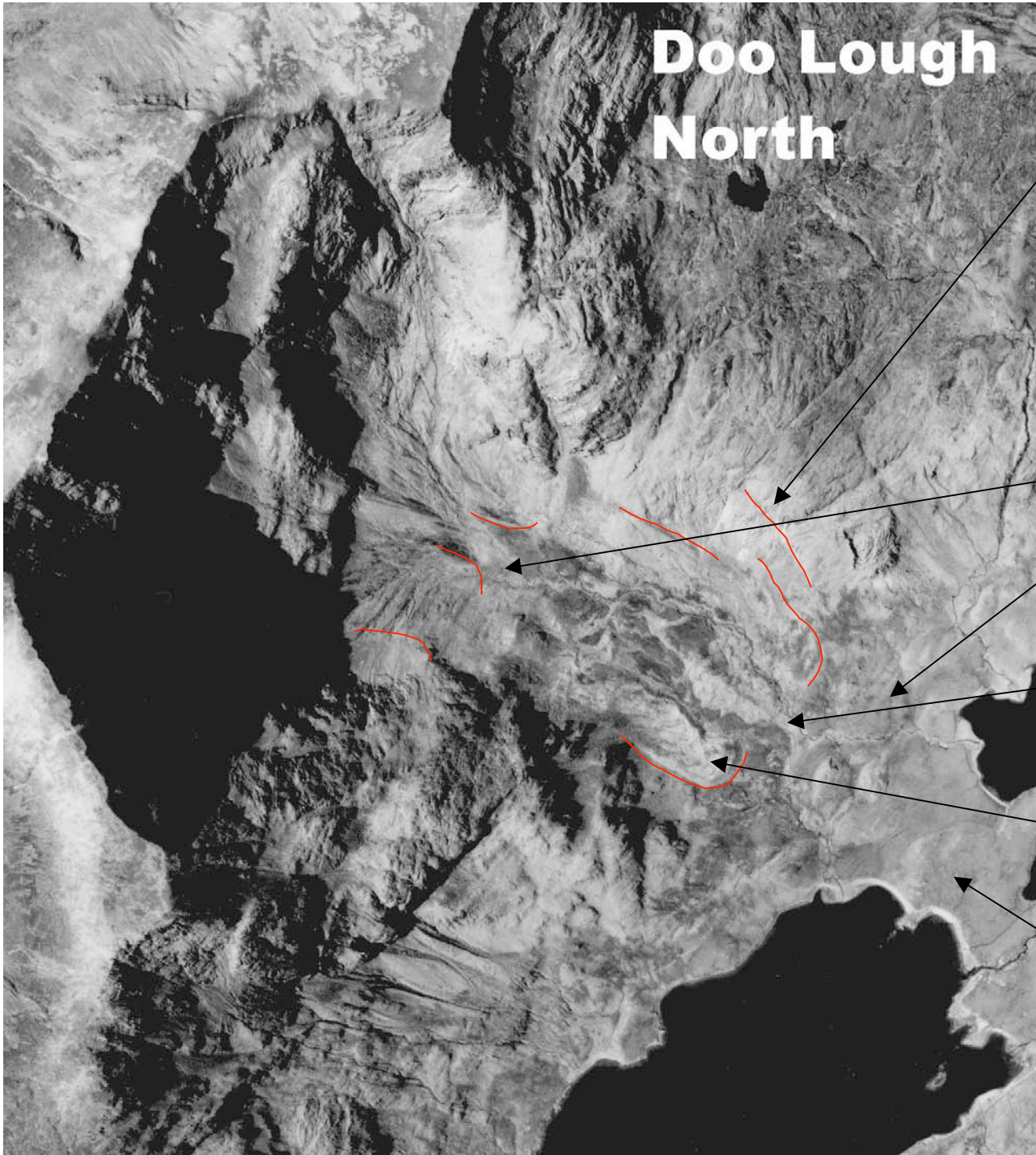
PT ramparts

Area of Str BR

Organics in stream

Stacked moraines
behind steep terminal

Possible cross-valley
moraine from valley
glacier?

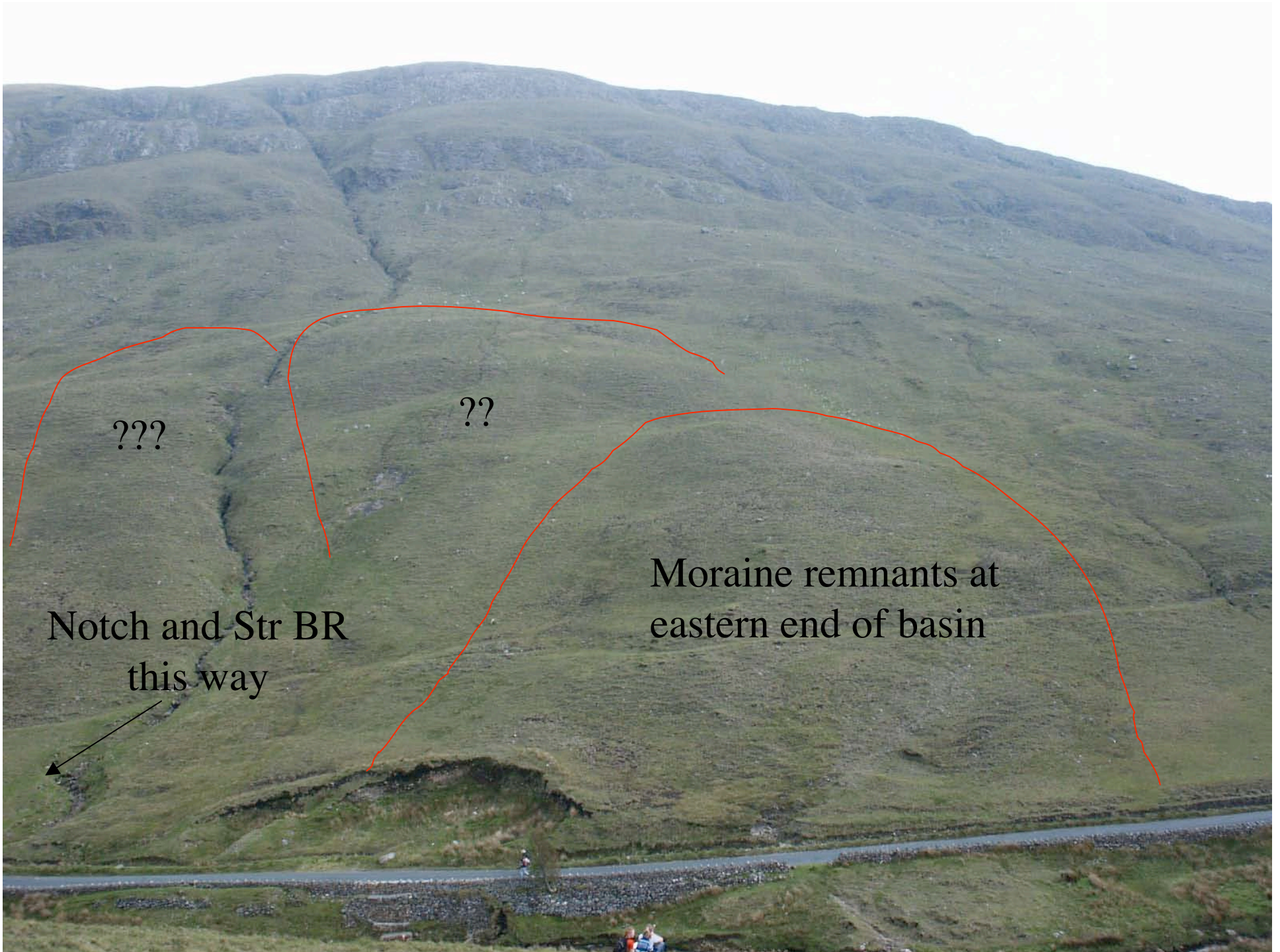


Day 3 Final project

- On the road past L. Nafoeey, stop in the tourist-picture-taking turnouts. A) Walk back down the road until you can see the end of L. Nafoeey. They should see that a big moraine dams L. Nafoeey to the east. Probably an ice-contact head. B) Point out the notch (underfit stream) that they will have to explain.
- Drop off the students to begin their march through the basin. Explain that clay and silt beds are found beneath the peat in the center of the basin. Point out drainage area of stream - too small for the notch.
- They should see remnants of moraines at both ends. Also, thick till and big boulders can be seen in stream cuts.
- Many striation sites along the road where it is descending to L. Nafoeey.
- Tell them that boulders used to fill the area below the notch. Now incorporated into road and stream walls.

The story

- Ice cap at end of glacial, radial flow indicated from previous days studies.
- Ice down wastes quickly at end of glacial. Exposes highlands first. Unusual because ice typically lasts longest at high elevation. Rapid heating when NADW starts up.
- Moraines form at valley mouth. Ice is in the deep valleys, not in our basin. Note ice-contact head in Nafooey. Do the striations fit story of are they older?
- Moraines dam a lake, which eventually bursts on NE side to cut notch.
- Subsequent climate removes most of moraines from hillsides. Best moraines at western end.



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Notch and Str BR
this way



Moraine remnants at
eastern end of basin