

Kildorais to Staffin Bay coastal section and The Quirang, Skye - an excursion

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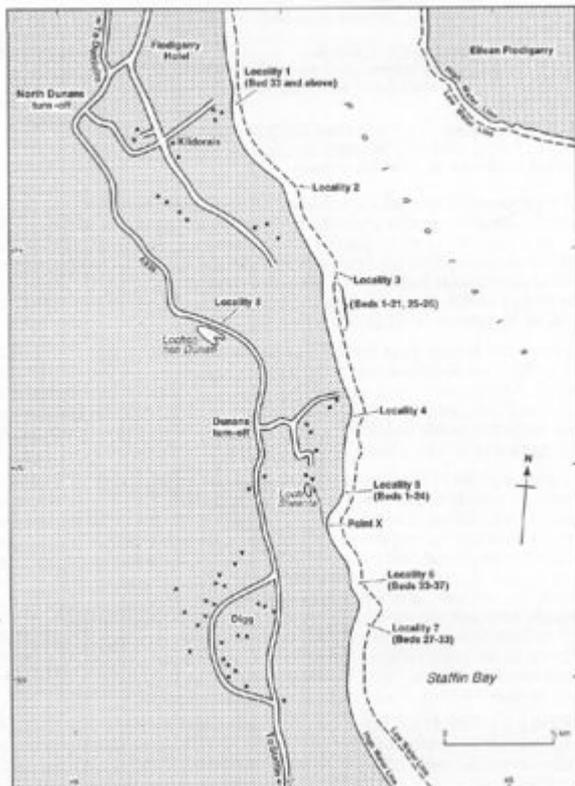


Figure 34a Excursion 21 Kildorais to Staffin Bay coastal section and The Quirang modified from Anderson and Dunham 1966 Excursion —location map

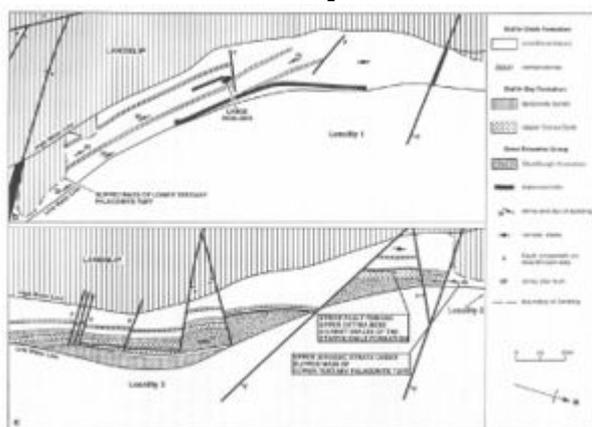


Figure 34bc Excursion 21 Kildorais to Staffin Bay coastal section and The Quirang modified from Anderson and Dunham 1966 Excursion . Detailed map of locality 1 to 3.

- [6 Appendix 3: Glossary of place names and grid references](#)

Excursion 21 Kildorais to Staffin Bay coastal section and The Quirang ([Figure 34a](#)), ([Figure 34bc](#)), ([Figure 34de](#)), ([Figure 34f](#)), (modified from Anderson and Dunham 1966)

Purpose: To examine Upper Jurassic sedimentary rocks, Lower Tertiary lavas and minor intrusions, and Quaternary landslips.

Aspects covered: Upper Jurassic sedimentary rocks; dykes of the Lower Tertiary regional swarm; dolerite sills and plugs; plateau lavas; landslipped material; glacial deposits.

Route:

- i. North Dunans (Kildorais)-Staffin Bay-Dunans-Lochan nan Dunan
- ii. The Quirang

Distance:

- i. 6 kilometres
- ii. 1 kilometre

Time:

- i. 4-6 hours
- ii. 1 hour

General comments: Coastal exposures are involved and, therefore, low (preferably spring) tides are essential. If travelling by coach, the party can be picked up from Locality 8 (opposite Lochan nan Dunan) or from the Dunans turn-off at the end of Part (i) of the excursion.

This excursion is split into two parts:

- i. The coastal section north of Staffin Bay
- ii. The landslipped material of The Quirang

Staffin Bay is located on the east side of north Skye, 29km (18 miles) north of Portree on the main (A855) coastal road. Along a narrow coastal section north of the bay, Upper Jurassic (Callovian, Oxfordian and Kimmeridgian) sedimentary rocks ([2F](#)) crop out between the High- and Low-Water Lines. These strata dip at high angles and, in places, are severely faulted. The faults, with significant strike-slip displacements, are related to the landslipping events of Quaternary times ([11D](#)). Dolerite sills ([9H](#)), plugs, and dykes of the Lower Tertiary regional swarm ([9B](#)) also disrupt these rocks. Metamorphism of the Upper Jurassic strata is restricted to localised baking close to igneous contacts. Inland, to the west, unstable, landslipped material ([11D](#)) obscures the underlying geology, which appears to be dominated by Lower Tertiary plateau lavas ([3D](#)) which dip to the west at a shallow angle. Boulder clay deposits ([11B](#)) also mask part of the underlying geology, especially SW of Staffin Bay.

The sequence of Upper Jurassic sedimentary rocks which crops out in north Trotternish (modified from Hudson and Morton 1969 and Sykes and Callomon 1979) consists of:

(TOP OF SEQUENCE NOT EXPOSED)

STAFFIN SHALE FORMATION (Middle Callovian-Kimmeridgian) (at least 113.60m)

Flodigarry Shale Member (41.15m)

Digg Siltstone Member (11.75m)

Glashvin Silt Member (16.35m)

Dunans Clay Member (37.20m) Dunans Shale Member (7.15m)

STAFFIN BAY FORMATION (Upper Bathonian-Lower Callovian) (at least 18.75m)

Belemnite Sands (7.55m)

Upper Ostrea Beds (11.20m)

The following detailed stratigraphic sequences and maps ([Figure 34a](#)), ([Figure 34bc](#)), ([Figure 34de](#)) are provided for reference (from Hudson and Morton 1969 and Sykes and Callomon 1979). With the coastal section it is advisable to use both data sources in conjunction. The dolerite dykes, sills and plugs act as excellent markers for locating the sedimentary units described.

STAFFIN SHALE FORMATION	m
<i>Flodigarry</i> Shale Member (Upper Oxfordian-Kimmeridgian) (A further 20m of shales and clays within the Mutabilis Zone)	
39. Silty clays with <i>Amoeboceras</i> and <i>Pictonia (baylei)</i> . Baylei Zone. Oxfordian-Kimmeridgian boundary	
38. Shale, laminated, hard, black, the bedding planes rich in crushed ammonites	0.45
37. Silty clays, slightly bituminous (cf. Bed 31). Bauhini Subzone	5.00
36. Continuous band of carbonate-cemented silty clay ('cementstone')	0.35
35. Silty clays, slightly bituminous (cf. Bed 31). Rosenkrantzi Zone, Marstonense Subzone from base upwards	6.00
34. Layer of large calcareous doggers	0.20
33. Silty clays, slightly bituminous (cf. Bed 31). Serratum Subzone from 12.20m below top; Regulare Zone from 7m below top	20.00
32. Shale, laminated, bituminous, dark grey, harder than the adjacent beds and forming a marker-ridge in the steeply dipping outcrop	0.95
31. Silty clay, medium to dark grey, slightly bituminous. Bivalves very abundant, especially <i>Trautscholdia</i> . Glosense Zone, Ilovaiskii Subzone from 0.60m above the base; Glosense Subzone from 2.95m above the base; Serratum Zone, Koldeweyense Subzone from 4.50m above the base	6.20
30. Siltstone, dark grey, glauconitic. Blakei Subzone	2.00
Digg Siltstone Member (Middle Oxfordian, Tenuiserratum Zone)	
29. Silty sandstone (cf. Bed 27)	0.70
28. Nodular sandstone, "silty, fine-grained, calcareous cement	0.30
27. Sandstone, very fine-grained, or sandy siltstone, yellow to grey, with subordinate dark grey silt. Abundant bivalves and ammonites. Base of the Blakei Subzone 7.70m above the base of the exposure	10.10

(GAP)

26. Sandstones, silty, or sandy silts, light yellow to grey. Abundant bivalves and ammonites <i>Glashvin Silt Member</i> (Lower Oxfordian, Cordatum Subzone Middle Oxfordian, Tenuiserratum Zone and Subzone)	0.65
(Top of the member taken as the first bed of light grey fine sandstone seen in the upper part of the beach between Localities 3 and 4)	
25. Silts, dark grey, richly fossiliferous	0.55
24. Silt, dark grey, and light clays (cf. Bed 21)	0.80
23. Sandstone, very fine-grained, silty, forming band in the middle of the cliff at Locality 5	0.10
22. Silts, dark grey, with lesser light grey clays (cf. Bed 21). Tenuiserratum Zone and Subzone	2.55
(GAP OF UNKNOWN BUT SMALL THICKNESS: BASE OF THE TENUISERRATUM ZONE SOMEWHERE HERE)	
21. Silts, dark grey, with abundant bivalves and ammonites. Subsidiary horizons of light grey-green silty clays and sandy lignitic intercalations. Cream ash bands. Densiplicatum Zone, Vertebrata Subzone from 5.40m above the base	12.35
Dunans Clay Member (Upper Callovian, Athleta Zone—Lower Oxfordian, Cordatum Zone and Subzone)	
(Change of facies, from light grey silty clays to dark grey silts. Poorly exposed junction)	
20. Silty clays (cf. Bed 6). Cordatum Subzone from 9.40m above the base	12.35
19. Silty clay, calcareous, harder than the adjacent beds. Useful marker bed. Costicardia Subzone	1.50
18. Silty clays (cf. Bed 6)	3.90
17. Layer of daggers (cf. Bed 7)	0.20
16. Silty clays (cf. Bed 6)	0.90
15. Layer of doggers (cf. Bed 7)	0.20
14. Silty clays (cf. Bed 6)	2.70
13. Layer of doggers (cf. Bed 7)	0.25
12. Silty clays (cf. Bed 6). Cordatum Zone, Bukowskii Subzone from 0.80m above the base	2.30
11. Layer of Doggers (cf. Bed 7)	0.20
10. Silty clays (cf. Bed 6)	1.40
9. Layer of doggers (cf. Bed 7)	0.20
8. Clays (cf. Bed 6). Praecordatum Subzone 3.60m above the base	5.50
7. Layer of calcareous, slightly sideritic doggers, weathering reddish	0.20
6. Clay, silty, grey-green, with layers of lignitic debris, much bioturbated by <i>Thalassinoides</i> and <i>Chondrites</i> , and phosphatic nodules. Lamberti Zone and Subzone; Mariae Zone, Scarburgense Subzone from 2.20m above the base.	2.55
5a-c. Two beds (a and c) of carbonate-cemented siltstone ('cementstone') separated by 0.45m of silty clay (b)—the most prominent marker at Staffin. Bositra common throughout. Kosmoceras in Beds b and c. Lamberti Zone, Henrici Subzone	0.95
4. Silts and silty clays, light grey-green, base burrowed by <i>Chondrites</i> . Bositra in several horizons. Athleta Zone, Phaeinum Subzone	1.90
Dunans Shale Member (Middle Callovian, Jason Zone and higher?)	
3. Shales, dark grey, bituminous. Occasional belemnites	3.45
2. Shales, laminated, black, bituminous, with <i>Lingula</i> and belemnites	0.45
1. Clay, shaly, medium to dark grey, bituminous, with horizons of glauconitic silt burrowed by <i>Chondrites</i> . Belemnites abundant in the glauconitic beds. Medea Subzone; Jason Subzone	3.25

STAFFIN BAY FORMATION

Belemnite Sands (Lower Callovian)

- | | |
|--|------|
| 7. Limestone, hard, sandy, glauconitic and sideritic, red weathering. Lower part with white nodules. Abundant belemnites. | 0.25 |
| 6. Sandstone, argillaceous and calcareous, soft; belemnites | 0.30 |
| 5. Sandstone, pebbly and coarse-grained, hard, rubbly weathering, calcareous and glauconitic; belemnites | 0.20 |
| 4. Sandstone, hard, calcareous, massive; not obviously fossiliferous
Sharp contact with bed below, which is penetrated by burrows | 0.20 |
| 3. Siltstone and fine sandstone, carbonaceous, soft. Carbonaceous laminae outline many burrows. Original sedimentary lamination mostly disturbed by burrowing | 3.00 |
| 2. Limestone, hard, sandy, shelly; fine-grained matrix; carbonaceous fragments common. Variety of bivalves, mostly disarticulated, but some with valves joined | 0.60 |
| 1. Siltstone and fine sandstone, carbonaceous, soft. Carbonaceous laminae outline small-scale ripple-bedding. Shelly | 3.00 |

Upper *Ostrea Beds* (Upper Bathonian–Lower Callovian)

- | | |
|--|------|
| 5. Shale, dark, very shelly; layers of mainly articulated heterodont bivalves; some harder limestones near base, a <i>Neomiodon</i> shell-bed at top | 2.90 |
| 4. Siltstone, soft, carbonaceous streaks (resembles Bed 1 of the Belemnite Sands); shelly | 1.20 |
| 3. Shale, dark, very shelly; with shell-beds in argillaceous matrix, about | 4.55 |
| 2. Limestone, hard, shelly, massive | 0.75 |
| 1. Shale, dark, shelly layers. Shell-beds hard and pyritic, with <i>Isognomon</i> ; including basal shell-bed 8cm thick, conformable but sharp base, about | 1.80 |

(Underlain by—GREAT ESTUARINE GROUP (SKUDIBURGH FORMATION):

Dark clay for top 0.5m (approximately); red-green mottled mudstone or siltstone below)

The proposed route of Part (i) has been chosen because the initial localities are more easily identified if the excursion starts in the north. Also, as much of the stratigraphy to be examined strikes parallel to the coast it is unlikely that all details of this section will be observed within the time constraints imposed by the tides. If the study of a full succession is the object of the excursion then Locality 3 should be visited when the tide is at its lowest level ([Figure 34a](#)).

(i) The coastal section north of Staffin Bay

From the bridge over the Kilmartin River, in Staffin Bay, follow the main (A855) coastal road north for 7km (4 miles) to the North Dunans turn-off. Ample parking is available for cars, minibuses and coaches at the turn-off. Proceed 1km east along the minor road to Kildorais (the end of the metalled road) and through a farm gate and across a stile to the beach opposite Eilean Flodigarry.

Locality 1 [NG 4680 7170]

The uppermost part of the exposed Staffin Shale Formation, consisting of the Flodigarry Shale Member, crops out here ([Figure 34bc](#)). These strata consist of siltstones, shales and clays of Bed 33, and above (including the type-locality of Beds 36–38). Cementstones (carbonate-cemented, silty clays) form obvious, outweathered features and indicate that bedding is close to vertical. Observed easily, but difficult to recover, are ammonites (composed of original aragonite), although belemnites can be readily collected. The large boulder on the beach within this bay consists of dolerite with slickensided, baked shale adhering to its west side. Outweathered calcareous concretions, often broken open and up to 50cm or more across, can be observed along the whole of this section.

Proceed to the southern end of the bay.

Locality 2 [NG 4700 7130]

This small promontory is marked by a thick, multiple dolerite intrusion. On the foreshore, just below the High-Water Line, an irregular mass of agglomerate and dolerite, associated with this intrusion, crops out. Continue south for 500m along the beach over a faulted and disrupted stratigraphy of: Staffin Shale Formation; Staffin Bay Formation; and, Great Estuarine Group (Skudiburgh Formation) ([Figure 34bc](#)), to the next small promontory (approximately 100m south of where the back wall of the beach gives way to more open ground).

Locality 3 [NG 4720 7090]

Here, all of the strata dip to the west at approximately 60°. Starting from the beach and proceeding seawards (to the east) the succession is as follows (unmodified from the detailed notes of Hudson and Morton 1969):

(WEST)

- (1) A 35cm-thick (intermittently-exposed) cementstone (Staffin Shale Formation)
- (2) 10m of dark grey, friable shale containing belemnites (Staffin Shale Formation)
- (3) A 0.25m-thick, red-weathering limestone (Unit 7 of the Belemnite Sands)
- (4) Units 6 through to 1 of the Belemnite Sands.
- (5) Units 5 through to 1 of the Upper Ostrea Beds
- (6) 1.5m of dark green clay (Skudiburgh Formation of the Great Estuarine Group)

FAULT

- (7) Units 5 through to 3 (?) of the Upper Ostrea Beds (approximately 9m thick)

FAULT

- (8) A thin bed of shale from the Staffin Shale Formation (at the northern end of the exposure only)
- (9) Belemnite Sands (extending below the Low-Water Line)

(EAST)

Proceed 600m south to the next obvious promontory, noting the Staffin Shale Formation stratigraphy in the first 200m (Beds 1-21, and Beds 25-26). The type-locality of Bed 25 may be examined 300m south of Locality 3. Also note in passing two outweathered, NW-SE -trending, dolerite dykes close to the High-Water Line on the beach. The more northeasterly of these two intrusions has adhering to its SW side baked shale containing bleached (white) belemnites and bivalves.

Locality 4 [NG 4730 7020]

Here, at least four dolerite dykes cut strata of the Staffin Shale and Staffin Bay Formations ([Figure 34de](#)). Close to the intrusions the country-rocks are baked and outweathered. For the next 200m, to the south, the type-locality strata of the Dunans Clay Member of the Staffin Shale Formation crop out and contain easily found, but generally fragmented, ammonites and bivalves. The buff-coloured boulders between the High- and Low-Water Lines are from the Belemnite Sands, which crop out just west of the Low-Water Line.

Locality 5 [NG 4726 6988]

Here, two 3m-wide, NW-SE -trending, dolerite dykes, which have locally baked the country-rock shales, crop out.

Locality 6 [NG 4730 6946]

SW of 'Irregular Intrusion 1' ([Figure 34de](#)) a buff-coloured cementstone horizon within the Staffin Shale Formation, containing light grey concretions up to 50cm across, forms a distinctive feature in an otherwise dark green, boulder-strewn foreshore. The concretions are elliptical and their shapes have been controlled by the thickness of the cementstone horizon. Elsewhere, are poor exposures of the Staffin Shale Formation. The type-locality Beds 33-35 crop out on the beach 25m west of 'Irregular Intrusion 1'. Continue south to the area south of 'Irregular Intrusion 2'.

Locality 7 [NG 4736 6926]

50m north of the large boulder on the beach are the type-locality Beds 30-32 of the Staffin Shale Formation, together with exposures of Beds 27-29 and 33. These strata occur within small 'windows' on the boulder-strewn beach.

Return north along the beach for 500m to the foot of the backwall (Point X on [Figure 34a](#)), 250m NW of 'Irregular Intrusion 1'. In so doing, note the remnants of the pier on 'Irregular Intrusion 1', formerly used in the transportation of diatomite (11F) from Sartle (occurrence (1) listed in Section [\(11F\)](#) of Chapter 11), via an aerial ropeway through Digg, to the coast (Anderson and Dunham 1966). A path through a small hazel grove leads to the east side of Loch Sheanta. Gain and then follow the metalled minor road to the Dunans turn-off from the main (A855) coastal road and proceed north along that road for 500m to the road-cut opposite Lochan nan Dunan.

Locality 8 [NG 4670 7066]

Here, a sequence of at least seven lava flows, dipping to the SE, is exposed. Each of these lavas has a distinctly red, lateritised top (from 5-30cm thick), grading down into an amygdaloidal portion, below which is a more massive central unit which shows crude columnar jointing. If not picked-up by coach from here, return along the main road to the North Dunans turn-off.

(ii)

Proceed 4km (2.5 miles) south along the main (A855) coastal road to the turn-off signposting The Quirang and continue 3km (2 miles) west (inland) to the ridge of The Quirang. Ascend the steep hair-pin bends in the road to the plateau area above the landslipped material ([11D](#)). Parking for 8 cars, 3 minibuses or one coach is available on the south side of the road 100m west of the plateau edge. Return down the road to a small quarry on the north side of the road at the higher hair-pin bend.

Locality 9 [NG 4404 6794]

Exposed on the quarry face is a 20cm-thick laterite ([3C](#)) capping one of the plateau lavas ([3D](#)). This lava is a porphyritic basalt, with phenocrysts of plagioclase, and is cut by 1-2cm-thick, almost-vertical, pipe amygdales consisting of weathered zeolites. From here, looking NE, the extensive landslips ([11D](#)) of The Quirang may be observed. Features of this landslip are illustrated in ([Figure 34f](#)). The base of the landslip(s) is a dolerite sill ([9H](#)) which intrudes Upper Jurassic strata ([2F](#)), dipping to the west at a shallow angle. At least five rotated blocks have been identified by Anderson and Dunham (1966). From this vantage point the attitude of the uppermost blocks may be explained

in terms of a simple rotation model, as shown in [\(Figure 34f\)](#). Looking east, note that the low-lying ground is used at present for peat extraction as a local fuel [\(11H\)](#).

Return to Portree, either, via Staffin (32km (20 miles)), or, via Uig (32km (20 miles)).

[References](#)

[Appendix 1: Glossary of petrological names and terms](#)

[Appendix 2: Glossary of fossil names](#)

[Appendix 3: Glossary of place names and grid references](#)

At all times follow: [The Scottish Access Code](#) and [Code of conduct for geological field work](#)

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