



THE Tweed FOUNDATION

A Tweed Foundation Paper

SECTION 2: THE CATCHMENTS OF THE TWEED AND THE EYE

2.4: Land-cover and vegetation

<i>Ettricke Foreste is a feir foreste, moorlands</i>	<i>When first descending from the</i>
<i>In it grows manie a semelie tree; There's hart and hynd, an' dae an' rae</i>	<i>I saw the stream of Yarrow glide Along a bare and open valley,</i>
<i>An' of a' wilde bestis grete plenty</i>	<i>The Ettrick Shepherd was my guide.</i>
Wordsworth, 1835	Traditional ballad, 16 th Cent William

(A) Background and History: After the abrupt melting of the ice 11,500 years ago, the bare soils and gravels were colonised by vegetation to give a landscape of mosses and grasses as seen today in Arctic and sub-Arctic areas of northern Europe. It was in this climatic period that Arctic Charr would have colonised the Tweed as they have both sea-going and resident freshwater forms, like Sea- and Brown-trout, under these conditions, but as the climate warmed, the sea-going form would have been suppressed and the nearest to the Tweed now are in Iceland. Birch were the first larger trees to arrive in Scotland, some 11,000 years ago, followed shortly by Hazel and about 1500 years later by Oak and Elm and by 8,000 years ago most of the major species were present (Tipping, 2003). Between 7500 and 5000 years before the present there was an optimum climate for the growth of trees (Gillen, 1995) - the Southern Uplands probably had trees right to their summits 7,000 - 6,000 years ago and were dominated by Oak (Tipping, 2003). However, the climate became colder and wetter around 5,000 years ago, Elm declined and peat began to form where forests once grew (Gillen, 1995). Around the same time the effects of agriculture become discernible in the evidence for past landscapes (Tipping, 2003) as fire cultivation and grazing began to make and maintain open areas. Clearance of forest to provide for the agricultural and pastoral needs of increasing human population has certainly been going on for a very long time - "*Considerable tracts of Southern Scotland and the north of England were largely deforested in a series of rapid events in the immediately pre-Roman centuries, in a wholesale manner not previously encountered*" (Armit & Ralston, 2003). Such changes in catchments would have had significant effects on their streams - when the forests of the Bowmont Valley were cleared around 2,300 years

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ago, the resulting surge in erosion produced a layer of gravel 8 cm thick in the sediments of Yetholm Loch (Smout, 2000). In mediaeval times, the process of de-forestation is well summed up by the fact that when the monks of Melrose Abbey rented large areas of grazing in the Bothwell and Monynut valleys in the late 12th century they also got licence to cut as much wood as they wanted : Unless there was a positive programme of fencing to allow regeneration, felled trees would not be replaced in an area used for grazing (Fawcett & Outram, 2004).

By the early Middle Ages, there were two "forests" in the catchment - Gala & Leader and Ettrick - that were preserved as royal hunting reserves. The name "forest" for these areas does not necessarily mean dense woodland, although there could be such areas in a "forest": rather that these areas were "waste" in the sense that they were royal property from which agricultural rents were not expected as their prime purpose was to provide wild deer (and boar) for hunting. Rents from temporary grazings of domestic animals within forests were, however, collected. The processes by which these two royal hunting "forests" were turned from being, it would seem, primarily woodland to being largely or wholly pastureland is covered by Gilbert (1979) and is summarised here: The Royal Forest of Gala and Leader appears to have been created shortly after 1136 when Melrose Abbey received rights to pasture animals and cut wood in it - the latter right, in addition to the right of "*pannage*" (to graze pigs on fallen acorns) that was also given, shows that Oak forest must have been part of the reserve. There are records of land being formally "*assarted*" (cleared of trees and turned into farmland) near Kedslie by a local landowner in the reign of David I (1124-53), but the greatest pressure came from the monks of Dryburgh and Melrose whose overlapping claims to pasturage brought them into a dispute that was settled around 1160. By 1180, Melrose Abbey had acquired rights to graze animals anywhere in the forest and continued to expand its rights to build; pasture and plough to the extent that in 1263 Alexander II gave up attempting to maintain his "*forest*" and granted it all to the monks. In Ettrick Forest, by contrast, the pressure on the woodland seems to have come largely from the crown itself: In 1330 the royal horse stud was transferred to Ettrick forest from the North-east of Scotland and it remained at "*Catcarmauch*" till 1501. As well as horses, royal sheep flocks were established by James I (1406-37) and after Ettrick returned to royal control in 1455 the number of "*steads*" (areas of farmland) under direct crown control was gradually increased from five to twenty-one giving an estimated flock of 6,300 sheep by the time of James IV (1488-1513). The pressures of economic expansion increased towards the end of the fifteenth

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century and by 1509 even permission to plough in the "forest" where it had become customary to do so was conceded, as was the right of tenants to sub-let land. The "forest" was effectively feued out by 1510, ending its primary purpose as a reserve for wild animals for hunting. It is interesting to note that while the fine for felling an Oak tree in the Ettrick forest was £10, it was only six shillings and eightpence for an Ash tree (Gilbert 1979, Table 13). That there was still a substantial amount of woodland in Ettrick by 1510 is shown by the fact that a Justice Ayre in Selkirk recorded no less than 148 wood-cutting offences by the inhabitants. However, the change from woodland to open, grazed, valleys and moors is summed up by the two verses at the head of this section : The 16th century verse praises the woods and wildlife of the Forest of Ettrick, the early 19th century verse refers to the "bare and open" valley of the Yarrow.

That the land obtained for agriculture by the clearing of trees rapidly lost fertility in the days before the widespread use of lime and fertiliser is apparent from documents relating to one of Melrose Abbey's farms or "granges", Drygrange (formerly Fauhope). The tenant who first cleared the fields of trees had originally been charged an annual rent of 10 merks by the abbot of Melrose but the land had proved so fertile that an additional five chalders of Bear (a kind of barley) had been levied. However, yields declined rapidly so that by 1537, the then tenants were appealing for a reduction, supported by the testimony of an elderly neighbour who said that it now took three acres of arable land at Drygrange to produce what one acre had done just after the original clearance (Fawcett & Oram, 2004).

The shortage of substantial trees in the upper catchment by the 17th century is noted in Pennicuick's "Description of Tweeddale", originally published in 1715, where it is said:

"Their greatest want here is of timber. Little planting is to be seen in Tweeddale, except it be some few bushes of trees about the houses of the gentry; and not one wood worth naming in all this open and windy country. So that this unhappy want of foresight in their forefathers necessitates them to be obliged to the Sherifffdom of Lanrick (Lanark) for most part of the timber necessary for their houses and husbandry. Yet, of late, there begins to appear amongst the young nobility and gentry of this place a general genius for planting; which in a few years will turn to the ornament as well as the advantage of this cold and naked country, where all sorts of forest trees will prosper well enough upon due pains and care as it is credible this has been a woody country of old"

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The editor of the 1815 edition of this work adds in a note to the section quoted here that "*Proofs of this penury of wood still remain ... there is hardly a planted tree to be met with that has yet been in the ground above seventy years in the whole county....*". The role of intensive sheep grazing in preventing the regeneration of trees is several times referred to by this editor, including the comments that:

".. the grasping and narrow views of the old storemasters led them to over-reach the mark and to injure themselves and the public by over-stocking their farms and over-milking their ewes. Their blind rapacity had the baneful effects of wasting both, by treading the grass and exhausting their already over-drawn flocks in searching for food ... Of late, more enlarged ideas and liberal principles taught and assisted by experience have shown the storemasters that their true interest is to stock light and milk little, if at all, in order to obtain the largest quantity of and most nourishing herbage..... Indeed, had they formerly been much wiser than their sheep, a very small portion of reflection must have taught them that it was absurd to expect even the same, and much more so, a greater quantity of vegetable food, from plants trodden down, and cropped and checked and stinted at the very outset of their growth by heavy stocking...Although now bare and naked from the indiscriminate application of the surface to the pasturing of sheep, even in the remembrance of the oldest inhabitants, considerable patches of natural wood remained on the banks of the Lyne about Drochil Castle..."

The change in attitude towards planting by landowners in the Tweed catchment noted by Pennicuick (1715) is verified by the fact that just a few years later, in 1729, a tree nursery, Dickson's of Hassendeanburn, was established near Denholm, which was later calculated to have supplied enough trees to stock 48,000 acres (House & Dingwall, 2003). A description of Selkirkshire by John Hodge in 1722 lists the baronial houses as either having :- "*Orchards*" - (Deuchar Tower; Sundhope; Gilmanscleuch): "*Orchards and plantings*" - (Philiphaugh; Tushielaw; Oakwood): "*Orchards, parks and plantings*"- (Broadmeadows; Eshiestell, Whitebank): "*Orchards, avenues and plantings*" - (Sunderland hall) or "*Orchards, parks, avenues and plantings*"- (The Hangingshaw; Todrig; The Yair; Fairnilee; Torwoodlee; Gala; Bowhill; Whitslaid). Only three places however, are mentioned as having considerable areas of woodland : - at Kirkhope Tower (Ettrickbridge) it was reported that "*there is a great wood of several sorts of timber goes easte from the toure down the water near two myles, but is now almost cut down*

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except some small remains of the wood yet growing"; Newark Castle, where it is said there is "a great deall of wood above and below" and around Plora (on the Tweed), "a great deall of wood". This same source includes a description of just how heavily the land was grazed:

"It is remarkable that the fforest is fitt for breading great store of white cattle . In it ther is ane hill called Kershope Hill within a short mile of the Water of Yarrow, the water on the west pairt thereof and the water of Etrick on the south a myle half distant or therby, it does belong to John Murray of Philiphaugh heritable sheriffe of the shire. On this hill is a cross called Taitts Cross where is to be seen boughted** and milked upwards of twelve thousand ewes in the month of June about eight a clock at night in one view".*

* Cattle is being used in its generic meaning of domestic animal here, so "white cattle" means sheep.

** A "bught", "bucht" or "bought" is a sheep fank or fold

In 1829, curiosity about the original forest cover of the Borders led the then Duke of Buccleuch to set aside some 300 acres of land (ranging in altitude from 600' to 1000') at Howbottom which was then left to see what might regenerate naturally in the absence of grazing. The results were surveyed in 1879 but no Oaks had re-appeared (Crichton & Wight, 1893).

Complete deforestation is more recent in some areas than might be thought - the Old Statistical Account for the Parish of Cranshaws on the upper Whiteadder which was written in 1791 noted: *"The Whiteadder or Whitewater runs along the N. and E. sides of the parish - The river Dye also runs through part of this district.....The banks of both were formerly covered with natural wood, which rendered the appearance of the country in summer most delightfully romantic; but now there is not a tree or even a shrub to be found on them."* Another place where trees persisted was the valley of the Jed, where a number of 19th Century angling authors refer to the greater difficulty of fishing there because of them (Anon, 1858), though Dorothy Wordsworth recorded not only that there had been extensive felling there in 1803 (Walker, 1997) but also that Pear orchards existed around Jedburgh, the produce of which were well known throughout Scotland. This lack of tree cover might well have had an impact on the history of rod fishing in the area as in the past rods were made from local wood, an aspect of fishing long forgotten since imported woods such as Greenheart and Hickory took over in the mid-19th Century. According to the earliest surviving account of rod fishing in English, the *"Treatise of Fishing with an Angle"*, printed in 1496, and summarised in Hills (1921) the wood for a rod must be cut between Michaelmas and Candlemas, heated in an oven, straightened by being tied to

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a straight piece of wood and thoroughly dried in smoke. The butt should be of Hazel, Willow or Rowan, six feet long or more, "*as thick as your arm*" and evenly tapered, the inside being burnt out to make it hollow. The top was to be in two parts, spliced together, the whole as long as the hollow butt into which it fitted. The lower part of this was to be of green Hazel and the upper a "*fair shoot*" of Blackthorn, Crab Apple, Medlar or Juniper. The woods for the butt are obviously chosen from species that can grow very straight and smooth trunks and those for the tip must be those that are "springy" as well as straight.

The two verses quoted at the head of this section summarise the change that took place within the catchment from the Middle Ages to the 19th century, and this change affected rivers and streams as well. The heavy and continuous grazing that prevented the regeneration of trees would also have affected the shape and form of the streams of the catchment. Grazed bankside turf has shallower roots than ungrazed or lightly grazed and is less able to resist the effects of trampling by hooves or the scouring effects of spates, making bank collapse more common, and a process by which streams became wider and shallower and deeper areas fill with gravel begins. Gillen (1995) notes that there has been an increase in river erosion and in the effects of frost and ice on high tops during the last 500 years, possibly due to increased grazing pressure in upland areas. Gradual changes like these are generally not noticed, but one event was recorded when circumstances combined to produced a sudden change on the Douglas Burn, the first large tributary on the Yarrow downstream of St. Mary's Loch :

"Twenty-five years ago (this would be around 1885), however, the character was changed. There had been a severe frost of nearly eight weeks duration; but the thaw came on suddenly, and the ice-bound tributaries of the Douglas broke loose and came tearing down the valley, bursting the banks, and leaving three burns where only one had been. It has never recovered from the effects of this flood, and there is now scarcely a pool left in its course, all being comparatively shallow runs where few big trout could find shelter" (Fraser, in Anon. 1911)

What was being recorded here was the final breakdown of a stream whose banks, in a valley that had been an important centre of population for centuries, were unable to cope with one more winter. The fact that they gave way so completely and suddenly shows that they were without protective vegetation and from being a natural stream with runs and pools it was turned

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in to a wide, gravel, plain with the stream meandering through it, often splitting into more than one channel (a "braided stream").

The first half of the nineteenth century saw a change away, at least in some areas, from the unwooded, open, grazing ground that had succeeded the forest. Sir Thomas Dick Lauder, born in 1784 and writing in 1848 could say:

"We confess that we are pretty well acquainted with most of the districts of Scotland, but we have no difficulty in stating, that we know of no district which has been so completely metamorphosed since the days of our youth as that of Gala Water. According to our early recollections, the whole wore a pastoral character. Crops were rare, and fences hardly to be met with. Not a tree was to be seen, except in the neighbourhood of one or two old places and especially at and around Torwoodlee and Gala House, near the mouth of the river. Everything in sight was green, simple and bare.... (now)... The whole country is fenced, cultivated and hedged around. Thriving and extensive plantations appear everywhere."

As this summary shows, the land cover of the Tweed catchment has seen huge changes over the past 500 years, from native forest, to bare treeless haughs and uplands and then to the patchwork of fields and woods of the present day. If the massive drainage of the early 19th century covered in Section 2.3 is added to this picture then it can be seen what massive ecological changes the native fish of the catchment have had to adapt to over quite a short period.

(B) Present Day Land Cover: The modern vegetation covers of the Tweed catchment are listed in Tables 2.4.1 a to c, taken from *The Land Cover of Scotland* (MacAulay Land-Use Research Institute, 1993). Other than the moorland and rough grass of the higher uplands and the trees surviving there in the narrow cleuchs, little can be regarded as natural or even semi-natural. Some of the lowland catchments are heavily agricultural - 89% of the catchment of the Leet was arable land in 1986 as was 68% of the Eden and 75% of the Turfford Burn on the Leader. At the opposite end of the scale the Dye, Lugate, Glensax and Caddon were all over 50% moorland and the Allan, Heriot and Cor over 50% rough grass. Only two catchments were over 50% Coniferous Plantation in 1986, the Rankle and Tima Waters on the Ettrick.

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Table 2.4.1a : Catchment areas, altitudes and percentage land-cover, Upper Tweed and Ettrick

	Area (km ²)	Altitudes (m)		Arable		Grassland		Woodland		Open	
		Source	Mouth	Crops	Impr.	Rough	Moor	Conif	Other	Water	Urban
UPPER TWEED											
Cor	9	580	378	0	+	70	13	15	0	0	0
Fruid	24	730	258	0	1	70	6	5	0	5	0
Talla	25	680	238	0	2	55	8	13	+	5	0
Kingledores	14	550	215	0	2	60	34	+	+	0	0
Stanhope	16	750	205	0	1	8	77	1	0	0	0
Biggar	122	250	188	0	55	25	10	7	+	+	1
Lyne	162	410	170	0	44	30	8	13	2	+	1
Manor	67	520	165	0	13	44	31	10	+	0	0
Eddleston	63	285	160	0	51	26	2	14	2	0	2
Glensax	23	695	155	0	17	15	56	10	1	0	+
Quair	49	690	140	0	16	43	14	25	1	+	+
Leithen	56	500	138	0	6	30	32	30	1	0	1
Caddon	35	550	113	+	31	15	51	1	+	+	1
Upper Tweed	962	460	98	0	28	30	19	19	1	+	1
ETTRICK											
Tima	31	355	230	0	1	12	2	85	+	+	0
Rankle	36	410	220	0	2	41	1	56	0	+	0
Yarrow	232	500	125	0	8	50	26	12	1	2	+
Ettrick	504	510	98	1	13	46	14	21	1	1	1

Table 2.4.1b : Catchment areas, altitudes and percentage land-cover, Middle Tweed, Gala, Leader and Teviot

	Area (km ²)	Altitudes (m)		Arable		Grassland		Woodland		Open	
		Source	Mouth	Crops	Impr.	Rough	Moor	Conif	Other	Water	Urban
MIDDLE TWEED											
Ellwyn	32	360	88	1	76	17	2	2	2	+	+
Bowden	17	250	65	27	50	13	+	3	1	1	2
M Tweed	195	98	28	48	32	7	1	4	3	1	3
GALA											
Heriot	48	630	240	0	16	53	34	4	+	0	+
Lugate	32	570	173	0	25	15	58	2	+	0	0
Gala	214	360	93	1	45	26	18	6	1	0	2
LEADER											
Cleekhimin	25	400	185	0	17	29	54	+	0	0	0
Earnscluch	18	455	160	5	7	17	63	8	0	0	0
Boondreigh	60	440	140	7	33	14	39	6	1	+	0
Turfford	23	145	98	75	11	+	0	9	1	0	2
Leader	263	420	75	20	37	15	20	5	1	0	1

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	Teviot										
Allan	35	520	135	0	21	57	4	18	1	0	0
Borthwick	90	420	115	0	19	27	+	42	1	+	+
Slitrig	66	410	100	0	31	41	1	24	1	+	1
Rule	98	390	65	4	43	17	+	31	2	0	+
Ale	175	360	58	14	35	29	1	18	1	1	+
Jed	147	450	53	3	34	12	4	35	2	0	1
Oxnam	73	305	48	9	46	24	0	11	+	0	0
Kale	160	400	45	24	26	34	1	7	+	+	+
Teviot	1134	330	28	12	33	26	1	21	1	+	1

Table 2.4.1c: Catchment areas, altitudes and percentage land-cover, Eden, Leet, the Scottish part of the Till and the Whiteadder

	Area (km ²)	Altitudes (m)		Arable Crops	Grassland			Woodland		Open Water	
		Sour	Mout		Im	Roug	Moo	Coni	Oth	Wat	Jrban
EDEN											
	125	230	25	68	18	6	0	4	3	+	+
LEET											
	114	65	10	89	6	+	0	2	2	+	+
TILL (Bowmont - Scottish part only)											
	98	530	30	4	33	54	3	5	+	+	+
WHITEADDER											
Bothwell	26	320	195	0	19	47	4	29	0	0	0
Dye	78	480	165	1	20	33	53	2	+	+	+
Monynut	20	380	145	0	26	25	11	36	2	0	0
Blackadder	168	385	35	34	31	17	9	5	2	+	1
Whiteadder	509	360	3	26	28	16	20	8	+	+	1
TWEED IN SCOTLAND											
TWEED	4875	460	0	15	24	22	10	13	1	+	1

DATA FROM: The Land Cover of Scotland, MacAulay Land-use Institute, Aberdeen, 1993

The Moorland column combines landuse categories "Heather" and "Peat

The Rough Grass column combines the landuse categories "Good" and "Poor" "Rough grass"

The Other Woods column combines landuse categories "Deciduous", "Scrub"

The Coniferous Plantation column combines landuse categories "Coniferous", "Felled" and "Newly Planted"

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Map 2.4.1, of the land cover of the catchment, is also from the 1993 edition of the "Land Cover of Scotland" produced by the MacAulay Institute, and shows the three broad zones that would be expected. The lower river is surrounded by arable land, the steeper areas further away from the main river are grassland of various types and the higher hills around the edges of the catchment are moorland and coniferous plantation.

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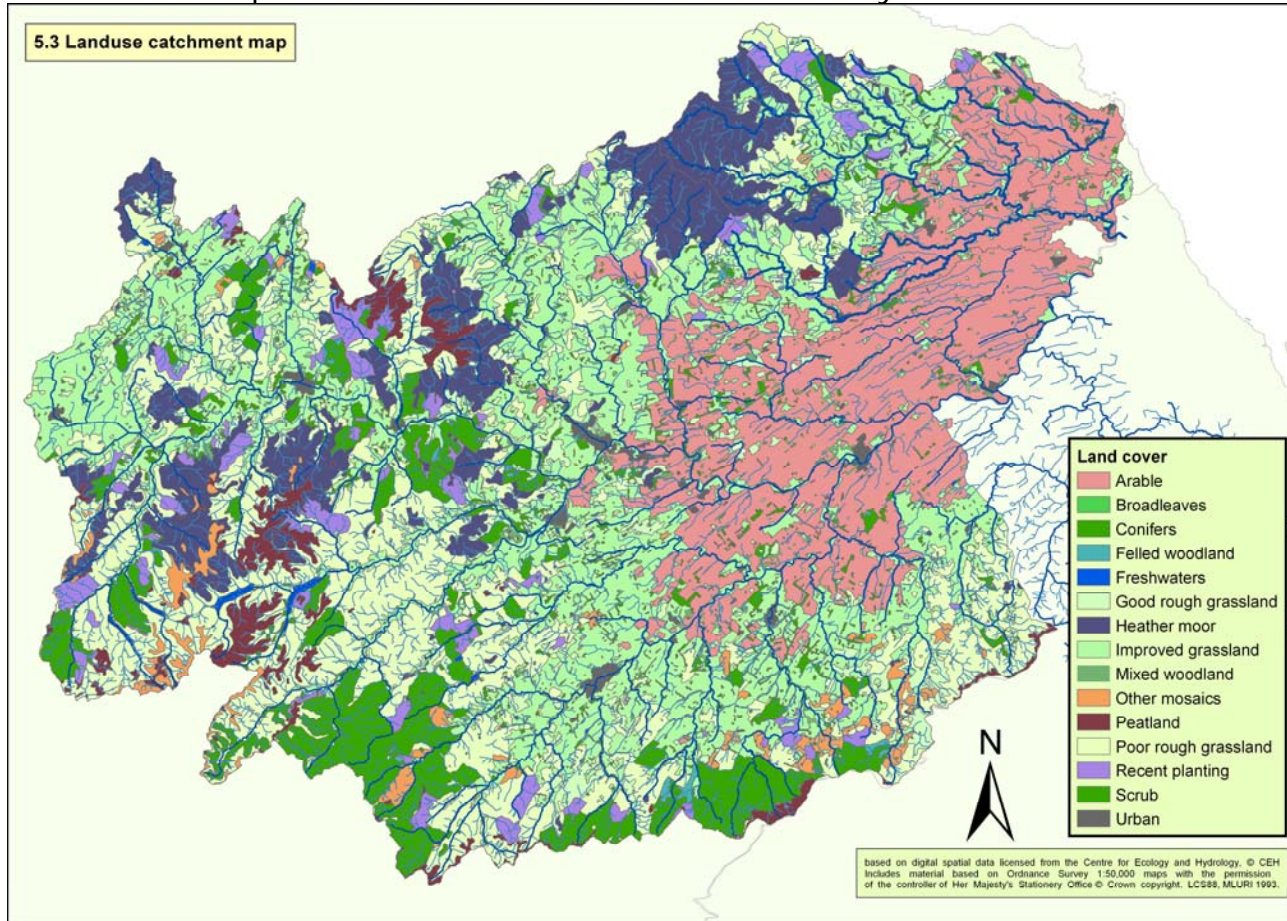
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Map 2.4.1 The Land Cover of the Tweed & Eye catchments



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