KOONYA B WATER QUALITY

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BACKGROUND

This brief report has been written to summarise the water quality investigations that have been undertaken in the Koonya area to date. The aim of this report is to determine: (1) whether the existing information provides any evidence that forestry operations to date have affected the water quality at the Koonya B spring; (2) whether there are factors other than forest operations that may have affected the water quality at Koonya B.

LONG-TERM RECORDS AT KOONYA B

Forestry Tasmania Water monitoring

Forestry Tasmania has been recording water quality (Table 1) at a site named Koonya B (Figure 1) since February 1994. The purpose of the study was to provide long-term baseflow trends so that any possible effect of future harvesting operations could be detected. No attempt was made to relate water quality to specific events such as storms.

The sampling site is a spring behind an empty house at map reference Sheet 5522 (Port Arthur, Edition 1, 1985) 565270 5228000. The record provides an indication of water quality over an eight-year period that includes the date of harvest of the Geoff Giblin coupe (April 1998) which is about 500 m distance upslope from the sampling site (Figure 1).

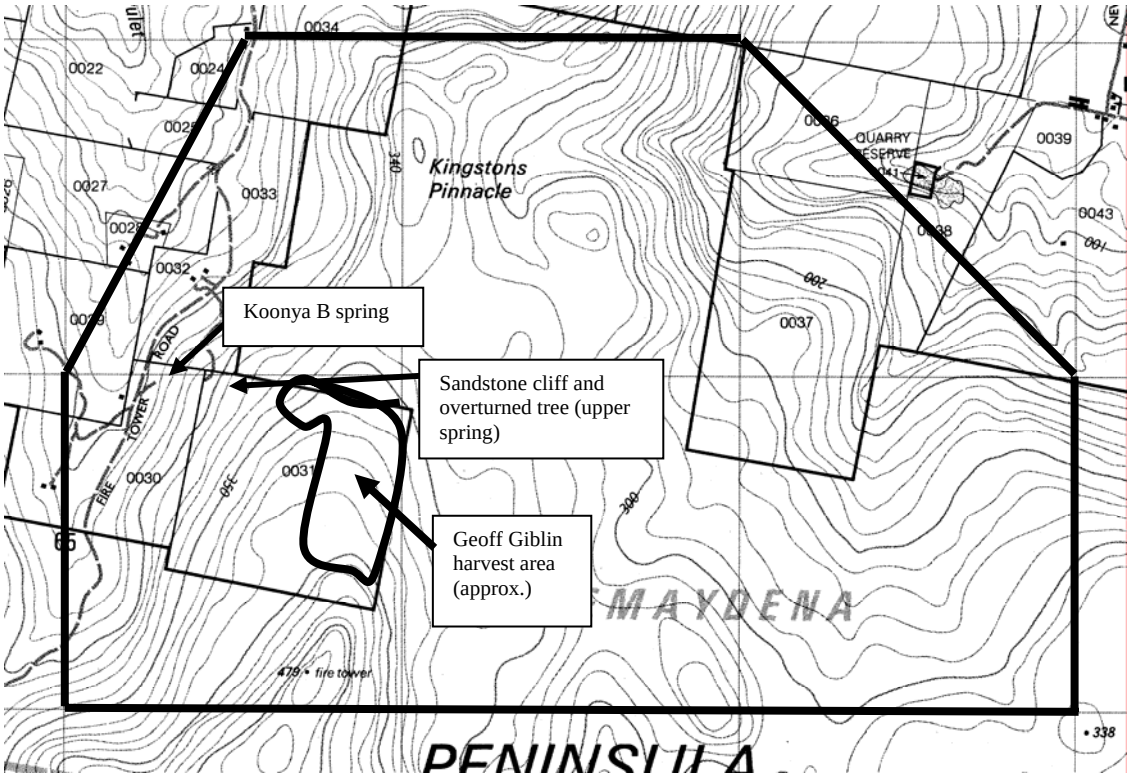

Figure 1. Outline of study area and location of the Koonya B spring and water sampling site and other features mentioned in the text. Positions are approximate.

Figure 2 presents the turbidity data of Table 1 plotted against rainfall, for Palmers Lookout rainfall Station on the Tasman Peninsula. (The rainfall record for Premaydena was also plotted and showed a very similar pattern).

Bearing in mind the widely-spaced and irregular sampling intervals, some limited conclusions can be drawn from the data in Table 1 and Figure 2:

- Total dissolved solids (TDS) values have remained relatively constant throughout the sampling period, and are on the low side for water derived from fractured dolerite (Sloane 1987), indicating a relative short contact time between the water and the rock and associated soils.
- Total suspended solids (TSS) range from a minimum of 3 mg/L to a maximum of 52 mg/L. The highest TSS and turbidity values (52 mg/L and 63 NTU) preceded activity on the Geoff Giblin coupe, which was logged in April 1998, indicating that peak TSS values may be caused by factors other than forest harvest. The coupe was burned in late April 1999 but there is no indication that this activity has affected water quality measurements.
- Mean turbidity is 23.5 NTU and has commonly exceeded the 5 NTU guidelines since records began in 1994. There is no apparent relationship between turbidity and rainfall.
- Average pH is slightly alkaline. Values are in the range 6.5 to 8.8 and show no trends with time.

Table 1. Water quality analyses at Koonya B sampling site.

Date	Colour (CU)	pH	TDS (mg/L)	TSS (mg/L)	Turbidity (NTU)
9 Feb 1994	-	-	-	-	4
9 May 1994	30	8.8	270	9	11
11 Jul 1994	40	8.0	250	13	16
31 Aug 1994	20	7.8	280	4	7
28 Nov 1994	85	7.5	255	6	15
6 Feb 1995	40	7.9	290	15	14
6 Apr 1995	20	7.7	280	3	3
23 Jun 1995	125	6.6	260	22	27
27 Sep 1995	50	7.7	265	12	13
21 Nov 1995	125	7.2	255	14	20
27 Feb 1996	30	8.1	275	15	5
20 May 1996	30	7.0	305	10	11
22 Jul 1996	50	7.4	280	17	16
18 Sep 1996	30	7.8	305	13	14
5 Feb 1997	100	7.5	300	14	21
6 May 1997	50	8.0	260	46	20
16 July 1997	40	7.8	275	12	12
29 Sep 1997	300	6.5	225	52	63
2 Dec 1997	50	7.9	280	14	12
12 Feb 1998	30	6.5	270	18	17
6 May 1998	20	7.6	260	14	13
30 Jul 1998	30	7.2	280	?	9
23 Dec 1998	5	8.0	280	20	11
8 Apr 1999	175	7.4	270	20	38
26 Aug 1999	50	7.9	290	10	16
20 Sep 1999	50	8.0	290	20	16
15 Mar 2000	30	8.1	250	20	15
8 May 2000	50	7.8	286	16	16
25 Jul 2000	60	7.7	286	12	12
5 Aug 2000	50	7.8	286	16	16
29 Sep 2000	40	7.5	284	13.	13
19 Nov 2000	70	7.5	264	21	20
11 May 2001	40	8.1	270	12.	12
12 Nov 2001	40	8.3	280	7	10
7 Feb 2002	30	8	272	9	8
26 Sep 2002	1	7.3	249	14	5
19 Dec 2002	-	-	-	-	11

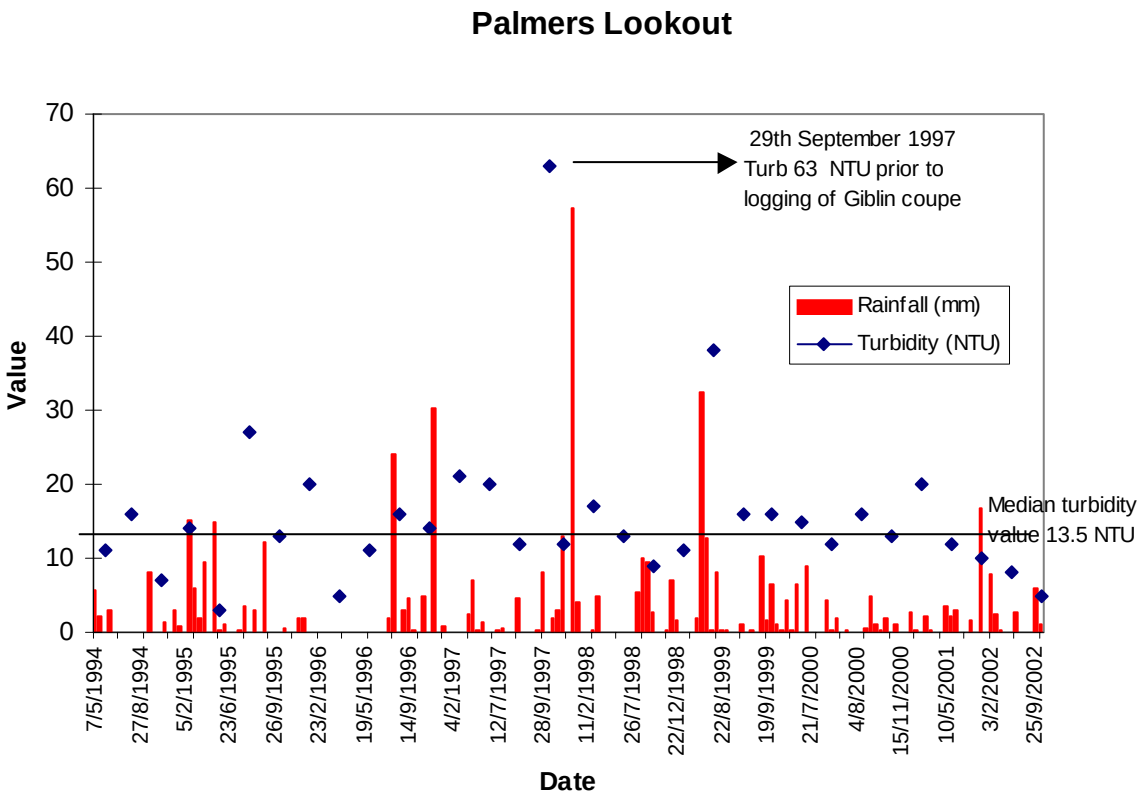

Figure 2. Turbidity in the Koonya B spring water in relation to rainfall at Palmers Lookout. *Plot by Kate Berry, DPIWE, Hobart.*

Evidence from the Giblin coupe

On 1 August 2002 Peter McIntosh, Tony O'Malley (forestry consultant) and Harvey Cusick (Gunns Ltd) visited the Geoff Giblin coupe to assess soil disturbance and its possible influence on the water quality of streams and springs near Firetower Road (McIntosh 2002). The coupe was harvested in April 1998 and burnt in April 1999. The burn was a low-intensity burn (not hot) and as a result eucalypt regeneration was poor although weeds and low shrubs now form an almost 100% cover. It was noted that the c. 12 ha harvested area of the coupe was confined to the rolling land in the east of the Giblin Block and was entirely underlain by deep soils in weathered dolerite. There was no evidence of surface flow of soil material except some slight movement on tracks. There are no streams flowing directly from the harvested area of the Giblin block to the Koonya B stream. Geoff Giblin's hut on the property was beside a stream which was running clear, as was a spring at 565517 5227853 (referred to as the 'sandstone cliff' or 'upper' spring in other reports) flowing to the Koonya B spring at lower altitude. Natural instability in the form of fresh scarps of soil was noted on steep lower slopes of the Giblin Block. These slopes were undisturbed by recent logging.

These observations (and the evidence of water quality measurements when compared to time of harvest and burning on the Giblin coupe) provide no support for the hypothesis that harvest on the Giblin coupe has directly affected water quality of streams or springs draining the coupe. The turbidity evident in the Koonya B spring is likely to originate from sources in sedimentary rocks and soils formed in them, mostly outside the Giblin property. These sources are further discussed below.

Evidence from the Koonya B stream

During initial fieldwork for the soil and geological surveys on 9 December 2002 the Koonya B spring was inspected and found to be cloudy (Figure 2). Immediately upstream of the Koonya B sampling site the stream flows across a bench (interpreted to be an alluvial fan) supporting moist forest, growing on soils estimated to have moderate to high erodibility (Davies and McIntosh 2003) and showing tunnel-gully erosion. Upstream of this area the stream passes within a couple of metres of an upturned tree which is shedding siltstone from its root ball (Figure 3). The vegetation growing on the root ball indicates that the tree probably fell 2–5 years ago. About 5 m east of this tree is a sandstone cliff 3–4 m high over which clear water flows (the 'sandstone cliff' spring). The water is trapped in a drum from which alkathene pipes feed domestic water intakes.

To provide further information on the possible contributions to turbidity from these various sources Alan Nash (Forestry Tasmania) sampled the Koonya B stream at various measured points between the Koonya B intake and the sandstone cliff 287 m upstream on 9 December 2002, using standard sampling techniques and duplicate sampling bottles. Mean turbidity values are shown in Figure 4.

Figure 2. The Koonya B spring and sampling site, showing the cloudy water. *Photograph: B. Haywood, 9 December 2002.*

Figure 3. Overturned tree 260 m upstream from the Koonya B spring and water sampling site. The siltstone particles on the root ball have been washed into the nearby Koonya B stream. *Photograph: B. Haywood, 9 December 2002.*

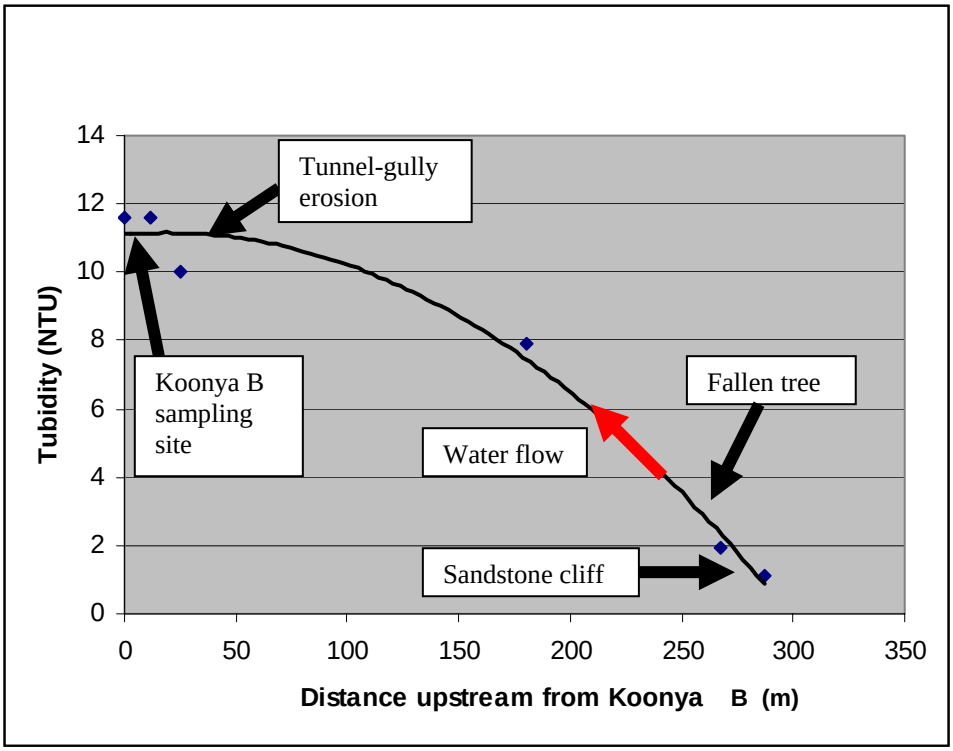

Figure 4. Mean turbidity levels (diamond symbols) at the Koonya B sampling site and at five points upstream, 9 December 2002.

The results indicate that a turbidity source or sources occur(s) between the sandstone cliff and the Koonya B sampling site. Field observations show that the fallen tree, which is shedding siltstone from its root ball, and the tunnel-gully erosion further downstream, are likely to be sources of the turbidity noted. The soils in which the tunnel gully erosion occurs have been described in the soil report (Davies and McIntosh 2003).

CONCLUSIONS

Water analysis of Koonya B spring since 1994 shows that the water from this spring regularly exceeds the 5 NTU guideline for drinking water. The median turbidity is 13.5 NTU. Neither the water analysis nor the field evidence from the Giblin forestry coupe indicate an effect of forestry activities on water quality. Nor is there any evidence that high rainfall consistently causes turbidity. Field evidence indicates that both an upturned tree and tunnel gully erosion immediately upstream of the Koonya B spring are likely to have contributed to turbidity in the Koonya B spring water.

REFERENCES

Davies, S. and McIntosh, P.D. 2003. Soil survey of the Koonya district. Forest Practices Board, Hobart, 10 p.

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