

PROTECTION FOR THE PURPLE SPOTTED GUDGEON IS LONG OVERDUE

Dailan Pugh, North East Forest Alliance. March 2017



Purple-spotted Gudgeon

Photo Dailan Pugh

Since the Purple-spotted Gudgeon was listed as endangered in 2006 the NSW Forestry Corporation has been required by its Fisheries Licence to stop logging "unmapped" drainage lines within 100km upstream of where potential habitat occurs and to undertake detailed habitat assessments when proposing instream works where potential habitat occurs within 2km upstream or 5km downstream. It wasn't until May 2016 that Fisheries NSW mapped the potential habitat of Purple-spotted Gudgeon, though the Forestry Corporation has since ignored its legal obligations to protect this Endangered species and is currently unlawfully logging 43 compartments in Bowman, Broken Bago, Bulls Ground, Burrawan, Comboyne, Conglomerate, Cowarra, Divines, Enfield, Gibberagee, Kiwarra, Pine Creek, Styx River, Tambo, and Wang Wauk State Forests by not complying with their Fisheries Licence. They need to stop until they comply with their legal obligations.

Forestry Corporation undertake logging operations under a Fisheries Licence (FL), introduced as an outcome of the Regional Forest Agreement in 1999, which is intended to regulate activities so as to reduce impacts of logging operations on State and Commonwealth threatened species of fish.

When the licence for north-east NSW was issued in 1999 it was specifically intended to reduce logging impacts on the habitat of the Endangered Eastern Freshwater Cod and Oxleyan Pygmy Perch. In 2006 the Purple-spotted Gudgeon was upgraded from an endangered population (on the Tablelands) to as endangered species in response to both its ongoing decline and its re-recording in coastal north-east NSW.

Loss and degradation of riparian vegetation and decreased water quality due to runoff from disturbed soils are known to be two of the principal threats to freshwater fish. The removal of riparian vegetation decreases the provision of overhanging vegetation and woody debris used as shelter by fish, the inputs of detritus used as food for the invertebrates the fish feed on, and reduces the ability of vegetation to trap and prevent sediments from entering streams. The fisheries licence thus focuses on controlling activities in streams and (minimally) protecting riparian vegetation.

The Fisheries Licence (condition 7) defines two habitat classes:

Class 1 aquatic habitat is defined as that part of a watercourse, wetland or other water body where potential habitat of threatened species does occur within 2km upstream or 5km downstream of the site of the proposed works

Class 2 aquatic habitat is defined as that part of a watercourse, wetland or other water body where the potential habitat of threatened species does occur within 100km downstream of the site of the logging.

These habitat classes require various responses from the Forestry Corporation, most significantly triggering the preparation of Aquatic Habitat Assessments (AHA), fish surveys in Class 1 habitat, improved design and implementation of stream crossings, and the requirements (7.1a, 7.1b) to establish exclusion, buffer and special operational zones around streams. For "unmapped" drainage lines and first order streams there are requirements for 5m exclusion zones, 5m buffer zones and 10m special operational zones.

Unmapped drainage lines are those streams that are not depicted on the 1:25,000 topographical maps that were prepared decades ago. Many streams were missed in that process, particularly headwater streams in forests where the streams were obscured by the dense canopies. Remapping of streams on State Forests was undertaken some years ago using Lidar, resulting in accurate mapping of all streams, though only those streams that correspond to the old 1:25,000 mapping are now routinely provided with buffers, with the other mapped streams still referred to as "unmapped" and mostly not provided with buffers unless threatened fish occur within 100km downstream.

Pugh (2016) found that for the Richmond and Clarence catchments 62% of the stream length is within catchments 0-20ha and that 43% of these streams are 'unmapped'. It is apparent that it is along the smallest streams and drainage lines where most of the interaction between terrestrial and aquatic environments occurs, and thus they have the most significant impact on downstream water quality.

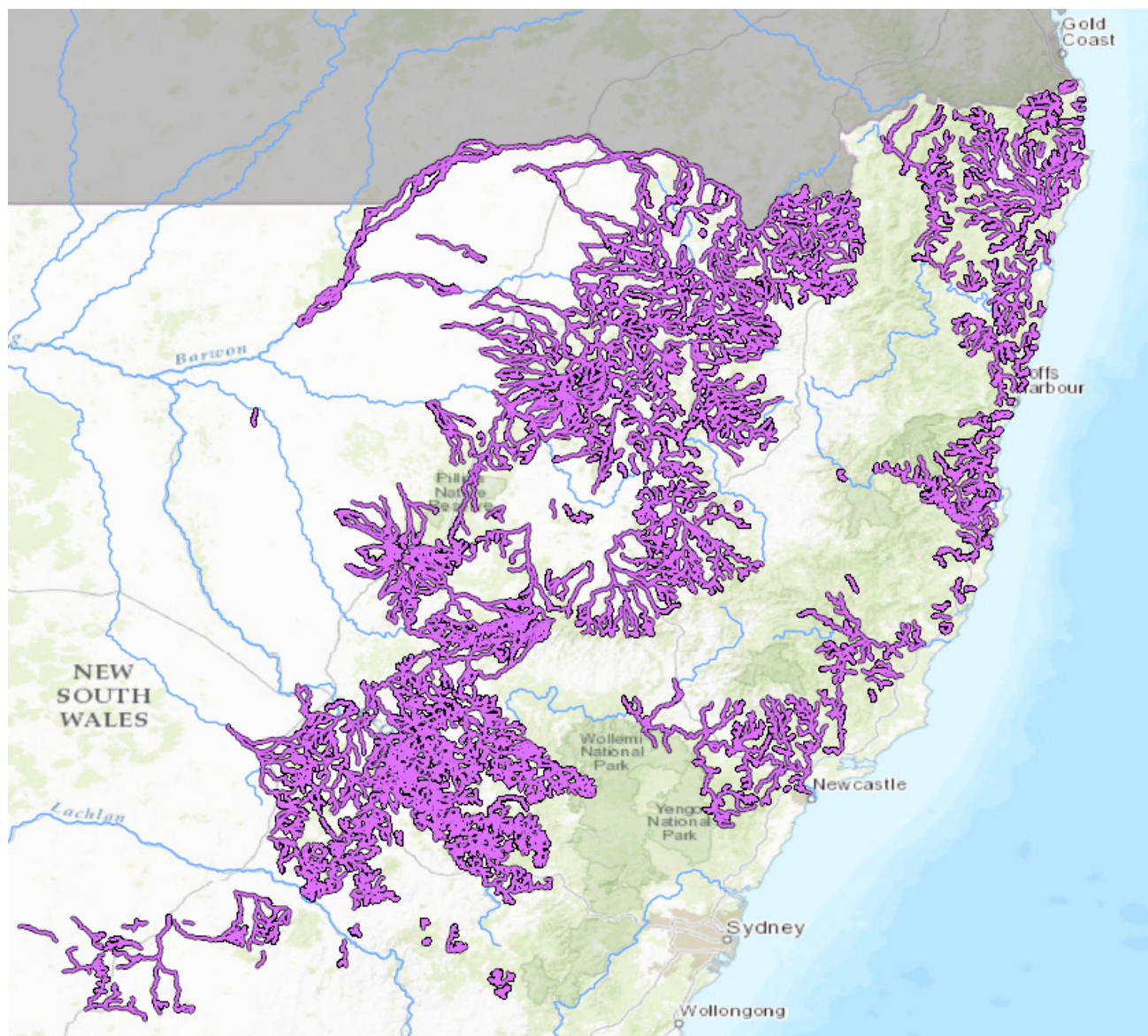
While the Purple-spotted Gudgeon has been identified as endangered in coastal north-east NSW since 2008 the Forestry Corporation has never done anything to protect it on the grounds that Fisheries NSW had not provided them with maps of its habitat.

This changed in May 2016 when the NSW Department of Primary Industries (DPI) published their "Fish communities and threatened species distributions of NSW" (Riches *et. al.* 2016) which identified the DPI's mapping of the habitat of a variety of threatened fish, including the Eastern Freshwater Cod and Purple-spotted Gudgeon. So since May 2016 the Forestry Corporation should have been identifying and appropriately managing Class 1 and Class 2 aquatic habitat for the Purple-spotted Gudgeon.

Though it is apparent that once again the Forestry Corporation have simply ignored their suite of legal obligations to mitigate impacts on the Purple-spotted Gudgeon. For this review the

requirement to protect "unmapped" drainage lines in Class 1 and 2 habitat is used as an indicator of compliance with the Forestry Corporation's obligations.

A review of the Forestry Corporation's current March 2017 spreadsheets of logging operations identifies that 31 compartments comprise *Class 1 aquatic habitat* and 12 comprise *Class 2 aquatic habitat* for Purple-spotted Gudgeon. For all except 3 of these compartments the current March 2017 lists identify that "unmapped" drainage lines are being logged, for the other 3 the harvesting plans clarify that logging of drainage lines is being undertaken.



Purple-spotted Gudgeon habitat in NSW (Riches et. al. 2016)

Only two of the harvesting plans inspected were prepared after September 2016, though both these confirm that the Forestry Corporation is still ignoring the Purple-spotted Gudgeon in their planning processes. Styx River State Forest compartments 553-556, 562, and 563 comprise Class 2 habitat for Purple-spotted Gudgeon, yet the harvesting plan is dated 4/1/2017, does not consider the Purple-spotted Gudgeon and identifies "*Unmapped drainage line harvesting: permitted*". Similarly Conglomerate State Forest compartments 514-518 comprise Class 1 habitat for Purple-spotted

Gudgeon, yet the harvesting plan is dated 11/11/2016, does not consider the Purple-spotted Gudgeon and identifies "*Unmapped drainage line harvesting: permitted*".

This review of current harvesting plans also identifies the construction of new stream crossings in Class 1 habitat in two operations, and the use of 58 existing crossings, in Class 1 habitat, many of which would involve instream works to reconstruct them. Numerous other crossings of "unmapped" streams are proposed. This suggests numerous breaches of the requirements to prepare Aquatic Habitat Assessments that consider the Purple-spotted Gudgeon and to construct stream crossings up to the standard required by the Fisheries Licence in Class 1 habitat.

A total of 43 compartments have been identified as being unlawfully logged in Bowman, Broken Bago, Bulls Ground, Burrawan, Comboyne, Conglomerate, Cowarra, Divines, Enfield, Gibberagee, Kiwarra, Pine Creek, Styx River, Tamban, and Wang Wauk State Forests.

NEFA asked NSW Fisheries to intervene to stop the logging of "unmapped" drainage lines in Gibberagee State Forest in February 2017. As part of our subsequent investigations into that operation we uncovered that it comprises Class 1 habitat for Purple-spotted Gudgeon and have been asking Fisheries NSW to urgently require compliance with the Fisheries Licence. Our recent audit (Pugh 2017) revealed that "unmapped drainage" lines were not just logged, they were trashed. We are still waiting for Fisheries NSW to investigate while the logging goes on.



Trashed "unmapped drainage" line in Gibberagee State Forest, the drainage line is in the centre of the photo buried in debris (Pugh 2017)

1. Background



photo: Dailan Pugh

The Southern Purple-spotted Gudgeon (*Mogurnda adspersa*) is an attractive small fish up to 10-17 cm long. It inhabits still or slow-flowing freshwater streams and billabongs, preferring deeper pools and pools with low velocity flow and overhanging vegetation in small upland, tributary streams. It is associated with water plants, tree roots, rocks, undercut banks, and sunken logs, where it feeds on aquatic and terrestrial insects (such as mosquito larvae), crustaceans, molluscs, worms and small fishes.

After a dramatic population decline in the late 20th century, the species was thought to be extinct in NSW until it was rediscovered in 2002. In 2006, following its discovery on the coast, the Fisheries Scientific Committee proposed increasing the threatened status of Purple-spotted Gudgeon from an "endangered population" to Endangered across NSW. In 2008 it was listed as Endangered. Two populations occur in NSW, one in the upper waters of the Murray-Darling basin (particularly around Tenterfield) and an eastern coastal population from the Hunter River north to the Richmond and Brunswick catchments.

NEFA have found that the Fisheries Licence (FL) has rarely been applied or enforced.

The Fisheries Licence (FL) was always intended to be an ineffective licence, with most of its prescriptive measures covered by other Licences, particularly the Environment Protection Licence (EPL). One of the key problems is that Forestry Corporation consider that according to the FL, irrespective of publicly available data, they do not have to take any specified actions to protect threatened fish species unless the data is first provided to them by Fisheries NSW. On this basis, apparently the FL did not even come into effect until records of the endangered Eastern Freshwater Cod were provided by Fisheries NSW to the Forestry Corporation in 2002.

After Forestry Corporation was exempted from the Environment Protection Licence (EPL) for most operations in 2004 they embarked on a spree of logging unmapped drainage lines, even where they were still legally required to protect them by the FL, but, they claimed only where Fisheries NSW have provided them with the information.

For over a decade the Forestry Corporation have avoided taking needed action to protect a number of Endangered fish, even when publicly available information showing the presence of Endangered fish downstream, on the pretext that the Fisheries NSW have not explicitly provided them with the data. An environmentally responsible agency would have done it for themselves.

In our audit of Yabbra SF (Pugh 2009) NEFA identified 5 unmapped drainage lines which had not been marked in the field and documented 22 trees that had been illegally removed from their stream banks. From NEFA's small sample it was evident that many other unmapped streams had also been subject to logging and burning, with estimates that some 20ha of unmapped streams and 100s of trees were likely to have been illegally logged in this single operation. Forestry Corporation had ignored the requirements of the FL despite being informed that the endangered Eastern Freshwater Cod occurred downstream. NEFA's exposure of the problem made the Forestry Corporation start applying the requirement to protect Eastern Freshwater Cod, over 7 years after they had been provided with the maps.

NEFA's audit of Doubleduke SF (Pugh 2010a, b) found that Forestry Corporation had recognised the presence of the endangered Eastern Freshwater Cod downstream but not the publicly available evidence in the 2005 Oxleyan Pygmy Perch Recovery Plan of the presence and potential habitat of the endangered Oxleyan Pygmy Perch downstream. The Forestry Corporation claimed (J. Murray pers. com., November 2010) that they didn't need to consider the species because Fisheries NSW had not provided them with the required information, and Fisheries NSW agreed. Fisheries NSW had claimed in 2005 that "*Preparation of distribution data for the Oxleyan pygmy perch (Nannoperca oxleyana) ... is complete. [This] species could be affected by forestry operations and the distribution data is expected to be provided to Forests NSW shortly*". We documented further offences at Wedding Bells SF in 2011 and Royal Camp SF in 2012 but our complaints were ignored, and while Fisheries NSW claim to have provided the required maps to Forestry Corporation some time ago, they still haven't provided them to NEFA.

In May 2016 the NSW Department of Primary Industries published their 'Fish communities and threatened species distributions of NSW' (Riches et. al. 2016) which published the DPI's mapping of the habitat of a variety of threatened fish, including the Eastern Freshwater Cod and Purple-spotted Gudgeon (but not Oxleyan Pygmy Perch). In September 2016 the Forestry Corporation were officially advised of the new mapping by DPI.

The Forestry Corporation should have started acting responsibly by applying the mapping in their logging planning after May 2016 but, despite no longer being able to claim ignorance, it is evident from this review that they have done nothing since then to implement the required protection for this species.

It is along the smallest streams and drainage lines where most of the interaction between terrestrial and aquatic environments occurs. Small headwater streams generally drain catchments smaller than two square kilometres and can constitute over 75% of the stream length in a drainage basin (Barmuta et. al. 2009).

Lowe and Likens (2005) consider:

Everywhere on Earth, streams and rivers occur in hierarchical networks resembling the branching pattern of a tree, with smaller branches joining to form larger branches as water travels from uplands to lakes, estuaries, and seas. The finest branches of these networks, beginning where water flowing overland first coalesces to form a discernible channel, are called headwater streams. ... because of their small size, these streams are often missing from maps that guide the management of natural resources.

...

There is growing evidence that the water quality, biodiversity, and ecological health of freshwater systems depend on functions provided by headwater streams, which are similar in their importance to the fine branches of the human respiratory system in the lung.

...

Headwaters are a source of life. They are critical habitat for rare and endangered freshwater species, and guardians of many downstream resources and ecosystem services on which humans rely ...

The key threatening process declaration under the *Fisheries Management Act 1994* for 'degradation of native riparian vegetation along New South Wales water courses' states:

4. Degradation of riparian vegetation has a major influence on stream ecosystems by;

- *Increasing the amount of sediment and nutrients reaching streams as runoff, and increasing light penetration of the water body. These inputs have the combined effect of smothering benthic communities and increasing harmful algal growth.*
- *Reducing the inputs of organic carbon, via leaves, twigs, and branches. Terrestrially derived carbon inputs are the major energy source in most stream ecosystems.*
- *Reducing the amount of large woody debris entering the aquatic ecosystem and thereby negatively impacting on habitat and spawning sites of several vulnerable and endangered species listed under the Fisheries Management Act, 1994.*
- *Destabilising river banks.*
- *Reducing the amount of overhanging riparian vegetation resulting in a loss of shade and shelter for fish.*

It is important to recognise that the 10m buffers applied to first order streams, and sometimes to unmapped streams, by the Fisheries Licence are significantly less than the 30-50m identified by Munks (1996) for small streams, tributaries, gully and drainage lines in catchments less than 100 ha, or the 35-40m (up to 200m to improve terrestrial biodiversity) identified by Hansen *et. al.* (2010) for steep catchments and low order streams, or even the 20-30m for erosion control identified by Croke and Hairsine (1995) for temporary and small streams in catchments less than 100ha. Measly 10m buffers are already grossly deficient, and fish can't afford to lose any more of this minimalist protection.

2. Review of Current Logging of Purple-spotted Gudgeon habitat.

2.1. Upper North East

A review of the Forestry Corporation's identified logging operations for March 2017 was undertaken. All compartments identified as either "yes" or left blank for the category "Unmapped Drainage Line Harvesting" in "IFOA Report UNC 0317" were assessed, with those identified as "completed" removed. The table below are extracts from that report, with the addition of NEFA's habitat assessment for the Purple-spotted Gudgeon. Please note that the "completed" operations are likely to have involved unlawful logging of unmapped drainage lines.

IFOA Region	State Forest	Cpt	Net Harvest Area (ha)	Drainage Feature Crossings (No.)		Unmapped Drainage Line Harvesting	NEFA Habitat Assessment for Purple-spotted Gudgeon
				New Crossings	Existing Crossings to be used		
UNE	Conglomerate	514	157	0	5	Yes	Class 1
UNE	Conglomerate	515	130	0	2	Yes	Class 1
UNE	Conglomerate	516	121	0	4	Yes	Class 1
UNE	Conglomerate	517	116	0	1	Yes	Class 1
UNE	Conglomerate	518	147	0	1	Yes	Class 1
UNE	Divines	80	181	0	1	Yes	Class 1
UNE	Divines	81	185	0	0	Yes	Class 1
UNE	Divines	82	111	0	9	Yes	Class 1
UNE	Divines	83	195	0	0	Yes	Class 1
UNE	Pine Creek	26	92	0	2	Yes	Class 1
UNE	Pine Creek	27	99	0	1	Yes	Class 1
UNE	Styx River	553	210	Nil	Nil	Yes	Class 2
UNE	Styx River	555	264	Nil	1	Yes	Class 2
UNE	Styx River	556	75	Nil	Nil	Yes	Class 2
UNE	Styx River	562	100	Nil	2	Yes	Class 2
UNE	Styx River	563	138	Nil	1	Yes	Class 2
UNE	Gibberagee	117					Class 1
UNE	Gibberagee	118					Class 1

A detailed assessment of compartments was undertaken, checking the date of the plan (where available), its stipulated prescription for unmapped streams, and the distance to mapped Purple-spotted Gudgeon habitat as identified by Fisheries NSW.

Gibberagee State Forest 117, 118

Plan dated 1/9/2016.

The Plan states "*Unmapped drainage line harvesting: permitted*"

Purple-spotted Gudgeon habitat on Mangrove Creek within 118 and immediately downstream of 117, on southern fall habitat is 3km downstream on Filans Creek.

Conglomerate State Forest 514-518

Plan dated 11/11/2016.

The Plan states "*Unmapped drainage line harvesting: permitted*"

Purple-spotted Gudgeon habitat within 515, 517 and 518, and immediately downstream of 514 and 516.

Divines State Forest 80-83

Plan dated 14/2/2014.

The Plan states "*Conditions of the Fisheries Licence do not apply in these compartments*"

Purple-spotted Gudgeon habitat within 80 and 81, and immediately downstream of 82 and 83.

Pine Creek SF 26 and 27

Plan dated 20/11/2013.

The Plan states "*Conditions of the Fisheries Licence do not apply in these compartments*"

Purple-spotted Gudgeon habitat 374m downstream of 26 and 27.

Styx River State Forest 553-556, 562, 563

Plan dated 4/1/2017

The Plan states "*Unmapped drainage line harvesting: permitted*"

Purple-spotted Gudgeon habitat around 12.5km downstream of 562 and 563, around 17km downstream of 556 and <100km downstream 553 and 555,



photo: Dailan Pugh

2.2. Lower North East

A review of the Forestry Corporation's identified logging operations for March 2017 was undertaken. Only compartments identified as both "active" as either "yes" or left blank for the category "Unmapped Drainage Line Harvesting" in "EPA Monthly Report Mar2017" were assessed. The table below are extracts from that report, with the addition of NEFA's habitat assessment for the Purple-spotted Gudgeon. Note that there are numerous compartments on the March list which are identified as "suspended", "proposed" and "completed" that were not assessed at this time.

IFOA Region	State Forest	Compartment	Net Harvest Area (ha)	Drainage Feature Crossings (No. of:)		Unmapped Drainage Line Harvesting	NEFA Habitat Assessment for Purple-spotted Gudgeon
				New Crossings	Existing Crossings to be used		
LNE	Bowman	22	194	Nil	2	Yes	Class 1
LNE	Bowman	23	161	Nil	Nil	Yes	Class 1
LNE	Bowman	24	267	Nil	2	Yes	Class 1
LNE	Bowman	32	138	Nil	1	Yes	Class 1
LNE	Broken Bago	1040	260	1	6	Yes	Class 1
LNE	Bulls Ground	64	211	Nil	4	Yes	Class 2
LNE	Burrawan	33	32	Nil	0	Yes	Class 1
LNE	Burrawan	35	78	Nil	0	Yes	Class 1
LNE	Burrawan	36	77	Nil	0	Yes	Class 1
LNE	Comboyne	147	145	Nil	8	Yes	Class 1
LNE	Comboyne	148	126	1	2	Yes	Class 1
LNE	Comboyne	149	137	Nil	1	Yes	Class 1
LNE	Comboyne	150	91	Nil	Nil	Yes	Class 1
LNE	Comboyne	151	105	Nil	Nil	Yes	Class 2
LNE	Comboyne	152	176	Nil	4	Yes	Class 1
LNE	Cowarra	34	37	Nil	0	Yes	Class 1
LNE	Enfield	51	136	Nil	Nil	Yes	Class 2
LNE	Enfield	63	113	Nil	Nil	Yes	Class 2
LNE	Enfield	64	144	Nil	Nil	Yes	Class 2
LNE	Kippara	33	95	Nil	2	Yes	Not determined
LNE	Kiwarra	59	87	Nil	Nil	Yes	Class 2
LNE	Kiwarra	60	96	Nil	Nil	Yes	Class 2
LNE	Tamban	68	25	Nil	2	Yes	Class 1
LNE	Tamban	69	132	Nil	3	Yes	Class 1
LNE	Tamban	71	88	Nil	0	Yes	Class 1
LNE	Wang Wauk	118	350	Nil	1		Class 1
LNE	Ingalba	436	172				Class 1
LNE	Ingalba	437	180				Class 1

A detailed assessment of compartments was undertaken, checking the date of the plan (where available), its stipulated prescription for unmapped streams, and the distance to mapped Purple-spotted Gudgeon habitat as identified by Fisheries NSW. Note that Kippara and Ingalba have been excluded from totals.

Protecting Purple-spotted Gudgeon

Broken Bago State Forest 1040

Plan undated

The Plan states "*Un -mapped Drainage Line harvesting is only permitted in compartment 1040*".

Purple-spotted Gudgeon habitat in 1040

Bowman State Forest 22-24, 32

Plan dated 2/8/2013

The Plan states "*Unmapped Drainage line harvesting will be undertaken in these compartments*".

Purple-spotted Gudgeon habitat around 3.4km downstream from 32, others adjacent upstream

Bulls Ground State Forest 64

Plan dated 22/3/2016

The Plan states "*Unmapped drainage line harvesting: permitted*"

Purple-spotted Gudgeon habitat around 6.2km downstream from 64

Burrawan State Forest 35-36

Plan dated 21/4/2016

The Plan states "*Unmapped drainage line harvesting: permitted*"

Purple-spotted Gudgeon around 650m downstream from 35, 36 adjacent.

Comboyne State Forest 147-152

Plan dated 14/4/2016

The Plan states "*Unmapped drainage line harvesting: permitted 147, 148, 149, 150, 151 and 152*"

Purple-spotted Gudgeon habitat around 500m downstream from 149, upstream are 147, 148, 150, 152. Habitat around 7.7km downstream from 151

Cowarra State Forest 34

No Plan

Listed as "*Unmapped drainage line harvesting: yes*"

Purple-spotted Gudgeon habitat in 34

Enfield State Forest 51, 63, 64

Plan dated 18/5/2016

The Plan states "*Unmapped drainage line harvesting: permitted*"

Purple-spotted Gudgeon habitat 12.8 km downstream from 51, others adjacent upstream.

Kiwarra State Forest 59, 60

Plan dated 21/7/2011

Unmapped drainage lines are identified for logging in harvesting plan,

Purple-spotted Gudgeon habitat 9.3 km downstream from 59, 5.8 km downstream from 60

Tamban State Forest 68, 69, 71

Plan dated 6/6/2016

The Plan states "*Unmapped drainage line harvesting: permitted*"

Purple-spotted Gudgeon habitat in 68 and 69, downstream of 71

Wang Waulk State Forest 118

18/12/2015

The Plan states "*Unmapped drainage line harvesting: permitted*"

Purple-spotted Gudgeon habitat around 4.1 km downstream.

?Ingalba 436, 437

Active operation, no harvesting plan, unknown if unmapped streams logged

Purple-spotted Gudgeon habitat in 436, adjacent to 437

3. References

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Croke, J. and Hairsine, P. (1995) 'A review of the code of forest practices in Victoria: water quality and quantity'. Unpublished consultancy report from Cooperative Research Centre for Catchment Hydrology to CSIRO Division of Forestry.

DPI Fish habitat mapping:

<http://www.dpi.nsw.gov.au/fishing/species-protection/threatened-species-distributions-in-nsw/freshwater-threatened-species-distribution-maps>.

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Pugh, D. (2016) New IFOA Changes in Forest Protection In the Clarence and Richmond River Valleys. Report for the North East Forest Alliance, January 2016.

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