

WIDE BAY BURNETT CONSERVATION COUNCIL INC.

Applicant

BURNETT WATER PTY LTD (ACN 097 206 614)

Respondent

FEDERAL COURT OF AUSTRALIA
QUEENSLAND DISTRICT REGISTRY

- 4 SEP 2009

FILED / RECEIVED

EXPERTS' OUTLINE OF POINTS OF AGREEMENT & CONTENTION

1. The Court ordered on 18 March 2009 that the experts in the same area of expertise confer for the purposes of:
 - (a) the experts identifying and clarifying any issue arising within their area of expertise;
 - (b) resolving or narrowing any points of difference between them.
2. This document records the outcomes of the meeting between Mr Jim Tait and Dr Peter Kind, held on² 1 August 2009 in Brisbane.
 - (a) Mr Jim Tait is an aquatic ecologist and fish biologist, retained by the applicant;¹
 - (b) Dr Peter Kind, fish biologist, retained by the respondent.²

Mr Kind requested that the Court note that some of the agreed facts listed below did not form part of his written statement provided to the court as they were not relevant to any of the questions provided in his written instructions from Allens Arthur Robinson Lawyers (acting on behalf of the respondent). Mr Tait requested that these facts be presented to Mr Kind during the

¹ Tait J (2009) "Lungfish passage through fishways and the impacts of restricted passage at Paradise Dam for Australian lungfish (*Neoceratodus forsteri*) in the Burnett River". Report prepared for the Federal Court of Australia at Brisbane in proceedings *Wide Bay Burnett Conservation Council Inc v Burnett Water Pty Ltd* (No. QUD 319/08), 22 June 2009.

² Kind PK (2009) "Statement of Peter Kevin Kind". Witness statement filed on behalf of the respondent in *Wide Bay Burnett Conservation Council Inc v Burnett Water Pty Ltd* (No. QUD 319/08), 10 August 2009.

Filed by Mr Tait and Dr Kind

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meeting and discussed to reduce points of disagreement that may subsequently arise in court. Both experts concurred that it was proper to address such facts out of a common desire to fulfil their collective duty to the court.

Agreed facts 3-55 were put forward by Mr Tait and discussed at the meeting. Agreement was reached when (1) the facts were extracted directly from Mr Kind's witness statement, (2) the facts were directly quoted from or accurately reflected stated results in previous reports authored or co-authored by Mr Kind, or (3) The facts were discussed at the meeting and both experts agreed on their validity.

POINTS OF AGREEMENT

AGREED FACTS

3. On the basis of available evidence, lungfish are a long lived and generally slow growing species that may live more than 50 years in the wild.
4. Lungfish have naturally low levels of genetic diversity and reduced genetic diversity compromises the ability of the species to respond to novel diseases, tolerate localised fish kills or recover from more widespread population declines
5. Lungfish have a life history characterised by the longevity of adults and apparent low adult mortality levels, characteristics that are thought to counter sporadic and inconsistent recruitment success.
6. Lungfish predominantly spawn in shallow pools and glides
7. The main spawning period for lungfish is August to December but may start as early as July and extend as late as January
8. The relatively large number of dams, weirs and other man-made barriers in the Burnett River Catchment pose a range of threats associated with flow regulation and passage barriers to the Burnett River lungfish population

9. The stocking and translocation of large predatory fish within the Burnett River basin poses an as yet unquantified threat to the Burnett River lungfish population particularly in terms of potentially increased rates of predation on juveniles
10. The profusion of exotic aquatic weeds particularly Water hyacinth, Salvinia and Hymenachne in the lower reaches of the Burnett river poses a potentially significant threat to the lower Burnett River lungfish population particularly in terms of water quality impacts on eggs and larvae
11. Maintenance of connectivity between breeding populations of lungfish in the Burnett River and its tributaries is important for the conservation of the species as a whole and within the Burnett River Catchment.³
12. Infrequent long distance movements (both upstream and downstream) between river reaches are biologically important to lungfish and are most likely related to foraging, breeding or dispersal
13. On the basis of available evidence including the habitat preferences expressed by spawning lungfish, impoundment of riverine reaches reduces the quality and availability of lungfish spawning habitat. Lungfish in impoundments make significantly longer movements than those in riverine reaches, some of which can be attributed to individuals seeking out alternative suitable spawning grounds.
14. Lungfish in impounded waters can be highly mobile and mean linear ranges of >28km have been documented for populations studied by tagging and radio telemetry in impounded sections of the Burnett River
15. Availability of suitable lungfish spawning habitat provides an indirect measure of population recruitment potential
16. Approximately half of the total core lungfish habitat in the Burnett River has been subject to impoundment by water infrastructure (DEWHA 2009,

³ Tait, n 1, p 48; Kind, n 2, pp 2 and 261.

http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=67620)

and this ratio of impounded versus non-impounded also applies to core lungfish habitat downstream of Paradise Dam.

17. Based on the predicted age of lungfish (see Brooks and Kind 2002), a large proportion of the adult lungfish present in the Burnet River would have been born before the construction of most dams and weirs that now impound half of the 'core' lungfish habitat in the Burnett River.
18. Radio tracking studies indicate that lungfish in flowing sections of the Mary and Burnett Rivers occupy smaller ranges and are less mobile than lungfish in impounded sections of the Burnett River.
19. Lungfish movements up to 81km have been recorded by mark / recapture programs in the Burnett River.
20. Approximately a quarter (24%) of the PIT tagged lungfish detected at the Paradise Dam upstream fishway entrance by DPIF (2008) had travelled greater than 5 km upstream from their original tagging location including seven individuals that had travelled 5-20 km and two individuals that had travelled >50 km
21. In the absence of fish passage barriers it would be expected that a representative subset of the lungfish detected by DPIF (2008) to have moved from lower reaches upstream to the base of the Paradise Dam would move upstream past that point except during rare periods of extreme low flow
22. Lungfish tagged by Brooks and Kind (2002) in the impoundments formed by Ben Anderson Barrage and Jones Weir were recorded moving upstream prior to the breeding season and seeking out suitable spawning habitat in shallow reaches at the Full Supply Level of those impoundments and in some tributary streams. Following the spawning period return movements occurred on a staggered basis with individuals often utilising small flow events or the tail of larger flows to assist their downstream passage

23. Lungfish can move through riffle and glide sections of a river at least as shallow as 12 cm
24. Flow models indicate that pre dam conditions would have provided hydrological connectivity at the Paradise Dam site including channel depth profiles sufficient for lungfish movement approximately 95% of the time.
25. Question 4 of the statement provided by Mr Kind asked him to assume that Paradise Dam would be above EL62m for approximately 80% of time and therefore the downstream fishway would be accessible This period is less than 95% of time when opportunities for lungfish movement would have existed under pre-dam flow conditions outlined in agreed fact 24
26. Limited lungfish movement opportunities resulting from infrequent operation of the downstream fishway is contrary to the needs of the Burnett River lungfish population in terms of the maintenance of population genetic vigour and recruitment levels
27. Any lungfish in the Burnett River could potentially try to migrate upstream or downstream past Paradise Dam.
28. There is good recent evidence indicating that the Enoggera Reservoir population of lungfish is now extinct
29. Many adult lungfish previously occurring in Enoggera Reservoir have moved downstream during flow events and been unable to return to the reservoir.
30. The only lungfish eggs ever found in the Paradise Dam impoundment were in reaches close to the full supply level where habitat was similar to pre-development conditions. These eggs were inundated by inflow events prior to hatching and are unlikely to have survived.
31. If no lungfish or only small numbers of lungfish (less than 10/year) successfully utilise the downstream fishway at Paradise Dam, it is likely that this would result in a significant impact on the Burnett River lungfish population within several generations, consistent

with the Significant Impact Guidelines for the *EPBC Act 1999*. The effect would be consistent with Significant Impact Criteria for Vulnerable Species in that it may (1) disrupt the breeding cycle of an important population and (2) fragment an important population into two or more populations.

32. If the restriction of lungfish movement at the Paradise Dam coincides with the pre spawning to post spawning period when Burnett River lungfish have been demonstrated to be most mobile then the potential for significant impact will be greater
33. If the restriction of lungfish movement pass the Paradise Dam coincides with years when optimal spawning conditions/habitats are available the potential for significant impact to the lungfish population will be greater than in years where optimal spawning conditions/habitats are not available
34. Lungfish populations in the Burnett River are dominated by sexually mature individuals suggesting ongoing very low levels of recruitment
35. There have been no significant lungfish recruitment events recorded in the Burnett River since those detected in 1996. However, no surveys likely to detect such events were conducted between 2000 and 2004.
36. Lungfish <300mm are encountered very infrequently in the wild. It is unclear whether this means that they are more difficult to catch than other fish or that very few survive to reach this size.
37. Small numbers of lungfish (<300mm) collected by current QPI&F surveys can provide a relative measure of recruitment success between breeding seasons but cannot be used to estimate total recruitment.
38. Inspecting lungfish ovaries is a reliable method to identify individual females that are entering the breeding population for the first time. However, such fish detected during the current 10 year lungfish monitoring program are likely to be 10-15 years old and hatched prior to the construction of Paradise Dam

39. Assessing the distribution and abundance of lungfish eggs using push nets is a reliable measure of measuring annual lungfish spawning success, but only provides a measure of recruitment potential rather than actual recruitment.
40. Reliable estimates of adult mortality are important and useful for assessing the long term prospects of endangered species populations
41. Current QPI&F monitoring programs have power to detect changes in the body condition of lungfish and relative success of annual spawning events over their ten-year time frame. They are not required to assess the genetic structure of lungfish populations and are unlikely to provide reliable estimates of adult mortality. Therefore the overall level of harm (if any) that may result if the non-continuous operation of the Paradise Dam fishways are reducing opportunities for lungfish to move between sections of the Burnett River cannot be adequately measured by the current monitoring programs..
42. Development of a lungfish life-history model would be desirable for improved lungfish management in the Burnett River, but is not a component or requirement of current monitoring programs being conducted by QPI&F.
43. There is ample evidence that some lungfish will swim downstream over dam spillways during spillway overflow events
44. Water releases from and overflow of water at the North Pine Dam spillway (on the North Pine River) in June 2009 is the most recent example of lungfish being killed by entrainment in spillway overflows
45. If a Paradise Dam spillway overflow event resulted in the death of 10(s) – 100(s) of adult lungfish it would represent a significant increase in the mortality rate for adult lungfish resident in the Paradise Dam reach. However, current adult mortality rates are poorly understood (refer 42 above).
46. Lungfish successfully passing through the downstream fishway would reduce the number of individuals that could potentially move over the spillway during the next spillway flow

47. Spillway overflow events at North Pine Dam support a conclusion that a significant proportion of any lungfish moving over the Paradise Dam spillway would experience significant injuries or death.
48. The proportion of fish suffering injuries and/or death is likely to be higher at Paradise Dam than North Pine Dam due to the higher wall, stepped spillway and shallow plunge pool.
49. The positive relationship between flow events and increased detections of tagged lungfish at the upstream side of the Paradise Dam wall reported by DPIF (2008) is consistent with post spawning season downstream lungfish movement patterns in the Burnett River reported by Brooks and Kind (2002) and Berghuis and Broadfoot (2004)
50. Radio telemetry studies by QPI&F (see Brooks and Kind 2002) tracked movements of lungfish prior to construction of Paradise Dam. 2 out of 12 lungfish (16.6%) tagged in the reach where Paradise Dam now stands moved downstream past the location of the existing dam wall during the 2 year study. It is plausible that an equivalent proportion of the total lungfish population now resident in the Paradise Dam reach would attempt to move past the dam wall over an equivalent time period.
51. The limited operation of the upstream fishway at the Paradise Dam during the first 3 years post dam commissioning (see Tait report figures 37 & 38 page 61) has on the basis of available data (DPI 2007, 2008) restricted the upstream movement of lungfish to the dam reach
52. Documented use of the Paradise Dam fishways by a significant proportion of the available lungfish migrant population (i.e. fish demonstrated to be undertaking upstream or downstream movements in the vicinity of the Paradise Dam) would be an endorsement of their effectiveness

Agreed Facts 53-56 were proposed by Mr Kind and were relevant to evidence provided in his witness statement.

53. Australian lungfish occur and are widely distributed in the Brisbane, Stanley, North Pine, Mary, and Burnett River Catchments. At least some individuals also exist in Lake Manchester, Enoggera Creek, the Coomera River, the Albert River, the Logan River, Gold Creek Reservoir and possibly the Condamine River.
54. Major flow events can disrupt the lungfish breeding season by scouring the river and destroying aquatic plants. This was witnessed in the Mary River in 1999. On this basis, it is unlikely that lungfish recruitment occurred every year in the Burnett River even prior to water infrastructure development.
55. Long-lived species with low adult mortality generally do not require successful breeding and recruitment every year. Sporadic and inconsistent recruitment success may be normal for lungfish.
56. The 10 year lungfish monitoring program described in paragraph 6 of the amended conditions of approval for Paradise Dam required Burnett Water Pty Ltd to measure condition of lungfish and lungfish habitat/macrophytes. Paragraph 9 of the conditions required a review to determine whether the lungfish population at or about AMTD 199km had experienced a decline during the 10 year monitoring program that could not be attributed to natural periodic fluctuations.

UNRESOLVED POINTS OF CONTENTION

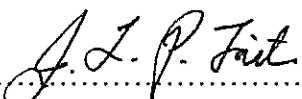
57. Fishway operation is an integral component of fishway design NO AGREEMENT - Mr Kind indicated that fishway design and operation falls outside his area of expertise.
58. There is a risk that emerging cumulative impacts that have the potential to reduce the recruitment success of juvenile lungfish and increase the mortality of adult lungfish, which could tip the Burnett River population toward an extinction spiral within several generations. NO AGREEMENT – Mr Kind 's opinion is that there is currently a risk of significant declines in lungfish populations within several generations, but extinction is unlikely at this point due to current high numbers of adult lungfish and potential for a range of management interventions to be progressively implemented. There is also

evidence that lungfish have recovered from one or more severe population declines in the past.


59. The 80% statistic for Paradise Dam downstream fishway access based on IQQM flow modelling does not refer to most years but to a theoretical average over the 107 year model simulation period which results in periods of between one and three years duration where the downstream fishway will be inoperable due to low dam water levels NOT AGREED – Instructions provided to Mr Kind by Allens Arthur Robinson (Q4) specifically instructed him to assume that Paradise Dam would be above EL 62m for 80% of time and did not call for further analyses of IQQM flow modelling

60. IQQM flow modelling indicates low dam water level constraints on access to the downstream fishway occur during the post spawning period for lungfish for up to 25% of years for the modelled simulation period NOT AGREED – Instructions provided to Mr Kind by Allens Arthur Robinson (Q4) did not request consideration of this issue.

Signed:


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Jim Talt

Date: ~~28~~ August 2009


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Dr Peter Kind

Date: ³ ~~...~~ ^{SEPTEMBER} August 2009