Management of the Impacts to Fauna During the Stage 4 Expansion of the Dampier to Bunbury Natural Gas Pipeline (DBNGP): A Review

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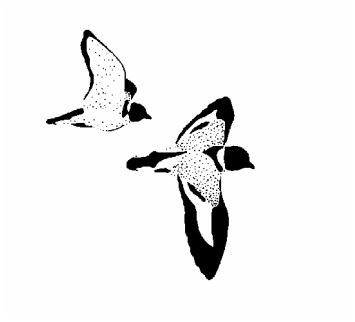

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Introduction

DBNGP (WA) Nominees Pty Ltd is proposing to continue the expansion of their underground gas transmission pipeline within the pre-existing Dampier to Bunbury Natural Gas Pipeline (DBNGP) corridor. Currently the Stage 4 expansion operation is in progress. Stage 4 involves the construction of ten separate expansion loops (5 to 47 km in length) immediately south of each of the ten compressor stations (CS) between Karratha and Kwinana. The proposed 'Stage 5' operations will comprise a series of loops that will ultimately link the Stage 4 Loops together in three phases: Stages 5A, 5B and 5C.

DBNGP (WA) Nominees Pty Ltd have committed to a range of environmental practices as part of the approvals process for Stage 4. A number of these pertain directly to the impact of the project on fauna and the subsequent protocols for management of fauna impacts (see Bamford and Bancroft 2005a; 2005b for details). The commitments addressed aspects such as:

- The timing (seasonal) of construction works;
- The length of open trench at any one time;
- The use of trench-plugs as fauna exit points;
- The use of temporary shelters within the trench;
- The infiltration of water into a trench;
- The time (daily) by which trenches should be checked for trapped fauna;
- The composition of fauna teams; and
- The capping of open pipes.

Bamford Consulting Ecologists was commissioned to review those commitments in light of the Stage 4 expansions completed so far and with the view to refining the commitments and improving the procedures for Stage 5.

Methods, Results and Discussion

Summary of Stage 4 work completed to date

At the time that this report was produced (22nd to 25th May 2006), works on Loops 8, 9 and 10 of the Stage 4 expansion had been completed, and work on Loops 6 and 7 have been commenced. The available data from weekly fauna reports (from Loops 6 to 9 of Stage 4) were summarised, and the numbers of each vertebrate species that have been removed from the trenches are presented in Table 1. One-hundred and four individuals from 23 species have been removed from the trenches (two of these captures were not identified beyond genus level). These removals comprise 1 frog, 79 reptiles and 24 mammals (see Table 1). The three most commonly encountered species represented nearly half of all captures: Bearded Dragons (21% of removals), Honey Possums (13%) and Bardicks (13%). Eleven species were represented by a single individual. Ninety-six percent of fauna were released alive and apparently uninjured. The four mortalities recorded were all Western Grey Kangaroos (one fatality and three injured animals that were euthanised).

Comments on fauna interactions from field staff

Feedback on the fauna interaction protocols was obtained by briefly interviewing (by phone):

- Pat Cullen (on-site Environmental Officer, Alinta)

- Kristy Sell (Director, MBS Environmental)

Both Pat and Kristy have had extensive trench-clearing (fauna) experience on several projects, including the Stage 4 works of the DBNGP extension. The following points summarise the discussions with Pat and Kristy.

The timing (seasonal) of construction works

The timing of the trench constructions (e.g. Loops 8 and 9) in the south appears to have been ideal. There have been relatively few captures, and a relatively low incidence of mortality. It was suggested that, in this region, the number of captures is dependent on the overnight temperature. The data from the available weekly fauna reports (for Loops 6 to 9) supported this hypothesis. Overnight minimum and daily maximum temperatures were provided for some of the raw data and a plot of the relationship of these with the number of trench captures (standardised per kilometre) is presented in Figure 1. There was a significant, positive linear relationship between overnight temperature and the number of trench captures ($F_{1,15} = 4.60$, $P = 0.049$), but no significant linear relationship between daily maximum temperature ($F_{1,13} = 0.13$, $P = 0.724$). Warmer nights resulted in greater numbers of trapped fauna.

The length of open trench at any one time

It is generally considered, by fauna handlers, that the length of trench open at any one time is not usually an issue. Restrictions on open trench length appear to be largely arbitrary and the rate of trench checking and clearing is more dependent on factors such as habitat, season, weather condition and staff experience. It was suggested that the most important factor was to ensure that appropriate resources (particularly fauna handlers) are provided to enable clearing operations to be conducted without compromising the welfare of fauna, irrespective of open trench length. Fauna 'hotspots' (see 'Future planning' below) should be identified *a priori* and fauna staff should be allocated appropriately. Ideally there should also be some provision to rapidly increase the number of fauna handlers when unexpectedly high numbers of animals are encountered in a trench (e.g. after sudden rainfall events, unseasonably warm weather etc.).

The use of trench-plugs as fauna exit points

Trench plus and ramps seem to work well, particularly for mammals. There has been regular evidence of animal tracks, leading out of the trench, at trench-plugs. The spacing of trench-plugs should not exceed the current protocol, and in areas of high fauna density may be more effective if spaced closer together.

The use of temporary shelters within the trench

In the experience of the fauna handlers consulted, temporary fauna shelters placed in the trench work very well. The current, insulated shelters work well, although the use of cardboard boxes and commercial egg-cartons (in combination with one another) may be equally, if not more, effective. Hessian bags (both dry and wet) may also be useful. To date, shelters have been deployed in proportion to the anticipated density of entrapped animals, or in response to actual animal densities. That is, greater numbers of shelters are placed in areas where a high number of animals is expected (e.g. through native bushland) or where a high number actually occurs.

The time (daily) by which trenches should be checked for trapped fauna

Fauna handlers found that it was sometimes difficult to comply with the 10 am trench-clearing deadline (i.e. to have completed fauna checking and clearing by that time each day). The 10 am deadline was a somewhat arbitrary time set by regulatory bodies in response to high levels of mortality in previous trench clearing projects (see EPA 2004). The previous, problematic trenches ran east-west (hence, the trench was exposed to the sun almost all day) and were dug during the hottest months of the year. The 10 am deadline was imposed to, in part, compensate for these factors. The DBNGP runs predominantly north-south, and construction has been planned for the months of the year in which fauna are likely to be least active (January to May for southern areas, April to October for northern areas). There have already been negotiations with CALM by field staff to allow flexibility in the 10 am restriction on the southern loops of Stage 4. Given the environmental conditions experienced so far, it is considered by field staff that animal welfare will not be compromised by leaving the fauna in the trenches for longer periods

The composition of fauna teams
The current composition of fauna teams was considered to be reasonable (to ensure worker safety and animal welfare).

Miscellaneous comments
Reptiles represent most of the captures, and it is thought that many of the larger mammals (e.g. bandicoots, kangaroos) caught in the trench are able to get themselves out (at the trench plugs).

It was considered that most captures occur in the initial few days of a trench being opened, with the number of captures per day decreasing with time. There were not sufficient data from the Stage 4 work completed to assess this pattern. It was also suggested that rarer species (often of conservation significance) were usually encountered at considerable time periods from the time when a trench was first opened. This may be because these species occur at relatively low densities in the landscape and, simply by chance, it takes more time for them, or their habitats, to be intercepted by the trench.

For Loops 8 and 9, in the metropolitan and wheatbelt regions, most captures occurred where remnant native bushland or wetland areas were intercepted by the trench. Paddocks and farmlands have had very low fauna densities.

In general (for all trenches that the interviewees had worked on) the greatest causes of mortality, by far, have been heat stress and desiccation due to high temperatures, direct sun, poor air movement and the lack of suitable shelter within trenches. The most susceptible groups are the geckos and dragons. The incidence of injury (i.e. not mortality) is infrequent. Most animals intercepted by the trench fall in without any apparent physical harm (e.g. broken bones, internal injuries). Larger species, such as kangaroos and emus, are most at risk to injury. Secondary causes of mortality (e.g. desiccation, drowning and predation) should be of much greater concern for most small vertebrates.

The impacts of the high level of traffic (associated with the project) on fauna may need to be reviewed.

The construction of Stage 5 will provide a massive opportunity to contribute to the understanding of vertebrate ecology (especially animal distributions) along a huge, near-continuous transect within Western Australia. The value of the simple ecological data (e.g. the abundance and location of specimens) should not be underestimated, and it would be highly desirable to produce a comprehensive report on these findings at the conclusion of the project.

Future planning

It was evident from the discussions with Pat and Kristy that the greatest contributions to minimising the impacts to captured fauna come from the sensible planning of:

- the seasonal timing of trench construction, and
- the deployment of human resources (fauna handlers) and their equipment.

Several pre-construction mechanisms were suggested to aid these processes:

- The identification of the likely relative densities of fauna along the route. Habitats or sites where a relatively high degree of ground fauna movement should be identified ('hotspots') and appropriate management measures planned (e.g. increased fauna staff or patrols, increased shelters, higher density of trench plugs).
- The identification of conservation significant species that are likely to be encountered along the trench.
- The identification of the major potential causes of injury or mortality to fauna along the route. The relative dangers associated with factors such as: heat stress, desiccation, cold stress, drowning (e.g. as a result of rainfall events or infiltration of ground water into trench), predation (by both feral and native predators) and direct injury (e.g. for larger animals) should be assessed.

The above mechanisms constitute part of an *a priori* risk assessment, where knowledge and experience gained from the current (Stage 4) operations are used to direct appropriate management measures during Stage 5 expansion. It must be firmly noted, however, that such desktop methods are only predictive and that the capacity for field staff to rapidly respond to changes in environmental conditions (e.g. weather, or unexpectedly high animal densities) should be maintained at all times to ensure the welfare of impacted fauna.

References

Bamford, M. J. and Bancroft, W. J. (2005a). Protocols for Interaction with Fauna During Construction of Looping 10 of the DBNGP Pipeline, 2006. Report prepared for Ecos Consulting (Aust) Pty Ltd, Perth, by M. J. and A. R. Bamford Consulting Ecologists, Kingsley, Western Australia.

Bamford, M. J. and Bancroft, W. J. (2005b). Protocols for Interaction with Fauna During Construction of Northern Loopings of the DBNGP Pipeline, 2006. Report prepared for Ecos Consulting (Aust) Pty Ltd, Perth, by M. J. and A. R. Bamford Consulting Ecologists, Kingsley, Western Australia.

EPA. (2004). EPA Bulletin No. 1127. Newcrest Mining Limited, Telfer Project, Power Supply and Infrastructure Corridor, Port Hedland to Telfer Gold Mine, Great Sandy Desert - Change to Environmental Conditions. Environmental Protection Authority, Perth, Western Australia.

Table 1. Species removed from the trenches during construction of Loops 6 to 9 of Stage 4 of the DBNGP expansion (between 03/04/06 and 18/05/06).

SPECIES		TOTAL CAPTURES
Frogs		
Limnodynastes dorsalis	Banjo Frog	1
Reptiles		
Pogona minor	Bearded Dragon	22
Echiopsis curta	Bardick	13
Pseudonaja nuchalis	Gwardar	9
Strophurus spinigerus	Spiny-tailed Gecko	8
Morethia obscura	Dusky Morethia	6
Ctenotus fallens	West Coast Ctenotus	5
Tiliqua rugosa	Bobtail	3
Demansia psammophis	Yellow-faced Whipsnake	2
Menetia greyii	Common Dwarf Skink	2
Strophurus sp.	Unidentified *Strophurus*	2
Ctenophorus nuchalis	Central Netted Dragon	1
Delma grayii	Gray's Legless Lizard	1
Lialis burtonis	Burton's Legless Lizard	1
Moloch horridus	Thorny Devil	1
Pseudechis australis	Mulga Snake	1
Pygopus lepidopodus	Common Scaly-foot	1
Ramphotyphlops waitii	Blind Snake	1
Mammals		
Tarsipes rostratus	Honey Possum	13
Macropus fuliginosus	Western Grey Kangaroo	5
Mus musculus	House Mouse	2
Pseudomys albocinereus	Ash Grey Mouse	1
Pseudomys hermannsburgensis	Sandy Inland Mouse	1
Pseudomys sp.	Unidentified *Pseudomys*	1
Rattus fuscipes	Bush Rat	1

Figure 1. The relationship between the number of animals removed per kilometre of trench and the minimum overnight (top chart) or maximum daily (bottom chart) temperature. A regression line is plotted for the former (see Results and Discussion).