AN EXAMINATION OF THE DECLARATION OF THE STAATEN WILD RIVER AREA

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ABSTRACT

The report provides comment on the declaration for the Staaten Wild River Area under the Queensland Government Wild Rivers Act (2005). Most of the considerations are general but specific issues are addressed for the Strathmore property.

TABLE OF CONTENTS

INTRODUCTION

This report was prepared as a consultancy against a request by the Queensland Department of Environment, Mines and Water (the Department) for comment on the proposed declaration for the Staaten Wild River Area. Most of the considerations are general but specific issues are addressed for the Strathmore property.

The submission is presented in three parts. The first examines what the Wild Rivers Proposal purports to achieve by reference to the Wild Rivers Act (2005) and the Revised Draft of the Wild Rivers Code for the assessment of development activities in Wild River Areas (no date given). The second provides comments on answers by the Department to specific questions. The third addresses application of the Wild Rivers legislation to the Strathmore property as identified in the proposed Staaten Wild River Area declaration (December 2006). Illustrations are presented in an appendix.

Information Sources

Sources of information include those identified as having been used in developing the proposal. The specific references used are:

- The Wild Rivers Act
- The Revised Draft of the Wild Rivers Code
- The Wild Rivers declaration proposal for the Staaten River
- The Normanton and Red River 1:250 000 scale geological maps
- Reports on hydrology, including the source of the estimate of catchment yield (National Land and Water Resources Assessment, 2002 presented in the Atlas of Australian Resources)
- The Hydrobiology Report (Gulf and Mitchell ecological and geomorphological assessment for the Gulf and Mitchell water resource plans. Natural Resources Mines and Water 2006)
- A quick-look Landsat 7 ETM satellite image for 2002.

Additional information was obtained during a visit to the area in December 2006 and from the Bureau of Meteorology (BOM) web site. The BOM information includes maps of long term averages for rainfall, and estimated potential and actual evapotranspirations.

The site visit to Strathmore included a low level flight to examine links between Vanrook Creek and the Einasleigh River, and ground observations to examine these links and Echo Creek. Soil samples were obtained at five sites to examine particular situations that broadly encompass the range of soil types. Vegetation was observed but not systematically recorded.

The site visit also included a low level flight from Strathmore to Highbury in a fixed wing aircraft, and inspection of the High Preservation Areas (HPAs) on Highbury in a helicopter. Photographs obtained from the helicopter were supplemented by ground photographs obtained later by Michael Digby, the local Catchment Management Officer.

Extracts from the Wild Rivers Act and Code and the proposed declaration for the Staaten Wild River in this report are highlighted in blue and are generally indented.

Basis for Comment

The comments address the 'scientific' validity of the proposed declarations to assess whether it can provide environmental or economic benefits to the State. There is therefore a need to identify what is meant by science.

With correct application of the term science there is a scientific method but no product called science. While science is routinely used as a noun this is effectively slang or shorthand for results derived through application of a scientific method. The products of science are technology.

Science is a method for exploring nature and for problem solving, with the key distinguishing feature between good and bad science being reliability. Results from good science provide a sound foundation for further research. With bad science results mislead if used as a basis for further research.

Practicing research scientists concerned about the standard of their work generally pay attention to the philosophical views of Popper. In particular, all agree on the need to test the reliability of observations and conclusions. However, many issues are by no means agreed. These include:

- Whether such testing can identify what is correct (this can be logically shown to be impossible and irrelevant).
- The inability to test complex systems.
- The need for predictability.

With ecology the system is invariably complex due to nonlinear relationships and interactions, and it cannot be fully tested. Also, knowledge of process does not guarantee prediction. The latter is evidenced by the process of natural selection not providing a means of predicting the outcome with evolution. When addressing complex systems science is seldom definitive.

Applications of science such as the Wild Rivers Act do not involve use of the scientific method and so are not scientific. However, they are presented as being underpinned by science and should therefore be correct in fact and logic. This analysis of the 'science' examines the validity of the facts and logic used in addressing Wild Rivers.

LEGISLATIVE ISSUES

The intent of the legislation is given as preserving natural values.

> The natural values to be preserved through a wild river declaration are:
>
> a. hydrological processes (unimpeded runoff, stream flow, aquifer recharge and spring discharge);
> b. geomorphic processes (unimpaired movement of sediments along the river system resulting in stable bed and banks and sediment delivery to estuaries, floodplains and downstream reaches);
> c. water quality (of sufficient physical, chemical and biological quality to meet human and ecological needs);
> d. riparian function (intact riparian trees, shrubs and sedges to protect stream banks and to provide food and habitat for native animals); and
> e. wildlife corridor function (sufficient areas of natural habitat within and along the river system to allow native fauna to migrate within their natural ranges).

Proposed development activities are assessed for their potential impact on these natural values.

The analysis below identifies that these basic tenants of the legislation do not make scientific sense.

Preservation

Preservation involves maintaining things are they are when in nature things invariably change. It is an intrinsic characteristic of biology that things change and that changes cannot be reversed. It is an intrinsic characteristic of physics that systems inexorably degrade and that the degradation cannot be reversed without external inputs. Preservation is only an option for museums.

Preserve natural values

In the Staaten proposal it is stated that 'A very important natural value of a wild river is a high degree of `naturalness' (or biophysical integrity).' This self evident statement arises because of the focus on values.

The Hydrobiology report identifies that *Key values were found to be associated with refugia (a habitat (or place) that supports populations of plants and animals not able to live elsewhere in the surrounding landscape).* That is, the natural environment of a species is identified as being a refuge simply because the species cannot occur everywhere. By this definition all natural environments are considered refugia. By this definition everywhere is a refuge for something and hence can be assigned high value.

Refugia are locations that accommodate immigrants displaced from elsewhere. Refugia are points of escape and generally not the normal location in which the species of interest occur.

While people have values nature does not. The correct wording would be attributes of the natural system assigned value by the community. However, as values are human precepts they differ within and between societies and change over time. They therefore cannot be preserved.

The use of values in referring to biophysical condition is common to many Queensland Government reports that relate to the Wild River Declaration Proposal. However, this common use does not make it correct or appropriate, and it results in self evident statements and circular arguments.

Assessing the impact of development activities on natural values would involve a public poll rather than scientific assessment. The intent of the Wild Rivers Act is either inappropriately expressed or it represents an expectation that Government can dictate to and control society.

Preserve processes

The same physical and biological processes exist in all natural terrestrial systems hence they do not need preserving. Indeed, there is nothing humans can do to eliminate an existing natural process or introduce a new one. The processes exist regardless of anything anyone can do and so do not require protection, let alone preservation.

The values that are sought to be preserved reflect outcomes where the outcomes of the natural processes vary depending on the constraints. The value is related to the outcome or end rather than the process or means. Water quality is an outcome.

The dot points A and B are processes and so cannot be assigned value as can be done with outcomes. Riparian and Wildlife Corridor function are similarly identified as a process hence logically they cannot be assigned value. A value can only exist in the delivery of a specific outcome where that outcome has not been defined. However, it is identified below that the riparian part of rivers does not have a natural function. Riparian function only makes sense when considered in an anthropomorphic rather than scientific context. Wildlife corridor is similarly an anthropomorphic representation.

Hydrological processes

The first requirement is given as unimpeded runoff when the prime requirement for biological systems to develop is for there to be impedance to runoff. Development of the biological system depends on retaining water in the system for use by plants and animals, and this involves slowing and reducing surface runoff. Of the land surfaces bare rock has lowest impedance to runoff but only algae and lichens can grow on rock.

The need to retain water in the system is explicit in the Staaten Proposal in references to the need to recharge waterholes. Despite this, developments that increase retention of water are prohibited. This conflict identifies that the Wild Rivers Act is directed at maintaining a condition or state rather than addressing processes as is asserted.

Geomorphic processes

The 'explanation' for geomorphic processes given in the code only addresses a few of the processes associated with water flows. The 'explanation' only identifies there should be no barriers to sediment flow in the stream bed. That is, no dams in stream channels or any water harvesting that significantly alters the characteristics of the stream water flows.

Three issues arise in addressing significant changes to stream water flows. The first is the use of a current degraded condition as the reference, the second is the high natural variability, and the third the identified need for off-stream water storages.

Any water harvesting would have to be enormous to produce a change to stream bed movement as most such movement is associated with extreme events that would essentially be impossible to significantly alter other than with a dam. In most of the environment under consideration the amount of water harvesting needed to produce a significant change is not feasible, if not impossible, because of the flat terrain. Moreover, such water harvesting increases off-stream storages and so provides the same environmental benefits identified for natural off-stream water storages.

Ecological Needs

Ecology is the study of interrelationships between biota and with their physical environment. It is a process and as such has no needs.

The consequence of ecology being a process can be illustrated by ecosystems. Ecosystems exist regardless and it is a human judgment as to one system being better than another. If the diversity of biota is considered important then South African heaths are on a par with rainforests when few other than botanists would consider them to be equal. If stability is most important then sandy deserts and salt pans top the list.

Riparian Function

According to the Concise Oxford Dictionary riparian is on or of the river bank, with ripa meaning bank. The sole riparian 'function' is therefore confining the extent of the river channel. However, banks are a consequence rather than a cause of streams, thus logically it is not a function.

The issue is the same as arises with identifying natural values. A channel constructed by humans is designed for a purpose and typically has banks to confine the extent of the water. A channel arising naturally is not designed and is a consequence of the characteristics of the terrain, soils and climate. In some situations there are no channels, and therefore no banks, as in the Staaten National Park (Fig. 1), coastal sand dunes, and large parts of NW Victoria. Identifying riparian function represents an anthropomorphic view of the system that has no basis in science. It is intrinsically contrary to the scientific method.

The reference to riparian function is likely meant to relate to riparian vegetation but this is unclear. Sedges are identified as comprising riparian vegetation but sedges typically occur in the stream bed rather than on a bank. This confusion is of particular consequence in the Gulf country because stream beds contain considerable terrestrial vegetation, including large trees such as *Melaleuca leucodendra*.

Large rivers such as the Gilbert and Einasleigh have distinct bands of vegetation along the stream banks. The vegetation in these bands differs from elsewhere because of enhanced provision of water and nutrients but with good drainage due to the incised river channel. This is riparian vegetation. Small channels such as Vanrook and Echo Creeks on Strathmore do not have a band of riparian vegetation as the vegetation on the top of the bank adjacent to the channel is the same as on the remainder of the plain away from the stream.

Flows in small channels do not influence the surrounding land other than to increase the rate of removal of surface and near surface water. In parts of Australia this improved drainage can produce a narrow band of eucalypts along the bank where paperbarks occur on the surrounding plains (the band of eucalypts comprises riparian vegetation), but this was not observed for designated streams on Strathmore or Highbury. The only different vegetation associated with such minor drainage channels occurs in the stream bed but technically this is not riparian vegetation.

Vegetation growing in stream beds is stream or riverine vegetation, just as vegetation growing in water, such as sedges, is aquatic rather than riparian. The term riparian has evidently been used to encompass vegetation in the stream as well as on the stream bank but this is an incorrect application of the term.

Wildlife Corridor Function

Wildlife corridor function is identified as constituting sufficient areas of natural habitat within and along the river system to allow native fauna to migrate within their natural ranges. Setting aside the tautology associated with the use of the term habitat[1] the immediate issues are, what fauna and what are their natural ranges? Invariably the answer is unknown and conclusions

[1] Habitat is the environment where a species is observed to occur hence the entire surface of the earth is habitat for something. The tautology arises because habitat is defined in terms of species occurrence but the occurrence of species is then discussed in terms of habitat. The considerations are almost invariably circular and conclusions usually arise through definition.

depend on speculative considerations concerning a few species considered important. Given the complexity of the situation, and the lack of information, there can be no definitive answer.

For rivers in particular, but biota in general, the issue relates to barriers rather than corridors. The relevant question is what prevents species occurring in locations/environments where they could be expected to occur? The considerations are particularly complex as they involve adaptation of species to environments and interactions between species (e.g. competition). However, for human induced change they can be simplified into identifying impacts that produce a significant change to species distributions and/or gene flow between populations. Addressing impacts of developments on the movement of biota involves identifying constructions that represent significant barriers rather than attempting to impose anthropocentric concepts relating to urban design[2].

Corridor function is identified as being relevant for wildlife but not plants when rivers are most apparently a 'corridor' for the movement of plants. In the gulf country this is most apparent with weeds such as mimosa and rubber vine. However, on analysis the apparent corridor function is related to a number of environmental considerations rather than transport by way of patterns of movement. Seeds can be transported by water, wind and animals thus the potential distribution of plants is not restricted by transport in streams. The effective restriction of rubber vine to stream channels and riparian vegetation relates to disturbance and the enhanced availability of water and nutrients rather than transport.

The distribution of rubber vine is related to disturbance enhancing recruitment and the existence of a suitable environment. Transport of seed by stream flows is irrelevant unless these criteria are met. That situation also arises with fauna. Water birds are associated with water but their distribution is not restricted to their moving along rivers or any other suggested corridor. Moreover, the water birds disperse many species of aquatic plants and animals thereby making their distribution independent of the interconnectivity of streams. Addressing observed patterns of biota by way of corridor function provides a misleading representation how ecological systems function.

High Preservation Areas (HPA)

General issues that arise with streams are the identification of HPAs along the entire length of specified streams, the criteria used to identify tributaries, and the assignment of special area status to waterholes that take water from streams.

Stream HPAs

The minimum width of a HPA from a stream bank is 200m but it can be varied up to 1000m. However, no rationale has been given for determining an appropriate width. A question raised at the 15 December 2006 meeting at Highbury, of why was a uniform buffer of 1000m required on either side of the stream, received an agency response 'because it is needed'.

Comprehensive observations of nitrogen levels of streams in the USA have identified that a 50m buffer is effective in preventing applications of nitrogen fertiliser from affecting streams. Nitrogen is a useful indicator because of the high levels of application in agriculture and its

[2] Considerations of corridors in ecology can be seen to derive from island ecology where the ocean represents a natural barrier to the movement of terrestrial biota. Considerations related to barriers have been inverted to consideration of corridors for the movement of biota, particularly when addressing remnant patches of vegetation (the islands). Considerations of corridors reflect anthropocentric constraints applied in designing urban developments rather than relating to natural controls on the distribution of species.

low level of binding to soils as an anion such as NO_3^-. Buffer distances for septic systems from stream lines in NSW are 100m where the fecal coliforms provide a good indicator of transport. For mechanical disturbance the setback of buildings on beaches in Queensland is typically around 100m with a maximum of around 200m. The required separation between urban development and agriculture in Queensland is 40m.

There is no known tangible evidence of a need for a 1000m setback from rivers, and the suggested width is much greater than all other restrictions implemented for similar reasons. Indeed, the level of 'protection' assigned to the rivers is 25 times greater than assigned to people. The glib statement 'because it is needed' is without apparent substance.

Stream order

By identifying a 1km width for HPAs along the entire length of nominated streams (the actual width of a HPA is 2km plus the width of the stream channel) the same status is assigned to all levels of streams that constitute a contiguous river. In the Wild Rivers Code the stream level is identified by way of stream order, and constraints on land clearing within HPAs vary with the stream order.

The stream order numbering system identifies the initial occurrence of an incised drainage line as a first order stream (stream order one). The channel that arises through the confluence of two first order streams is given an order of two. A third order stream arises where second order streams coalesce, etc. The stream order number for a river varies with the characteristics of the terrain and climate but it would typically be at least four. It would be exceptional for first and second order streams to be regarded as rivers or major tributaries.

The irrationality in assigning the same status to all stream levels in a contiguous stream is most evident through the failure to assign status to other feeder streams. A stream with an order of one can be subject to an HPA due to its name when the vast majority of level one streams have no such buffer. In the Staaten proposal around eleven order one level streams have been assigned 1km HPAs. The number of level one order streams in the catchment not assigned HPAs is unknown but could comprise several thousand.

The current designation of HPAs around level one streams arises solely because of their name and cannot serve any useful purpose if only because of their very limited representation. The designation of HPAs around low levels of streams in this manner cannot have a significant beneficial impact regardless of what is being addressed.

Major tributary

The issue of what constitutes a major tributary could be addressed logically by way general application of the term but the response given to the question by the department (given below) identifies that common usage of the term is considered irrelevant. In English the word major indicates something is large or has particular significance, and the term tributary is usually taken to indicate a direct connection between a river and the tributary. While the legislation allows any stream to be identified as being a major tributary this is contrary to the normal use of the English language.

Most of the streams identified as being 'major tributaries' in proposals are named as creeks on maps and this reflects their level of development. Their channels are small and flows are highly seasonal and variable. Long sections do not have persistent waterholes and the channels are completely dry for most of the year. Riparian vegetation is absent in the upper sections at least.

Special areas

The intent of the Wild Rivers Act is to maintain flows in rivers but some special areas are justified on the basis that they take flows from rivers. The natural occurrence of off-stream surface water storages is regarded as being good but constructed off-stream water storages are considered bad and are prohibited. This is despite the water infrastructure developed for agriculture in the south being beneficial to water birds, particularly since they maintain populations during drought.

The justifications given for such special areas are that they are hydrologically connected to streams and they provide an important environment for wildlife. With the first justification the entire catchment can be a special area as, by definition, it is hydrologically connected to the river. However, if connection via a channel is considered to be a requirement, then many if not most of the existing off-stream water storages are not connected to streams via channels. The second justification does not appear to be valid given the intent of the Wild Rivers Act which relates to rivers and not the entire landscape.

Water Yield Estimates

In the Staaten Wild River Declaration Proposal the mean annual runoff from the Staaten catchment is given as being 6851 GL, and this is used to specify the maximum amount of water that can be harvested by humans.

> Mean annual flow for the river system is 6 851 000 ML, which is the largest flow volume of all the Gulf Basin catchments.

The Natural Resources Atlas on the Australian Government Department of Environment and Heritage Web site contains information on catchment yields developed for the National Land and Water Resources Audit (NLWRA) by the Department. This identifies that the Staaten Basin lies within the Gulf of Carpentaria Drainage Division with the Gilbert and Mitchell Basins occurring on either side. There is no drainage entity of Gulf Basins. The Gulf Basins is an administrative artifact and its use in biophysical analysis results in spurious comparisons.

The estimated mean annual discharges for the Gilbert, Staaten and Mitchell basins given in the Atlas of Australian Resources are 4375, 6851 and 22951 GL respectively. The estimated yield from the Mitchell basin is much higher than for the Staaten. Normalising these figures to catchment size provides an estimate of the average unit area yield (specific yield), which is 94, 266 and 313 ML/km^2 respectively. The figures given in the Hydrobiology report differ slightly but the relativities are the same. While the Mitchell catchment is the largest it also has the highest unit area yield because of higher rainfall.

The estimate of catchment yield for the Staaten River was determined by the Department using a daily Sacramento Model calibrated to the Dorunda stream gauge (established 1989, catchment area 6720km^2) and mean daily rainfall for the gauged catchment (rain gauges undefined). The Dorunda measurements relate to around 27% of the Staaten Basin but do not encompass flows from any coastal flats. The prediction of catchment yield is based on rainfall for the period 1900 - 1999 (rain gauges undefined).

Such modeling is always limited by the available information and in this instance is particularly limited by the very limited network of rain gauges, and the small percentage of the basin that was addressed. The reliability of the flow measurements is unknown but stream gauging is difficult in such flat terrain, particularly where there are intermittent massive flows.

Taking broad averages for the Staaten Basin from the generalised graphs by the BOM (Fig 2) the difference between the predicted actual evapotranspiration and rainfall projected from the very limited ground observations is around 6425 GL. While the two estimates of catchment yield are equivalent the information available for the BOM modeling does not allow determination of whether the estimates are independent. The BOM estimates could have been tailored to match the Departmental estimate, and/or the Departmental modeling could have relied on BOM estimates for rainfall and evaporation. The rainfall runoff ratio is greater than 25% which is high for Australia.

The uncertainties in estimates are evidenced by the sources of data used by the BOM. No measurements were obtained from within the Staaten Basin or in its vicinity. They are also evidenced by differences between estimates of runoff for Gulf catchments derived by the Department using different models. Table 4 in the Gulf Draft Water Resources Plan 2006 identifies differences in estimates presented in 2002 and 2006 of -14, -47 and +10% for the Leichhardt, Flinders and Gilbert Rivers respectively.

The estimate of yield for the Staaten Basin represents a broader than ball park figure, hence the presentation of a single figure as being definitive is misleading. Moreover, it fails to address the variability. While the BOM identifies the variability in rainfall as being moderate the 90 percentile rainfall is around 2.5 times that for the ten percentile. Also, the estimated mean discharge is around 10% greater than the median identifying that rainfall in most years is lower than the average due to a skewed distribution in the rainfall. The rainfall – runoff ratio varies more than rainfall with the ratio being highest in above average years.

Despite the large uncertainties in estimates, and without consideration of the significance of variability, a definitive statement is made concerning the amount of water that can be potentially harvested without affecting the river.

> It is important that a vast majority of the area's runoff is available to the river system to retain the high degree of naturalness that characterises a wild river area. Therefore it is desirable that the total amount of water available for allocation in a wild rivers area will be limited to less than one percent of the area's mean annual flow unless varied by a water resource plan made under the Water Act.

This statement may have been prompted by the dilemma identified in the Hydrobiology report that *using the most optimistic data range, it is extremely difficult to make the relationships positive for the entire western section of the study zone given the amount of evaporation, the generally low rainfall of the area, and the ability of common recharge equations to adequately represent anything but ideally layered aquifers*. That is, discharge is occurring where, according to application of current technology, it should not. The same situation arises when applying general water balance calculations to the Staaten as the runoff is considerably higher than would be expected using normal considerations. In the Hydrobiology report *It is therefore concluded that the system probably represents the remnants of an earlier climatic regime and that the system is trending naturally towards an unsustainable system.*

While the conclusion is possible it is highly speculative and fails to take account of the limitations in knowledge and technology. The logic applied is that we know our knowledge and technology are right and can therefore introduce a new factor to account for discrepancies. The correct interpretation is that the extreme failure evidences major deficiencies in the knowledge and technology used.

The suggestion that the suggested trend is unsustainable is also problematical. Natural systems are never static. There is no reason to expect them to stay the same, and there are many reasons

to expect them to change. Indeed, grazing would be expected to have produced significant hydrological changes but we are not in a position to even start to quantify their magnitude. These limitations are compounded when attempting to predict what may occur in the future due to the inherent unreliability of extrapolation. An inability to emulate the existing situation means there is no possibility of predicting the future.

Vegetation

> The main vegetation types in the Mitchell-Gilbert Fan subregion are tea-tree Melaleuca species, low woodlands and open woodlands, coolibah or box woodlands and widespread wetlands. The Mitchell-Gilbert Fan subregion supports six `of concern' regional ecosystems.
>
> `Of Concern Regional Ecosystem' is a regional ecosystem that is prescribed under a regulation in the Vegetation Management Act 1999 and has either 10-30 % of its pre-clearing extent across the state remaining or more than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10 000 ha.

Use of the term remnant is problematical as evidenced by the terminology 'remnant vegetation remaining'. By definition remnants remain.

If none of a vegetation type has been cleared then technically there are no remnants. As the vegetation of the region is essentially uncleared there are effectively no remnants.

The irrationality of the considerations is of practical consequence as agency personnel identified a patch of woody plant encroachments on Strathmore as being remnant vegetation. The area was thought to contain regrowth from prior clearing when it represented encroachment of woody plants into grassland. However, even this misconception does not explain their conclusion as the recruiting species were common and widespread in uncleared vegetation. There was no basis for is categorisation as an 'Of Concern Regional Ecosystem'.

Land Use

> Grazing, followed by nature conservation, are the main land uses in the proposed wild river area. The declaration will not affect grazing.

Grazing can continue in a HPA but developments that can enhance the grazing are highly restricted. The opportunities to develop are very limited and this is highly significant for commercial operations. Several papers presented at the Fenner Conference on 'Integrating Agricultural and Environmental Imperatives for a Profitable and Sustainable Future' held at the Shine Dome of the Australian Academy of Science in November 2006[3] used Australian Bureau of Statistics (ABS) data to examine the commercial viability of farms. While production has increased markedly over the last 30 years the profitability of farms has not changed. Farms have to be continuously developed to remain viable.

The situation with grazing is the same as with attempts to preserve an existing natural situation. Attempts to maintain a current situation inevitably result in decline. Ongoing development is essential, and the necessary development is highly restricted by the constraints imposed by a Wild River declaration. The statement that the declaration will not affect grazing is false and misleading.

[3] The proceedings were published by CSIRO.

Another point that was clear from the Fenner conference is that addressing environmental considerations in agriculture depends on profitability. Preventing the main opportunities for development will result in environmental degradation.

> In 2000/01 the gross value of agriculture production (including crops and livestock disposals) for the Carpentaria Shire was $50 million. This indicates the value of the industry to the proposed wild river area (Economic Associates 2005).
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> The estimated value of commercial fishing (mainly prawn, finfish and crab) in the Gulf region is between $35 and $78 million annually (Economic Associates 2005). The Gulf fisheries' production is closely connected to the area's seasonal flow events.
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> Although there is little tourism due to limited access and remoteness, recreational fishing is also important to the proposed wild river area, especially for barramundi and saratoga. Bird and crocodile watching are also attractions.

These statements do not examine the economic implications of the Wild River Declaration and one is self contradictory. The statements that agriculture will be unaffected, and inferences that the declaration will provide significant benefits through fishing and tourism, are made without providing justification. It is difficult to see how recreational fishing can be important when there is little tourism.

An analysis should be provided that evaluates the impact of the proposal on future revenues. For example, the Staaten can only be assigned a small part of the revenue from Gulf fisheries. The revenue must be appropriately apportioned. Moreover, there is a need to identify likely future trends and how they could be affected by possible developments. Tourism is of little consequence for the foreseeable future due to the existence of more attractive and accessible alternatives and the high operational costs in such a remote area.

The general situation in Australia is that:

- Irrigation provides 50% of the profit from agriculture and that return is obtained from less than 1% of agricultural land.
- Water for irrigation has always been greatest in northern Australia but, due largely to the proximity to markets, irrigation has been largely restricted to the south.
- Development of transport and the Asian economy have made agricultural production viable in northern Australia, as illustrated by the extension of the Ord River irrigation area[4].

Taking these factors into account the proposed declaration can only have a significant negative economic impact.

General Constraints

The legislation attempts to legitimise the imposition of sectoral social values by referring to 'scientific' processes. However, all assessments are anthropocentric and so are diametrically opposed to requirements when applying the scientific method. Nonsensical considerations that

[4] The Ord was uneconomic when established for the political reason of providing a homeland for Israel. It is now highly viable because of the development of markets which is enhanced by proximity and the reverse seasonality with northern markets. It identifies the foreseeable future trend provided sustainability can be addressed.

arise through this abuse of science include nature having values. Other anthropomorphic representations include:

- Processes requiring preservation
- Ecology having needs
- Wildlife having corridors
- Environments used by water birds being termed refugia
- Working link between the land and aquatic ecosystems
- The suggested natural riparian function
- Where natural geomorphic processes happen naturally streams will tend to have stable bed and banks.
- Preserving special features is an important part of maintaining a proposed wild river area's natural values.
- Abandoned riverine channel[5]

The anthropomorphic considerations demonstrate the absence of science when the Wild Rivers Act, the Code, and the proposed declarations are expressed in scientific terms. This represents pseudoscience.

The agricultural reforms of Stalin evidence such use of pseudoscience to promote a political agenda[6]. Strict controls were imposed on those on the land, and the permitted activities were determined by scientists selected by a centralist government. The control and application of pseudoscience were counterproductive. The reforms failed but at great social cost.

The ingrained irrationality makes it impossible to rationally address proposals under the Wild Rivers legislation other than to identify the irrationalities. There is no logical basis in the legislation for assessing whether proposals can or will achieve desirable biophysical outcomes.

The situation is exemplified by the mode of application of the precautionary principle. This principle arose when the Green political party gained influence in Germany and was used to promote their agenda. It has been variously expressed but basically states that a lack of scientific certainty that an action is needed should not be used as justification for not imposing a restriction.

The dilemma this poses is that there is no certainty with predictions given the complex situations addressed with the environment. Science addresses uncertainties but gives no certainty of there being a specific outcome[7]. The precautionary principal can therefore be used to justify any restriction. However, it is useless when attempting to identify an appropriate way forward and is therefore counterproductive.

The context for the Wild Rivers Act introduces a nuance to the Precautionary Principle through its application to values rather than science. Consideration of scientific certainty has been replaced by assessment of how activities/developments may affect perceived values rather than tangible outcomes. Proposals need only state that the identified values are being addressed without demonstrating that the identified restrictions are needed to provide suggested or inferred benefits.

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[5] The term abandoned river channel is used in the geological map and elsewhere but from a scientific perspective this does not justify its use. They are relict or remnant river channels.

[6] Joravsky, D (1970) The Lysenko Affair. Harvard University Press, Cambridge Massachusetts pp.459

[7] Predictions are necessarily based on simplified representations of systems (models) and therefore can never be completely correct. Their reliability depends strongly on the complexity of the system. In some situations predictions are impossible, as with evolution, as there is no defined outcome.

One consequence of this situation is that it places the onus on those affected by proposals to demonstrate that they are not needed rather than the proponents demonstrate that they are. However, given that benefits are defined by way of values rather than tangible outcomes, and as the criteria used are nonsensical, there is no definitive or rational means of response. The proponents can place constraints on the activities of others regardless of the rationality or likely outcomes.

Negative Consequences

A basic precept underpinning the legislation is that we cannot return things to how they were in 1770 but we can maintain things as they are. As natural systems invariably change, and as biological changes are irreversible, the first precept is valid and the second is not. The current situation cannot be preserved.

A diverse array of information identifies that land under agriculture in Australia has degraded since 1770 (e.g. Tunstall 2009[8]). The degradation is evidenced by increases in erosion, woody vegetation and dryland salinity, and decreases in soil organic matter. These changes have occurred under grazing alone and initially did not involve tree clearing or ploughing. Attempts to retain the current situation are therefore directed at maintaining a degraded condition.

Some current impacts of the prior land use are obvious, as with weeds (Fig. 3) and erosion (Fig. 4), but these have been deemed to be minor in the proposal. Others have been ignored, as with the pronounced impact of feral pigs on soils, plants and animals, and the changed fire regime. Some are only apparent to those with the expertise needed to recognise them, as with encroachment or invasion of native woody plants (bush thickening).

There is abundant evidence of bush thickening on Strathmore, as with the fenceline illustrations obtained near the junction of Vanrook Creek and the Einasleigh River (Fig. 5). Another obvious situation occurs on some floodplains where there are no large trees and eucalypt regeneration has either died or regrown from the lignotuber following death of the shoots. The trunks of the largest trees were around 500mm DBH but all were dead.

Some scientists in the Queensland Government Herbarium have concluded that bush thickening derives from fluctuations in climate and is unrelated to land use. This ignores the obvious that bush thickening can vary either side of fencelines when fences cannot influence patterns induced by climate. The woody plant encroachment/bush thickening is an impact of grazing and reflects degradation associated with a changed surficial hydrology. The existing land use impacts have had definite hydrological consequences throughout the catchment.

Few relevant scientific studies exist for the impacts of 200 years of land use on stream flows in Australia but one was conducted by Queensland Government personnel in the Burnett region[9]. With a degraded soil 20% of rainfall was lost a surface runoff. Improving the soil structure eliminated surface runoff but water equating with 20% of rainfall was still lost, but as subsurface drainage (percolation).

The improvements to the soil increased plant growth but they can also benefit streams as percolated water is supplied at a slower rate and has higher persistence and quality than surface runoff. Improvements to the soil can improve stream flows while also improving production

[8] Degradation of Farming Systems. Available on eric.com.au.

[9] Bell, M. J., Bridge, B. J., Harch, G. R., Want, P. S., Orange, D. N. and Connolly, R.D. (2001) Soil structure affects water balance of Ferrosol cropping systems. Proceedings of a GRDC conference, Kingaroy

by plants. Benefits to all parts of the system are obtained by reducing rather than maintaining or increasing the rate of water runoff.

While the 1770 situation cannot be recreated the current situation can be improved by appropriate land use (development). However, it will not be improved where the focus is on preservation. Indeed, attempts at preservation will invariably exacerbate the decline.

Development is intrinsic to all biological systems as without it they cease to exist. All biological systems naturally tend to expand (develop to occupy available space / increase utilisation of resources) as that is fundamental to their survival. They cannot always expand but the tendency to develop at least decreases the rate of decline.

The premise that the past cannot be returned but the current situation can be preserved is invalid and blocks opportunities for a rational evaluation to develop a more favourable outcome. Quite apart from things never remaining the same, there is no consideration of how the current situation can be beneficially changed from a degraded situation. One certainty is that the situation will not improve given imposition of restrictions designed to preserve the existing situation. Indeed, the situation will inevitably degrade further due to the impacts of existing factors such as pigs and weeds.

The difficulty in attempting to apply a rational analysis is exemplified by the Wild Rivers Act attempting to preserve values when values reflect human beliefs. Values do not provide a rational basis for evaluating whether or not land use activities could have a significant impact. For implementation it is therefore assumed that any new land use would be detrimental, thus development is automatically excluded from high preservation areas (HPAs)

A rational evaluation would address potential tangible gains and losses with and without development. Without such an evaluation there is no basis for discussion and administrators can claim what they like without providing justification for suggested or inferred benefits. In the current situation the existence of alternatives that can enhance environmental outcomes as well as production is irrelevant. The Wild Rivers Act is therefore detrimental to the interests of the State.

The restrictive zonings imposed under the Act will not provide environmental benefit and can be expected to be environmentally detrimental. This is normal as attempts to maintain the status quo inevitably produce degradation. The Wild Rivers Act is regressive as well as repressive.

DEPARTMENTAL RESPONSE TO QUESTIONS

The following provides comment on the answers requested in a letter. The questions are in italics, the responses are indented in blue, and the comments in normal type.

1) What is the criterion upon which the Minister relied when deciding that the Staaten and Van Rook should be included in the notice of intent. What maps and other data did he use. Please provide us with a copy.

> The proposed Staaten Wild River Area was identified in the 2004 election commitment and adopted as Government policy following that election. A copy of the 2004 election commitment paper is enclosed. The key criterion for identifying potential wild river areas is that the river system has all or almost all of its natural values intact. Wild river natural values are hydrologic processes, geomorphic processes, riparian function, wildlife corridor function and water quality. This is generally evident by the low levels of disturbance to the natural values of that river system, as may be caused by development, intensive land use, vegetation clearing, etc. For example, there has virtually been no water resource development, irrigated agriculture, broadscale land clearing, intensive animal husbandry, point-source polluting industry or mining development in the proposed wild river area. I note that the Staaten has the least amount of disturbance amongst the Gulf of Carpentaria river systems.

Natural processes remain intact regardless of any development. The statement on wild river natural values is nonsense presented as being something meaningful through the pretext of being based on science through a suggested association with processes.

The assessment of condition has been based on the absence of point or concentrated developments (concentrated land use) rather than an assessment of processes (function) or outcomes (condition). The 'note that the Staaten has the least amount of disturbance amongst the Gulf of Carpentaria river systems' reflects the lack of such developments rather than condition of the catchments. There are no measurements of catchment processes, condition or performance, as acknowledged in the response to point 2. It is essentially a data free analysis.

Given the lack of data the logic applied is that, because there is no point or concentrated development, the catchments must have 'all or almost all of their natural values intact'. That is, the catchments are assumed to be in good condition without there being any data to show that they are other than a lack of developments other than grazing. The situation is presented as; we know (assert) the catchments are in good condition and that situation is evidenced by the lack of point or concentrated development.

2) What impact has current and use of the land we occupy had upon the hydrological processes, geomorphic processes, riparian function, wildlife corridors and water quality. What is the criterion upon which the Minister relied. Please provide copies of all maps, reports and other data.

> No specific assessment was made of the Impacts of past or current land use on Strathmore (or any other individual property in the proposed wild river area) on the wild river natural values. The fact that the natural values are still largely intact indicates that there may be little impact from historic land use.

This contains the explicit comment 'the fact that the natural values are still largely intact'. As identified for point 1, this is an assertion without observations on catchment condition or

changes induced by land use. It is not an established fact and the arguments used to justify the assertion are tautological (circular and self evident). It is inferred that the catchments must be in good condition given the limited development and, because they are assumed to be in good condition, all of the natural values are deemed to be intact. This conclusion is justified by identifying that there has been limited development. Such tautology is usual with data free analyses.

The last sentence in the response to point 2 evidences a lack of knowledge of the impacts of grazing and disregard for the collection and presentation of facts. There is abundant evidence of the impacts of grazing on land within the Staaten basin and some of these impacts can have a pronounced effect on the hydrology. The impacts are greatest in the vicinity of rivers and will inevitably increase with time given the wild river proscriptions.

3) *What is the criterion upon which the Minister relied upon which the Minister relied on in determining which water courses were major tributaries of the wild rivers. Please advise what the Minister defines as major tributary. Please provide copies of all maps, report and other data relied upon.*

> As outlined in the Staten Wild River Declaration Proposal of December 2006 at page 9, major tributaries were identified through desktop studies using the following guiding principles:
>
> - larger tributaries in the catchment, that is, those directly connected to the main stream (primary tributaries)
> - tributaries that contribute most of the flow volume (i.e. tributaries draining larger catchment areas)
> - tributaries that contribute most of the ecologically significant flow or aquatic habitat to the system.
>
> These principles were applied to the drainage network depicted on the most current publicly available 1:250,000 scale topographic maps. The interpretations were supported by reference to geological maps and aerial photos available at the time. The term 'major tributary' does not necessarily imply a large stream; the size of the streams in a river basin depends on its landscape, hydrology and geology.
>
> The following publicly available resource materials were used in this assessment. The topographic map - - -- -

The development of principles to identify major tributaries evidences a disregard for existing knowledge and science. Words have been redefined to suite the purpose of those using them. The statement that 'the size of the streams in a river basin depends on its landscape, hydrology and geology' is a statement of fact and does not address the issue of the significance of streams. To most in the general and scientific community the term major tributary would reflect the size of the stream.

The first dot point accords with general use. With the second dot point, there is no substantive basis for determining relative flows other than coarse estimates of catchment boundaries and the sizes/development of the streams. The low resolution Landsat image for 2002 clearly shows major tributaries such as the Einasleigh and Etheridge Rivers but identification of creeks is difficult because of their small size.

It appears that, for streams, the 'analysis' has simply involved selecting the longer stream lines in generalised representations of the drainage network given in topographic maps. One consequence of this is that Vanrook Creek is identified as a single continuous line extending from the Staaten to east of the confluence of the Einasleigh and Etheridge Rivers. However, in

its upper reaches Vanrook Creek is connected to the Einasleigh River. Topographically and geographically the upper reaches of Vanrook Creek are part of the Gilbert rather than Staaten River basin.

On the third dot point, there is no information that allows identification of 'ecologically significant flow' even if it could be tangibly defined. Regardless of what it is, 'ecologically significant flow' cannot be assessed from the reference information identified as having been used.

4) What is the criteria upon which the Minister relied in determining that the High Preservation Area buffer for the rivers and their major tributaries should be 1 kilometre. For example was the buffer based upon riparian vegetation. Please provide copies of all maps. reports and data relied upon.

> The Wild Rivers Act clearly limits the extent of high preservation areas to be within 1km of a wild river, a major tributary or special feature. This value was adopted for the Staaten River, Vanrook Creek and their major tributaries because there was no evidence of any significant natural barriers that would otherwise mitigate the potential impacts of land based developments on the natural river values. The topography of the Staaten River basin is generally broad open country that drains to the stream system. The buffer aims to separate development from the river system to minimise the potential impacts that can be caused by polluted runoff, spray drift and other land-based degrading processes. Riparian vegetation does not necessarily mitigate these processes and so the extent of such vegetation was not a criterion in determining the buffer widths.

This is addressed above by identifying that there is no scientific evidence that indicates a 1km buffer is needed to achieve the suggested outcomes but there is abundant evidence to the contrary. The absurdity of the suggested need is illustrated by the degree of protection from agriculture assigned to the river being 25 times greater than is assigned to people.

The Wild Rivers Act identifies the minimum width of the HPA either side of a stream as being 200m, and the maximum 1km. While not explicit, the inference is that a 200m width is normal but that greater widths will arise where there are identified special needs. The above response reverses this situation by stating that the maximum width of 1km will apply unless there are special reasons for reducing it. This situation is not identified in either the Wild Rives Act or Code and has no identified substantive basis.

STRATHMORE ISSUES

Much of the upper section of Vanrook Creek lies on Strathmore. This has been identified as a wild river separately from the Staaten even though it is part of the Staten Wild river declaration proposal.

The major tributaries specified in the notice of intention that lie on Strathmore are:

- Wyaaba Creek- Red River
- Pelican River
- Pandanus Creek
- Echo Creek
- Cockburn Creek anabranch

The Staaten catchment has been divided into 3 geomorphic sub-bioregions. Strathmore is located in the Mitchell-Gilbert Fan sub-bioregion.

A small part of the Vanrook Creek Floodplain Complex special area lies on Strathmore. However, designation of Echo Creek as a Major Tributary is solely based on the suggestion that it is important for maintaining the Pelican Creek Floodplain Complex special area.

Streams

Vanrook Creek

The Staaten River is the main stream within the proposed wild river area. While Vanrook is currently a major tributary of the Staaten River, it has been listed as a wild river because it is possible it may disconnect from the Staaten in future. To provide certainty for landholders in the drainage basin, Vanrook has been listed as a wild river.

Freshwater flows, particularly after heavy rainfall during the wet season, are important for maintaining diverse habitats.

The issues with Vanrook Creek relate to connectivity as well as the assignment of HPA status to low levels of stream order. The main channel of the Vanrook on Strathmore appears to have a stream order of two to three and there is no riparian vegetation. The geomorphic characteristics of the channel accord with its being named a creek.

Generalised topographic maps identify Vanrook Creek as having a continuous channel from its junction with the Staaten, to east of the junction of the Einasleigh and Ethridge Rivers. However, on the ground there is direct connection between Vanrook Creek and the Einasleigh River. This is evident from the air (Fig. 6) and is identified in the geology map (Fig. 7). The association with the Einasleigh River is also evident in coarse resolution satellite imagery (Fig. 8) but the occurrence of a separate contiguous channel through Strathmore to the Staaten River is not.

Hydrologically the upper sections of Vanrook Creek appear to be linked with the Gilbert Basin rather than the Staaten Basin. The linkage is not restricted to overbank flows as suggested in the description given in the proposal for the Vanrook Creek Floodplain Complex (given below).

The occurrence of two river channels running parallel in close proximity is unusual hence there is likely a geological basis for this occurrence. The geology map identifies the northern bank of Vanrook Creek on Strathmore as comprising a formation in the Pliocene to Holocene Wyaaba beds (Czv), and the channel and southern bank as more recent Quaternary flood plain alluvium (Qa). This section of Vanrook Creek lies on a geological boundary with the creek being geologically and topographically linked with the Einasleigh River.

There is a marked disjunct in elevation between either side of Vanrook Creek with the low side being towards the Einasleigh River to the south. The geomorphological indications are that the sections of Vanrook Creek on Strathmore are linked with the Gilbert Basin rather than the Staaten Basin.

Echo Creek

> Echo Creek drains a relatively small catchment area but its flows are important for filling numerous waterhole habitats located in a large floodplain area near Pelican Creek. Echo Creek and Pelican Creek flow relatively close to each other in their lower reaches.

On Strathmore most of Echo Creek is a second order stream at most. As identified in the declaration proposal, it is not a major tributary.

The additional issue is the assignment of status to a creek because of its suggested significance to waterholes rather than to the Staaten River. The proposal is meant to address the maintenance of the river.

Cockburn Creek anabranch

> Cockburn Creek anabranch leaves Pelican Creek and joins into Wyaaba Creek downstream (that is, it is not an anabranch of Cockburn Creek in the north-east of the catchment). Cockburn Creek anabranch runs parallel to Wyaaba Creek and has a similar channel size. Due to this relatively large size, it is likely that this channel is a major secondary channel during the wet season. Waterholes along the creek may also be important areas of aquatic refuge during the dry season.

This correctly identifies that Cockburn Creek Anabranch is not an anabranch but fails to identify why it is a major tributary.

Special Areas

Vanrook Creek Floodplain Complex

> The catchment boundary between Vanrook Creek of the Staaten River catchment and the Einasleigh River of the Gilbert River catchment is narrow with low relief. Near the Einasleigh River confluence with the Gilbert River there is a floodplain complex with a number of channels and waterholes that appear to be fed by overbank flows from the Gilbert River catchment during the wet season. Maintenance of this lateral hydrological connectivity is considered important for preserving the natural values of the proposed wild river area's downstream reaches.

The considerations given in addressing Vanrook Creek identify that this special area is associated with the Gilbert rather than Staaten Basin.