✓ Wickender
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Dover

NPWS North-east Forest (Sur
Biodiversity Vertebrate Fauna Project.
1992-3

2. METHODOLOGY

The overall project objective, to map the predicted distributions of target forest fauna at a regional level, largely determined the methodology. This objective and the methods employed as a consequence are not to be confused with those of concurrent fauna surveys being conducted in the same general areas by the NSW Forestry Commission. The aim of the Commission's Environmental Impact Statement (EIS) surveys is to assess the impact of proposed forest-based activities on the fauna of various Management Areas (York et al. 1991). As such these two large projects are focused at different scales. Much of the information gained will be complimentary and it is anticipated that the combination of data will benefit both projects. The sharing of knowledge derived can only lead to improved forest fauna habitat management.

The overall strategy of the fauna project is summarized diagrammatically in Figure 1.

2.1 Survey Design, Stratification and Site Selection

2.1.1 Project Planning and Survey Design

Due to the vagaries of funding application and allocation procedures the pre-planning time frame for the fauna survey project was decidedly but unavoidably insufficient.

The impetus for the project grew from the initiative of planning personnel within the NSW NPWS Northern Region office. It was recognized that potential funding sources provided scope to address the chronic lack of regional systemmatic information concerning rare and threatened forest fauna of northeast NSW. Funds were solicited from a variety of sources with the result that project planning commenced in August 1991 with an uncertain funding future after the first financial year and with only six weeks to plan sampling intensities and stratification procedures before the optimal field season period beginning in October. The provision of further funds and subsequent project expansion became an interactive and iterative development process but it was the initial funding level and assessment of logistic constraints that largely determined the stratification and sampling intensity for the whole project.

Initial funding was provided by the Environmental Resource Information Network (ERIN) to conduct a pilot survey of the Clarence Valley. Logistic constraints included:
(i) The availability of survey team leaders and the perceived work load they could sustain through the field season greatly influenced survey design.

(ii) With systemmatic regional fauna survey work having never been conducted in northeast NSW there was an initial shortage of suitable four wheel drive vehicles (Two per team) and field sampling equipment that had to be addressed with great haste.

(iii) The sheer size of the study area (XXXXX ha) and enormous diversity of habitats had to be considered in light of available survey effort.

It was decided that three survey teams, each with an 'expert' team leader, could be assembled for the pilot Clarence Valley survey and that each team would be able to complete 10 field surveys of one week duration over the 1991-92 summer. From that point a statification was developed to maximize survey coverage given that 30 areas were to be sampled.

The project expanded with further funds (e.g. National Rainforest Conservation Project) and sampling was also conducted outside the Clarence Valley in the 1991-92 field season by two additional survey teams. The 1992-93 season entailed extensive sampling (by four survey teams) outside the Clarence Valley in order to survey the range of faunal habitats in the rest of the forests of northeast NSW at the same stratification level and, as far as possible, the same intensity as that carried out in the Clarence Valley.

2.1.2 Stratification and Survey Site Selection

Geographic Information Systems (GIS) allow generation of stratified survey designs and optimal location of individual survey sites and transects (Perrier and Smith 1990). The NSW NPWS have designed their own GIS, the Environmental Resource Mapping System (ERMS). The initial role for ERMS in this project was to define and map broad survey strata by overlaying

three mapped environmental variables. These were geology (7 classes), elevation (3 classes) and vegetation systems (5 classes) (Figure 2). The only additional constraint was the need to locate strata in areas where access by established road networks would allow efficient use of available survey time. Strata were identified as priorities for survey based on their overall occurrence within the study area. An index of directed sampling intensity (No. sites/log of area) was implemented to increase the level of sampling of rarer Strata at the 'expense' of the more common and widespread Strata. However the latter were well represented in the priority Strata. A summary of the stratification showing the number of Sites, area, and index of survey intensity for each Stratum throughout five broad predetermined latitudinal bands (Figure 3) is supplied as Appendix 1. Survey Areas were chosen where combinations of three priority Strata could be efficiently sampled.

Computer (ERMS) generated maps (1:125000) were then produced for each survey Area and supplied to the team leader. The priority Strata to be sampled during the six day field trip to that Area were highlighted. Three Strata were targetted in each Survey Area and each Stratum itself comprised three survey Sites to be selected in the field (Figure 4).

Within the identified priority Strata on-ground survey Sites were chosen following a standard pattern comprising a Gully, Midslope and Ridge Site for each Stratum (see Figure 5). Three Sites were used within each Stratum in an effort to account for the perceived moisture gradient of habitat types within the relatively heterogeneous Strata. For example, a moist forest unit was defined as being at least 50% moist forest. In such a system we could expect dry forest on the ridges and rainforest in the gullies. The concept of Gully (G), Midslope (M), and Ridge (R) Sites was to ensure that the wettest, driest and 'typical' habitats were sampled. The G, M and R labels were simply convenient Site identifiers. The Gully Site acted as an axis or focus for the Stratum and ensured the sampling of creeklines (important for a subset of the standard sampling methods). The Ridge and Midslope Sites were spaced at least one kilometer from it or each other, depending on the Stratum characteristics. This facilitated the geographic spreading of the three Sites.

The selection of the three Sites was aided by Forestry Commission of NSW forest type maps (where available), topographic maps and on-ground assessment. A range of disturbance histories (logging, grazing, burning) within each Stratum across the forest estate.

Most standardized survey effort was expended at the standard Sites (Gully, Midslope, Ridge) and along the two kilometer Road Transect, again centered or beginning at the Gully Site (see Table 1). The standard sampling methods could and were also utilized within the survey Area.

The field component of the project included two sampling seasons. Five hundred and seventy three (573) Sites were surveyed in total, 378 in the first season (November 1991-May 1992) and 195 in the second (October 1992-April 1993).

..1.3 Target Species

A list comprising 149 native forest inhabiting vertebrates (46 mammals, 45 birds, 37 reptiles and 21 Amphibians; see Appendix 2) was collated as the target species for this project (see Gilmore and Parnaby 1993). To qualify for this list one of the following criteria had to be met:

(i) Those forest inhabiting species appearing on the NSW NPWS Schedule 12 list of rare and threatened fauna.

(ii) Those species for which the northeast NSW forests represent a significant part of their range.

(iii) Those forest species considered currently subject of known or potential threatening processes brought about directly or indirectly through habitat clearing or modification.

Sampling techniques were chosen to maximize the detection of these species.

2.2 Field Methodology

The methods employed for this project were designed to detect the presence and absence of target forest fauna throughout the range of environmental variation in the northeast NSW forest habitats.

Several of the sampling techniques also yield information on the relative abundance of different species. However as pointed out by McKenzie (1991) "The relative abundance of a species in any assemblage is so strongly influenced by the operation of localised processes that it is liable to be far too sensitive for studies that aim to discriminate patterns in species composition at regional scales". The next phase of this project will see the development of microhabitat models that will relate the finer scale densities of target fauna to finer scale site characteristics such as floristics and vegetation structure.

Each survey team was usually comprised of five people. The team leader was responsible for on-ground site selection, technique implementation, record verification, collection of voucher specimens and accurate mapping and description of survey sites. All team members were involved with each survey technique during the six day field trips. Priority Strata methods (Table 1) were conducted first and if time and weather conditions allowed additional work was undertaken throughout the survey Area.

2.2.1 Site-based Methods (At each Gully, Midslope, Ridge Site)

The following field sampling methods were employed at each standard Site (see Figure 5, Table 1).

a) Large hair-sampling tubes

Large hair-sampling tubes of the type described by Scotts and Craig (1988) have proven an efficient means of detecting ground mammals, particularly the more cryptic medium sized species. They have become a recognized and standard component of many fauna survey programs (e.g. Flora and Fauna Surveys of the Victorian Department of Conservation and Natural Resources).

Six large hair-sampling tubes were placed 20 meters apart along a ground transect at each Site. Tubes were baited alternately with singed meat or a mixture of peanut butter, oats, honey and essence of pistacchio nut oil. Each tube was fitted with double-sided adhesive tape to collect hairs of small and medium sized mammals investigating the bait. Meat baited tubes were set to attract carnivorous and omnivorous species (Spotted-tailed Quoll (Dasyurus maculatus), Eastern Quoll (D. viverrinus), Feral Cat (Felis catus), Dog or Dingo (Canis familiaris), Bandicoots etc.). The Long-nosed Potoroo (Potorous tridactylus), Rufous Bettong (Aepyprymnus rufescens) and other small macropods were among those targetted by non-meat baited tubes.

Tubes were left on-site for 10 days. Hair samples were identified by B. Triggs using the cross-sectioning technique (Brunner and Coman 1974), and were divided into three categories; definite, probable and possible. Only definite identifications were included in the analyses. Many samples were only identifiable to the level of genus (e.g. all Trichosurus, many Antechinus samples).

Table 1. Summary of sampling methods employed within each fauna survey Area, NSW NPWS North East Forests Biodiversity Vertebrate Fauna Project, 1992-93. (see text for more detail)

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1. Priority Stratum Methods	3 Strata per Area
At each standard Site (Gully, Midslope, Ridge)	3 standard Sites per Stratum
a. Large hair-sampling tubes	6 @ 20m; 10 nights
b. Diurnal reptile census	1 person hr
c. Nocturnal bird call playback	Call playback series
d. Bat ultrasonic recording	30 mins
e. Opportunistic species list	(diurnal birds etc)
At each Gully Site	

a. Bat (harp) trap	2 nights
b. Nocturnal streamside search	1 person hr

Along 2km Road Transect

a. Vehicle-based spotlighting	>2km @ <5km per hr
b. Large cage trapping	10 @ 220m; 4 nights
c. Large hair-sampling tubes	10 @ 220m; 10 nights
d. Predator scat search	>2km slow walking

2. Additional Sites (Throughout Study Area)

a. 2nd bat trap session	2 nights
b. Elliott trapping	Lines of 10; 4 nights
c. Extra owl,reptile,frog censuses, hair-tubing, bat ultrasonics	Opportunistic

3. Incidental Records

a. Vehicle-based	All drives through study area
b. Other	Other records

4. Non-standard Methods

a. Frog track transects	Opportunistic
b. Hand spotlighting	Opportunistic
c. Bird/frog playback & recording	Opportunistic
d. Dry pitfall buckets	3 @ 50m; 5 nights

b) Diurnal reptile census

A standard one person hour census was conducted at each survey Site. When possible censuses were restricted to the period mid-morning to late afternoon and when temperature and insolation were sufficient to ensure at least some reptile activity.

The census technique entailed active seaching of perceived reptile and frog microhabitats within approximately one hectare. Active or basking reptiles were identified by sight and captured for verification when neccessary and possible. Sheltering or cryptic species were detected by destructively searching fallen logs, litter, decorticating and fallen bark, rock outcrops and other likely substrates. Incidental observations of other fauna were recorded opportunistically. All predator scats and some nor-predator scats were collected during censuses.

The identity and number of reptiles and frogs detected, along with time of day and temperature, were noted at the finish of the census. Representative voucher specimens were retained, preserved, numbered and lodged with the Australian Museum for verification of field identifications and as area representatives for taxonomic studies.

c) Nocturnal bird call playback

Nocturnal birds and mammals are often only detected when they vocalize for reasons of territory proclamation or social contact. This behaviour may be exploited when surveying for these species by broadcasting pre-recorded calls to ellicit a response from locally present individuals. Forest owls, Marbled Frogmouth (Podargus ocellatus), Australian Owlet-nightjar (Aegotheles cristatus) Yellow-bellied Glider (Petaurus australis), Sugar Glider (P. breviceps) and Koala (Phascolarctos cinereus) are all known to respond to calls of their conspecifics and also to calls of other species (e.g. Milledge et al. 1991).

A standard census involved the broadcasting of the calls of the three large forest owls, Powerful Owl (Ninox strenua), Masked Owl (Tyto novaehollandiae) and Sooty Owl (T. tenebricosa), from the road adjacent to each Site. The calls of other nocturnal birds and various arboreal marsupials were included in the census at the discretion of the team leader. For example the Marbled Frogmouth, Barking Owl (Ninox connivens), Squirrel Glider (Petaurus norfolcencis) and Koala were included when surveying habitats or areas where they were likely to occur. Very windy and rainy periods were avoided. On arrival at the Site the surrounding area was searched by spotlight to detect any fauna in the immediate vicinity. For each species a five minute pre-recorded tape of it's call series was played on a Sony Professional Walkman and amplified through a nine volt Toa transistor megaphone. A listening period of at least two minutes followed each species' call series. The surrounding area was again searched by spotlight after the last listening period. At the finish of the census note was made of the calls broadcasted, response or presence of any fauna, date, time of census, and the amount of cloud cover.

d) Bat Ultrasonic Recording

Insectivorous, microchiropteran bats were sampled by two techniques. Harp trapping is discussed in sections 2.2.2 and 2.2.3 below, ultrasonic recording is dealt with here.

Fifteen species of insectivorous bat are currently listed on the NSW NPWS Schedule 12 species list (Part 2) as Vulnerable and Rare. Most of these are dependent on forest habitats and all can be broadly described as forest species (Parnaby 1992). All may be found within the Northeast Forests Biodiversity Study Area, although some are more characteristic of the western slopes of the Great Divide. As a group the insectivorous bats are considered sensitive, vulnerable, under surveyed, under studied and under classified (Lunney 1991 Parnaby 1991, Richards 1991). They were deemed a second to none priority in this survey.

Bat traps (see 2.2.2a) rarely capture high flying species, an important group that often comprises more than a third of bat species in an area (Parnaby 1992a). Ultrasonic recorders (Corben 1989) are therefore an important adjunct to more traditional bat capture techniques.

The ultrasonic calls of microchiropteran bats were recorded at most standard survey Sites and some additional sites.

For the first field sampling season (1991-92) all 'bat detecting' was performed by H. Parnaby (see Parnaby 1992a). Anabat II detector units, each consisting of a bat detector, cassette recorder and automatic timer, were placed on the ground on tracks or beside creeks and usually set to sample independent sites simultaneously, starting at dusk. In addition, opportunistic sampling was undertaken by an observer using a laptop computer for direct call storage. It was concluded that a higher number of identifiable calls were recorded when the detector was directed at calling bats by an observer (Parnaby 1992a). Eighty four Sites (out of XXX Sites surveyed by other methods) were sampled in the 1991-92 season.

The automated system was replaced by observer based censuses for the second field sampling season. Each survey team was equipped with one detector, a cassette recorder and 60 minute cassette tapes. Census duration was 30 minutes. The usual procedure was to sample one Stratum (three Sites) per night, ensuring coverage of the three Strata (nine Sites) in three nights and allowing scope for further sampling if the opportunity arose. Censuses usually began at, or soon after, dusk, generally recognized as a peak activity period for microchiropteran bats. The observer would stand or sit on the track or beside the creek adjacent to the survey Site where the detector microphone could be pointed toward gaps in the tree canopy. The observer visually scanned the canopy gaps in search of flying bats. When a bat was seen and detected it was tracked with the microphone to maximize the chance of recording an identifiable call. Calibration tones were recorded at the start and finish of the census and after each recorded bat call. The census time, temperature, wind and level of night light were all noted. Site details were written on the cassette which was sent to H. Parnaby for analysis. A subset of Sites where bat ultrasonics were not recorded in the 1991-92 field season were revisited in the 1992-93 season. These Sites generally corresponded with those chosen in the stratification for sampling of invertebrates. Limited resources precluded a return to all 1991-92 Sites.

For a more detailed account of the methods of taped call analysis see Parnaby (1992a, 1993). Basically the analysis took two forms:

-A count of bat 'passes' giving a quantified measure of bat activity at each Site.

-Identification of high flying bat species and as many other species as possible to produce an inventory for each Site.

e) Opportunistic Species Lists
Opportunistic species lists comprised the main means of recording diurnal birds, and other fauna not formally censused, at the survey Sites.

It was decided that little was to be gained, in terms of target species records, from detailed diurnal bird censusing that would not be gleaned from a site-based inventory.
All species seen or heard within a survey Site during other activities were recorded. Specific bird listening periods were also included at most Sites. Sites were visited at varying times of the day through the survey week so that more complete species lists would result.

2.2.2 Methods At Each Gully Site

a) Bat (Harp) Trapping

The second component of the methodology for bat survey (see 2.2.1d) was bat trapping. While ultrasonic recorders were used principally to detect high flying bat species collapsible bat or harp traps (Tideman and Woodside 1978) generally capture low flying species.

Four nights were available in each survey Area for bat trapping. These were divided into two sessions of two nights each (see also 2.2.4b).

Generally one session was at the stream or drainage line constituting the Gully Site in each of the three priority Strata. Many microchiropteran bat species forage along forest streams. By positioning bat traps across the stream a number of target species could potentially be caught. If the Gully Site proved unsuitable (e.g. inaccessible or totally overgrown) then an alternative trap position was selected within the Stratum to maximize potential captures.

Traps were cleared each morning. Captured bats were identified by the team leader based on external morphology, forearm measurement, body weight and the consolidation of these features within the identification guide of Parnaby (1992b). Representative voucher specimens were retained, preserved and lodged with the Australian Museum for verification of field identifications. This regional collection will be invaluable in the unravelling of the many unknowns of bat taxonomy (see Parnaby 1991). The majority of captured individuals were not required for collection and were released that night at the point of capture.

b) Nocturnal Streamside Search

Frogs have only recently been identified, outside herpetological circles, as potential indicators of environmental degradation. Forest frogs, or a sensitive subset of them, may prove to be a vital group in the assessment of our ability to conserve natural processes within forest habitats. They constituted another high priority group for the project.

The sensitivity of frogs to microhabitat conditions determines their seasonal and daily activity patterns. Activity is known to peak in late spring to early summer, for many of the more common species, when they enter beeding phases. The activity patterns of other species (including several target frog species) are poorly known. Some species appear to breed only after very specific rainfall events. A subsidiary aim of the project was to gain information on these aspects of frog activity by surveying through the season.

Survey specifically for frogs took two forms. The first is described here. The second was by driving and walking forest tracks during and after rain (see 2.2.6a)..

Nocturnal streamside searches were conducted at the Gully Site of each Stratum. A standard search involved one person hour of searching for active, basking or calling frogs along the drainage line, stream, or river. Observations of other fauna were recorded opportunistically.

The identity and number of frogs and other fauna detected, along with time and temperature were recorded at the finish of the census. Representative voucher specimens were retained, preserved, numbered and lodged with the Australian Museum for verification of field identifications and as area representatives for taxonomic studies.

2.2.3 Two Kilometer Road Transect Methods

The transect running between the two outer survey Sites (see Figure 5) was always at least 2km in length and was the focus for several field sampling methods.

a) Vehicle-based Spotlighting

Spotlighting from a slow moving vehicle was used to detect arboreal marsupials and nocturnal birds in trees and shrubs; reptiles, amphibians, birds and mammals on and adjacent to tracks. Detections were made by sight and by listening for calls.

The standard technique was to drive at least the 2km transect at no more than five kilometers per hour. Two observers, each with a 100 watt spotlight, sat on the roof rack or stood in the back of a utility. The odometer reading and time was noted at the start and finish of the spotlighting transect and also for every animal detected.

b) Large Cage Trapping

The Spotted-tailed Quoll (Dasyurus maculatus) is the largest remaining mainland marsupial carnivore and as such deserves a pivotal position and status in the conservation of biodiversity. Having suffered a drastic reduction in range it appears restricted to a number of key refugia. The forests of north east NSW appear to include several strongholds for this species. The Eastern Quoll (D. viverrinus), assumed extinct on the mainland since known remnant populations disappeared in the 1960's, has been reported from a handful of northeast NSW forest localities. None of these have yet been confirmed. These two species were high priority target species for this survey. They were surveyed by two methods (see also 2.2.3c), each exploiting the use made of forest roads by larger predators.

Ten large cage traps (XX x YY x ZZcm) were generally baited with singed meat. Traps were placedadjacent to the road verge at 220m intervals along the 2km road transect of each priority Stratum. Traps were set for four nights and checked every morning.

c) Large Hair-sampling Tubes

Cage traps proved a successful method for detecting Spotted-tailed Quolls and other carnivorous and omnivorous species (e.g. bandicoots) however additional effort was deemed appropriate to further survey this important group. The use of an alternative technique also provides the opportunity to test the effectiveness of each.

The second method used was large hair-sampling tubes. Ten large tubes (see 2.2.1a) were set along the same 2km road transects used for large cage trapping. Tubes were placed on the opposite side of the road to the cage and left in place for 10 nights. Hair analysis followed the same procedure outlined in 2.2.1a.

d) Predator Scat Search

The analysis of predator scats to identify prey remains within them has proven an efficient sampling technique in many fauna survey programs. The unmeasurable time delay between prey ingestion and defaecation means that prey records cannot be accurately located. For predictive modelling purposes such records are obviously of lower value than actual known localities however they may constitute a useful adjunct to more accurate records for an Area. For other species they may be the only available records. The species identity of the predator that dropped the scat was usually confirmed as part of the analysis and provided many records of the Spotted-tailed Quoll, Fox and Dogs.

All 2km road transects were searched on foot to find and collect predator scats. Unknown scats of other fauna were also collected. Each was placed in an individually labelled envelope and sent to B. Triggs for identification and analysis. Procedures were the same as for hair tube samples (2.2.1a).

2.2.4 Methods Outside Priority Strata

a) Second Bat Trapping Session

After two nights of trapping specifically within each priority Stratum bat traps were moved for a second session. They were placed in locations throughout the survey Area (i.e. not neccessarily within the Strata) where maximum captures of target species were likely. These Sites were usually perceived 'flyways' on forest roads, creeks or at fire dams where bats could be interupted along their potential flight paths. Bat identification, collection and release procedures were the same as for the first session (2.2.2a).

b) Elliott Trapping

The known ranges of several small terrestrial mammals of the northeast NSW forests are fragmented or restricted (e.g. Hastings River Mouse (Pseudomys oralis), Dusky Antechinus (Antechinus swainsonii), etc, see Gilmore (1993)). Several of these were targetted by trapping with Elliott type B box traps (--x--x--cm). This technique was implemented opportunistically at the discretion of the team leader. Sites were chosen to maximize the chances of detecting target species. A standard elliott trapping session comprised lines of 10 traps at a 10m spacing. Traps were baited with a mixture of peanut butter, oats and honey. They were set for four nights and cleared every morning. Trapped animals were identified for species and sex then either released or retained as voucher specimens.

c) Extra Owl, Reptile, Frog Censuses, Hair-tubing, Bat Ultrasonics, Predator Scats.

Novel, interesting and potentially productive habitats within survey Areas but outside priority Strata were investigated opportunistically. Standard methods were used to detect target species and others in these habitats and Site numbers allocated accordingly. These Sites often included rainforest gullies (e.g. Sooty Owl, Marbled Frogmouth); rocky outcrops, log dumps (reptiles); fire dams, gullies (frogs).

2.2.5 Vehicle-based Incidental records

Whenever driving through the survey Area accurate odometer readings were kept of interesting fauna seen on or adjacent to the roads. These included all mammals, less common birds, large and less common reptiles, and frogs (i.e. all target species). In order to facilitate accurate mapping and recording of sampling locations odometer readings were also noted for track intersections, standard and additional survey Sites. All species records were entered in the NSW NPWS Wildlife Atlas.

2.2.6 Non-standard Methods

a) Frog Track Transects

Clearly frog activity increases in wet weather and many individuals can be found crossing and sitting on forest roads. An efficient way to sample at these times simply involves driving these roads slowly (5-15 km/hr) during and soon after rainy periods. Individual frogs were captured by hand during this activity and either released following identification or retained as voucher specimens. Data collected in this way were treated as incidental records.

b) Hand Spotlighting

Vehicle-based spotlighting (2.2.3a) tends to bias detections toward easily seen species (e.g. Greater Glider Petauroides volans, Brushtail Possums Trichosurus spp., Common Ringtail Pseudocheirus perrigrinus) and away from more cryptic species (e.g. Brush-tailed Phascogale Phascogale tapoatafa, Sugar Glider Petaurus breviceps, Feathertail Glider Acrobates pygmaeus). Hand spotlighting was used opportunistically to supplement the standard methods. It simply involved slow walking along forest roads by one or two observers carrying 50 watt spotlights and searching the adjacent trees, shrubs, ground layers and road surface. Data collected in this way were treated as incidental records.

c) Diurnal Bird, Frog Playback and Recording

Playback of bird and frog calls can be an efficient sampling technique. Similarly by recording an unknown call an observer may verify identification by consultation with co-workers. These techniques were also implemented opportunistically.

d) Dry Pitfall Buckets

Pitfalls can be an efficient technique for the capture of certain reptiles, frogs and small mammals some of which are difficult to detect by other means (e.g. active skinks, fossorial reptiles, litter inhabiting frogs, pygmy possums, planigales). Left in situ for two or three weeks, and provided with a preservative fluid ('wet pitfalls'), significant captures can result.

The NSW National Parks and Wildlife Service's Animal Ethics Committee refused an application for the use of wet pitfalls during the Northeast Forests Biodiversity Vertebrate Fauna Project.

itfalls without preservative ('dry pitfalls') must be checked every day to retrieve and release trapped animals. At the start of the project it was decided to persevere with dry pitfalls. However the time and energy involved in the installation and checking processes, while worthwhile if traps can be left in place after the main survey period, proved inefficient in the context of other survey activities and priorities. Dry pitfalls were terminated after X survey Areas (Z Sites). It was anticipated that the extra time made available for active searching techniques would reveal most of the species likely to be trapped in pitfalls. The technique did however produce several significant finds and is described here.

Three pitfall buckets were installed at the beginning, middle and end of the hair tube transect at each Site. Each pitfall was a 20 litre ???? bucket sunk into the ground so that the rim was level with or below the soil surface. Pitfalls were cleared daily and remained on-site for four nights.

2.2.7 Site Information

Accurate species locality records were vital in the development of predictive models investigating relationships with mapped environmental variables. The whole study area is covered by 1:25,000 map sheets allowing Australian Map Grid co-ordinates to be calculated for all survey Sites with an accuracy enabling the location of each record within a one hectare square.The start and finish of each 2km road transect, and for every incidental species record. If forest type maps (NSW Forestry Commission) were available for the area being surveyed the type designation was checked for each Site. brief description of disturbance history was also noted for each Site (e.g. Logged or unlogged, burnt or unburnt, estimate of disturbance time and intensity). Maps showing the location of each survay Site, spotlighting and cage transects were prepared, digitized and stored within the GIS for analysis and retrieval.

2.2.8 Limitations of the Systematic Survey

As with any survey of natural systems many limitations were inherent in the systematic survey methodology.

Prevailing weather conditions can exert significant influence on results. Rain and cold often lead to reduced activity levels for several groups (e.g. bats, reptiles) and reduced effectiveness of some survey methods (e.g. Hair-sampling tubes).

Many cryptic species were either were not adequately sampled and numbers recorded from the systematic survey were inadequate for reliable analysis. Some of these require species specific survey, others were better reperesented in historical record data bases and surveys from other sources (see 2.3, 2.4)

2.2.9 Species Nomenclature

For mammals (except bats) Strahan (19--) provides the most complete recent account and this classification is followed. Recent and on-going taxonomic changes within the microchiropteran bats makes species nomenclature somewhat tenuous. The recent identification guide of Parnaby (1992) presents the most recent synposis for the study area.

29/6/95

PH 7116

Notes on Cricket Field Development, Byron Bay High School

Key Points

Byron Shire Council is currently preparing an FIS for the Byron High School cricket oval and sporting fields. A member of the NPWS Northern Zone Team is meeting with the school principal next week to discuss this matter.

The Government made a clear commitment in "Labor's Vision for the NSW Coast" that "A moratorium will be placed on development of environmentally sensitive coastal sites until completion of the conservation inventory and new reserve system", including sites having endangered species and sites acting as a wildlife corridor. The cricket field meets both of these criteria.

If the Government is to honour this promise, why is it allowing the cricket field to continue to go through the planning process? A moratorium should mean that this expensive, publicly funded FIS is suspended.

In advice to Council in 1993, the NPWS supported the investigation of alternative sites to the High School which present fewer environmental constraints. An extensive sporting complex, including a cricket field, is to be developed about 4 km from the school near the "Short Stop" south of Ewingsdale Road.

The NPWS should investigate the whole link between Cape Byron and Broken Head for inclusion in the National Parks system. Other developments which should be subject to a moratorium include:
- the Davikin development at Broken Head;
- the 15 lot Detala development above Cibum Margil Swamp. This would clear heath assessed by NPWS as regionally significant and place the endangered wallum froglet under threat;
- the CALM residential development proposed for naturally vegetated Crown land above Seaview St, Byron Bay.

Background Information

- Approximately 4 hectares of coastal vegetation between the school and Tallow Creek to be cleared. Zoned 5(a) Special Uses (School), owned by the Department of Education.

-The development of this wildlife corridor would be contrary to the intentions of the North Coast Urban Planning Strategy, which Council is effectively disregarding.

- The site has a significant chance of containing potential acid sulphate soils. This was stated in advice to Council from the Department of Agriculture in 1993.

In his report to Council in 1993, environmental consultant Peter Parker said: "The forested lands to the east of Byron High School are a vital link in a vegetated corridor between Cape Byron and Broken Head. The proposed development will require the clearing of virtually all of this (section of the) corridor thus 'fracturing' this corridor at a critical location."

PTO

The endangered Bush Hen has been recorded on the site and the endangered Long-nosed Potoroo may also be present. Addressing section 4A of the EP&A Act, fauna expert Professor Peter Baverstock stated: "The Bush Hen would probably be sensitive to removal of habitat. There is no similar habitat adjacent to the site" and "The Bush Hen and the Long-nosed Potoroo would probably not renew."

- David Wickenden, BEACON Secretary, 22nd June '95.

Gary Davies

(O) 598230

(M) 015-937-386

Back Mon.

Sirius(e) Valley whom Jill spoke with

Garry prepare letter to Council yesterday.

Garry may call in to Thorpa Twid pm

Back in office Mon.

25/8/95
David A

NPWS Act.

Licence to 'take + kill' must be acc. by FIS

The licence applic. must be submitted for 28 days.

Where DA, FIS must be submitted with Ct. (cf Batra judgement)