

REVIEW OF SELECTED SITES AGAINST SELECTION PRINCIPLES - PRELIMINARY DRAFT (EXAMPLE ONLY)

Site name and characteristics	Role in Regional Representation	Special features	Relationship to design principles	Outcome
Koondoola Open Space Recently zoned Parks and Recreation and acquired by MfP Representation of floristic community 20a, Banksia attenuata woodland over species rich dense shrublands. Located in few restricted locations on two land systems, the yellow Spearwood dunes and yellow sands on Pinjarra Plain north and east of Perth respectively.	Koondoola Open Space is the largest and best condition representation of this community type on the Spearwood dunes (If not anywhere). The vegetation unit is highly cleared most of its former range is within the urbanised area and cleared portions of the Pinjarra Plain. Currently unreserved for conservation but included in part of M53 and M12 from where it has been largely cleared. Considered to be an endangered community type.	This community is one of the most species rich found on the coastal plain with an average of 67 species/100 m2. An uncommon and restricted plant community type. This community generally contains several species of priority flora.	This site is the largest and best condition example of this restricted community type and represents a priority area for the conservation of this vegetation. Only a small % of the original area of this community type remains. Tenuous links remain to bushland areas thought to be the same community type to the south-east and north-west.	Priority for secure conservation reservation.
Coogee Ridge (S6-M92) Beeliar Regional Park Cleared limestone ridge. System 6 recommended the area as a possible regional park because of its landscape prominence and as a possible open space link between the lakes in the Beeliar wetland chain. Beeliar regional park recommendations refer to the area only as a potential corridor linking the Market Garden Swamps with Manning Lake.	No functional role in regional representation of biological diversity.	Limited value as representation of outcropping limestone ridge of the Spearwood association.	Does not meet design principles	Delete from System 6, the corridor link shown in the Beeliar regional park Recommendations is appropriate.

Site name and characteristics	Role in Regional Representation	Special features	Relationship to design principles	Outcome
Mofflyn Bushland South Perth (submission area) Privately owned, zoned urban in the MRS and subject to a development proposal., but has strong local community support. Small banksia woodland community representative of the Bassendean South vegetation complex. Not yet analysed floristically. Bassendean South vegetation complex is moderately cleared in the Metropolitan Region, but highly cleared in the south Perth area.	Greater than 10% of the vegetation complex remains. Condition is degraded with most of the understorey replaced by weeds and structural integrity lost. Has a well developed mature banksia overstorey.	No features of special significance.	Has limited link to banksia woodland in John McMillan Park to the north	Not proposed for inclusion in System 6
Port Mandurah development site Stage 2a (submission area) Private Land subject to canal development proposal. Contains remnants of a range of Plant community types, including Samphire salt marsh, sedgelands, Melaleuca cuticularis open woodland and Casuarina obesa woodland of the Vass Complex. Has been used for rural pursuits.	Upland areas: are in a degraded condition having been extensively grazed and cleared in the past. Structural integrity has been lost. The area does not include any priority species and has limited species diversity. Fauna habitat value is judged to be relatively low, but is used by kangaroos. Saltmarsh areas: are in good to excellent condition and retain their structural integrity, despite grazing impact in some areas. Has high species diversity for a saltmarsh and includes one outlier species commonly found in the north-west of the state. High fauna values for waterbirds	Saltmarsh areas have very high fauna value for waterbirds including JAMBA and CAMBA species and Ramsar listing.	Saltmarsh areas: Forms part of a key waterbird habitat along a migration route and an important component in the maintenance of the estuarine ecosystem function. Upland area: Serves as part of a corridor and habitat for kangaroos.	Saltmarsh areas are recommended for inclusion in the updated System 6. Upland areas proposed for development.

Site name and characteristics	Role in Regional Representation	Special features	Relationship to design principles	Outcome
Cannington Wetlands-Brixton Street area. Small portion in System 6 M69 Kenwick Swamp. Larger area now recognised and zoned as P and R and being progressively acquired by MfP. Some further areas interim recognised by EPA pending update of System 6. The largest remaining and only substantial naturally vegetated area of the seasonal wetlands of the Pinjarra Plain land unit. The area contains 6 floristic community types: •Marri-Kingia woodlands on heavy soils •Herb rich saline shrublands on claypans •Herb rich shrublands on claypans •Shrublands on dry clay flats •Low-lying Banksia attenuata shrublands and woodlands; and •Central Banksia attenuata - B menziesii woodlands.	At approximately 200 ha this is the largest contiguous area of native vegetation characteristic of the Pinjarra Plain. The wetlands encompassed in this area give some idea of the complexity and diversity of these wetlands which were once widespread on the Pinjarra Plain. These community types were variously recorded on the heavy soils from south of Busselton to Gingin and would have represented widespread and typical communities from this region. The eastern side of the coastal plain, is estimated by CALM to be 97% cleared. The area is part of the Guildford vegetation complex (Heddlie et al) which is approximately 94 % cleared in the metropolitan area but overall is estimated to be 99.4% cleared. This area is the most important area for achieving representation of the flora and geomorphic units of the Pinjarra Plain and arguably of the eastern side of the Swan Coastal Plain.	The area is exceptionally diverse, representing 6 seasonal wetland and upland community types of the Pinjarra Plain, most of which are considered to be vulnerable. In this regard it displays the range of micro-topographic changes that determine the ecological communities and their ecotones across the wetland complexes of the Pinjarra Plain . The area is also extremely species rich, supporting over 500 plant taxa, representing one third of the total flora of the coastal plain, and includes over 30 significant taxa, including 4 Declared Rare Flora and 6 Priority taxa.	This is the largest contiguous and arguably the most viable example of the Pinjarra plain vegetation communities remaining. The prospect for attaining an adequate representation (for example the 10% referred to in the Urban Bushland Strategy) of these community types in a protected area system is unattainable because of the extent of the clearing. The area forms a tenuous linkage to a series of important remnants to the northeast and may form a significant habitat link for bird movements through the eastern coastal plain region.	A most important area and high priority to secure for conservation.

Detail Criteria one step beyond
original principles (endorsed by
SYSTEM 6 UPDATE TWG/SOSC)

2/5/96
BtG.

DRAFT SELECTION CRITERIA

Scope: for the purpose of this exercise the scope of the area involved is limited to the Swan Coastal Plain. (This is still subject to review)

Objective: to establish a reserve and protected area system that is as far as possible is Comprehensive, Adequate and Representative (consistent with the National Strategy for the Conservation of Australia's Biodiversity) ; recognising the limitations due to clearing and development in the region.

Selection Criteria:

1. Criteria to Achieve Representation of Ecological Communities

• Vegetation/Landforms

Regional representation of the following major components of the environment to be primarily based on the following information sets:

- Upland Vegetation
 - Representation of floristic plant communities (CALM/DEP/Ag West (T Griffin) data)
- Seasonal Wetlands
 - Floristic Communities
 - Representation of Semeniuk Wetland Suite and Type (WAWA wetland info and PEP data for rem veg occurrence)
NB: some suites may be cleared, recommendations may serve to retain geomorphic features for landscape representation.
- Lakes
 - Representation of Semeniuk Suites and Types
 - Vegetation Communities - WAWA (Wetlands, fringing vegetation and associated catchments)
- Rivers/Streams
 - Protection of 'All' Remnant Vegetation (PEP, Ag West and WAWA data bases)
(Recognises special values and role of riverine fringing vegetation)
- Estuaries / Saltmarshes
 - Fringing and Saltmarsh veg ; Protection of all fringing vegetation and 50m upland buffer (WRC (L Penn), PEP and Ag West data)
 - Waterbodies; General - Management for highest beneficial use.
Specific - Reservation /Protection of important habitat areas
 - Fish nursery areas;
 - Wading bird habitat;
 - Prime fish feeding habitat;
 - Representative substrate types;
 - (across salinity range)
- **Representation of Fauna Species** (in absence of information on fauna communities)
 - WAM data (Metro studies)
 - Nominated mammal sp - recent records (Phascogales, Honey Possum; Ring-tailed Possum)
 - RAOU data
 - sites supporting large insectivorous bird assemblages (upland sites);
 - wetland waderbird data

- areas of;
- high species diversity;
 - supporting rare flora;
 - major breeding sites
 - supporting species not represented elsewhere;

- CALM Endangered Species Data
 - areas supporting endangered species (eg Bandicoot)
- WAM Records (recent)
 - (check for recent records of endangered sp.)

Selection of Ecological Communities/Species so that replicates represent (are located);

- the range of geomorphological units that they occupy;
- the geographic range of the community/species;
- the range of structural formations (for plant communities)

2. Special Sites

- **Sites of National / International significance**
 - Ramsar wetlands;
 - JAMBA/CAMBA sp habitat (See fauna);
 - ANCA (1996) Wetlands of National Importance;
 - ANCA listed Endangered sp;
 - AHC listed areas.
- **Sites of High Biological Diversity**
 - Select sites of exceptional sp and/or community diversity (where option exists)
 - NB: these areas should be picked up as representative areas.
- **Sites Supporting Threatened Communities**
 - Restricted Communities (eg karst communities);
 - Outlying populations (sp/communities)
 - NB: these areas should be picked up as representative areas.
 - (CALM / WAM data)
- **Exceptional Examples of Environments**
 - major breeding sites / large populations;
 - Concentrations of DRF / or Threatened Sp.
 - NB: - these areas should be picked up as representative areas.
 - may be modified environment supporting major population of a single sp.
- **Ecological Transects - bushland areas continuous across a range of landform units, climatic range or time on the Swan Coastal Plain eg;**
 - Mundajong Rd / Wonnerup-Tuttanup Rd / Wilbinga-Yeal Swamp;
 - N-S variation of Quindalup coastal strip;
 - Environments representing range of salinities in estuaries and fringing marsh/wetland vegetation (Bennett Brook).
- **Sites Showing Evidence of Environmental Processes or Relictual sp.**
 - Fossil sites (WAM / DME data)
 - Mound Springs/Cave Fauna
 - Stromatalitic Communities.
- **Reference Sites - Exceptional Sites of Scientific or Educational value**
 - Pt Kennedy Dune/Wetland time-series;
 - DRF reference sites (CALM);
 - Sites demonstrating coastal processes (MfP/Semeniuk);
 - Long-term scientific monitoring sites (CALM/WAM/Uni's)

- **Important Geomorphological / Geological Sites**

- Geological sites;
 - Mound Springs;
 - M90 Limestone Cliffs/vegetation
 - Karst features.
- (Semeniuk / DME)

3. Design Criteria -for functional / viable CAR reserve and protected area criteria system.

- **Criteria for Conservation of Adequate Area (Check UBAG criteria)**

(NB: Counting only securely protected /managed areas (DEFINE SECURE))

- Minimum of **10%** of Heddel Complexes protected in secure reserves/protected areas
- unless less than 15 000 ha original area - then minimum of 1 500 ha to be protected (whole coastal plain).

- Vulnerable community types to have 'higher' (say 15%) area protected.

eg - Bassendean Sand Banksia woodlands (susceptible to dieback weed invasion) Special attention to large intact areas;

- Riverine communities (Weed invasion);
- Quindalup Tuart Woodlands (Weed invasion).

NB: - Sites selected on floristic information and other info (above) to protect the range of ecological communities present)

- Recognise that the total % area protected will be greater than 10% - taking into account areas of regional significance for other purposes.

- **Selection of Replicates of Each Community**

Minimum of **10** replicates - preference for sites in the best condition available.

Replicates are required to:

- Reduce the prospect of total loss through some event or process;
- Improve representativeness across sp/community range.

- **Ecological Viability Criteria**

- Boundaries should be determined to take account of ecological requirements and potential threats (or alternative protection measures arranged);

eg - upland areas to maintain wetland water quality and fauna habitat;

- Sites should be selected (where possible) to provide for seasonal habitat requirements of fauna;

- Compact shape and manageable boundaries desirable;

- Where optimal boundaries are not achievable -seek to identify and manage off site threats;

- Preference is for sites facilitating 'whole of ecosystem' management, particularly for estuaries, rivers and wetlands);

- Corridors linking recommendation areas should be identified and retained where possible (desirable that they be in good condition and >50 m wide); (Where a choice exists - selection of recommendation areas linked by corridors will be preferred, other factors being equal)

* Key 'stepping stone' habitat for migratory species are important for regional ecology at various scales - consideration needs to be given at regional and local significance levels (This a general (Pt 1) recommendation).

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THE CRITERIA

The selection of areas for the proposed System 6 conservation reserve and protected area system is based on a number of primary criteria for selecting representative examples of the plant and animal communities of the regions and other sites of special conservation value. A set of secondary criteria guide the design of the system to make it as functional and viable as possible. At a third level these criteria are supported by a number of guiding statements that need to be considered during selection and design of the system.

In the context of these criteria regions refers to the two interim biogeographic regions (Swan Coastal Plain and Jarrah Forest) identified in 'Interim Biogeographic Regionalisation for Australia' by ANCA.

Primary Criteria

The conservation reserve and protected area system will be primarily based on:

Ecological Communities

- Regional representation of the plant communities defined floristically, or by using vegetation complexes and structural units where floristic information is unavailable;
- Regional representation of the animal communities where relevant information is available;
- Representation of examples of plant and animal communities from each of the geomorphic units that they occur on;
- Representation of species and the genetic diversity within species by protecting examples of plant and animal communities across their geographic range;
- Representation of the range of structural diversity exhibited by each plant community (or areas that may develop to represent this diversity through post fire succession);
- Regional representation of the range of landforms where they still retain their associated ecological communities;
- Representation of wetlands from each of the consanguineous wetland suites;
- Integrated whole of system protection and/or management for key ecosystems (eg. estuaries).

Special Sites

- Areas identified as being of national or international significance for conservation of the natural environment (including migratory species);
- Areas with an unusually high diversity of flora and/or fauna species or communities in close association;
- Sites containing rare or threatened species, species of restricted distribution or outliers from their normal range;
- An exceptional example of one or more groups of plants or animals making up the community;
- Areas displaying the range of ecological communities and their ecotones across a landscape;

- Areas containing evidence of evolutionary processes either as fossilised material or as relict species;
- Areas of scientific and educational interest that demonstrate important environmental processes at work;
- Areas considered to be of high value for scientific study, or as reference sites;
- Areas containing other unusual or important geomorphological or geological sites in the region.

Secondary Criteria

Supporting criteria for designing the conservation reserve and protected area system so that it remains as functional and viable as possible are:

- Selection of a number of examples of each community type in the best condition possible for conservation;
- Selection of a suitable proportion of the original area of the more extensive plant communities (For less extensive or less resilient plant communities larger percentages may be necessary, up to 100% for rare communities);
- The supporting environmental and ecological requirements necessary for maintaining the plant and/or animal communities be protected and contained within the proposed conservation area or linked to it;
- Important corridors/links that effectively increase the viability of habitats for supporting the biota (eg. linking large areas or different habitats necessary for fauna);
- Key habitats along migration routes may need protection;
- Importance of conserving bushland surrounding habitats of very high conservation value or sensitivity, contributing to their viability;
- Importance of identifying adjacent land requiring appropriate management to protect areas of very high conservation value or sensitivity where necessary.

Guiding Statements

Important additional issues to be considered in the selection of areas and design of the conservation reserve and protected area system are:

- Overall adequacy of the proposed conservation system needs also to be considered in terms of its capacity to persist and maintain the biota through time (this involves factors such as size, quantity, replication, connectivity, configuration, species requirements, extinction probabilities, disturbance risk, etc);
- Protection of essential resources and ecological processes necessary for the protection and maintenance of important ecological communities (eg. groundwater levels, water quality, nutrient cycling);
- Larger areas that contain an assemblage of ecological communities are preferable to multiple numbers of smaller areas;
- Compact shape and manageable boundaries;

- Corridors should avoid major barriers (eg. highways) where possible;
- Good to excellent vegetation condition (Keighery;). Where no alternative exists then areas with a condition rating of poor or better may be considered on the basis that they may be rehabilitated;
- Low exposure to threatening processes where possible;
- Rationalisation of boundaries of current or proposed conservation areas;
- Other landuses that support, and are compatible with, conservation purposes could be recognised in the selection of areas;
- Low level of landuse conflict where possible;
- Areas zoned for more intensive landuses (eg. residential or industrial) be considered carefully in the light of cost of acquisition and future impacts;
- Areas with conflicting planning or extractive industry potential be considered after constraining issues have been resolved or if no other alternatives of similar value exist;
- Areas for which the Government has already given development approval should not be considered for inclusion in the proposed conservation system.

Criteria for the selection and design of a conservation reserve and protected area system for System 6.

PREAMBLE

The original System 6 study was carried out from 1976 to 1983 and relied heavily on community involvement. The study recognised that the metropolitan area would continue to grow and that land would be required for a range of uses. System 6 identified special areas of conservation, recreation and/or landscape value and made recommendations to Government for their protection and management. The System 6 study primarily sought to achieve a balance between conservation and development.

The area defined as System 6 was the most densely populated part of the State with the greatest intensity of land use, it stretches from Moore River in the North to the Blackwood River in the South, and from the coast to the eastern edge of the Darling Range.

In this current programme to update the recommendations of the System 6 report the Environmental Protection Authority has requested that the study area be extended to include the coastal plain portion of System 1. This then takes in the whole of the southern Swan Coastal Plain and effectively covers the regions most threatened by increasing land use and development pressures that now extend well beyond the Perth metropolitan region.

The primary focus of the update programme is on conservation with the main objective to ensure that the conservation system for the region is comprehensive, adequate and representative. Effectively this means conservation of the regions biological diversity at the ecological community, species and genetic levels. It is not intended to revisit the implemented recommendations of the original System 6 study but in particular to identify and conserve those ecological communities that are threatened or poorly reserved.

It is accepted that the identification of ecological communities will primarily be based on plant community definition since there is relatively little information on the fauna communities (apart from birds) throughout the region. Nevertheless the fauna communities are expected to be related to a combination of plant community and geomorphology and therefore should be reasonably well represented through this process.

Landscape and recreation issues are also being considered in the update programme but to a lesser extent than in the original study and only if compatible with the primary conservation objective.

As in the original study the update programme will consider both public and private lands for the identification of priority areas for the conservation system. Public lands alone are not sufficient to represent the range of ecological communities found in the region. In many instances this may require acquisition by the State and in this context zoning becomes an important consideration.

Areas for which the Government has already given development approval will not be considered for inclusion in the updated System recommendations.

It is not proposed to review the State Forest estate in any detail since CALM's Forest Management Plan 1994-2003 recommendations have been accepted by the Government and serve to update the Systems' recommendations.

Similarly, the marine environment will not be specifically included in the programme in the light of a recent report to the Department of Conservation and Land Management, 'A Representative Marine Reserve System for WA', which makes recommendations for a comprehensive marine reserve system. Nevertheless the marine environment may need to be given general consideration since adjacent marine and terrestrial environments can influence each other.

The following criteria have been developed to focus the selection of bushland areas for the update programme towards areas of high or special conservation value at a regional level. Clearly many of the criteria are inter-related and for many pieces of bushland a number of the criteria will be met.

THE CRITERIA

The initial identification of areas for the proposed System 6 conservation reserve and protected area system is based on a number of selection criteria for selecting representative examples of the plant and animal communities of the regions and other sites of special conservation value. A second set of design criteria guide the design of the system to make it as functional and viable as possible. At a third level these criteria are supported by a number of guiding statements that need to be considered during selection and design of the system.

In the context of these criteria the following definitions apply:

'regions' - refers to the two interim biogeographic regions (Swan Coastal Plain and Jarrah Forest) identified in the Australian Nature Conservation Agency report 'Interim Biogeographic Regionalisation for Australia';

'representative' - means inclusive of the range of known ecological communities in each region, or their habitats;

'ecological communities' are defined primarily by the plant communities using floristic information where available and vegetation complexes and structural units where not available. Where sufficient information on the fauna is available then animal communities will be defined.

Threat Index Selection Criteria

The conservation reserve and protected area system will be primarily based on representation of the ecological communities. The criteria to be considered are:

- Regional representation of the plant communities defined floristically (Gibson et al; 1994), or by using vegetation complexes and structural units where floristic information is unavailable;
- Regional representation of the animal communities where relevant information is available;
- Representation of examples of plant and animal communities from each of the geomorphic units that they occur on;
- Representation of species and the genetic diversity within species by protecting examples of plant and animal populations across their geographic range;
- Representation of the range of structural diversity exhibited by each plant community (or areas that may develop to represent this diversity through post fire succession);
- Representation of wetlands from each of the consanguineous wetland suites.

In addition to representation of ecological communities, sites of special interest for scientific research or conservation of biodiversity and/or environmental, ecological and evolutionary processes need to be included in the system. The criteria for considering these aspects are:

- Areas identified as being of national or international significance for conservation of the natural environment (including migratory species);
- Areas with an unusually high diversity of flora and/or fauna species or communities in close association;

- Sites containing rare or threatened species, species of restricted distribution or outliers from their normal range;
- An exceptional example of one or more groups of plants or animals making up the community;
- Areas displaying the range of ecological communities and their ecotones across a landscape;
- Areas containing evidence of evolutionary processes either as fossilised material or as relict species;
- Areas of scientific and educational interest as reference sites or as examples of important environmental processes at work;
- Areas containing unusual or important geomorphological or geological sites in the region.

Design Criteria

Supporting criteria for selection and design of the conservation reserve and protected area system so that it remains as functional and viable as possible are:

- Selection of a number of examples of each community type in the best condition possible for conservation;
- Conservation of an adequate area of each community type (For less resilient communities proportionately larger areas may be required, up to 100% of remaining area may be necessary for highly cleared or naturally rare communities);
- The supporting environmental and ecological requirements necessary for maintaining the plant and/or animal communities should be protected and contained within the proposed conservation area or linked to it;
- Integrated whole of system protection and/or management is desirable for key ecosystems (eg. estuaries);
- Important corridors/links that effectively increase the viability of habitats for supporting the biota may need protection (eg. linking large areas or different habitats necessary for fauna);
- Key habitats along migration routes may need protection;
- Importance of conserving bushland surrounding habitats of very high conservation value or sensitivity, contributing to their viability;
- Importance of protecting areas of very high conservation value or sensitivity where necessary by identifying adjacent land requiring appropriate management to minimise potential impacts.

Guiding Statements

When selecting and designing the proposed conservation reserve and protected area system there are a number of important additional issues that need to be considered. They relate to potential conflicts in land use and to the capacity of the proposed system to persist and maintain the biota through time. The issues requiring consideration are:

- Protection of essential resources and ecological processes necessary for the protection and maintenance of important ecological communities (eg. groundwater levels, water quality, nutrient cycling);

- Larger areas that contain an assemblage of ecological communities are preferable to multiple numbers of smaller areas;
- Compact shape and manageable boundaries are preferable;
- Corridors should avoid major barriers (eg. highways) where possible;
- Good to pristine vegetation condition (Keighery; 1994). Where no alternative exists then areas with a condition rating of degraded or better may be considered;
- Low exposure to threatening processes where possible;
- Rationalisation of boundaries of current or proposed conservation areas;
- Other landuses that support, and are compatible with, conservation purposes could be recognised in the selection of areas;
- Low level of landuse conflict where possible;
- Areas zoned, but not developed or approved for more intensive landuses (eg. residential or industrial) be considered carefully in the light of cost of acquisition and future impacts;
- Areas with conflicting planning or extractive industry potential will be considered if no other areas of similar value exist, otherwise only after any constraining issues have been resolved;
- Areas for which the Government has already given its final approvals for development (eg. at the subdivision stage or equivalent) should not be considered for inclusion in the proposed conservation system.

Criteria to conserve a comprehensive and adequate representation of the natural environment within the System 6 region.

PREAMBLE

The System 6 study was carried out from 1976 to 1983 and relied heavily on community involvement. The study recognised that the metropolitan area would continue to grow and that land would be required for a range of uses. System 6 identified special areas of conservation, recreation and/or landscape value and made recommendations to Government for their protection and management. The System 6 study primarily sought to achieve a balance between conservation and development.

The area defined as System 6 was the most densely populated part of the State with the greatest intensity of land use, it stretches from Moore River in the North to the Blackwood River in the South, and from the coast to the eastern edge of the Darling Range.

In this current programme to update the recommendations of the System 6 report the Environmental Protection Authority has requested that the study area be extended to include the coastal plain portion of System 1. This then takes in the whole of the southern Swan Coastal Plain and effectively covers the regions most threatened by increasing land use and development pressures that now extend well beyond the Perth metropolitan region.

The primary focus of the update programme is on conservation with the main objective to ensure that the conservation system for the region is comprehensive, adequate and representative. Effectively this means conservation of the regions biological diversity at the ecological community, species and genetic levels. It is not intended to revisit the implemented recommendations of the original System 6 study but in particular to identify and conserve those ecological communities that are threatened or poorly reserved.

It is accepted that the identification of ecological communities will be primarily based on plant community definition since there is relatively little information on the fauna communities (apart from birds) throughout the region. Nevertheless the faunal communities are expected to be related to a combination of plant community and geomorphology and therefore should be reasonably well represented through this process.

Landscape and recreation issues are also being considered in the update programme but to a lesser extent than in the original study, and only in the context of compatibility with conservation since the over-riding objective is conservation.

As in the original study the update programme will consider both public and private lands for the identification of priority areas for the conservation system. Public lands alone are not sufficient to represent the range of ecological communities found in the region. In many instances this may require acquisition by the State and in this context zoning becomes an important consideration.

Areas for which the Government has already given development approval will not be considered for inclusion in the updated System recommendations.

It is not proposed to review the State Forest estate in any detail since CALM's Forest Management Plan 1994-2003 recommendations have been accepted by the Government and serves as an update of the System's recommendations.

Similarly, the marine environment will not be specifically included in the programme in the light of the Wilson report and the anticipated formation of a Marine Parks Authority in the near future. Nevertheless the marine environment may need to be given some general consideration since adjacent marine and terrestrial environments can have an influence on each other.

The following criteria have been developed for selecting areas for consideration in the updating of the conservation recommendations for System 6 and the coastal plain portion of System 1. Clearly many of the criteria are inter-related and for many pieces of bushland the criteria from several subject areas will be met.

THE CRITERIA

The criteria for design and selection of the conservation reserve and protected area system to be proposed in the updated System 6 report are based on a number of primary criteria, and associated supporting criteria and explanatory statements.

Primary Criteria

A representative conservation reserve and protected area system will be based on adequate representation of each of the;

- natural floristic community types (Gibson et al; 1994) on the Swan Coastal Plain or of a recognised vegetation complex (Heddl;) on the Darling Scarp and Plateau;
- fauna communities of the region where relevant information is available;
- range of landforms in the region that retain their associated ecological communities;
- sites of special or exceptional conservation value or scientific interest;
- key areas for protecting and maintaining community viability and important ecosystem supporting processes.

Representative of ecological communities

- Representation of the genetic diversity within species by protecting examples of plant and animal communities across their geographic range;
- Representation of examples of plant and animal communities from each of the geomorphic units that they occur on;
- Representation of the range of structural diversity exhibited by each plant community (or areas that may develop to represent this diversity through post fire succession);
- An exceptional example of one or more groups of plants or animals making up the community;
- The supporting environmental and ecological requirements necessary for maintaining the plant and/or animal community be protected and contained within the proposed area or linked to it;
- Protection of [a number of examples] of each community type in the best condition possible for conservation;
- Conservation of [at least 10%] of the original area of the more extensive plant communities (For less extensive or less resilient plant communities larger percentages may be necessary, up to 100% for rare communities).

Representative of unusual or important landforms

- Representation of wetlands from each of the consanguineous wetland suites in the region;
- Representation of other unusual or important geomorphological or geological sites in the region;

Special sites which demonstrate unusually rich diversity, rarity or important environmental, ecological and evolutionary processes or which may have special scientific or research value

- Areas identified as being of national or international significance for conservation of the natural environment (including migratory species);
- Areas with an unusually high diversity of flora and/or fauna species or communities in close association;
- Sites containing an unusually high number of rare species, species of restricted distribution or outliers from their normal range;
- Areas displaying a successional series of communities in a natural actively changing landscape;
- Areas displaying the range of ecological communities and their ecotones across a landscape;
- Areas containing evidence of evolutionary processes either as fossilised material or as relict species;
- Areas of scientific and educational interest that demonstrate important environmental processes at work;
- Areas considered to be of high value for scientific study, or as reference sites.

Key areas for protecting and maintaining habitat and community viability and important ecosystem supporting processes *

- Important corridors/links that effectively increase the viability of habitats for supporting the biota (eg. linking large areas or different habitats necessary for fauna);
- Networks of vegetation linkages be retained to provide for the movement of mobile fauna through the local area and region, including migratory species;
- Key habitats along migration routes may need protection;
- Corridors should avoid major barriers (eg. highways) where possible;
- Rationalisation of current or proposed conservation areas to include adjacent or connected bushland that will significantly improve their viability for biota and reduce the intensity of management required;
- Importance of conserving bushland surrounding habitats of very high conservation value or sensitivity to contributing to their viability;
- Importance of landuse control mechanisms where natural environments are not available to protect areas of very high conservation value or sensitivity;

Not really
a conservation
area - it's just
for 2011-12

- Protection of essential resources and ecological processes necessary for the protection and maintenance of important ecological communities (eg. groundwater levels, water quality, nutrient cycling);
 - Integrated whole of system protection and/or management for key ecosystems (eg. estuaries).
- * Network areas need not represent an ecological community or contain vegetation in good condition.

Supporting Criteria

Important additional criteria for the selection of areas

- Overall adequacy of the proposed conservation system needs also to be considered in terms of its capacity to persist and maintain the biota through time (this involves factors such as size, quantity, replication, connectivity, configuration, species requirements, extinction probabilities, disturbance risk, etc);
- Larger areas that contain an assemblage of ecological communities are preferable to multiple numbers of smaller areas;
- Compact shape;
- Good to excellent vegetation condition (where no alternative exists areas with condition rating of poor or better may be considered on the basis that they may be rehabilitated);
- Low exposure to threatening processes;
- Rationalisation of boundaries of current or proposed conservation areas;
- Other landuses that support, and are compatible with, conservation purposes could be recognised in the selection of areas;
- Low level of landuse conflict;
- Areas zoned for more intensive landuses (eg. residential or industrial) be considered carefully in the light of cost of acquisition and future impacts;
- Areas with conflicting planning or extractive industry potential be considered after constraining issues have been resolved or if no other alternatives of similar value exist;
- Areas for which the Government has already given development approval should not be considered for inclusion in the proposed conservation system.

Principles for the selection and design of a conservation reserve and protected area system for System 6.

PREAMBLE

The original System 6 study was carried out from 1976 to 1983 and relied heavily on community involvement. The study recognised that the metropolitan area would continue to grow and that land would be required for a range of uses. System 6 identified special areas of conservation, recreation and/or landscape value and made recommendations to Government for their protection and management. The System 6 study primarily sought to achieve a balance between conservation and development.

The area defined as System 6 was the most densely populated part of the State with the greatest intensity of land use, it stretches from Moore River in the North to the Blackwood River in the South, and from the coast to the eastern edge of the Darling Range.

In this current programme to update the recommendations of the System 6 report the Environmental Protection Authority has requested that the study area be extended to include the coastal plain portion of System 1. This then takes in the whole of the southern Swan Coastal Plain and effectively covers the regions most threatened by increasing land use and development pressures that now extend well beyond the Perth metropolitan region.

The primary focus of the update programme is on conservation with the main objective to ensure that the conservation system for the region is comprehensive, adequate and representative. Effectively this means conservation of the regions biological diversity at the ecological community, species and genetic levels. It is not intended to revisit the implemented recommendations of the original System 6 study but in particular to identify and conserve those ecological communities that are threatened or poorly reserved.

It is accepted that the identification of ecological communities will primarily be based on plant community definition since there is relatively little information on the fauna communities (apart from birds) throughout the region. Nevertheless the fauna communities are expected to be related to a combination of plant community and geomorphology and therefore should be reasonably well represented through this process.

Landscape and recreation issues are also being considered in the update programme but to a lesser extent than in the original study. Recreational uses within the areas identified will need to be compatible with the sensitivity and conservation value that the areas contain. Nature based recreation is a recognised part of the purpose of conservation reserve categories such as National Parks and Conservation Parks, and recreation to this extent is compatible with the principles for this study. Landscapes will be considered in the context of the primary conservation objective - representativeness of the ecological communities - and are also a recognised part of National Parks and Conservation Parks.

As in the original study the update programme will consider both public and private lands for the identification of priority areas for the conservation system. Public lands alone are not sufficient to represent the range of ecological communities found in the region. In many instances this may require acquisition by the State and in this context zoning under the Metropolitan Region Scheme and local structure plans becomes an important consideration.

Areas for which the Government has already given development approval will not be considered for inclusion in the updated System recommendations.

It is not proposed to review the State Forest estate in any detail since CALM's Forest Management Plan 1994-2003 recommendations have been accepted by the Government and serve to update the Systems' recommendations.

Similarly, the marine environment will not be specifically included in the programme in the light of a recent report to the Minister for the Environment 'A Representative Marine Reserve System for WA', which makes recommendations for a comprehensive marine reserve system. Nevertheless the marine environment may need to be given general consideration since adjacent marine and terrestrial environments can influence each other.

The following detailed principles have been developed to focus the selection of bushland areas for the update programme towards areas of high or special conservation value at a regional level. Clearly many of the principles are inter-related and for many pieces of bushland a number of the detailed principles will be met.

The next phase after the selection of areas using these detailed principles, is to determine the level of protection required (eg. Nature Reserve, National Park, Regional Park, land managed by Local Authorities or conservation on private land) for each area and develop recommendations for their protection and management.

THE PRINCIPLES

The initial identification of areas for the proposed System 6 conservation reserve and protected area system is based on a number of selection principles for selecting representative examples of the plant and animal communities of the regions and other sites of special conservation value. A second set of design principles guide the design of the system to make it as functional and viable as possible. At a third level these principles are supported by a number of guiding statements that need to be considered during selection and design of the system.

In the context of these detailed principles the following definitions apply:

'regions' - refers to the two interim biogeographic regions (Swan Coastal Plain and Jarrah Forest) identified in the Australian Nature Conservation Agency report 'Interim Biogeographic Regionalisation for Australia';

'representative' - means inclusive of the range of known ecological communities in each region, or their habitats;

'ecological communities' are defined primarily by the plant communities using floristic information where available and vegetation complexes and structural units where not available. Where sufficient information on the fauna is available then animal communities will be defined.

Selection Principles

The conservation reserve and protected area system will be primarily based on representation of the ecological communities. The principles to be considered are:

- Regional representation of the plant communities defined floristically (Gibson et al; 1994), or by using vegetation complexes and structural units where floristic information is unavailable;
- Regional representation of the animal communities where relevant information is available;
- Representation of examples of plant and animal communities from each of the geomorphic units that they occur on;
- Representation of species and the genetic diversity within species by protecting examples of plant and animal populations across their geographic range;
- Representation of the range of structural diversity exhibited by each plant community (or areas that may develop to represent this diversity through post fire succession);
- Representation of the range of wetland types (based on consanguineous suites).

In addition to representation of ecological communities, sites of special interest for scientific research or conservation of biodiversity and/or environmental, ecological and evolutionary processes need to be included in the system. The principles for considering these aspects are:

- Areas identified as being of national or international significance for conservation of the natural environment (including migratory species);
- Areas with an unusually high diversity of flora and/or fauna species or communities in close association;

- Sites containing rare or threatened species, species of restricted distribution or outliers from their normal range;
- An exceptional example of one or more groups of plants or animals making up the community;
- Areas displaying the range of ecological communities and their ecotones across a landscape;
- Areas containing evidence of evolutionary processes either as fossilised material or as relict species;
- Areas of scientific and educational interest as reference sites or as examples of important environmental processes at work;
- Areas containing unusual or important geomorphological or geological sites in the region.

Design Principles

Supporting principles for selection and design of the conservation reserve and protected area system so that it remains as functional and viable as possible are:

- Selection of a number of examples of each community type in the best condition possible for conservation (the number of areas will depend on the vulnerability and resilience of the community type);
- Conservation of an adequate area of each community type (For less resilient communities proportionately larger areas may be required, up to 100% of remaining area may be necessary for highly vulnerable, highly cleared or naturally rare communities);
- The supporting environmental and ecological requirements necessary for maintaining the plant and/or animal communities should be protected and contained within the proposed conservation area or linked to it;
- Integrated whole of system protection and/or management is desirable for key ecosystems (eg. estuaries);
- Important corridors/links that effectively increase the viability of habitats for supporting the biota may need protection (eg. linking large areas or different habitats necessary for fauna);
- Key habitats along migration routes may need protection;
- Importance of conserving bushland surrounding habitats of very high conservation value or sensitivity, contributing to their viability;
- Importance of protecting areas of very high conservation value or sensitivity where necessary by identifying adjacent land requiring appropriate management to minimise potential impacts.

Guiding Statements

When selecting and designing the proposed conservation reserve and protected area system there are a number of important additional issues that need to be considered. They relate to potential conflicts in land use and to the capacity of the proposed system to persist and maintain the biota through time. The issues requiring consideration are:

- Protection of essential resources and ecological processes necessary for the protection and maintenance of important ecological communities (eg. groundwater levels, water quality, nutrient cycling);
- Where available relatively larger areas that contain an assemblage of ecological communities are preferable to multiple numbers of smaller areas;
- Compact shape and manageable boundaries are preferable;
- Corridors should avoid major barriers (eg. highways) where possible;
- Areas of good to pristine vegetation condition (Keighery; 1994) are preferred. Where no alternative exists then areas with a condition rating of degraded or better (with potential for restoration) may be considered;
- Areas with low exposure to threatening processes (eg dieback infection) are preferred where possible;
- Rationalisation of boundaries of current or proposed conservation areas to improve representation or management capability will be considered;
- Other landuses that support, and are compatible with, conservation purposes should be recognised in the selection of areas, (eg. nature based recreation);
- Areas with a low level of land use conflict and free from planning and extractive industry constraints will be given preference, only where such sites in reasonable condition are not available will other more constrained sites be considered;
- Areas zoned, but not developed or approved for more intensive landuses (eg. residential or industrial) are considered constrained sites (but not ruled out) in the light of cost of acquisition and future impacts;
- Areas for which the Government has already given its final approvals for development (eg. at the subdivision stage or equivalent) should not be considered for inclusion in the proposed conservation system.

Principles for the selection and design of a conservation reserve and protected area system for System 6.

PREAMBLE

The original System 6 study was carried out from 1976 to 1983 and relied heavily on community involvement. The study recognised that the metropolitan area would continue to grow and that land would be required for a range of uses. System 6 identified special areas of conservation, recreation and/or landscape value and made recommendations to Government for their protection and management. The System 6 study primarily sought to achieve a balance between conservation and development.

The area defined as System 6 was the most densely populated part of the State with the greatest intensity of land use, it stretches from Moore River in the North to the Blackwood River in the South, and from the coast to the eastern edge of the Darling Range.

In this current programme to update the recommendations of the System 6 report the Environmental Protection Authority has requested that the study area be extended to include the coastal plain portion of System 1. This then takes in the whole of the southern Swan Coastal Plain and effectively covers the regions most threatened by increasing land use and development pressures that now extend well beyond the Perth metropolitan region.

The primary focus of the update programme is on conservation with the main objective to ensure that the conservation system for the region is comprehensive, adequate and representative. Effectively this means conservation of the regions biological diversity at the ecological community, species and genetic levels. It is not intended to revisit the implemented recommendations of the original System 6 study but in particular to identify and conserve those ecological communities that are threatened or poorly reserved.

It is accepted that the identification of ecological communities will primarily be based on plant community definition since there is relatively little information on the fauna communities (apart from birds) throughout the region. Nevertheless the fauna communities are expected to be related to a combination of plant community and geomorphology and therefore should be reasonably well represented through this process.

Landscape and recreation issues are also being considered in the update programme but to a lesser extent than in the original study. Recreational uses within the areas identified will need to be compatible with the sensitivity and conservation value that the areas contain. Nature based recreation is a recognised part of the purpose of conservation reserve categories such as National Parks and Conservation Parks, and recreation to this extent is compatible with the principles for this study. Landscapes will be considered in the context of the primary conservation objective - representativeness of the ecological communities - and are also a recognised part of National Parks and Conservation Parks.

As in the original study the update programme will consider both public and private lands for the identification of priority areas for the conservation system. Public lands alone are not sufficient to represent the range of ecological communities found in the region. In many instances this may require acquisition by the State and in this context zoning under the Metropolitan Region Scheme and local structure plans becomes an important consideration.

Areas for which the Government has already given development approval will not be considered for inclusion in the updated System recommendations.

It is not proposed to review the State Forest estate in any detail since CALM's Forest Management Plan 1994-2003 recommendations have been accepted by the Government and serve to update the Systems' recommendations.

Similarly, the marine environment will not be specifically included in the programme in the light of a recent report to the Minister for the Environment 'A Representative Marine Reserve System for WA', which makes recommendations for a comprehensive marine reserve system. Nevertheless the marine environment may need to be given general consideration since adjacent marine and terrestrial environments can influence each other.

The following detailed principles have been developed to focus the selection of bushland areas for the update programme towards areas of high or special conservation value at a regional level. Clearly many of the principles are inter-related and for many pieces of bushland a number of the detailed principles will be met.

The next phase after the selection of areas using these detailed principles, is to determine the level of protection required (eg. Nature Reserve, National Park, Regional Park, land managed by Local Authorities or conservation on private land) for each area and develop recommendations for their protection and management.

THE PRINCIPLES

The initial identification of areas for the proposed System 6 conservation reserve and protected area system is based on a number of selection principles for selecting representative examples of the plant and animal communities of the regions and other sites of special conservation value. A second set of design principles guide the design of the system to make it as functional and viable as possible. At a third level these principles are supported by a number of guiding statements that need to be considered during selection and design of the system.

In the context of these detailed principles the following definitions apply:

'regions' - refers to the two interim biogeographic regions (Swan Coastal Plain and Jarrah Forest) identified in the Australian Nature Conservation Agency report 'Interim Biogeographic Regionalisation for Australia';

'representative' - means inclusive of the range of known ecological communities in each region, or their habitats;

'ecological communities' are defined primarily by the plant communities using floristic information where available and vegetation complexes and structural units where not available. Where sufficient information on the fauna is available then animal communities will be defined.

Selection Principles

The conservation reserve and protected area system will be primarily based on representation of the ecological communities. The principles to be considered are:

- Regional representation of the plant communities defined floristically (Gibson et al; 1994), or by using vegetation complexes and structural units where floristic information is unavailable;
- Regional representation of the animal communities where relevant information is available;
- Representation of examples of plant and animal communities from each of the geomorphic units that they occur on;
- Representation of species and the genetic diversity within species by protecting examples of plant and animal populations across their geographic range;
- Representation of the range of structural diversity exhibited by each plant community (or areas that may develop to represent this diversity through post fire succession);
- Representation of the range of wetland types (based on consanguineous suites).

In addition to representation of ecological communities, sites of special interest for scientific research or conservation of biodiversity and/or environmental, ecological and evolutionary processes need to be included in the system. The principles for considering these aspects are:

- Areas identified as being of national or international significance for conservation of the natural environment (including migratory species);
- Areas with an unusually high diversity of flora and/or fauna species or communities in close association;

- Sites containing rare or threatened species, species of restricted distribution or outliers from their normal range;
- An exceptional example of one or more groups of plants or animals making up the community;
- Areas displaying the range of ecological communities and their ecotones across a landscape;
- Areas containing evidence of evolutionary processes either as fossilised material or as relict species;
- Areas of scientific and educational interest as reference sites or as examples of important environmental processes at work;
- Areas containing unusual or important geomorphological or geological sites in the region.

Design Principles

Supporting principles for selection and design of the conservation reserve and protected area system so that it remains as functional and viable as possible are:

- Selection of a number of examples of each community type in the best condition possible for conservation (the number of areas will depend on the vulnerability and resilience of the community type);
- Conservation of an adequate area of each community type (For less resilient communities proportionately larger areas may be required, up to 100% of remaining area may be necessary for highly vulnerable, highly cleared or naturally rare communities);
- The supporting environmental and ecological requirements necessary for maintaining the plant and/or animal communities should be protected and contained within the proposed conservation area or linked to it;
- Integrated whole of system protection and/or management is desirable for key ecosystems (eg. estuaries);
- Important corridors/links that effectively increase the viability of habitats for supporting the biota may need protection (eg. linking large areas or different habitats necessary for fauna);
- Key habitats along migration routes may need protection;
- Importance of conserving bushland surrounding habitats of very high conservation value or sensitivity, contributing to their viability;
- Importance of protecting areas of very high conservation value or sensitivity where necessary by identifying adjacent land requiring appropriate management to minimise potential impacts.

Guiding Statements

When selecting and designing the proposed conservation reserve and protected area system there are a number of important additional issues that need to be considered. They relate to potential conflicts in land use and to the capacity of the proposed system to persist and maintain the biota through time. The issues requiring consideration are:

- Protection of essential resources and ecological processes necessary for the protection and maintenance of important ecological communities (eg. groundwater levels, water quality, nutrient cycling);
- Where available relatively larger areas that contain an assemblage of ecological communities are preferable to multiple numbers of smaller areas;
- Compact shape and manageable boundaries are preferable;
- Corridors should avoid major barriers (eg. highways) where possible;
- Areas of good to pristine vegetation condition (Keighery; 1994) are preferred. Where no alternative exists then areas with a condition rating of degraded or better (with potential for restoration) may be considered;
- Areas with low exposure to threatening processes (eg dieback infection) are preferred where possible;
- Rationalisation of boundaries of current or proposed conservation areas to improve representation or management capability will be considered;
- Other landuses that support, and are compatible with, conservation purposes should be recognised in the selection of areas, (eg. nature based recreation);
- Areas with a low level of land use conflict and free from planning and extractive industry constraints will be given preference, only where such sites in reasonable condition are not available will other more constrained sites be considered;
- Areas zoned, but not developed or approved for more intensive landuses (eg. residential or industrial) are considered constrained sites (but not ruled out) in the light of cost of acquisition and future impacts;
- Areas for which the Government has already given its final approvals for development (eg. at the subdivision stage or equivalent) should not be considered for inclusion in the proposed conservation system.

SYSTEM 6 — A REPRESENTATIVE CONSERVATION SYSTEM

The following discussion gives some background to the original System 6 study followed by an outline of the Department of Environmental Protection's current programme to update the recommendations of System 6 and the coastal plain portion of System 1 on behalf of the Environmental Protection Authority.

Background

Introduction

In 1971 the newly formed Environmental Protection Authority (EPA) established a Conservation Through Reserves Committee to assess the adequacy of the reserve system for the whole of Western Australia and make recommendations to Government for a representative set of conservation reserves.

For the purposes of the studies, the CTRC divided Western Australia into 12 regions or 'systems'. Each region was then studied to determine areas which should be set aside as reserves because of their value for flora, fauna, landscape, geology or recreation.

The CTRC studies subsequently became the EPA's statement of areas which should be set aside as parks and reserves in Western Australia.

System 6 is one of the series of regions studied and its recommendations along with the other 11 systems proposes a network of parks and reserves throughout Western Australia.

The study

The System 6 study was carried out from 1976 to 1983 and relied heavily on community involvement. The study recognised that the metropolitan area would continue to grow and that land would be required for a range of uses. In identifying special areas, System 6 sought to achieve a balance between conservation and development.

The area defined as System 6 was the most densely populated part of the State with the greatest intensity of land use, it stretches from Moore River in the North to the Blackwood River in the South, and from the coast to the eastern edge of the Darling Range (map attached).

Where the other System studies largely confined themselves to publicly owned land the recommendations for System 6 also included privately owned land. Because of the intensity of land use in the area only a small amount of lands are reserved under the Land Act and these were insufficient to represent the range of ecological communities and associated habitats within the System 6 area.

In 1981 a draft report and recommendations was released by the EPA for public comment. In October 1983 the final report and recommendations of the EPA were released in what is now known as the System 6 Red Books Part I and Part II. It was subsequently endorsed by Cabinet in 1984.

Part I of the report contained general recommendations to Government that provided a framework for conservation in the region. It pre-dated formation of the Department of Conservation and Land Management and covered issues such as conservation in state forests, Land Act reservation, conservation on private land and regional parks.

Part II contained the more specific recommendations relating to issues such as reservation, tenure and management for 209 identified areas (108 in the metropolitan region and 101 in the country).

About 15 per cent of the System 6 region was recommended to be set aside and managed for conservation, recreation or landscape purposes, but outside State Forest areas this amounts to only 2.8% of the System 6 region.

Implementation

The Government has been progressively implementing the recommendations of the System 6 study since its completion. Nevertheless implementation has not been rapid, largely because of the intensity of land use in the region and hence the high degree of conflicting landuse, both current or proposed.

The Department of Environmental Protection set the Red Book Task Force in 1988 and then the Urban Conservation Branch in 1991 to expedite implementation of the System recommendations. The Red Book Status Report was released by the Department in 1993 and gave an account of progress up to that time for the recommendations of all the systems.

Approximately 47% of the recommendations contained in the System 6 report have now been implemented and many others are well advanced toward implementation.

A need to update the recommendations

Over recent years there has been criticism from both Government agencies and the community concerning the System 6 Red Book and the slow rate of implementation of the recommendations. One of the main problems is that the recommendations have become outdated over the 12 years since their release. There are several reasons for this but the main points are listed below:

- The conservation values of some of the recommendations areas have been lost or severely degraded over the years and therefore there is a need to re-examine the recommendations to determine which areas are no longer worthy of remaining in the system.
- There have been changes in Government agency legislation and responsibilities over the years since the report was released. Some of the recommendations, particularly the general recommendations in Part I, need to be updated to reflect these changes.
- Difficulties in implementing the recommendations has highlighted the need to ensure that all recommendation are clearly written and not subject to interpretation. The intent of some of the recommendations is unclear.
- Recent studies have greatly improved knowledge of the flora and fauna of the region, and have resulted in additional areas of high conservation value being identified and recommended for reservation. The controversy over such places as Brixton St, Ellen Brook, Hepburn Heights and Lemnos St substantiates the need to update the recommendations so that areas of high conservation value are identified in advance of potential development.
- Development must be facilitated through an up-front identification of areas of high conservation value which require some form of protection. The planning process has zoned and/or acquired significant areas for conservation purposes. However, in recent years the uncertainties introduced because of the dated information base of the System 6 recommendations have eroded confidence that all the important areas have been adequately identified.

These concerns have highlighted the need to revisit System 6 and update the recommendations.

A programme to update the System 6 recommendations

Introduction

The EPA has recognised that there is a need to review and update the recommendations contained in the System 6 reports and also the coastal plain portion of System 1. Collectively these areas effectively cover the regions most threatened by the increasing land use and development pressures that now extend well beyond the Perth metropolitan region and more closely follows natural biogeographical regions, taking in the whole of the Southern Swan Coastal Plain.

The System 1 report was the first of the System studies to be completed, and only considered a few large areas for reservation/management. It is now well recognised that the recommendations in System 1 do not adequately represent the range of ecological communities and associated habitats found in the area.

The Department of Environmental Protection has therefore been requested by the EPA to initiate an update programme for these areas.

Scope and boundaries of the update programme

The programme is intended to update the recommendations contained in the Red Book Reports for System 6 and the coastal plain portion of System 1. Thus the study will include the whole of the Swan Coastal Plain south of the Moore River (map attached). Systems 1 and 6 should be representative of the range of ecological communities and associated habitats originally found on the Swan Coastal Plain, the Darling Scarp and the Darling Plateau.

It is not proposed to review the State Forest estate in any detail since CALM's Forest Management Plan 1994-2003 recommendations have been accepted by the Government and serves as an update of the System's recommendations.

Similarly, the coastal marine environment, excluding estuaries, will not be specifically included in the programme in the light of the Wilson report and the anticipated formation of a Marine Parks Authority in the near future. Nevertheless the marine environment may need to be given some general consideration since adjacent marine and terrestrial environments can have an influence on each other. Estuarine environments will be considered within the scope of this programme.

The general recommendations contained in Part I of the System 6 report and in the Preamble to System 1 will be updated in conjunction with the more specific recommendations in System 6 Part 2 and System 1. Implementation of the general recommendations is intended to provide a framework for assisting implementation of the more specific recommendations for individual bushland areas.

The objectives of the update programme

The primary objectives of the update programme are :

- **To ensure that the conservation system proposed in System 6 is representative of the ecological communities and associated habitats of the region.**

In the light of current knowledge this may require some additional areas being identified in the study area. At the same time the EPA recognises that there is a need to re-examine some existing System 6 recommendation areas since their conservation values may have been lost or severely degraded over the years.

- **To ensure that a suitable policy framework with appropriate legislative backing is proposed to enable implementation of the more specific System recommendations.**

The general recommendations contained in Part 1 of the System 6 report are intended to provide this framework and will need to be updated to reflect current thinking on conservation strategies as well as the current legislative and administrative arrangements.

- **To assist planning and development processes through identification of areas of regional conservation value which require protection and hence reduce conflicts and environmental assessment periods.**

It is the Authority's preference that these areas be identified in advance of development proposals rather than having to deal with these areas as major conservation issues affecting development proposals, as was the case with the urbanisation plans for Brixton Street, Kenwick, Ellenbrook and which may occur with Carburnup Town-site.

- **To assist with subsequent implementation of recommendations by involving all the relevant agencies and groups in the update programme, with the intention that as far as possible conflicts or constraints will be identified and resolved prior to finalisation of the report and recommendations.**

Recommendations will need to be clear and well argued.

The process

The update programme is expected to take approximately two and a half to three years to complete. The early stages of the programme are constrained by the field survey programme which can only take place over the spring flowering periods.

The approach has been to use detailed information on the plant communities together with soil and landform information to define representative ecological communities in the study since our knowledge of the fauna communities is less extensive. However where information on fauna is available this will be used to assist in identifying representative ecological communities and important areas requiring recognition and protection.

Unusual or special landform features (such as limestone cliffs, river gorges or mound springs) will also be considered in the study where they retain natural vegetation. Areas such as these are often already a regional landscape feature and generally contain unique ecological communities.

To help coordinate the programme and facilitate communication between the large number of stake-holders that need to be involved in the process a Steering Committee and a Technical Working Group has been set up.

The System 6 Steering Committee comprises senior representatives from key State government agencies (at CEO or Director level), local government and an EPA member (see appendix 1) and will meet at key points to maintain the overall direction of the programme.

The Technical Working Group comprises representation from a wide range of government agencies and the community. This group will meet more regularly and will identify, discuss and resolve issues that arise and will develop strategies for updating the System 6 recommendations.

The update programme will be dependent on the knowledge already held by both government agencies and the community in identifying areas for consideration in the System update programme. Available resources are limited and will prevent surveying all remnant bushland to develop the updated recommendations.

Public input will be sought by inviting people to submit to the programme areas that they think have special conservation values that should be considered for inclusion in the System recommendations. These submitted areas will be assessed against a detailed set of criteria developed through the Technical Working Group and Steering Committee and where appropriate will be surveyed to determine the ecological communities they contain and confirm their conservation value. If the submitted area meets the detailed criteria it will be added to a list of possible areas for inclusion in the proposed conservation estate.

The specific recommendations for System 6 and System 1 will then be updated using this list. Any issues that might constrain the implementation of the updated recommendations would be resolved as far as possible prior to finalisation of the draft report.

As well as these specific recommendations, the update programme will also review the general recommendations in Part 1 of the original System 6 report that provide some broader policy guidelines for achieving conservation in this region.

The specific recommendations will be released with the general recommendations as a draft report for public comment. Public submissions will be collated and reviewed and the report finalised for consideration by the EPA.

It is envisaged that the final report would be submitted to Cabinet for endorsement, as were the original EPA Systems reports.

This approach is intended to provide wide involvement, while maintaining an effective and efficient process for resolving issues. The objective is to develop a well argued set of recommendations for conservation in the study area that are supported by government and the community.

A GENERAL DISCUSSION TO HELP GUIDE THE PREPARATION OF SUBMISSIONS TO THE SYSTEM 6 UPDATE PROGRAMME.

Introduction

This paper briefly discusses some issues that are considered to be important when updating conservation recommendations such as those contained in System 6. It should be useful when selecting areas for your submissions to the Department of Environmental Protection.

All submissions received will be assessed individually by the System 6 Technical Working Group. Where applicable this will include visiting the site for a field assessment and if appropriate an intensive field survey. If an area meets approved criteria then it may be considered for inclusion in the updated System 6 report and recommendations.

Bounds of the study

The boundary of the study area we are seeking submissions from takes in all of the Swan Coastal Plain from the Moore River south to approximately Dunsborough, including estuaries, rivers and other wetlands but not marine areas. A recent report to the Department of Conservation and Land Management has already considered Western Australia's coastal marine environment and made recommendations for a comprehensive marine reserve system.

Also included within the bounds of the study is the Darling Scarp and parts of the Darling Plateau from the Moore River in the north to the Blackwood River in the south and inland to approximately Toodyay and Boddington. The Department of Conservation and Land Management has recently completed its Forest Management Plan for all State Forest areas on the plateau and the government has endorsed this as an update to the System 6 recommendations for state forest.

Please note that this programme is not a forum for addressing the protection of bushland where development approval has already been given. The programme will not consider areas for which the Government has already given a commitment to development.

Objective

The primary objective of the update programme is to propose a conservation estate for the study area that is comprehensive, adequate and representative of the ecological communities in the region. The study will look to build on the existing conservation estate. The focus of the programme is therefore on conservation values rather than recreation or aesthetic values. Hence areas that contain natural vegetation in the best possible condition or important habitat for flora and fauna are of prime interest.

The primary focus of the study will be on the conservation of ecological communities and their associated physical environment. Never-the-less, the presence of rare flora or threatened fauna species in a site is one of a number of factors that will be given consideration. However, areas that contain rare species may not be given priority consideration if the surrounding community is well represented in the conservation estate or is in a degraded condition unless the rare species is not protected or does not occur elsewhere.

Guiding comments

If near pristine areas are not available then areas with minimal disturbance are preferred and these should be in a condition suitable for regeneration. There will be some plant communities where this is no longer possible and in these instances vegetation in poorer condition may need to be considered in conjunction with strategies for their rehabilitation.

There are some plant communities that are now considered to be threatened because of the extensive clearing that has taken place. For example natural vegetation associated with the heavier soils of the eastern side of the Swan Coastal Plain is estimated to be at least 97% cleared. As a result many of the small pockets of vegetation remaining in this area are likely to contain threatened or inadequately reserved plant communities.

Large areas containing a range of ecological communities are generally a better proposition for protection than several smaller isolated areas. These larger areas often support a far greater biodiversity and exhibit a greater capacity to resist degradation, particularly from outside influences. They also contain a range of habitats that may provide for a more intact fauna community.

However, even where larger areas can be protected, replication of these community types in several separate reserves/areas is an essential attribute for achieving an adequate conservation status.

Consideration also needs to be given to consolidating already existing conservation areas, particularly those that are small in size or contain significant biota/ecological communities. Increasing the size of the protected area enhances its long-term value and viability.

The establishment of naturally vegetated corridors or links connecting existing or proposed conservation areas is an important issue. The primary role for these vegetated links is to facilitate the movement or migration of fauna. There are also benefits for the flora such as pollination and seed dispersal by the animals moving through the corridors. Corridors may be linear, in which case they should be as wide as possible, or they may be bushland pockets located close to each other.

The region is rich in animal species from mammals and birds through reptiles and amphibians to the invertebrates such as insects and spiders. Many of the animal communities of the region have been severely impacted by the loss of habitat through factors such as clearing, new fire regimes as well as introduced predators (foxes, cats, etc). Areas that still retain a diverse assemblage of animals or a relatively intact animal community are likely to be of high conservation significance.

Landforms and landscapes that still retain their natural vegetation fall within the scope of the programme, particularly those that are unusual (for example coastal limestone cliffs, mound springs, and river gorges). These can contain unique ecological communities or, as is the case for wetlands, provide essential habitat for many species of fauna.

Please send your submissions to:

The System 6 Study Team
Department of Environmental Protection
141 St Georges Terrace
PERTH WA 6000

The deadline for submissions is Friday 18 August 1995.

SYSTEM 6 BUSHLAND SUBMISSION FORM FOR CONSIDERATION IN THE UPDATE PROGRAMME

If you wish to submit more than one area for consideration in the System 6 update, please use a separate form for each area.

Please fill in each section giving as much information as possible.

LOCATION, OWNERSHIP AND ZONING OF THE AREA

1. Location

Please give as accurate and detailed a description as possible of the site location

Please include either a hand drawn or copied map showing the area of the area

a) Bordering Roads:

b) Nearest Corner:

c) Lot Number: Street Number:

d) Town/Suburb/Location:

e) Local Council:

f) Site Name (if any):

g) Approximate size of the area (ha):

h) Please locate the area on a map and give us map references if possible:

.....

i) Map: Streetsmart /UBD/Other:

j) Map no.:

k) Grid Ref:

l) Please give any other information that may help us to find the location:

.....

m) Are you aware of any development proposals that are likely to affect the area?

.....

.....

NOTE: Areas that have already been given development APPROVAL should not be nominated

Please fill out those questions that you can answer

2. Who owns the area? (If owned by the person/s making the nomination please indicate)

3. If you own the area, and may be interested in participating in conservation on private land initiatives please indicate (and leave your name and address at the end of this submission form)

4 .What is the area zoned? (please indicate whether zoning is Town Planning Scheme or Metropolitan Region Scheme)

CAN YOU TELL US A LITTLE ABOUT THE PHYSICAL CHARACTERISTICS OF THE AREA

5. Why do you consider this area important? (Refer to Guiding Issues paper)

6. What is/are the soil type/s and colours ?

Type: Sand/Clay/Gravel/Loam/Silt

Colour: White/Grey/Brown/Orange/Yellow/Red/Black

7. Does the area have any special features such as unusual landforms / landscapes that still retain their natural vegetation? Yes/No

If yes, what are they?

8. Is the area a wetland or does it include a wetland?

If yes, what kind of a wetlands is it?

a) lake

b) river

c) stream

d) swamp

e) estuary

f) seasonally wet

g) other

9. What percentage of the wetland is open water in summer?

CAN YOU TELL US A LITTLE ABOUT THE VEGETATION /FAUNA ON THE NOMINATED AREA.
--

10. What percentage of the area is indigenous vegetation?

11. If the area includes regions cleared of native bushland please indicate reasons
for the inclusion.

12. Has any previous flora or fauna survey work been done on the area?
.....

If yes, please give details of the work

13. How would you rate the condition of the native bushland? (see attached table)

- a) pristine
- b) excellent
- c) very good
- d) good
- e) degraded
- f) completely degraded
- g) don't know

14. Please indicate the disturbances affecting the area and where appropriate the
percentage of the area disturbed.

- a) Partial clearing
- b) fragmentation
- c) Selective removal of species: timber cutting, wildflower picking, mowing
dieback and other plant diseases
- d) Fire regime, including intensity, season and frequency
- e) 'Enrichment plantings' that is plantings of species not found in that
community
- f) Weed invasion
- g) Animal impact: horses, foxes, rabbits, cats, dogs, camels, goats etc
- h) Soil movement, both removal and dumping
- i) Changes in water regimes; flooding, drainage and watering
- j) Salinity
- k) Fertiliser drift and along waterways nutrient influx
- l) Mining, including that for road works

- m) Grazing: stock, overgrazing by feral or native mammals
- n) Proliferation of tracks, fire breaks and walk trails
- o) Off-road vehicle use
- p) Use as service corridors by the SEC, Main Roads, Water Authority.

(Source: B Keighery. Bushland Plant Survey, September 1994)

15. Does the area contain any plant species of special interest that you know of? (eg. declared rare flora, priority taxa, outlier populations)

Do you know what they are?
.....

16. Do you know of any native animals that use the area?

Can you list those you know of? (birds, mammals, reptiles, amphibians etc)

.....

17. Is the area used by any native animals of special interest? (eg. endangered species, large/important populations).....

If yes, please name them and indicate source of information

.....
.....

<i>CAN YOU TELL US A LITTLE ABOUT THE SURROUNDING AREA</i>
--

18. Are there any bushland areas (including wetlands) near to this area?

.....

If yes, how close are they ?

.....
.....

Are they already conservation reserves?

What is their approximate size?

19. Does the submitted area link other bushland areas?

.....
.....

Please attach any additional information about the area which may be of use when assessing it.

Thank you for providing this submission. If you want further feedback on the outcome of submission then please leave name and address.

Should we need to contact you for further site identification it would be helpful to have a name and telephone contact number

This information will be treated as confidential

Name: (Please Print)

Address:

Daytime telephone number:

Table 2: Vegetation Condition Scale

Modified from Trudgen 1991 by B. J. Keighery for the Swan Coastal Plain Survey 1993.

1 = 'Pristine'

Pristine or nearly so, no obvious signs disturbance.

2 = Excellent

Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species

For example damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.

3 = Very Good

Vegetation structure altered, obvious signs of disturbance.

For example disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.

4 = Good

Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate to it.

For example disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

5 = Degraded

Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.

For example disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

6 = Completely Degraded

The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

These areas are often described as 'parkland cleared' with the flora composing weed or crop species with isolated native trees or shrubs.

Source: B Keighery. Bushland Plant Survey, September 1994

Ecoplan News

Issue 11 Spring 1994

System 6 under review

System 6 is to be up-dated. Gary Whisson, Department of Environmental Protection Urban Conservation manager, said both Part 1 and Part 2 would be up-dated.

"We will review both the general recommendation and the specific area-based recommendations of the earlier work," Gary said.

"We will focus mainly on the coastal plain as the area under most intensive development pressure.

"The work will follow the public comment and public involvement process of the other systems reports.

"This comprehensive review with extensive public consultation is expected to take about two and a half years to complete."

The original System 6 work was done in the early 80s — the Green Book for public comment was released in April 1981 and the Red Book in October 1983.

Gary said the work had already started on the up-date, with a botanical team set up in the department to look at the floristics of existing System 6 areas. The team was made up of Bronwen Keighery, Jeni Alford and Natalie Thorning.

Much of their work would focus on extending the coverage of the floristic survey of the southern Swan Coastal Plain completed in July this year*. The work would provide a major part of the up-dated information base used to review the representativeness of the System 6 recommendations.

* Gibson, N, Keighery, BJ, Keighery, GJ, Gurbidge, AH and Lyons, MN (1994) A Floristic survey of the southern Swan Coastal Plain, unpublished report for the Australian Heritage Commission prepared by Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.).



Bronwen Keighery (right) and Jeni Alford in the field.



Wandoo woodland at Pearce (M15).



Ecoplan update

— with Margo O'Byrne and Jill Harris, EPA community involvement co-ordinators



On a very cold Saturday at the end of July the first regional forum for the south east region was held at the Armadale Settlers Common Field Study Centre.

The forum was attended by members of the Armadale Settlers' Common group, Armadale City River Care, Friends of Brixton Street, Crestwood Bushland Restoration Group, Friends of River Canning Environment, Canning River Regional Park Volunteer Guide, Friends of Mary Carroll Park and Bungendore Park management committee.

The day provided an opportunity for members of different groups to exchange ideas on things such as how to get more community members interested in bushland, what kind of signs to erect, how to work with local government and different techniques for removing weeds.

The group also heard from Brian Peddie about how to use community arts to involve people in local bushland. Brian

gave people vision and told them how to attract new people into their areas. He said people who wouldn't normally get out into the bush would come to an artistic event. These could be arranged to coincide with special events in the bush, such as the first flowers of spring and the arrival of migratory birds.

A workshop on writing submissions was held at the Naturalists' Hall. Garry Middle from the Department of Environmental Protection spoke about submissions made to government departments, such as for environmental impact assessments, and Margo O'Byrne talked about submissions to funding agencies for grants. Sixteen people attended and generally felt that the information presented was most helpful.

On National Landcare Day (September 2) several activities were held to draw public attention to weeds. These included a weed walk at Gosnells, weeding activities at Quinns Rock, Hudman Road Reserve in Boya and Baigup Reserve in Bayswater. There were many positive outcomes from these activities, including a new member for Friends of Ellis Brook and three new members for the Hudman Road Reserve Group. Staff from the DEP worked, through an extended lunch-break, in Kings Park alongside members of the friends group. They were removing peppermints (*Agonis flexuosa*) from a heavily infested site and have decided to adopt an area of the park.

Jeni Alford ran a plant identification course in Bold Park on Sunday 11 September. Thirteen people attended and learnt some basics of plant identification, including the main characteristics of the major families. Participants were also introduced to a range of useful books on the subject and had a chance to practice their ID skills using them. Jeni said she thought the most useful sort of plant identification training that she could offer people would be to go out to their patches and help set up a quadrat and identify the major plants there. If

your group is interested in taking up this offer contact Jeni Alford or Jill Harris at the DEP.

As a follow-on from the plant ID course, a visit to the WA Herbarium will be held at 4pm on Wednesday 26 October. It will be a general introduction to the work of the herbarium staff and how to use the herbarium. If you are interested, contact Jill.

On the subject of training, there will be another series of introductory Ecoplan training sessions held in October-November. The training runs over four consecutive Saturday mornings (22 and 29 October, 5 and 12 November). If you or someone you know wants to do the training contact the Jill or Margo on 222 7000.

Changes Changes

There have been a few staff changes in the DEP's Urban Conservation Branch to allow for the work on the System 6 up-date. Jeni Alford will no longer be working on Ecoplan. For the remainder of her time with the department, Jeni will be working with Bronwen Keighery on the floristics of System 6 areas. Bronwen has joined the department on a short term contract specifically to do this floristic work. Natalie Thorning, who is on voluntary work experience with the department, will also be working on the project. Bronwen, Jeni and Natalie can all be contacted on 222 7058, although they will be spending most of their time out in the field.

Jillian Harris has come back into the branch to work with Margo on Ecoplan. Jillian, who normally works in the department's environmental education section, will be known to some Ecoplan volunteers as she filled in when Margo was away last year. As well as Ecoplan, Jillian will be working on some publications about urban bushland management and weeds. She will be in the office full time on 222 7051. Margo will continue to work half time and will be in the office in the latter part of the week. She can be reached on 222 7054.



Bob Crowe from DEP getting stuck into the Peppermints at Kings Park.



System 6 in Wanneroo

A study of the status of key conservation areas in Wanneroo has recently been completed.

David Wake from the Coalition for Wanneroo's Environment did the study as a major project to finish his degree in Population, Resources and Technology at Murdoch University. The Coalition for Wanneroo's Environment received funding for the project, which covered research expenses and publication of a report and brochure to be based on the project report. David expects the publications to be out in the next few months.

In the review, David studied the 12 System 6 areas in the City of Wanneroo. He said those areas form the core of conservation and open space proposals for Wanneroo, but

that implementation of System 6 recommendations had been problematic.

David said the issues in Wanneroo were the same as the issues in urban conservation elsewhere in metropolitan Perth. They included failure to acquire and reserve areas for conservation, absence of management strategies to retain conservation values on private land, lack of a management framework for regional parks and lack of commitment to protecting areas.

The study concluded that a review of urban conservation in the Perth metropolitan region was needed.

For more information on the study contact David Wake on 305 1591.

Watsonia under control

The seemingly impossible has been achieved in Darlington — watsonia is under control in the area.

Although not completely eradicated, the plant is not reproducing — there are fewer plants every year. The hard work in getting the weed under control has been done by the Darlington Rate-payers and Residents Association and the Eastern Hills Branch of the Wildflower Society. The aim of the control programme is to allow the natural understorey to regenerate.

Peter Day, who led the charge against watsonia in Darlington is happy to share his experience and expertise with others keen on controlling the weed. If watsonia is a problem in your patch and you want some advice, ring Peter on 299 6649. A publication on how to control Watsonia is available from the Eastern Hills Branch of the Wildflower Society.

New environmental group formed

The Roleystone Dieback Group has been formed. The group is looking at the eradication and control of dieback in the Darling Scarp. In particular, the new group is making a series of tree injectors to help save some of the affected jarrah trees. Congratulations on starting your new group and all the best with the hard slog ahead.

Book Review

Landcare — communities shaping the land and the future.

This new book by Andrew Campbell, with case studies by Greg Siepen, begins with a sobering introduction to the state of the world's environment, particularly agricultural areas. From there it moves on to a detailed analysis of the landcare movement in Australia. As *Landcare* says — "Imagine one-third of all families involved in voluntary conservation groups — think of the possibilities for constructive environmental change." This is exactly what is happening in rural Australia.

Landcare contains a wealth of information



on the experiences of landcare groups across Australia. Although principally about the experiences of rural Australian landcare groups, the book also goes into detail on what makes community groups work. From this perspective it will be useful to Ecoplan groups.

Ecoplan has recently bought a copy of *Landcare* for its small library. It is available for loan to Ecoplan volunteers, as are several other useful books on bush regeneration, plant identification and group facilitation. Ring Margo or Jill for details.

Wungong Gorge

More than 450 people walked the Wungong Gorge on a glorious spring day. This once-a-year event opened the Wungong for all to enjoy. The five-kilometre walk was followed by earth games, canoeing and music from Shebeen. The weather and wildflowers combined to create a magical day. The Armadale Recreation and Earth Discovery Scheme received an award from the Healthy Hearts Foundation for best recreation programme in WA and was highly commended at the national awards. Thanks to the Bedfordale Volunteer Fire Brigade and all those who made it a great day.

Star Swamp

The story of saving the Star Swamp Bushland has been recorded in a resource book, edited by Anne Bloeman and Joan Petroboni, and titled *Reserving Star Swamp Bushland: A case study in community action*. This book is based on the actual documents, letters and press clippings that were written during the campaign to save the reserve. It includes copies of all available documents. The book will be available for \$20 from either the City of Stirling or Friends of Star Swamp Bushland from early November.



Regional reports



South West Region

from Co-ordinator Carina Calzoni

Friends of Woodman Point

Over the past few months the Friends of Woodman Point has been investigating funding opportunities for bush regeneration projects. One option we looked at was approaching local industry for support. This whole exercise has been quite an experience.

Many people will already be aware of the current issue relating to Cockburn Cement's plans to dredge a 50 hectare area of Success Bank, just off Woodman Point, which will remove seagrass communities in the area.

Earlier this year a group called the Coastal Waters Alliance was formed because of concern about the continuing removal of seagrass meadows in Perth's metropolitan waters. The Friends of Woodman Point was asked to join the Coastal Waters Alliance. At the time we were unsure of all the issues and decided to investigate further before committing ourselves.

At the same time we were looking for funding and approached Cockburn Cement, which showed keen interest in the group. Two representatives came out to have a look at our efforts so far and to discuss ways they could offer us support. Although we could see benefits in having financial support from Cockburn Cement, group members were concerned that such support may be inconsistent with the group's philosophy.

We decided to use our Annual General Meeting as a forum to discuss the issue and give our members the opportunity to be involved in the decision. We invited two speakers to address the seagrass issue: Pieter Tencate from Cockburn Cement and Bob Slight from the Coastal Waters Alliance.

After hearing both sides, group members felt they couldn't support dredging the seagrass. Cockburn Cement's support was not accepted and the group decided to join the Coastal Waters Alliance.

At the AGM we also discussed the proposal of setting up a nursery with the Department of Sport and Recreation rangers. The Friends of Woodman Point will collect seeds from the Rottnest Island pine and tuarts around the reserve. The rangers will propagate the seeds then, in the following season, the group will help plant the seedlings. A seed collecting day is planned for

Sunday 9 October (9.30am — 12.30pm). Those interested in participating should meet at the ranger's office in the picnic area at the end of Nygerbup Close.

On Sunday 11 September we had our spring walk with Robert Powell. It was a lovely sunny day for a nice relaxing walk. Robert's knowledge of the plants and their communities made the walk very interesting. First he led the group of 17 through the eastern part of the reserve. The army cleared the understorey in this part several years ago but it is now beginning to regenerate. Robert also showed us an area where Rottnest Island cypress is beginning to regenerate after a fire there three years ago. This was pleasing to see.

Along the walk Robert pointed out many of the weed species that had found their way into the reserve. Without a doubt, bridal creeper is the biggest threat. In some areas it is the only understorey — quite a frightening sight! Apart from this, it was an enjoyable day, as I'm sure all the participants would agree.

If you want to know more about the Friends of Woodman Point or any of the events mentioned call either Carina Calzoni on 339 6205 or Ben Carr on 339 2300 (W) or 335 4635 (H). We'd love to hear from you.

North West Region

from Co-ordinator Fay Mumme

Friends of Yellagonga Regional Park (Inc)

After a tricky start, due to a mix-up with our room booking, our guest speaker on frogs proved interesting. Dr Mike Bamford used slides and live exhibits to illustrate his subject matter. Mike successfully aimed his talk at both children and adults and generated lots of interesting discussion.

A public display at the park was mounted in June at the Women's Health and Art Exhibition, which was the culmination of a project co-ordinated by the Joondalup Community Foundation (Inc) and Trust.

This display resulted in a follow-up talk to the Granny Spiers' Community House Friendship Group in Heathridge. The women, some of whom live near the boundary of the park thought Yellagonga was further north near Yanchep somewhere! The much needed signage to inform the public about its location can't come too soon.

Moves are being made by CALM to form

the Community Advisory Committee which they hope will be operating in a couple of months.

The group has continued with its weeding programme, which received a boost recently due to funding from Wanneroo City Council.

The AGM was held on 29 September at Landsdale Farm School. Matthew Williams from the WA Insect Study Society was the guest speaker.

Friends of Marmion Marine Park

This group holds monthly meetings which consist of alternate library evenings, with specimen identification, and guest speaker nights.

In July, Mark Dyson presented and narrated a 60-minute video on the whale sharks at Exmouth. The video, which was produced by fellow divers, contained very sharp shots that were taken 20 to 30 metres away from the sharks — indicating the excellent visibility in Exmouth waters. The vast variety of sea life under the Exmouth jetty was also recorded.

In September, Phyllis Robertson spoke on her ocean voyage to Antarctica.

At the last (monthly) beach walk held by the group, many types of marine flotsam and jetsam were discovered and identified. Differences between Bryozoan organisms and sponges were discussed and lots of rubbish picked up.

Are you interested in feeding and helping to research turtles? Twelve research animals at Hillarys Marina are in need of volunteers' assistance. Tasks include weighing and measuring. Contact Dee Webb on 307 6346.

Coming events for members include a \$50 Rottnest weekend at Kingstown on the March 1995 long weekend. The public is invited to attend a beach walk in October and a kiddies touch pool in November (see Events Calendar). John Dowzard welcomes members along on his boat for regular diving and snorkelling trips in the park.

More details about the friends group can be sought from John Dowzard on 247 2053.

Friends of Star Swamp Bushland Reserve

The Star Swamp Bushland is always a blaze of colour over the spring months, with patches of orchids scattered throughout but especially in the south-western corner of the reserve. People attending the monthly walks (fourth



Saturday) have seen many of the more than 200 flower species that grow in the reserve.

This year Star Swamp has again become home to a pair of nesting swans and it is hoped that this pair will be able to raise their cygnets without interference. A firmer policy on controlling dogs in the vicinity of the swamp is being introduced as last year unleashed dogs killed the swans nesting there.

For more information contact Christine Curry on 447 2983.

Quinns Rock Environmental Group (Inc.)

The group is working on a conservation proposal for bushland in the Quinns Rock townsite. There are significant bush areas of public open space, like the park off Starrs Road, in Gumblossom Reserve and near the caravan park. We have the opportunity to keep these areas to retain some of our local bush, provide wildlife habitat, contribute to the character of the town and offer places to explore and enjoy nature.

We are also working on a regeneration plan for the bushland off Mindarie Drive and Starrs Road. This could address the management objective for the area, minimising disturbance, controlling weeds and rehabilitating degraded edges. We are keen to involve local residents in looking after the site. A workshop to discuss the plan will be held on October 12.

Contact David Wake 305 1591, Miguel or Teresa Castillo 305 1045

Central Region

from Miles Hitchcock

Bayswater Greenwork

Bayswater Greenwork has reached the final list for the John Tonkin Greening Awards in two categories: The community groups category and the bushland conservation category. Both nominations are for the work done at Garratt Road, including negotiating the management plan for the area with the Department of Planning and Urban Development and the local councils, bush regeneration and tree planting.

The group recently received a grant from the National Landcare Programme to hold public education seminars on Baigup Wetlands.

On National Landcare Day, Michael MacShane led a weed walk and talk at Baigup for a small group of people. The event provided an opportunity for people to see the work Bayswater Greenwork has done in removing a huge area of pampas grass — about one hectare of

the noxious weed has been successfully cleared. Michael has established a trial site for different rates of herbicide to work out the most effective way of eliminating pampas grass. The group hopes to get rid of the rest of the pampas grass at Baigup this summer.

For more information contact Linda Taman on 370 1213

South East Region

from Co-ordinator Brett Tizard

Armada Settlers' Common

The Armada Settlers' Common has recently announced a photography and art competition to mark the centenary of the City of Armadale. With spring promising to display the wonder of wildflowers, now is a good time for both primary and secondary students to start clicking, painting or sketching the splendour of spring. Entries close on 3 December. Winners will be announced during the centenary celebrations.

The Armadale District's Science Network visited the Armada Settlers' Common Field Study Centre and spoke about using this piece of urban bushland for environmental education. After a brief introduction to the reserve, the gallant band made good use of a sunny day and meandered along one of the walk trails. An enjoyable and informative afternoon was had by all.

The Armadale LETS group held a busy bee at the Armada Settlers' Common to help build the network of paths in the wildflower gardens. The gardens form part of the Field Study Centre and the paths will provide access for wheelchairs and those not able to get into the bush. Thanks to all those who helped on the day and created 18 metres of paving.

The Armada Settlers' Common will be holding a series of guided walks through the reserve to mark the release of new walk trail brochures. The walks will be held on 8 and 22 October at 10am and 2pm. Everyone is welcome. Phone Brett Tizard on 497 4038 for further details. The brochures will be distributed to the usual outlets, including the DEP, local libraries, tourist centres and so on.

Hills Region

from Co-ordinator Robert Watkinson-Slough

Regional co-ordinators know they have at their disposal an enormous amount of support from Ecoplan. Co-ordinators only have to exercise their imaginations to produce ideas that can return optimum to a whole lot of people who felt powerless as they watched the bush seemingly relegated to a neglected place in our

West Australian society.

This has been the experience of the 22 people who just finished the first Hills APACE Bush Regeneration Course, initiated by Ecoplan and benevolently supported by the Eastern Hills Wildflower Society through a Save The Bush grant.

Next, Sue Bernie (Eastern Hills Wildflower Society) will take some of these people on a practical experience over several weeks to learn about native seed collecting, cleaning and propagating and establishing seedlings back into the wild.

Brett Tizard (Armada Settlers' Common) is holding a Management Plan Field Day on 19 November (see advertisement) to see first-hand how problems in a conservation area were dealt with in a management plan.

Hudman Reserve, Boya

Leonie Campbell and Jan Pitman have started collecting for the reserve's herbarium.

National Landcare Day was celebrated at the reserve and a plan was hatched to regenerate a lookout area above the quarries. Leonie, Brian Crute, Twinks and the Joyces are regularly working to control the cancerous watsonia and freesias, following the Bradley method of bush regeneration.

Strettle Road, Glen Forrest

Work was done recently to remove Canary Island Broom Bush and Mt Morgan wattles, both environmental weeds there. Robyn Rudeforth obtained a grant from Ecoplan to attend the Greening Australia Conference in October 1994 and will be working on a project for the reserve inspired by the conference.

Parkerville Groups

Brian Marshall thanks the APACE course participants for the huge kick-start they gave to rehabilitating and area around the Parkerville Primary School.

Max Hoare is taking a leadership role in another part of the Parkerville area.

Bushland and community groups

A position paper is now being developed by the Mundaring Shire Community Environment Advisory Body. This paper will provide advice to the shire on how to encourage and facilitate the community to look after local bushland.

Congratulations!

Congratulations to Brett Tizard on becoming a finalist in the individual category of the John Tonkin Greening Awards and in the Young Achiever Award. Well done Brett!



Coming events calendar



OCTOBER

Saturday 8	8.00am	Friends of Trigg Bushland
Saturday 8	10.00am	Armada Settlers' Common
Saturday 8	2.00pm	Armada Settlers' Common
Sunday 9	9.30am	Friends of Marmion Marine Park
Sunday 9	9.30am — 12.30pm	Woodman Point

Sunday 9 —
Thursday 13

Tuesday 11	8.00pm	Friends of Marmion Marine Park
Saturday 15	8.00am	Friends of Lake Gwelup
Saturday 22	9.15am	Ecoplan introductory training.
Saturday 22	8.00am	Friends of Star Swamp Bushland
Saturday 22	10.00am	Armada Settlers' Common
Saturday 22	2.00pm	Armada Settlers' Common
Wednesday 26	4.00pm	

Friday 28 and Saturday 29	7.00—9.00 pm	Go Bush Activity
Saturday 29	10.00am—4.00pm	
Saturday 29	9.30am	Ecoplan introductory training.

Monthly nature walk. Meet at Elliot Road, Trigg.
Guided walk. For details phone Brett Tixard on 497 4038.
Guided walk. For details phone Brett Tizard on 497 4038.
Beach walk. Meet at North Beach Jetty, Castle Street and West Coast Drive, North Beach.
Seed collecting. Those interested in participating should meet at the ranger's office in the picnic area at the end of Nygerbup Close.
Catchments, Coasts and Corridors teachers' professional development programme. For details phone Boyd Wykes on 384 5469.
Members and visitors night, Mt Flora Conference Room, Elvire Street, Waterman.
Monthly nature walk. Meet at Scout Hall, Huntriss Street, Gwelup.
Week 1. Naturalists' Club Hall, Nedlands.
Phone Margo or Jill on 222 7000.
Monthly nature walk. Meet corner of Castle and Hope streets, North Beach.
Guided walk. For details phone Brett Tizard on 497 4038.
Guided walk. For details phone Brett Tizard on 497 4038.
Visit to WA Herbarium for Ecoplan volunteers.
For details phone Jillian Harris on 222 7051.
Caring for you bush block, (Run by Ecoplan and CALM Go Bush) at The Hills Forest (CALM). For details of this and other CALM Go Bush activities phone Paula on 295 2244.
Week 2. Naturalists' Club Hall, Nedlands.
Phone Margo or Jill on 222 7000.

NOVEMBER

Saturday 5	9.30am	Ecoplan introductory training.
Saturday 12	9.30am	Ecoplan introductory training.
Wednesday 16	7.30pm	Friends of Star Swamp
Saturday 19		Management Plan

Friday 25	7.30pm	Friends of Star Swamp
Saturday 26	8.00am	Friends of Start Swamp

Week 3. Naturalists' Club Hall, Nedlands.
Phone Margo or Jill on 222 7000.
Week 4. Naturalists' Club Hall, Nedlands.
Phone Margo or Jill on 222 7000.
General meeting and guest speaker, Mr Flora Conference Room, Elvire Street, Waterman.
Management plan in action field trip — Ecoplan Hills region (and others) visit to Armadale Settlers' Common. Details available from Robert Watkinson-Slough on 572 1489 (H) or Jill Harris on 222 7051.
Nocturnal Walk. Meet at Groat Street Carpark, North Beach.
Monthly nature walk. Meet on the grassed area, Hope Street, North Beach.

DECEMBER

Saturday 3		Entries close
Friday 16		Ecoplan Deadline

Entries close for Armadale Settlers' Common photography and art competition.
Ecoplan News (summer edition) deadline. Copy to Jillian Harris, Department of Environmental Protection, 141 St George's Terrace, PERTH WA 6000. Fax 322 1598



Crawling around Perth's bushland



Perth's urban bushland is literally crawling with unknown species, according to research underway at the WA Museum.

A team from the WA Museum is studying the invertebrate fauna, especially the ground fauna, at a few sites throughout the metropolitan area. It is the first time this work has been done and it is turning up some interesting results.

Dr Mark Harvey, Curator of Arachnids at the WA Museum, said they had found several spider genera and families not previously recorded in South-West Australia.

Mark said most of the species they were finding were probably unnamed species, although at this stage they did not have details as a lot of the sorting and identification was yet to be done.

"With most invertebrates, the species aren't known. Often we are

doing well to know the genera," Mark said.

"There are thousands of species of spiders, so it's hard to know them all."

The work is funded by the Heritage Council of WA under a National Estate Grant. It is being done by Dr Mark Harvey, Dr Ric How, John Dell and Julianne Waldoock.

Mark said sampling would be done over three years and an extra year would be used to analyse the data. Currently the group was working on the first year's data.

The study should provide a picture of what is around and the effect fragmentation of the bushland is having on those species.

"It is too early to say exactly how many species there are," Mark said.

"The diversity is very high — there are probably several thousand species."



*Huntsman spider — one of the more familiar spiders found on the Swan Coastal Plain.
Photo by Douglas Elford, Courtesy WA Museum.*



Ecoplan contacts

□ Contact numbers:

Ecoplan community involvement
co-ordinator

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Jill Harris ☎ 222 7051

Conservation Council of WA

Urban Bushland co-ordinator

Joan Payne ☎ 397 6380

WA Conservation Council

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587 Wellington Street

PERTH ☎ 321 5942

Greening Western Australia

1118 Hay Street

WEST PERTH ☎ 481 2144

APACE

1 Joanna Street

NORTH FREMANTLE ☎ 336 1262

Volunteer Centre of WA

79 Stirling Street

PERTH ☎ 220 0676

Community Skills Training Centre

227 Stubbs Terrace

SHENTON PARK 6008

□ Ecoplan community contacts:

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Brett Tizard ☎ 497 4038

Central-South Region

Carina Calzoni ☎ 339 6205

North-West Region

Fay Mumme ☎ 401 2678

Central Region

Linda Taman ☎ 370 1213 (w)

Eastern Hills Region

Robert Watkinson-Slough ☎ 572 1489

Catchments, corridors and coasts

A special professional development programme on teaching for the environment is being organised by the Australian Association for Environmental Education.

Catchments, corridors and coasts is a one week programme that aims to introduce teachers to:

- ♦ local environmental issues;
- ♦ sound environmental education principles;
- ♦ the smorgasboard of environmental programmes and resources available in WA;

- ♦ the unifying concepts of landcare and sustainability that can help bring these programmes and resources together for students;
- ♦ the links between these environmental education opportunities and the school curriculum, at all levels and subject areas; and
- ♦ the links with the Student Outcome Statements of which trials are being run in some schools.

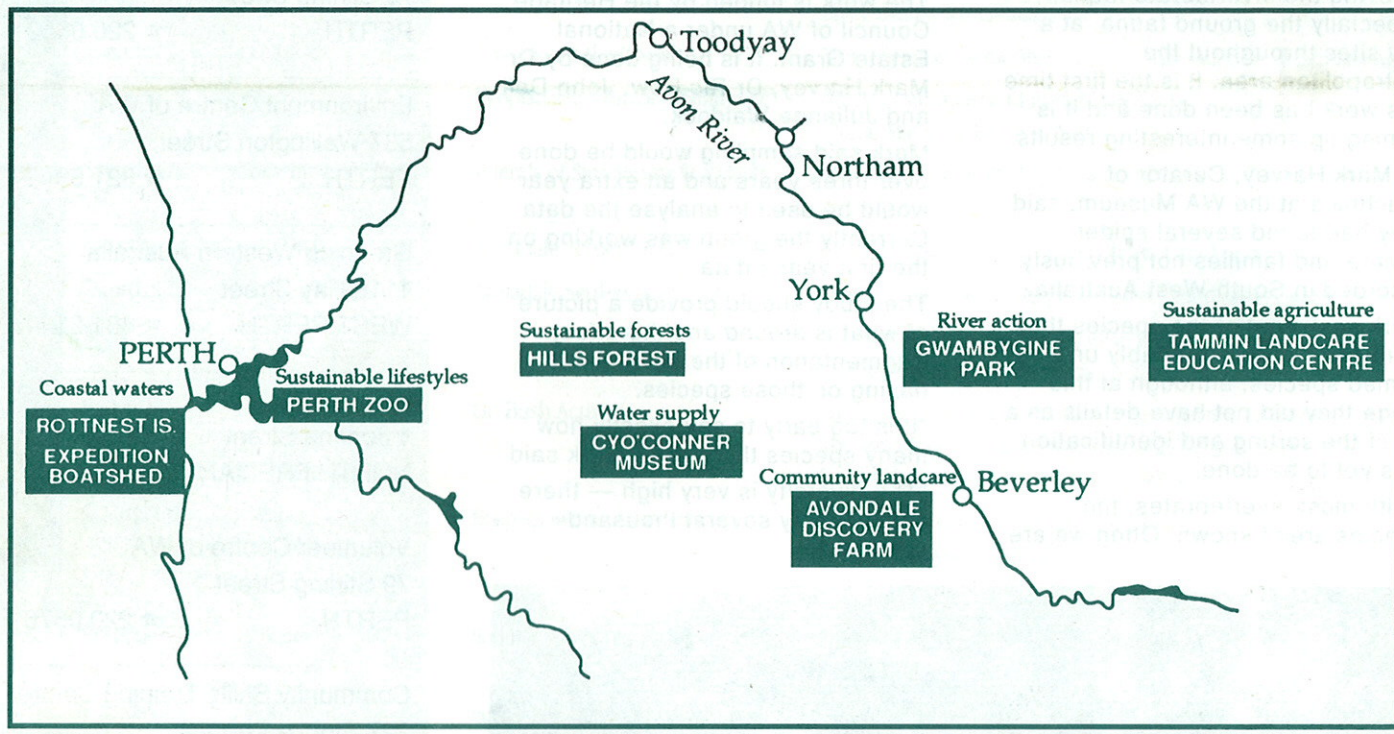
The first course will run from Sunday 9 to Thursday 13 October 1994. A second course will be run from

Monday 16 to Friday 20 January 1995. More courses may be run later.

Although it is aimed at practising teachers, there may be some space in the first course for other interested people.

The course has been developed through a National Professional Development Programme grant, so the first two courses will only be \$150.

For more details contact the course co-ordinator Boyd Wykes (work hours 384 5469, fax 383 1702).



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Conservation Reserves
for Western Australia
as recommended by the
Environmental Protection Authority — 1983

THE DARLING SYSTEM — SYSTEM 6

Part I: General Principles and Recommendations

Report I3
October, 1983



Department of Conservation and Environment
Western Australia

COPY BUNBURY FIELD NOTES

Many Gray, Brown Kang.
Lyn Dumb Lane & Angela

25/8/74 Pearce Airforce Base

Wing Commander Oliver
LANDS

- Neaves Road lands have kangaroos
- Muchea
- Lancelins
- Caversham (old racing track)
new signal unit
- Gingin

Pearce

Ellenbrook Southern block,
outside perimeter fence But
Ellenbrook is boundary to
west (Muchea townsite
intrusion into lands)

See maps - from Richard
Hart.

Wandoo's left in
cleared area

Wandoo Woodland =
land in Pearce sites

Scattered Wandoo 2-10%

Viminaria 2m in clumps

over Acacia lasio 0.5m 40% } 80%

Hyp. angust 0.5m 40%

Kunzea latifolia 2-10% 1m

Grasses - Newmann oleo 10%

Sedges < 2% except around to 40%

Herbs Danga 30%

CONDITION Vary Good - Good

Sparsens = trop. tol.

Other - Dryandra nivea, Cylich mult;

Poly. multi, Centropis arist

Hakea lasio, Astarea, Scattered

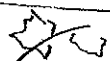
Xanthorrhoea, Drosera, Bulbosa

Drosera menziesii, Grevillea

pilifera, Verticordia densiflora

Meso, Letra, Cylich aren.

Creek E. Saevola = Engin
Shyphn glauc, Shylid Shlot
See the Aniz? vinda
Note - moss over substantial
not all areas Sparaxis but
all from moss, Cape being
Sewer located distals
(N RAAF Police Rd)

Creeklane Pea 

Area 2

Scattered Wandoo see
site 2 for Poace.

~ 6 grid squares (grid =
200 X 200 m)

Adjacent under Wandoo, near
creek and along creeklane
sp! 1.2m / Tm

Creeklane Euc. ma. Wood / For
no understory except
scattered shrubs.

Driving Notes

Ellen Brook

S Cas okos
Cas ob / Euc rudis } over pasture

Wandoo to E merge
Merri to EB

N Wandoo

Knoll opposite Calvary

Area 3 Triangle = A2
more tantho - from road.

Wandoo 5 - 20%
(young trees)
over Vm juncea / 2m - 1.5m
Kun lit
over Xant picea / 70% 1m - 0.5m
occ Ac. lassio.

Cyth. over 10-20%
Moso setra

Western block S → N

4

- Creek = Euc. rudis
- Adjacent Euc. rudis Mel. raph,
Mel. viminea
over pasture with scattered
Triglochin proserp., Cat. cony.

6

- Cas. obesa Woodland 20%
scattered Mel. raph which may
clump over pasture ^{or}
Triglo sp (specimen) ^{sp2} Cat. cony,
Cras. natans Dense Herbs > 70%
Triglochin proserp.
other patches Cape Tulip / ^{exotic} grasses off to
side to be on higher ground
Adjacent (E) cleared RAAF
field was Mel lot clays
Trib. aust / Triglo sp / Triglo pro
Sedge patch again higher
ground has exotics

⑦ Drainage line

Mel. raph. scatt. Cas. ob.
over as previous Herb descrip

Clay patches in area
with Mel. viminea, Centrolapis sp
(too early)

Clay pans on
bank
Bulbs. cold.
Eleocharis

⑧ Claypan flats

Herbs > 70% - 100%

Quercus, Centrolapis species
*Rom. ros' + ? Triglo glab, Triglochin sp
Drosera menz menz ^{Centrolapis}
Sporogularia ^{macro} ~~salina~~, Centrolapis poly.
Scattered area
Cyath. arar.

Panper flat, slight dip
Tub.

Lepiloma australis (fine weed)
Cras. natans

further N.

Scattered individuals / clumps
Lept. canus, Vant dens
Kunz. lit, Jack tree, Cyll
avenacea

- ⑨ Cas. ob Mel vin scattered
Leptocarpus ^{patch} aristatus
Asteron patches & clay pans
shallow species as previous
except add L. aris. and prob
Pogonotopsis strictus (red) all
last year dead ^{SP}
Salt Scallops purple ^{SP} Centropus

Vole - Poth. Sch. juncos
under dense Mel. raph. beside
depression

Lepid long patch } patches
Baumea juncos
Dro. gigantea

- ⑩ deep depression
few radiis L. forest
at edges

Tight lochia proc (thin leaves,
other broad leaves) in $\approx 1/20$ a 1m
in middle; thin water ^{SP}
and deep mud edge. Schoenus sp.

- ⑪ Wandoo Woodland

Make wandoo with
blossoms (pink & grey - Corolla)

over ^{SP} Hyp. angust & Accia ^{SP} is
also Accia ^{SP}

- ⑫ Jacksons st. seat Vin. 72m 30%

Clay pans mostly disturbed

Vant dense / Accia and ^{SP}

Lept canus, Opac. vaginata

Dro. heterophylla & Tub many

in area and closed ad runway.

Schoenus regens.

Settling Pond Area

(13) W side

Acacia Salig 3m 70%
 over exotics herbs/grasses 770%
 including ~~also~~ Centro. arist (last year looks)
 Drosera gland, Lam rosea,
 Cape tulip

Grey sand (all other soils clays
 brown)

Patches V. dense 0.5m 580%
 over herbs / Mammal Centrolepis 770%
 * Lam ros., Dros gland, Brachy kall.
 Centro. arist, Dros manz manz
 Trib aust

Hydrocotyle 7 diatom, Banya

COND Poor 2
 Good 2

Grazed

Soil - Sandy clay

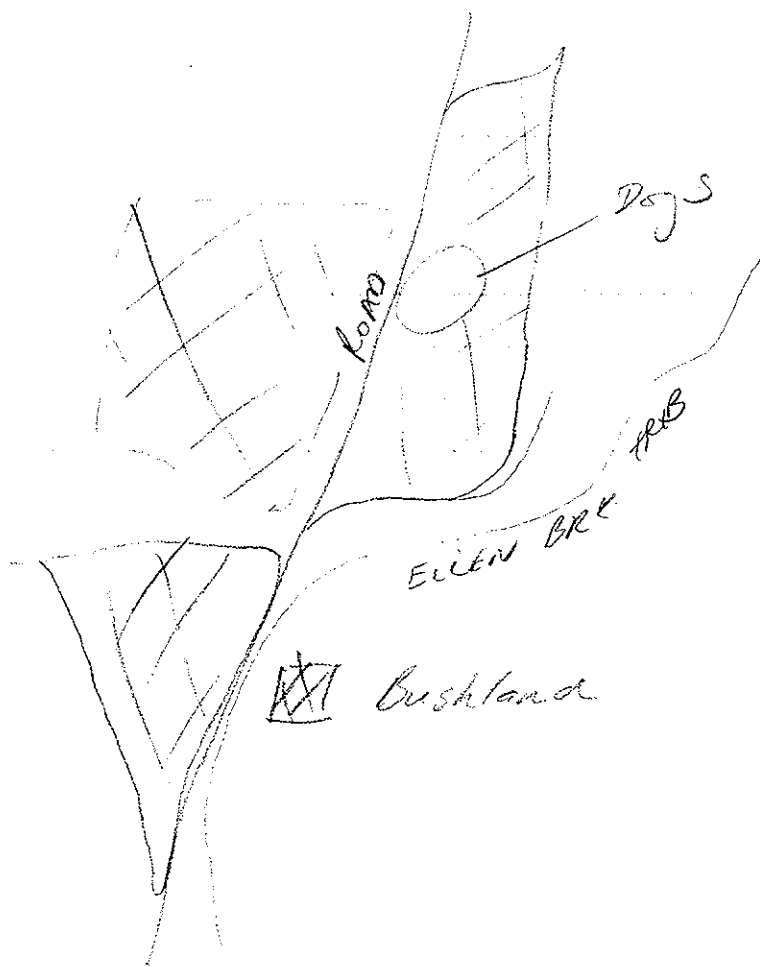
NE Side adj settling pond

(14) Acacia saligna and
 scattered to dense Marri
 (regrowth to 4m)
 generally grazed and
 disturbed scattered shrubs
 patches with some structural
 integrity

Log ciliata, V. dense
 Grv. bipin, Petrophile Marri Wood.
 Herb = ~~Veronica~~ Gonocarpus

Claypans next to car
 Warmly ^{SP} Tribos Chasyl
 off. spiralis, Poly mellea &
 tenuella, Thely ant.
 Drosera, ? bulbosa
 longish These occur through to
 the NW corner of area
 adjacent to runway from
 Jacksonia N.

SE corner

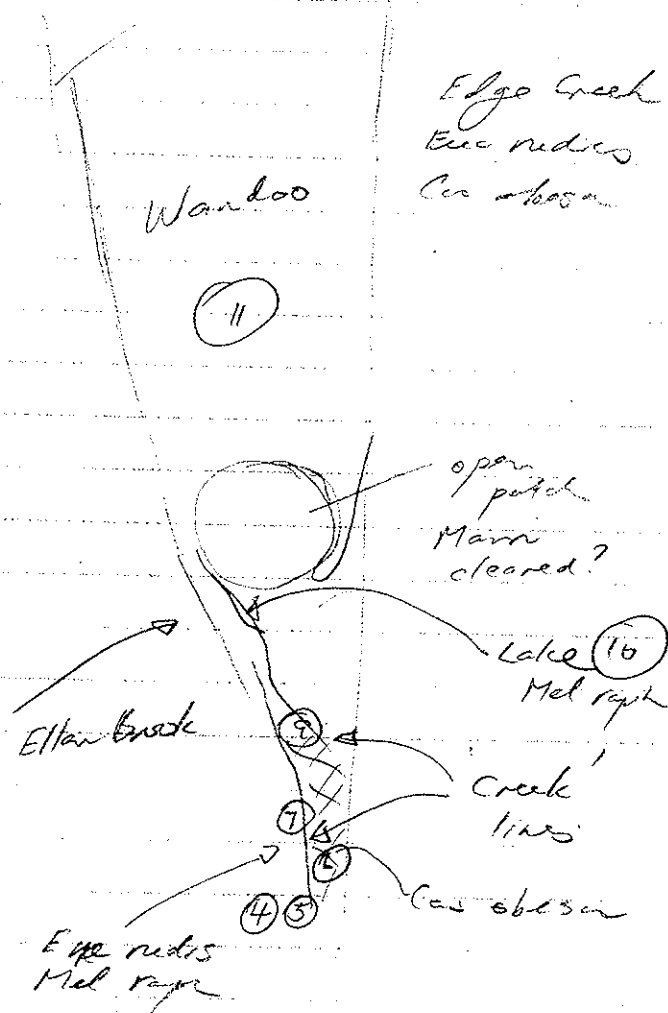


SW Corner $\approx 20 \times 200$ grid squares

Site 100 Al. Soil
Kelvin Bates from
Deer Park Housing

Site 100 - Burns Jan 1994

Warrumbia
Boerhaavia heterophylla
Amygdalus
Tub



4/9/94

Serpentine Nat Pk

Schoenus ?brevisetis

Petrophile seminuda - white

Petrophile striata - flat yellow

Lechenaultia flor = biloba

W
A
T
K
-

6/9/94

Location

Green Hills

Darwinia sp. M. det.

Timore Sulamp

(Said pine)

① Red/Sand Ridge to W YUKI #1
Orange = Dark Wood

Yellow Sand Flat = Marri VO Wood

② YUKI #1

Swamp area disturbed for
minid ironstone & marl from
area grossly disturbed but
regeneration. NOTE in all

• Leptocarpus clay flat

③ Eu. rudis / Low Woodland
M. rapk

single site could be
located adj to Rd

Orchids - Cal Klomet, terr
& Diuris

④

B. prionotes Woodland

scattered Chaco wood

• Dros eryth

• Drosera manz ssp P.

• Calladenia ferrug.

Thys. pet.

Airfield Rd Ironstone

Timore Rd - no
Ironstone - point 37

QUINNS HILL

28/9/84

E boundary

Weeds along boundary from
Marri Wood over heath
Rd to crossing
River Bank

Euc. rudis OF Forest - ~~OF~~
over Ac silig, Ac 700ch, ^{sent} Exo sp. ^{Tully}
x Labich ~~low~~ Shrubland (30-70%)
over Hyp argust
over Exotic grasses mostly
Panicum polycarpum

Photo 21 of Moore River on
crossing

River Crossing

Euc rudis OF over
Mel voph L. Wood - F
over Sporob / Sedges.
exotic grasses - Lolium,
annual Veldt

etc, single Poa (VSP)
Scattered Iso nod (VSP)

River W

Went on steep laterite
slope photo 22

Drainage from Mogumber W
Rd into Res photo 23.

Note: See notes on
aerial photos and
data sheets.

Aerial photos in
cabinet

W
A
T
E
R
C
A
B
I
N
E
T

30/1/24

PLANT - *Asplenium* milt.
DIANE - *Bijuncus* = *B. praeussii*

MOORE WANDER WAMI

Comasp. glaucum

Dryas pol. = *Dry. hesperia*

Stelagmus similis = *S. simplex*

Pink = *Dryas* - *Stelagmus*

Yellow ~~*Stelagmus*~~ *Petrophite*

Stelagmus, dry. *Stelagmus* = *Pet. striata*

Stelagmus *Stelagmus* = *Pet. striata*

Banksias

In late bank = *B. chaenophyton*

Come = *B. micrantha*

= *B. sphaer. ssp. sphaer.*

Dryas - *V* = *D. stolon. sphaer.*

Petrophite sericea =
Solt yellow

Conospermum acaule = *pet. line*
Conosp.

Haben. arvensis ✓

Haben. silvest. ✗ *terete*
curved back

Solt 1st. *conch* = *H. similis*

Dryas pygmaea = *D. lanceolata*

Mirbelia spinosa ✓

Compholob. ✗ = *Margia*

Haben. stricta —

Spraguei tridentatus = Moore p1

Leobachia *puberula*
desmopogon

Andersonia *hetera* ✓
And. *lehm* ✓

Leucopogon  = *L. oligantha*

Pityrodia *bartramii*

Dampiera *scapigera*

Platanus *drum.*

Conostictis / *C. setigena*
Con. crassifolia

W
A
T
C
H

See notes on
photo sheet

1. 100
 2. 100
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 95. 100
 96. 100
 97. 100
 98. 100
 99. 100
 100. 100

14. 10/10/1914 to 10/15/1914 and
 15. 10/16/1914 to 10/21/1914
 Gas pipeline Road

Earlier notes on sheets and
remnant veg x aerial maps
photography.

LAKE RICHMOND 18/5/87

See notes on sheet 11
Aracia = Anisotheca
Quercus *subulata*
Pinus strobus *resinosa*

WHITEMAN PK 19/10/94

more than 500 line patches
veg (see photo) in good
condition.

* Sea Rd 1.8 Km

Conocarpus *altissima*
Wedelia *grandiflora* *Banksia* *lanceolata*
Hamelia *fruticosa* ? *the* *shrub* *altissima*

4.4 cm Hohlbohrer für
Seile $\phi 7$

W
A
T
K
I
A

12/10/94
Canex yuccosii = ? RUC $\phi 2$
 = LEOA $\phi 1$

$\phi 2$
 lower *Canex*
Andromeda
 ? *gracilis*

Canex *occidentalis*
 $\phi 1$
Canex *occidentalis* $\phi 5$

Check *Mytilus* sites $\phi 6$ & $\phi 7$
 $\phi 6$ = *L. rosea*
 $\phi 7$ = *H. acerosa*

PERTH AIRPORT 20/10/94
 SWIRPS 1 & 2

Mel shape
 Mel lat
 1/20 deeper low
 longer

All 1/20 dried on wet
 favorable condition *Canex* *peruviana*
 (pink) caught ground on plates.
 $\triangleright$ *Regulus* with green the *aguias*
 are feeding.

Photo extra
 16 Tank, *Canex* $\phi 2$
 17 Dieback to South of $\phi 2$

Take stem low wood in
 between between sites $\phi 3$ & $\phi 4$
 also not only as mapped.

W
A
T
E
R

Tarnish has been better,
especially early on in
black land

Salicinas claudens

Site #1 Add Polyp (see 4)

S.k. #5 - Add *Corythos* sp. (see)

Adj (NW) Swamps

McB Press
McB rhyph

Asterisk/Paricahy
or slightly closed
Shrubs 2-1.5m
over southward
Wet/Sedges
= #5
Succulent
McB rhyph
Bank lit.

Soil/E Swamps wetter
than N (but drain through
S Swamps) perhaps presence
of planty swamp

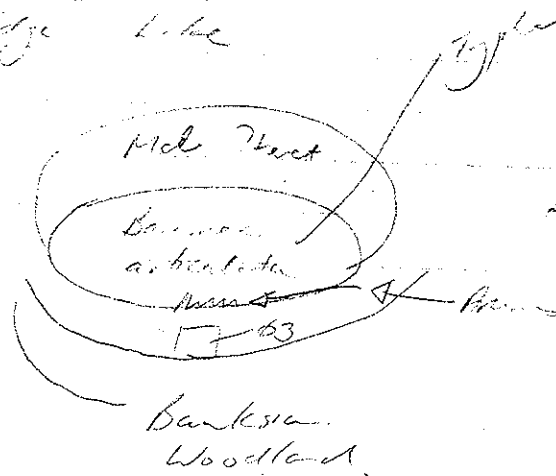
McB Press
McB rhyph
McB rhyph

McB Press 25/2/94 1994

Drain on site with
into the bank (photo)
from dense scrubland
wetland.

Site ③

Edge Lake



JANDAKOT AIRPORT 26/10/94
Several tall ridges, one to
the NE other to SW sites SW
area

Worked on for corner (W2)
burnt, several Euc. radis.

(W4) Scattered Jarrack to
som in areas like Site #2/
dieback taking out 2/04
Banksias to leave as a
Mall. Woodland. Central
duskybark photo kept as a
from cleared area.

Banksia ridge along Ten
Hurst PK 2 sites

Site #7 similar to inter.
of Banksia woodland in
the Park.

VELLAGONGA RIVER PK 27/10/94
Eastern side
Intermediate
Edges' lake blown #1 & #2

are, lacking understory
(photo)

Banks. distolia fringe
with B. att, Euc. radis &
Euc. radis

Predominant weeds
Perennial veldt, Warea
see photo 19

Western side

Site in Murrumbidgee at
road side it time, there
have understory as Site #3
but much greater cover of
*Hom. Floe

CANADARA LAKE 27/10/94

Lake as diag on Site #2
(width shrub band varies)
Some bank ill at edge but
narrow presence
Bank Woodland on rise

MET Site last 2/11/94

Ky1 } Low lying unit
Sal }

DL - Creek line

Areas

(Recreation) Reserve A 11598

Easement

Lot 1974 (kelas chert form)

Lot 1981

YANKEEP

opp Galatea Rd on highway
• 2nd track T left
Taken to water trough via
main tracks
Use N boundary rd.
• Central to left - at
Y junction take track to
right = Two Rocks Tanks.

D Follow to Y junction
go right to Twin Tanks

Go back to fence line
Grahams

561 1121

Mania

Handled Northwards

254

2

4.3 resume, ~~remembrance~~ ~~6/7/5~~

4-3-12-0

1. 9. 11

100

1. 84

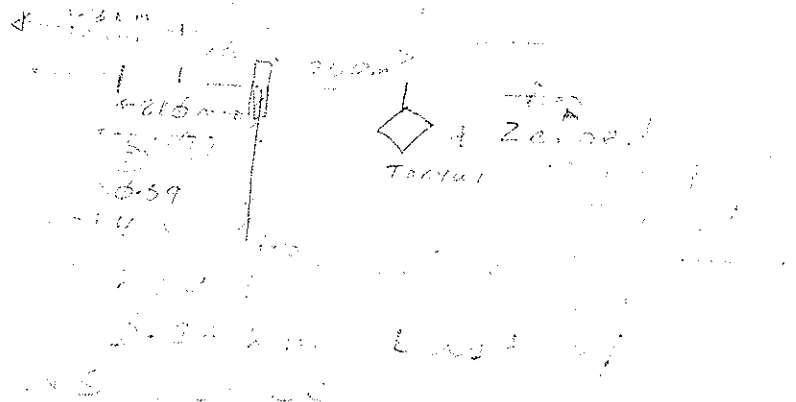
4-3

720-1111

1. 4.

W
A
T
K
I
N

6km from NW fence line



0.3km from $\phi 1$ = Euc. descriptions

1.4km turned back + zeroed (on a ridge) (marked)

$\phi 0.6$ km TOKYU 2

$\phi 0.7$ km TOKYU 3 =

7 $\phi \phi$ m. W. of 3rd fence line

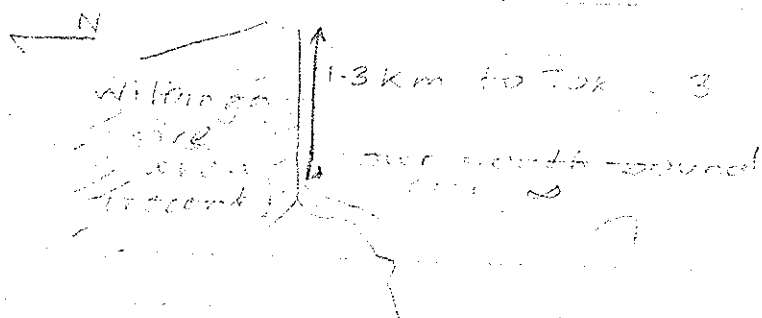
Zeroed odo again

$\phi 1.3$ at car turning Sth.

In Wilbinga:

Five steps // to this sign

Wilbinga burnt to S
extension to W. difficult to
see from track.



TOKYU $\phi 4$ 1.55 km

Wg. D. j. succulenta. Herb.

Sage in Wilbinga adj.

Hole in Sarcocolla Bank Wood

Vehicle

Zeroed at photo 38 of

Acacia xanthophylla $\phi 0.55$ km

to NS fence + gate

2.1 km at Mill turned
back East.

TOKYU $\phi 5$ 2.4 km

3.5 km at gate into Euc. field

ridges near water
talked as TOKYO #4

M53

4/11/94

Fire training
landscape NBT in Leaping
native, no attempt to retain
native veg. New boundary
closed, fenced goes ACROSS
creek.

Creekline weed infested
some Wat. bulb mainly 'Cane Grass'
= ? *Lespedeza*

Banks OK see site and
additional species.

Private Land / WANA not
managed, rubbish dumped,
and etc see KLT 1991

Predom 'upland' weed =
Ok Love Grass

Numerous firebreaks, tracks

over entire area

M1 / Wilbinga Interference
and M1 (Amplitude)
M1/Canal strip outside fence
largest patch S, Q4, other Q5
A. Sites 2 — 2 sites Mel / Q4

A1 Young field

A/B, 3 sites Dec / 10th

C Dune — Bank — Dry ridge /
Swale

D Trest Bank
Wilbinga (Spaced / limestone)
E Mallee patches

F Coastal area limestone to
coast Mel. and Low Thickets
Walk in to get sites

G. Scattered patches

H. Limestone / Bank

C.T. = 6 H.O. Sites
Sites along Highway W.A.

5.5 km W

8/11/94

For large sites
In mallee
low bank TLL
etc

Wilbinga South

Gates 7.5 km from Wanneroo Rd
0.0 from gate to Wilbinga
3.5 km to M1 fence corner
on coastal boundary
4.5 km to K40 66 & 67 from
gate

Sites on M1 banked
previous trip very similar
to 66-67 not banked
7.1 gate to W40 61 & 62

Good Pickers

Togola 4WD T-277

1.1 from WLB $\phi 1$ & $\phi 2$ to
Nance line Tokyo Land.

1.1 from pt from track to
 $\phi 1$ & $\phi 2$ to $\phi 3$ & $\phi 4$
= 2.5 km

WILBINGIA

Kohat Morley

Morley Rd

LOWER (HIT&KING) 6084

O. Gate to N

WLB $\phi 7$

O. km gate
to NW Euc. forest
over simplified same
unit.

WILBINGIA

9/11/94

WLB $\phi 8/9/10$ Area is
a mosaic of $\phi 5$ & KLS (see
map) KLS both low & high
in landscape.

Photos at $\phi 8$ & $\phi 10$ to
show landscape

Dominant

Ac rostr (dull or
bright green)

Ac truncata (bright green)

Dry sessilis

Lin. maritima ridges

Mel. huey

occ. petalles Ac. tanth &

Santalum (pale green)

gives

comb

of

vege. shrub

units.

Can't know, guess it seems to
be excellent, mess at time
sampling & around dead but
density 79% in patches
bare ground. * *Hel. pusilla* most
evident weed.

Cows attracted to area.

Site #12

Species rich coastal
shrublands other success in
area are Dod. quad, *Thom.*
triphylla. General cond as #12
to lower part old settlement
area.

C End of accessible area
1.8 km S Sites 10
= Site 1

Flats of *Sedges* near
Sanlier area = 7/10

Also patches *Hak. int.*

Hak. varia, *Kun. enc*

Area cleared see *Hak. varia*
photo

Nisa

Rel. 6-9 km from
turning pt Lake Pinyan
Track.

Northern Boundary =
Shal. Forest Bank Woodl.

300m S of T/O to
Pinyan track, south of
Teants over Mel. pries

9.3 km to T/O to Nisa
Rel. 2.1-3 km to alternative
entrance to L. Pinyan Track.

MICHAEL

17/11/94

Separate N. blocks
Regalia (30-70%) 10-30-0
Par. Velt Low Gums
Bank. inc. 10
Country. m. 10

Site Commonwealth Land

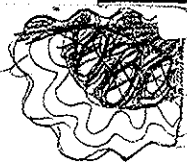
Agth sp 770%

Mel. raph. } 5-15 30-70%
Bank lit }

Styl. d. juncea / see box

Adj. Pain / Ast / Hyp / Ent
30 770% scaled

Mel. pries. Darwinia sp
over Hyp. disub.



W
A
T
K
I

C3

22/11/94

River

- ① 10-30%
Euc. rudis over scattered
Ac & *Mel. rhyph* 2-3m
 over pasture and scattered
 clumps Sedges (lucid long)

In head *Juncus* / *Silene*
 29 (P) → A E 30 (P) → W

- ② *Marr* 10-30%
 over Jack storn (25m)
 30-70% scattered bank
 prior bank grasses, *Euc*
rudis.

over pasture, *Cracken*
Styp. glauc
Dan *glabrid*
Cono. cand.

Hyp. argus { clumps
Vet. densa scattered

Down slope no earth
~~Ac silv~~ / ~~Jack~~ steep
 slope to NW bank prior
 increase over earth.
Patch *Dry. sessile*
 Weeds up slope = *Hcl pur*;
Urs. anth.
 Other seen - *Rach. fern*
Lox. Hex, *Con. stop.* ? ~~grass~~ *minu*

Loam in head to
 brown sand over orange/yel
 sand.

P 30 across valley

P 32 Adj. clearing

P 32 *Marr* 2-10% over
 Jack storn 2-10% over
Allox. humil 30-70%

W
A
1
K
2

P34 Wandoo Woodland P34

↑ sandy (grey) laterite
↓

P34 Laterite Sand

Mixed Shrubland 1m 30-70%
over Yanth drum Dry pink
cel song, kept erubos, Alla
humilis, Hbb hyp, Hbk
incass, D. Hbb in

Excellent Saturated
Moist

P35 Euc tod

Banksia Woodland

Grey sand (scat lt p. bbb's)

Note scattered bank
down the fire

P

Euc tod

Bank att / menz 2.5m

2-10% over Ad. egg 10-30%

(2m) over (1m) 50-70%

Hbb hyp, Erem. ? p. erub, Yanth drum
Schott invol, Stirl. 1st Jack
att stern, Hbb pachy, Astro xero
over 2-10 Moso pseudo.
Excellent.

P36 Adj Black to N (channel
on photo) re-growth.

Note Black along line to
W for Euc Excellent
to W.

W
A
T
K
I
N

Hakea smilacifolia 1

1.0 Petrophile aden. seen A/Ps Heat 6

B 1.48 Km PZ to NW

Wetted area

Track into the ridge

Isopogon drum?? check
specimen prob Petrophile 'brev' #2

Post P5

4.4 No Dry min

4.58 Lat ridge 2

Euc. macrocarpa

Mozumber Nature Reserve
Visited brick house,
1st note - no residents
but truck in the paddock.

B/P39 Recent burn
Wet corner Mel. priessiana
(mostly private land)
Deep white sand
Gnaphalium / Ariz pul

C River goes through latitude
P30/31

Manni over low

scattered shrubs to 1 Manni

over Bank prun / Petroselinum

Euc ^{scat} to Manni over

Cankesia 30-70% ~ 1.5m

D Mixed Heath with
scattered Bank. ~ P32-37

E Valley P 39
 x CHA River bed pasture
 as other sites, Euc. vudis along
 bed

P1 Wandoo Patch
 both sides river
 River P2 & 3
 Heaths on upland related
 to soil & amount of detritus

Condition - River valley
 weed washed some banks
 and also from adjacent farms
 to S

Great variety of landscape.

MOORE RIVER NP

TEDS Sibs

Orange Spring Rd
 ① EHQ = P5

Cavalla Bridge

P6 Down River (L)

Euc vudis one Mel/Haph.
 Sedges

P7 Bank provides for
 over Velt cross Degraded.

Western boundary

A River Euc vudis
 Mel rhaph
 (tall meadow)

B Bank
 Pamine
 or Moss
 pseudo

COND GOOD - DEGRADED

Banksia att x Euc. bed 30-10%
 5-15m over Yanth p
 10-30% (1-1.5m) over

over 2-10% Shrubs *Osmunda*
Moss *pseudo* 30-70%
Adj Bank *ilici*

Adj to Road Bank *Prior*
and *Mel Kurraa ericifolia*
30-60% 770%
COND Very Good

Section reverse & hence
not known by whom.

Note Dod haet. along
River (at Badg.) see
(12K for notes)

EAH 2 Orange Springs Mel.

Six Mile Swamp
Photos general area
within the looking sites
Photos to show the variation

Banksia Ridge →
Periclymenum → *Melaleuca*
Taxa - *Melaleuca*, *Melaleuca*
erica (occ), *Actinostichum*
Moua *Bygonia* *Mallotus*
Melaleuca species - shrubs to
2m *Melaleuca*, poly,
viminea (as *Baumea juncea*)
15, 16, 17.



W
A
T
E
R

W Ridge Wet Flats → Low Ridge E

Close series
P19 P20 over Adams Flats

Round trip 6.05 km

Beermuttal W Rd.
Muckan Limestone spurs
5.4 → 10.4 km

Moore River Est begins 13.1
km W Beermuttal
Lysium ~~elagans~~ elegans
(Bamburgh? pu. purpurea)
0.6 x 0.3 km N
Beermuttal Rd

~~Over the ridge~~

13.1
10.6
B

Muckan
? Albas, Euc de ipier
Mel. poly, tereti vinn, uncinata
? Mel. pyr, Allogynia, Mel. hueg
Chasmodon uncinata, Euc
Vinn. juncea, Al. salig
2.7 km W Brand Hwy
to 7.7 km

New Volatile!! 30/11/94
No log ~29900 DEP to
Tandana etc

Lysium elegans NOT Ridge
to sites #3 & #4
Scattered Bankett/maiz over
Albas truss (30-70% 1.5-2.0m)
over Euc. panic / Lenc. cono
30-70 (1m) over Lys. b. &
10-30 x Pet. on
~ 30 plants
Photos 23 & 24

W
A
1
C
1
1

BEELIAR 04

Mel lateritia 2-10%

Lawn area > 70%

Polygonum stratum

Myrio crispum

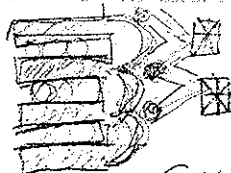
Centella cordilata

5/12/94

YELACONCA

Site in Mani not alone
ensure it this in actual
recommendation, best cond
veg. Should be kept and
adjacent plantings be
degraded to NOT be a source
of weeds.

Get Study 3d 11 Lower
Campus, add to System 6.



GNANAGUA LAKE

Front of lake, low level
mountain sites for lake bed.
Also Moore's Lake Forest

Area area of lake, no wood,
grass & all plantings, non-
local (Euc. grasses, Poplar -
metres high) and permanent
local.

Horse pick led to sign, but
day, then to the Reserve.
No indication to all in
vehicles.

DIANECLA

Note Mani overlooking to
E on Barteja

W
A
T
C
H
I
N
G

5/12/94

Bennett Brook
East side near
Litchwood

H0-A Mel rhoph / Zyphe
(Misty Tonantalis)
Large near Bulb cold.
Then C. scaphura / Mel vine
Can observe / Rd to (Prob)
over grasses (exotic)

A B & C →
RIPPLE WHITE GRASS

Note Site of Mel let =
Mel vine (seedling)

5/12/94

Mel rhoph on waterway
but to W creekline / Dep
Mel rhoph & Merri

1/2 to Weeds -
Psoralea (Arg) Green plant
to N of Pyralis

STAR SWAMP

Swamp site - just to
N Dargy Creek
Mel rhoph } 30-70%
Can samples }
over

Common grasses / Cyperus
tristis 30-70%

Zyphe orient.
Centropus cordi
Lodina alata
Buttala Grass
Couch / Grass 2 = Mel ph
Tulipa lutea

4

W
A
T
K
I
N

6/12/94

Casuarina
SW corner Miami / Joroch
over fourth sub similar
species to S1 & S4
This large flat area not
present in Llanos Rd
possible Col. weeg. habitat.

CALM sign on NW
corner indicates walking
areas allowed - no need
for entry permission

'CALM Conservation Area'

Trail to W of Prison
Push fence goes up ridge
a 100m Lys elegans patch
with 50 plants
Also back over Eremia x
passage further to S

~~OVER THE ROAD~~
John Mather 7/12/94

Puerto

Cute 4

Must get key to

Underlying sand in patches
is yellow

S8 → S7 transition
not mapped as such but
as S8

- see John's note

Native area in excellent
condition except for debris
sites, especially central
area.

Eastern bounding ridges
sand higher, low to
low in landscape.

Large plantings around
Central too.

W
A
T
K
I
N

Leda

6/12/94

Photos Tent region in
basin to SW site #1
Slope to NE of site #1
looking to NE.

Photo to W of site #2
where road begins, note
change in color
p29

Photo 30 & 31

Sections from track site #1
to W along track // to
railway.

Photo 32 & 33

Tent to NW of Lake
- Limestone outcrop.

Long section

Sites #3 & #4 just to
South.

Crop pipeline rd.

Approx lat line of site #5
Site #5

Gravel sent over limestone
on NE slope ridge
outcropping limestone.

Bank at (0-15m, 2-10%
up to 10-30%) over Acrost
(7-2m 10-30%) over Mel as
(1-0.5m 30-100%) over
riches (10-30%)

W
A
T
K
I
N

Data base addition

Perth Airport

7/12/94

Swamps all have large to small Mel p. on margins, Mel rhyph in guts.

B.W.
Site #4 Cyth claud, throughout woodlands in area

Site #6 BW no Cyth claud seen.

'Sites' located on Tingey Vay map
Low land - east

A. Mel rhyphs only

Bromus / Mel lichen /
Capitulum

B1 Rich vane, Mel rhyphs,
1st off 'Kosciuszko' lichen.

B2 Mr (T) but = B1

C Trees been cleared, regrowth

Photo

P. i. ell. p. (Hafz)
apparently within these 5 km
dome, combinations #5 & #2
Some of these rhyphs. #2

P. i. ell. p. (Hafz) = #5

Similar!

P1 & 2, 3, 4 & 5

Location of the sites

① Shrub 1-2 m 30-100%

Kunzea to ~~some~~ Todd GARD

Hyp. argent. Vert. Ind. Xanth. 2p

Vert. dense, dry ~~moor~~, ~~grass~~

Stylid. d. lat. (pink) ~~to~~ ~~broda~~ ~~grasses~~
= COSN ~~to~~ ~~broda~~ ~~grasses~~ ~~to~~ ~~broda~~ ~~grasses~~

over top. now 20-70%

Note single outgrowth areas.

Site in D ad to W

Photo 6 & 7

(E) *Contea* Woodland = $\phi 6$
Photo 8

(F) Burnt *Pe*
Bybylis *Leventhooker*
9x10x12 Across Burnt Area
P11 = *Leventhooker*

(G) Heavy soil Mel Vm,
disturb

P15 & P16

Pe over *Bauman*
pencil 710% 70cm over
Cotula cynosu

appears to be salt affected -
Couches *Egrodium* *darlington*
Patches *Bullb. caed.*

Mixed Heaths (like $\phi 5$)

Pop. strata (not nearest
brown soils) cleared.

Leptocladus south coast alt
Pauciflora

Lepto. aristatus

(H) Sandy ridge, cleared
Not seen, but may regrow

Lepto. lept. one spec each
Bush several undist. to EB
*EB *Sagittaria* possibly *Leptocladus*
Leptocladus

Heavy Soil (Hats to either
side, cond. from very variable.

Westerly N $\rightarrow$ S 770% Wm

(I) *Pe* over *gum* *Pe* at crest, *Eu. viny*
Not base, *Pe* lot, *Eu. viny*
Leptocladus *indurata* *indurata*
Sc. black *Pe*, *Pe* p x
Eu. viny

**Leptocladus* invasion edge, low
grows.

COND *Exaltat* with
sever. *Leptocladus* disturb
dense *Pe* ellip edges.

1950-1951

the country against me.

Contains more low lying

- (J) Bm, Ba x Bi over 30-70%
Phleb c/d lumps 30-70%
Sedges, lily pads Schoenoc
Succulent shrubs 2-10 C.S.M.
bas. enio, Pet. line, Erem p,
Grom. toon, Luccaria, Jack daisy,
Mel sp B,
Cand
Fic, ? petrel clearing,
structure imprinted Fresh. Barn ox
10-20%

(K) p 17 along
m.p / Ref. Summary p.

- ④ Dark Brn / Ba / Ern,
very like *Dianella* =
But *neg.*
(*Cono ovata*)
P18.

On side slope to S. B. 11th.
M. 1900. ? 1900

Excellent - V Good.
along road. Holdup Lane. Good.

Entrance for 404
at Home Milan
Entrance

W
A
T
K
I
N

LAKE PINJAN
Site 15 12/12/91

P34/35

Salicoid, Styloid

MS off (asid)

Lepidoderm (PMS 10) 77%

Schennus 2/10/10

Red grass (pink) * large glab

Vill = 01, Styloid river

200s 7/10/10, 100s yellow

100s 1/10/10, Styloid (exposed)

Cent. mation, 100s clark

Grass, Cent. 100s

One 100s, 100s 100s

Enter viny

5 Jan x Lizard

P36/37

Small 100s, 100s (2nd one to E)

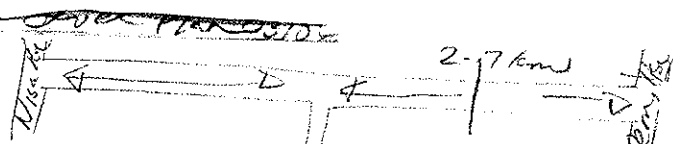
on N boundary with

bringing 100s into

Ridge 100s 100s

100s, 100s 100s

PMS 14



2.7 km from to to
Pinjar Central track.

N → S or E

Horse Farms (back land
regrowth)

600m / 1000
S Block Bank
Woodland b. 100s / bank off
over Kan area

COND Very Good to Ex.
Ridge to W Bank. Wood.
(Bath / men)

5.6 km } Section } Rd E
7.3

Bank Wood

Ex to Good to S

W
A
T
C
H

20/2/96

Wetland area

Pathananga See KLT

Tetiana auct browsed by
cattle VSP with grazing (cattle)
adj area in native plants to
1m (see VSP) after fire 1995

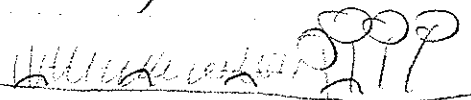
Swamp

S

Sand
Mamm
over bank

legid long
Bacm. juv

Mel lot
70% N



Ironstone boulders

1st auct.

Nel & Austin Perret
(525 5091)

Change till 1:30
ie 6 hours

Watkins Rd / Norman

Outlined comments

- 10% PER Vibe. C Street
- EPA Threatened & Poorly
Respl. Communities
(Identification Gibson et al 1994
KLT 1992)
- DRT
- Possible leg. Res. Com.

Sensory Areas

Watkins & DRT / Antic Watkins
adj 2:30 (or 2:45)
possible Ag. res at adj. Wat

- Grazing & Destruction re-
it difficult to survey
Norman location

between

4

Melanie
J Dixon

21/24/96

- 1.
 - 2 (to 15%)
 - 3
 - 4
- } to be done.

GARY? CHAM?
Other access to
Lata - need to
contact Ntali for
access.

Check Allan

Boundaries Metro-Region
• $\neq$ PEP boundaries
• thought of a greater
boundary but not legal

Definition Conservation Estate

Bushmead

WUT-1

20/6/97 BUSHMEAD

Creek line

Euc. red, Euc. cyl, Mel. sheph
good veg. Harri / in soil.

Pachura

Harri / Jarrol good veg
on Hotel Bank (seedlings)

Creek valley, patchy Jarrol,
some bush

Commonwealth bounds

creek line for use of
to use culverts

access to helipad for
turning

ISSUE creek boundary

Old Kalamunda railway

Easement (pipeline)

- Muddering when the

about 30 roos

ISSUES

* Cemetery conditions to increase
* creek boundary commonwealth
(Some area was not negotiable)

* Commonwealth give land
Not identified in the plan
being any area DEP's position

* Water table for digging
graves

* Bone for the little iron would
need to go through licensing
graves

* Meeting over next
couple weeks

Bushmead

possibly
18/2/97.

Brian Busseton ? February

no alternatives, checked by
DEP

• Ray Skedman / Lorlie / Derek
/ Environ West Sands

2d

• Skated DEP

• Follow up meeting
Skedman / DEP shown
photos other routes
not satisfactory

• WS can be involved

* Skedman said that
WS could see.

Problems

- no information (document sent after
by company)

- issues / depend Society

1. ... PK. Resp.

A Torrak trees

Slope

C Bank South North

Shrubs plus

- *Polypodium*
- *Polygonum* } v. wet
- *Smilax* } mostly planted.
- *Sedum* }
- *Sedum* }

Bush over opp Underwood

- Skedman / Underwood

Torrak 10-30 to 30-70

over Torrak 30-70° variable

Xantho (to 2m) 10-30%

South H.K. pros

Bank pro clumps, occ

Bank a.t.t.

Ground < 1m variable

up to 70% Veldt can be planted

Underwood Bank clumps

Journal notes

View to KP

1. Old houses, 2. New houses
3. Old houses, 4. New houses
5. Old houses, 6. New houses
7. Old houses, 8. New houses
9. Old houses, 10. New houses
11. Old houses, 12. New houses
13. Old houses, 14. New houses
15. Old houses, 16. New houses
17. Old houses, 18. New houses
19. Old houses, 20. New houses
21. Old houses, 22. New houses
23. Old houses, 24. New houses
25. Old houses, 26. New houses
27. Old houses, 28. New houses
29. Old houses, 30. New houses
31. Old houses, 32. New houses
33. Old houses, 34. New houses
35. Old houses, 36. New houses
37. Old houses, 38. New houses
39. Old houses, 40. New houses
41. Old houses, 42. New houses
43. Old houses, 44. New houses
45. Old houses, 46. New houses
47. Old houses, 48. New houses
49. Old houses, 50. New houses
51. Old houses, 52. New houses
53. Old houses, 54. New houses
55. Old houses, 56. New houses
57. Old houses, 58. New houses
59. Old houses, 60. New houses
61. Old houses, 62. New houses
63. Old houses, 64. New houses
65. Old houses, 66. New houses
67. Old houses, 68. New houses
69. Old houses, 70. New houses
71. Old houses, 72. New houses
73. Old houses, 74. New houses
75. Old houses, 76. New houses
77. Old houses, 78. New houses
79. Old houses, 80. New houses
81. Old houses, 82. New houses
83. Old houses, 84. New houses
85. Old houses, 86. New houses
87. Old houses, 88. New houses
89. Old houses, 90. New houses
91. Old houses, 92. New houses
93. Old houses, 94. New houses
95. Old houses, 96. New houses
97. Old houses, 98. New houses
99. Old houses, 100. New houses

② = ①
AZ length

301-5-

③ Large boat / Jarak
in area Water Corp / Uni /
and ③
New into ② Jarak 10-30%
new Jarak trees Jarak stone
old work

Plants under local dist
Outcrop in canyon

④ Plants + exotics in
ship to 3 Uni animal
yards.

3/4/5 31-AT Tuent Birk
old / new / increased to 5+
6 edge = 60 adj but
location for new beds 1 in
Sugar land etc planting

All trees good reg
seedlings Jarak / Birk / Tuent.

⑦ Work Cover
Tarrach / Thrust + 1000
junk - mostly rust.

⑩ Plumbing 10-15
Euc. mac / Euc. mac
Bunk att / men on. 10-15
One Tarrach / Thrust
Over pictures 10-15
75% Tarrach 10-15
Tarrach 10-15

Tarrach 10-15
⑪ Thrust / Bunk att / Thrust 15%
slut Tarrach NO understory
- Mown
E Bunk per

⑫ Thrust 10-30 over
30-40 Bunk att 10-15 over
Tarrach 10-30
Pictures 10-15 75%

Young Bunk, Thrust
Over 1000 rust chips
10-15 1000 to 1000
Tarrach 10-15

⑬ OK 10-15 / Thrust
70% Vol. 14

Bunk 10-15
Tarrach 10-15

Tarrach 10-15

Patchy Tarrach. ⑭

⑮ Thrust / Thrust 30-70%
Some 7 70%

Pictures Dry 75%
Tarrach 10-15 Dry 75%
Over 70% Vol. 14

Native 10-15

More, Hard, More 10-15

8C
NE corner bank prunotes 7700
cane veldt, butt
Hak pro/Jack

(10) Low trees 7700
Over Veld 7700
Native scott

Dian red, Conga m
on tank, Juvul ing
the pul, Beret ang (1)
Euph for

Alor bet, Tank set,

Patches Dry

NW corner D/G Bank prun
Bank mang (ocean both)

9A.

Juvul/Mucos two. 30 7576
into some bank mang
over Juvul prun (1) 7576
Dian red, Beret ang 30-7576
to 7 veld to W

Set Juvul. / Tank
through grounds, patches
Harris

ditto eyes
9B Swamping hollow
Mang/Alor set, Single tree shrubs
Patches edges
Baumjunc

wettest - rapid long
Corker road.
Juvul. ? / Baumjunc
Typha pro
Red gum seedlings / trees

A programme to update the System 6 recommendations

Introduction

The EPA has recognised that there is a need to review and update the recommendations contained in the System 6 reports and also the coastal plain portion of System 1. Collectively these areas effectively cover the regions most threatened by the increasing land use and development pressures that now extend well beyond the Perth metropolitan region and more closely follows natural biogeographical regions, taking in the whole of the Southern Swan Coastal Plain.

The System 1 report was the first of the System studies to be completed, and only considered a few large areas for reservation/management. It is now well recognised that the recommendations in System 1 do not adequately represent the range of ecological communities and associated habitats found in the area.

The Department of Environmental Protection has therefore been requested by the EPA to initiate an update programme for these areas.

Scope and boundaries of the update programme

The programme is intended to update the recommendations contained in the Red Book Reports for System 6 and the coastal plain portion of System 1. Thus the study will include the whole of the Swan Coastal Plain south of the Moore River (map attached). Systems 1 and 6 should be representative of the range of ecological communities and associated habitats originally found on the Swan Coastal Plain, the Darling Scarp and the Darling Plateau.

It is not proposed to review the State Forest estate in any detail since CALM's Forest Management Plan 1994-2003 recommendations have been accepted by the Government and serves as an update of the System's recommendations.

Similarly, the coastal marine environment, excluding estuaries, will not be specifically included in the programme in the light of the Wilson report and the anticipated formation of a Marine Parks Authority in the near future. Nevertheless the marine environment may need to be given some general consideration since adjacent marine and terrestrial environments can have an influence on each other. Estuarine environments will be considered within the scope of this programme.

The general recommendations contained in Part I of the System 6 report and in the Preamble to System 1 will be updated in conjunction with the more specific recommendations in System 6 Part 2 and System 1. Implementation of the general recommendations is intended to provide a framework for assisting implementation of the more specific recommendations for individual bushland areas.

The objectives of the update programme

The primary objectives of the update programme are :

- **To ensure that the conservation system proposed in System 6 is representative of the ecological communities and associated habitats of the region.**

In the light of current knowledge this may require some additional areas being identified in the study area. At the same time the EPA recognises that there is a need to re-examine some existing System 6 recommendation areas since their conservation values may have been lost or severely degraded over the years.

- **To ensure that a suitable policy framework with appropriate legislative backing is proposed to enable implementation of the more specific System recommendations.**

The general recommendations contained in Part 1 of the System 6 report are intended to provide this framework and will need to be updated to reflect current thinking on conservation strategies as well as the current legislative and administrative arrangements.

- **To assist planning and development processes through identification of areas of regional conservation value which require protection and hence reduce conflicts and environmental assessment periods.**

It is the Authority's preference that these areas be identified in advance of development proposals rather than having to deal with these areas as major conservation issues affecting development proposals, as was the case with the urbanisation plans for Brixton Street, Kenwick, Ellenbrook and which may occur with Carburnup Town-site.

- **To assist with subsequent implementation of recommendations by involving all the relevant agencies and groups in the update programme, with the intention that as far as possible conflicts or constraints will be identified and resolved prior to finalisation of the report and recommendations.**

Recommendations will need to be clear and well argued.

The process

The update programme is expected to take approximately two and a half to three years to complete. The early stages of the programme are constrained by the field survey programme which can only take place over the spring flowering periods.

The approach has been to use detailed information on the plant communities together with soil and landform information to define representative ecological communities in the study since our knowledge of the fauna communities is less extensive. However where information on fauna is available this will be used to assist in identifying representative ecological communities and important areas requiring recognition and protection.

Unusual or special landform features (such as limestone cliffs, river gorges or mound springs) will also be considered in the study where they retain natural vegetation. Areas such as these are often already a regional landscape feature and generally contain unique ecological communities.

To help coordinate the programme and facilitate communication between the large number of stake-holders that need to be involved in the process a Steering Committee and a Technical Working Group has been set up.

The System 6 Steering Committee comprises senior representatives from key State government agencies (at CEO or Director level), local government and an EPA member (see appendix 1) and will meet at key points to maintain the overall direction of the programme.

The Technical Working Group comprises representation from a wide range of government agencies and the community. This group will meet more regularly and will identify, discuss and resolve issues that arise and will develop strategies for updating the System 6 recommendations.

The update programme will be dependent on the knowledge already held by both government agencies and the community in identifying areas for consideration in the System update programme. Available resources are limited and will prevent surveying all remnant bushland to develop the updated recommendations.

Public input will be sought by inviting people to submit to the programme areas that they think have special conservation values that should be considered for inclusion in the System recommendations. These submitted areas will be assessed against a detailed set of criteria developed through the Technical Working Group and Steering Committee and where appropriate will be surveyed to determine the ecological communities they contain and confirm their conservation value. If the submitted area meets the detailed criteria it will be added to a list of possible areas for inclusion in the proposed conservation estate.

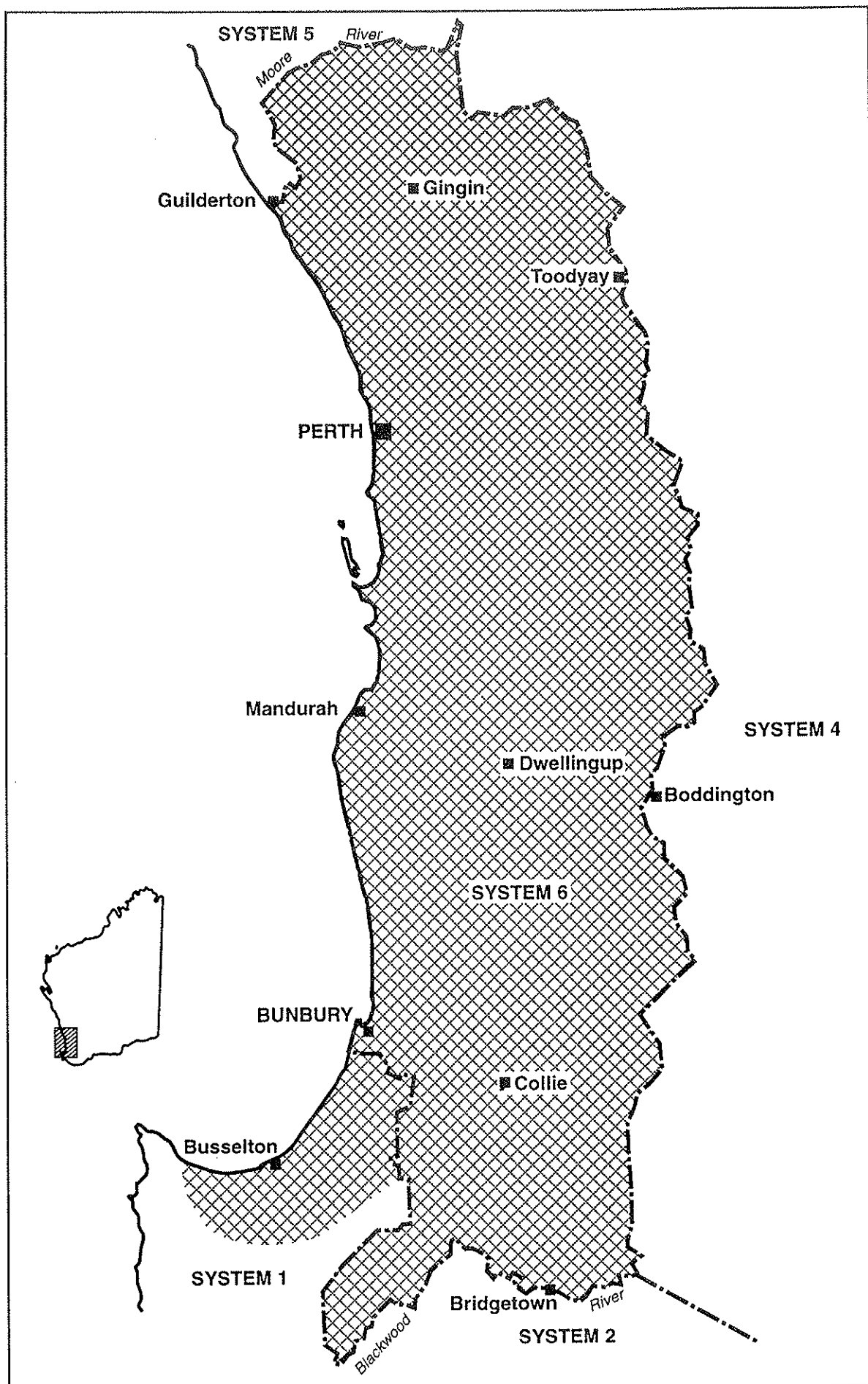
The specific recommendations for System 6 and System 1 will then be updated using this list. Any issues that might constrain the implementation of the updated recommendations would be resolved as far as possible prior to finalisation of the draft report.

As well as these specific recommendations, the update programme will also review the general recommendations in Part 1 of the original System 6 report that provide some broader policy guidelines for achieving conservation in this region.

The specific recommendations will be released with the general recommendations as a draft report for public comment. Public submissions will be collated and reviewed and the report finalised for consideration by the EPA.

It is envisaged that the final report would be submitted to Cabinet for endorsement, as were the original EPA Systems reports.

This approach is intended to provide wide involvement, while maintaining an effective and efficient process for resolving issues. The objective is to develop a well argued set of recommendations for conservation in the study area that are supported by government and the community.



SYSTEM 6 UPDATE PROGRAMME STUDY AREA

A GENERAL DISCUSSION TO HELP GUIDE THE PREPARATION OF SUBMISSIONS TO THE SYSTEM 6 UPDATE PROGRAMME.

Introduction

This paper briefly discusses some issues that are considered to be important when updating conservation recommendations such as those contained in System 6. It should be useful when selecting areas for your submissions to the Department of Environmental Protection.

All submissions received will be assessed individually by the System 6 Technical Working Group. Where applicable this will include visiting the site for a field assessment and if appropriate an intensive field survey. If an area meets approved criteria then it may be considered for inclusion in the updated System 6 report and recommendations.

Bounds of the study

The boundary of the study area we are seeking submissions from takes in all of the Swan Coastal Plain from the Moore River south to approximately Dunsborough, including estuaries, rivers and other wetlands but not marine areas. A recent report to the Department of Conservation and Land Management has already considered Western Australia's coastal marine environment and made recommendations for a comprehensive marine reserve system.

Also included within the bounds of the study is the Darling Scarp and parts of the Darling Plateau from the Moore River in the north to the Blackwood River in the south and inland to approximately Toodyay and Boddington. The Department of Conservation and Land Management has recently completed its Forest Management Plan for all State Forest areas on the plateau and the government has endorsed this as an update to the System 6 recommendations for state forest.

Please note that this programme is not a forum for addressing the protection of bushland where development approval has already been given. The programme will not consider areas for which the Government has already given a commitment to development.

Objective

The primary objective of the update programme is to propose a conservation estate for the study area that is comprehensive, adequate and representative of the ecological communities in the region. The study will look to build on the existing conservation estate. The focus of the programme is therefore on conservation values rather than recreation or aesthetic values. Hence areas that contain natural vegetation in the best possible condition or important habitat for flora and fauna are of prime interest.

The primary focus of the study will be on the conservation of ecological communities and their associated physical environment. Never-the-less, the presence of rare flora or threatened fauna species in a site is one of a number of factors that will be given consideration. However, areas that contain rare species may not be given priority consideration if the surrounding community is well represented in the conservation estate or is in a degraded condition unless the rare species is not protected or does not occur elsewhere.

Guiding comments

If near pristine areas are not available then areas with minimal disturbance are preferred and these should be in a condition suitable for regeneration. There will be some plant communities where this is no longer possible and in these instances vegetation in poorer condition may need to be considered in conjunction with strategies for their rehabilitation.

There are some plant communities that are now considered to be threatened because of the extensive clearing that has taken place. For example natural vegetation associated with the heavier soils of the eastern side of the Swan Coastal Plain is estimated to be at least 97% cleared. As a result many of the small pockets of vegetation remaining in this area are likely to contain threatened or inadequately reserved plant communities.

Large areas containing a range of ecological communities are generally a better proposition for protection than several smaller isolated areas. These larger areas often support a far greater biodiversity and exhibit a greater capacity to resist degradation, particularly from outside influences. They also contain a range of habitats that may provide for a more intact fauna community.

However, even where larger areas can be protected, replication of these community types in several separate reserves/areas is an essential attribute for achieving an adequate conservation status.

Consideration also needs to be given to consolidating already existing conservation areas, particularly those that are small in size or contain significant biota/ecological communities. Increasing the size of the protected area enhances its long-term value and viability.

The establishment of naturally vegetated corridors or links connecting existing or proposed conservation areas is an important issue. The primary role for these vegetated links is to facilitate the movement or migration of fauna. There are also benefits for the flora such as pollination and seed dispersal by the animals moving through the corridors. Corridors may be linear, in which case they should be as wide as possible, or they may be bushland pockets located close to each other.

The region is rich in animal species from mammals and birds through reptiles and amphibians to the invertebrates such as insects and spiders. Many of the animal communities of the region have been severely impacted by the loss of habitat through factors such as clearing, new fire regimes as well as introduced predators (foxes, cats, etc). Areas that still retain a diverse assemblage of animals or a relatively intact animal community are likely to be of high conservation significance.

Landforms and landscapes that still retain their natural vegetation fall within the scope of the programme, particularly those that are unusual (for example coastal limestone cliffs, mound springs, and river gorges). These can contain unique ecological communities or, as is the case for wetlands, provide essential habitat for many species of fauna.

Please send your submissions to:

The System 6 Study Team
Department of Environmental Protection
141 St Georges Terrace
PERTH WA 6000

The deadline for submissions is Friday 18 August 1995.

SYSTEM 6 BUSHLAND SUBMISSION FORM FOR CONSIDERATION IN THE UPDATE PROGRAMME

If you wish to submit more than one area for consideration in the System 6 update, please use a separate form for each area.

Please fill in each section giving as much information as possible.

LOCATION, OWNERSHIP AND ZONING OF THE AREA

1. Location

Please give as accurate and detailed a description as possible of the site location

Please include either a hand drawn or copied map showing the area of the area

a) Bordering Roads:

b) Nearest Corner:

c) Lot Number: Street Number:

d) Town/Suburb/Location:

e) Local Council:

f) Site Name (if any):

g) Approximate size of the area (ha):

h) Please locate the area on a map and give us map references if possible:

.....

i) Map: Streetsmart /UBD/Other:

j) Map no.:

k) Grid Ref:

l) Please give any other information that may help us to find the location:

.....

m) Are you aware of any development proposals that are likely to affect the area?

.....

.....

NOTE: Areas that have already been given development APPROVAL should not be nominated
--

Please fill out those questions that you can answer

2. Who owns the area? (If owned by the person/s making the nomination please indicate)

3. If you own the area, and may be interested in participating in conservation on private land initiatives please indicate (and leave your name and address at the end of this submission form)

4 .What is the area zoned? (please indicate whether zoning is Town Planning Scheme or Metropolitan Region Scheme)

CAN YOU TELL US A LITTLE ABOUT THE PHYSICAL CHARACTERISTICS OF THE AREA

5. Why do you consider this area important? (Refer to Guiding Issues paper)

6. What is/are the soil type/s and colours ?

Type: Sand/Clay/Gravel/Loam/Silt

Colour: White/Grey/Brown/Orange/Yellow/Red/Black

7. Does the area have any special features such as unusual landforms / landscapes that still retain their natural vegetation? Yes/No

If yes, what are they?

8. Is the area a wetland or does it include a wetland?

If yes, what kind of a wetlands is it?

a) lake

b) river

c) stream

d) swamp

e) estuary

f) seasonally wet

g) other

9. What percentage of the wetland is open water in summer?

<i>CAN YOU TELL US A LITTLE ABOUT THE VEGETATION /FAUNA ON THE NOMINATED AREA.</i>
--

10. What percentage of the area is indigenous vegetation?

11. If the area includes regions cleared of native bushland please indicate reasons for the inclusion.

12. Has any previous flora or fauna survey work been done on the area?

If yes, please give details of the work

13. How would you rate the condition of the native bushland? (see attached table)

- a) pristine
- b) excellent
- c) very good
- d) good
- e) degraded
- f) completely degraded
- g) don't know

14. Please indicate the disturbances affecting the area and where appropriate the percentage of the area disturbed.

- a) Partial clearing
- b) fragmentation
- c) Selective removal of species: timber cutting, wildflower picking, mowing dieback and other plant diseases
- d) Fire regime, including intensity, season and frequency
- e) 'Enrichment plantings' that is plantings of species not found in that community
- f) Weed invasion
- g) Animal impact: horses, foxes, rabbits, cats, dogs, camels, goats etc
- h) Soil movement, both removal and dumping
- i) Changes in water regimes; flooding, drainage and watering
- j) Salinity
- k) Fertiliser drift and along waterways nutrient influx
- l) Mining, including that for road works

- m) Grazing: stock, overgrazing by feral or native mammals
- n) Proliferation of tracks, fire breaks and walk trails
- o) Off-road vehicle use
- p) Use as service corridors by the SEC, Main Roads, Water Authority.

(Source: B Keighery. Bushland Plant Survey, September 1994)

15. Does the area contain any plant species of special interest that you know of?
(eg. declared rare flora, priority taxa, outlier populations)

Do you know what they are?

16. Do you know of any native animals that use the area?

Can you list those you know of? (birds, mammals, reptiles, amphibians etc)

17. Is the area used by any native animals of special interest? (eg. endangered species, large/important populations).....

If yes, please name them and indicate source of information

CAN YOU TELL US A LITTLE ABOUT THE SURROUNDING AREA
--

18. Are there any bushland areas (including wetlands) near to this area?

If yes, how close are they ?

Are they already conservation reserves?

What is their approximate size?

19. Does the submitted area link other bushland areas?

Please attach any additional information about the area which may be of use when assessing it.

Thank you for providing this submission. If you want further feedback on the outcome of submission then please leave name and address.

Should we need to contact you for further site identification it would be helpful to have a name and telephone contact number

This information will be treated as confidential

Name: (Please Print)

Address:

Daytime telephone number:

Table 2: Vegetation Condition Scale

Modified from Trudgen 1991 by B. J. Keighery for the Swan Coastal Plain Survey 1993.

1 = 'Pristine'

Pristine or nearly so, no obvious signs disturbance.

2 = Excellent

Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species

For example damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.

3 = Very Good

Vegetation structure altered, obvious signs of disturbance.

For example disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.

4 = Good

Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate to it.

For example disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

5 = Degraded

Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.

For example disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

6 = Completely Degraded

The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

These areas are often described as 'parkland cleared' with the flora composing weed or crop species with isolated native trees or shrubs.

Source: B Keighery. Bushland Plant Survey, September 1994

Slides to support System 6 Update Talks.

1. Use for describing what bushland is; use definition from Urban Bushland Disc. Paper (Kearney)

A. Marri Woodland
at Talbot Road.
(interim)

B. Wandoo Woodland.
(interim)

2. Shrublands are bushland too

A. Mandijong
Road Shrubland.
(interim)

B. Talbot Road
Shrubland
(interim)

3. Native Grasslands and Sedge-lands are bushland too

A. Becker Point
(M106)

B. Britton St
(interim)

4. Vegetated landscape feature

A. John Forest
(M21)

B. Ridge in Bold Pl
towards Perth.
(M47)

5. Vegetated landscape feature on the coast
(Coastal verge is bushland too)

A. Garden Island
(M96)

B. Burns Beach.
(M2)

6. Coastal verge is bushland too.

A. Mindarrie
? M2
(houses)

B. Garden Island
(M96)

7. Vegetated wetland - fringing

A. Wetland
? Beeliam
(M93)

B. Anstey - Keon
Suitable update
nomination.

8. Plants grow in seasonally ponds on clay in excellent condition

A. Ludlow Tuart Forest

Apogoneton hexataphus
(Water)

B. Ludlow Tuart Forest

Apogoneton hexataphus
(Water)

9. Vegetated creekline or rivers are ~~very~~ rare on the Swan Coastal Plain and Plateau

A. Lowlands -
Serpentine River
Flooded Gum
(*Eucalyptus rudis*)
forest over active
understorey
(M105)

B. Carbanup River
(interim)

10. Vegetated seasonally waterlogged flat.

A. Bullsbrook N.R.
(M14)

(B.) Ambergate Regional Park
(interim)

11. This is not bushland.

A. Marri over
Watsonia marginata
No structure
No floristics

B. Marri over
Watsonia marginata
No structure
No floristics

12. Condition is difficult to tell after fire.

A. Ambergate R.P. B. Cardup NR

13. Bushland in ^{excellent} ~~good~~ condition after fire

A. Ambergate with
Stipa Compressa,
a native grass.

B. ditto

14. Bushland of concern — ^{degraded} condition
in need of very active management.

A. Yandep
(M3)

B. Kings Park
(M49)

CARE —

15. This is bushland in ~~good~~ excellent condition too, all the plants on the ground are native.

A. Seasonal wetland
adjacent to
Lake Bambun
(interim)

B. ditto.

16. Bushland needs to be able
regenerate — seedlings

A. Hakea tritricata
Seedlings

B. Marri
Seedling.

17. A disturbance in bushland - disease

A Dieback front
in Banksia
Shrubland.

B. Loss of vegetation
due to dieback.

18. Fragmentation - road verges but
still in excellent condition.

A. Mundijong
(interim)

B. Woorup Tulumup
(interim)

19. Lack of management - rubbish
dumping

A. Yanchep
(M4)

B. Brixton St
(interim)

native

20. The presence of tiny plants
is important in condition assessment.

A. Perry Lakes
bed

B. Wetland plots

21.-24 "Plants of special interest"

21 A. *Blancoa canescens* B. Rainbows
Drypis gigantea.
uncommon in metro area.

22. A/B Two forms of Common *Hovea*.

23. A A new subspecies
of Common Lambpoison
confined to the Gingin
area. B. *Petrophile laterida*
confined to
ironstones in the
Busselton area.

24. Banksia woodland endemics.

A. *Conostephium minus*

B. *Lysinema elegans*.

25. Bushland/are habitat for animals
Wetlands

A. Pelican

B. Bandicoot

26. Insects are animals too.

A. Beetle

B. Jewel Beetle.

System 6 Update seminars

COUNTRY

Harvey

Date: 3 July 1995

Time: 7:00pm - 9:00pm

Venue: RSL Hall, Becher Street, Harvey

Mandurah

Date: 4 July 1995

Time: 7:00pm - 9:00pm

Venue: Rushton Park Netball Pavilion, Thompson Street, Mandurah

Gin Gin

Date: 5 July 1995

Time: 7:00pm - 9:00pm

Venue: Gin Gin Recreation Centre, Jones Street, Gin Gin

Donnybrook

Date: 5 July 1995

Time: 7:00pm - 9:00pm

Venue: Shire Hall, Bentley Street, Donnybrook

Bunbury

Date: 6 July 1995

Time: 7:00pm - 9:00pm

Venue: RSL Hall, 19 Spencer Street, Bunbury

Busselton

Date: 7 July 1995

Time: 7:00pm - 9:00pm

Venue: Civic Centre, Southern Drive, Busselton

METROPOLITAN

Wanneroo

Date: 11 July 1995

Time: 7:00pm - 9:00pm

Venue: Function Centre, Civic Drive, Wanneroo

Mundaring

Date: 3 July 1995

Time: 7:00pm - 9:00pm

Venue: Mundaring Recreation Pavilion, Mundaring Weir Road, Mundaring

Kalamunda

Date: 4 July 1995

Time: 7:00pm - 9:00pm

Venue: Cyril Road Hall, Cnr Cyril Road and Markham Street, High Wycombe

Cockburn

Date: 6 July 1995

Time: 7:00pm - 9:00pm

Venue: Cockburn Wetlands Centre, Lot 387 Hope Road, Bibra Lake

Armadale

Date: 7 July 1995

Time: 7:00pm - 9:00pm

Venue: Morgan Park Pavilion, Ironcap Place, Armadale



Department of Environmental Protection

13 JUN 1995

Dear Sir / Madam,

My purpose in writing to you is to inform you of the Department's System 6 Update program. I would also like to tell you about the opportunities for the community to be involved in updating the conservation recommendations.

System 6 includes conservation areas in Perth and extends from the Moore River to the Blackwood River and inland as far as Toodyay and Boddington. We have included the Swan Coastal Plain from Bunbury to Dunsborough - System 1 - in the review because we believe this area is facing the same development pressures as System 6.

More detailed information about the System 6 Update program is included in the attached background paper. Enclosed is also a 'flyer' which I - hope you can use to further distribute information about the System 6 Update program.

A series of Public Information Seminars will be held in early July in both the metropolitan area and some country regions. I would welcome your attendance at one of these seminars to assist us in the update. The details of the seminars are included in the attached seminar information sheet.

At these seminars staff from the DEP will explain the objectives of the System 6 Update, what selection criteria will be applied and how to nominate local bushland areas for consideration in the System 6 Update.

I would be grateful if you could let people in your group or area know about the System 6 Update and the forthcoming seminars. We depend on people such as yourself for public input and participation in the protection of bushland areas.

I look forward to your support.

Yours faithfully,

(Dr) Bryan Jenkins
Chief Executive Officer

29 May 1995

Copy to
Cons. Committee
13.6.95

Protect your natural environment

Help us find bushland or wetland areas of special value

Do you know of bushland that has high conservation value?

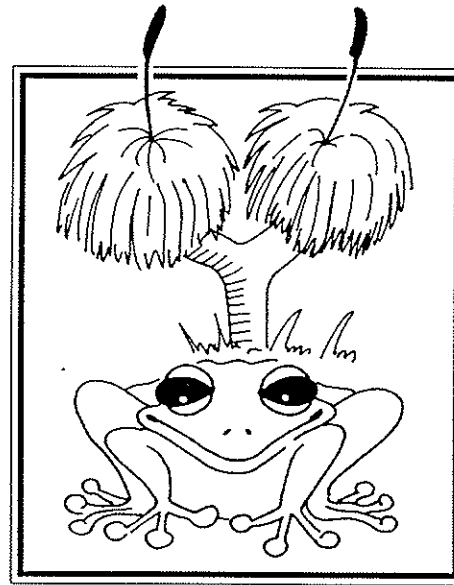
If so, should it be recommended for government protection?

Find out at the: **Public Information Seminar**

The Department of Environmental Protection (DEP) is holding information seminars for people interested in finding out more about the current program to update the recommendations of the System 6 Report.

At this meeting, DEP staff members will explain what the System 6 Update is about, what the selection criteria are, and how to go about nominating areas for inclusion in the System 6 Update Report.

System 6 includes conservation areas around Perth and extends from Moore River in the north, to the Blackwood River in the south and inland as far as Toodyay and Boddington.



Public seminars will be held at Harvey, Mandurah, Donnybrook, Bunbury, Busselton, Gin Gin, Wanneroo, Mundaring, Kalamunda, Cockburn or Armadale. Call (09) 222 7000 for times and addresses.

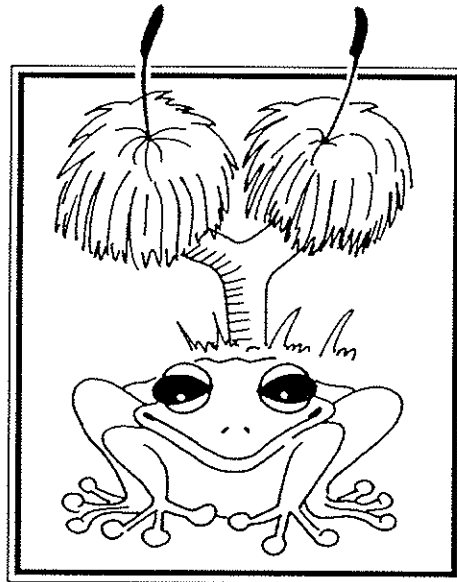
Also included is the Swan Coastal Plain from Bunbury to Dunsborough — System 1 — because this area is facing the same development pressures as the areas closer to Perth.

An update of the EPA's original conservation recommendations is needed to take account of new, more detailed knowledge and to see if the recommendations adequately represent and conserve the variety of native plants and animals found in the region.

If you are interested in finding out more about the System 6 Update please contact — Roxane Shadbolt on (09) 222 7022, or Kevin McAlpine on (09) 222 7055 at the Department of Environmental Protection (Office: 222 7000).

13 JUN 1995

The System 6 Reports



The System 6 reports were part of a major systematic review of conservation reserves in WA which was started by the EPA in the early 1970s. System 6 includes conservation areas around Perth and extends from Moore River in the north, to the Blackwood River in the south and inland as far as Toodyay and Boddington. The Swan Coastal Plain from Bunbury to Dunsborough (System 1) is also included in the update because this area is facing the same development pressures as the areas closer to Perth.

The EPA's original reports, which were endorsed by government in 1984, established general principals for conservation and made specific recommendations for 209 metropolitan and country areas. To date, about 47 per cent of the report's recommendations have been implemented and many others have been progressed.

An update of the EPA's original conservation recommendations is needed primarily to take account of new, more detailed knowledge and to see if the

current and proposed conservation estate adequately represents and conserves the variety of native plants and animals found in the region.

A workshop involving the Technical Working Group and 'invited experts' from government and community groups, held in June, to assist in determining the criteria to be used to identify and select areas for inclusion in the Systems recommendations. The public will then be asked to nominate areas using the criteria as a guide to their selection. The nominated areas will be surveyed during the following flowering season and, if appropriate, added to a list of possible areas for inclusion in the Systems. This list will be included in a draft report updating the System 6 recommendations. Public submissions will be collated and reviewed and the report finalised for consideration by the EPA.

It is envisaged that the final report would be submitted to Cabinet for endorsement in 1997.

SYSTEM 6 SEMINAR TEAMS

TEAM ONE

DATE	LOCATION	TEAM
Monday 3 July	Harvey	Kevin Margo Jenny
Tuesday 4 July	Mandurah	Kevin Margo Jenny
Wednesday 5 July	Gingin	Kevin Roxanne
Thursday 6 July	Cockburn	Kevin Margo Jenny
Friday 7 July	Armadale	Kevin Margo Greg
Tuesday 11 July	Wanneroo	Kevin Margo Roxanne

TEAM TWO

DATE	LOCATION	TEAM
Monday 3 July	Mundaring	Gary Bronwen Greg
Tuesday 4 July	Kalamunda	Gary Bronwen Greg
Wednesday 5 July	Donnybrook	Gary Bronwen Deborah
Thursday 6 July	Bunbury	Gary Bronwen Deborah
Friday 7 July	Busselton	Gary Bronwen Deborah
Monday 10 July	Nedlands	Gary Bronwen Roxanne

Kevin McAlpine 143 Rochdale Rd PL 384 8463
Mt Claremont

Gary Whisson 61 Throssell Rd PL 294 1898
Awanui

Jennie Anderton 57 PIER ST Ph 339 2225
E. FREMANTLE

Roxane Sharbolt 38 Belhus Dve, Trigg 4479193

Deb ROHAN Lot 13 Wallaby Way, Chidlow 5723247

MARCO O'BYRNE 7/124 SWANBOURNE ST 430 5036
FREMANTLE (at NORTHCLIFFE) 097 767182

Greg Allen 398 6968

Bronwyn Keating 224 Homersley Rd 381 4062
SUBURB BROOK

MOBILE PHONES:

015 197 401

015 442 573

Accommodation for System 6 roadshow

Gingin Motel/hotel

Booked 21/6 with Christine. 3 single hotel rooms for 1 night 5th July \$20/room.
5 Jones Street Gingin. Tel 09 575 2214

Fawlty Towers Hotel

Booked 21/6 with Patricia. 1 family suite with 2 rooms 1 double and 1 twin, and own bathroom for 3 nights, 5th, 6th & 7th July \$85/night. Need to book in before 8pm. Price includes a continental breakfast. Ocean Drive Bunbury. Tel 097 212 427.

Harvey Hotel

Booked 22/6 with Kathy Fletcher. 3 single rooms for 1 night, 3 July.
Harvey Street Harvey. Tel 097 29 1034.

A GENERAL DISCUSSION OF SOME ISSUES TO HELP GUIDE SUBMISSIONS TO THE SYSTEM 6 UPDATE PROGRAMME.

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Large areas containing representatives of a range of ecological communities are a better proposition for protection than several smaller isolated areas such as those on the eastern Swan coastal plain. These larger areas support a far greater biodiversity and exhibit a greater capacity to resist degradation, particularly from outside influences. They also contain a range of habitats that may provide for a more intact fauna community.

Consideration also needs to be given to consolidating already existing conservation areas, particularly those that are small in size or contain significant biota/ecological communities. Increasing the size of the protected area enhances its long-term value and viability.

The establishment of naturally vegetated corridors or links connecting existing or proposed conservation areas is an important issue. The primary role for these vegetated links is to facilitate the movement or migration of fauna. There are also benefits for the flora such as pollination and seed dispersal by the animals moving through the corridors. Corridors may be linear, in which case they should be at least 30 metres wide, or they may be bushland pockets located close to each other.

The region is rich in animal species from mammals and birds through reptiles and amphibians to the invertebrates such as insects and spiders. Many of the animal communities of the region have been severely impacted by the loss of habitat through clearing, change in habitat through timber harvesting and new fire regimes as well as introduced predators (foxes, cats, etc). Areas that still retain a diverse assemblage of animals or a relatively intact animal community are likely to be of high conservation significance and need to be recognised.

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Please note that this programme is not a forum for addressing the protection of bushland where development approval has already been given. To minimise conflict and maintain credibility the programme will not consider areas for which the Government has already given a commitment to development.

Please send your submissions to:

The System 6 Study Team
Department of Environmental Protection
141 St Georges Terrace
PERTH WA 6000

The deadline for submissions is Friday 18 August 1995.

Theresa Tice

Mundaring 3rd Greg
Kalamunda 4th Greg

Danbybrook 5th } Early Afternoon
 Bonbury 6th } • Local Gr
 Busseton 7th } • MAM office
 } Deb

Bussellton 7th

Central Metro Roxane
10th

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- CASH 19/10/06
Bumby
Bussellton
Hawley
Cape?

4

7

Date: 6 July 1995

Time: 7:00pm - 9:00pm

Venue: Cockburn Wetlands Centre, Lot 387 Hope Road, Bibra Lake

Date: 7 July 1995

Time: 7:00pm - 9:00pm

Venue Morgan Park Pavilion, Ironcap Place, Armadale

Date: 10 July 1995

Time: 7:00pm - 9:00pm

Venue WA Naturalists Hall, 63 Meriwa Street, Nedlands.

SYSTEM 6 BUSHLAND SUBMISSION FORM
FOR CONSIDERATION IN THE UPDATE PROGRAMME

If you wish to submit more than one area for consideration in the System 6 update, please use a separate form for each site.

Please fill in each section giving as much information as possible.

THE NOMINATED SITE

1. Site Location

Please give as accurate and detailed a description as possible of the site location
Please include either a hand drawn or copied map showing the location of the area

a) Bordering Roads:

b) Nearest Corner:

c) Lot Number: Street Number:

d) Town/Suburb/Location

e) Local Council

f) Site Name (if any):

g) Approximate size of the area :

h) Please locate the area on a map and give us references if possible:

i) Map Streetsmart /UBD/Other.....

j) Map no.

k) Grid Ref

l) Please give a further description of location that may help us to find it:

Please fill out those questions that you can answer

2. Who owns the site

3 .What is the site zoned?

4. Has any previous survey work been done on the site?

If yes, please give references

5. For what reasons are you nominating the site?

6. What is/are the soil type/s and colours ?

Sand, Clay, Gravel, Loam, Silt

7. Does the site have any special features such as unusual landforms / landscapes that still retain their natural vegetation? Yes/No

If yes, what are they?

8. Is the area a wetland or does it include a wetland?

If yes, what kind of a wetlands is it?

- a) lake
- b) river
- c) stream
- d) swamp
- e) estuary
- f) other

9. Does the area waterlog seasonally? Yes / No

(2)

Can you tell us a little about the vegetation on the nominated site.

10. Does the site contain indigenous (native bushland) vegetation?

11. What percentage of the area is indigenous vegetation?

12. What percentage of the total area is exotic vegetation ?

13. How would you rate the condition of the vegetation?

- a) pristine
- b) very good
- c) good
- d) degraded
- e) very degraded
- f) don't know

14. Please indicate the disturbances affecting the area.

- a) Clearing
- b) Fragmentation
- c) Weed infestation
- d) Presence of feral animals
- e) Fire
- f) Rubbish dumping, litter
- g) Dieback (& other diseases)
- h) Change in water regime (flooding, draining, irrigating)
- i) grazing and trampling (eg inappropriate tracks, firebreaks)
- j) service corridors (eg SECWA, Telecom)
- k) harvesting (eg firewood collection)
- l) other (please define)

15. Does the area contain any plant species of special interest?

Do you know what they are?

16. Is the area used by a number of native animals?

Can you list those you know of?

17. Is the area used by any native animals of special interest?

If yes, please name them:

Can you tell us a little about the area nearby

18. Are there any bushland areas next to the site?

If yes, how close are they?

Are they already conservation reserves?

What is their approximate size?

19. Does the submitted area link other bushland areas?

Please attach any additional information about the site which may be of use when assessing the site

*Should we need to contact you for further site identification it would be helpful to have a name and telephone contact number
This information will be treated as confidential*

Name(Please Print)

Daytime telephone number

NOTE: Areas that have already been given development APPROVAL should not be nominated

SYSTEM 6 UPDATE - ISSUES WORKSHOP

AGENDA

- | | |
|----------------|--|
| 9.00am | Welcome and Introduction |
| 9.45am | Group discussion |
| 10.30am | Morning Tea |
| 10.45am | Group discussion |
| 12.00 | Lunch |
| 1.00pm | Group reports and comment from the wider group |
| 3.00pm | Afternoon tea |
| 3.15pm | Group discussions to finalise outcomes |
| 4.00pm | Finish. |

All are invited to stay for some refreshments after close of the workshop.

SYSTEM 6 UPDATE PROGRAMME

- background paper for the workshop

This paper gives a brief history to System 6 followed by an outline of the programme to update the recommendations of System 6 and the coastal plain portion of System 1. The paper also identifies a range of issues on which the Department is seeking guidance to assist in scoping the update programme and setting criteria to guide the nomination and selection of areas for inclusion in the conservation estate. The issues will form the basis for discussion at the workshop on Thursday 8 June.

The outcome of this workshop will be a clarification and refining of the issues which will enable the development of criteria. The criteria will be referred to the Technical Working Group and the Steering Committee, which were established as part of the programme, for review and endorsement.

BRIEF HISTORY OF SYSTEM 6

The System 6 study was carried out from 1976 to 1983 and relied heavily on community involvement. The study recognised that the metropolitan area would continue to grow and that land would be required for a range of uses. In identifying special areas, System 6 sought to achieve a balance between conservation and development.

The area defined as System 6 was the most densely populated part of the State with the greatest intensity of land use, it stretches from Moore River in the North to the Blackwood River in the South, and from the coast to the eastern edge of the Darling Range (map attached).

Where the other System studies largely confined themselves to publicly owned land the recommendations for System 6 also included privately owned land. Because of the intensity of land use in the area only a small amount of lands are reserved under the Land Act and these were insufficient to represent the range of ecological communities and associated habitats within the System 6 area.

In 1981 a draft report and recommendations was released by the EPA for public comment. In October 1983 the final report and recommendations of the EPA were released in what is now known as the System 6 Red Books Part I and Part II. It was subsequently endorsed by Cabinet in 1984.

Part I of the report contained general recommendations to Government that provided a framework for conservation in the region. It pre-dated formation of the Department of Conservation and Land Management and covered issues such as conservation in state forests, Land Act reservation, conservation on private land and regional parks.

Part II contained the more specific recommendations relating to issues such as reservation, tenure and management for 209 identified areas.

About 15 per cent of the System 6 region was recommended to be set aside and managed for conservation, recreation or landscape purposes, but outside State Forest areas this amounts to only 2.8% of the System 6 region.

The Government has been progressively implementing the recommendations since the report was endorsed. The Red Book Status Report was released in 1993 giving an account of the progress up to that time. Approximately 47% of the recommendations contained in the System 6 report have been implemented, many others are well advanced toward implementation.

AN OUTLINE OF THE UPDATE PROGRAMME

Over recent years there has been criticism of the System 6 Red Book Report and its recommendations and the slow progress of implementation from both Government agencies and the community. One of the main criticisms is that the recommendations have become outdated over the 12 years since their release.

The EPA has also recognised that there is a need to review and update the recommendations contained in the System 6 reports and also the coastal plain portion of System 1. Collectively these areas effectively cover the regions most threatened by the increasing land use and development pressures that now extend well beyond the Perth metropolitan region and more closely follows natural biogeographical regions, taking in the whole of the Southern Swan Coastal Plain.

The System 1 report was the first of the System studies to be completed, and only considered a few large areas for reservation/management. It is now well recognised that the recommendations in System 1 do not adequately represent the range of ecological communities and associated habitats found in the area.

The Department of Environmental Protection has therefore been requested by the EPA to initiate a programme to update the conservation recommendations for these regions so that the range of ecological communities and associated habitats originally found are represented in the current or proposed conservation estate.

The general recommendations contained in Part 1 of the System 6 report and in the Preamble to System 1 will be updated in conjunction with the more specific recommendations in System 6 Part 2 and System 1. Implementation of the general recommendations is intended to provide a framework for assisting implementation of the more specific recommendations for individual bushland areas.

It is not proposed to review the State Forest estate in any detail since CALM's Forest Management Plan 1994-2003 recommendations have been accepted by the Government and serves as an update of the System's recommendations.

Similarly, the marine environment will not be specifically included in the programme in the light of the Wilson report and the anticipated formation of a Marine Parks Authority in the near future. Nevertheless the marine environment may need to be given some general consideration since adjacent marine and terrestrial environments can have an influence on each other.

Objectives

The primary objectives of the update programme are :

- To ensure that the conservation system proposed in System 6 is representative of the ecological communities and associated habitats of the region.

In the light of current knowledge this may require some additional areas being identified in the study area. At the same time the EPA recognises that there is a need to re-examine some existing System 6 recommendation areas since their conservation values may have been lost or severely degraded over the years.

- To ensure that a suitable policy framework with appropriate legislative backing is proposed to enable implementation of the more specific System recommendations.

The general recommendations contained in Part 1 of the System 6 report are intended to

provide this framework and will need to be updated to reflect current thinking on conservation strategies as well as the current legislative and administrative arrangements.

- To assist planning and development processes through identification of areas of regional conservation value which require protection and hence reduce conflicts and environmental assessment periods.

It is the Authority's preference that these areas be identified in advance of development proposals rather than having to deal with these areas as major conservation issues affecting development proposals, as was the case with the urbanisation plans for Brixton Street, Kenwick, Ellenbrook and which may occur with Carburup Town-site.

- To assist with subsequent implementation of recommendations by involving all the relevant agencies and groups in the the update programme, with the intention that as far as possible conflicts or constraints will be identified and resolved prior to finalisation of the report and recommendations.

Recommendations will need to be clear and well argued.

The process

The update programme is expected to take approximately two and a half to three years to complete. The early stages of the programme are constrained by the field survey programme which can only take place over the spring flowering periods.

A Steering Committee and a Technical Working Group has been set up to help coordinate the programme.

The System 6 Steering Committee comprises senior representatives from key State government agencies (at CEO or Director level), local government and an EPA member (see appendix 1) and will meet at key points to maintain the overall direction of the programme.

The Technical Working Group comprises a core of agencies/groups (see appendix 1) with a wide-ranging interest in the programme that will meet regularly, and an additional group of agencies with a narrower (but perhaps still very strong) interest related to a specific issue or issues. This additional group would be kept informed of progress and would become involved in the Working Group when the issues of interest were being addressed.

This approach is intended to provide wide involvement, while maintaining an effective and efficient process for resolving issues. The objective is to develop a well argued set of recommendations for conservation in the study areas that are supported by the majority of agencies/groups. This would be achieved by resolving, as far as possible, any conflicts or constraints to implementation prior to finalisation of the report.

There are a number of specific scoping statements and key issues that need further consideration through this workshop before framing an agreed set of criteria to identify and select areas that will be considered in the update. This workshop will address these points. Following the workshop the guiding criteria will be finalised by the beginning of July.

Public and government input will then be sought by inviting nomination of areas that meet these criteria for consideration. The nominated areas will be surveyed during the next flowering season and, if appropriate, added to a list of possible areas for inclusion in the proposed conservation estate. The System 6 and System 1 recommendation areas will then be updated using this list and released with the general recommendations as a draft report for public comment. Public submissions will be collated and reviewed and the report finalised for consideration by the EPA.

It is envisaged that the final report would be submitted to Cabinet for endorsement, as were the original EPA Systems reports.

ISSUES FOR DISCUSSION AND CLARIFICATION

The update programme will be dependent on the knowledge already held by both government agencies and the community in identifying areas for consideration in the System update programme. Available resources are limited and will prevent surveying all remnant bushland to develop the updated recommendations.

A clearly defined set of criteria therefore need to be developed to focus the identification of priority bushland areas, particularly when we call for public nominations.

However, before addressing the criteria there are a number of issues that need further discussion. These issues can be divided into two classes:

- Scoping statements which are needed to provide an agreed approach and framework for the study;
- Key issues that need to be clarified in order to develop criteria for areas to be considered for inclusion in Systems 1 or 6.

The issues requiring discussion

SCOPE AND APPROACH OF UPDATE STUDY

The issues listed below are those that will provide some general directions for the study and which will essentially 'set the scene' for development of the criteria. They are broad issues and some may be reflected in the general recommendations of the final report.

Conservation, not recreation

The primary objective of the update programme is to ensure a conservation estate for the region that is representative of the ecological communities and their habitats.

It is proposed that the update will concentrate on areas of regional conservation value. It is not intended to deal with the areas of local urban bushland or areas which have primarily social and amenity value. This represents a change from the scope of the original System 6 report. Areas primarily serving recreational purposes will need to be protected through planning measures.

Corridors/Linkages/Networks

In intensely settled and highly cleared regions those areas set aside or managed for conservation make up a small proportion of the overall land area, often may be relatively small in size (less than 100 ha) and are generally isolated from other conservation areas. While a relatively small area may be suitable for conserving many plant communities, many vertebrates need a much larger area to support a viable population.

The fragmentation of bushland areas over most of the study area has meant that where animal populations still exist they may be effectively isolated from other populations and susceptible to local extinction through disturbances such as fire. Consolidation of the conservation estate by developing a network of vegetated corridors linking the fragments could be considered.

While it is generally agreed that corridors linking fragmented habitats together are a useful tool for managing ecological communities there is very little information available for designing effective corridors. To be able to recommend specific areas to function as corridors may be beyond the present study. The concept could be addressed in the general recommendations discussing the need for linking areas within the conservation estate and raising its profile by

making recommendations for achieving this objective through government processes.

Management boundaries

To help protect the core conservation area an area of land should surround it with the primary function of minimising external impacts. Consolidation of small reserves may reduce the area required for this protective role.

Unless adequately managed surrounding land uses will have an influence on conservation areas. Depending of the land use and the sensitivity of the ecological community or its habitat the influence can be dramatic and lead to almost total loss of conservation value. Examples range from the large scale such as eutrophication of estuaries, like the Swan and Peel-Harvey systems, to the small scale such as weed invasion of bushland from over the fence garden dumping.

Communities or habitats may be vulnerable or sensitive to outside disturbances for a number of reasons, for example they may contain the last remaining population of a species or they may be very small in size and susceptible to disturbance.

In most cases defining the extent of 'management boundaries' is very subjective and where private land is involved compensation may be required. Nevertheless the issue needs to be addressed and could be taken into account through the general recommendations and/or the specific recommendations.

KEY ISSUES AND DEVELOPMENT OF SELECTION CRITERIA

Guidelines will be developed to guide nomination of bushland areas towards those areas that are of regional value and that may be suitable for inclusion in System 6. More detailed criteria will also be developed for assessing the nominations and selecting those areas that should be considered for inclusion in System 6. However, some of the issues that relate to the guidelines and criteria need further clarification before they can be developed. These issues are briefly outlined below.

What is adequate protection?

An ideal reserve system seeks to include large diverse reserves and multiple representatives of ecological communities in several reserves to provide representation of genetic variability within species.

In the context of the fragmented landscape of much of this region, what should be the minimum area of bushland/wetland considered worthy of protection. Some communities only exist on small areas, some may be reasonably robust? Is minimum viable size a useful criteria for application to System 6?

A catastrophic event may completely destroy one area or lead to its degradation, therefore the precautionary approach is to ensure that a number of areas are protected to reduce the risk of this happening. What is the minimum number of separate areas of a community required to ensure protection of that community?

Where large areas of remnant bushland containing several ecological communities still exist should these be given precedence?

Determination of ecological community types

The first objective of the update programme is to provide protection for the range of ecological communities and habitats extant in the region.

Plant communities

There are several studies that have defined plant communities and/or associations over significant portions of the study area.

The vegetation mapping by Beard in the the south-west of the State defines broad vegetation systems.

As part of the original System 6 study Heddle et al mapped the vegetation of the System 6 region down to the level of vegetation complexes.

More recently a floristic survey of the Swan Coastal Plain based on over 500 sites has been completed (Gibson et al; 1994) with additional information collected for System 6 areas as part of this programme. Statistical analysis of this information defines plant communities based on species in common.

It is proposed that the update programme use the floristic survey methodology in conjunction information on vegetation structure to identify representative plant communities on the Swan Coastal Plain, and use the vegetation complex maps for identifying communities in the Darling Range.

Those plant community types that are poorly represented in the current or proposed conservation estate will need to be targeted through the nomination process. However, identifying the different community types without a detailed knowledge of the flora is very difficult.

Fauna

The level of information available on fauna in the study area is significantly less detailed and extensive than for flora. The fauna is often very cryptic in habit and therefore identification of faunal communities can be difficult in many cases. However, areas of bushland should not be identified and set aside on the basis of floristic information alone. Consideration needs to be given to how representative fauna communities can best be identified, particularly those that are still relatively intact, and taken into account.

Rare species

The government has a responsibility to protect genetic diversity. Rare species of flora and fauna are found throughout the study region, sometimes in locations that have very little apparent conservation value.

Rare taxa can be associated with restricted ecological communities, and could perhaps be used as an indicator and vice-versa.

How rare species are taken into account needs further consideration, ie. should they be a priority determinant for selecting areas for consideration in the programme or should they only be one of many determinants?

Representation of geomorphological units

The System 6 region can be divided up into distinct geomorphological units based on soils and landform. The distribution of some faunal assemblages appears to be somewhat correlated to substrate types (eg. soil type) (WA Museum pers com.), as are vegetation complexes and to a lesser degree floristic community types.

Should the update programme specifically ensure that these units are represented in the conservation estate.

Estuarine environments

In this context we refer to the subtidal and intertidal zones from the mouth of a river system

upstream to the limit of marine salt-water influence.

The floristics of ecological communities and habitats associated with estuarine environments do not illustrate the degree of diversity of many wetlands but do contain species/communities that are specially adapted to the harsh saline conditions. Estuarine environments therefore provide essential habitat for many unique species of flora and fauna.

The form of protection that these communities and habitats require needs further discussion and the parameters that identify key communities and habitats need to be clarified.

Wetland environments

The wetlands of the region have been mapped and classified by Semeniuk and others. Wetland environments include a wide range of habitats and hence quite different ecological communities. Consideration needs to be given to how the different communities and habitats should be identified and represented in the conservation estate.

APPENDIX 1

Steering Committee Membership

Department of Conservation and Land Management
Department of Environmental Protection
Department of Land Administration
Department of Resource Development
Environmental Protection Authority
Ministry for Planning
Western Australian Municipal Association

Mr Kieran McNamara
Dr Bryan Jenkins
Mr Chris Williams
Mr Geoff Suttie
Dr Brian Logan
Mr Paul Frewer
Mr Clive Robartson

Technical Working Group Membership

Aboriginal and Torres Strait Island Commission
Aboriginal Affairs Department
Conservation and Land Management

Conservation Council of Western Australia
Department of Aboriginal Affairs
Department of Land Administration
Department of Minerals and Energy Western Australia
Department of Resource Development
Ministry for Planning
Water Authority of Western Australia
Waterways Commission of Western Australia
Western Australian Municipal Association
Western Australian Museum

Ms Helen Wallace-Bruce
Ms Mary Durack
Dr Neil Gibson
Mr Paul Brown
Ms Joan Payne
Mary Durack
Mr Steve Burgess
Mr Tony Smurthwaite
Dr Don Martin
Mr Chris O'Neill
Dr Linda Moore
Ms Verity Klemm
Mr Michael Parker
Dr Ric How

WORKSHOP DISCUSSION GROUP ISSUES

Based on the issues raised for discussion in the background paper relating to scoping considerations and to setting selection criteria, the workshop has been structured into 6 groups each seeking to explore a set of related questions. Participants have been assigned to one of these groups. The questions and issues raised for consideration by each of the groups are meant as a guide only. If the group considers them to be deficient or heading in the wrong direction then additional or alternative issues should be listed and discussed.

We are not necessarily looking for a consensus view from each group. If there is a strong divergence of opinion over an issue then we are interested in all opinions. We are looking for practical consideration of the issues as they relate to this region.

The day will be organised to allow time for the groups to consider the issues before them, then to report to the whole workshop for wider discussion before returning to consider the comments raised in the wider discussion.

The outcomes of the workshop are expected to provide clarification of the direction to be taken when developing the guidelines and criteria for selecting areas to be given consideration in the process of updating the recommendations of the System 6 and System 1 reports. The issues and resulting criteria will be reviewed by the System 6 Technical Working Group, Steering Committee and the Environmental Protection Authority.

Group 1 - Scope of the Update

ISSUES

- We are proposing that the primary focus of the update programme should be on achieving a system of conservation reserves and protected areas representative of the regions ecological communities and their habitats. To what extent should landscape and recreation values be considered? (eg. Where 2 areas have similar conservation value, but one also has major recreation value, which should be favoured?).
- Corridors/linkages/networks - These are considered to have an important role in the conservation of fragmented landscapes. Should the update programme consider specific areas with this function, or should it be addressed under the general recommendations as a concept that needs to be investigated and applied throughout the region?
What are the basic attributes of effective corridors/linkages/networks?
- Management boundaries. Where possible should boundaries or zones be defined to protect core natural areas from the impacts of surrounding landuses? - can they be effective?
Where possible should they be included in the reserved area or implemented through applying landuse constraints to surrounding land?
How can they be defined? - what should their minimum size be?

Group 2 - Adequate Protection?

ISSUES

- How should 'adequately protected' be defined?
How many examples are required for 'adequate protection'?
What percentage of the original area should be protected?
- Where reserves in fragmented landscapes are concerned is it generally the bigger the better? What emphasis should there be on multiple smaller reserves vs assemblages of ecological communities in one large area?
- Is there a minimum size for viability?

Group 3 - Flora Conservation

ISSUES

- We are using floristic community types, vegetation complexes, structure and geomorphology as a basis for determining plant communities. What are the best available practical measures of representativeness to achieve effective conservation of ecological communities?
- What emphasis should be given to structure?
- If the emphasis is on representation of ecological communities, what consideration should be given to individual species (common and rare) and intraspecific variation?
- What weighting should be given to rarity (species and communities)?

Group 4 - Fauna

ISSUES

- We are using floristic community types, vegetation complexes, structure and geomorphology as a basis for determining plant communities. Will this provide an adequate basis for representation of fauna? If not what are the best available practical measures of representativeness to achieve effective conservation of faunal communities/species assemblages?
- Can and should relatively intact faunal communities be identified? (indicators?).
- If the emphasis is on representation of ecological communities, what consideration should be given to individual species (common and rare) and intraspecific variation?
- Are there individual species that we should focus on maintaining viable populations? if so what general and specific factors need to be taken into account?
- What weighting should be given to rarity (species and communities)?

Group 5 - Estuaries

ISSUES

- What estuarine communities/habitats are threatened or poorly reserved/protected?
- What parameters should be used to identify these communities/habitats?
- How might these communities be best protected? (mechanisms, scale).

Group 6 - Wetlands

ISSUES

- How should we identify representativeness for wetlands? (Semeniuk classification, floristic community types, vegetation complexes, structure, fauna habitat, etc?)
- Is water quality a possible indicator of intact fauna and flora community?
- Should only those wetlands with significant remnant vegetation be considered?

URBAN CONSERVATION NOTES

GROUP 1 Summary

New Issue

Process for implementation must be planned from beginning, including all relevant stakeholders. Note inter-agency integration new legislation or use of existing mechanisms across agencies and various Acts. Note non-application of general recommendations in System 6, perhaps because this was not done.

Implementation should be based in desired outcome and within a particular time frame.

Without widespread public support recommendations unlikely to succeed.

Conservation on private land needs to be equal thrust with reserve system.

Dot Pot 1

Natural landscapes and landforms are a part of nature conservation.

Need to seek complementary uses such as passive recreation and water reserves, to achieve N C aims.

All areas of remnant vegetation, including small areas, need to be considered.

Need to differentiate between passive and active recreation at planning stage. eg bushland conservation zone.

Corridors/linkages

Viability dependent on resources. Both general concept and specific areas.

Basic attributes

Avoid major barriers, linkage of large blocks, as short as possible, as wide as possible $\geq 30\text{m}$, condition and representativeness of ecosystem type not necessarily important.

Need for revision of concept of Regional Parks.

Include privately owned land including gardens and hobby farm (eg Darling Range Regional Park).

Management boundaries/buffers

Desirable to buffer reserve areas. Mainly approach through planning although include where possible.

Community support essential.

Need for attention in early planning stages, include State Planning policy level.

“Planning Policy for Reserve Buffer Zones”

Need DEP/EPA commitment to integrate System 6 recommendations into total function of State and local government.

Is the Steering Group or the Technical Group equipped to address across agency integration necessary for implementation?

Via Statutory mechanisms, either existing or new. ie New legislation if necessary.

GROUP 4 - Fauna

1. Viability of a population cannot be defined.
2. Artificially created areas need to be considered as may be only remaining refuge eg swamps/wetlands.
3. The mobile/sedentary and seasonal nature of species needs to be considered before criteria for reserves can be set.
4. A major weakness of System 6 - limited to vegetation communities *Need more emphasis on faunal communities esp. common* and invertebrates.
5. Sites based on flora condition are not necessarily representative of fauna assemblage - eg below ground fauna - reptiles and invertebrates.
6. Mobile species might have separate feeding, roosting and breeding sites, therefore need a reserve system which has both small and large patches of bushland or ground feeding sites eg birds of prey, waterbirds that nest in trees and feed on ground.
7. Need to consider the potential of sites, although species not present now could be re-introduced or come back through natural recolonisation.
8. Need resource for seasonal migrants which move through from other regions. These species may only come through for a short period eg *small* insectivorous birds.
9. Sites for transequatorial migrants that only occupy areas for brief periods. *eg JANABA/CANBA sp*
10. Rare and endangered species - Problem of past people have tended to concentrate on rare and endangered species at expense of other species/communities.
11. We should be thinking in terms of centuries not years or decades! - need to maintain processes of
 - evolution
 - genetic diversity
 - *need to allow scope for different requirements if climate changes - will fauna become less tolerant of reduced resources.*
12. 'Indicator' species - not necessarily an appropriate way of identifying areas for fauna - further information may allow selection of indicator species.
13. Species - particularly invertebrates only known from single localities - so locality needs to be part of the reserve system, irrespective of condition of area.
14. Flagship species - where rare and endangered species are on a site it needs to be part of the reserve system but should NOT mean where such species are not present the site shouldn't be reserved. **THIS SHOULD NOT BE CONSIDERED ALONE!**
15. Although the larger the area the better, size alone should not determine whether an area should be included in the reserve system (see 13).
16. Small patches might be important in linking up other patches and *as* sites for movement of species.

17. Measure of habitat complexity/vegetation structure could be used as a predictor for fauna conservation value.

GROUP 4 - Solutions

1. A full fauna survey of the SCP - both vertebrates and invertebrates.
2. Mandatory as a general recommendation - ~~An independent fauna survey should be undertaken prior to development proposals. This should be paid for by the proponent but consultants should be appointed by the EPA.~~
after the initial review
3. Must be ongoing review of System 6 ^{after the initial review} as new data comes forward, the discovery of new species may require acquisition of new areas ~~after the 2.5 - 3 years.~~
4. Initial survey of ground invertebrates should be undertaken to provide baseline collections.
5. Value of fauna 'phone-ins' needs to be considered carefully.

GROUP 5 - Estuaries

- What estuarine communities are poorly reserved?
 - a) All estuaries within the region are distinct, threatened, and of high conservation and social value.
 - b) Fringing communities are severely threatened by changed hydrology ($\pm$ flow) and direct removal by development; degradation by weed invasion, litter dumping, changed (increased) fire frequencies.

Add zones (see Luke)/Key Impacts - INSERT 2A here

Definition - Pritchard (modified) - tidal, part of river where water is measurable affected by the ocean.

Whole river system is the fundamental management unit.

- Parameters?

Biological, (fauna/flora), geomotriphic, human/environmental values.
- Protection?

Heighten public information and awareness of values to be maintained and why.
- Amend current inadequate legislation so that:
 - a) various parts of law work in an integrated fashion together - the legal base should be viewed as a tool kit.
 - b) pursue development and implementation of Swan-Canning EPP (and perhaps similar EPPs for other estuaries). Link to other statutes - eg planning controls via 5AA and TPS, fisheries refuge zones, buffer requirements, drainage management etc.
 - c) statutes should recognise the need for habitat connectivity and zones of influence impinging on conservation areas.

d) fundamental reform of outmoded statutes, eg various water laws, Waterways Conservation Act, Soil and Land Conservation Act Regular evaluation of success.

e) Key principles should be:

- duty of custodial care on public or private land managers/owners
- ecological sustainability of populations/systems (with a recognition of appropriate exploitation)
- public conservation of foreshore reserves (where possible)
- transparency and accountability of advice and decision-making (if EPA Act) and action
- clear definition and recognition of environmental values (= beneficial uses)
- restoration/creation of functioning estuarine systems (= essential life support systems) or ecological 'services'.
- public funding should be the key, but not only mechanism. All estuaries are key State and public resources.
- zone of influence (see 5).
- equity issues should be defined and recognised.

Research requirements

- tied to recommendations and subject to the availability of funds - State or Federal (ANCA).
- priority is set to pursue certain research objectives to meet requirements of management.
- Government bound to carry out within a time period - on basis of priority.
- research may include methods of restoration/creation of estuarine habitats.

Zone of influence about reserve

- determines the conduct of Government agencies and/or commercial enterprises.
- based on the values being conserved - zone size and requirements will vary from reserve to reserve.

Estuarine zones and impacts

Zone	Impacts
1. Buffer - upland (or one of below in a degraded state)	Development, recreation
2. Associated wetlands (Fresh)	Development, altered hydrology
3. Intertidal zone (Fresh to saline balance)	Recreation, pollution, development, altered hydrology
4. Banks	Recreation/pollution/dredging or reclamation
5. a) Basin - Inlet	Pollution, recreation, siltation
b) Basin - River (Channel)	Pollution, recreation, erosion and siltation

6. Conspriuous natural feature of the inlet environment ie Kings Park, Mount Henry, Lechenault Peninsula

GROUP 5 (Estuaries) and GROUP 6 (Wetlands) - Combined Summary

1. In addition to representativeness and rare species, maintenance of supporting ecosystem (ecological) processes particularly hydrology at the catchment scale.
2. Ministry of Planning should be required to establish the catchment conditions (particularly water balance) necessary to retain System 6 values before an area is rezones. An enforceable Catchment Management Plan recognising the above should be an integral part of the rezoning, and be publicly assessed and available.
3. We a confident that restoration of degraded wetlands (including estuaries) is cost-effective and feasible to achieve representativeness and connectivity. Wetlands are key corridors for the movement of both plants and animals. Restoration opportunities and needs should be considered as part of the review.
4. **RESERVE! PROTECT! MANAGE!**

GROUP 6

1. How should we identify representativeness?
 - a) Use Semeniuk/WAWA Geomorphic mapping and evaluation work supported by finer scale vegetation and other environmental variables (eg salinity pH colour)
 - b) Use dual approach of using 'naturalness' and representativeness (not exclusive representativeness) (or two tiered).
 - c) Use existing Water Authority data as foundations
2. Is water quality a possible indicator of intact fauna and flora community
 - a) Not tight linkage between water quality and biodiversity.
3. Should only those wetlands with significant remnant vegetation be protected.
 - a) No, representativeness is very important.

Major Issues

- a) Major omissions in first reports need to be addressed eg Paganoni.
- b) What is in good condition/pristine is still important consideration.
- c) Flexibility in applying criteria is required.
- d) Management and administration of multiple use corridors and reserves needs to be resolved.
- e) Wetland management responsibility needs to be resolved.
- f) Boundary of specific locations needs to be reviewed using better information.
- g) Jim Lane - new policies, legislation and definitely additional funding is required.

GROUP 6 - Wetlands

Broadscale classification is not enough eg a dampland could be a paddock.

Wetlands with good plant structure generally have good faunal representation.
Invertebrates/birds.

Cultural significance of wetlands?? eg Aboriginal culture.

May use historical/cultural events/reasons to help justify protection.

GROUP 1

Corridors

Doesn't have to be of particular habitat.

Mechanisms? Planning legislation Ministry for Planning/Local Government??

Ink EPP and Statement Planning Policies link between levels of Government.

Corridors/linkages could be formal reserves or private lands managed appropriately.

Fundamental change in development structure required to enable effective linkage and setting aside of conservation areas.

Education - sharing responsibility with the community.

RECREATION

Include passive recreation only with conservation.

GROUP 2 - Adequate Protection?

Spatial and management strategies eg buffers and corridors dependant on biota of reserve requiring protection.

How much? dependant on size of blocks.

How can the numbers be provided/calculated now for estimation of adequacy?

Or what basis do we make the choice to accept/reject??

Very species rich area so lack of redundancy.

GROUP 4 - Fauna

Rare and endangered species should not be the prime determinate of reservation through important to protect rare and endangered species particularly 'flashy' species to keep public and political interest.

Rare species do not necessarily indicate threatened communities.

Consider practical rather than ideal methods of taking fauna into account

Condition of plant community may not indicate condition of fauna community (except perhaps invertebrates).

Use select groups of invertebrates better known and easier to sample spiders, centipedes, scorpions.

GROUP 3 - Flora Conservation

In The Region (Darling Region)

Scales Information Available

1:250 000 Beard's Vegetation Statewide

1:250 000 Vegetation Complexes Heddle et al for Darling Region

1:50 000 Geomorphology - Urban Geol; Environmental Geol; Land Capability

1: 25 000 Floristic Community Types

Practical Application

- floristic community types
- structure
- substrale
- combinations unites (above)
- areas across range
- species considerations - weightings
- condition vegetation

In Australia and In the World - Additional weightings

Over-riding consideration: Communities of common species from across their range.

GROUP 1 - Discussion

Recommendations:

Update recommendations more clearly relate to 'conservation areas'.

Challenge of update is to keep the conservation areas as viable networks in outlying areas of area not revisit same problems (insurmountable) in the metropolitan area.

Example of Byford/Mundijong area concept of the 'village'.

Necessity to keep corridors zoned appropriately NOT zoned so as out of reach of the 'purchasing body'. Planning needs to be co-ordinated.

Public support critical informative role within the review.

Change in approach to conservation being across private and public lands ie joint responsibility.

Parks and Recreation zoning not suitable area non-conflict.

Active Recreation and Passive Recreation - both needs to be met but in separate areas.

- Conservation areas can and should encompass passive recreation. Must further define the term 'recreation' - only passive recreation emphasis on conservation.

GROUP 2 - Adequacy - two aspects

1. Representative: procedure for dividing up the region overall levels - geomorphologically (N-S) - rivers and estuaries (E-W). Level 2 - plant communities, level 3 - fauna and other special considerations.

2. Functional - maintain through time size, connectivity - surrounding matrix, replication.

Measurements of determinants of functional adequacy - species and disturbance levels.

How Big, How Many, How Much - ask this independently once divided Geomorph then Plant comms.

- Landscape protection zoning keen totally rejected so all conservation then through acquisition.

- Concept application

What are the elements of communities.

How vulnerable are the area ie use biota to determine connectivity eg corridor not cost effective if connectivity can be addressed through landscape.

- Look needs biota (data tends to be what can be measured rather than what should be measured). Focus on vulnerable aspects.

- 10% of rare types is obviously not sufficient but of widespread types is widespread.

What proportion of what exists can we sacrifice repeatedly asked. ie a diminishing resource MUST go back to the biota.

- How much redundancy? Very little no redundancy in most situations. Invertebrates may indicate that there is even less redundancy.

- Extinction - ie we need comparable information on size areas and relationship to each other.

- Invertebrate data/reptiles (KP).

- Fundamental problem is unvigueness at what level do consider cut-off point.

ie No redundancy as a very species rich community - high diversity levels are the NORM.

GROUP 3 - Vegetation - Flora Conservation

Condition: able to be regenerated (ie poor (MET) or good (BJK) or better condition).

Large areas:

GROUP 5 - Estuaries

Need to deal with fringing communities such as salt marshes perhaps through reservation.

Opportunity to contribute to legislation as Water Acts are being reviewed in next 2-3 years.

GROUP 3 - Flora Conservation

Hydrology control

- physical environmental requirements for floristic communities need to be considered.
- the natural variation in ecosystem water balance must be understood and then development/conservation designed to disturb it as little as possible.

Need to support other government policies that maintain critical physical environment parameters such as hydrology.

SYSTEM 6 UPDATE PROGRAMME WORKSHOP ON SELECTION CRITERIA

GROUP 1 - SCOPE OF THE UPDATE

Summary

Additional Issue requiring consideration

Process for implementation must be planned from beginning, and should include all relevant stakeholders. Without widespread public support recommendations unlikely to succeed. Note, non-application of general recommendations in original System 6, perhaps because this was not done.

Note inter-agency integration, new legislation or use of existing mechanisms across agencies and various Acts.

Implementation should be based on desired outcome and within a particular time frame.

Conservation on private land needs to be given equal thrust as that of reserve system.

Landscape and recreation values

Natural landscapes and landforms are a part of nature conservation.

Need to seek complementary uses such as passive recreation and water reserves, to achieve nature conservation aims.

All areas of remnant vegetation, including small areas, need to be considered.

Need to differentiate between passive and active recreation at planning stage. eg bushland conservation zone.

Corridors/linkages

Viability dependent on resources. Both general concept and specific areas.

Basic attributes of effective corridors/linkages/networks

- Avoid major barriers
- linkage of large blocks
- as short as possible
- as wide as possible $\geq 30\text{m}$
- condition and representativeness of ecosystem type not necessarily important. (conditions may be poor but still imp at corridors)

Need for revision of concept of Regional Parks to include:- privately owned land, including gardens and hobby farm (eg Darling Range Regional Park).

Management boundaries/buffers

Desirable to buffer reserve areas. Mainly approach through planning although include where possible.

Need for attention in early planning stages, including State Planning policy level. "Planning Policy for Reserve Buffer Zones"

Community support essential.

Need DEP/EPA commitment to integrate System 6 recommendations into total function of State and local government.

Is the Steering Group or the Technical Group equipped to address across agency integration necessary for implementation - via Statutory mechanisms, either existing or new. ie New legislation if necessary?

ISSUES RAISED IN FULL GROUP DISCUSSION

Public support critical informative role within the review.

Change in approach to conservation being across private and public lands ie joint responsibility.

Corridors

Emphasis that don't have to be of particular habitat.

Mechanisms:-

Planning legislation Ministry for Planning/Local Government?

Link EPP and State Planning Policies link between levels of Government.

Corridors/linkages could be formal reserves or private lands managed appropriately.

A fundamental change in the development structure required to enable effective linkage and setting aside of conservation areas.

Education - sharing responsibility with the community.

Challenge of update is to keep the conservation areas as viable networks in outlying areas of area not revisit same problems (insurmountable) in the metropolitan area. Example of, Byford/Mundijong area concept of the 'village'.

Necessity to keep corridors zoned appropriately NOT zoned so as out of reach of the 'purchasing body'. Planning needs to be co-ordinated.

Recreation

Parks and Recreation zoning not suitable area non-conflict.

Active Recreation and Passive Recreation - both needs to be met but in separate areas.

Conservation areas can and should encompass passive recreation. Must further define the term 'recreation' - only passive recreation emphasis on conservation.

Update recommendations should more clearly relate to 'conservation areas'.

SUMMARY WHEN REGROUPED

GROUP 2 - ADEQUATE PROTECTION?

ISSUES RAISED IN FULL GROUP DISCUSSION

Spatial and management strategies eg buffers and corridors dependant on biota of reserve requiring protection.

How much? - dependant on size of blocks.

How can the numbers be provided/calculated now for estimation of adequacy?

Or what basis do we make the choice to accept/reject??

Very species rich area so lack of redundancy.

GROUP 2 - Discussion

Adequacy - has two aspects representativeness and functionality

Representative

Procedure for dividing up the region

overall levels - geomorphologically (N-S)
- rivers and estuaries (E-W)

level 2 - plant communities

level 3 - fauna and other special considerations.

Functional - maintain through time

- size
- connectivity
- surrounding matrix
- replication.

Measurements of determinants of functional adequacy - species and disturbance levels.

How Big, How Many, How Much - ask this independently once divided geomorphologically then plant communities.

Concept application

What are the elements of communities.

How vulnerable are the areas ie use biota to determine connectivity eg corridor not cost effective if connectivity can be addressed through landscape.

- Look at needs of biota (data tends to be what can be measured rather than what should be measured). Focus on vulnerable aspects.
- 10% of rare types is obviously not sufficient but of widespread types is widespread.

What proportion of what exists can we sacrifice repeatedly asked. ie a diminishing resource MUST go back to the biota.

How much redundancy? Very little, no redundancy in most situations. Invertebrates may indicate that there is even less redundancy.

Fundamental problem is uniqueness at what level do we consider cut-off point, ie No redundancy as a very species rich community - high diversity levels are the NORM.

GROUP 3 - FLORA CONSERVATION

Summary

In The Region (Darling Region)

Scales Information Available

1:250 000 Beard's Vegetation Statewide

1:250 000 Vegetation Complexes Heddl et al for Darling Region

1: 50 000 Geomorphology - Urban Geol; Environmental Geol; Land Capability

1: 25 000 Floristic Community Types

Practical Application

- floristic community types
- structure
- substrate
- combinations units (above)
- areas across range
- species considerations - weightings
- condition vegetation

Additional weightings

In Australia

In the World

Over-riding consideration: Communities of common species from across their range.

ISSUES RAISED IN FULL GROUP DISCUSSION

Vegetation condition: able to be regenerated (ie poor or better condition).

Hydrological control:

- physical environmental requirements for floristic communities need to be considered.
- the natural variation in ecosystem water balance must be understood and then development/conservation designed to disturb it as little as possible.

Need to support other government policies that maintain critical physical environment parameters such as hydrology.

GROUP 4 - FAUNA

Considerations when setting criteria

1. The viability of a population cannot be defined.
2. Artificially created areas need to be considered as may be only remaining refuge eg swamps/wetlands.
3. The mobile/sedentary and seasonal nature of species needs to be considered before criteria for reserves can be set.
4. A major weakness of System 6 - limited to vegetation communities. Need more emphasis on faunal communities especially invertebrate communities.
5. Sites based on flora condition are not necessarily representative of fauna assemblage - eg below ground fauna - reptiles and invertebrates.
6. Mobile species might have separate feeding, roosting and breeding sites therefore need a reserve system which has both small and large patches of bushland or ground feeding sites eg birds of prey, waterbirds that nest in trees and feed on ground.
7. Need to consider the potential of sites. Although species not present now could be re-introduced or come back through natural recolonisation.

8. Need resource for seasonal migrants which move through from other regions. These species may only come through for a short period eg small insectivorous birds.
9. Sites for transequatorial migrants that only occupy areas for brief periods eg JAMBA/CAMBA species.
10. Rare and endangered species - Problem of past people have tended to concentrate on rare and endangered species at expense of other species/communities.
11. We should be thinking in terms of centuries not years or decades!
need to maintain processes of:-
 - evolution
 - genetic diversity
 need to allow scope for different requirements
ie.- if climate changes - will fauna become less tolerant of reduced resources.
12. 'Indicator' species - not necessarily an appropriate way of identifying areas for fauna - further information may allow selection of indicator species.
13. Species - particularly invertebrates only known from single localities - so locality needs to be part of the reserve system, irrespective of condition of area.
14. Flagship species - where rare and endangered species are on a site it needs to be part of the reserve system but should NOT mean where such species are not present the site shouldn't be reserved. THIS SHOULD NOT BE CONSIDERED ALONE!
15. Although the larger the area the better, size alone should not determine whether an area should be included in the reserve system (see 13). Small patches might be important in linking up other patches and as sites for movement of species.
17. Measure of habitat complexity/vegetation structure could be used as a predictor for fauna conservation value.

Solutions

1. A full fauna survey of the Swan Coastal Plain - both vertebrates and invertebrates.
2. Mandatory as a general recommendation:
An independent fauna survey should be undertaken prior to development proposals. This should be paid for by the proponent but consultants should be appointed by the EPA.
3. Must be ongoing review of System 6, after the current two and a half to three year review, as new data comes forward, the discovery of new species may require acquisition of new areas.
4. Initial survey of ground invertebrates should be undertaken to provide baseline collections.
5. Value of fauna 'phone-in' needs to be considered carefully.

ISSUES RAISED IN FULL GROUP DISCUSSION

Rare and endangered species should not be the prime determinate of reservation, though important to protect rare and endangered species particularly 'flashy' species to keep public and political interest.

Rare species do not necessarily indicate threatened communities.

Condition of plant community may not indicate condition of fauna community (except perhaps invertebrates).

SUMMARY WHEN REGROUPED AFTER DISCUSSION

Use select groups of invertebrates better known and easier to sample spiders, centipedes, scorpions.

No areas from 'Wanneroo to Armadale' can afford not to be kept for fauna. Far less exists than is required so all areas need to be maintained This includes remnant trees.

The dune tops on the bassendean soils are high priority.

Beyond the metropolitan areas an integrated reserve system needs to be established.

Need for off reserve conservation.

GROUP 5 - ESTUARIES

What estuarine communities are poorly reserved?

- a) All estuaries within the region are distinct, threatened, and of high conservation and social value.
- b) Fringing communities are severely threatened by changed hydrology ($\pm$ flow) and direct removal by development; degradation by weed invasion, litter dumping, changed (increased) fire frequencies.

Estuarine zones and Key impacts

Zone	Impacts
1. Buffer - upland (or one of below in a degraded state)	Development, recreation
2. Associated wetlands (Fresh)	Development, altered hydrology
3. Intertidal zone (Fresh to saline balance)	Recreation, pollution, development, altered hydrology
4. Banks	Recreation/pollution/dredging or reclamation
5. a) Basin - Inlet b) Basin - River (Channel)	Pollution, recreation, siltation
6. Conspriuous natural feature of the inlet environment ie Kings Park, Mount Henry, Lechenault Peninsula	Pollution, recreation, erosion and siltation

Definition - Pritchard (modified) - tidal, part of river where water is measurable affected by the ocean. Whole river system is the fundamental management unit.

Parameters

Biological, (fauna/flora), geomotriphic, human/environmental values.

Protection

Heighten public information and awareness of values to be maintained and why.

Amend current inadequate legislation so that:-

- a) various parts of law work in an integrated fashion together - the legal base should be viewed as a tool kit.
- b) pursue development and implementation of Swan-Canning EPP (and perhaps similar EPPs for other estuaries). Link to other statutes - eg planning controls via SAA and TPS, fisheries refuge zones, buffer requirements, drainage management etc.
- c) statutes should recognise the need for habitat connectivity and zones of influence impinging on conservation areas.
- d) fundamental reform of outmoded statutes, eg various water laws, Waterways Conservation Act, Soil and Land Conservation Act Regular evaluation of success.
- e) Key principles should be:
 - duty of custodial care on public or private land managers/owners
 - ecological sustainability of populations/systems (with a recognition of appropriate exploitation)
 - public conservation of foreshore reserves (where possible)
 - transparency and accountability of advice and decision-making (if EPAct) and action
 - clear definition and recognition of environmental values (= beneficial uses)
 - restoration/creation of functioning estuarine systems (= essential life support systems) or ecological 'services'.
 - public funding should be the key, but not only mechanism. All estuaries are key State and public resources.
 - zone of influence (see 5).
 - equity issues should be defined and recognised.

Research requirements

- tied to recommendations and subject to the availability of funds - State or Federal (ANCA).
- priority is set to pursue certain research objectives to meet requirements of management.
- Government bound to carry out within a time period - on basis of priority.
- research may include methods of restoration/creation of estuarine habitats.

Zone of influence about reserve

- determines the conduct of Government agencies and/or commercial enterprises.
- based on the values being conserved - zone size and requirements will vary from reserve to reserve.

ISSUES RAISED IN MAIN DISCUSSION GROUP

Need to deal with fringing communities such as salt marshes perhaps through reservation.

Opportunity to contribute to legislation as Water Acts are being reviewed in next 2-3 years.

GROUP 6 WETLANDS

How should we identify representativeness?

- a) Use Semeniuk/WAWA Geomorphic mapping and evaluation work supported by finer scale vegetation and other environmental variables (eg salinity, pH, colour)
- b) Use dual approach of using 'naturalness' and representativeness (not exclusive representativeness) (or two tiered).
- c) Use existing Water Authority data as foundations

Is water quality a possible indicator of intact fauna and flora community

Not tight linkage between water quality and biodiversity.

Should only those wetlands with significant remnant vegetation be protected.

No, representativeness is very important.

Major Issues

- a) Major omissions in first reports need to be addressed eg Paganoni.
- b) What is in good condition/pristine is still important consideration.
- c) Flexibility in applying criteria is required.
- d) Management and administration of multiple use corridors and reserves needs to be resolved.
- e) Wetland management responsibility needs to be resolved.
- f) Boundary of specific locations needs to be reviewed using better information.
- g) New policies, legislation and definitely additional funding is required.

ISSUES RAISED IN MAIN DISCUSSION

Broadscale classification is not enough eg a dampland could be a paddock.

Wetlands with good plant structure generally have good faunal representation
Invertebrates/birds.

Cultural significance of wetlands? eg Aboriginal culture.

May use historical/cultural events/reasons to help justify protection.

GROUP 5 (ESTUARIES) AND GROUP 6 (WETLANDS) - COMBINED SUMMARY WHEN REGROUPED

1. In addition to representativeness and rare species, maintenance of supporting ecosystem (ecological) processes particularly hydrology at the catchment scale.
2. Ministry for Planning should be required to establish the catchment conditions (particularly water balance) necessary to retain System 6 values before an area is rezoned. An enforceable Catchment Management Plan recognising the above should be an integral part of the rezoning, and be publicly assessed and available.

3. We are confident that restoration of degraded wetlands (including estuaries) is cost-effective and feasible to achieve representativeness and connectivity. Wetlands are key corridors for the movement of both plants and animals. Restoration opportunities and needs should be considered as part of the review.

4. RESERVE! PROTECT! MANAGE!