3. METHODS

3.1 Background to Methodology

The 'Top End Waterways Project' was required to assess, describe and report on the current physical and ecological condition of the major rivers and their tributaries within the Katherine Region, commencing with the Daly River catchment. Developing a suitable methodology was beyond the scope of the project. Therefore, an appropriate methodology, that could be adapted for use by the 'Top End Waterways Project', had to be selected for this study.

The 'State of the Rivers' methodology (Anderson, 1993b,c) was assessed and selected to provide a general framework for the 'Top End Waterways Project'. The methodology was developed by J.R. Anderson for the Department of Primary Industries in Queensland where it is currently being utilised, following its testing and validation, to assess the States’ rivers on a catchment by catchment basis (Anderson, 1993a,b,c; Phillips and Moller, 1995).

Other existing studies and approaches to measuring stream condition that were reviewed and considered for possible implementation included:

- Conservation Value and Status of Victorian Rivers – Part 1 Methodology and Part 2 East Gippsland Rivers (Macmillan & Kunert, 1990; Macmillian, 1990);
- The Environmental Condition of Victorian Streams (Mitchell, 1990);
- Environmental Flow Studies for the Wimmera River, Victoria – Parts A-E (Anderson & Morison, 1989a,b,c,d; Anderson et al., 1989e);
- Rivers and Streams Special Investigation – Victoria (Land Conservation Council, 1989);
- Water Victoria – An Environmental Handbook (Dept of Water Resources Victoria, 1989);
- State of the Environment Report 1988 – Victoria’s Inland Waters (Office of the Commissioner for the Environment, 1988); and
- Statewide Assessment of Physical Stream Conditions – Phase 1 (Ian Drummond & Associates Pty Ltd, 1985).

Of the approaches reviewed, the ISC method could have had possible application within the Northern Territory to benchmark stream condition, but because the concept was still being developed in 1995 and had not been trialed, the ISC method was not considered appropriate for this study.

From the ‘State of the Rivers’ methodology (refer Anderson, 1993b,c), the ‘Top End Waterways Project’ adapted the sampling strategy, survey methods and data collection sheets for use in assessing the condition of rivers in the Katherine Region. Following the collection, preliminary analysis and presentation of the data for the Daly River catchment, the condition and stability ratings developed by Anderson (1993b,c) were modified or completely altered by a NT Technical Working Group. The alterations to the condition and stability ratings were thought necessary so that results would reflect Northern Territory (ie wet/dry tropical) conditions more closely. Sections 3.4, 3.5 and 3.6 discuss in more detail the sampling strategy, survey components and the condition and stability ratings, respectively.

The ‘State of the Rivers’ method adopted a “snapshot” survey approach with the aim of comparing different stream sections within a catchment in terms of their current physical and ecological condition, and assessing the extent to which that condition has deteriorated from a “pristine” condition. The ‘Top End Waterways Project’ seeks to establish the condition of the streams at the time of the survey relative to a benchmark. The benchmark used is an “ideal” undisturbed or natural state that has been defined by the NT Technical Working Group as well as from a preliminary analysis of the Daly River catchment data.

The snapshot highlights the most severe and urgent problems and also sets a baseline or benchmark against which future trends and the rate of change can be assessed. It does not directly measure the rate of change or trend but relies on comparisons between the condition at the time of the survey and after follow-up surveys.

3.2 Scope and Limitations

The methodology is a snapshot of stream condition in whole catchments or sub-catchments at one point in time and does not allow for close examination of particular areas or reaches. This is principally due to the lack of survey sites at that scale and the likelihood that survey sites are put in areas of easier access.
The method is not intended to provide all the information that managers may require about stream condition when planning management programs. It will help to identify key issues, problems and priorities and also help to broadly recognise what processes are causing river degradation. It will also help to identify where more detailed investigations are needed. Consequently, it is an important management tool but it should be only one source of information on which to base decision making processes.

The ‘State of the Rivers’ survey is focussed on collecting physical and ecological information on instream and riparian habitats (ie the river itself, the banks and the channel). The survey does not include lakes and wetlands (eg billabongs, swamps and oxbows) unless they occur along defined stream channels. The ecological condition assessment is based on assessing the condition of the instream aquatic and riparian habitats and the vegetation structure, rather than conducting flora and fauna surveys or assessing community structure or integrity. The abundance and type of aquatic life (eg macroinvertebrates, fish, etc) or other fauna using the riparian zone has not been assessed. The ‘Top End Waterways Project’ has incorporated a vegetation survey component to more adequately describe the riparian vegetation.

Stream flow measurements are not an obligatory part of the methods even though one-off measurements were taken where possible throughout the catchment. To overcome this lack of information, the ‘Top End Waterways Project’ has summarised the stream flow information that exits for gauge stations within the Daly River catchment (refer Sections 2.6.1 and 4.10). The extent of changes to hydrology is not an inherent part of the methods. This would involve taking into account any change in volume and seasonality of flows from natural conditions; and changes to the balance and close interaction between ground and surface water, which is particularly important during the dry season when groundwater maintains baseflows in many rivers and creeks. The influence of artificial barriers on the hydrology of streams is also not assessed.

Water quality measurements are also not an obligatory part of the ‘State of the Rivers’ methods. It was felt that rather than carry out one-off water quality sampling as part of the ‘Top End Waterways Project’, it would prove more useful to summarise longer term water quality information that currently existed for the Daly River catchment (refer Sections 2.6.3 and 4.11). Temporal variability in water quality (eg seasonal changes, influence of groundwater particularly during the dry season) was not assessed.

The survey includes estuaries. Their inclusion was important for completeness, but the survey methodology was primarily designed for the non-estuarine sections of rivers and streams, and so certain additions were made to the ‘State of the Rivers’ methodology to allow for estuaries to be included, rather than specifically designing estuarine survey techniques.

Linkages to other projects and initiatives that address other issues relating to rivers is important to aid overall river management decision-making processes. The ‘Top End Waterways Project’ has established links with, for example, the Ausrivas project and riparian vegetation assessments by overlapping survey sites with those projects in order to allow possible correlations to be drawn between these studies. Linkages to long term water flow and quality databases (eg Hydsys), development of environmental flows guidelines, vegetation databases, Wild Rivers assessments would also prove useful.

### 3.3 Follow-up Surveys

The ‘State of the Rivers’ survey methods were designed for use as a baseline or benchmark against which future trends (ie rate of change in condition) can be established through follow-up replicate surveys (Anderson, 1993a). The method allows for future partial or complete follow-up surveys to not only assess the rate of change but to try and assess the effectiveness of remedial measures. This has been achieved by adopting a standard methodology that can be repeated at a later date. Photographs, access notes, sketches and a GPS recording for each site will enable survey sites to be re-located for future surveys.

In order to monitor the rate of change in river condition as has been benchmarked by the ‘Top End Waterways Project’, or to look at management induced improvements or areas where management practices/land uses have changed or intensified, there will need to be follow-up surveys. It is recommended that a suitable strategy and schedule for ongoing site surveys, including what raw data should be re-collected, be designed and implemented by Department of Lands, Planning and Environment who are the custodians of the data and the project. It is envisaged that selected priority sub-sections (or preferably sub-catchments) be targeted if whole catchments cannot be re-surveyed. Long time periods (5 years or more) are generally required before changes in indicators like river channel physical form (eg river bank and bed stability) and the streamside zone (eg assessment of riparian vegetation and reach environs) can be measured.
The best time for conducting surveys is during the dry season. This avoids problems with bad weather and access problems, but it is also more practical for many aspects of the survey that are best done when water levels are not elevated and water clarity is highest.

3.4 Sampling Strategy

A stratified sampling approach is the basis of classifying the current physical and ecological condition of the streams, as described in the Qld ‘State of the Rivers’ methodology (Anderson, 1993a,b,c; Phillips and Moller, 1995). The catchment being studied is divided into “homogeneous stream sections” which represent stream sections that share similar natural features and conditions.

The delineation of the “homogeneous stream sections” involved a progressive division of the catchment into smaller and smaller units. Initially, the Daly River catchment was divided into 16 major sub-catchments (shown in Map 6). These represent the major tributaries within the Daly River catchment.

The major tributaries were further sub-divided into 33 sub-sections (shown in Map 7). Planning of these sub-section boundaries was done using 1:250,000 topographic map sheets initially and finalised using 1:50,000 sheets, along with a combination of aerial photography/landsat imagery, where available. A brief reconnoitre trip was also carried out in April 1995 for three days to investigate areas and access.

Sub-section boundaries were established at major tributary junctions. The tributaries were further sub-divided according to attributes including geology, stream gradient, altitude, natural and artificial barriers (such as weirs, waterfalls, gorge systems), bed and bank substrates, stream order, landuse and the tidal limit.

The number of sub-sections delineated for this project was substantially less than selected for Qld ‘State of the Rivers’ projects to date. The reasons for this include: variation in altitude does not exist within the Daly River catchment as compared to the river catchments being studied in Queensland (ie all of the Daly River catchment is less than 460m); there are very few artificial barriers, like weirs, on rivers; the rivers are not impounded by dams; the catchments are far less developed; access is far more difficult and time consuming; the resources available (ie time, staff) to sample a large number of sub-sections is not available.

It was the aim of this project methodology to select a number of sites within each sub-section to represent the range and extent of stream types and conditions, including a range of stream orders.

Section 2.7.5 outlines the Strahler system of assigning stream orders. Map 8 shows the 7 stream orders for the Daly River catchment, based on the Strahler system and on a 1:250,000 map scale. The Daly River and lower Katherine River recorded the largest stream order of 7, on which 31 sites were sampled along an approximate stream length of 362km. Map 8 also shows the approximate stream length and number of sites sampled for each stream order. Fewer sites were recorded from the minor stream orders (1 and 2), even though they made up a large proportion of the stream lengths. It was generally felt that due to the constraints on the number of sites that could be sampled, a greater focus should be placed on the medium and larger-sized rivers and creeks.

Aerial photography/landsat imagery, where possible, and 1:250,000 topographic map sheets were used to select sites within each sub-section. Access for both vehicles and boats are a major determinant of the precise location of the sites. If a structure existed within the river (eg a low level crossing or bridge), the site would be selected upstream of it where possible so as to avoid any influence/interference it may be causing.

A total of 131 sites were sampled throughout the Daly River Catchment (refer Map 9). Of these sites, 109 were full survey sites. The remaining 21 ‘photo sites’ were visited in order to gain a greater understanding of the range and extent of stream types throughout the catchment. On average, 1-2 sites were sampled per day by a team of two people (ie 131 sites sampled over 96 days).

The Qld ‘State of the Rivers’ methodology was designed as a rapid survey where 8-10 sites could be surveyed per day. The considerably fewer number of sites sampled per day, as well as throughout the Daly River catchment, reflects the difficult access, particularly in remote areas; the greater distance between sites; the requirement to use boats to undertake surveys because of the presence of crocodiles; the collection of additional information (eg longitudinal profile and vegetation surveys, water flow, etc); and the limited resources available (staff, timeframe, etc).

To allow for the fewer number of sub-sections that were delineated for the Daly River catchment and the fewer number of sites that were surveyed, the condition and stability rating results for each site have been shown individually rather than as a
result for the entire sub-section. It was felt that although a site provides an indication of the condition of the stream along a particular reach, from this a general interpolation of the results or trends can be made regarding the condition of the stream length between sites within a sub-section.

3.5 Survey Components

At each full survey site, the boundary for the survey (ie the ‘reach’) was chosen in the field. The reach was generally representative of the channel habitat types, instream physical and ecological condition. Each reach usually consisted of at least two complete pools and riffle/run habitats.

Assessments are made on data sheets that are set up to describe the stream, banks and environs. The components of the field surveys are summarised below. Refer to Appendix B for a summary of the data sheet information. Those survey components that have been modified from the ‘State of the Rivers’ method or are new additions are highlighted in Appendix B.

- Site Description

Information relating to the survey (such as date, recorders, site number, tributary name, type of site, whether or not tidal) are recorded. A location description for each site, including an access sketch, is provided so that the site, and each sample point where a cross-section survey has been done, can be relocated for follow-up surveys. A GPS is used to provide a grid reference for the site and each sample point.

A standard set of colour slides is taken at each site including upstream and downstream views, at each bank, along the reach environs and at other key features. These slides are numbered sequentially and are accompanied by an associated description.

- Reach Environs and Site Features

Reach environs are those lands immediately adjacent to the riparian zone along the reach and include the floodplain and valley flat. Local information is recorded about these lands including land use, local disturbance, land tenure, local vegetation/habitat type and floodplain features. This information is important for classification purposes and for identifying processes and potential causes of changes in condition in the stream. A subjective overall disturbance rating, based on the extent of clearing, and replacement of vegetation by exotic species in the riparian zone and adjacent land, is also recorded.

The water levels at the time of sampling is also recorded along with the local channel pattern (eg regular meanders, braided channel, etc).

- Channel Habitat Types, Diversity and Dimensions

The segments of the reach were categorised into the following channel habitat types: waterfall, cascade, rapid, riffle, glide, run, pool or backwater. The average reach length surveyed was recorded (ie average for study was 824m; range 17.5m to 5,000m). The pool chosen was usually the largest and deepest in the area. Longitudinal profile surveys, that is depth measurements along the streams’ ‘thalweg’, assisted with determining the location of the four habitat types that would make up the reach (ie at least two complete pools and riffle/run habitats).

The length, percentage of the reach covered, depth and width of each channel habitat type present, along with a sketch, was recorded. This information allows for an assessment to be made of the diversity of habitat types present in the area, which is important ecologically. Two sample points were usually selected, one at a pool habitat and one at a shallow habitat-type like a riffle, run or rapid.

A cross-section survey was done across each sample point/habitat type at right angles to the bank. The survey was aimed to pass over the point of maximum depth and minimum flow in a pool section and maximum flow and minimum depth in a riffle/run habitat. The extremes were chosen in order to establish the range of substrates, depths and channel parameters within the reach.

The cross-section surveys also took into account the width, height and slope of the lower and upper bank on each side of the stream to the high bank. The slope and shape of the banks along the reach were also ranked. Up to three flow measurements were undertaken at some cross-sections.

A depth sounder and boat were used to measure cross-section depths and widths where water was present and boat access was available. The depth measurements made are dependent on the prevailing discharge at the time of the survey but are also referenced to the ‘water mark’. If the river or creek bed was dry, or isolated pools were present, a tape measure and measuring pole were used to measure the depths and widths in relation to the ‘water mark’.
The concept of a ‘water mark’ is used to provide a reference point for standardising the channel measurements and for defining the boundary between the lower and upper banks (refer to Glossary).

Cross-sections provide a basic picture of the channel size, shape and form. They also provide baseline information for follow-up surveys when changes in channel dimensions may be detected. The cross-sections have been presented diagrammatically in Part 2 of this report.

**• Bank Condition and Stability**

The assessment of the banks is made in terms of the percentage of the bank length, for both lower and upper banks, that is recorded as being stable or unstable (eroding or aggrading). That is, the dominant process at the time of sampling is recorded. The location of the instability (for example at bends, obstacles, irregularly, etc) and the local factors affecting stability are also assessed to help to identify the processes involved. Overall subjective ratings of the condition of the bank stability is also made. The presence of artificial bank protection measures, such as tree planting and fencing off of river banks, is recorded.

**• Bed and Bar Condition and Stability**

The type of bar and its relative percentage of the total surface area of the bed, above water mark, is assessed. Overall subjective ratings of the stability of the bed and what is the dominant process at the time of sampling (ie whether stable, aggrading or eroding) is also made. Local factors affecting stability is assessed. Features relating to the gravel angularity and shape, bed compaction and the type of controls (eg rock outcrops, culverts, etc) stabilising the bed are also recorded.

**• Bed and Bank Sediments**

At the time of undertaking the cross-section surveys, the sediment composition of the bed, from three samples, and the lower and upper banks was also recorded. A grab-type sediment sampler was used to sample bed sediments. The contribution made by each sediment size class (ie fines, sands, gravels, cobbles, boulder and rocks), expressed as a percentage of the total volume, was determined by visual inspection. The sediment size classes are those of the Standards Association of Australia. From this data the mean size of the sediment has been determined for each of the major channel types.

Stream invertebrate distribution and abundance is very much influenced by the type of substrate present and the relationship between flows, depths and substrates.

**• Riparian Vegetation**

Riparian vegetation was assessed in terms of percentage cover for the various structural groups: trees >30m, 10-30m, 2-10m; regenerating trees <2m; woody shrubs <2m; vines; rushes/sedges; phragmites; herbs; grasses; ferns; mangroves; and palms. The covers for native versus exotic species, within each structural category, are recorded separately. The total percentage cover of exotic species within the riparian zone for each bank is also assessed. The width of the riparian zone for each bank is recorded and is measured from ‘water mark’ to the edge of the distinct band of riparian vegetation.
The percentage of the lower and upper bank length that was bare of vegetation cover, separated into overstorey versus understorey cover, was also assessed. The overstorey comprised trees and shrubs (>1.3m tall) whereas the understorey included the remaining ground covers.

This project also undertook vegetation surveys or compiled vegetation lists of the major species for each site. A vegetation profile was not completed at every site. The 10m-wide belt transect was located at right angles to the water’s edge and extended to the upper bank or edge of riverine vegetation. Measurements (such as diameter at 1.3m, bole and tree height, and crown width) for each tree, greater than 1.3m tall and located within the profile, was recorded. Ground covers, such as grasses and herbs, were recorded within this vegetation profile through the use of a 1m² quadrat, usually located at 5m intervals along the profile length starting at the water’s edge. Percentage covers for each species type located within the quadrat was recorded. The vegetation profiles have been represented diagrammatically (refer Part 2 of the report) in order to show the zonation of, and a typical cross-section through, the riverine vegetation.

**Aquatic Vegetation**

Aquatic vegetation was divided into either submerged (eg Chara/Nitella, Vallisneria, etc), floating (eg water lilies, etc) or emergent (eg Phragmites, Typha, rushes/sedges, etc) groups and was assessed in terms of percentage cover for the various structural types. The presence of exotic species was also recorded. Identification of the major aquatic vegetation was also undertaken as part of this study.

**Instream and Bank Habitats**

Instream cover for organic debris (such as logs, branches, leaves and twigs), emergent and aquatic vegetation, rocks and permanent pool habitats deeper than 1m was assessed in terms of percentage cover. Bank habitat types providing cover along the stream (such as canopy cover, low vegetation, root and bank overhang) were assessed in terms of percentage of bank length and average width provided by each type.

An overall aquatic rating for all aquatic life was subjectively assessed. The rating took into account the diversity of depths and substrates, level of disturbance, diversity and extent of cover, extent of canopy and other vegetation cover, and whether or not the stream dries up. Passage for fish and other organisms at the time of the survey and when the water is at its normal level was also assessed.

**Additional Sources of Information**

Stream flow information collected at flow gauge stations throughout the Daly River catchment, and extracted from a database system called ‘Hydsys’, have been used to summarise flow volumes and monthly discharges. Cross-section surveys at flow gauge stations have also been extracted from ‘Hydsys’.

Water quality information collected throughout the catchment for flow gauge stations and other water quality sampling points on rivers and creeks, that have been extracted from ‘Hydsys’, have been used to summarise results for the following parameters: Electrical conductivity, turbidity, water temperature, pH, total alkalinity and total phosphorus. Water quality information collected at Ausrivas (Australian River Assessment Scheme) project sites, have also been summarised.

Background information on the Daly River catchment has been gained through a literature review, as well as liaising with landowners/managers (pastoralists, aboriginal groups), councils and other government departments.
3.6 Data Analyses and Presentation of Information

Once collected, the raw data has been entered, verified and stored in an Access Relational Database that has been designed for the ‘Top End Waterways Project’. This database can be used as an ongoing management tool to store and analyse the information collected over time. This database can be directly interfaced with the GIS package ‘ArcView’.

Information from stream gauging sites, water quality sampling sites and Ausrivas project sites have been included as additional reference information within this database.

Data analysis or queries have been designed to provide summaries of the data for the entire catchment as well as for each sub-section. Only those sites where information has been collected on a particular field component are included in determining percentages for that component.

The raw data recorded for each of the components at a site is used to produce a series of condition or stability ratings for each site. The ratings developed by Anderson (1993b,c) were modified or completely altered by a NT Technical Working Group so that results would reflect Northern Territory conditions more closely. Appendix C summarises the condition and stability ratings, including the formulae, used for this project. Those that have been modified or completed altered have been highlighted in Appendix C. The condition or stability ratings include:

- state of the reach environs;
- channel type diversity;
- bank stability;
- bed stability;
- cover and structural diversity of riparian vegetation;
- cover of exotic riparian vegetation;
- cover and diversity of instream and bank habitats; and
- overall condition.

The overall condition is the result of combining equally the condition and stability ratings for the reach environs, bank and bed stability, riparian and exotic vegetation, and instream and bank habitats. The derived rating for channel type diversity is not used to produce the overall condition rating. Maps 10-26 shows the results for the condition and stability ratings and other attributes for each site (discussed in Section 4 ‘Catchment Results’).

Each rating category for each site is scored as a percentage or a number, with 100% or 10 representing an ideal, undisturbed or natural state and 0% or 1 being very disturbed or unstable. A summary of the overall condition and stability rating categories used are outlined in Table 3.1.

### Table 3.1 Condition & Stability Rating Categories

<table>
<thead>
<tr>
<th>Condition and Stability Categories</th>
<th>Rating (%)</th>
<th>Rating (out of 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme Modification (1)</td>
<td>0 - 20</td>
<td>1 - 2</td>
</tr>
<tr>
<td>Extreme Instability (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe Erosion or Aggradation (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Cover/Diversity (4) &amp; (6)</td>
<td>21 - 40</td>
<td>3 - 4</td>
</tr>
<tr>
<td>High Cover for Exotics (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Overall Condition (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Modification (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Instability (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Erosion or Aggradation (3)</td>
<td>41 - 60</td>
<td>5 - 6</td>
</tr>
<tr>
<td>High Cover for Exotics (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Cover for Exotics (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Overall Condition (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some Modification (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited Instability (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Cover for Exotics (6)</td>
<td>61 - 80</td>
<td>7 - 8</td>
</tr>
<tr>
<td>High Overall Condition (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Essentially Natural (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stable (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very High Cover/Diversity (4) &amp; (6)</td>
<td>81 - 100</td>
<td>9 - 10</td>
</tr>
<tr>
<td>Exotics Absent (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very High Overall Condition (7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) State of the reach environs (2) Bank stability (3) Bed stability (4) Cover and structural diversity of riparian vegetation (5) Cover of exotic riparian vegetation (6) Cover and diversity of instream and bank habitats (7) Overall condition

The results for each of the ratings are presented as the number or percentage of sites in each rating category. Even though this has not been directly related to the actual proportion of the river system in each of these categories, it is felt that these results provide an indication of the major condition and stability rating trends for each sub-section.

Presentation of maps have been done using ArcView GIS package. Catchment and sub-section boundaries were drawn and digitised off 1:50,000 topographic map sheets. Vegetation profiles, based on hand drawn and scanned trees, have been presented using Microstation (refer Part 2). Cross-sections have also been presented diagrammatically using Excel (refer Part 2).
Below are examples of a range of condition and stability ratings found throughout the Daly River catchment:

**State of the reach environs:**

- Essentially natural
- Some modification
- Moderate modification

**Bank stability:**

- Stable banks
- Limited bank instability
- Moderate bank instability

**Bed stability:**

- Stable bed
- Moderate bed aggradation
- Moderate bed erosion

**Cover and structural diversity of riparian vegetation:**

- High cover & structural diversity
- Moderate cover & structural diversity
- Low cover & structural diversity

**Cover and diversity of instream and bank habitats:**

- Very high cover & diversity
- Moderate cover & diversity
- Low cover & diversity

**Overall condition:**

- Very high overall condition
- High overall condition
- Moderate overall condition