**Conceptual framework** for a rapid assessment of marine, coastal and terrestrial biodiversity, vulnerability, human pressures, and response management.

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| --- | --- |
| **Step** | **Guidance** |
| 1. **Purpose and Objective**
 | The purpose and objective described in the ProDoc  |
| 1. **Determine scale and resolution**
 | Eventually undertaken at sites in each participating country. Country scale can be determined by initial GIS analysis of priority areas using some criteria (options outlined below), followed up with local stakeholder structured interviews to strengthen the case for site selections.  |
| 1. **Define a core or minimum set of indicators**
 | Review available information on international and regional indicator sets that relate to biodiversity, vulnerability, human pressures, IWRM and ICM. Identify core or minimum data sets that will sufficiently describe the location, size, special features, management issues and ecological characteristics of the sites. Indicators must be relatable to reporting requirement for SDG, Aichi, GEF and other regional frameworks. Can indicators be grouped into indices to make for easier translation into useful maps for stakeholders |
| 1. **Review existing knowledge and information**
 | Review available information sources and peoples’ knowledge (including scientists, stakeholders, and local communities), to determine the extent of knowledge and information available for marine and coastal biodiversity in the sites being considered. |
| 1. **Working groups**
 | Working group 1 = refine framework, indicator sets and indices (RPCU)Working group 2 = invite technical experts in the region to review and refine indicator sets including agreement on established methodology protocols, weightings for indices (where applicable), prioritisation for trial sites.  |
| 1. **Literature review**
 | collate and synthesise existing biophysical, social and management information on the chosen priority sites – information from regional and national data sources, research papers, regulatory data (assist IW Managers in collection) |
| 1. **Field Study design**
 | Where literature review reveals gaps in information a rapid field study needs to be completed. Survey methods as agreed upon by Working Group 2,  |
| 1. **Establish a time schedule**
 | 2-4 weeks (will depend on the amount of data that is needed, some countries more, others will require less) |
| 1. **Establish resource requirements**
 | A country by country requirement as will depend on the amount of data needed |
| 1. **Establish a database management system and specimen curation system**
 |  |
| 1. **Establish a reporting procedure**
 |  |
| 1. **Establish a review and evaluation procedure**
 |  |
| 1. **Conduct Field Study**
 |  |
| 1. **Data assessment and reporting**
 |  |

**Rapid Assessment of terrestrial biodiversity**

**Objective:** The process of identifying priority locations for integrated land, water, forest and coastal management in the Pacific PICS, and reaching cross-sectoral and community stakeholder agreement on the selection of sites and priority R2R reforms and investments, has the potential to be divisive and acrimonious. Recognising this problem, this component will build on the objective approach to site selection initiated by the GEF Pacific IWRM Project by constructing an objective and scientifically sound procedure for the identification of priority R2R sites within the 14 participating countries that will:

* be fully transparent and comprehensible to all parties,
* both technical and political;
* based as far as possible on objective quantifiable criteria and indicators;
* will reflect the importance of the sites from the perspectives of the range of biological, environmental and socio-economic conditions at the national level, and;
* from the perspective of vulnerabilities associated with disaster risk, climate variability, and extremes in weather.

The procedure will recognize the different roles, knowledge and priorities of women and men and through gender analysis set the baseline for gender-responsive management.

**Purpose:** To assess major groups of terrestrial biodiversity

**Assessment type:** inventory assessment and indicator assessment

**Resources:**

*Time:* Medium length (4 weeks)

*Money:* Ample or limited($?)

*Expertise:* Local available experts; from where?, field of expertise?

**Scope:**

*Taxa:*

Vegetation and flora

 *Data:*  e.g. habitat types, species list, health, canopy cover, unique areas

 *Methods:* e.g.

 *Analysis:* e.g. species composition, forest cover, occurrence of special species

Birds

*Data:*  e.g. species list, location of breeding grounds,

 *Methods:* e.g.

 *Analysis:* e.g. relative abundance, richness, correlations between habitat

Bats

*Data:*  e.g. species list, location

 *Methods:* e.g.

 *Analysis:* relative abundance, richness

Invertebrates

*Data:*  e.g. species list, new species, distribution

 *Methods:* e.g.

 *Analysis:* relative abundance, richness, distribution patterns

Herpetofauna

*Data:*  e.g. species list, new species, distribution

 *Methods:* e.g.

 *Analysis:* relative abundance, richness, distribution patterns

**Rapid Assessment of marine and coastal biodiversity**

**Objective:** The process of identifying priority locations for integrated land, water, forest and coastal management in the Pacific PICS, and reaching cross-sectoral and community stakeholder agreement on the selection of sites and priority R2R reforms and investments, has the potential to be divisive and acrimonious. Recognising this problem, this component will build on the objective approach to site selection initiated by the GEF Pacific IWRM Project by constructing an objective and scientifically sound procedure for the identification of priority R2R sites within the 14 participating countries that will:

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The procedure will recognize the different roles, knowledge and priorities of women and men and through gender analysis set the baseline for gender-responsive management.

**Purpose:** To assess major groups of marine and coastal biodiversity

**Assessment type:** inventory assessment and indicator assessment

**Resources:**

*Time:* Medium length (4 weeks)

*Money:* Ample ($?)

*Expertise:* Local available experts; from where?, field of expertise?

**Scope:**

*Taxa:*

Marine flora

 *Data:*  e.g. species lists, new species, health, morphophytes

 *Methods:* e.g. 10 sites sampled by visual census using quadrants

 *Analysis:* e.g. relative abundance

Corals

 *Data:*  e.g. species lists, new species, health, habitat characteristics, unique areas

 *Methods:* e.g. 20 sites sampled by visual census using quadrants

*Analysis:* e.g. relative abundance, richness, density, comparisons of sampling sites, occurrence of special species

Fish

*Data:* e.g. species list, new species, distribution

*Methods:* e.g. 40 sites sampled by visual census using transects

*Analysis:* e.g. richness, relative abundance, distribution patterns, correlations between habitat, characteristics and abundance, ecological and geographical structure in assemblages

Macro-zoobenthos:

*data:* e.g. species lists, abundance

*methods:* e.g. 20 sites sampled using dredge

*analysis:* e.g. relative abundance, richness, density, comparisons of sampling sites and with previous data, taking into account abiotic variables

Mangrove

*Data:*  e.g. species list, coverage, resource uses

 *Methods:* e.g.

 *Analysis:* e.g. richness, diversity

Birds

*Data:*  e.g. counts, breeding colonies

 *Methods:* e.g.

 *Analysis:* e.g. relative abundance, special species, diversity

Herpetofauna

*Data:* e.g.

 *Methods:* e.g.

 *Analysis:* e.g.

*Abiotic variables:*

e.g. Chemical (Total phosphorous and Nitrogen, Nitrates, Nitrites, Ammonium, Phosphates, Biological Oxygen Demand) and physical features (pH, Dissolved Oxygen, Temperature, Salinity, Alkalinity, Transparency) of the water were measured and sediments were sample and examined (Determination of Organic Matter).

*Geographical*: Studies are focussed on …

*Site Selection:* Sites were selected randomly in each of the main habitats. They are e.g. shallow reef drop off, reef lagoon, rocky pavement to reef crest, front of reef crest, from drop off to reef crest etc,

Table 1: Identified sampling protocols

|  |  |  |  |
| --- | --- | --- | --- |
| **Method** | **Biodiversity covered** | **Expertise** | **Reference**  |
| Reef Check protocol | Corals, fish invertebrates, substratum type | Non-specialists. Applied worldwide. | <http://www.reefcheck.org/methods.htm> |
| Conservation International Marine RAP | Coral diversity, fish, molluscs | Specialist – applicable worldwide | <http://www.biodiversityscience.org/xp/CABS/research/rap/methods/marine_rap_methods/marrapmethods.xml> |
| SPREP BIORAP | Terrestrial vegetation and flora, fish, marine mammals, bats, reptiles, birds, invertebrates, pest animals | Relatively experienced surveyors (involves identification to species). | <http://www.sprep.org/publications/guidelines-for-undertaking-rapid-biodiversity-assessments-in-terrestrial-and-marine-environments-in-the-pacific>  |
| Monitoring coral reefs with indicator species | Butterflyfish as indicators of reef health | Non-specialist or specialist. Applied in the Indo-Pacific | <http://www.coral.noaa.gov/themes/butterfl.pdf> |

Table 2: Identified sampling methods. Note: Cost estimations mostly calculated for equipment, chemicals (taken from CBD SBSTTA 13)

| **Taxon** | **Method** | **Application** | **Field Time** | **Cost** | **Habitat** | **Required expertise\*** | **Possibility of collecting ?** | **Equipment** | **Sources of Equipment** | **References**  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Water Quality** | Physical probes | pH, O2, temperature, Oxygen Biological Demand (OBD), alkalinity | short- 10 -30 minutes | $100-3000 depending on number of probes and quality | All water bodies | none | no | pH probe, temperature probe, dissolved oxygen probe, OBD collection equipment, titration equipment | Hanna Instruments (2002) |  English, Wilkinson and Baker, 1997 |
| Secchi Disc | water transparency | short, 5-10 minutes | $10 | All water bodies | none | no | Secchi disc | National Hunting and Fishing Supply (2002a) | English, Wilkinson and Baker, 1997 |
| Water sample collection and Lab analysis | total phosphorus, phosphates, total nitrogen, nitrites, nitrates, ammonium, silicates, chlorophyll-a | 10 minutes in field, 3 hours in laboratory per sample | high - laboratory equipment | All water bodies | training in using laboratory equipment | water samples | spectrophotometer, filters, bottles, water samples, net for reactive phytoplankton |  Hanna Instruments (2002) | Strickland y Parson, 1972 |
| visual assessment of sediment  | sediment colour and type (organic, sandy clayish, etc) | fast- 1-5 minutes | 0 | all water bodies | none | sediment sample | grab sampler (can be done in conjunction with benthic invertebrate sampling) | Elcee Instruments and Service (2002) | English, Wilkinson and Baker, 1997 |
| **Fish**         | seine net (various types, purse, beach) | mostly smaller fishes | 1-4 hours | $50-$250/ net, depending on size | shallow water without strong current, for big nets a boat could be needed for deployment and pulling | skill in seining  | yes, net does not kill fishes | seine net, boat, measuring boards, scales, sheets, pencils, slates, plastic bags, plastic labels, preservative, GPS | Seattle marine and Fishing Supply Company (2002a) | English, Wilkinson and Baker, 1997 |
| Scoop and tray nets | suitable for small fish near surface, use only against banks | 1-5 hours | $5-$20/ net | Used in inaccessible areas, such as mangroves | Skill in using the nets but easy to learn | yes | Scoop and tray net, boat, measuring boards, scales, sheets, pencils, slates, plastic bags, plastic labels, preservative, GPS | Seattle marine and Fishing Supply Company (2002d) | English, Wilkinson and Baker, 1997 |
| Push net | Catches only small organism | 1-2 hours | $5-$20/ net | Most shallow waters | Skill in using the nets but easy to learn | yes | Push net, boat, measuring boards, scales, sheets, pencils, slates, plastic bags, plastic labels, preservative, GPS | Seattle marine and Fishing Supply Company (2002e) | English, Wilkinson and Baker, 1997 |
| Cast net | Suitable for small fish and prawns | 1-2 hours | $50-$200/ net | Good for confined areas and shallow waters | Skill on cast. Operators vary on efficiency | yes | Cast net, boat, measuring boards, scales, sheets, pencils, slates, plastic bags, plastic labels, preservative, GPS | National Hunting and Fishing Supply (2002a)/castnets.html | English, Wilkinson and Baker, 1997 |
| Drop net | Small organisms | 1-2 hours | $50-$100/ net | Good for small and shallow areas | Skills on construct and use. Labour intensive | yes | Drop net, boat, measuring boards, scales, sheets, pencils, slates, plastic bags, plastic labels, preservative, GPS | Seattle marine and Fishing Supply Company (2002e) | English, Wilkinson and Baker, 1997 |
| Lift net | Small and rare species that must be concentrated | 1-2 hours | $50-$100/ net | Good for small and shallow areas | Skills on use the net | yes | Lift net, boat, measuring boards, scales, sheets, pencils, slates, plastic bags, plastic labels, preservative, GPS | Seattle marine and Fishing Supply Company (2002e) | English, Wilkinson and Baker, 1997 |
| Trap nets (see note below) | Most fish sizes and types, primarily in shallow waters | 12-24 hours, based on tides (barrier and bag) Corrals are set up for longer and collect every 24 hours or so | $50-$500/nets, corral depending on size | shallow waters | Skill in setting the nets. Corral required expert people (fishermen) | yes | Barrier, bag nets and/or fish corral, boat, measuring boards, scales, sheets, pencils, slates, plastic bags, plastic labels, preservative, GPS | Seattle marine and Fishing Supply Company (2002g) | English, Wilkinson and Baker, 1997 |
| fish traps | Mostly bottom living fishes | 24 hours- leave out overnight | $50-100/trap | mostly shallow waters, for deeper waters a motorized winch is needed | Skill on setting traps in right places. Fishermen support advised | yes, trap does not kill fishes | fish traps (may be motorized winch), boat, measuring boards, scales, sheets, pencils, slates, plastic bags, plastic labels, preservative, GPS |  Seattle marine and Fishing Supply Company (2002g) | English, Wilkinson and Baker, 1997 |
| dive/ snorkeling (transects, stationary, roving) | suitable for surveying clear waters | usually about 1 hour, but variable depending on repetition | low (snorkeling) to high (scuba) | All clear waters | diving needs certification Identification of species and survey design | No | snorkel/scuba gear, underwater sheets, pencils and slates |  Mares (2002) |  English, Wilkinson and Baker, 1997 |
| questionnaire | ask local fishermen about the fishes they observe and use | 2-4 hours | Low  | All waters | Easy to apply but require knowledge to prepare it | No | Basic stuff for filling questionnaires | Everywhere |   |
| sonars | suitable for schooling, pelagic fish, not very precise data | depending on the size of the water body  |  $100 - 1000 | All waters, but mostly deep | Skill in operating the sonars  | No | Sonar, boat, basic stuff for taking notes | Surprise (2003) |   |
| **Benthic macroinvertebrates**      | visual search/ snorkel/ dive (quadrats,intercept and band transects) | suitable for surveying clear waters and medium/big size animals | usually about 1 hour, but variable depending on repetition | low (snorkeling) to high (scuba) | All clear waters | diving needs certification | yes | snorkel/scuba gear, underwater sheets, slates and pencils, collecting material |  Mares (2002) | English, Wilkinson and Baker, 1997 |
| kick net | all invertebrates inhabiting hard substrates | 1-5 hours | $55  | good for wadable waters with gravel or stoney bottom | skill with kick nets | yes | kick net, basic stuff for taking notes and collecting material | Great Outdoor (2002) | http://www.wavcc.org/wvc/cadre/WaterQuality/kicknets.htm |
| Dip net | suitable for sampling nectic animals in shallow waters | 1-2 hours | $5-$20/ net | All waters | Skill in using dip nets | yes | dip net, basic stuff for taking notes and collecting material | Seattle marine and Fishing Supply Company (2002d) | Downing & Rigler (1984) |
| Sledge | Semi-quantitative sampling. Suitable for epifauna (good info for caracterization) | About 1 site/hour | Not available | Sof-bottom habitats | Skill on sledging | Yes | Sledge, wire-mesh sieves, buoys, GPS, boat, sorting box, rope, jars and preservatives, waterproofs labels and pencils, forceps | Not available | English, Wilkinson and Baker, 1997 |
| Dredge | At best, semi-quantitative data. Useful in broad area surveys and inventories | About 1 site/hour | $500-600/ dredge | Sof-bottom. Sample deeper into the substrate | Skill in dredging | Yes | Dredge, wire mesh sieves, GPS, boat, sorting box, rope, jars and preservatives, waterproofs labels and pencils, forceps | Wilflife Supply Company (2002) | English, Wilkinson and Baker, 1997 |
| Trawl | Larger epifauna and demersal nekton (complementary to other methods). Cualitative | 1 site/2-3 hour | $1000 for nets, boat rental and field assistance | Soft-bottom | Skill in trawling | Yes | Trawl, wire mesh sieves, GPS, boat, sorting box, rope, jars and preservatives, waterproofs labels and pencils, forceps | Seattle marine and Fishing Supply Company (2002c) | English, Wilkinson and Baker, 1997 |
| Grab | Quantitative sampler of epifauna and infauna (particularly sedentary and slow-moving) | About 1 site/hour | $350- $1100 | Sof-bottom habitats | Skill in using grab  | yes | Grab, hopper with base, wire mesh sieves, Rose Bengal stain, buoys, GPS, boat, sorting box, rope, jars and preservatives, waterproofs labels and pencils, forceps | Elcee Instruments and Service (2002) | English, Wilkinson and Baker, 1997 |
| Surber sampler | all invertebrates inhabiting stony or gravel substrates | 1-3 hours | $200  | gravel or stony bottom waters, mainly still waters | knowledge of using Surber and requirements to quantify data | yes | Surber sampler, bucket, preservatives, jars, basic stuff for taking notes | KC Denmark (2002) | Downing & Rigler (1984) |
| Aerial nets | for catching adult invertebrates | 1-5 hours | $35-$50 | land | skill in using aerial nets | yes | insect net, jars, preservatives, basic stuff for taking notes | BioQuip (2002) | Downing & Rigler (1984) |
| **Zooplankton** | box samplers | for plankton crustaceans and rotifers  | 1-3 hours | $100 | Any water | skill in using samplers | yes | plankton (box) samplers, basic stuff for taking notes and collecting material | McLane Resarch Laboratories (2002) | Downing & Rigler (1984) |
|  | Plankton nets | For plankton |  |  | Any water |  |  |  |  |  |
| **Macrophytes**     | visual search | note visible plants within certain area qualitative analysis | variable depending on area searched | Low | Any habitat (marine or coastal) | Identification of species | yes | Basic stuff for taking notes and collecting material |  Everywhere |  NSW National Parks and Wildlife Service (2001) |
| Random sampling | qualitative, more unbiased than a visual search | 1-5 hours | Low | Any habitat (marine or coastal) | Identification of species and survey design | yes | Basic stuff for taking notes and collecting material |  Everywhere | NSW National Parks and Wildlife Service (2001) |
| Plots (size variable depending on type of vegetation) | Any coastal and marine vegetation. including mangroves.  | Variable, depending, but usually 1plot/hour | Low |  Coastal habitats | Identification of species and survey design | Yes | Basic stuff for taking notes and collecting material, measuring tapes | Everywhere | NSW National Parks and Wildlife Service (2001) |
| dive/ snorkeling (quadrants) | Suitable for surveying clear waters. Deep waters in case of dive | usually about 1 hour, but variable depending on repetition | low (snorkeling) to high (scuba) | All clear waters | diving needs certification. Identification of species and survey design | yes | snorkel/scuba gear, underwater sheets, slates and pencils, collecting material | Mares (2002) | English, Wilkinson and Baker, 1997 |
| Grab | good, quantitative method  | 1-5 hours | $350- $1100 | Vegetation associated to soft-bottom  | Skills on use grabs | yes | Grab, hopper with base, buoys, GPS, boat, rope, jars and preservatives, waterproofs labels and pencils, forceps | Elcee Instruments and Service (2002) | Downing & Rigler (1984) |
| **Epiphytic macroinvertebrates**  | various samplers, depending on type of vegetation |  | 1-4 hours | $100-$200/ sampler  | Seagrass and macroalgal beds | skill in sampling  | yes | tube or box samplers, sieves, basics for taking notes, collecting material |   | Downing & Rigler (1984), Kornijów & Kairesalo (1994) [[1]](#endnote-1), Kornijów (1997) [[2]](#endnote-2) |
| **Reptiles and Amphibians**          | dip nets (amphibians) | suitable for catching tadpoles | variable depending on repetition | $5-$20/ net | Any water where species occur | Skill in using dip nets | yes | dip net, basic stuff for taking notes, collecting material | Seattle marine and Fishing Supply Company (2002d) | NSW National Parks and Wildlife Service (2001) |
| visual search (amphibians/ reptiles) | good for locating relatively visible organisms | variable | Low | land and surface water | Knowledge of microhabitats | no | Basic stuff for taking notes | Everywhere | NSW National Parks and Wildlife Service (2001) |
| Vocalizations | Listen for and sometimes record frog calls and identify species from call | Variable, several hours depending on search and record time | Low- tape recorder | Any habitat where species occur | Knowledge of frog calls and identify species from calls, habitats | No | Tape recorder, cassettes, playback, flashlights, basic stuff for taking notes | Any electronic good shop | NSW National Parks and Wildlife Service (2001) |
| pitfall traps with drift fence (amphibians/ reptiles) | good for collecting animals that are difficult to sight; estimate relative abundance and richness | should be left out 24-48 hours | Low if old buckets are used | land | Skill in setting up pitfall traps with drift fences | yes | Buckets, hand shovel, metal for fence, basic stuff for taking notes, collecting material | AOL (2002) | NSW Agriculture (2003) |
| litter search (amphibians/ reptiles) | usually used for finding frogs in conjunction with quaudrants | variable depending on repetition | Low | land | Minimal | yes | Basic stuff for taking notes, collecting material | Everywhere | NSW National Parks and Wildlife Service (2001) |
| transects (amphibians/ reptiles) | used to control sample area to quantify and standardize data | dependant on length and number of transects | Low | Open land habitats where species occur | Knowledge of establishing transects | yes | Marking tape, basic stuff for taking notes, collecting material | Everywhere | NSW National Parks and Wildlife Service (2001) |
| Point counts | High species diversity and structurally complex areas | Depending the sampling area | Low | Several kind of land habitats | Knowledge on the biology of the local species | Yes | Basic stuff for taking notes or tape recorder, collecting material | Any electronic good shop | NSW National Parks and Wildlife Service (2001) |
| Snorkeling/dive (reptiles) | used especially for looking for turtles | variable depending on repetition | low (snorkeling) to high (scuba) | Any water | Diving certification | yes | Snorkel/scuba gear, dip net, underwater sheets, slates and pencils | Mares (2002) | NSW National Parks and Wildlife Service (2001) |
| nooses (reptiles) | suitable for lizards | depends on number of lizards sought | Low | Land | Skill in making noose and spotting lizards | yes | long, flexible, but strong weed/ rope, basic stuff for taking notes, collecting material | Mac-n-stuff (2002) | NSW National Parks and Wildlife Service (2001) |
| turtle traps (reptiles) | used to trap turtles on land and water | at least 1 day | $65-$150/ trap | Water and/or riparian habitats | Knowledge on setting traps | yes | Turtle trap, bait, basic stuff for taking notes, collecting materials | Tomahawk Live Trap (2002) | NSW National Parks and Wildlife Service (2001) |
| Questionnaire | Ask local people about the species they observe and use | 2-4 hours | Low  | All water bodies | Easy to apply but require knowledge to prepare it | no | Basic stuff for filling questionnaires | Everywhere | NSW National Parks and Wildlife Service (2001) |
| **Birds**    | point counts (terrestrial species) | used to control sample area to quantify and standardize data - can be done on foot in dry season and canoe in wet season | 1-5 hours | $100 | Any land habitat where the species occur | Knowledge of parameters for carrying out and recording point counts | no | Binoculars, measuring tape, flagging, basic stuff for taking notes | NSW National Parks and Wildlife Service (2001) | NSW National Parks and Wildlife Service (2001) |
| Transects(terrestrial and acuatic species) | used to control sample area to quantify and standardize data - can be done on foot in dry season and canoe in wet season | 1-5 hours, but depending on the sampling area | $100 | Any open habitat | Knowledge on the biology of the species and survey design | no | binoculars, measuring tape, flagging, basic stuff for taking notes | NSW National Parks and Wildlife Service (2001) | NSW National Parks and Wildlife Service (2001) |
| vocalizations | listen for and sometimes record bird calls and identify species from call | variable, several hours depending on search and record time | low- tape recorder (if needed) | Any habitat where species occur | Knowledge of how to identify bird species from calls, habitats | no | tape recorder, cassettes, playback (if needed), basic stuff for taking notes | Any electronic good shop | NSW National Parks and Wildlife Service (2001) |
| locate nesting sites | bird species nesting near water or on wet habitats | 1-5 hours | $100  | Any habitat where species occur | Knowledge of nesting habitats | no | binoculars, maps, basic stuff for taking notes | Orion (2002) | NSW National Parks and Wildlife Service (2001) |
| Sighting | look for mammals | variable | $100  | Any habitat where species occur | Minimal | no | binoculars if necessary, basic stuff for taking notes | Orion (2002) | NSW National Parks and Wildlife Service (2001) |
| **Mammals**   **Habitat type** | Tracks | detecting mammal presence on land, riparian | 1-4 hours- depends on search time | $0  | Any habitat where species occur | Able to detect tracks and identify species from tracks | no | minimal- take photo or make plaster cast, basic stuff for taking notes | Any photo camera supplier | NSW National Parks and Wildlife Service (2001) |
| transects | quantifies data if there are many sightings | 1-5 hours | $0  | Open habitat where species occur | Knowledge of establishing transects | no | binoculars if necessary, basic stuff for taking notes | Orion (2002) | NSW National Parks and Wildlife Service (2001) |
| field habitat assessment | morphology, characteristics, , evidence of disturbance, microhabitat structure, shoreline attributes, water depth | 1-3 hours | low | Any habitat | training in field methods | no | tape measure, camera, substrate sampler, basic stuff for taking notes |   | [www.usgs.gov/nawqa](http://www.usgs.gov/nawqa) |
| spatial data analysis | land use, vegetation type and distribution, shape of water bodies, water color, hydrologic regime, slope | variable, depending on data resolution and availability | variable- depending on data resolution and availability | Any habitat | knowledge of image processing and GIS | no | satellite imagery, aerial photos, digital elevation models, land cover, hydrography, geology, basic stuff for taking notes |   | www.freshwaters.org; www.usgs.gov |
| Manta towsurvey | Very useful for rapid assessment of habitats | 15 km of shoreline per day by team of 5 people | $50 | Any clear water. Mainly shallow and mid-depth waters | Can be acquired in a day | No | Manta board, underwater paper and pencils | Easy to do by anyone | English, Wilkinson and Baker, 1997 |

1. Kornijów R., Kairesalo T. 1994. A Simple Apparatus for Sampling Epiphytic

Communities Associated with Emergent Macrophytes. Hydrobiologia 294: 141-143. [↑](#endnote-ref-1)
2. Kornijów R. 1998. Quantitative sampler for collecting invertebrates associated with submersed and floating-leaved macrophytes. Aquatic Ecology, 32: 241-244. [↑](#endnote-ref-2)