



Australian Government
Geoscience Australia

National Geochemical Survey of Australia: Sample collection training

**Patrice de Caritat, Andrew McPherson,
Megan Lech**

Training Overview

- Background on NGSA
- Target sample point selection
- In-field sample site selection
- Sampling via auger holes/trenches
- Bag labelling (random numbers)
- Field measurements (pH, colour)
- Collection of field duplicates
- In-field documentation (digital data template, photos)

Background

- Part of Onshore Energy Security Initiative
- Aims:
 - Calibrate & ground truth radiometrics
 - Fill gaps in radiometric and geochemical data
 - Multi-element characterisation & ranking of radiometric anomalies
 - Characterisation of geothermal hot spots
 - Mineral exploration for non-energy related commodities

Target/Theoretical Sample Points (1)

ANU's Australian
Nested Catchments
and Sub-Catchments

9 Second Digital
Elevation Model

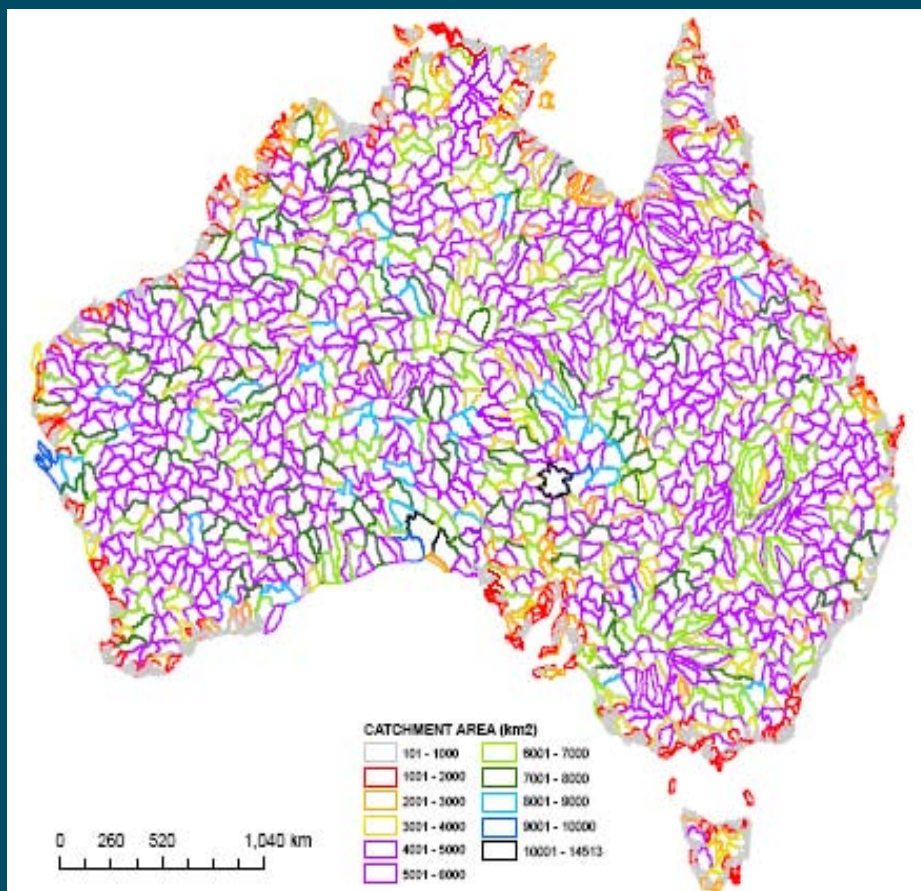


ArcHydro extension for ArcGIS®



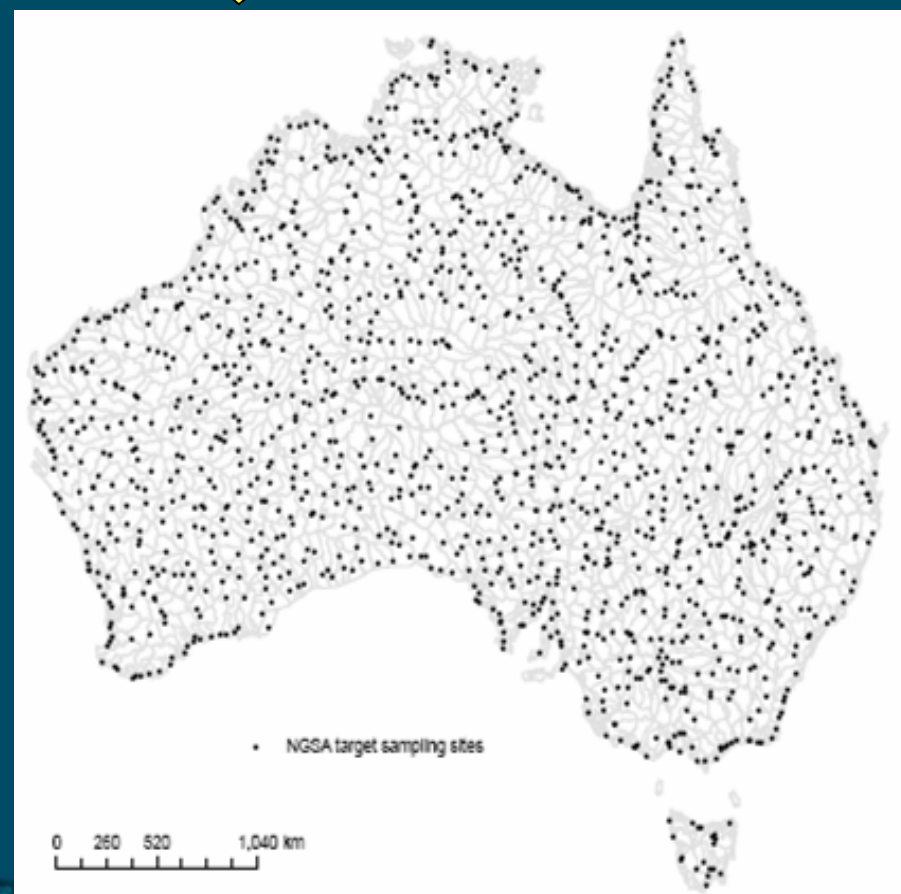
Catchments
Target Sample Site
(lowest point in catchment)

Target/Theoretical Sample Points (2)



▲
Catchments (~ 5000 km²)

1390 sites



In-field site selection

- Sample at a representative location
- Obtain permission to sample
- To avoid contamination:
 - Sample upstream of roads, buildings, dams, fences
 - Avoid disturbed sites e.g. campsites, graded areas, rehabilitated areas
 - Preserve site to be sampled
 - Sample near open cluster of mature trees
 - Remove jewellery, don't handle sample
 - Precondition sampling equipment

In-field site selection

- Sample in a transported, depositional environment (not *in situ* on weathered bedrock)
- If dunes present, sample in swale
- Radiation screen – site must be below 5 $\mu\text{Sv/hr}$
 - If above 5 $\mu\text{Sv/hr}$ & cannot sample catchment, provide details in digital data entry template

What can happen if sampling is not homogeneous

- **Even at high density, noisy maps can result from sampling of various materials.**
- **This can happen for instance where there is a poor description of what to aim for in the field.**
- **Loose adherence to instructions in the Field Manual could result in a dissapointing end product...**
- **Therefore it is important to conduct this in-field training and stick to the instructions in the Field Manual.**

Equipment

- GA: Field kits (augers, crowbar, bags...)
- State/NT:
 - Vehicles
 - Lap top for data entry
 - GPS
 - Digital Camera
 - Fuel & oil
 - First aid kit
 - Communication equipment

Field equipment



Sample Collection

- 2 x ~10 cm intervals to be collected
- 0-10 cm = Top Outlet Sediment (TOS)
- ~60-90 cm = Bottom Outlet Sediment (BOS)

1 Collect TOS:

- scrape away vegetation
- prepare with crowbar
- sample with white scoop over large area

2 Collect BOS:

- Condition augers
- Auger to correct depth with post hole digger
- Composite sample!

3 - 6 holes needed

Sample Collection



1 Collect TOS:

- scrape away vegetation
- prepare with crowbar
- sample with white scoop over large area

2 Collect BOS:

- Dig pit (~50 cm wide & between 70 & 150 cm long)
- Collect sample with white scoop over large area

3 Radiation screen keep if $<5 \mu\text{Sv/hr}$

Only 1 trench needed

Sample collection (Trench)

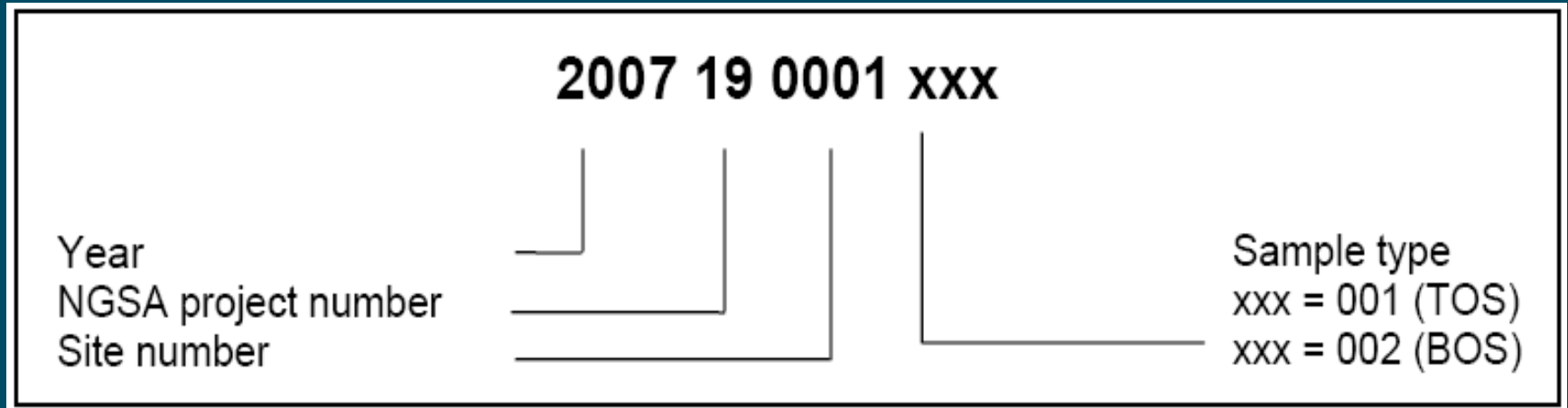


In-field measurements

- Munsell colour (wet & dry)
- pH



Sample numbering



- Bags arranged in random order (Plant 1973)
 - Reduction in false anomalies
 - Enables meaningful estimates of variance based on duplicates

Sample bags

Labelled canvas bag with
plastic bags inside

200719

0439

001

TOS

Nat. Geoscience Surv. of Aust.

2007 19
0439 001
TOS

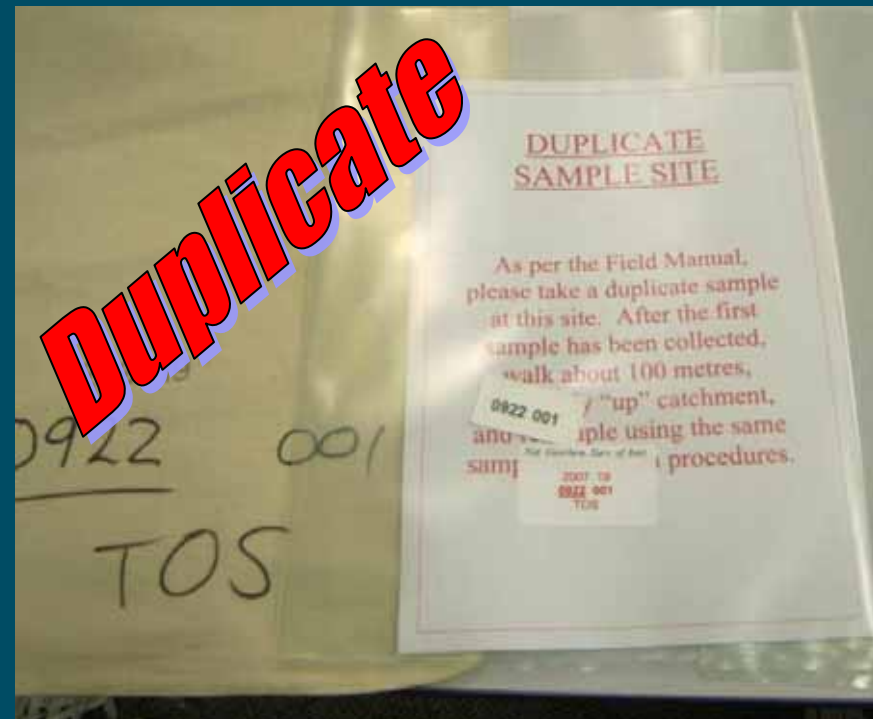
Nat. Geoscience Surv. of Aust.

2007 19
0439 001
TOS

0439 001

Sticky label on
each plastic bag

Tyvek label (short no.)
in each plastic bag



DUPLICATE SAMPLE SITE

As per the Field Manual,
please take a duplicate sample
at this site. After the first
sample has been collected,
walk about 100 metres,
and take a sample using the same
procedures.

0922 001

2007 19
0922 001
TOS

Data Entry Template

**See Appendices
for definitions**

Example

Can't live witho

BOS

TOS

Lookups to help with data entry



NATIONAL GEOCHEMICAL SURVEY OF AUSTRALIA (NGSA)

SITE_ID: 2007 19 _ _ _ _

Date _ _ / _ _ / _ _ _ _ (dd/mm/yyyy)

Time: _____ Entered by: _____

LOCATION

LATITUDE_GDA94: - _____ °S

SL ELEVATION: _____ m

LONGITUDE_GDA94: _____ °E

MAPSHEET_1:250K: _____

STATE: _____

SITE DETAILS

HOLE_TYPE J: _____

TARGET_SITEID: TS _ _ _ _

PROPERTY_NAME: _____

WATERCOURSE: _____

LANDFORM_TYPE J: _____

GEOMORPH_PR J: _____

GEOMORPH_PR2 J: _____

Site

Catchment

LANDUSE_TYPE_SITE J: _____

LANDUSE_TYPE_CATCH J: _____

LANDUSE_SUBTYPE_SITE J: _____

LANDUSE_SUBTYPE_CATCH J: _____

Sources of Contamination:

Comments:

SAMPLE DETAILS

<i>Top Outlet Sediment (TOS) SITE_ID+001</i>	<i>Bottom Outlet Sediment (BOS) SITE_ID+002</i>
TOS _ _ - _ _ m	BOS _ _ - _ _ m
SAMPLE_TYPE J: AUGER T, PIT/TRENCH T (tick)	SAMPLE_TYPE J: AUGER T, PIT/TRENCH T (tick)
field_pH_TOS J: _____	field_pH_BOS J: _____
TMunCol_dry J: _____	BMunCol_dry J: _____
TMunCol_moist J: _____	BMunCol_moist J: _____
Radiation screen: Yes, ≤5 µSv/hr T (tick)	Radiation screen: Yes, ≤5 µSv/hr T (tick)

Induration? J: _____

No. of holes augered: _____

Depth to induration: _____ (m)

SAMPLE DETAILS (CONT)

NGSA field sampling check list

HAVE YOU:

- 1 Used the Field Manual to determine a suitable site location?
- 2 Gained permission to sample at this site?
- 3 Checked site for obvious signs of contamination & maintained the integrity of the site before sampling?
- 4 Screened the site for radiation? [NB: If higher than **5** $\mu\text{Sv/hr}$, reselect sample site as per Field Manual]
- 5 Cleaned/conditioned the equipment to reduce chance of cross-contamination?
- 6 Read all instructions and manuals, and used the correct PPE for the job? (e.g., for close soil contact or use of power auger)
- 7 Worn gloves at all times while handling the samples and sample bags?
- 8 Collected the bottom sample from least 3 holes?
- 9 Taken 2-3 kg of TOS and BOS sample? (i.e., 2 full bags for each)
- 10 Placed correct Tyvek label inside each bag?
- 11 Checked that all plastic bags have the same SampleID as the calico bag they are placed into?
- 12 Screened the samples for radiation? [NB: If higher than **5** $\mu\text{Sv/hr}$, return the sample & reselect sample site as per Field Manual]
- 13 Photographed the site (sample bag, general view of site, holes)?
- 14 Refilled the holes to ensure safety of others/stock?
- 15 Taken a sample duplicate after the plastic bags with red labels? Is the Site_ID to which this duplicate relates documented in the digital data entry template?

Site documentation – photos

1 Photograph bag



2 Photograph site, towards river/creek showing holes

3 Take photograph away from river/creek showing holes

4 Rename photos with site number

Freighting

- Check off samples
- Pack into buckets



Finally

- Read OH&S guidelines before departure
- Refer to: Lech *et al.* (2007) National Geochemical Survey of Australia: Field Manual, Geoscience Australia Record 2007/08
- Enjoy yourselves and THANK YOU!!