Ankay Substrate Survey Protocol

Standard Operating Procedure — Point-Intercept Transect Method

1. Purpose

The purpose of this protocol is to standardize Ankay's coral reef survey method for monitoring benthic substrate composition, coral growth forms, and visible coral health conditions on natural reef sites.

This protocol uses a **point-intercept transect method**, where the substrate directly under fixed points along a transect line is recorded at regular intervals. The method is designed to be simple, repeatable, safe for divers, and suitable for long-term comparison across sites and survey periods.

2. Survey Design

2.1 Sampling method

Ankay uses a **Site and depth stratified point-intercept transect** monitoring using 30 m transects.

2.2 Transect length and point spacing

Each transect is:

- **30 m long**
- Surveyed every **25 cm**
- Total points per transect: **120 points**

Calculation:

30 m ÷ 0.25 m = 120 survey points

At each point, the surveyor records the predominant substrate or organism directly beneath the marked point.

2.3 Number of transects per site

Each survey event consists of one 30 m benthic transect per site. Sites may be surveyed repeatedly over time to support long-term monitoring.

2.4 Depth range

Surveys are conducted on natural reef areas within the study depth range of approximately 5–18 m. Each individual transect should remain within a relatively consistent depth band and should not vary by more than approximately ±2 m along the transect.

3. Survey Team Roles

Each transect is conducted by a minimum two-diver team.

3.1 Navigator / Leader

The Navigator is responsible for:

- Maintaining the target depth range.
- Following the direction indicated by the staff member.
- Keeping the transect generally parallel to the shoreline or reef contour.
- Watching for major hazards, including boats, current, entanglement risk, and venomous animals.
- Maintaining buddy contact with the Line Manager.

3.2 Line Manager

The Line Manager is responsible for:

- Following behind the Navigator.
- Laying the transect line.
- Managing the reel.
- Keeping the line as straight and taut as conditions safely allow.
- Avoiding unnecessary contact with live coral or fragile benthic organisms.
- Tidying the line during return and retrieval.

3.3 Role confirmation

Roles must be confirmed on the surface before descent.

4. Required Equipment

Each survey team should carry:

- 30 m transect tape or survey line
- 2lb weight with a reusable zip-tie
- Underwater slate and code cheat sheet
- Pencil
- Depth gauge / dive computer
- Compass, if needed
- Secchi disk
- SMB / DSMB
- Camera, if available, for unknown or unusual observations

5. In-Water Transect Setup

5.1 Starting point

The staff member defines the general starting area based on the site plan, reef condition, safety, and target depth.

The exact starting point is selected haphazardly by trained staff within representative reef habitat, while prioritizing diver safety, reef protection, and consistency with the target depth band.

Avoid placing the transect across:

- Large sand patches, unless representative of the site
- Abrupt reef edges
- Unusual isolated reef features
- Dangerous surge zones
- Fragile coral colonies
- Areas with excessive entanglement risk

5.2 Laying the transect

The team should:

1. Descend safely and confirm buddy readiness.
2. Confirm target depth.
3. Take Secchi disk measurement.
4. The navigator begins swimming parallel to the shore or reef contour.
5. The line Manager lays the transect behind the Navigator.
6. Maintain depth within the ±2 m range.
7. Keep the line as straight as conditions allow following reef contour.
8. Avoid dragging the line across live coral.
9. Return to the zero mark, tidying or straightening the line as needed.

6. Survey Procedure

6.1 Point-intercept recording

The survey begins at the zero point after the line has been laid.

The surveyor records one observation every:

25 cm

Each point is recorded from 0.25 m to 30.00 m, for a total of 120 points.

At each point:

1. Identify the predominant substrate or organism directly under the point.
2. Record the substrate acronym.
3. If the point is live hard coral, record coral growth form and visible coral condition.
4. If unsure, use the cheat sheet, confirm with buddy.
5. Do not spend excessive time on one point if it affects safety, air, or bottom time.

6.2 Rule for uncertain points

If the exact organism under the point is unclear:

- Record the predominant substrate directly beneath or touching the point.
- If useful, take a photo and record the image number.

6.3 Coral identification level

Corals are identified by **growth form**, not species.

Accepted coral growth form categories are listed in Section 8.

7. Substrate Codes

At every 25 cm point, record one primary substrate code.

7.1 Abiotic substrate

Category	Code
Silt	SI
Sand	SA
Rubble	RB
Rock	RK

7.2 Sponge

Category	Code
Sponge, general	SP
Barrel sponge	BA
Globular / irregular sponge	GB
Rope sponge	RP
Aggressive sponge	AG
Encrusting / calcareous / boring sponge	EN
Tubular sponge	TB

7.3 Algae

Category	Code
Algae, general	AL
Turf algae	TF
Calcareous macroalgae	CMA
Fleshy macroalgae	FMA
Crustose coralline algae	CCA
Peyssonnelid algal crust	PAC

7.4 Other benthic organisms

Category	Code
Fire coral	FC
Corallimorph	CP
Anemone	AN
Octocoral	OC
Encrusting gorgonian	EG
Black coral	BC
Zoanthid	ZO
Tunicate	TU
Benthic cyanobacterial mats	BCM
Seagrass	SG
Other	OT

8. Coral Growth Form Codes

If the point falls on live hard coral, record the coral growth form.

Coral growth form	Code
Massive / encrusting	MA
Branching	BR
Leaf / plate / sheet	LE
Meandroid / brain	MB
Fleshy / flowering	FL
Solitary	SO
Digitate	DI

9. Coral Health Codes

If the point falls on coral, record all the visible coral health conditions when applicable.

If coral appears normal and healthy, record **HE**.

Health condition	Code
Healthy	HE
Degraded — mild, 10–50% affected	DGM
Degraded — heavy, more than 50% affected	DGH
Dead	DE
Partially bleached	PB
Fully bleached	FB
Paling	PA
Yellow band disease	YBD
White band disease	WBD
Black band disease	BBD
Damselfish algal garden	DAG
Algae overgrowth	AOG
Aggressive sponge	AG-SP
Branching fire coral aggression	AG-FC
Encrusting zoanthid aggression	AG-ZO
Encrusting gorgonian aggression	AG-EG
Fish predation	FP
Sedimentation	SD

10. Data Sheet Structure

Each transect data sheet should include:

10.1 Site and transect metadata

- Site name
- Date
- Surveyor
- Start depth
- End depth
- Visibility / Secchi
- Temperature

10.2 Point data

Each point should include:

Field	Description
Point number	1–120
Distance	0.25 m to 30.00 m
Substrate code	Primary substrate at point
Coral growth form	Only if substrate is coral
Coral health code	Only if substrate is coral
Notes	Optional notes, image number

11. Photo Documentation

Photos should be taken when:

- Coral condition is uncertain
- Disease is suspected
- Bleaching is observed
- Unknown organisms are present
- There is unusual substrate cover

12. Transect Retrieval

After all 120 points are recorded:

1. Confirm buddy status, air, and no-decompression time.
2. Reel the transect line back in carefully.
3. Avoid dragging the line across coral or fragile organisms.
4. Maintain awareness of current, boats, and surroundings.
5. Begin ascent only when the team is ready.
6. Deploy SMB when required.
7. Complete a safety stop.

13. Safety Protocol

Survey work must never take priority over diver safety.

13.1 General safety reminders

Divers must:

- Maintain visual contact with buddy.
- Monitor air frequently.
- Monitor no-decompression time.
- Leave enough time and air for a safe ascent and safety stop.
- Be aware of boats.
- Use SMB during ascent when appropriate.
- Look and listen before ascending.
- Watch for venomous animals.
- Avoid entanglement with the transect line.
- Maintain good buoyancy and avoid reef contact.

13.2 Abort conditions

The survey must be stopped if:

- A diver is low on air.
- A diver is approaching no-decompression limits.
- Buddy contact is lost.
- Current or surge becomes unsafe.
- Boat traffic creates risk.
- Visibility becomes unsafe.
- A diver becomes stressed, tired, cold, or uncomfortable.
- Entanglement risk increases.
- The team cannot complete the survey without rushing.

If the team is running low on air, do not try to finish the survey.

14. Data Entry and Backup

Data should be entered as soon as possible after the dive, preferably on the same day.

Post-dive workflow:

1. Review field sheet for missing values.
2. Clarify uncertain notes while still fresh.
3. Upload photos and match photo numbers to notes.
4. Enter data into the Ankay coral survey spreadsheet or database.
5. Back up the file and photos.
6. Wipe clean the underwater slate for the next survey.

15. Quality Control Rules

To maintain consistency:

- Use only approved substrate codes.
- Use only approved coral growth form codes.
- Use only approved health codes.
- Do not guess coral growth form if uncertain.
- Do not invent new codes.

17. Summary of Core Method

Each Ankay natural reef survey consists of:

- **1 transect per site**
- **30 m transect length**
- **25 cm point spacing**
- **120 points per transect**
- **Depth range between 5 m and 18 m**
- **Maximum ±2 m depth variation within a transect**
- **Substrate recorded at every point**
- **Coral growth form recorded when point is coral**
- **Coral health recorded when point is coral**
- **Safety prioritized over survey completion**