



Rifle Range Road Monitoring Training

WWF-Singapore

02/08/2024

*Please rename yourselves to
your full name so we can help
track attendance :)



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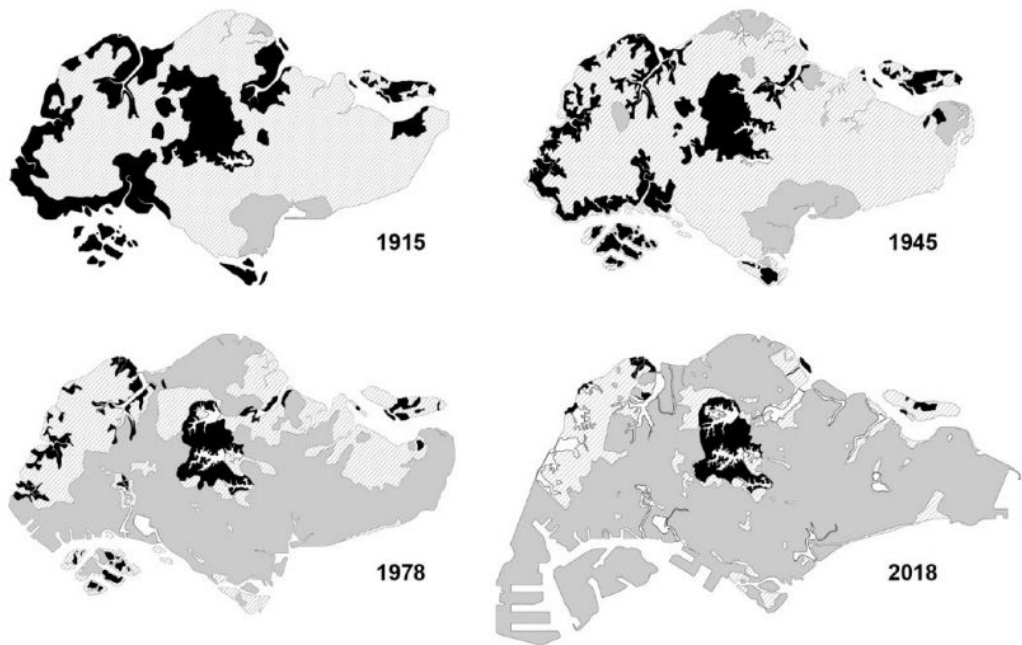


01






Background

Urban Development in Singapore



Type of land cover

-  Unmanaged vegetation (primary forest, secondary forest, freshwater swamp forest, mangroves)
-  Agricultural areas, cultivated land and green spaces (including parks, cemeteries, golf courses)

-  Built-up area (residential, commercial, industrial, transport, utilities)

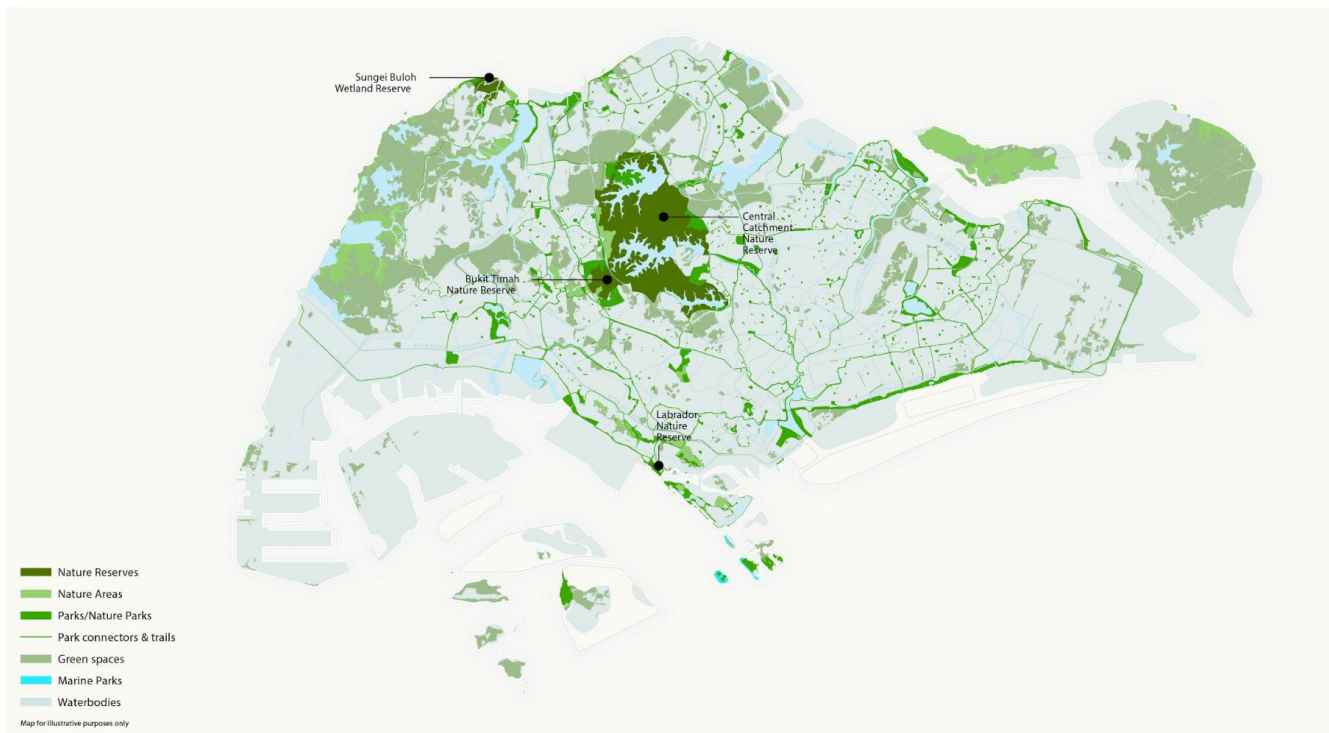
-  Impounded reservoirs

0 10 km

(Fong et al., 2019)



Urban Development in Singapore



(URA, 2021)



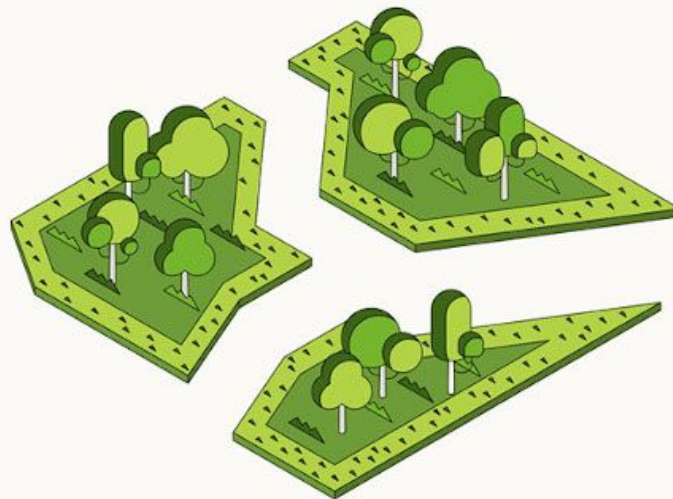
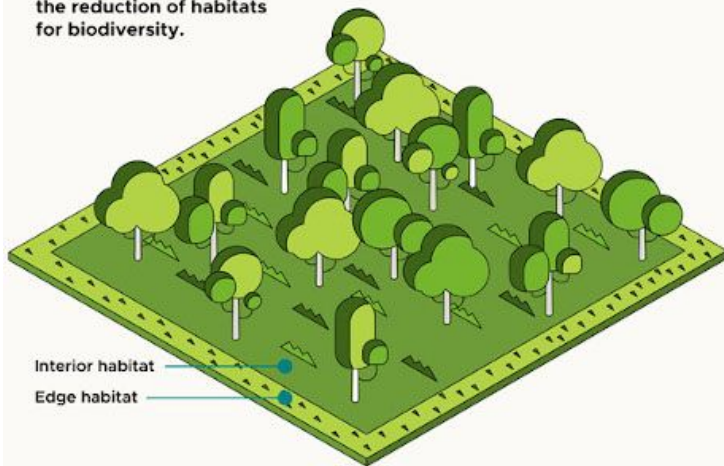
Urban Development in Singapore





Habitat Fragmentation

Fragmentation results in the reduction of habitats for biodiversity.



Edge effects - Boundaries of fragmented habitats are subjected to more altered environmental conditions, such as increased wind and sunlight, which may be disadvantageous to more sensitive species and favours invasive species.

Genetic isolation - Fragmented populations of plants and animals become genetically isolated, and more susceptible to diseases



WWF

Hab

Male sambar deer gets hit by taxi & dies at Mandai Road

Poor thing :(

Tharun Suresh | © July 12, 2024, 04:53 PM



Roadkills - spaces, ma collisions

Human-Wi negative c



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Wildlife Crossings - Restoring Connectivity



Eco-Link @ BKE



Mandai Lake Road



Wildlife Crossings - Restoring Connectivity



Rope Bridges



Drain Culverts



Roadway Animal Detection System + Advance Warning Signs

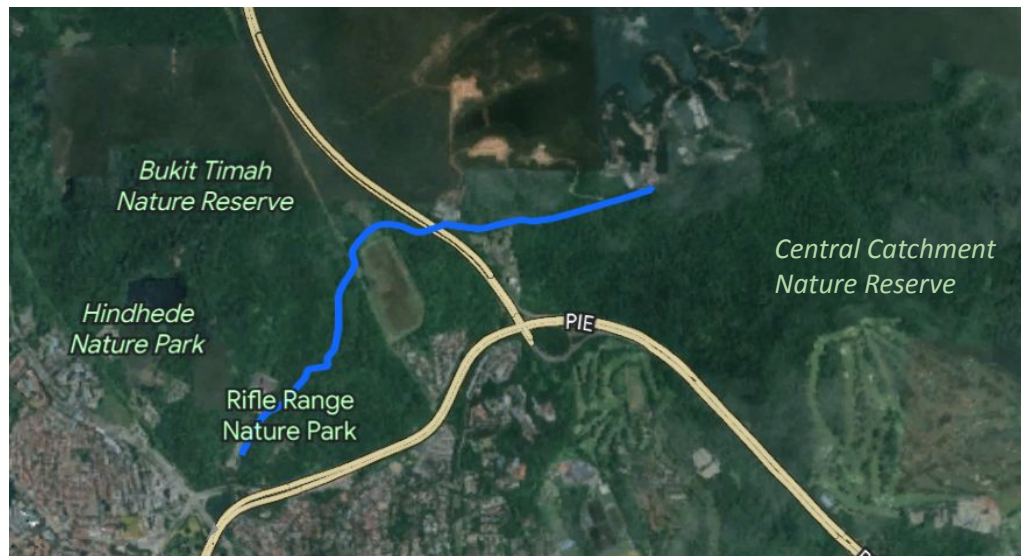


- Warns motorists of the presence of animals
 - Encourages careful driving
- System uses video analytics to recognise animals when they are near the road
 - Will trigger the Advance Warning Signs
 - Lights will flash to signal that animals are around
- System piloted at Old Upper Thomson Road in 2019
 - Near 100% accuracy rate in detecting the presence of animals



Rifle Range Road

- Rifle Range Road is the major road passing through Rifle Range Nature Park
- In close proximity to Bukit Timah Nature Reserve and Central Catchment Nature Reserve
- Man-made barrier to animal movement



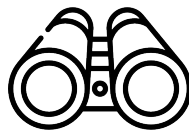


Results Summary (October 2023 - May 2024)



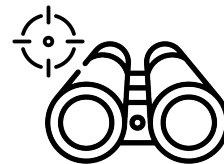
58

Volunteers



417

Individuals Recorded



305

Target Individuals*



17

Surveys



31

Unique Species



21

Target Species*



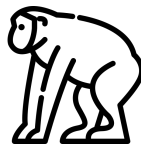
Results Summary (October 2023 - May 2024)

T
A
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T



5

Amphibian Species



6

Mammal Species
(excluding bats)



10

Reptile Species



4

Bird Species



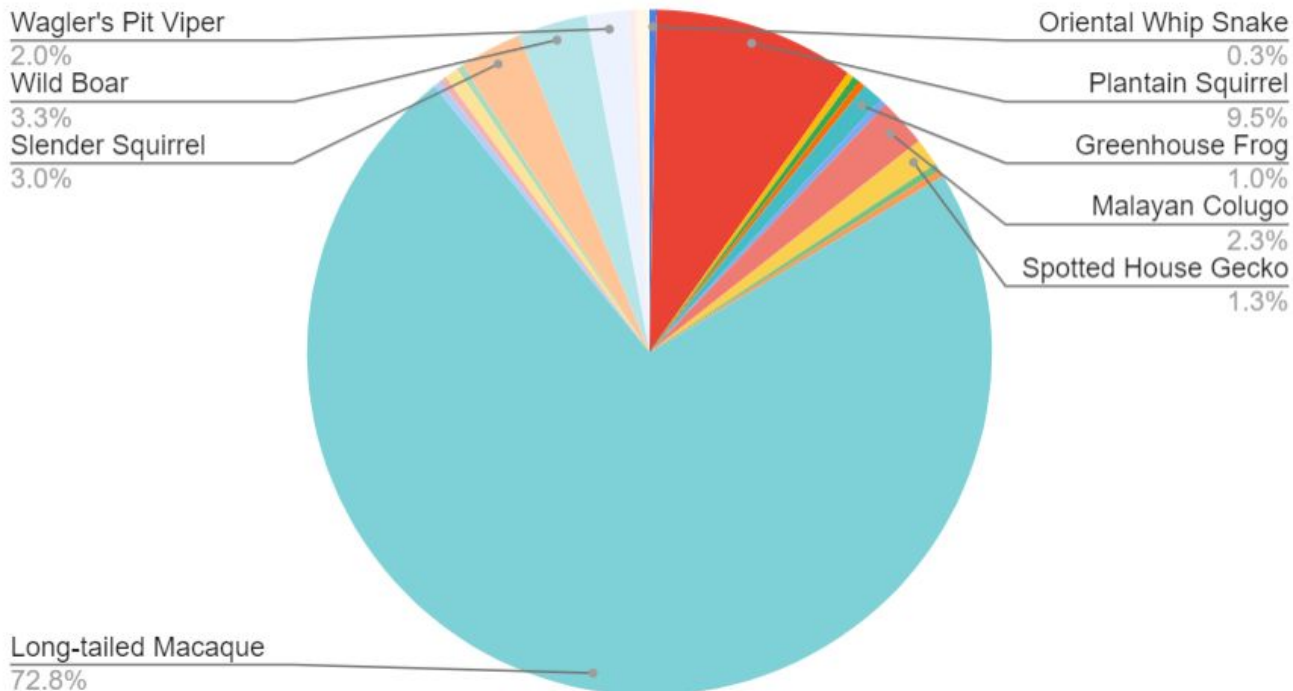
7

Other Species



Results Summary (October 2023 - May 2024)

Target Species

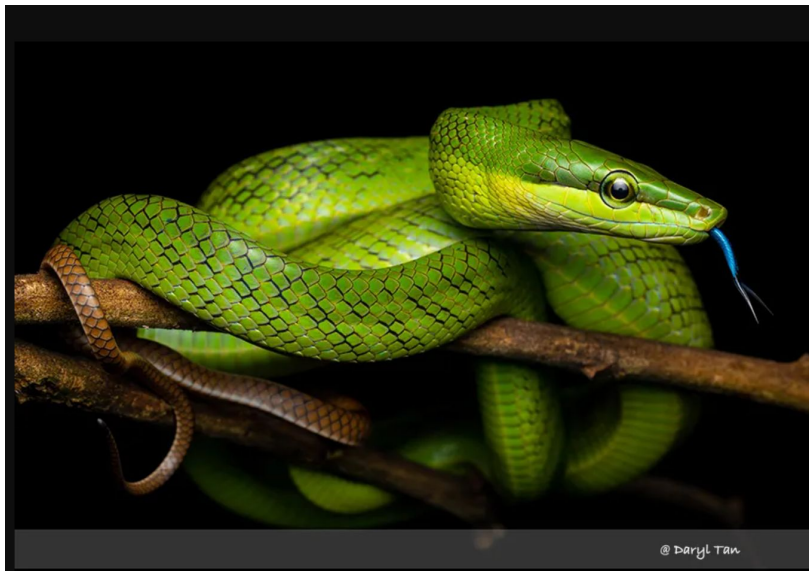




Results Summary (October 2023 - May 2024)

Notable Sightings

Red-tailed Racer
(*Gonyosoma oxycephalum*) **VU** in **SG**





Results Summary (October 2023 - May 2024)

Notable Sightings

Cinnamon Bush Frog
(*Nyctixalus pictus*) **VU** in SG



Straw-headed Bulbul **EN** in SG
(*Pycnonotus zeylanicus*) **CR** Global



Image by Vinson Tan (楊祖武) from Pixabay



Results Summary - Roadkill

Notable Sightings

Graphic Warning!!



Results Summary (October 2023 - May 2024)

All Species

Amphibians	Arachnids	Birds	Insects
Greenhouse Frog	Hasselt's Spiny Spider	Crimson Sunbird	Stick Insect
Copper-cheeked Frog	Golden Orb Weaver	Brown Boobook	Common Parasol
Cinnamon Bush Frog		Straw-headed Bulbul	Sumatran Small Paper Wasp
Four-lined Tree Frog		Red Junglefowl	
Asian Toad			



Results Summary (October 2023 - May 2024)

All Species

Mammals	Molluscs	Reptiles	Reptiles
Plantain Squirrel	Yellow-shelled Semi-slug	Oriental Whip Snake	Equatorial Spitting Cobra
Malayan Colugo	Humphrey's Land Snail	Peninsular Rock Gecko	Wagler's Pit Viper
Long-tailed Macaque		Sumatran Gliding Lizard	Malayan Water Monitor
Common Treeshrew		Common Sun Skink	Clouded Monitor
Slender Squirrel		Spotted House Gecko	
Wild Boar		Red-tailed Racer	



02



Logistics



Survey Schedule

August		September		October		November	
31st Sat	25th Sun	28th Sat	29th Sun	26th Sat	27th Sun	30th Sat	24th Sun

AM: 8.00 am - 10.30 am, PM: 6.00 pm - 8.30 pm

- WWF-Singapore volunteer team will release slots on Eventbrite for volunteers to register 2 weeks prior to each session.
- Each session will be capped at **5 participants (not including WWF-Singapore staff)**.

What do you need?

Attire



- Comfortable hiking attire
- Long pants are highly recommended
- Covered shoes
- Cap, arm sleeves (optional)

Items to Bring



- Charged mobile phone
- Insect repellent
- Drinking water
- Wet weather gear (poncho, umbrella)
- Flashlight/headlamp (**for PM sessions**)
- Clipboard and printed datasheet (optional)
- Camera (optional)
- Binoculars (optional)

What do you need?

Items to Bring

- Flashlight/headlamp (for PM sessions)



Preferred Super XHP360 LED Powerful Flashlight USB Recharge Torchlight 26650 5000MAH High Power Led Flashlights Tactical Lantern

4.8 ★★★★★

75 Ratings

Report

7.7 GREAT SHOPPER SALE FINALE

~~625-00—695-00~~ **\$16.12 - \$19.00** **36% OFF**

Shop Vouchers **\$0.5 OFF** **\$1 OFF** **\$2 OFF** **\$2 OFF** **\$3 OFF** Show All

Return **15-Day Returns** No Questions Asked*

Bundle Deals **Any 2 enjoy \$0.50 off**

Protection **Damage Protection** **NEW** Protects your new item for 6 months from date of delivery, covering total loss as a result of Accidental & Liquid damage and Wear & Tear

FREE SHIPPING Free shipping
Free shipping for orders over \$15.00

Shipping **Shipping Fee** \$0.00

USB Rechargeable
Built-in battery

Adapter
Computer
Car Adapter
Power bank

20000 Lumens Hands-free LED Headlamp Motion Sensor Red-white Light Head Lamp LED Torch Headlamp USB Rechargeable Powerful Headlight

4.9 ★★★★★ | 291 Ratings | Report

7.7 GREAT SHOPPER SALE FINALE

~~620-23—624-41~~ **\$9.41 - \$11.58** **53% OFF**

Return **15-Day Returns** No Questions Asked*

Bundle Deals **Any 2 enjoy 3% off**

Protection **Damage Protection** **NEW** Protects your new item for 6 months from date of delivery, covering total loss as a result of Accidental & Liquid damage and Wear & Tear

Shipping **FREE SHIPPING** Free shipping
Shipping From Mainland China
Shipping Fee \$0.00 - \$1.99

Emitting Color **A** **B** **C**

Car/Taxi to Rifle Range Nature Park

- Search for “Rifle Range Nature Park” on Google Maps/ride-sharing app.
- Carpark and drop-off/pickup point is beside the Visitor Pavilion (start point)
- **For PM surveys - Note that the carpark entry gantry only operates between 7.00am - 7.00pm, but the exit gantry will remain open 24/7. You will still be able to exit the carpark even after park operating hours.**
- If questioned by the security guard*, say that you were walking along Rifle Range Road outside, and were not in the park. If they ask for a contact person, please refer them to **Jiajun (WWF-SG staff) at +65 97848003.**

* Don't worry! We have already informed them previously about our programme.

Public Transport to Rifle Range Nature Park

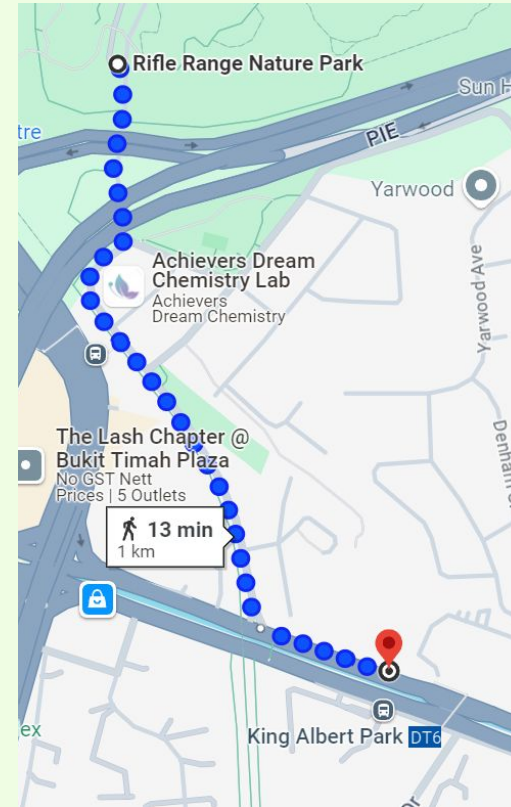
Before Survey

1. Beauty World MRT (DTL) - Exit A, go to Level 4 of Beauty World Centre
2. Take the overhead bridge from MuzArt/Better Days Cafe.
3. Follow directions to Visitor Pavilion

After Survey

For AM Surveys: Exit via same overhead bridge from Visitor Pavilion to Beauty World Centre.

For PM surveys: Access to overhead bridge is closed after 7pm, so continue along Rifle Range Road until Dunearn Road (turn left to King Albert Park MRT). **Refer to map on the right**



Before the Session



- WWF-Singapore staff will notify the Telegram group 2 days in advance on whether the session will proceed.
- Please **inform the main chat group ahead of time if you need to withdraw** from the session.
- Participants should check the weather forecast 1 - 2 hours before the start of the survey. The session should **NOT** proceed in the event of heavy rain/thunderstorm.

Before the Session

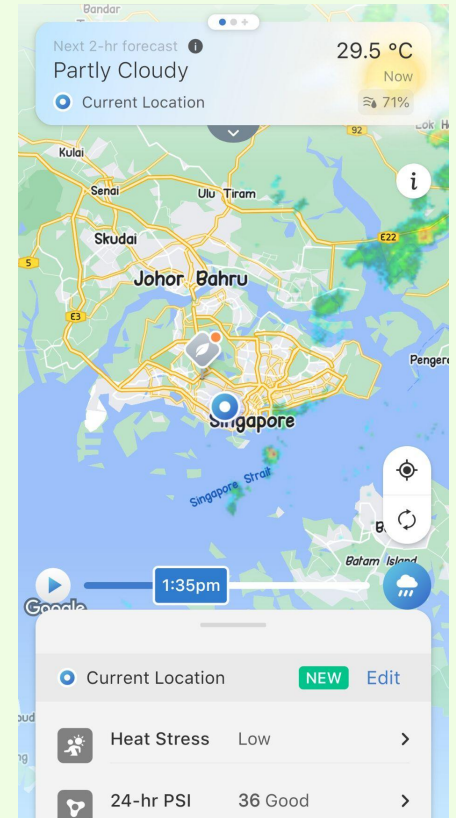
- **NEA Website Weather Forecast:**

<https://www.nea.gov.sg/corporate-functions/weather>

<http://www.weather.gov.sg/home/>

- **myENV App**

App Store, Google Play



During the Session



- Do note that these surveys are meant to be **volunteer-led**, WWF-Singapore staff may not necessarily be present during the session!
- Participants will **meet at the Visitor Pavilion of Rifle Range Nature Park**.
- We recommend that surveys only proceed if there are **at least 2 volunteers present**.
- One representative to message the main Telegram chat group at the start and end of every session (feel free to take a photo for attendance 😊).

The background features a close-up of a green iguana's head on the right side, looking towards the left. The iguana has a textured, scaly appearance with a yellowish-green hue. The background is filled with lush green foliage, including some red flowers, which is softly blurred. A dark green vertical bar is positioned in the center of the image, containing the number '03' in white. The bottom half of the image is a solid light green color.

03

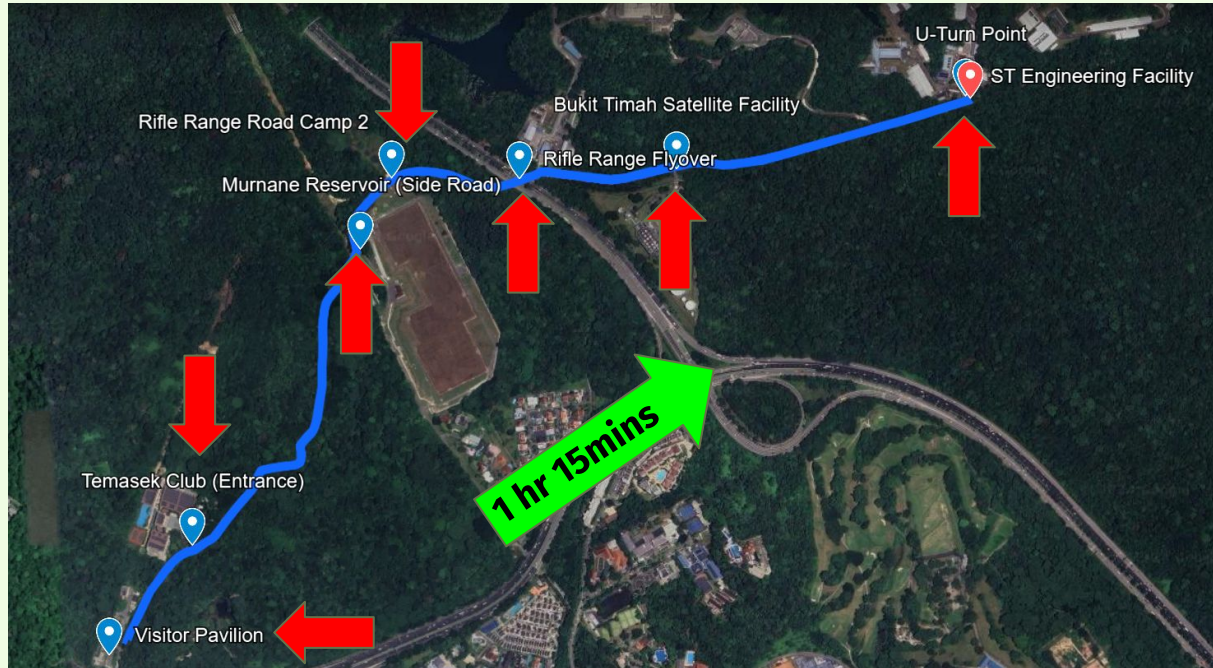
Survey Protocol

Survey Route



Start from the Visitor Pavilion and walk out onto the pavement along Rifle Range Road. **Data collection can start once the group has reached the road.**

Survey Route



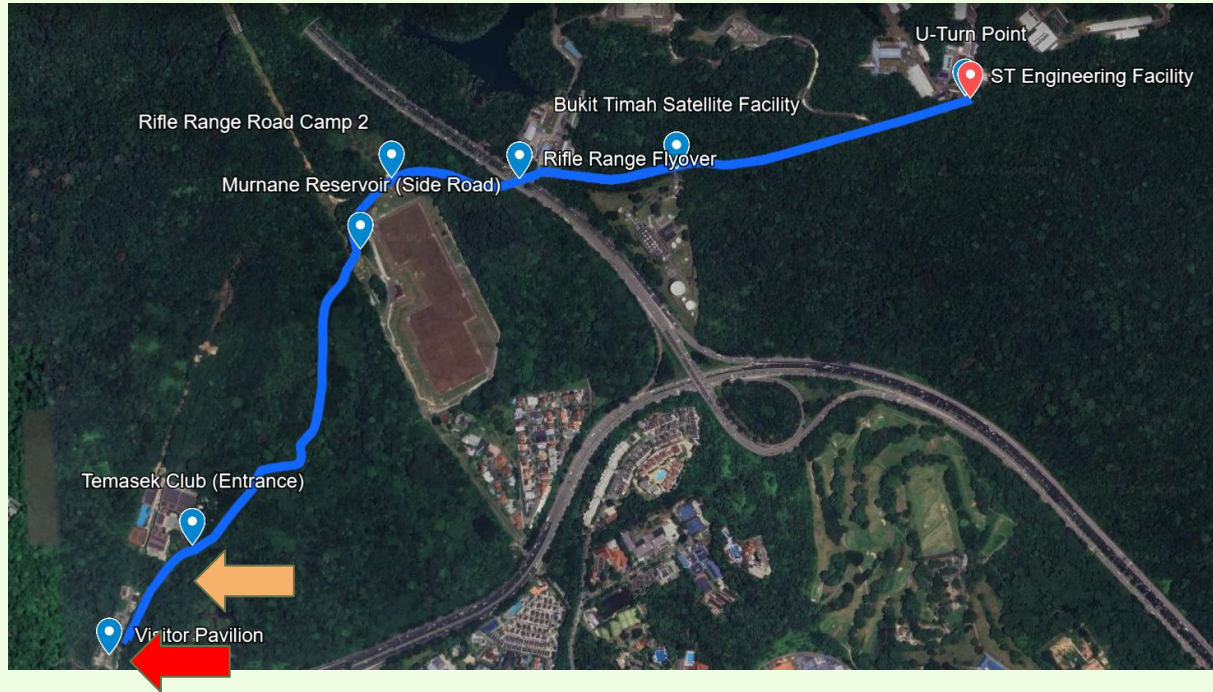
Landmarks: Temasek Club → Murnane Reservoir → Rifle Range Road Camp 2 → Rifle Range Flyover → Singtel Satellite Facility → ST Engineering Facility.

Survey Route



After the u-turn point at the ST Engineering Facility, retrace route back to Visitor Pavilion.

Survey Route (Rope Bridges)



Red: Rope Bridge A

Orange: Rope Bridge B

Rope Bridge A



Before Visitor Pavilion/Overhead Boardwalk

Rope Bridge B

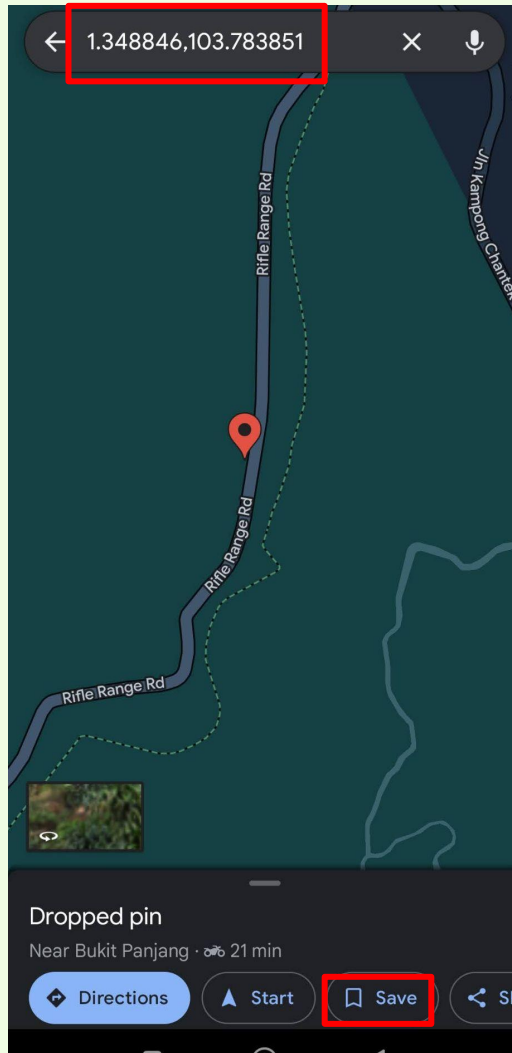


Between Visitor Pavilion and Temasek Club

Data Collection

Record any **mammal, reptile, and amphibian sightings** on/along the road:

- Location: **GPS coordinates**, Nearest landmark such as building or lamp post number



Google Maps

- Drop a pin by tapping on the area along the road where the animal was spotted
- The coordinates should appear in the search bar at the top of the screen
- Copy the coordinates onto the datasheet or save the pin to transfer later.

Data Collection

Record any **mammal, reptile, and amphibian sightings** on/along the road:

- Remarks:
Roadkill/Behaviour/Crossing the road
- Side of the road: If animal was observed crossing the road, use the side it started from



Feeding



Resting/Basking



Crossing



Grooming

Data Submission

- All collected data should be submitted onto Typeform **within 1 week of the survey.**
- If there are good photos of animals, please also submit them to the WWF-Singapore iNaturalist project!

6 → Would you like to report any animal sightings? *

Tell us more about what you found! Record any **mammal, reptile, and amphibian sightings** on/along the road. **Roadkills** should also be recorded.

Yes ✓

No

8 → Animal Sighting #2

Provide details on the next animal sighting during your survey.

press Enter ↵

a. Genus/Species Name *

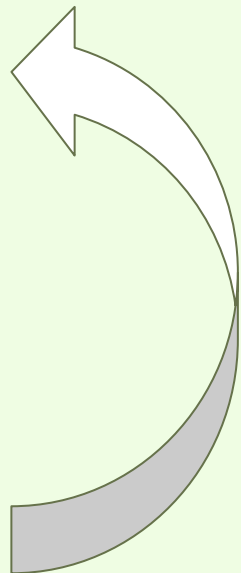
If animal could not be identified, please provide a thorough description (e.g. size, colours)

Macaca fascicularis

h. Do you have another animal sighting to submit?*

Yes

No



Safety Information

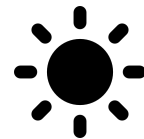
- Always prioritise safety!
- Please always **stay on the sidewalk wherever possible**. There are sections where there is no pavement, please keep to the side of the road and look out for oncoming traffic.
- Hazards: Slopes, vehicles, bicycles, tree-falls
- **For PM sessions**, ensure your torches are fully charged and/or bring spare batteries. Wearing bright colours/reflective vests is recommended. A small stretch near ST Engineering is not lit at night

The background of the slide is a close-up photograph of green plant leaves, likely from a grass or similar species, showing detailed vein patterns and textures. The leaves are arranged in a dense, overlapping pattern, filling the entire frame. The lighting is soft, highlighting the natural green hues and the fine details of the leaf surfaces.

Species Identification

04

Mammals - Shrews and Squirrels



Plantain Squirrel (*Callosciurus notatus*)



- Widespread in urban areas, parks, nature reserves
- Arboreal
- Distinct white and black stripe along side of body
- Stout body with thick, bushy tail

Slender Squirrel (*Sundasciurus tenuis*)



- Mostly associated with forest habitats
- Arboreal
- No stripe along side of body
- Slender body with thin, furry tail



Common Treeshrew

Pointed Nose.
Thin Tail



Shrew-faced Ground Squirrel

Pointed Nose.
Bushy Tail

Mammals - Rats and Mice



Singapore Rat (*Sundamys annandalei*)



Rattus sp.



- Inhabits secondary forests
 - Mostly on the forest floor, but can climb trees
 - Grey-brown fur with pale underside
- Commonly found as roadkill

Mammals - Flying/Gliding



Sunda Colugo (*Galeopterus variegatus*)



- Mostly resting in the daytime, hanging onto sides of trees
- Mottled-grey to reddish-brown
- Active at night, glides across trees
- Patagium (webbing) connects to tail

Horsfield's Flying Squirrel (*Iomys horsfieldii*)



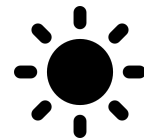
- Very elusive
- Arboreal
- Grey/red/brown uppersides
- Long, bushy tail is not connected to patagium

Dog-Faced Fruit Bat (*Cynopterus brachyotis*)

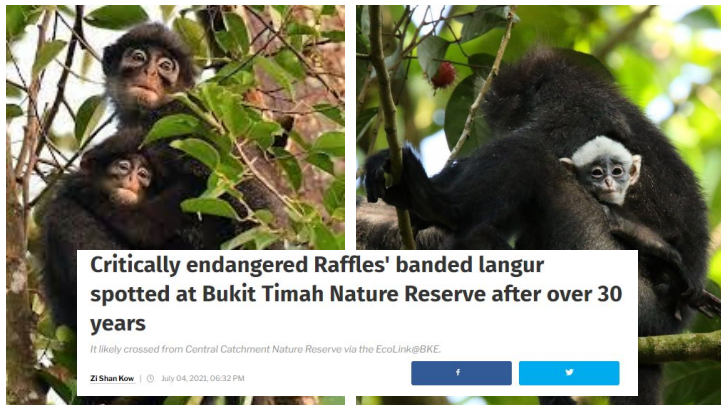


- Capable of true flight
- Active during dusk
- Flying around lamp posts, trees

Mammals - Primates



Raffles' Banded Langur (*Presbytis femoralis*)



- Arboreal, very shy
- Lives in troops, but adult males might be solitary
- Adults have black fur with white stripes on their thighs and a white belly
- Infants are born with bright white fur

Long-tailed Macaque (*Macaca fascicularis*)



- Trees, forest floor, and roadsides
- Lives in troops of 15-35 individuals, with solitary individuals often being males looking for a new troop
- Adults are golden brown with pale undersides and distinct white eyelids. Infants are born with black fur



Sunda Slow Loris (*Nycticebus coucang*)



- Found in Bukit Timah, Central Catchment, and Pulau Tekong
- Arboreal
- Slow lorises are the only venomous primates, mixes a secretion from its elbow with its own saliva

Rare Sunda Slow Loris Spotted In S'pore After Nature Lover Searched For Almost 1 Year



ENVIRONMENT | FEATURED | LATEST NEWS

The nature lover waited till 3.20am in the morning.

By Jeremy Lee - 23 Sep 2023, 2:06 am



Lesser Mouse-deer (*Tragulus kanchil*)



- Forest floor
- Small mammal 40 - 55 cm long, 20 - 23 cm tall
- Chevron-shaped three white stripes on chest
- Mostly spotted through their eye-shine in the undergrowth

Common Palm Civet (*Paradoxurus hermaphroditus*)



- Found across Singapore, sometimes seen in residential areas
- Usually high up on trees
- Three stripes on its back, spots on the side of body
- Distinct black 'mask' on its face
- Eye-shine in the foliage of trees



Leopard Cat (*Prionailurus bengalensis*):



- Forest floor, but can climb trees
- Singapore's last wild cat
- Size of a domestic cat, but with black spots on the sides of yellowish-brown body

Sunda Pangolin (*Manis javanica*):



- Bukit Timah and Central Catchment Nature Reserves, Pulau Ubin, and Pulau Tekong
- Sometimes also seen near urban areas
- Found both on the ground and up on trees
- Unique animal with its back covered in scales



Eye-shine



- Useful way of spotting mammals at night
- Other animals might also produce eye-shine
 - Colours can be a way to tell them apart
 - e.g. Moths (orange/red), spiders (green), mammals (white)
 - However, no hard and fast rule

Herpetofauna - Frogs and Toads



Greenhouse frog (*Eleutherodactylus planirostris*)



- Non-native
- Lives in moist leaf litter on the ground
- Rapid, chirpy call (sounds like squeaky tap)
- Very small, 1 - 3 cm

Copper-cheeked frog (*Chalcorana labialis*)

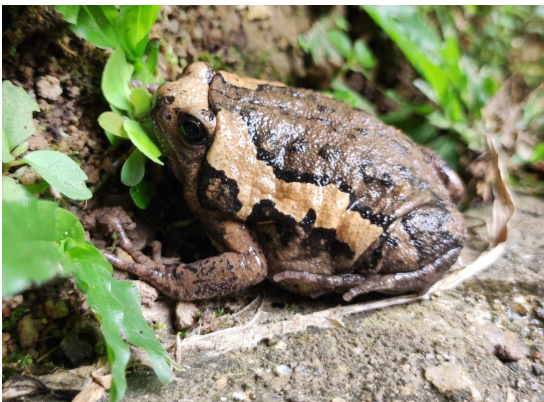


- Commonly found in streams, foliage in and adjacent to forests
- Small, only grows up to 7cm
- Large brown eardrum behind eye, white lips
- Calls sound like dripping water

Herpetofauna - Frogs and Toads



Banded Bullfrog (*Kaloula pulchra*)



- Can be found near human habitation, in puddles, drains, etc.
- Up to 7.5 cm
- Chubby, with distinct orange/brown stripe running down side of body
- Loud, drawn out call

Asian Toad (*Duttaphrynus melanostictus*)



- Very common, found in grassy areas, drains, and roads
- Up to 11.5 cm
- Lines of warts along its back and side, raised ridge behind the eye

Herpetofauna - Snakes and Lizards



Oriental Whip Snake (*Ahaetulla prasina*)



- Commonly found resting on foliage along forest edges
- Up to 2m
- Slender, light brown to bright green

Painted Bronzeback (*Dendrelaphis pictus*)



- Found in forest edges, parks, and gardens
- Up to 1.25m
- Brown/bronze on top, pale below
- Black stripe running across eye

Herpetofauna - Snakes and Lizards



Wagler's Pit Viper (*Tropidolaemus wagleri*)



- Venomous! Please maintain a safe distance
- Grows to a maximum of 1m
- Resting on low-lying vegetation/structures
- Juveniles and males are green with red and cream spots, and have a stripe through the eye
- Females are large, coloured black and yellow (yellow stripes and underside).

Equatorial Spitting Cobra (*Naja sumatrana*)



- Capable of spitting venom if they are feeling threatened, treat with caution
- Black to bluish-black, can flare hood around its neck
- Can be found searching for prey on forest floor

Herpetofauna - Snakes and Lizards

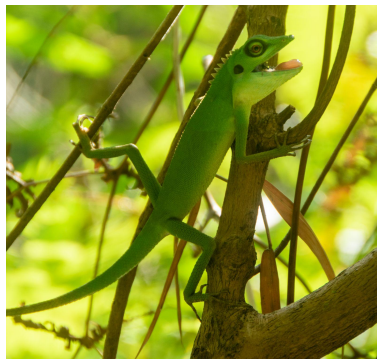


Reticulated Python
(*Malayopython reticulatus*)



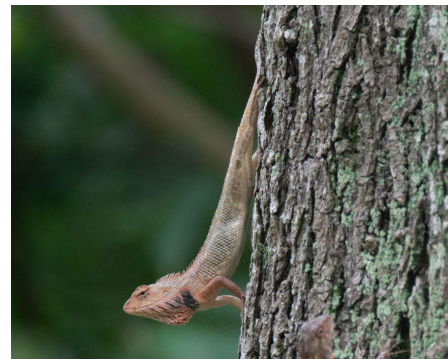
- In Singapore, sometimes seen in storm drains or on pavement-side railings
- Usually 5 - 7m, but can grow up to 10m (longest snake in the world!)
- Distinct zig-zag pattern along its body

Green Crested Lizard
(*Bronchocela cristatella*)



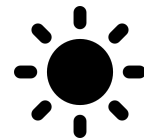
- More associated with forested areas, but can also be found in parks
- Bright green, with head sometimes bluish.

Changeable Lizard
(*Calotes versicolor*)

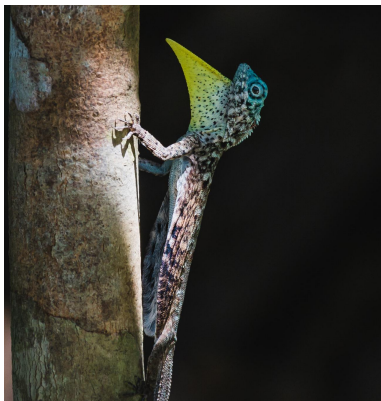


- Common in parks, gardens, urban areas.
Green/brown/grey, with males sporting a reddish head during the mating season

Herpetofauna - Snakes and Lizards



“Flying Dragons” (*Draco sp.*)



- On the sides of trees along forest edges, parks, and roadsides
- 10cm or less in length (excluding tail)
- Back is mottled brown/green/blue
- Males also have a ‘flag’ on their necks

Monitor Lizards (*Varanus sp.*)



Clouded



Malayan Water

- Foraging amongst leaf litter, or resting on branches
- Can be differentiated by head shape and position of nostril
 - Clouded Monitors have nostrils in the midway along the snout, while Malayan Water Monitors have it nearer to the tip



Miscellaneous

- Biodiversity identification guides/tools
 - Seek by iNaturalist
 - Ecology Asia
 - Biodiversity of Singapore
 - NParks Flora & Fauna Web
 - Taxo4254 by NUS
- Nearest Parking:
 - [Rifle Range Nature Park Carpark](#) (Open from 7.00am to 7.00pm, but exit is still allowed past 7.00pm)
 - [Mayfair Park Estate](#) (Curbside parking)
- Toilets at Rifle Range Nature Park Visitor Pavilion are open and functioning 24 hours, but lights will only be on from 7.00am to 7.00pm. Do let the onsite security guard know before using.



Miscellaneous

- If you encounter macaques and wild boars, keep your distance and make sure any food/bottles are stored securely in your bags.
 - Remember to record them in the datasheet too!
- Be wary of snakes/bees/wasps in the foliage along the road.
- There are only shelters at both ends of the survey route (Visitor Pavilion, Temasek Club and ST Engineering Visitor Carpark). Participants are to make the call on whether to end the survey and head to shelter in the event of sudden rain.

Any Questions?

*We will be sharing a Google Drive containing the training materials, datasheet, and a survey SOP document for easy reference

Training Materials, Photos,
Datasheets



Rifle Range Road Monitoring
Telegram Group

