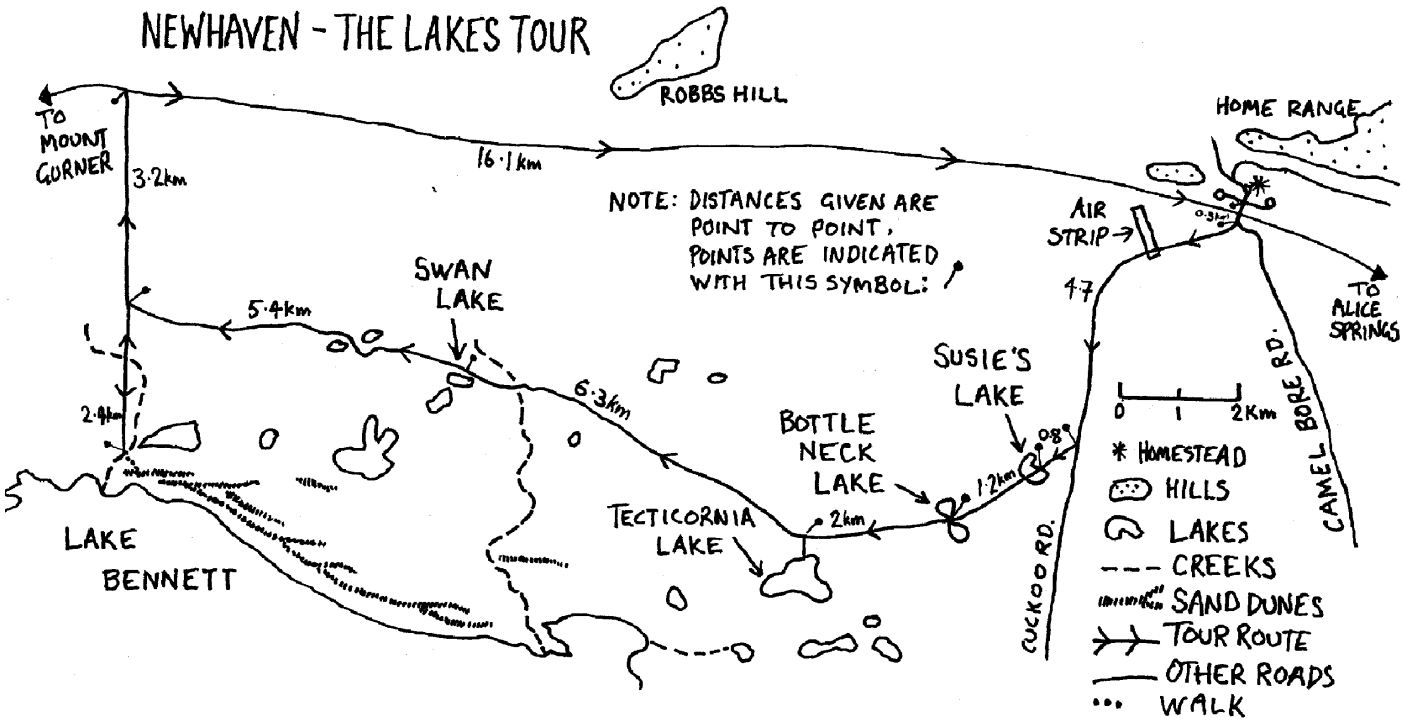
Newhaven Wildlife Sanctuary
The Lakes Tour

Please Note: Newhaven Sanctuary has a vast number of tracks and firebreaks not all of these are open to the public. For safety please keep to designated tracks. Always take plenty of drinking water. Part of this track is very sandy, use 4WD only. While on Newhaven please use UHF channel 3 Duplex.

Lakes Tour Summary

South of Newhaven Homestead the landscape is shaped by the presence of salt and calcrete (a form of limestone deposited in ancient drainage lines). The Lakes Tour, with walks, allows you to explore many very different small ephemeral lakes, and ends with a view of a large salt lake, Lake Bennett, which is best viewed at sunset. The total distance is about 50km, and a comfortable travelling and walking time is 4 hours. Recent rainfall determines the state of these wetlands, what wildlife you will find around them and the level of vehicle access. The Sanctuary Manager can advise on conditions.



Tour Notes

0.0 km - Bird Box:
This Tour begins at, and is distance-referenced from, the Registration/Information Shelter ('Bird Box'). Start from here after noting the odometer or resetting the trip meter. Begin by heading south.

0.3 km - Y Junction:
Drive to the intersection with the main road, cross this road. Here the road divides. Take the right fork following the **LAKES TOUR** sign, this is Cuckoo Rd. You now head into a patch of mulga woodland.

0.5 km - Burrowing Bettong warren:
On the LHS, you will pass a remnant Burrowing Bettong warren. There are many remnant warrens throughout Newhaven, within calcrete landscapes. Keep an eye out.

Burrowing bettongs were once widespread across arid and semi arid Australia. The inland subspecies (*Bettongia lesueur graii*) that once occupied Newhaven is presumed to have become extinct during the 1950s. However, two other subspecies persist now on four islands off the coast of WA and in a few small mainland areas, where they have been re-introduced into fenced areas and are protected from foxes and feral cats.

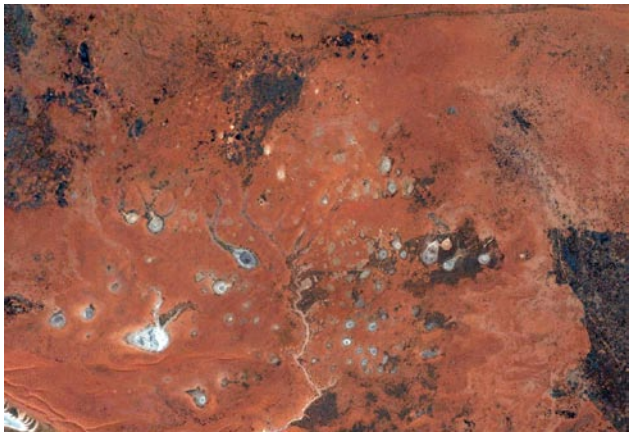
1.0 Km - Old growth spinifex:
The vegetation here is very dense. Both the trees, mostly mulga, and grass, dominated by soft spinifex, crowd the road edge. You will notice large patches of grey; this is where the old spinifex hummocks are dying off in their centres. Old growth spinifex is rare on Newhaven, as almost all of the spinifex sandplain country has been recently burnt. Protected by a network of roads, this small patch has not been burnt for many years. Old growth Spinifex is an important habitat for a number of birds, reptiles and small mammals.

1.9 km - Airstrip:
The road crosses the airstrip and turns further to the south.

2.0 km - Prescribed burn:
On the left hand side you will see a small burnt area. This burn was intentionally conducted in the cool month of August 2007. It aims to help protect the patch of mulga woodland you have just past through, by reducing the fuel available to wildfire in areas adjacent to the woodland.

4.0 km - Conkerberry:
On the left is a large conkerberry (*Carissa lanceolata*). This species is fire sensitive. If fire frequency could be reduced within this vegetation type (semi-saline spinifex plains) there would be an increase in not only conkerberry, but other fire sensitive species such as beefwood (*Grevillia striata*) and broombush (*Templetonia egena*). Conkerberry produces a small delicious edible berry.

5.0 km - Lakes Circuit turnoff:
Turn right here. You are now heading south west. The road soon enters a cluster of small lakes. These are dotted across the landscape between the large Lake Bennett to the south, and the Newhaven-Nyirripi road to the north.



In the adjacent image, the lakes appear as isolated dimples in the land surface. A weak but consistent pattern can be seen. In shape, they look somewhat like tadpoles all swimming in the same direction. Their outlines are often defined by vegetation where trees and shrubs grow densely due to prolonged water availability after rain.

T
The lakes are the end-point of rainfall. Very intense storm rain produces runoff. It heads down slope, in this case generally from north to south. The ‘tadpole head’ is where the runoff water forms a pool. The ‘tadpole tail’ points towards the origin of the flow.

Sheets of calcrete under the soil determine the pool’s longevity. The ponded water infiltrates the soil and eventually reaches the buried calcrete layer. If the calcrete layer is unbroken, then the ponded water remains until evaporated. If the calcrete layer is cracked, then the water will seep through into the deeper layer. Its speed is determined by the perforations in the calcrete.

Over tens of thousands of years, the calcrete sheet becomes thinner and more perforated. This is because rainwater contains dissolved carbon dioxide from the air and is thus an extremely weak acid - carbonic acid, otherwise known as soda water. It very, very slowly

dissolves the calcrete (limestone). Eventually a ponded area may slump and continue to slump and deepen after each flooding.

There is another part of the story. Water flowing overland carries dissolved mineral salts. In a non-draining pond, when the water evaporates the salt remains. Thus, over the millennia, non-draining ponds will become increasingly salty.

The lakes cluster is the result of millenia of the overland flow of surface water - from the rocky uplands to the lowest points in the landscape - Lake Bennett and the east to west string of salt lakes.

Due to the topography of underlying rock, the groundwater on Newhaven is shallow, 3 – 5m. It is this groundwater that is tapped by Newhaven bores. The quality of water drawn from these shallow aquifers varies greatly. Freshwater bore, as its name suggests, is of high quality. In contrast J bore is very high in dissolved salts. The groundwater is renewed by summer rainfall.

There are deeper, larger aquifers (60-200m) that are tapped by Aboriginal communities, such as Papunya, Yuendumu, and Nyirripi, where larger quantities of water are needed. Tests of the 'age' of this water reveal that it is about 80,000 years since it was last recharged, at a time when rainfall was significantly higher.

5.8 km - Susie's Lake:
Please keep to the main track or park very carefully.

At about 1 meter, this is one of the deepest of the small lakes on Newhaven. The aerial view (adjacent) helps interpret what you see at ground level. Susie's Lake is tadpole shaped; the inflow is from the northeast; the circular section is the deepest section. Bands of vegetation define the lake's shape. Which species are present and in what numbers is primarily determined by two factors namely the duration of ponding and level of salts retained in the soil.

Sharply defining the sandy shoreline of this lake is a fringing line of spectacular old growth Inland Teatree *(Melaleuca glomerata).*

What you see on the lake surface will depend on the last filling of the lake. At its very centre, where the water remains for the longest, aquatic species grow. Here you might see a clump of the fern Nardoo (*Marsilea exerata).* Nardoo can tolerate being submerged for a long time. If you come at a wet time, the nardoo will be growing strongly, its fronds emerging above the water. If you come at a dry time, there will be desiccated fronds at your feet. Nardoo is a 'renaissance' plant; it can tolerate extreme desiccation of its tissues. On wetting, it returns to life, and grows rapidly.

In Susie's Lake, and many of the other freshwater ephemeral lakes across Newhaven, there also lives a 'renaissance' crustacean. In the sand underneath the dried Nardoo, there will be eggs of the Shield shrimp (*Triops australiensis*). The eggs of these small crustaceans hatch immediately on wetting, to produce, often in great numbers, rapidly growing adults. They reproduce by laying eggs in the sandy bottom there to desiccate and lie dormant until the next flooding. This is a lifestyle not matched by any other aquatic animals. It compensates for having no defences against predators. Shield shrimps do not survive in permanent wetlands where there are vertebrate (fish and reptiles) or invertebrate (water beetle) predators.

As you move out from the centre, or lowest point of the lake, you will find a band, or patches, of plants that germinate after the water level recedes.

Check for resident or visiting wildlife by searching for tracks. Dingo, hopping mice and camel tracks are common, as are those of goannas.

7.3 km - Bottleneck Lake:

The view from space shows that Bottleneck Lake is similar to Susie's Lake in shape and zones of vegetation. The view from the ground reveals differences. Bottleneck Lake is shallow. At the lower point, vegetation types and patterns are different.

The soil surface in the bottom of the lake differs from that in the previous lake. While there is no obvious salt crust, there are salt tolerant plants here, such as Heart-leaved Frankenia

(*Frankenia cordata*) and samphire (*Tecticornia verrucosa)*. This particular samphire is rare on Newhaven and has a restricted distribution across the western deserts.

Fragments of grinding stones and mill stones used by Aboriginal people here not that long ago can be found on the fringes of this lake. Please leave these where found.

These tools had a variety of uses including preparation of flour from seeds. While not approaching the size of wheat seeds, there are native grasses, samphires and other plants with suitable seeds that grow in these ephemeral wetlands. Some suitable grasses include *Panicum decompositum*, *Eragrostis eriopoda* and*Yakirra australiense*. Seeds from various samphire including *Tecticornia verrucosa* (image opposite)*,* some herbs such as *Portulaca oleracea*, *Dysphania kalpiri* and seeds from some acacia species such as *Acacia coreace* were also used if available.

7.4 km - Old track
There is an old track to the right. Continue on main track to the left.

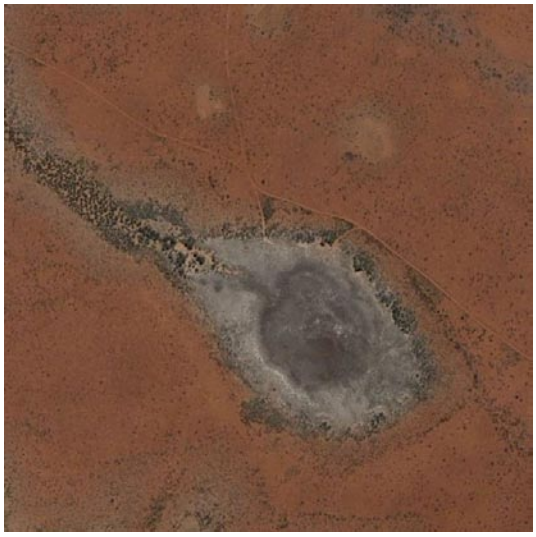
9.3 km - Tecticornia Lake:
Viewed from the air, there is little zonation or definition by vegetation, and, while there are still active signs of flooding, there is no obvious centre of ponding in this lake. You will discover how this lake is different by walking across its surface, which comprises a mix of small island and drainage lines. These islands support salt tolerant species, mainly the sampire, *Halosarcia indica*. making it more swamp-like in nature.

This lake was named (just a few years ago) after the green-blue samphire that grows in Bottleneck Lake.

9.9 km - Old track:
There is another old track to the right. Continue on the main track to the left.

11.7 km - Views:
To the north on the horizon is Rob's Hill and to the south, the Andrew Young Range (also known as the Black Hills), is visible. The red dunes that flank Lake Bennett's northern edge will soon appear.

15.6 km - Swan Lake:



Swan Lake differs significantly from the previous three lakes visited. The aerial view shows that it is fed by a broad but shallow drainage line. It has an obvious terminal ponding site, but fringing zones of vegetation are largely absent. Here, soil colour makes zones visible.

On the ground, the soil type and colour differences are strong. Salt tolerant grass, such as salt love grass, (*Eragrostis falcata*), grows on the fringing white sand of this semi saline lake. It has a dark centre, where samphires are growing. As you walk to the centre, a strong salt crust crunches under your feet. Underneath the crust is black wet clay. Scattered on the surface are numerous shells of an aquatic snail.

The flow of water into this lake brings clay and salt. Clay, a very fine soil fraction, lines the bottom of the lake as all the water evaporates. With this repeated cycle, the lake bottom be develops a clay lining, and is thus effectively sealed against drainage. When filled, this lake would hold water longer than the others. Even though the lake surface is salty, when filled, the salinity levels are still low enough to permit the growth of an aquatic snail. The prolonged flooding along with growing food supplies, make this lake attractive to water birds, hence its name.

In times of above average rainfall, this small lake forms a link in a wide but scattered chain of ephemeral wetlands stretching across the desert

15.8 km - Old track:
There is another old track to the right. Continue on the main track to the left.

The track winds its way through numerous small water holding depressions. Varying vegetation distinguishes each lake.

18.3 km - Burrowing Bettong burrows:
The road has just crossed a sandy shallow ephemeral drainage line. An aerial view suggests that in the past, flows were greater and or more frequent. Those past flows have cut through the underlying calcrete layer. On the western edge, where the road climbs out of this drainage line, a mini escarpment of calcrete is visible.

If you stop and explore the site, on both sides of the road you can see how burrowing animals exploit surface breaks in the calcrete layer.

The presence of calcrete has numerous influences on plants and animals.

Chemically: calcrete influences the availability of nutrients. Some plants prefer calcareous soils such as witchetty bush (*Acacia kempeana*).

Physically: the presence of impervious calcrete sheets just below the surface alters the amount of water that can be stored in the soil layer (above the sheet). It also affects the rate by which rainfall either infiltrates the soil or runs off - a very influential consequence for plants and animals in an arid environment.

Calcrete is also an important habitat. Where calcrete sheets are cut and exposed, as here, they provide a physically strong burrow where the extreme temperatures of summer can be avoided.

If you travel in the south of Newhaven you will encounter extensive, near-surface calcrete sheets that border the chain of salt lakes that run between Lake Bennett and Lake Lewis.

As mentioned earlier Burrowing Bettongs dug extensive warren systems in which they would rest during the day. These extensive warrens may have supported up to 100 animals. Interestingly, bettong numbers were initially not seriously affected by rabbits, which arrived here in the 1920s, with both species sometimes sharing warrens. Today, however, you will only find rabbits.

21 km - T junction:
Turn left (south) a 2.5km drive takes you to the viewing area for the largest lake on Newhaven, Lake Bennett.

This track follows an old fence line. Some of the wooden fence posts are still visible, some have been burnt by previous fires. The remnant fence lines remaining on Newhaven represent years of hard labour.

21.5 km - Old track:
The main track veers to the left to avoid erosion.

23.4 km - Lake Bennett viewing area:
The turnaround area is very soft. Please stay as high as possible.

The lake is directly ahead of you beyond the sand dune. Walk across the creek and climb the ridge of the sand dune. This dune provides the best overall view.

Lake Bennett receives surface water from several large ephemeral channels. It is the western end of the east – west string of salt lakes that begin with Lake Lewis, south of Tilmouth Well roadhouse. They are the remains of a once much larger Lake Ngalia formed several million years ago.

As the following satellite images show, Lake Bennett and surrounds fill after exceptionally heavy rain.

25.8 km - T junction:
Travel straight through; this is the quickest way home, it will take you to the main road.

26 km – Damaged mulga:
To the right there is a small patch of young mulga. This mulga has been damaged by camels. Almost each individual tree has had its main trunk snapped so the camel is able to graze its leaves. You will also notice a similar pattern within the next mulga patch just to the north.

27.1 km - Road on left:
There is a turn off to the left. Do not take. Continue to the north.

29 km - T junction:
Turn right here. You will now be travelling east along the main road towards the Homestead and campgrounds.

39 km - Newhaven Homestead turn off:
Turn left towards the campgrounds.

We hope that you have enjoyed this tour.