WETLANDS

Sirkelsvlei - Taking a stroll through Cape Point's largest permanent waterbody

Sue Matthews visits Sirkelsvlei, Cape Point's freshwater gem.

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A narrow path of white sand snaked before us as we hiked through the fynbos, pausing to watch five browsing eland before continuing on in our quest. Surely we should have reached it by now… had I taken a wrong turn and led my friends astray? Moments later, a surge of relief and excitement as I glimpsed a flash of blue through the rocks ahead.

We had come to see Sirkelsvlei, the largest permanent waterbody in the Table Mountain National Park's Cape of Good Hope section, more commonly referred to as simply Cape Point, after the iconic tourist site at the tip of the Cape Peninsula. Having hiked and cycled in Cape Point on a number of occasions over the years, I had not been to Sirkelsvlei for more than two decades. My visit then had been discouraging – after a long trudge from the Cape Point gate in particularly blustery and overcast weather, the windswept vlei had appeared grey and unwelcoming.

What a difference a day makes! Today, under an unbroken blue sky and with only the gentlest of breezes, the vlei was a jewel in a setting of brown and green, offset by a spectacular mountain backdrop. Contrary to its name, Sirkelsvlei is not round but elongated, although each end curves gently along a soft, marshy shoreline, contrasting sharply with the rugged, rocky sides. As we soaked up the view, three bontebok ambled along to the north-west end and lay down on the grass – evidently a favourite spot, judging by the scattering of dung. A splash in the water reminded me that Cape terrapins occur here, but it was only a pair of Egyptian geese, having a bath. Otherwise, the only obvious fauna was a grey heron that flew off shortly after we arrived.

Later, after returning home, I looked up Tony Gardiner's PhD thesis, 'A study on the water chemistry and plankton in blackwater lakelets of the south-western Cape', awarded by the University of Cape Town (UCT) in 1988. Sirkelsvlei was one of six vleis investigated by Gardiner, three of them in Cape Point. For a 15-month period between February 1981 and April 1982, he conducted monthly monitoring and sampling at each of the vleis, with 17 sites in total, amounting to an enormous laboratory and microscopy workload. The research was an extension of Gardiner's Honours thesis in 1980, and after eight years he was

evidently ready for a radical change. Upon completing his PhD, he did an MBA and then entered the business consulting world, never to return to science.

Nonetheless, thanks to Gardiner we know that Sirkelsvlei has a relatively high pH for a blackwater system, as he recorded a mean pH of 6.55 but a maximum of 6.9 in late summer to autumn. This can be attributed to buffering due to Sirkelvlei's high salinity, which was an order of magnitude greater than the other five vleis studied. Its ion composition closely matches that of seawater, which is a clue to the cause for the high salinity. Sirkelsvlei is only 2.5 km from the sea, as the crow flies, and Cape Point is officially the windiest place in South Africa. The marine salts are simply picked up as aerosols from the sea surface and deposited inland. The wind and the vlei's large surface area to depth ratio then concentrate these salts through evaporation. The highest conductivity recorded by Gardiner was approximately 25% that of seawater, but this was in March 1982, when the major ions were at a peak due to elevated evaporation and lack of dilution. Gardiner notes that Cape Point received 2.7 times less rainfall in the summer of 1981/1982 than in the same five months in 1980/1981, but a look at historical rainfall records reveals that his entire sampling period coincided with a drought. Indeed, his shallowest site in Sirkelsvlei had no water to sample by April 1982, and his deepest – recorded as 1.4 m in September 1981 – had dropped to 45 cm.

By the end of 1982, the vlei had dried up, as it is prone to do during droughts. While terrapins are able to burrow down into the mud and aestivate at such times, fish cannot survive without water. Fortunately, the only fish in Sirkelsvlei were alien species of bass and tilapia that had been introduced over the past three decades – not even the hardy indigenous Cape galaxias has ever been found here, although it does occur elsewhere in Cape Point. Gardiner states that the vlei had also dried up in 1969 and 1973, and on the former occasion the conservation staff had removed truckloads of ammunition casings that had been lying there since the Second World War, when Sirkelsvlei had been used as a strafing range for aircraft.

Sirkelsvlei had a considerably greater phytoplankton biomass than the other Cape Point vleis studied, with high chlorophyll c:a ratios indicating a large proportion of diatoms. Zooplankton were abundant, the community being dominated by the calanoid copepod ***Metadiaptomus capensis***, which has only been recorded from a few other high-salinity vleis and rock pools.

Sue Matthews

Bontebok would not have occurred naturally in the Greater Cape Town area, but were introduced to Cape Point in 1946 as part of the effort to save the subspecies from extinction

Such a brief summary does not do justice to Gardiner's thesis, which remains the most detailed scientific work on Sirkelsvlei. However, a more accessible account of Cape Point's freshwater systems in general can be found in a chapter of the coffee table book ***Between Two Shores: Flora and Fauna of the Cape of Good Hope***, written by Michael Fraser and illustrated by his partner, Liz McMahon. The Scottish couple arrived in South Africa in 1984 and spent their first two years living in Cape Point while Fraser conducted research for his MSc degree on the ecology of fynbos birds. Two years after the book's publication, by David Philip in 1994, they returned to Scotland and haven't returned since, but Fraser tells me that Cape Point remains his favourite place on the planet.

Over the past few years, he has published species accounts of its birds (2016), mammals (2022), and reptiles and amphibians (2023) in the open-access journal ***Biological Observations***, which was initiated by the Animal Demography Unit at UCT as a platform for both scientists and citizen scientists to publish biodiversity-related contributions as quickly as possible. Fraser originally compiled the species accounts in the 1990s and has tried to update them with input from local birders and naturalists, but since the journal is not peer-reviewed, there may be some inaccuracies where the latest scientific knowledge has not been incorporated. Furthermore, the title of these three publications all refer to the Cape of Good Hope Nature Reserve, as it was known in Fraser's time there. The reserve was proclaimed in 1939 by the Divisional Council of the Cape, but incorporated into the TMNP when it was established in 1998.

Fraser gives a fascinating overview of the management history in his ***Biological Observations*** publication on mammals. In the past, there was pressure from some quarters to make Cape Point a game reserve, so a variety of large antelope, as well as zebra, were introduced between the 1940s and 1990s, even though it became increasingly evident that the nutrient-poor, unpalatable fynbos there could not support them. Some, such as wildebeest (both blue and black), were subsequently removed, and supplementary feeding with hay and lucerne was carried out for many years. In the 1970s the bontebok were in terrible condition, and found to be not only infested with parasites, but suffering from osteoporosis and cardiac problems due to copper deficiency. To remedy this, some of the ponds that had been constructed as waterholes for the game animals (and in a few cases the cattle before them) were dosed with copper sulphate.

Sirkelsvlei is in fact the only fresh waterbody in Cape Point that is considered both natural and permanent. It is essentially a giant rock pool between two sandstone ridges, and is replenished primarily by subsurface flow. During winter, scores of ephemeral or seasonal pans are filled by rain, run-off, seepage and inundation from the high water table, since much of the land has a flat profile and the shallow soils overlie hard quartzitic sandstone. These pans dry up in summer, as do most of the streams, at least on the surface. The largest, the Krom River, discharges on the west coast, in a part of Cape Point that is closed to the public. Although it sometimes flows over the beach into the sea, it more typically empties into a lagoon that is

John Measey

Seine-netting of artificial ponds containing hybrids of common and Cape platannas was conducted for many years to control the number of common platannas.

periodically flooded with seawater during high seas and spring tides. The lagoon is popular with seabirds as a roosting and bathing spot, according to Fraser, who also confirms Gardiner's ascertain that Sirkelsvlei is not attractive to birds.

As for amphibians, Fraser's species account indicates that more than a dozen species of frogs and toads have been reported to occur at Cape Point, but no mention is made of Sirkelsvlei specifically. Other sources reveal that the clicking stream frog, ***Strongylopus grayii***, has been heard, if not seen, in the vicinity, and the African clawed frog, ***Xenopus laevis***, has been reported from the vlei itself. This little beastie is amusingly described by Fraser in his ***Between Two Shores*** book as having "all the grace and poise of a Sumo wrestler in battle dress."

Many South Africans know the species as the common platanna, and may have heard that it has become invasive in other parts of the world after originally being introduced as a laboratory animal for pregnancy tests (the female frog lays eggs within a day of being injected with the urine of a pregnant woman). Starting in the 1930s, thousands of frogs were exported from South Africa to medical labs, which soon established their own breeding programmes. The species proved so easy to keep in captivity that a flourishing pet trade developed in the 1950s and '60s. By then, new technologies for pregnancy diagnosis had been developed, so some labs simply released their frogs, but many more were already using the species for other biological research and analytical testing. Since the frog is a highly opportunistic species with a wide salinity and temperature tolerance, released animals and escapees from labs, breeding facilities and homes have established invasive populations in the wild over the years, negatively impacting indigenous biota through competition and predation.

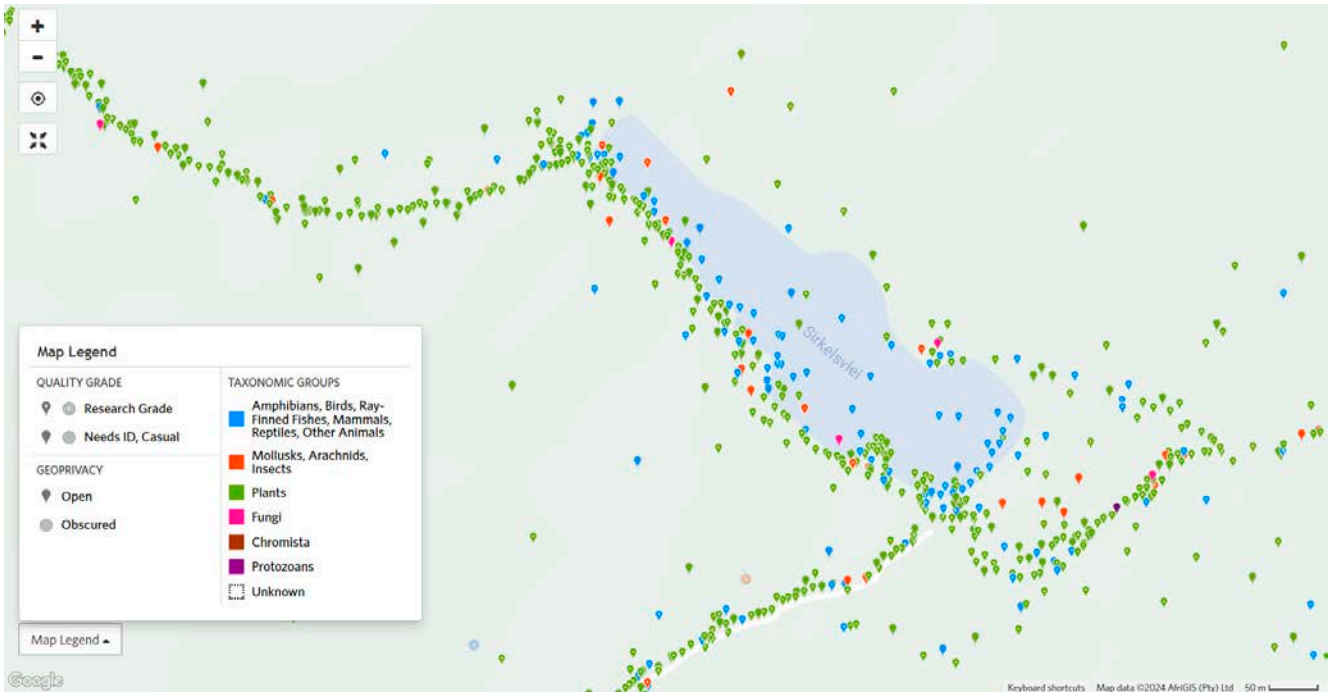
In the south-western Cape – and Cape Point in particular – the chief concern has been its threat to the smaller Cape platanna, ***Xenopus gilli***. Also called the Cape clawed frog, this species is endemic to the winter rainfall region of the Western Cape, and is classified as endangered in ***The IUCN Red List of Threatened Species***, based on the most recent assessment in August 2016. The rationale for this listing was the known area of occupancy of only 60 km^2, the population being severely fragmented into four disjunct areas between the Cape Peninsula and the Agulhas Plain, and the continuing decline in the quality of its habitat and the number of mature individuals.

Cape Point was considered the stronghold of the species, but fears for it grew from the 1980s when Mike Picker's PhD research revealed that ***X. laevis–X. gilli*** hybrids occurred in half of the reserve's permanent waterbodies (but never in Sirkelsvlei). In 1985 a programme to remove ***X. laevis*** from the ponds was instituted, with seining and bait-trapping taking place annually

John Measey

Cape Point was once considered the stronghold of the endangered Cape platanna, Xenopus gilli, but populations further afield have been found in recent decades. The species does not occur in Sirkelsvlei, preferring more acidic, seasonal pools.

iNaturalist



Observations posted on iNaturalist reveal that Sirkelsvlei is a popular destination for hikers, nature lovers and fynbos fundis. The area is a plant hotspot with a number of threatened species, and was listed as a target in the Great Southern Bioblitz 2022.

until 2000, when it ceased following the change in management authority. In 2010, Dr John Measey of Stellenbosch University's Centre for Invasion Biology revived the control programme with his MSc student, André de Villiers, and within five years they had caught and euthanased more than 2 000 ***X. laevis***. Monitoring results, detailed in a paper in ***Conservation Evidence*** (2016), showed a marked increase in young ***X. gilli*** over the five-year period, suggesting that ***X. laevis*** has a negative impact on ***X. gilli*** through predation and/or competition.

Measey continued with the monitoring and control programme for a few years with visiting students from the Organisation of Tropical Studies, a nonprofit consortium of about 50 universities, colleges, and research institutions worldwide. Regular removal of ***X. laevis*** was also included in SANParks' Annual Plan of Operations for Cape Point, but apparently this work has not been done because of capacity constraints.

Fortunately, ***X. gilli*** has been discovered in additional locations in the past few years, and hybridisation is no longer considered a major concern. Measey explains that the better genetic techniques that are available now have found no evidence of gene flow, or introgression, between the two species, despite them sharing a habitat for so long. While laboratory studies have shown that hybrid females are capable of backcrossing – producing viable offspring after mating with either parent species – they don't appear to do this in the wild.

Measey says that one way of protecting ***X. gilli*** from ***X. laevis*** at Cape Point would be to fill in the artificial ponds where the hybrids occur, since game animals do not use them as waterholes anyway. He explains that under natural conditions ***X. gilli*** normally breeds in seasonal and ephemeral pans that get inundated in rainy periods. Historically, it was probably the dominant of the two species in much of its range, with ***X. laevis*** confined to slow-moving rivers. On the Cape Flats, for example, even large waterbodies like Zeekoevlei and Rondevlei would have been seasonal rather than permanent. And while both species can burrow down into wet mud to aestivate when water dries up, ***X. gilli*** is adapted to seasonal wetlands by having tadpoles that develop quickly when water is present.

"The tadpoles of ***X. laevis*** can't develop as quickly, so where the wetlands are seasonal the ***X. laevis*** don't go through to metamorphosis, and that controls their numbers," he says. "In my opinion, if Sirkelsvlei was the only permanent waterbody left in Cape Point, ***X. laevis*** wouldn't be so much of a problem."

Sue Matthews

The vlei rat Otomys irroratus likely lives in the marshes at each end of the vlei, where it feeds on grasses and other plant material.