Appendix 1

TABLE 1: Morphometric features associated with the Kruger National Park land types within which the four research supersites occur.

Supersite	Land system	Land type	Geology	Geomorphology	Rainfall (mm)	Altitude (m)	Stream frequency (n/km^2)	Slope classes (% of area)			
								0–2	2–6	6–15	> 15
Southern Granites	Skukuza	Renoster-koppies	Granite or Gneiss of the Nelspruit granite suite	Moderately undulating plains sloping down towards the Sabie River	500–750	250–350	2.30	7	86	6	1
Northern Granites	Phalaborwa	Shivhulani	Mainly amphibolite of the Gravelotte group and migmatite of the Makhutswi gneiss; dolerite dykes occur frequently and syenite plugs occur as scattered koppies	Moderately undulating incised plains sloping northward towards the Letaba River	450–600	350–400	3.90	6	81	12	1
Southern Basalts	Satara	Satara	Olivine-poor basalt of the Sabie River basalt formation intruded frequently by dolerite dykes	Flat to slightly undulating plains associated mainly with interfluvial areas and related to the LTIII erosion surface	500–650	140–310	0.39	97	3	0	0
Northern Basalts	Letaba	Mooiplaas	Mainly Olivine-rich basalt of the Letaba formation	Flat and level plains related to the LTIII erosion surface	450–500	300–421	0.27	94	6	0	0

Source: Land types taken from Venter, F.J., 1990, 'A classification for land management planning in the Kruger National Park', PhD thesis, Department of Geography, University of South Africa
LTIII, later tertiary phase 3.

TABLE 2: Landforms, soils and dominant vegetation associated with the designated landsystems within which the four research supersites occur.

Supersite	Landforms, soils and vegetation	Slope position			
		Crest	Midslope	Footslope	Valley bottom
Southern Granites	Landforms	Convex well-drained interfluvial areas with slope angles seldom more than 10%	Convex to concave moderately to poorly drained slopes with slope angles less than 1% – 13%	Straight poorly to moderately drained slopes with slope angles of 1% – 9%	Concave and irregular drainage channels
	Soils	Moderately deep eutrophic yellow apedal coarse sand occasionally with plinthic subsoil horizons	Shallow grey eutrophic coarse sand over weathered rock or greyish-brown clay	Duplex soils with shallow (10 cm – 20 cm) brown and grey loam abruptly overlying primatic clay which is frequently calcareous	Complex association of deep brown sand to calcareous clay (occasionally calcareous along drainage lines) and shallow to deep brown sand to clay with rock outcrops (small drainage lines)
	Vegetation	Moderately dense mixed *Combretum spp.* bush savannah; *Combretum zeheri* is prominent	Moderately dense *Terminalia sericea* bush savannah	Open *Acacia nilotica –Acacia gerrardii* shrub savanna with short grasses; *Acacia borleae* often dominant	Dense heterogeneous riverine forest
Northern Granites	Landforms	Convex interfluvial areas with slope angles seldom more than 3%	Long straight well drained slopes with slope angles of 4% – 7%	Straight to concave well drained slopes with slope angles of 0% – 3%	Concave and irregular drainage channels with slopes 4% – 9%
	Soils	Very shallow red and brown apedal loam and coarse sand; rock outcrops occur occasionally	As for crest but with more red loam and less brown sand	Shallow red apedal and structured loam and clay associated dolerite dykes or metalavas; duplex soils occur where gneiss is present	A complex association of alluvial sand to clay in various stages of profile development; loamy and clayey subsoils are frequently calcareous
	Vegetation	Moderately dense *Combretum apiculatum –Colophospermum mopane* bush savannah	Moderately dense *Combretum apiculatum – Colophospermum mopane* bush savannah	Moderately dense *Colophospermum mopane – Acacia nigrescens* bush to tree savannah	Dense heterogenous riverine forest
Southern Basalts	Landforms	Extensive plains with slopes under 4%	Short with slopes 1% –5%	Short with slopes 1% – 4%	Flat with multiple channels and pans
	Soils	Moderately deep to shallow red and brown structured and paraduplex clay	Shallow red and brown orthic and melanic loam and clay	Deep to moderately deep black and brown vertic and pedocutanic frequently calcareous clay	A complex association of black and brown calcareous alluvial clay and loam in various stages of profile development
	Vegetation	Open *Acacia nigrescens – Sclerocarya birrea* tree savannah; *Dichrostachys cinerea* is a prominent shrub.	Moderately dense *Acacia nigrescens – Dichrostachys cinerea* bush savannah	Grassland to moderately dense *Combretum hereroense – Euclea divinorum* bush savannah; *Acacia borleae* form localised dense shrub stands	Dense heterogeneous riverine forest; *Acacia xanthophloea* often present
Northern Basalts	Landforms	Extensive plains with convex slopes under 0% – 2%	Convex slopes 1% – 7%	Concave or straight slopes 0% – 5%	Concave or irregular with slopes 0% – 1%
	Soils	Shallow to moderately deep black structured and vertic calcareous clay often overlying calcrete	Shallow black structured calcareous clay overlying calcrete	Moderately deep to deep black vertic calcareous clay	Deep vertic calcareous clay overlying gleyed clay
	Vegetation	Dense to moderately dense *Colophospermum mopane* shrub savannah; the dominant grasses are *Bothriocloa radicans* and *Setaria woodii*	As crest but also species preferring shallower soils	Open to dense *Colophospermum mopane* bush savannah; *Combretum imberbe* often conspicuous	Predominantly dense riverine forest with heterogeneous vegetation; *Hyphaene natalensis*, *Lonchocarpus capassa* and *Acacia xanthoploea* are often the dominant woody plants

Source: Landsystems taken from Venter, F.J., 1990, 'A classification for land management planning in the Kruger National Park', PhD thesis, Department of Geography, University of South Africa

Note: This is the Online Appendix of Smit, I.P.J., Riddell, E.S., Cullum, C. & Petersen, R., 2013, 'Kruger National Park research supersites: Establishing long-term research sites for cross-disciplinary, multiscaled learning', *Koedoe* 55(1), Art. #1107, 7 pages. http://dx.doi.org/10.4102/koedoe.v55i1.1107.

TABLE 3: Hydrogeological characteristics for the regions of the Kruger National Park research supersites.

Supersite	Formation	Typical borehole depths	Typical water strikes	Borehole yield	Occurrence of groundwater	Water type
Southern Granite	Nelspriut suite	Between 30 m and 80 m (average 51 m)	Between 10 m and 50 m	54% of boreholes: < 1 L/s 37% of boreholes: 1 L/s – 5 L/s	Broken or weathered gneiss	Na-HCO3
Northern Granite	Makhutswi	Between 20 m and 80 m (average 47 m)	Within the first 30 m	37% of boreholes: < 1L/s 43% of boreholes: 1 L/s – 5 L/s 20% of boreholes: > 5 L/s	Broken gneiss, possibly dyke contact zones	Na-HCO3
Southern and Northern Basalts	Letaba	58% of boreholes: 50 m 35% of boreholes: 50 m – 100 m (average 49m)	Within the first 20 m	58% of boreholes: < 1 L/s 34% of boreholes: 1 L/s – 5 L/s (average: 1.48 L/s)	Broken Basalt	Na-Mg-HCO3

Source: Du Toit, W.H., 1998, *Geohidrologie van die Nasionale Krugerwildtuin gebaseer op die evaluering van bestaande boorgatinligting* [*Geohydrology of the Kruger National Park based on the evaluation of existing borehole information*], vol. 1, Directorate Geohydrology internal report GH 3798, Department of Water Affairs and Forestry, Pretoria

TABLE 4: Annual rainfall (01 July to 30 June) recorded since 1940–1941 at Skukuza (approx. 10 km from centre of Southern Granites supersite), Crocodile Bridge (approx. 13 km from centre of Southern Basalts supersite), Phalaborwa (approx. 15 km from centre of Northern Granites supersite) and Mooiplaas (approx. 5 km from centre of Northern Basalts supersite).

Rainfall year	Southern Basalt supersite (Crocodile Bridge)	Northern Basalt supersite (Mooiplaas)	Northern Granite supersite (Phalaborwa)	Southern Granite supersite (Skukuza)
1940–1941	561.7	-	313.8	-
1941–1942	876.3	-	644.6	576.9
1942–1943	777.1	-	401.4	488.2
1943–1944	573.3	-	379.4	591.4
1944–1945	457.6	-	277.6	598.3
1945–1946	703.1	-	-	472.9
1946–1947	538.8	-	224.3	372.4
1947–1948	697.1	-	493.6	602.5
1948–1949	-	-	323.4	483.8
1949–1950	737.0	-	627.4	571.3
1950–1951	-	-	-	453.2
1951–1952	455.2	-	286.9	403.4
1952–1953	-	-	-	447.9
1953–1954	-	-	392.6	347.6
1954–1955	715.0	-	500.3	530.4
1955–1956	702.5	-	586.2	651.0
1956–1957	476.9	-	-	381.2
1957–1958	607.4	-	-	724.1
1958–1959	665.5	-	-	646.2
1959–1960	561.3	-	345.3	699.4
1960–1961	643.9	-	621.7	715.3
1961–1962	355.9	-	393.5	419.4
1962–1963	-	-	392.4	525.1
1963–1964	443.0	-	429.1	368.1
1964–1965	-	-	514.8	400.4
1965–1966	511.0	-	433.0	567.0
1966–1967	771.0	-	583.1	631.4
1967–1968	463.0	-	297.9	423.0
1968–1969	-	-	-	410.9
1969–1970	423.8	-	303.7	-
1970–1971	610.0	-	504.4	524.2
1971–1972	837.7	-	707.6	879.0
1972–1973	388.6	-	391.1	319.3
1973–1974	870.5	-	694.3	820.8
1974–1975	663.6	557.0	745.7	672.7
1975–1976	654.7	578.0	709.0	699.0
1976–1977	845.8	863.5	702.8	514.1
1977–1978	812.5	535.0	694.4	849.9
1978–1979	504.9	430.0	573.0	449.6
1979–1980	316.9	624.6	725.6	487.9
1980–1981	637.2	685.5	880.8	749.2
1981–1982	535.1	347.8	370.3	554.2
1982–1983	380.5	196.0	233.7	272.3
1983–1984	722.7	322.6	465.2	640.6
1984–1985	891.8	653.4	694.7	834.5
1985–1986	417.8	415.1	445.2	443.6

Source: Data retrieved from South African National Parks Scientific Services archive

Table 4 continues on the next page →

TABLE 4 (Continues ...): Annual rainfall (01 July to 30 June) recorded since 1940–1941 at Skukuza (approx. 10 km from centre of Southern Granites supersite), Crocodile Bridge (approx. 13 km from centre of Southern Basalts supersite), Phalaborwa (approx. 15 km from centre of Northern Granites supersite) and Mooiplaas (approx. 5 km from centre of Northern Basalts supersite).

Rainfall year	Southern Basalt supersite (Crocodile Bridge)	Northern Basalt supersite (Mooiplaas)	Northern Granite supersite (Phalaborwa)	Southern Granite supersite (Skukuza)
1986–1987	497.0	225.4	314.0	446.8
1987–1988	648.4	702.2	-	681.9
1988–1989	694.3	225.0	-	660.6
1989–1990	663.7	412.3	619.6	498.5
1990–1991	469.6	371.3	582.6	429.4
1991–1992	370.1	151.4	172.8	237.2
1992–1993	828.5	419.8	-	608.7
1993–1994	319.9	273.1	333.2	354.7
1994–1995	469.8	436.1	555.4	654.8
1995–1996	767.2	764.7	756.7	909.3
1996–1997	520.3	291.5	400.5	538.6
1997–1998	550.5	234.8	329.6	492.1
1998–1999	1116.6	842.3	720.7	796.6
1999–2000	1223.6	1363.6	1174.2	1125.8
2000–2001	606.4	514.1	560.3	659.2
2001–2002	515.9	460.5	415.9	572.7
2002–2003	368.2	313.5	221.6	307.4
2003–2004	692.7	729.7	712.3	614.5
2004–2005	498.2	309.7	225.0	759.7
2005–2006	717.1	683.3	502.2	862.7
2006–2007	406.1	244.3	305.1	359.1
2007–2008	398.5	437.8	448.0	470.1
2008–2009	429.36	261.0	284.9	668.2
2009–2010	579.4	590.0	419.7	567.1
2010–2011	662.8	441.6	495.0	479.2
Average	**607**	**484**	**489**	**565**

Source: Data retrieved from South African National Parks Scientific Services archive

TABLE 5: Average herbivore density (individuals per km^2) on research supersites based on aerial census data collected between 1987 and 1993.

Species	Northern Basalts	Northern Granites	Southern Basalts	Southern Granites
Buffalo	0.93	0.15	1.18	0.01
Elephant	0.07	0.22	0.17	0.09
Impala	0.04	10.74	11.84	14.44
Kudu	0.08	0.40	0.30	0.30
Roan	0.07	0.00	0.00	0.00
Sable	0.04	0.02	0.00	0.00
Tsessebe	0.81	0.00	0.00	0.00
Waterbuck	0.14	0.00	0.14	0.00
White rhino	0.00	0.00	0.77	0.07
Blue wildebeest	1.55	0.24	2.84	0.24
Zebra	4.57	1.63	1.73	0.16
Giraffe	0.03	0.46	0.47	0.31
Eland	0.03	0.00	0.00	0.00

Source: Derived from Smit, I.P.J., Grant, C.C. & Devereux, B.J., 2007, 'Do artificial waterholes influence the way herbivores use the landscape? Herbivore distribution patterns around rivers and artificial surface water sources in a large African savanna park', *Biological Conservation* 136(1), 85–99. http://dx.doi.org/10.1016/j.biocon.2006.11.009

TABLE 6: The job-row-image codes for historical aerial photography available for the Kruger National Park supersites prior to 2008.

Year	Southern Granites supersite	Southern Basalts supersite	Northern Granites supersite	Northern Basalts supersite
1940	155-009-00454 to 00455	155-012-00110 to 00114	-	-
1942	-	-	165B-026-59635 and 165B-029-59586 to 59590 and 165B-031-59495 to 59500 and 165B-032-59476 to 59480	165B-015-60046 and 165B-016-60016 to 60020 and 165B-017-59965 to 59970 and 165B-018-59935 to 59890
1968	539-018-01241 to 01244	539-020-01522 to 01525	539-004-00610 to 00615	539-001-00545 to 00548
1977	788-002-00020 to 00025 and 788-003-00110 to 00115	788-006-00140 to 00142 and 788-007-00205 to 00207	779-023-02740 and 779-024-09461	779-002-05224 and 779-008-02893 to 02900 and 779-012-02841 to 02845 and 779-018-09820 and 779-019-09817

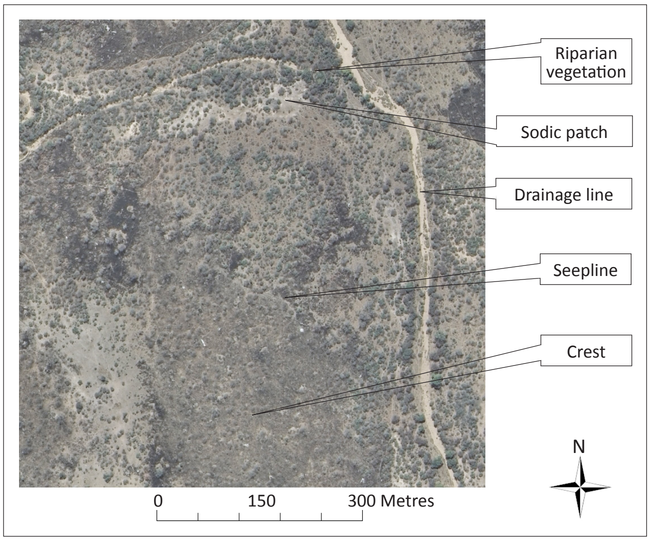
Note: This imagery can be ordered directly from National Geospatial Information. The georeferenced colour photography collected during surveys since 2008 can be downloaded from the SANParks data repository (http://www.dataknp.sanparks.org). Further details on the National Photography and Imagery Programme can be found at http://www.ngi.gov.za/index.php/Image-tabs-home/national-aerial-photography-and-imagery-programme.html

Table 6 continues on the next page →

TABLE 6 (Continues ...): The job-row-image codes for historical aerial photography available for the Kruger National Park supersites prior to 2008.

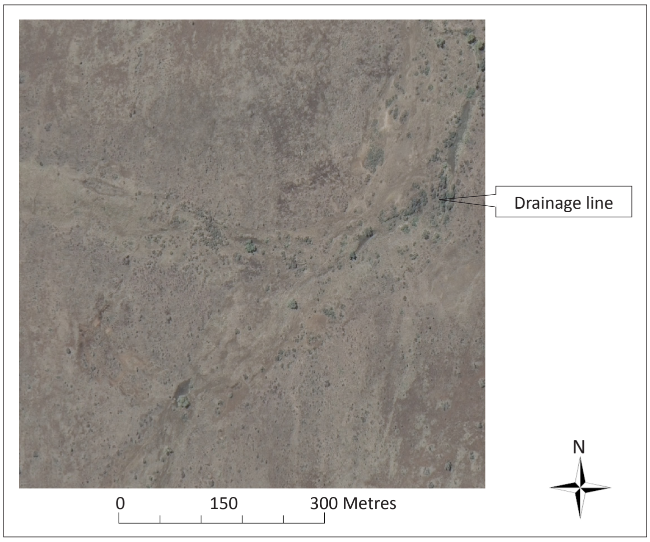
Year	Southern Granites supersite	Southern Basalts supersite	Northern Granites supersite	Northern Basalts supersite
1985	875-21-2322 to 2325	875-25-5320 to 5323	-	-
1989	-	-	932-011-04180 to 04181 and 932-012-04161 to 04163	932-006-06230 and 932-007-01033 to 01035 and 932-008-03167 and 932-016-05088
1994	-	-	975-007-00095	975-008-00847 to 00852 and 975-006-00136 to 00140
1997	996-16-0228 to 0230	996-19-0180 to 0182	-	-
2001	-	-	1055-010-05050 and 1055-011-05375 to 05376 and 1055-012-05015 to 05016	1055-006-05335 and 1055-007-05392 to 05395 and 1055-008-05070

Note: This imagery can be ordered directly from National Geospatial Information. The georeferenced colour photography collected during surveys since 2008 can be downloaded from the SANParks data repository (http://www.dataknp.sanparks.org). Further details on the National Photography and Imagery Programme can be found at http://www.ngi.gov.za/index.php/Image-tabs-home/national-aerial-photography-and-imagery-programme.html



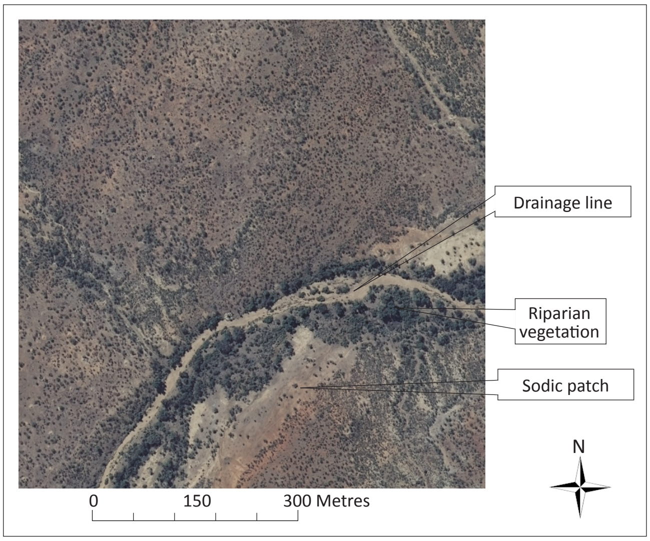
Source: 0.5 m resolution imagery collected by National Geospatial Information in 2010

FIGURE 1: Aerial photograph (1:5000) of a portion of the Stevenson-Hamilton supersite (Southern Granites) – notice the catenal elements, including drainage network, riparian vegetation and sodic valley bottoms.



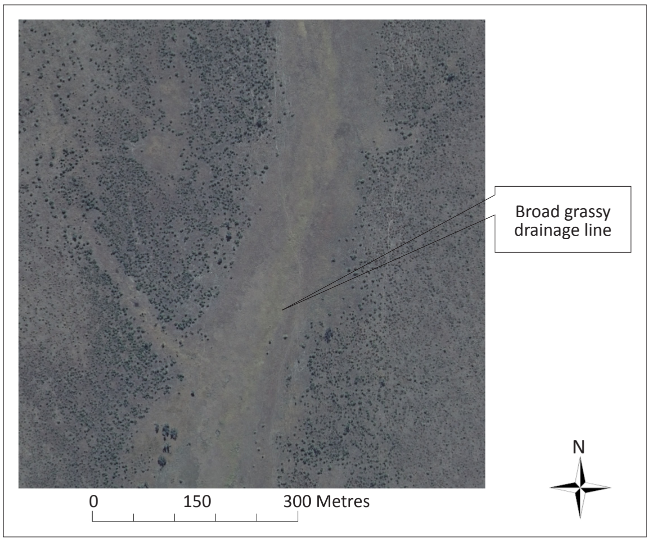
Source: 0.5 m resolution imagery collected by National Geospatial Information in 2010

FIGURE 2: Aerial photograph (1:5000) of a portion of the Nhlowa supersite (Southern Basalts) – notice the low woody cover and general lack of tall trees except around drainage lines.



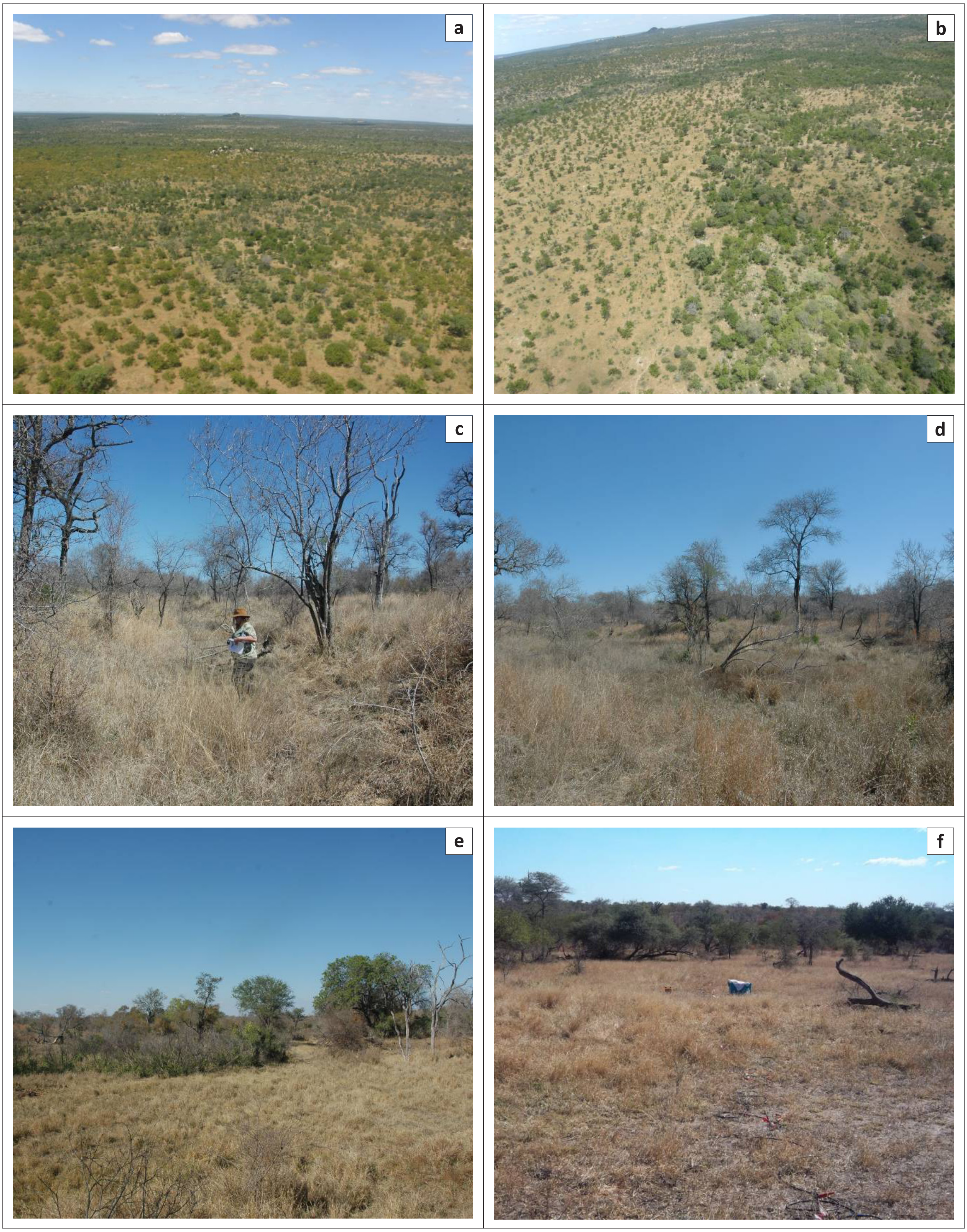
Source: 0.5 m resolution imagery collected by National Geospatial Information in 2008

FIGURE 3: Aerial photograph (1:5000) of a portion of the Ngwenyeni supersite (Northern Granites) – notice the catenal elements, including drainage network, riparian vegetation and sodic valley bottoms.



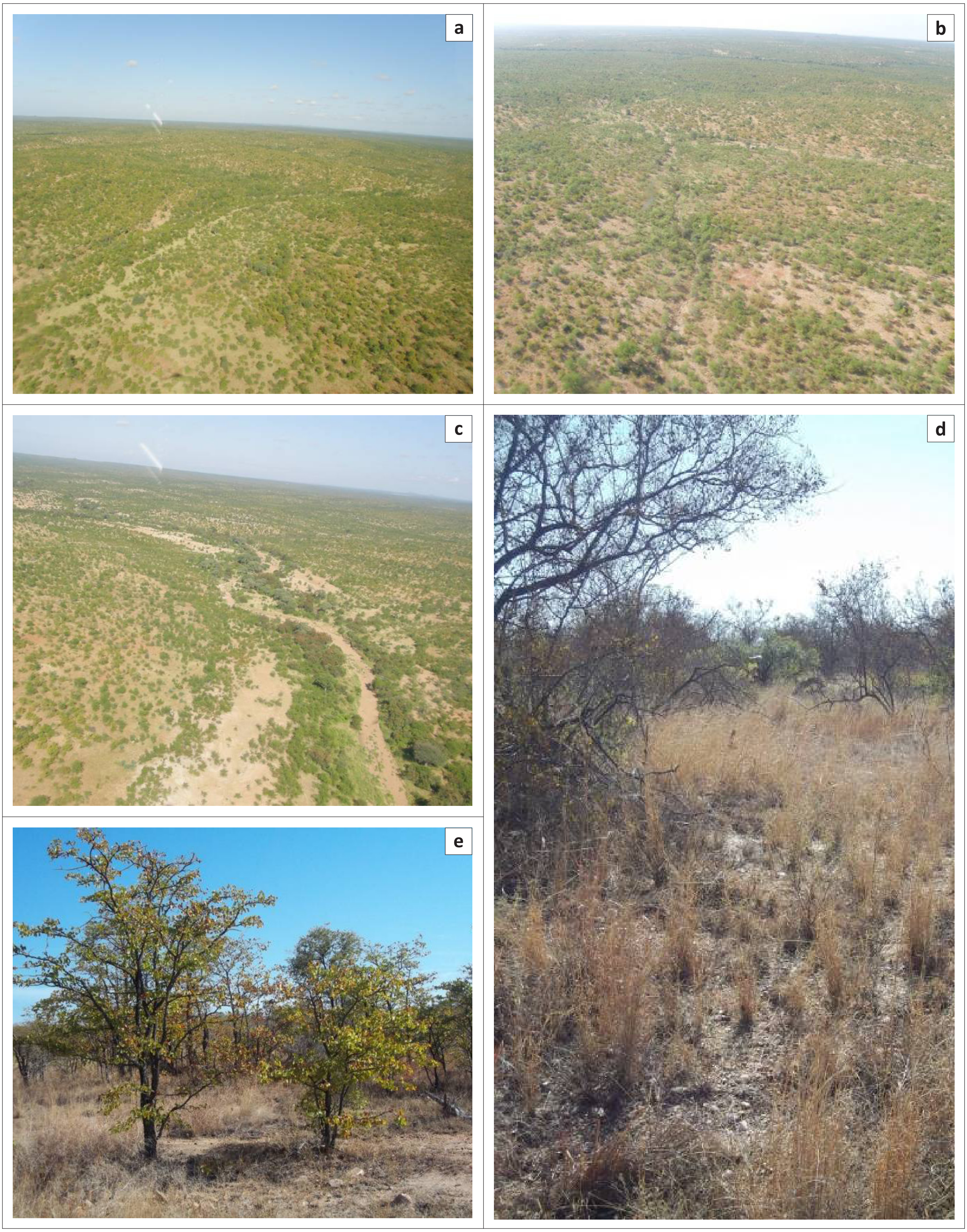
Source: 0.5 m resolution imagery collected by National Geospatial Information in 2008

FIGURE 4: Aerial photograph (1:5000) of a portion of the Mooiplaas supersite (Northern Basalts) – notice the broad open drainage line.



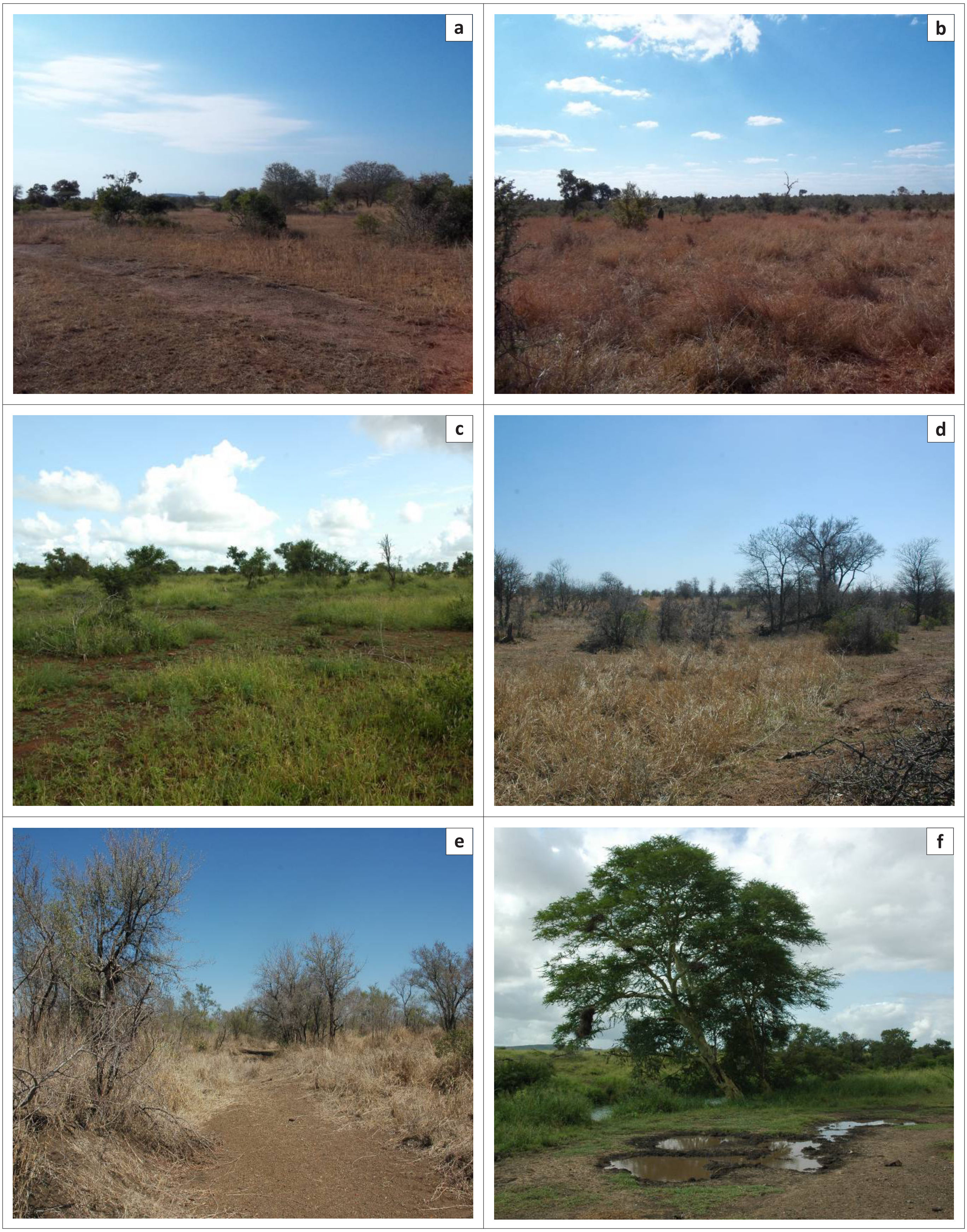
Source: Photographs by Izak Smit and Edward Riddell

FIGURE 5: Photographs of the Stevenson-Hamilton supersite (Southern Granites), depicting, (a, b) oblique aerial shots of supersite, (c, d) example of first-order streams, (e) bottomland with third-order stream in background and (f) sodic patch.



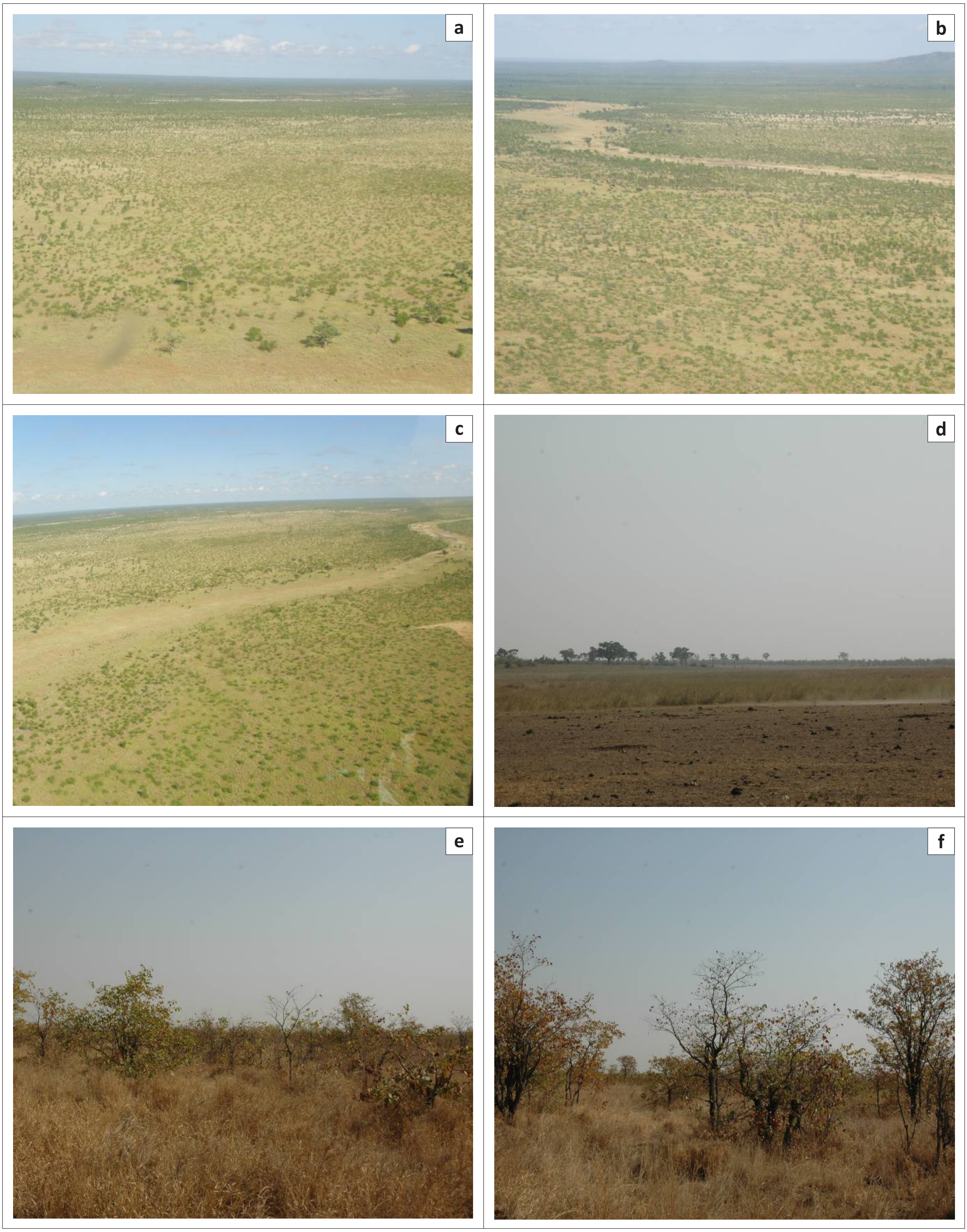
Source: Photographs by Izak Smit and Edward Riddell

FIGURE 6: Photographs of the Ngwenyeni supersite (Northern Granites), depicting, (a) oblique aerial shot of supersite, (b) third-order stream, (c) Ngwenyeni River and sodic areas, (d) typical sparse herbaceous cover and (e) typical mopane trees and sparse herbaceous cover.



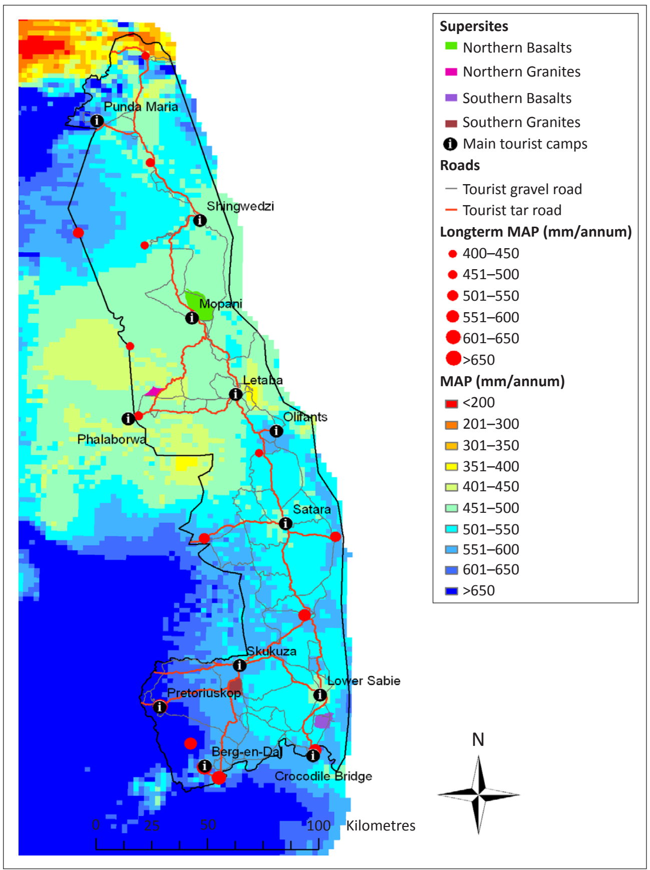
Source: Photographs by Izak Smit and Edward Riddell

FIGURE 7: Photographs of the Nhlowa supersite (Southern Basalts), depicting, (a) sodic area, (b) typical interfluvial upslope with dense herbaceous layer, (c) grazing lawns, (d) first-order stream, (e) second-order stream and (f) third-order stream in wet season.



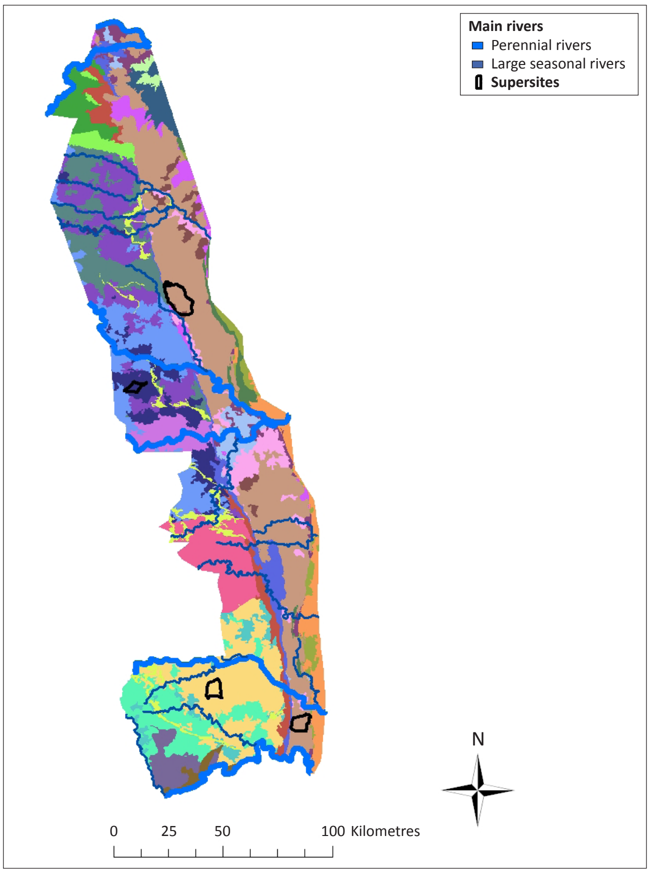
Source: Photographs by Izak Smit and Edward Riddell

FIGURE 8: Photogrpahs of the Mooiplaas supersite (Northern Basalts), depicting, (a) oblique aerial shot of supersite, (b, c) oblique aerial shots of grassy second-order or third-order stream within supersite, (d) barren area next to waterhole and (e, f) typical shrub mopane with dense herbaceous cover.



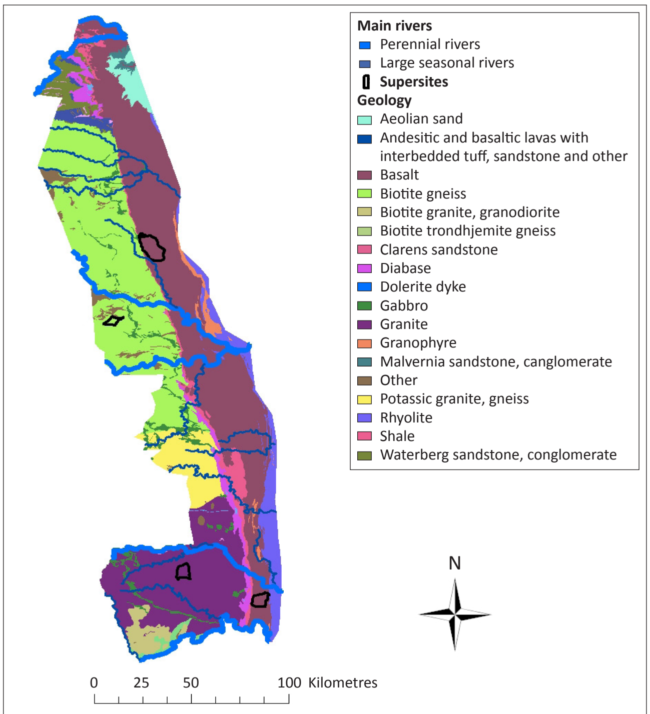
Source: Surface map based on point map of long-term rainfall history at Kruger National Park rainfall stations, as well as Schulze, R.E., Maharaj, M., Lynch, S.D., Howe, B.J. & Melville-Thomas, B., 1997, *South African atlas of agrohydrology and –climatology*, WRC report TT82/96, Water Research Commission, Pretoria
MAP, mean annual precipitation.

FIGURE 9: Kruger National Park supersites in relation to main tourist camps and road infrastructure, with average long-term mean annual precipitation surface as backdrop.



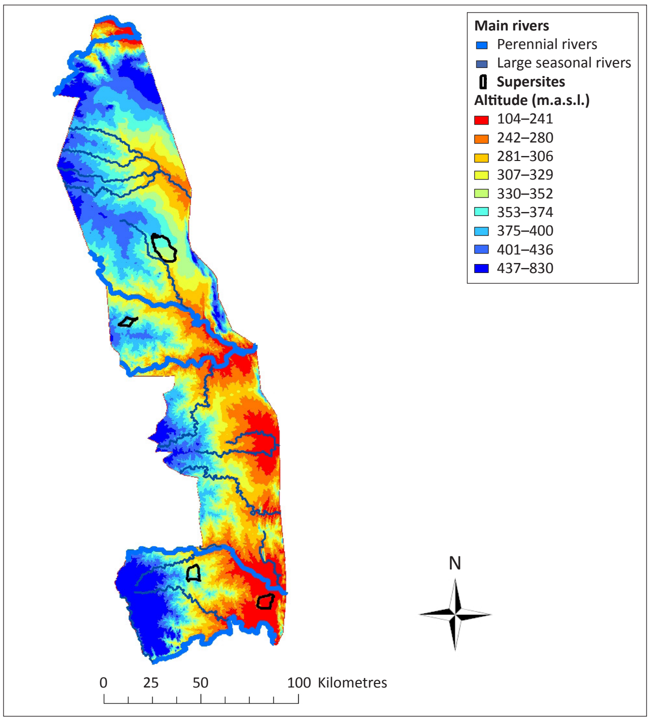
Source: Cullum, C. & Rogers, K.H., 2011, *A framework for the classification of drainage networks in savanna landscapes*, WRC report TT498/11, Water Research Commission, Pretoria

FIGURE 11: Kruger National Park supersites in relation to physiographic zones. The physiographic zones represent a combination of morphological classes and geology.



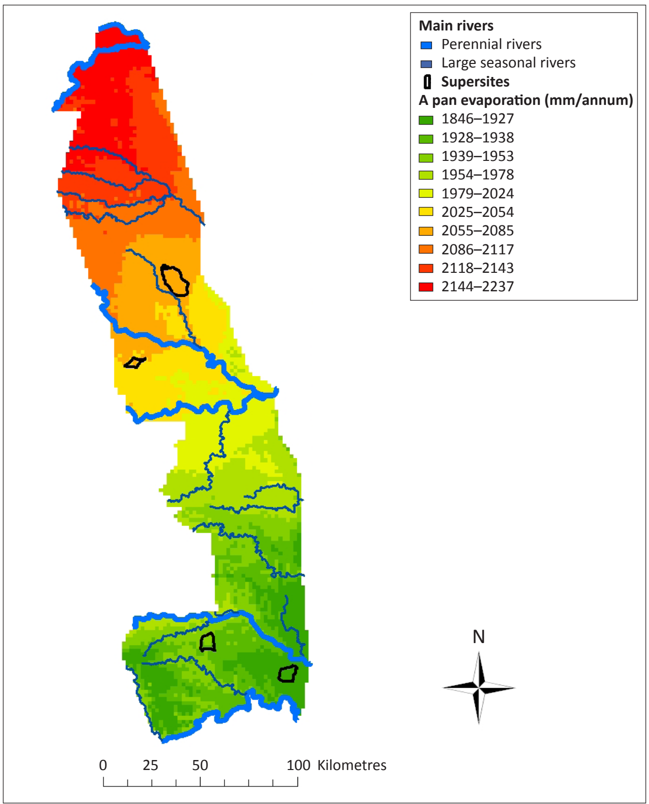
Source: Geology simplified from detailed geological map obtained from the Council for Geoscience

FIGURE 10: Kruger National Park supersites in relation to simplified geology.



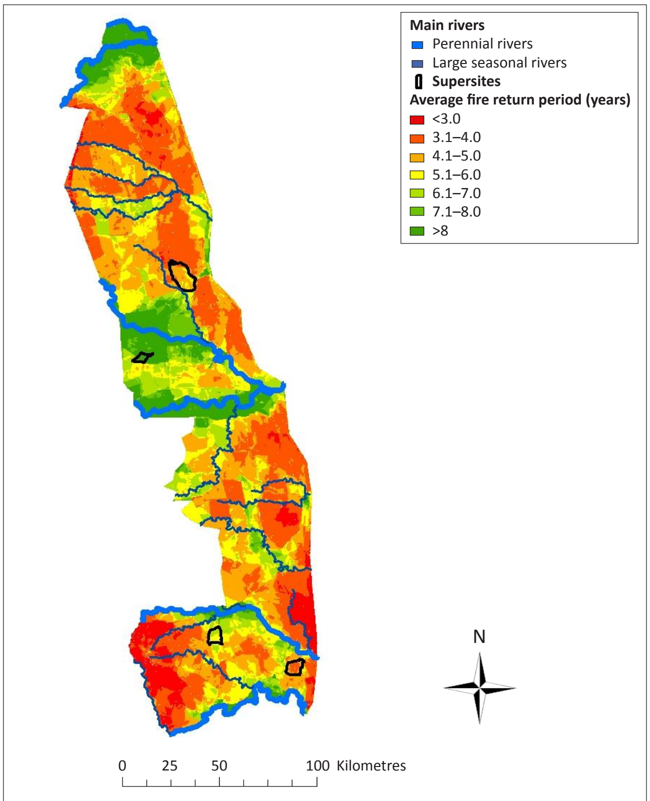
Source: Altitude derived from 20 m contour lines from National Geospatial Information

FIGURE 12: Kruger National Park supersites in relation to perennial and large seasonal rivers and altitude.



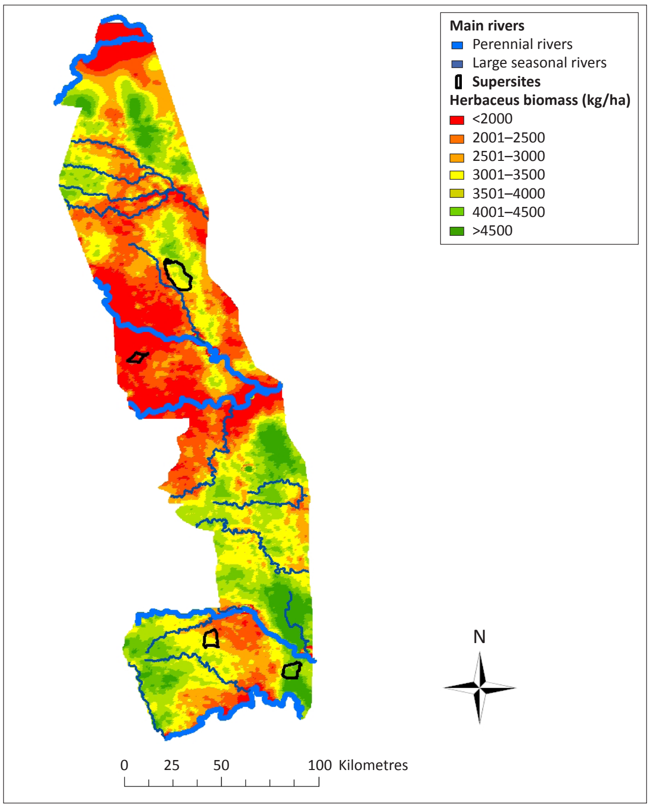
Source: Derived from Schulze, R.E., Maharaj, M., Lynch, S.D., Howe, B.J. & Melville-Thomas, B., 1997, *South African atlas of agrohydrology and -climatology*, WRC report TT82/96, Water Research Commission, Pretoria

FIGURE 13: Kruger National Park supersites in relation to mean annual A-pan equivalent evaporation.



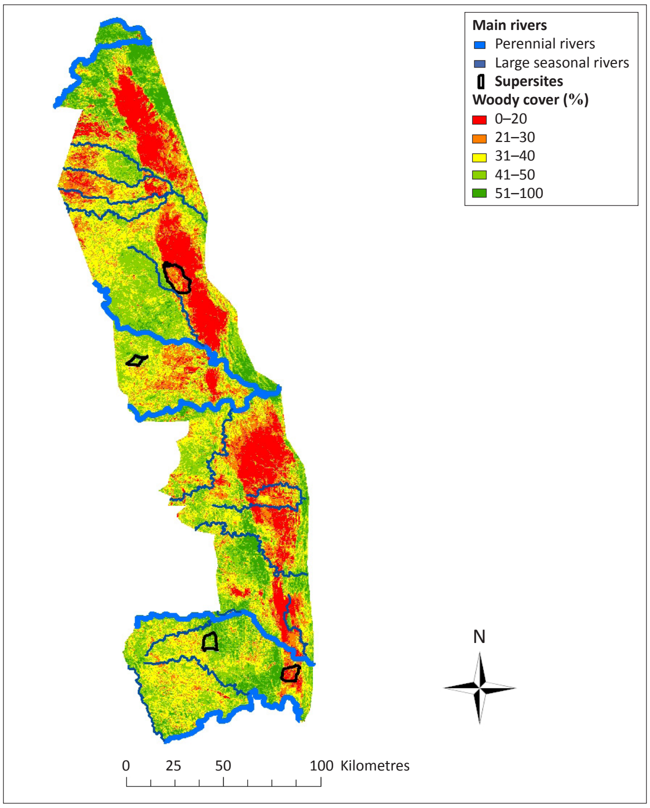
Source: Smit, I.P.J., Smit, C.F., Govender, N., Van der Linde, M. & MacFadyen, S., 2013, 'Rainfall, geology and landscape position generate large-scale spatiotemporal fire pattern heterogeneity in an African savanna', *Ecography* 36(4), 447–459. http://dx.doi.org/10.1111/j.1600-0587.2012.07555.x

FIGURE 14: Kruger National Park supersites in relation to park-wide average long-term (1941–2006) fire return period (years).



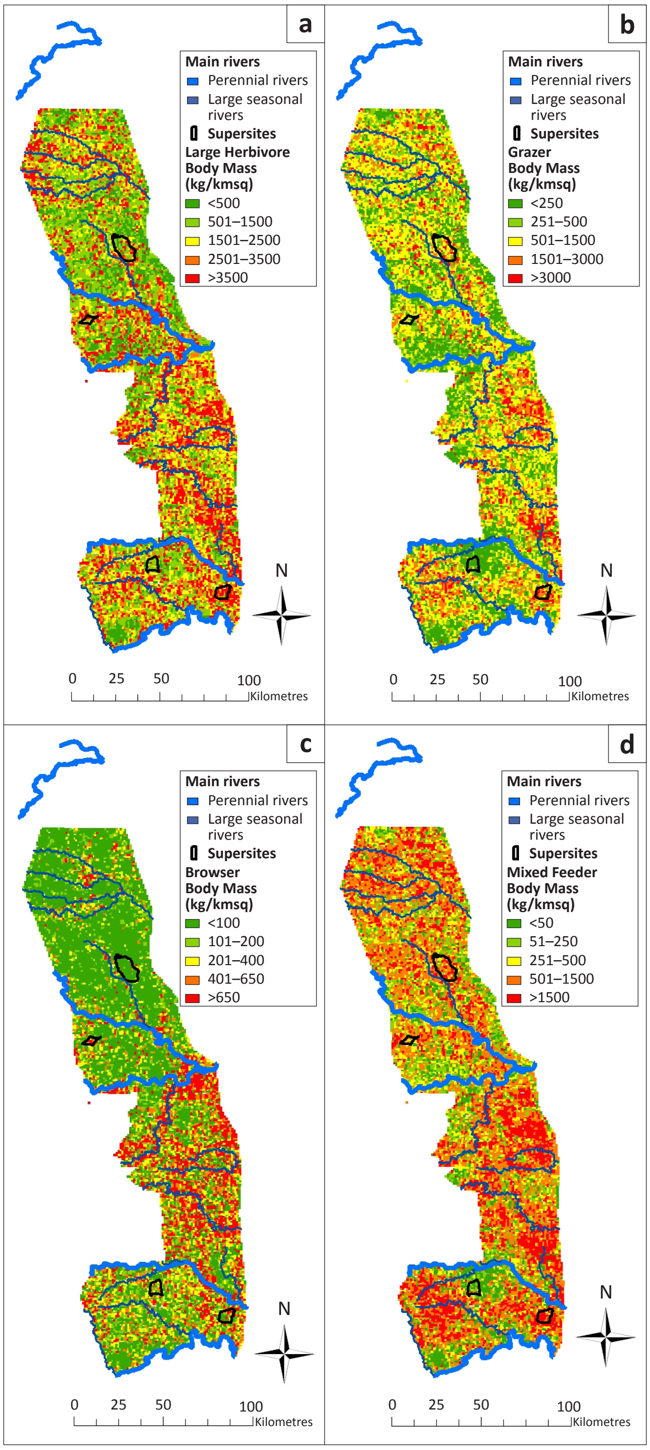
Source: Smit, I.P.J., 2011, 'Resources driving landscape-scale distribution patterns of grazers in an African savanna', *Ecography* 34(1), 67–74. http://dx.doi.org/10.1111/j.1600-0587.2010.06029.x

FIGURE 15: Kruger National Park supersites in relation to park-wide long-term (1989–2004) average herbaceous biomass (kg/ha).



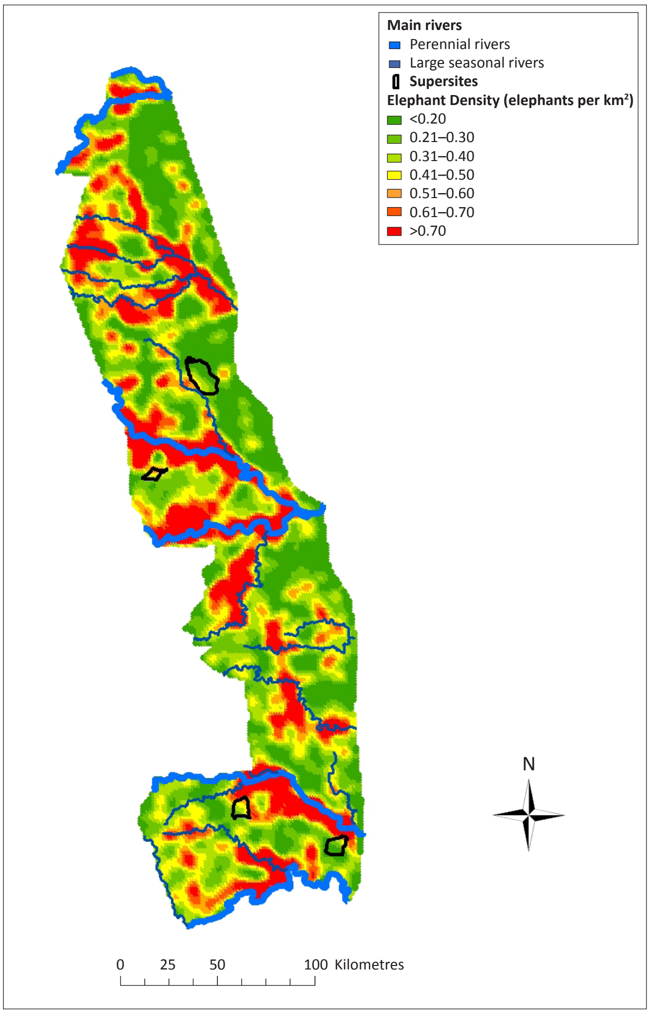
Source: Bucini, G., Hanan, N.P., Boone, R.B., Smit, I.P.J., Saatchi, S., Lefsky, M.A. *et al.*, 2010, 'Woody fractional cover in Kruger National Park, South Africa: Remote-sensing-based maps and ecological insights', in M.J. Hill & N.P. Hanan (eds.), *Ecosystem function in savannas: Measurement and modeling at landscape to global scales*, pp. 219–237, CRC/Taylor and Francis, Boca Raton

FIGURE 16: Kruger National Park supersites in relation to park-wide woody cover (%).



Source: Derived from Smit, I.P.J., Grant, C.C. & Devereux, B.J., 2007, 'Do artificial waterholes influence the way herbivores use the landscape? Herbivore distribution patterns around rivers and artificial surface water sources in a large African savanna park', *Biological Conservation* 136(1), 85–99. http://dx.doi.org/10.1016/j.biocon.2006.11.009
Data incomplete for far north.

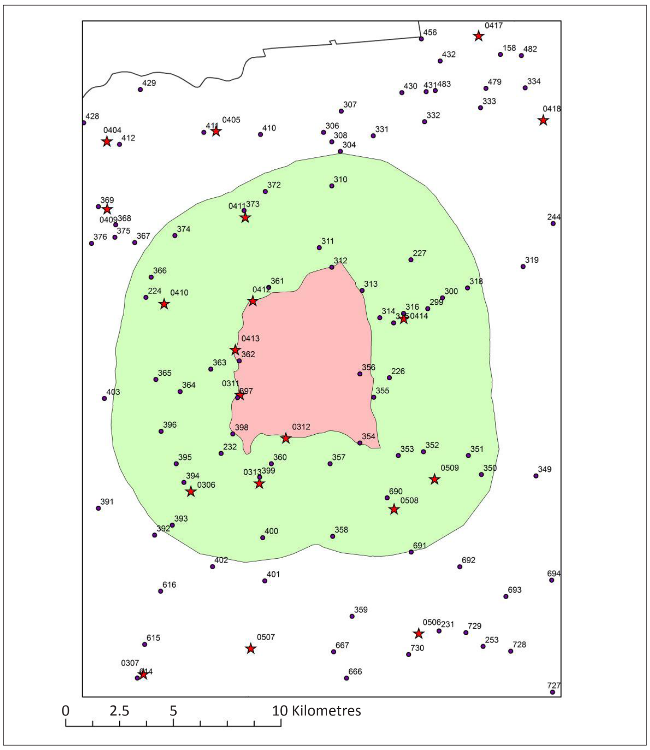
FIGURE 17: Kruger National Park supersites in relation to park-wide large-herbivore biomass (kg/km^2) based on historical aerial surveys (1987–1993). This figure represents, (a) total large herbivore biomass, (b) total grazer biomass, (c) total browser biomass and (d) total mixed feeder biomass.



Source: Smit, I.P.J & Ferreira, S.M., 2010, 'Management intervention affects river-bound spatial dynamics of elephants', *Biological Conservation* 143(9), 2172–2181. http://dx.doi.org/10.1016/j.biocon.2010.06.001

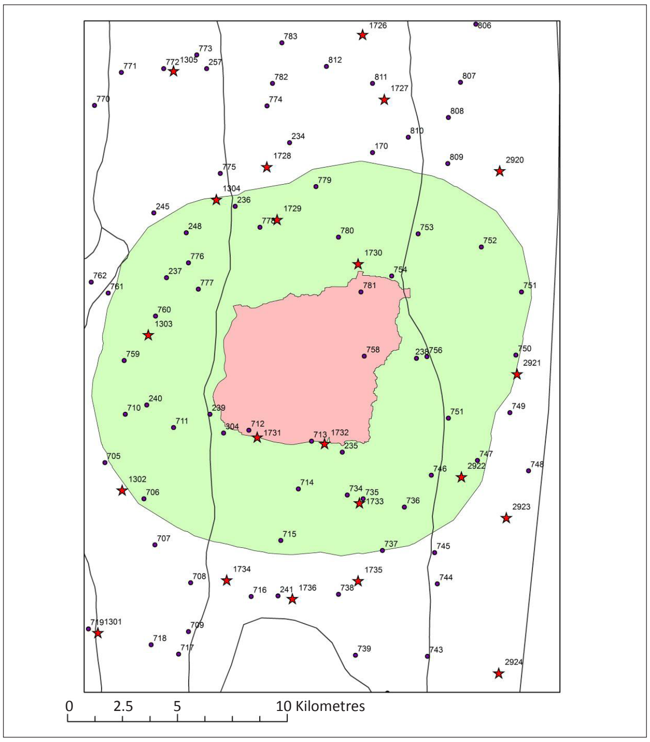
FIGURE 18: Kruger National Park supersites in relation to 5 km gaussian smoothed long-term (1985–2007) dry-season elephant distribution (elephants per km^2).

Appendix continues on the next page →



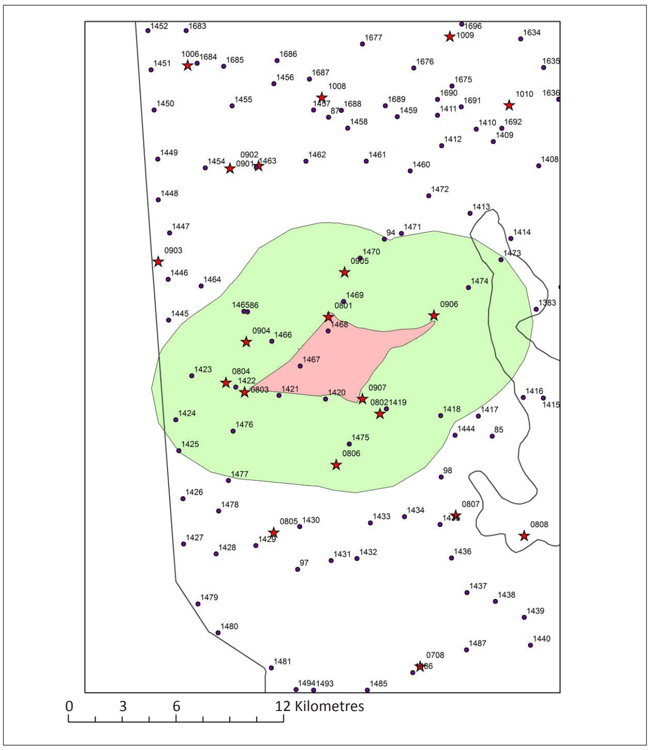
The pink area represents the Stevenson-Hamilton (Southern Granite) supersite and the green area a 5 km buffer. The numbers represent the unique site numbers and can be used to extract the relevant data from the datasets.

FIGURE 19: Site locations of grass, woody vegetation and soil surveys conducted by Venter (1990) (dots) for the Stevenson-Hamilton supersite and surrounds, as well as the 'vegetation condition assessment' sites (stars) where Kruger National Park rangers have collected herbaceous and woody vegetation monitoring data since 1989.



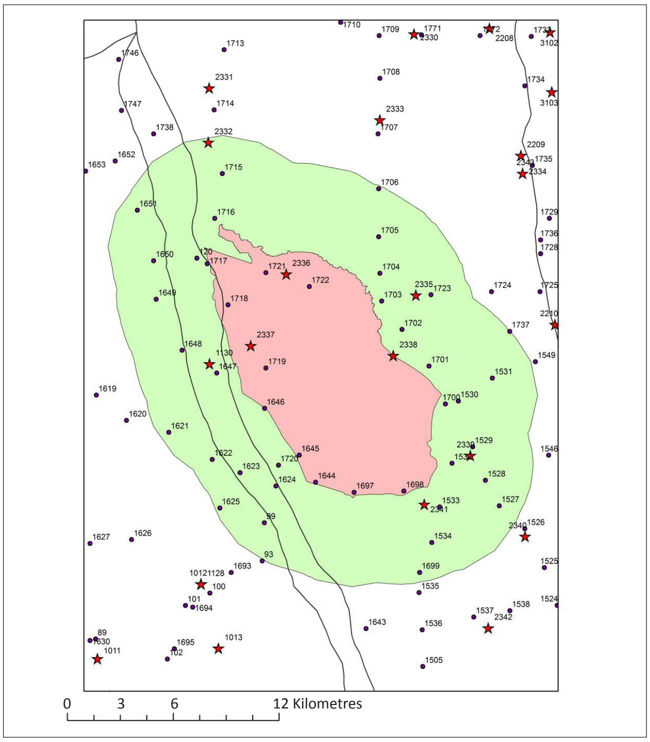
The pink area represents the Nhlowa (Southern Basalt) supersite and the green area a 5 km buffer. The numbers represent the unique site numbers and can be used to extract the relevant data from the datasets.

FIGURE 20: Site locations of grass, woody vegetation and soil surveys conducted by Venter (1990) (dots) for the Nhlowa supersite and surrounds, as well as the 'vegetation condition assessment' sites (stars) where Kruger National Park rangers have collected herbaceous and woody vegetation monitoring data since 1989.



The pink area represents the Ngwenyeni (Northern Granites) supersite and the green area a 5 km buffer. The numbers represent the unique site numbers and can be used to extract the relevant data from the datasets.

FIGURE 21: Site locations of grass, woody vegetation and soil surveys conducted by Venter (1990) (dots) for the Ngwenyeni supersite and surrounds, as well as the 'vegetation condition assessment' sites (stars) where Kruger National Park rangers have collected herbaceous and woody vegetation monitoring data since 1989.



The pink area represents the Mooiplaas (Northern Basalts) supersite and the green area a 5 km buffer. The numbers represent the unique site numbers and can be used to extract the relevant data from the datasets.

FIGURE 22: Site locations of grass, woody vegetation and soil surveys conducted by Venter (1990) (dots) for the Mooiplaas supersite and surrounds, as well as the 'vegetation condition assessment' sites (stars) where Kruger National Park rangers have collected herbaceous and woody vegetation monitoring data since 1989.