

Targets: FS Biodiversity Plan

AN OVERVIEW OF MY UNDERSTANDING AND IMPLEMENTATION OF PFAB, VICTOR & ARMSTRONG (2011), POINTING OUT SOME OF THE CHALLENGES

Nacelle Collins



destea

department of
economic, small business development,
tourism and environmental affairs
FREE STATE PROVINCE

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ORIGINAL PAPER

Application of the IUCN Red Listing system to setting species targets for conservation planning purposes

Michèle F. Pfab · Janine E. Victor · Adrian J. Armstrong

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Abstract Biodiversity targets, or estimates of the quantities of biodiversity features that should be conserved in a region, are fundamental to systematic conservation planning. We propose that targets for species should be based on the quantitative thresholds developed for the Vulnerable category of the IUCN Red List system, thereby avoiding future listings of species in an IUCN Red List threat category or an increase in the extinction risk, or ultimate extinction, of species already listed as threatened. Examples of this approach are presented for case studies from South Africa, including threatened taxa listed under the IUCN Red List criteria of A to D, a species listed as Near Threatened, a species of conservation concern due to its rarity, and one species in need of recovery. The method gives rise to multiple representation targets, an improvement on the often used single representation targets that are inadequate for long term maintenance of biodiversity or the arbitrary multiple representation and percentage targets that are sometimes adopted. Through the implementation of the resulting conservation plan, these targets will ensure that the conservation status of threatened species do not worsen over time by qualifying for higher categories of threat and may actually improve their conservation status by eliminating the threat of habitat loss and stabilizing population declines. The positive attributes ascribed to the IUCN Red List system, and therefore to the species targets arising from this approach, are important when justifying decisions that limit land uses known to be detrimental to biodiversity.

Keywords Biodiversity targets · Bioregional plans · Conservation targets · Land-use planning · Multiple representation · Systematic · Threatened species

Abbreviations

CR Critically Endangered
EN Endangered

M. F. Pfab (✉) · J. E. Victor
South African National Biodiversity Institute, Private Bag X101, Pretoria 0001, South Africa
e-mail: M.Pfab@sanbi.org.za

A. J. Armstrong
Ezemvelo KZN Wildlife, P.O. Box 13053, Cascades, South Africa

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Targets: FS Biodiversity Plan

AN OVERVIEW OF MY UNDERSTANDING AND IMPLEMENTATION OF PFAB, VICTOR & ARMSTRONG (2011), POINTING OUT SOME OF THE CHALLENGES

For the FS Biodiversity Plan the quantitative species targets were set according to the guidelines of Pfab, Victor & Armstrong (2011).

Summary of the content of Pfab, Victor & Armstrong (2011):

1. Provides **criteria to ID species** to be included in a biodiversity plan
2. Provides **quantitative targets** for such species
3. Targets should be **proportionally** assigned to the planning region
4. Suggests that the number of individuals can be **converted to a spatial target** by determining the area of habitat required to support the relevant number of individuals

Targets: FS Biodiversity Plan

Summary of quantitative targets as per Pfab, Victor & Armstrong (2011):

	Critically Endangered	Endangered	Vulnerable	Near Threatened	Rare
Solely A	<ul style="list-style-type: none"> - 11 locations (or in the absence of any potential threat, 11 populations or 11 localities) should be conserved - At least 10,000 mature individuals should also be conserved 	<ul style="list-style-type: none"> - 11 locations (or in the absence of any potential threat, 11 populations or 11 localities) should be conserved - At least 10,000 mature individuals should also be conserved 	<ul style="list-style-type: none"> - 11 locations (or in the absence of any potential threat, 11 populations or 11 localities) should be conserved - At least 10,000 mature individuals should also be conserved 	<ul style="list-style-type: none"> - 11 locations (or in the absence of any potential threat, 11 populations or 11 localities) should be conserved - At least 10,000 mature individuals should also be conserved 	- All known populations
B	- All known populations	- All known populations	- All known populations		
C	- All known populations	- All known populations	- All known populations		
D	- All known populations	- All known populations	- All known populations		
Solely E	<ul style="list-style-type: none"> - 11 locations (or in the absence of any potential threat, 11 populations or 11 localities) should be conserved - At least 10,000 mature individuals should also be conserved 	<ul style="list-style-type: none"> - 11 locations (or in the absence of any potential threat, 11 populations or 11 localities) should be conserved - At least 10,000 mature individuals should also be conserved 	<ul style="list-style-type: none"> - 11 locations (or in the absence of any potential threat, 11 populations or 11 localities) should be conserved - At least 10,000 mature individuals should also be conserved 		

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Data requirements:

Threat status

Criteria for listing

RSA Population size

Provincial portion

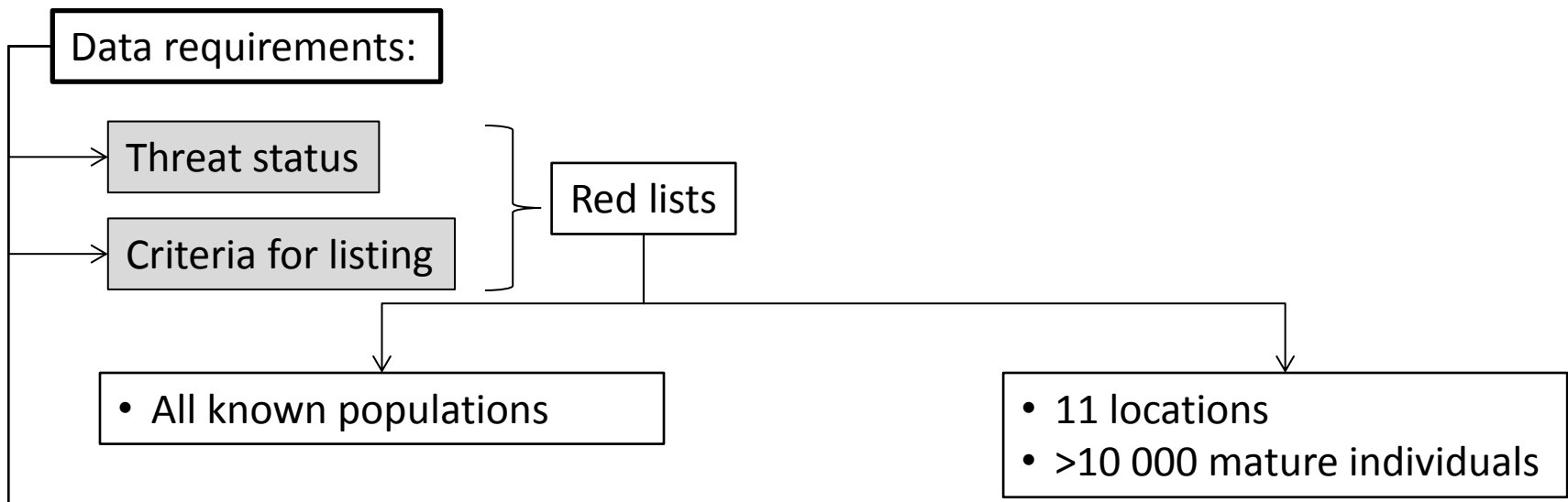
Home range

- To determine the required target (All locations or 11/10 000)

- For species with target 11/10 000; To determine if the required target can be achieved (RSA < 10 000?)

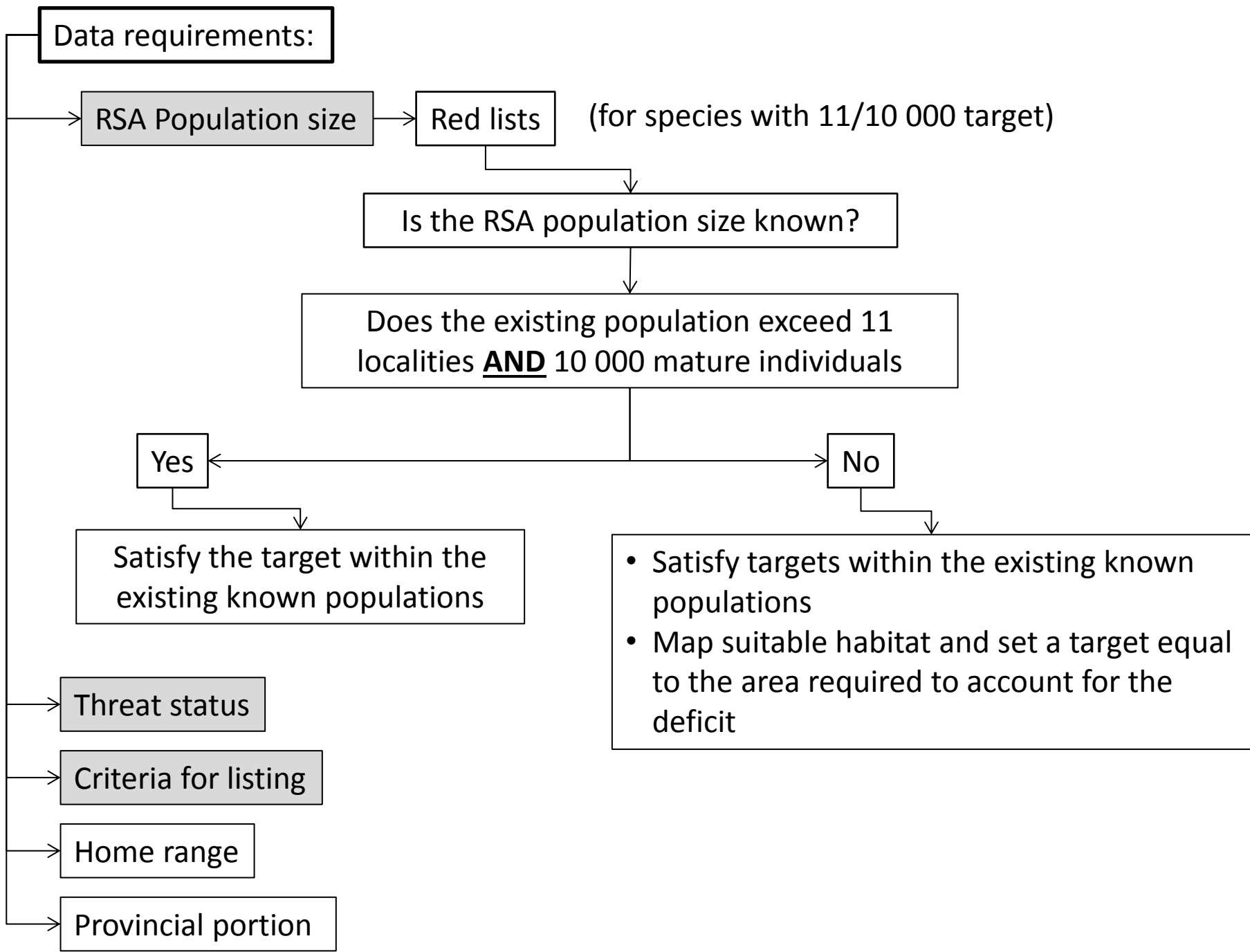
- To calculate the proportional provincial contribution (e.g. 36%)

- Converting the number of individuals to a spatial target
- Buffer to apply to account for persistence



E.g.

Status	Criteria	Target
VU	A1a,c,d,e; A2b,c	11/10000
VU	A2c; B1+2c; C1	100
VU	A1a,c; A2b,c; C1	100
CR	A1c; A2b,c	11/10000
VU	C1	100
CR	A2c; C1; C2a	100
NT	D1	100
VU	A1c; A2b,c; C1	100
VU	A1a; C1	100
EN	C1	100
NT	A2c	11/10000
VU	A1c; A2c; C1	100
VU	A2c; C1; C2b	100
EN	C2b	100
CR	A2c	11/10000
NT	C1; C2a	100
NT	A1c; A2c	11/10000



Data requirements:

Provincial portion

Need to know the extent of species distribution to calculate the proportional target

Determining the proportional target was found to be very challenging

Possible methods to calculate the proportional target:

- Ecological niche modelling (mainly Avifauna)
- IUCN shapefiles
- Cartographic mapping (e.g. Vegetation type in which a species was recorded; mainly Flora)
- Georeferencing distribution maps (mainly other taxa)

Threat status

Criteria for listing

RSA Population size

Home range

Data requirements:

Provincial portion

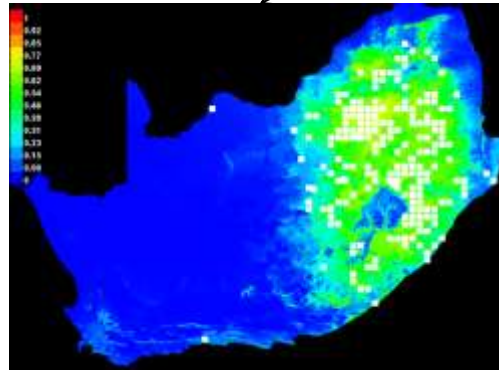
Need to know the extent of species distribution to calculate the proportional target

Ecological niche modelling

Note!

A limitation of this approach to taxa other than Avifauna was that training points were often limited to what was available for the FS

Grass owl (*Tyto capensis*)



↓ >100 ha

Threat status

Criteria for listing

RSA Population size

Home range

Province	Outside (ha)	Inside (ha)	Total (ha)	% of Grand total
Eastern Cape	133298.3624	35649.96129	168948.3237	9.766751771
Free State	43918.19175	85852.73231	129770.9241	23.52042737
Gauteng		16540.95316	16540.95316	4.531600532
KwaZulu-Natal	28438.30887	66183.43772	94621.74659	18.13177866
Limpopo	73024.78348	52847.16192	125871.9454	14.47813949
Mpumalanga	17079.19358	59579.34204	76658.53561	16.32250424
North West	58167.00406	48359.89945	106526.9035	13.24879794
Northern Cape	375659.6573		375659.6573	0
Western Cape	130581.2974		130581.2974	0
Grand Total	860166.7988	365013.4879	1225180.287	100

Data requirements:

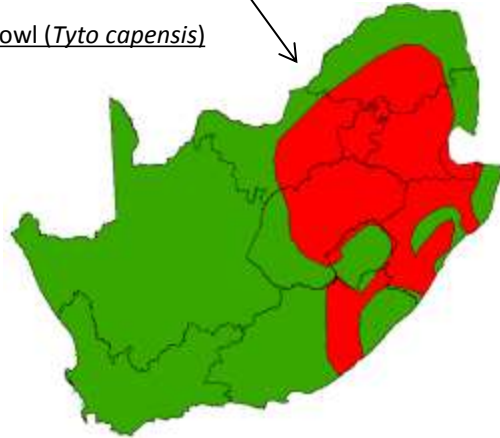
Provincial portion

Need to know the extent of species distribution to calculate the proportional target

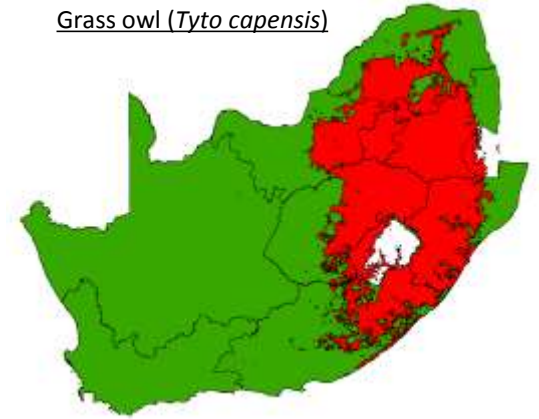
IUCN shapefiles

<http://www.iucnredlist.org/>

Grass owl (Tyto capensis)



Grass owl (Tyto capensis)



Threat status

Criteria for listing

RSA Population size

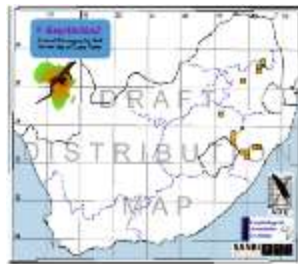
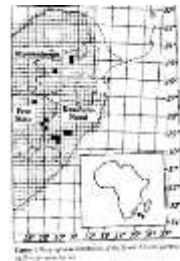
Home range

Data requirements:

Provincial portion

Need to know the extent of species distribution to calculate the proportional target

Cartographic mapping according to vegetation type



Teradactylus breyeri:
The regional extent was accepted to be all **vegetation types** in which centroids of **QDSs** with observations as well as **actual observations** are located.

Threat status

Criteria for listing

RSA Population size

Home range

Province	Outside (ha)	Inside (ha)	Total (ha)	% of Grand total
Eastern Cape	168921.4	26.93258	168948.3	0.065014
Free State	109357	20413.88	129770.9	49.27786
Gauteng	14774.58	1766.37	16540.95	4.26391
KwaZulu-Natal	82093.87	12527.88	94621.75	30.24153
Limpopo	125055.4	816.4968	125871.9	1.970973
Mpumalanga	70784.02	5874.514	76658.54	14.18072
North West	106526.9		106526.9	0
Northern Cape	375659.7		375659.7	0
Western Cape	130581.3		130581.3	0
Grand Total	1183754	41426.07	1225180	100

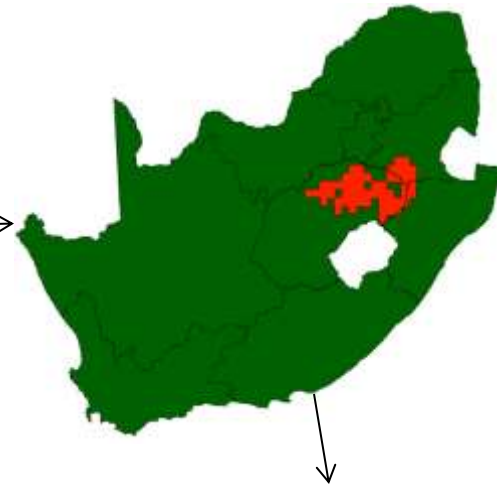
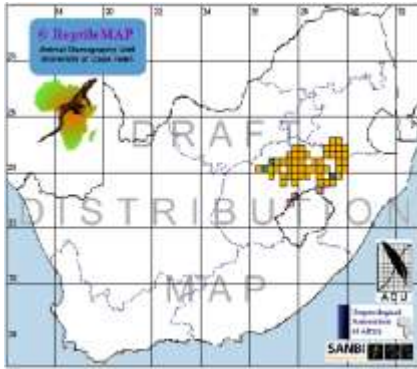
Data requirements:

Provincial portion

Need to know the extent of species distribution to calculate the proportional target

Georeferencing of distribution maps

Sungazer (*Smaug giganteus*)



Threat status

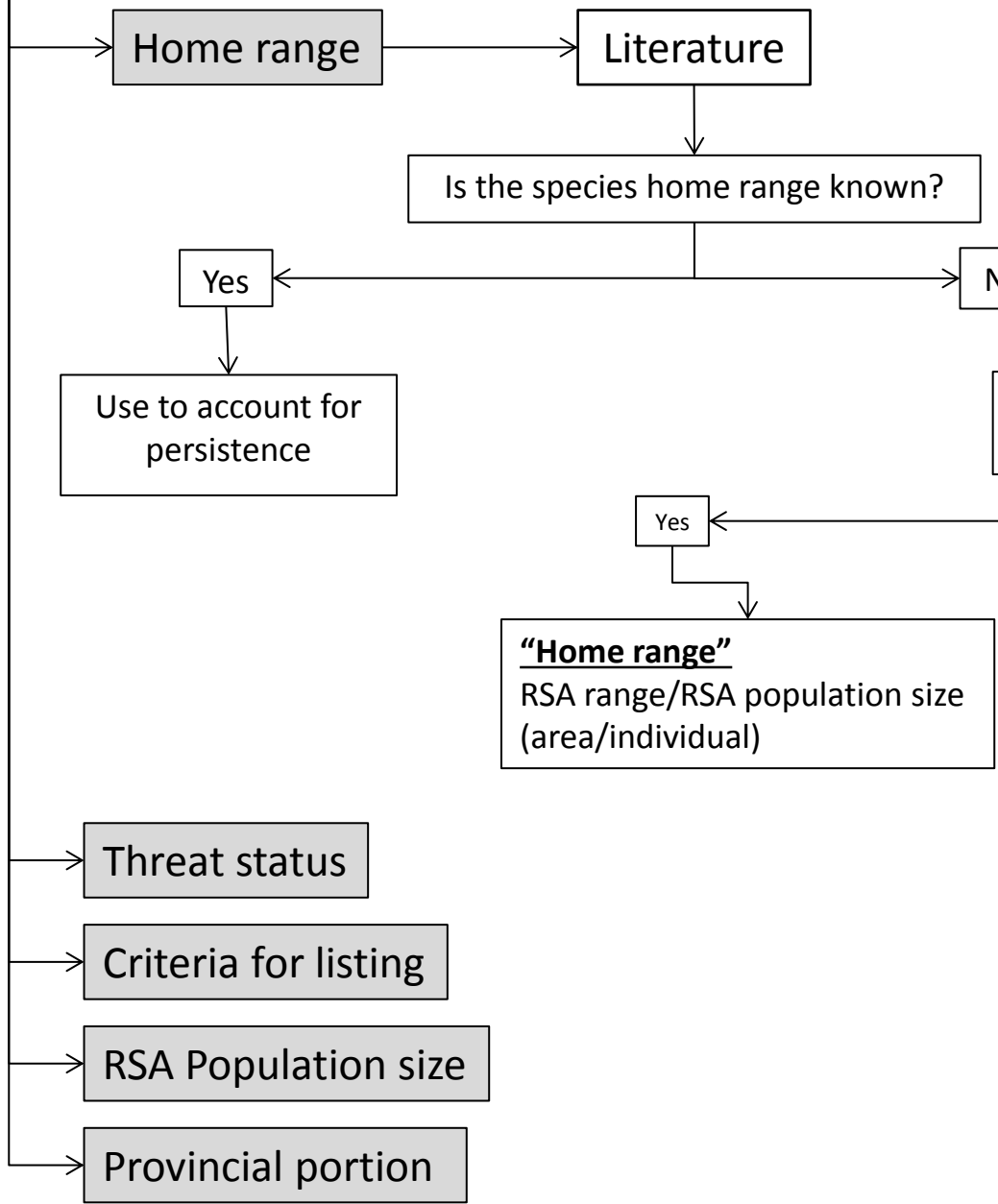
Criteria for listing

RSA Population size

Home range

Province	Outside	Inside	Total	% of Grand total
Eastern Cape	168966		168966	0
Free State	98358.36	31466.79	129825.2	79.29738
Gauteng	16547.79		16547.79	0
KwaZulu-Natal	91975.87	2385.456	94361.32	6.011429
Limpopo	125754.8		125754.8	0
Mpumalanga	70664.84	5829.759	76494.6	14.69119
North West	106512.2		106512.2	0
Northern Cape	372889.4		372889.4	0
Western Cape	129462.2		129462.2	0
Grand Total	1181131	39682.01	1220813	100

Data requirements:



To account for persistence all actual observations were buffered by the home range, or if unknown, by the standard buffer

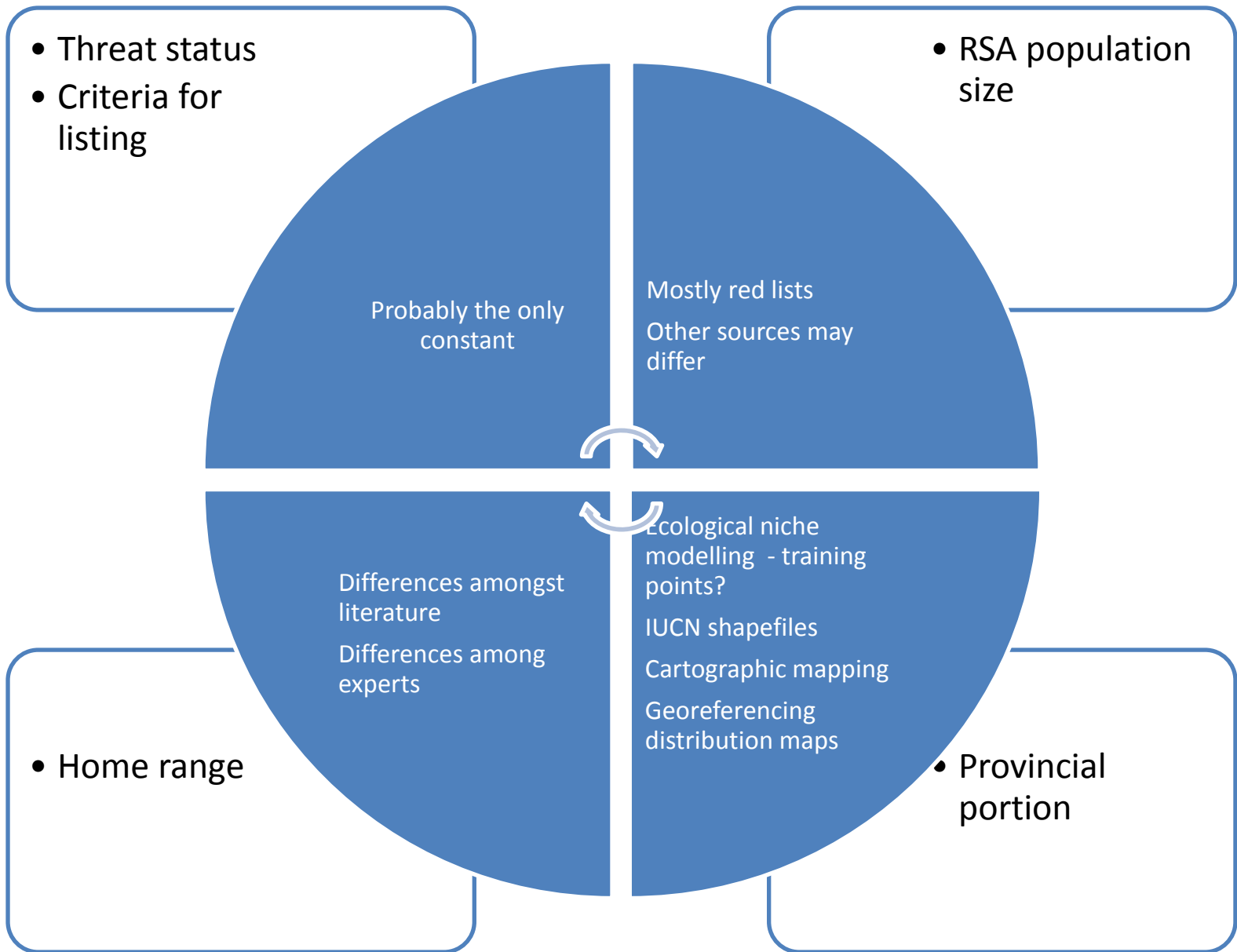
Threat status

Criteria for listing

RSA Population size

Provincial portion

Use a standardized "home range"	
Taxa	Standard buffer width
Flora	100 m
Avifauna	500 m
Invertebrates	100 m
Reptiles	100 m
Mammals - small (terrestrial)	100 m
Mammals - small (bats)	500 m
Mammals - large	500 m



So many variables mean that different people will get to different targets, even if assessing the same province

Common name	Target	Estimated RSA population	Estimated RSA range (km2)	(Ind/km2)	(km2/ind)	Home range/Occupancy (km2)	Proportional FS distribution (%)	FS/11	FS/10 000	Area/10 000 individuals (km2)
Blue Crane	11/10000	21000	500000	0.042	23.810	3.8	18.38755	3	1838.755	3493.635
Yellowbreasted Pipit	100	6500	3000	2.167	0.462	0.0078	15.79303	2	1579.303	6.159282
Grey Crowned Crane	100	3000	20000	0.150	6.667	28.8	10.90161	2	1090.161	31396.63
Greater Bittern	11/10000	350	50	7.000	0.143		12.66056	2	1266.056	180.8651
Southern Ground Hornbill	100	2000	160000	0.013	80.000		0.323796	1	32.380	2590.367
Wattled Crane	100	230	1000	0.230	4.348	16.64	5.316014	1	531.601	8845.847
Black Harrier	100	1000	416500	0.002	416.500		13.3661	2	1336.610	556698.2
African Marsh Harrier	100	5000	33500	0.149	6.700		14.52395	2	1452.395	9731.048
Corncrake	100	2500	35000	0.071	14.000	0.09	2.25	1	225.000	20.25
Saddlebilled Stork	100	150	700000	0.000	4666.667		13.12156	2	1312.156	6123393
Blue Korhaan	11/10000	5000	260000	0.019	52.000	0.468	41.63666	5	4163.666	1948.596
Whitebellied Korhaan	100	5000	138000	0.036	27.600		24.15409	3	2415.409	66665.28
Bald Ibis	100	10000	180000	0.056	18.000		23.51814	3	2351.814	42332.66
Bearded Vulture	100	200	100000	0.002	500.000			0	0.000	0
Rudd's Lark	11/10000	5000	500	10.000	0.100	0.016	11.51	2	1151.000	18.416
Bush Blackcap	100	5000	1500	3.333	0.300		2.203628	1	220.363	66.10884
Melodious Lark	11/10000		110400	0.000	#DIV/0!	0.25	47.45993	6	4745.993	1186.498
Stanley's Bustard	100	5000	215000	0.023	43.000		0.37318	1	37.318	1604.675
Martial Eagle	100	600	750000	0.001	1250.000	130	8.626271	1	862.627	56070.76
Whitewinged Flufftail	100	250	40	6.250	0.160		38.11039	5	3811.039	609.7662
Botha's Lark	100	5000	500	10.000	0.100		38.11039	5	3811.039	381.1039
Grass Owl	100	5000	13900	0.360	2.780	3.13	23.96528	3	2396.528	7501.133



Blue Crane

VU (A1a,c,d,e; A2b,c)
 11 populations / 10 000 individuals (Proportional FS target = 3 populations / 1839 mature individuals)

Avifauna		Modelled area	14810.8331 km2		
		Proportional RSA population target (km2):	3493.63453 km2	% Target	Target expression
• Pseudo_1 (point): Actual point observations (nesting/roosting)	→	Pseudo_1 area (point)	37.694124 km2	100 %	37.694 km2
• Pseudo_1 (polygon): Actual polygon observations (nesting/roosting)	→	Pseudo_2 area (point)	0.785191 km2	100	0.7852 km2
• Pseudo_2 (point): Actual point observations (not nesting/roosting)	→	Pseudo_2 area (polygon)	12.662014 km2	100	12.662 km2
• Pseudo_2 (polygon): Actual polygon observations (not nesting/roosting)	→	Pseudo_4 area	14759.6918 km2	23	3394.7 km2
• Pseudo_3: Suitable habitat adjacent to Pseudo_1	→				
• Pseudo_4: Large scale observations within ecological niche modelled range	→				
• Pseudo_5: Remainder of the ecological niche modelled range	→				3445.9 km2

Avifauna

- Pseudo_1(point): Actual point observations (nesting/roosting)
- Pseudo_1 (polygon): Actual polygon observations (nesting/roosting)
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- Pseudo_5: Remainder of the ecological niche modelled range

Blue Crane		11 populations / 10 000 individuals (Proportional FS target = 3 populations / 1839 mature individuals)	
Modelled area	14810.8331 km ²		
Proportional RSA population target (km ²):	3493.63453 km²	% Target	Target expression
Pseudo_1 area (point)	37.694124 km ²	100 %	37.694 km ²
Pseudo_2 area (point)	0.785191 km ²	100	0.7852 km ²
Pseudo_2 area (polygon)	12.662014 km ²	100	12.662 km ²
Pseudo_4 area	14759.6918 km ²	23	3394.7 km ²
			3445.9 km²

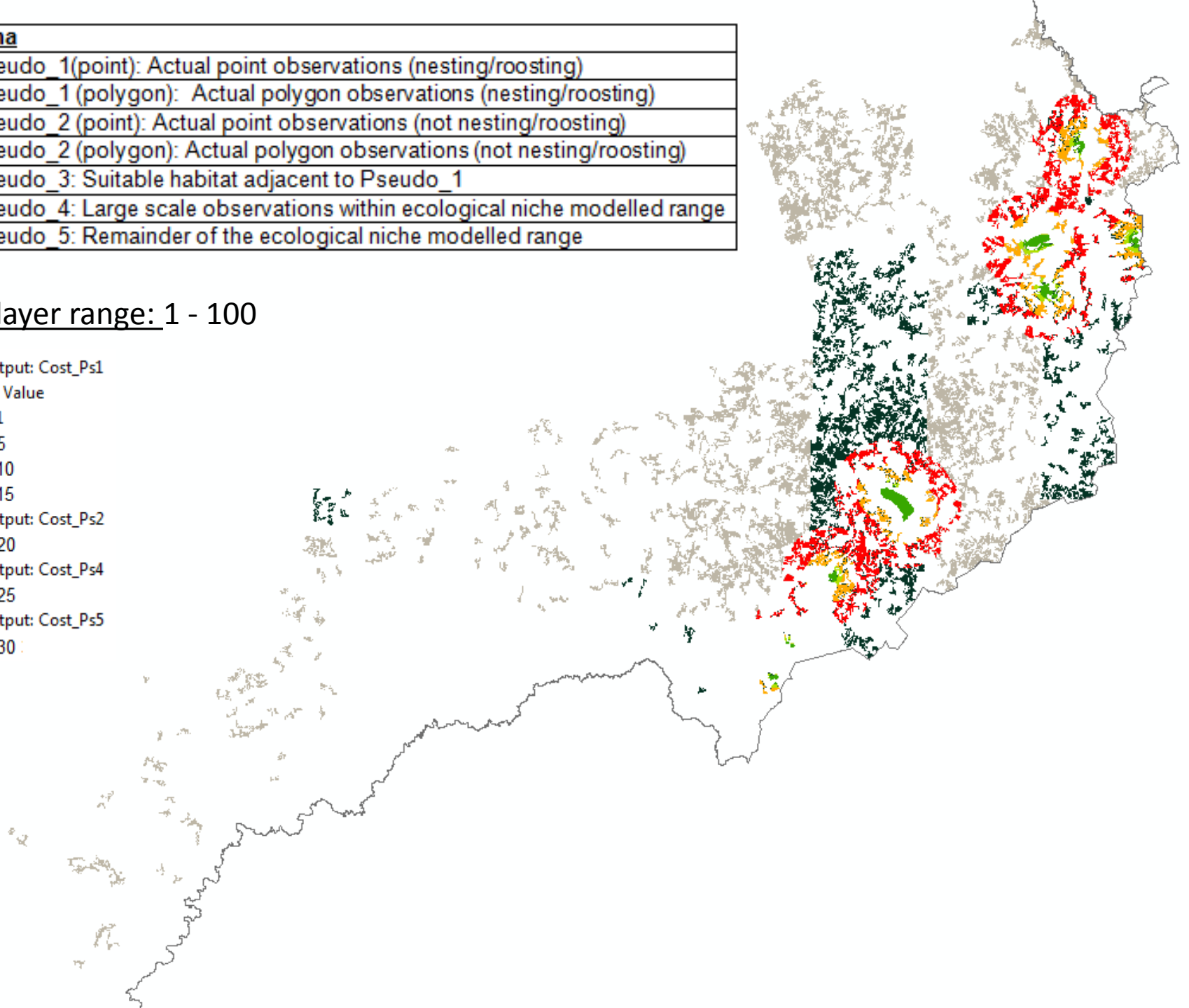
Only actual observations were included as features with targets
 All other Pseudo layers were included in the cost layer (lowered cost)

Avifauna

- Pseudo_1(point): Actual point observations (nesting/roosting)
- Pseudo_1 (polygon): Actual polygon observations (nesting/roosting)
- Pseudo_2 (point): Actual point observations (not nesting/roosting)
- Pseudo_2 (polygon): Actual polygon observations (not nesting/roosting)
- Pseudo_3: Suitable habitat adjacent to Pseudo_1
- Pseudo_4: Large scale observations within ecological niche modelled range
- Pseudo_5: Remainder of the ecological niche modelled range

Cost layer range: 1 - 100

- Output: Cost_Ps1
Value
 - 1
 - 5
 - 10
 - 15
- Output: Cost_Ps2
20
- Output: Cost_Ps4
25
- Output: Cost_Ps5
30



Final Comments:

- Found the Pfab, Victor & Armstrong (2001) way of setting targets for 53 (45) species **very time consuming**.
- The **many variables** and options make it **impossible for all to arrive at the 'correct' proportional target**. The result is that for some species the total target will be e.g. 80% and for other e.g. 130% of the actual target.
- To ensure that all provinces contribute their proportional target it is proposed that targets should be set at a **national level**, irrespective of the method used .

THANK YOU!!



destea

department of
economic, small business development,
tourism and environmental affairs
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