Community-based Wildlife Monitoring

In Selected Concessions of Chobe and the Okavango Delta, 2013 - 2015

A Partnership between Okavango Research Institute and
Round River Conservation Studies

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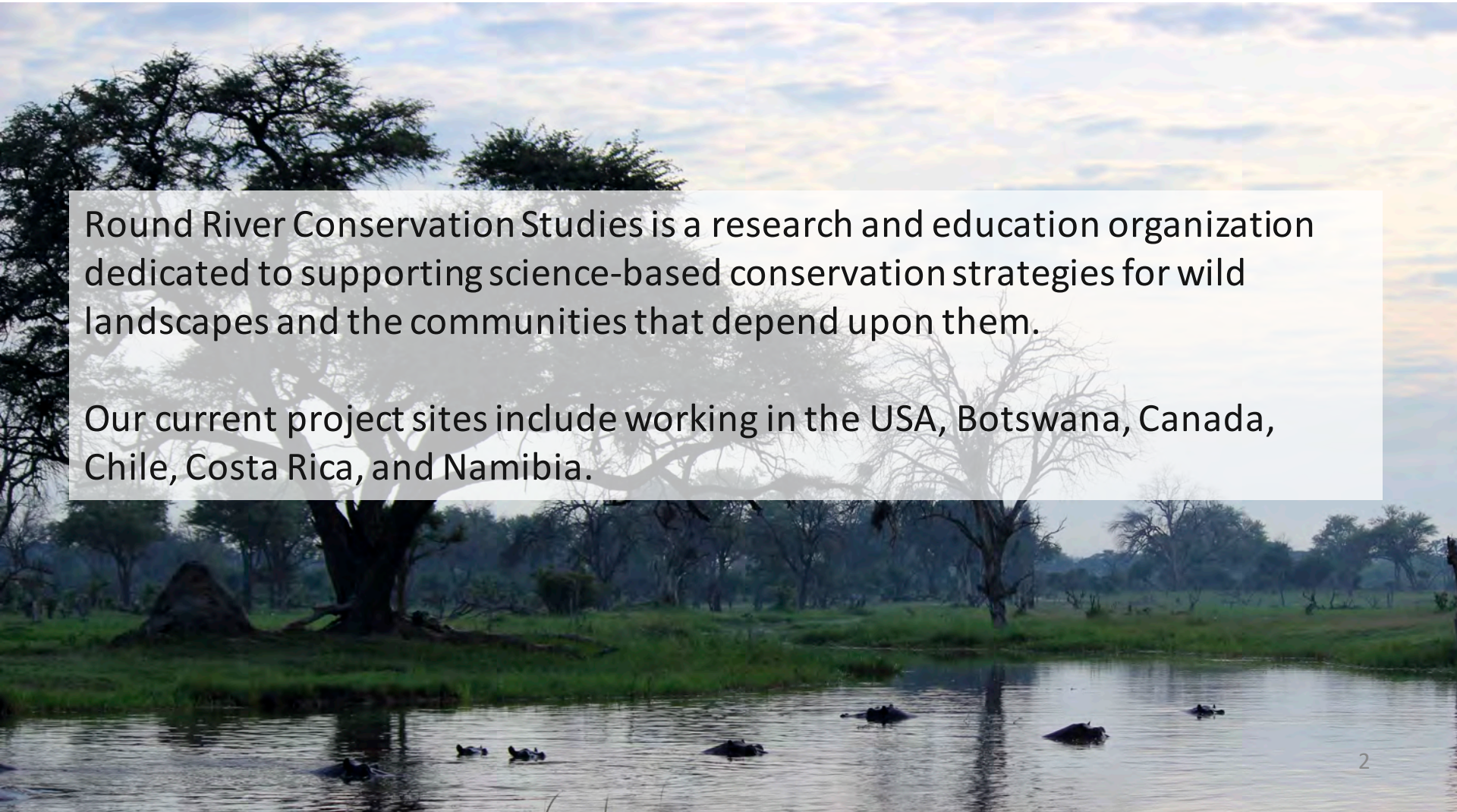


Round River Conservation Studies is a research and education organization dedicated to supporting science-based conservation strategies for wild landscapes and the communities that depend upon them.

Our current project sites include working in the USA, Botswana, Canada, Chile, Costa Rica, and Namibia.

Community-based Wildlife Monitoring

- History of surveys in the Delta
- Aerial survey synopsis
- Meetings in Maun, SAREP monitoring project
- Resulting Round River's partnerships with ORI, DWNP, SAREP, Community Trusts

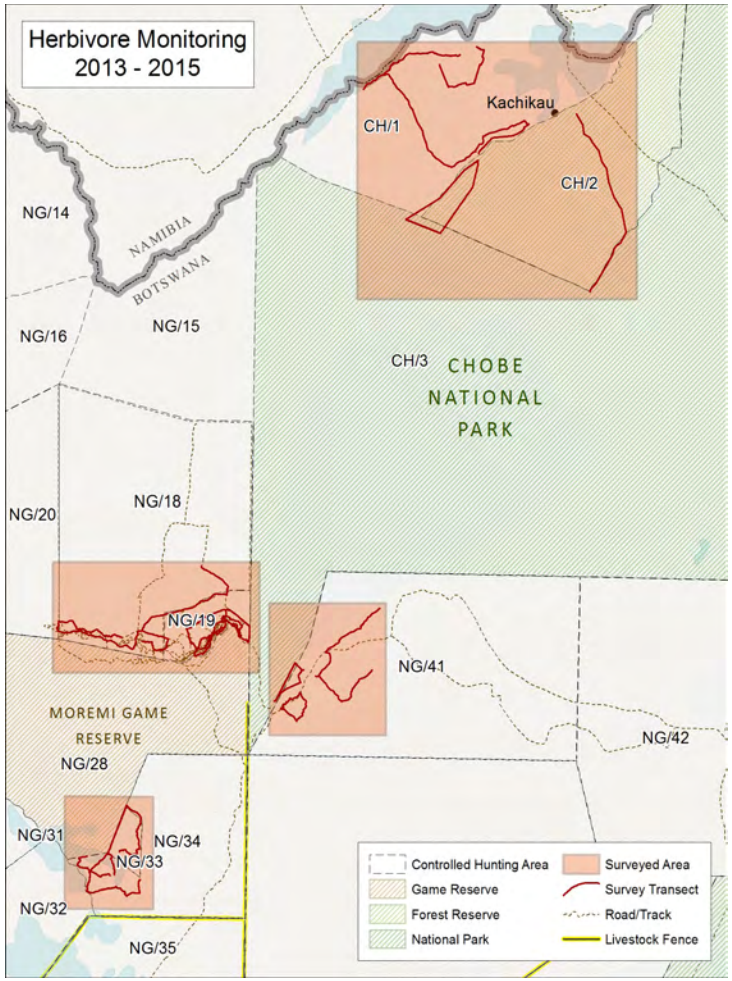
Community-based Wildlife Monitoring

Today we will present:

- Density and Demography Surveys (DADS) of Wildlife
- Birds of Botswana Surveys
- Capacity building and Training with Escort Guides

Part I: Density and Demography Surveys (DADS)

- Wildlife Driving Transects
- Data on all large mammal species
- Counts, sex, age data
- Initiated in 2012
- 5 sampling seasons to date
- Concessions: NG18, 19, 33, 34, 41; CH 1, 2



DADS Survey Training

Training required before surveys undertaken

- Correct use of compass, GPS and laser range finder
- Estimating distances
- Classification of sex and age classes of each species
- Correct data recording

DADS Data Collection

- Drive transects between 6am and noon
- Most concessions have 4 transects
- Each transect varies in length (10-40km), on average 22 km long
- Each of 2 teams does 1 transect each morning
- Try to have 4 people on each team
- Angle, distance, GPS location, habitat type, vegetation cover
- Data collected allows us to map the animals location and measure their distance from the transect line

DADS Sampling Effort

Survey protocol: Each survey is repeated 3 times, with a 2 day interval

Concession	Dry 2013 Ave (Total) Km	Wet 2014 Ave (Total) Km	Wet 2015 Ave (Total) Km	Dry 2015 Ave (Total) Km	Wet 2016 Ave (Total) Km
NG18	51.6 (120.2)	37.8 (113.2)	75.7 (174.2)	89.5 (268.6)	N/A
NG19	62.0 (186.0)	38.4 (115.3)	78.1 (234.4)	79.5 (238.5)	74.0 (221.9)
NG33/34	81.0 (243.1)	49.5 (148.4)	79.9 (239.8)	77.8 (233.4)	144.4 (433.2)
NG41	88.0 (248.7)	39.7 (119.1)	84.5 (253.5)	81.3 (243.8)	132.5 (397.4)
CH1	N/A	N/A	61.9 (185.7)	102.19 (306.6)	N/A
CH2	N/A	N/A	79.03 (157.1)	N/A	N/A

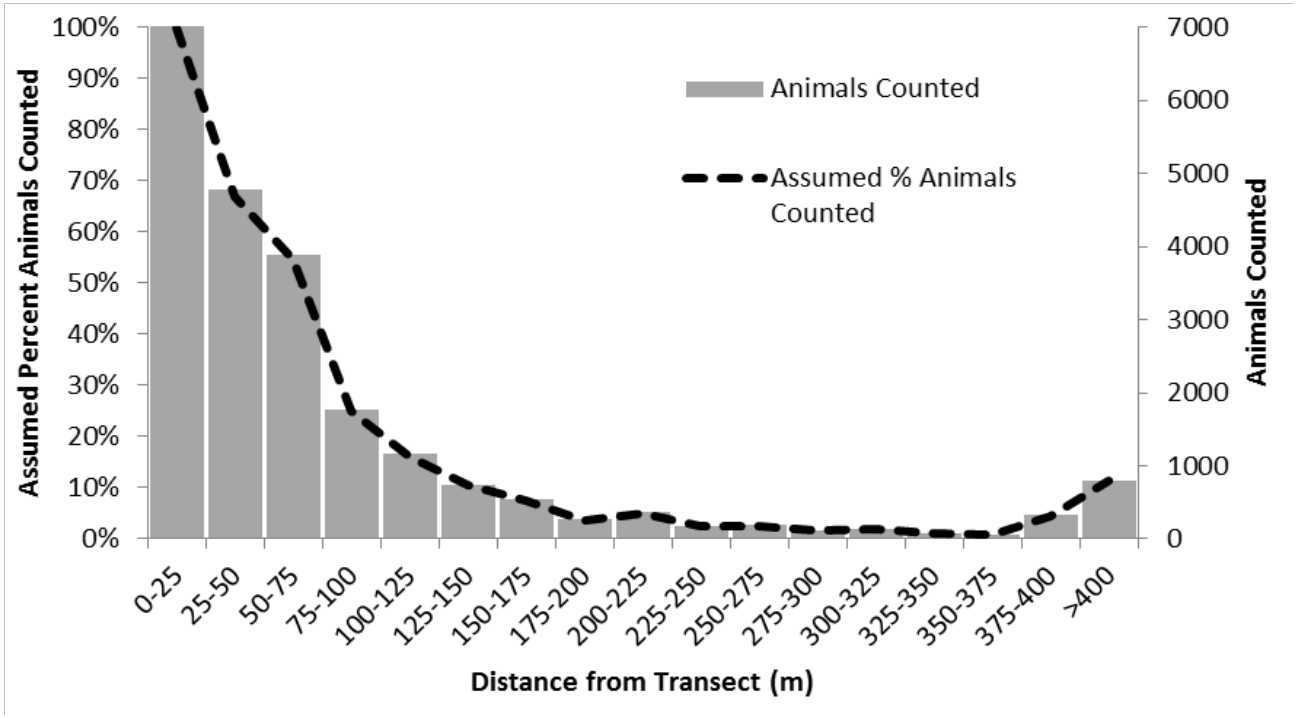
DADS: Common species observed

Species	CH1 (n=18)	CH2 (n=6)	NG18 (n=38)	NG19 (n=39)	NG33/34 (n=42)	NG41 (n=42)
African buffalo	148		36	52	186	2392
Eland	37					14
Elephant	123	5	245	254	469	539
Giraffe	71		189	91	281	169
Impala	175	17	1772	3241	3334	2119
Kudu	34	2	167	171	172	66
Ostrich	27		13	12	14	48
Red lechwe			138	132	206	
Reedbuck			45	17	6	14
Roan	1		25	2	3	27
Steenbok	5	6	18	19	62	64
Tsessebe			30	25	48	89
Waterbuck			114	202		77
Wildebeest	18		3	54	15	530
Zebra	1049	4	126	407	188	700

What percent of the animals did we see?

- We know we don't see all the animals while driving
- It is very important to understand what % we are probably seeing
- We assume that we can see 100% of animals within 25m
- We can also estimate how many we see at further distances

We estimate we only see about 25% of animals that are over 75-100m away!



DADS Density Estimates

We evaluated 2 ways to analyze for density estimates

- Line transect analyses (Distance sampling)
  - Gold standard, can include all animals seen
  - Key assumptions must be met
  - Must have many observations of each species
- Strip transect analyses (Strip-width sampling)
  - Include animals seen within 50m of transect
  - Assume we have seen 100% of animals within this strip (we know we will underestimate)

DADS Strip Transect Densities

- Strip transect estimates for 19 large mammals for each season and concession surveyed— African buffalo, baboon, common duiker, common reedbuck, eland, elephant, giraffe, hippo, impala, kudu, ostrich, red lechwe, roan, steenbok, tsessebe, warthog, waterbuck, wildebeest and zebra
- SE and %CV indicate data variation; would like CV >50%
- Can provide a baseline for on-going monitoring efforts

Impala	Dry 2013			Wet 2014			Wet 2015			Dry 2015		
	D	SE	%CV	**D**	SE	%CV	**D**	SE	%CV	**D**	SE	%CV
CH1							2.2	1.2	53	1.6	0.7	43
CH2							1.1	1.1	99			
NG18	13.1	3.4	26	16.0	3.5	22	20.5	6.1	30	16.5	7.3	44
NG19	32.8	10.2	31	13.6	4.6	34	28.4	6.8	24	22.8	7.6	34
NG33/34	35.8	6.4	18	6.6	1.2	18	27.1	6.6	24	29.6	6.6	22
NG41	10.7	2.9	27	1.3	1.0	77	10.8	4.3	40	16.0	3.4	21

DADS Line Transect Densities

- Line transect estimates are a more robust approach if adequate data is collected with appropriate field protocols
- For 7 species, we could pool data across concessions for key parts of analyses, while still calculating densities for each concession:
  - elephant, giraffe, impala, kudu, steenbok, warthog, zebra
- Goal: standardized field data across various survey efforts to leverage data
- This technique may provide a baseline for on-going monitoring efforts

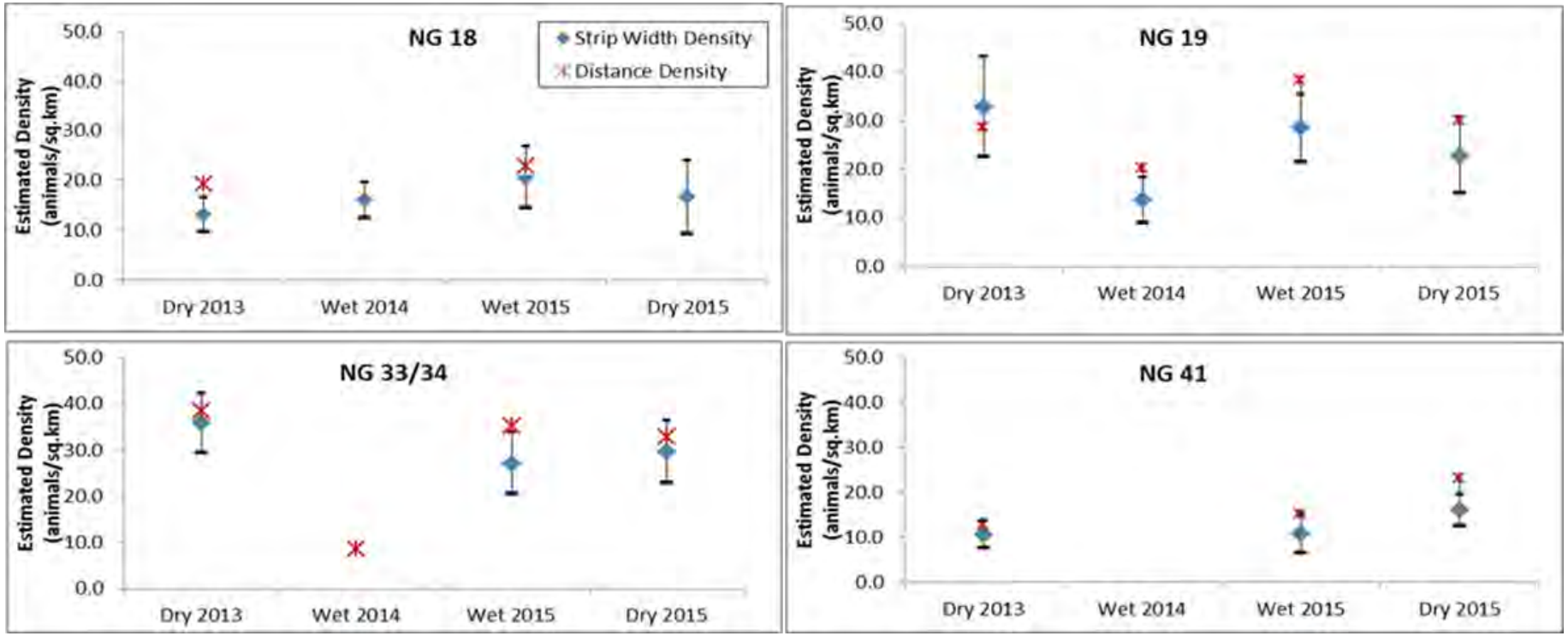
Strip and Line Transect Densities

Impala		Dry 2013			Wet 2014			Wet 2015			Dry 2015		
		D	SE	CV	D	SE	CV	D	SE	CV	D	SE	CV
NG 18	Strip	13.1	3.4	26	16.0	3.5	22	20.5	6.1	30	16.5	7.3	44
	Line	19.3	3.7	19	-	-	-	22.8	11.2	49	-	-	-
NG 19	Strip	32.8	10.2	31	13.6	4.6	34	28.4	6.8	24	22.8	7.6	34
	Line	17.0	10.1	25	20.0	7.1	33	38.1	13.9	35	29.9	10.2	34
NG 33/34	Strip	35.8	6.4	18	6.6	1.2	18	27.1	6.6	24	29.6	6.6	22
	Line	38.4	6.7	17	8.7	2.6	30	35.3	13.8	39	32.8	12.1	37
NG 41	Strip	10.7	2.9	27	-	-	-	10.8	4.3	40	16.0	3.4	21
	Line	12.5	5.9	47	-	-	-	-	-	-	23.1	9.8	42

Density = per sq. km

DADS Density Estimates

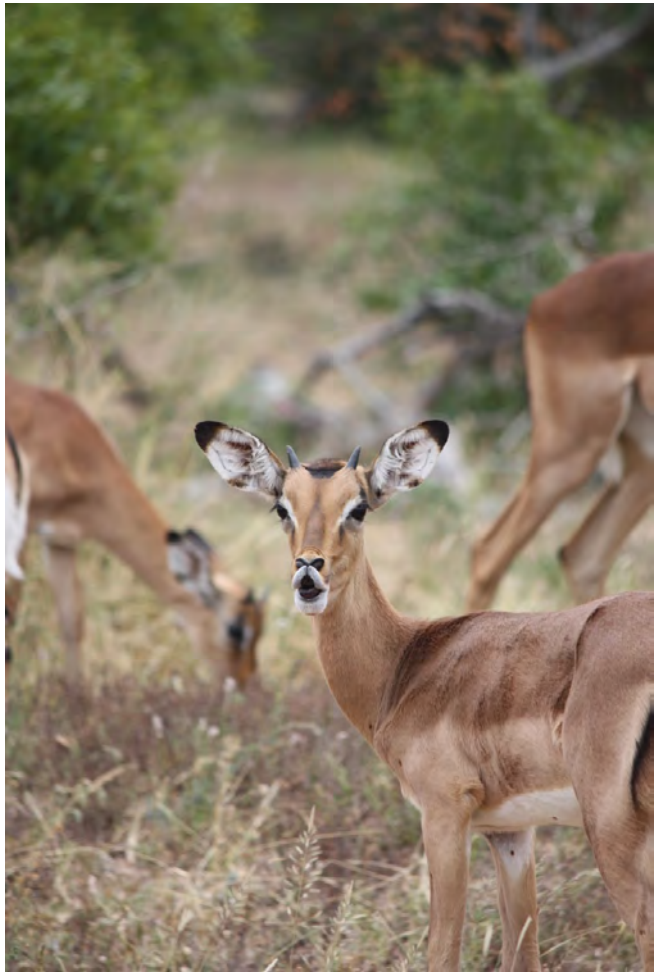
Impala



DADS Demography Data

- Record the sex and age class for all animals seen
- Sex ratios (# Males: # Females) and age ratios (# Young: # Adult Females)
- Requires experience and training to do accurately

Demography Age Classes



A class = <12 months
B class = 12-24 months
C class = 24+ months
C* class = When there is only one male with a group of females. He is therefore a breeding male.

Impala

Once A class animals are around 5 months old (around April) it becomes difficult to reliably distinguish the classes of females. We therefore only count the males in a breeding herd and double the numbers to account for the females (assuming an even sex ratio).

Juvenile

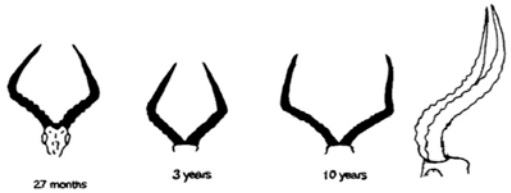
A class

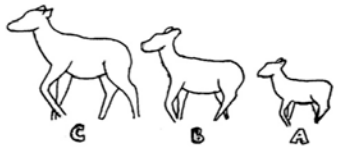
Sub-adult

B class

Adult

C class





DADS Demographic Data

Females per one adult male

Impala	Dry 2013	Wet 2014	Wet 2015	Dry 2015
NG18	2.75	1.24	0.69	2.07
NG19	2.47	3.33	1.82	2.72
NG33/34	1.59	1.42	0.89	0.95
NG41	2.13	0.35	0.54	2.55

Juveniles per one adult female

Impala	Dry 2013	Wet 2014	Wet 2015	Dry 2015
NG18	0.11	0.25	0.05	0.08
NG19	0.10	0.24	0.14	0.06
NG33/34	0.15	0.27	0.35	0.13
NG41	0.05	0.00	0.00	0.00

Conclusions

- First documented ground-based density estimates for a diversity of herbivore species in northern Botswana?
- Need enough data for rigorous analyses to provide confidence for long-term monitoring decisions
- With time, DADS can complement aerial surveys to assist with wildlife management
- Need to start looking at the larger picture and placing this information in the context of landscape and habitat conditions

Recommendations

We provide several recommendations in our report, but the most relevant:

- Increase the number of concession transects
- Standardize training and field methods across all survey efforts so we may combine data for analyses
- Establish a Monitoring Working Group
- Increase efforts to put population information into a larger context

Part II: Bird Surveys

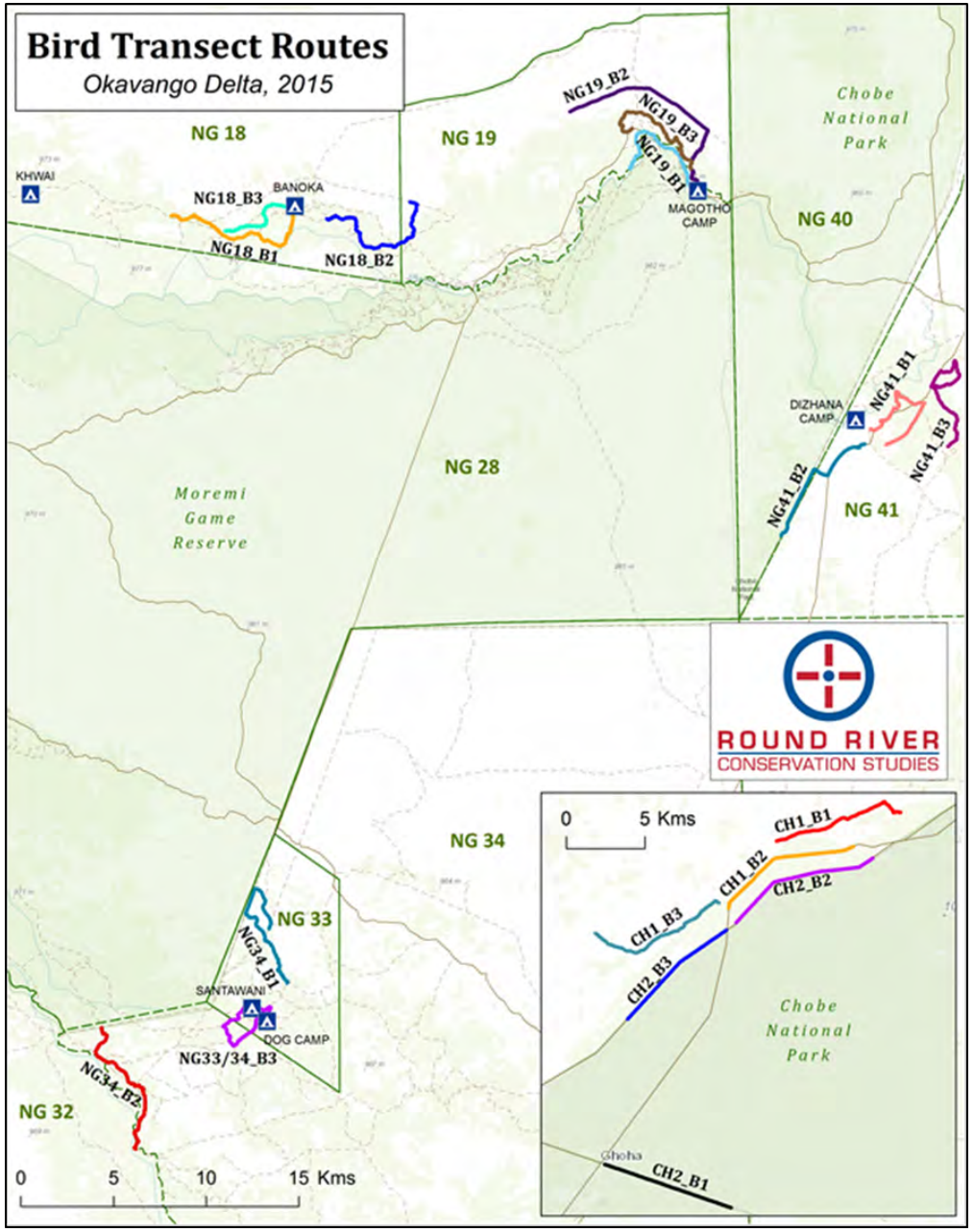
SAREP monitoring recommended including bird surveys

- Little information on birds in area
- Potentially vulnerable to some impacts such as climate change, habitat loss, poisoning
- Indicator species
- Important economic resource (tourism)

Community Bird Surveys

3 types of surveys

- Birdlife Birds of Concern
- Birdlife Botswana Point Count Surveys
- SAREP Point Count Surveys



Birdlife Birds of Concern

- Opportunistic recording whenever a listed bird is seen during any of our field activities
- 943 birds of concern sightings (2,225 individuals) over 5 seasons
- 14 of 20 birds of concern species identified
- Data provided to Birdlife Botswana

SAREP Point Counts

- Point count surveys added in 2015
- Similar to Birdlife Point Counts
- 9-11 points in transect; exploring differences between 200 – 1000m
- 188 different species, 6,701 individuals seen throughout 2015!
- Found higher diversity near riverine habitats

Bird Survey Conclusions

- Bird surveys provide important information for monitoring
- Provide opportunity to develop bird identification skills in escort guides and students
- Recognition of birds as important components of Botswana's biodiversity
- Survey protocols still being developed and refined
- Include bird survey topics in recommended Monitoring Working Group

Part III: Community Training and Involvement

All field efforts in collaboration with escort guides for each concession

Training includes

- Implementing standard field protocols for line transect surveys and bird surveys
- Use of GPS, digital laser rangefinder, compass
- Data recording protocols and quality control
- Bird identification by sight and call, recording protocols
- Computer use and data entry protocols

Outcomes

- 38 guides participated in wildlife monitoring activities since Feb 2013.

Concession/Trust	# Participating Community Escort Guides	# Guides Participating in 2 field seasons	# Guides Participating in 3 or more field seasons
Sankuyo	7	3	3
Mababe	17	7	3
Khwai	13	7	4
Chobe Enclave	2	0	0

Recommendations

- Critical to incorporate communities in long-term monitoring efforts
- Continue training of escort guides
- Work closely with head escort guides in order for them to pass on the skills and training
- Offer more advanced training with computer skills

Monitoring Discussion and Recommendations

- The monitoring surveys discussed are all relatively new to region
- With 3-4 years experience, perhaps now is the time to review and refine these protocols
- Monitoring Working Group
  - Review and refine survey protocols now
  - Develop collaborations to improve efficiency and effectiveness within each concession and across the region
  - Ensure standardized protocols and levels of training are consistently applied to every survey effort
  - Single entity (ORI, DWNP, or ?) to receive survey data and provide to designated analyst, allowing combined data to be leveraged for maximum utility

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