Southern Bent-wing Bats at Naracoorte Caves: Research, conservation, interpretation

Steve Bourne
Kristen M. Lear
U.S. Fulbright Postgraduate Scholar
Southern Bent-wing Bat

- *Miniopterus schreibersii bassanii*
- Insectivorous bat weighing 14-18 grams
- Obligate cave dweller
- Highly restricted range
- Uses at least 100 caves for over wintering sites
- Reliance on only two maternity sites
- Listed as critically endangered under the *EPBC Act 1999*
Source: Southern Bent-wing Bat draft Recovery Plan
Bat Cave, Naracoorte

- Largest of two known maternity sites for the Southern Bent-wing Bat
- 6-8,000 visitors participate in the Bat Tour each year
Presenting Bats to Park Visitors

- First “bat” tours commenced around 1985
- Consisted of slide show and viewing exit flight in summer months
Bat Observation Centre

- Permanent cameras installed in Bat Cave in 1995
- Overcome humidity issues, minimal maintenance
Bat Observation Centre

• Allows real time viewing with no disturbance
• Excellent forum for educating park visitors and disseminating research results
What do visitors ask?

- How many bats are there?
- Is the population increasing/decreasing?
- What is causing this?
- What do they eat?
- How far/fast do they fly?
- How do they breed/raise their young?
- What are their predators?
- Plus the usual misconceptions!
Bela Lugosi

THE DEVIL BAT

Susanne Kaaren

Directed by Jean Yarbrough
Produced by Jack Gallacher

Agnes Moorehead
Vincent Price

When it flies, someone DIES!
Population monitoring
How many bats are there?

- 1955 Bat Cave observations began (Hamilton-Smith): 200,000 bats
- 1963 mark-recapture (Dwyer and Hamilton-Smith): 100,000 – 200,000
- 1967 epidemic reduced population to 60,000
- 1980s/1990s: population recovered to near 1960s numbers
- 2000 – 2008 annual video recording of exit counts (Grant): 35,000 to 21,000
- 2009/2010 thermal imaging counts (Reardon): 30,000
Bat Cave Maximum Population Size

<table>
<thead>
<tr>
<th>Season</th>
<th>Maximum number of bats</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955</td>
<td>200,000</td>
</tr>
<tr>
<td>1963-64</td>
<td>150,000</td>
</tr>
<tr>
<td>1967</td>
<td>60,000</td>
</tr>
<tr>
<td>1980-1995?</td>
<td>150,000</td>
</tr>
<tr>
<td>2000</td>
<td>65,000</td>
</tr>
<tr>
<td>2000/01</td>
<td>37,800</td>
</tr>
<tr>
<td>2001/02</td>
<td>32,800</td>
</tr>
<tr>
<td>2002/03</td>
<td>30,800</td>
</tr>
<tr>
<td>2003/04</td>
<td>25,000</td>
</tr>
<tr>
<td>2007/08</td>
<td>21,260</td>
</tr>
<tr>
<td>2008/09</td>
<td>30,000</td>
</tr>
<tr>
<td>2009/2010</td>
<td>30,000</td>
</tr>
</tbody>
</table>

Population monitoring
Limitations

• Previous observations infrequent
• Various counting methods – inconsistent
• Methods laborious
• Observations only at Bat Cave – what about winter sites?
Current research

- Accurately determine population numbers and trends at Bat Cave throughout the year
- Conduct winter survey of all known over-wintering sites
Current research

- Two thermal imaging cameras
- 102 counts since September 2011 (64 analysed)
- Automated counting system (Thermal Target Tracker (T3))
What Does This All Mean?

- **Increase in spring / decrease in fall**: bats returning from overwintering caves in spring and going to overwintering caves in fall

- **Regular fluctuations in numbers**: significant proportion using surrounding caves during summer

- **Increase in peak population size from previous years**: cannot assume sustained population growth
Winter Surveys

• First winter survey in 1999
  • South Australia only: Upper SE in June, Lower SE in July
  • ~12,200 bats found, limited as it occurred over multiple days/months, Victorian caves not surveyed

• 19 June 2010
  • Included Victorian caves
  • ~14,900 bats found

• 21 July 2012
  • Included Victorian caves
  • 15,300 bats found in SA (mainly in 4 caves in Upper SE)
## Winter Surveys

Comparison of winter survey results for select caves in Upper South East South Australia

<table>
<thead>
<tr>
<th>Name of Cave</th>
<th>Estimated Number of Bats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1999</td>
</tr>
<tr>
<td>Cave Park Cave (U37)</td>
<td>0</td>
</tr>
<tr>
<td>Blanche Cave (U4, 5, 6)</td>
<td>235</td>
</tr>
<tr>
<td>Bat Cave (U2)</td>
<td>500</td>
</tr>
</tbody>
</table>
Cave conditions

• Data loggers for long term monitoring of cave conditions
Cave conditions
Declining population: What might the problems be?

- Chemicals
- Disease
- Less suitable habitat
- Weather conditions
- Disturbance during winter torpor

= “Lackatucka” syndrome
Observations in 1999-2000 suggested a severe decline in guanophylic invertebrate fauna - the cave bugs.
Investigate possible causes for decline in both bat and invertebrate numbers
Research – the cave bugs

- Invertebrate studies - Bellati and Moulds
Chemical residue in guano and bats - Mispagel and Allinson
Research – nasty chemicals

- Chemical residue in guano and bats - Mispagel and Allinson
Research – nasty chemicals
Disease and drought

- 2006 – driest year on record
- Lowest recorded overnight temperatures in December
- No water seeping into Bat Cave
- Less pups born and pups abandoned – many 100’s died
Disease and drought

- 2008
- Poor recruitment again
- Disease??
Disease and drought

- October 2009 – white ulcers observed
- Investigation with universities, Adelaide Zoo, government agencies, laboratories – 9 in all!
- Pox virus and parasite *Riouxgolvania beveridgei* identified
Happy times again
Changing land use

- Changing land use and associated chemical usage-MacDougall
Changing land use
Where do they go to feed?

- Tracking to feeding grounds
- Grant in 2003
- Repeated as a Friends of Naracoorte Caves project in 2010

Challenges
- Only able to track a small number of bats
- Expensive
- Weather dependent
- Limited life of transmitters
Where do they go to feed?
Where do they go to feed?
Where do they go to feed?

Plane’s flight path while tracking a single bat
Where do they go to feed?

- 9.15 pm Exit Bat Cave
- Stringybark along ridge
- Open pasture - no trees
- Bool Lagoon wetland
- Vineyard
- Pasture with some trees
- Heavily treed area
- 11.15 pm Blue Gum Plantation
Other research activities

- Bat health and genetics studies
Conservation

• Management of Bat Cave
  • Restricted access
  • Pest control
Conservation

- Friends of Naracoorte Caves project funded through Envirofund
Cave Park Cave
Cave Park Cave
Joanna Bat Cave
Education - Bat booklet

- Bat information
  - All species found in the region
  - Where bats live
  - Conservation issues
  - What to do if you find an injured bat
Education-community talks

- Threatened Species Day 2003
Acknowledgements

- Friends of Naracoorte Caves
- U.S. Fulbright Program, Australian-American Fulbright Program
- Department of Environment, Water and Natural Resources
- Commonwealth Government Envirofund program
- World Heritage funding program
- Nature Conservation Foundation
- SA Museum, Deakin, Flinders and Adelaide Universities
- The many agencies and researchers who have contributed and continue to contribute to our understanding of the Southern Bent-wing Bats