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## **Greylag Goose Session**

Setting Population-Size Targets for the NW/SW European Population of Greylag Geese Using Multi-Criteria Decision Analysis

Fred A. Johnson and Henning Heldbjerg

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## Overview

- Twenty-one European goose experts used their professional judgement to express the relationship between Greylag Goose abundance and nine management objectives
- Objective weights expressed by EGM IWG members and permanent observers were
  - highest for habitat impacts, agricultural damage, and bird strikes
  - intermediate for government costs, cultural and aesthetic values, and sport hunting
  - lowest for amenity fouling and disease transmission.
- By combining the judgements of goose experts and the relative importance of objectives expressed by EGM IWG members, we identified preferred population targets for the two management units of Greylag Geese

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## Management objectives interpreted from ISSMP

	Criterion	Objective
(1)	Maximize	Cultural and aesthetic values provided by Greylag Geese
(2)	Minimize	Agricultural damage (real or perceived loss of crop biomass) by Greylag Geese
(3)	Minimize	Government payments to mitigate agricultural damage by Greylag Geese
(4)	Minimize	Direct costs to government of culling and scaring Greylag Geese
(5)	Minimize	Indirect costs to government of public derogations of Greylag Geese
(6)	Minimize	Deleterious impacts to other species resulting from habitat modifcation by Greylag Geese
(7)	Maximize	Satisfaction with amount of sport hunting opportunity for Greylag Geese
(8)	Maximize	Public health (amenity fouling & disease transmission by Greylag Geese)
(9)	Maximize	Air safety (number of bird strikes by Greylag Geese)
Not listed	Maximize	Probability that population size falls above the FRVs for Greylag Geese
		(FRVs have not yet been established.
		Any candidate population target that is less than or equal to a
		FRV that is eventually established will be dropped from consideration)





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# Expert elicitation

- Data Centre contacted ≥3 technical experts in each participating Range State
- 21 experts responded, using professional judgement to identify the relationship between Greylag Goose abundance and each objective
- Breeding-season relationships are management-unit specific, but the wintering season included abundance arising from both management units
  - MU 1 (migratory)
    - Breeding: Norway, Sweden, Denmark, Finland
    - Stopovers: Denmark, Germany, France
    - Wintering: Netherlands, Denmark, Sweden, Spain, France
  - MU 2 (sedentary)
    - Breeding: Netherlands, Belgium, NW Germany
    - Wintering: Netherlands, Belgium, NW Germany

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(2) Loss of crop biomass

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(9) Bird strikes

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## Specification of candidate targets

- Goal was to select a range wide enough to encompass diverse stakeholder interests, and with increments that would reflect realistic management and monitoring capabilities.
- MU1:
  - Breeding-pair range reported in ISSMP: 81.6 92.0 (mean = 86.8)
  - Reported range (ISSMP) ± 20%: 65.3 110.4
  - Five equally spaced values within the range: 65, 77, 88, 99, 110
  - Candidates: 70, 80, 90, 100, 110
- MU2:
  - Breeding-pair range reported in ISSMP: 94.5 149.5 (mean = 122.0)
  - Reported range (ISSMP) ± 20%: 75.6 179.4
  - Five equally spaced values within the range: 76, 102, 128, 153, 179
  - Candidates: 80, 100, 120, 140, 160
- 25 possible pairs of MU1/MU2 targets





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## Consequence scores & Swing-weighting

 EGM IWG members and permanent observers asked to weight the relative importance of objectives based on the consequence scores provided by technical experts

Mgmt Unit 1	70	70	70	70	70	80	80	80	80	80	90	90	100	110
Mgmt Unit 2	80	100	120	140	160	80	100	120	140	160	140	160	160	160
1. C&A	0.33	0.49	0.59	0.65	0.68	0.42	0.55	0.63	0.67	0.69	0.68	0.68	0.68	0.67
2. Crop	0.09	0.13	0.20	0.29	0.42	0.16	0.21	0.27	0.37	0.49	0.44	0.57	0.66	0.78
3-5. Cost	1.13	1.80	2.34	2.86	3.49	1.65	2.29	2.80	3.31	3.93	3.73	4.33	4.81	5.42
6. Habitat	0.10	0.18	0.25	0.33	0.46	0.15	0.22	0.29	0.37	0.50	0.43	0.55	0.64	0.77
7. Hunting	0.15	0.33	0.46	0.56	0.65	0.25	0.40	0.51	0.60	0.69	0.65	0.74	0.79	0.84
8. Health	0.26	0.34	0.40	0.46	0.50	0.29	0.37	0.44	0.49	0.54	0.54	0.58	0.64	0.74
9. Air	0.26	0.30	0.34	0.38	0.45	0.28	0.32	0.36	0.41	0.48	0.45	0.53	0.57	0.63

• For each objective, green candidates are the best and red the worst





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# Objective weights by affiliation





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### Consensus-convergence weights

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Weighted score

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## Conclusions

- MCDA widely used, but this is 1st time (to our knowledge) it has been used to help set population targets for migratory birds
- Despite some limitations, the MCDA process
  - is fully transparent
  - clearly separates the science part (the expert elicitation) from the value part (the swingweighting exercise)
- Use of the consensus-convergence method to identify a set objective weights is preferred to ad hoc approaches to negotiation
  - inclusive, repeatable, and transparent
  - blind to dominant personalities or powerful special interests

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# Conclusions (2)

#### • Lessons learned

- the lack of empirical models to predict the consequences of candidate targets relative to management objectives is an important limitation
- although not practical, weighting of objectives would ideally involve a fully democratic process
  - available time for parties to consult within their organizations was necessarily limited
- the MCDA should not be perceived as dictating a preferred set of candidate targets
  - rather it narrows the range of candidates that may be worthy of further discussion
  - in hindsight, a broader range of candidate targets perhaps should have been considered





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# Conclusions (3)

- There is near universal agreement that lowering the abundance of Greylag Geese would best meet a broad range of management objectives.
- Most preferred targets:
  - MU1 (migratory segment): 70 thousand breeding pairs
  - MU2 (sedentary segment): 100 thousand breeding pairs
  - Approximate wintering population size is 617 thousand
- 2<sup>nd</sup> most preferred:
  - MU1: 70k breeding pairs
  - MU2: 80k breeding pairs
  - Approximate wintering population size is 545 thousand

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Candidate	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
MU1 breeding																									1
pairs	70	70	70	70	70	80	80	80	80	80	90	90	90	90	90	100	100	100	100	100	110	110	110	110	110
MU2 breeding																									1
pairs	80	100	120	140	160	80	100	120	140	160	80	100	120	140	160	80	100	120	140	160	80	100	120	140	160
																									1
Winter individuals	545	617	690	763	835	581	654	726	799	872	617	690	763	835	908	654	726	799	872	944	690	763	835	908	981