



MEETING REPORT
INTERCAFE @ Gdansk, 23-25 April 2005

“Cormorant Ecology, Commercial Fishing and Stakeholder Interaction”

INTERCAFE Meeting Report, Gdansk, Poland, April 2005

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This full report of the meeting is in four parts: (1) Work Group 1: Ecological databases and analyses; (2) Work Group 2: Conflict management and resolution; (3) Work Group 3: Linking science with policy and best practice, (4) Report on field trip.

PART (1) Work Group One: Ecological Databases and Analyses

Michal Adamec, Janis Baumanis, Bzoma Szymon, Mindaugas Dagys, Botond Kiss, Henri Engström, Manfred Enstrupp, Marijan Govedic, Svein Lorentsen, Ivailo Nikolov, Josef Trauttmansdorf, Mennobart van Eerden, Stef van Rijn, Catarina Vinagre, Stefano Volponi.

(A) Primary Aims

Aim (1) Water System Database

Responsible person: **Stef van Rijn**

Also Mennobart van Eerden, Jean-Yves Paquet, Catarina Vinagre, Mikael Kilpi

The work of this sub-group aims to investigate the ecology of cormorants at the continental level, particularly their temporal and spatial status and distribution and choice of breeding roosting and foraging sites. Analysis of these data at the continental scale in relation to ecological characteristics (e.g. geographical, climatological, biological – size, nutrient status, fish communities etc) through a Geographic Information System that will provide better understanding of current cormorant distribution across Europe and could also allow predictions of their future distribution. Furthermore, this improved understanding in relation to ecological system characteristics would enable the investigation of site-choice (i.e. breeding, foraging) by cormorants and could lead to more effective widespread management options.

The overall plan is to start off with copies of Mennobart's (RIZA) electronic water map of Europe. Map(s) will be produced with the current coordinates/sizes of cormorant colonies and current coordinates/sizes of cormorant roosts and a third with some sort of indication of the foraging sites associated with these (maybe use 2 maps - a winter one and a summer one). On top of these maps, it is hoped be able to drape other 'environmental' maps - maybe mid-winter temperature, water depth, water quality (cf. Henri Engström's relationship between cormorant numbers and phosphorous loading in Sweden), fish distribution, etc. Given that these 'environmental' datasets will undoubtedly not cover all of Europe (and may be in slightly incompatible formats), one of the main task of WG1 is to 'join up' the maps

up somehow. Because coverage is patchy, it may only be possible to join up bits of the map - maybe a particular country has better coverage than another.

On this matter, Harald Claasen took all REDCAFE data from REDCAFE WP2 and applied a decision tree analysis to model cormorant 'damage' on a continental scale. It may be possible to incorporate/develop some of Harald's work. In terms of foraging sites, data(sets) may be more difficult to assemble. There is probably enough data to start populating the breeding/roosting site maps and the next task is to search for compatible environmental datasets.

RIZA's Water System Database is the key to all this work and so during the Gdansk meeting Stef van Rijn and Mennobart van Eerden reported on the actual contents of the database - mainly currently unanalysed data gathered during the REDCAFE project. Bias in the database has been considered (at the moment the coverage is unevenly distributed both at continental and national levels) and efforts will be made by INTERCAFE participants to improve the coverage where necessary (e.g. parts of France) and provide data for 'missing' countries (i.e. Portugal and 'new' countries to the network). It was also recognised that the quality of currently-held data requires checking. RIZA also have a water depth map of Europe, which will be used later in the development of the integrated database. However, it is currently not possible to undertake any spatial analysis as the breeding and wintering cormorant datasets are still not complete (see work of Rosemary/Loïc and Stefano/Thomas B).

It was agreed the responsible person would send questionnaire forms by email to every participant in each country in order to find information on specific/important (parts of) relevant water systems. During the next meeting in Saxony, the status of the database and plans for the next stages of development/analysis will be presented.

Aim (2) Status of Breeding Colonies in 2006.

Responsible person: **Thomas Bregnballe** (absent)

Also Stefano Volponi, Svein-Håkon Lorentsen, Stef van Rijn.

At the meeting, in plenary with all WG1 participants, the subgroup discussed the types of information to collect during colony monitoring and the contents of the letters that will be written to the national co-ordinators. To accomplish the organisation of the count, a list of 4-5 regional co-ordinators and potential national co-ordinators has been arranged.

While participants agreed on both contents, some are worried about the relatively short amount time available to organise a pan-European counts, especially considering potential difficulties in making effective contact and involving people outside INTERCAFE (e.g. eastern countries such as Hungary, former Yugoslavia) or finding financial support for logistics in some countries (e.g. Romania).

For effective monitoring of the Danube Delta colonies, Botond Kiss pointed out the need of carrying out a pre-survey in winter 2005 by aeroplane to localise all the colonies to be visited and counted the following spring (2006). For these activities, an estimated budget of respectively 1,600 euro (flight over the Delta with an Antonov II) and 2,000 euro (3 teams of 3 people involved for 4 days field work, inclusive of renting ships, fuel and accommodation).

To cope with lack of personnel in some countries, an STSM will be considered. Michal Adamec suggested that funding for some colony counts may be asked/gathered by INTERCAFE through the DOEN foundation (The Netherlands). Stefano Volponi reported that for some eastern countries funds may be obtained from several other foundations such as the Whitley Laing Foundation (Rufford Small Grants for Nature Conservation – max. £5,000 - www.rufford.org - www.whitleyaward.org).

Mindaugas Dagys reported that in Kalinigrad counts of breeding colonies are regularly carried out, but on odd years (2005 and 2007), so special arrangements should be taken to cover this region in 2006. Janis Baumanis provided a useful contact for this region.

During the WG1 plenary session, **R. Parz-Gollner reported on the preliminary results of the first pan-European winter roost count** carried out in January 2003. The aim of the first pan-European midwinter census was to get as complete a picture as possible of the actual population size, migration pattern and distribution of cormorants wintering in Europe. To reach that goal the international cormorant research group took advantage of the experience of people joining the long existing international waterbird-census-network as volunteers in many European countries. The plan was to count all known cormorant night roosts (inland and sea coasts) in all European countries and North Africa simultaneously in mid-January 2003.

Two European coordinators were nominated to organize the count:

- Responsible for EU - west and north, northern Africa: Loic Marion
- Responsible for EU - central and east: Rosemarie Parz-Gollner

The European coordinators tried to find partners who were taking over the national coordination in all relevant countries participating in that project. These partners (national coordinators) were responsible for the data collection on a national level and for the feed back of the results to the European coordinators. Counting teams doing the field work were organized on a national level by the national coordinators.

Two leaflets as well as protocols for the data collection were distributed via the European coordinators to explain and describe the project and to provide all people involved with the relevant information about the data collection. Already existing counting schemes in various countries were continued or were adapted in accordance to the guidelines following the common goal to collect Cormorant numbers at roost sites.

Both European coordinators kept contact with their national partners, tried to give support and help in solving questions whenever needed and are responsible for the final European-wide data synthesis. It was the responsibility of the national coordinators to decide about the final numbers, the status and the accuracy of the counts on a national level.

Results

38 countries (regions) were listed and have been involved in this project (see Table 1). For the final data synthesis at least three countries will be treated separately:

- Ireland, Norway – wintering populations consists of *P.carbo carbo* species only;
- Israel – wintering population does not belong to European population, exchange with Ukraine.

For 21 countries, final results have been calculated (completely or partly counted plus best estimates); 14 countries/regions are still under revision, further sources of information are checked to improve the data quality. Data compilation will be finalized and published in the name of the Cormorant Specialist Group of Wetlands International as soon as all final corrections are completed.

Apart from results on numbers and distribution of Great Cormorants wintering in Europe, other useful information for WG1 participants related to the **methodological and logistical aspects related to the management and co-ordination** of such a large international project. Among the problems and challenges that were encountered and that are likely to be important for the breeding colony counts in 2006 were:

- find national motivated and expert co-ordinators;
- motivate the teams working in the field;
- keep contacts between regional and national co-ordinators with field worker teams;
- give support and resolve questions (also considering language difficulties);
- gather promptly results at national level;
- collect and correct data at regional/global level;
- produce report and summaries on time for further analysis in and outside INTERCAFE.

Another issue that arose during WG1 plenary meeting concerned the **ownership of the final database** as well as the use of the data. It seems very important to define common rules to overcome potential problems of data and information ownership. Clearly a general discussion among INTERCAFE participants is needed so produce an ‘official answer’ to this crucial question. By the summer and before the next meeting in Saxony it is intended to: (1) prepare forms and instructions for carrying out the colony counts; (2) send such materials and a letter to national co-ordinators, (3) get an overview of the requirements and opportunities for support funding.

No	country	status	remarks
1	Albania	rough estimate/numbers not available	revision
2	Austria	completely counted	final result
3	Belgium /south, Belgium north	partly counted + estimate, in progress	revision
4	Bosnia Herz.	rough estimate/ numbers not available	revision
5	Bulgaria	partly counted + best estimate	final result
6	Croatia	rough estimate/ numbers not available	revision
7	Czech Republic	partly counted + best estimate	final result
8	Denmark	estimate - in progress	revision
9	Estonia	completely counted	final result
10	Finland	counted	final result
11	France	completely counted	final result (incl. c.c)
12	Germany	completely counted	final result
13	Great Britain	counted + best estimate	final result (incl. c.c)
14	Greece	completely counted	final result
15	Hungary	completely counted	final result
16	<i>Ireland</i>	best estimate	carbo carbo
17	<i>Israel</i>	completely counted	Pop. out of Europe
18	Italy	best estimate	final result
19	Latvia	completely counted	final result
20	Liechtenstein	completely counted	final result
21	Lithuania	partly counted + estimate	final result
22	Luxenburg	estimate - in progress	revision
23	Montenegro	rough estimate/numbers not available	revision
24	Netherlands	final results - best estimate	final result
25	northern Africa (Morocco, Lybia)	rough estimate/ numbers not available - in progress	revision
26	northern Africa (Tunisia, Algeria)	rough estimate/ numbers not available - in progress	revision
27	<i>Norway</i>	rough estimate - in progress	revision (carbo carbo!)
28	Poland	completely counted	final result
29	Portugal	rough estimate - in progress	revision (incl. c.c)
30	Romania	partly counted + rough estimate	final result
31	Russia / Kaliningrad	partly counted + best estimate	final result
32	Serbia	rough estimate/ numbers not available	revision
33	Slovakia	partly counted + rough estimate	revision
34	Slovenia	completely counted	final result
35	Spain	completely counted	final result
36	Sweden (south)	rough estimate - in progress	revision
37	Switzerland	completely counted	final result
38	Turkey (partly, western area)	no estimate so far - in progress	revision

Table 1. List of countries and status of mid-winter census data collection (July 2005).

Aim (3) Historical Database of Breeding Colonies

Responsible person: **Stefano Volponi**

Also Thomas Bregnballe, Henri Engström, Marijan Govedic, Josef Trauttmansdorf.

During the meeting the responsible person distributed a preliminary worksheet summarising information already available for each country. Gaps in actual knowledge were discussed country by country with further information being provided by participants. It was decided that there would be no time limits, so it is intended to go back in the past as far as possible; Marijan Govedic suggested collecting information on distribution from paleontological studies.

To accomplish these aims, a list of national co-ordinators was appointed to look for published and unpublished data; most of them are also involved in organising the pan-European breeding count in 2006. By the next meeting in Saxony it is intended to update the database with data provided by participants at or after the Gdansk meeting, report remaining gaps and start to organise the GIS interface to allow presentation and analysis of historical breeding data.

(B) Secondary aims

Sub-group 1 - Cormorant manual

Responsible person: **Josef Trauttmansdorf**

Also involved: David Kortan, Szymon Bzoma, Marijan Govedic, Botond Kiss, Thomas Bregnballe, Svein Lorentzen, Mennobart van Eerden, Jean-Yves Paquet, Stef van Rijn, Rosemarie Parz-Gollner, Reinard Haunschmid.

During the early phase of the meeting, the manual's program and potential contents were discussed and revised. Participants started to provide materials for the manual (e.g. a collection of literature citations on cormorant diet in Europe was made available by J. Trauttmansdorf). During a working session, participants formed small groups aimed to list the manual contents (see page 10). Participants agreed to start writing the different chapters as soon as possible (likely after the spring/summer season which is mainly dedicated to field work) and have some draft materials ready to be discussed in the next meeting in Saxony (early October 2005). Stuart Newson may be able to provide *carbo/sinensis* information.

It was agreed the chapter on how to count breeding colonies should be considered of a high priority in view of the pan-European count scheduled for the spring 2006. The printed manual would preferably be in A5 (or A4) format to allow easy use; the final version will also be distributed on CD-Rom and let available through the INTERCAFE web site. It was also agreed to circulate materials among WG1 members by email and then upload on the website the preliminary draft versions of the different chapters to allow all the INTERCAFE participants to read and revise the different versions.

Participants appointed for writing and revising chapters of the manual were:

- Diet (J. Trauttmansdorff, D. Kortan, S. Bzoma, M. Govedic, B. Kiss, M. Enstripp)
- Colonies and roosts (T. Bregnballe, Svein-Håkon Lorentzen, R. Parz-Gollner)
- Breeding success (B. Kiss, T. Bregnballe)
- Sex & age (M. van Eerden, J.Y. Paquet, S. van Rijn, R. Parz-Gollner)
- Fish density (R. Haunschmid, S. Franca, C. Vinagre, I. Russell)
- Indicators of fish damage (D. Kortan, H. Engström)

Sub-group 2 (WG1) Ecology of Pygmy Cormorants

Responsible person: **Zeev Arad** (absent)

Also Ivailo Nikolov, Savas Kazantzidis, Stefano Volponi, Botond Kiss.

During the meeting participants discussed the working steps identified in Lisbon, and particularly:

(1) All representatives have already started to collect data and information for the Pygmy cormorant database, including data on distribution and numbers of both breeding colonies and wintering quarters. Stefano Volponi and Stef van Rijn reported the forthcoming publication (in the WI Cormorant Bulletin) of a review on the breeding distribution of the species in the western Palearctic and the promotion of a network of specialists involved in monitoring the species. The network already includes several INTERCAFE participants.

(2) Participants confirmed the decision to organise a joint mission for counting Pygmy cormorants in the Danube Delta as well as the plan to apply for the STSM program and send a group of graduate students from the participating countries to learn census techniques in the field and help Botond Kiss accomplishing a Pygmy (and Great) count in May 2006. With respect to the latter point, it was argued that both breeding time and habitat of colonies are not exactly the same for the two cormorant species so there may be some difficulties for monitoring both Pygmy and Great cormorants at the same time/period; this should be taken into account when applying for/organising any STSM.

(3) Further effort will be spent to establish connections with other possible countries such as Hungary, Croatia and Ukraine which hold large and partially unknown breeding population of the species. Some good contacts have already been established with people/organisations which can assist/join (?) INTERCAFE (e.g. Marko Tucakov from Croatia).

Sub-group 3 (WG1) The Baltic Sea Leaflet

Responsible person: **Timo Asanti**

Also Mindaugas Dagys, Linas Lozys, Mikael Kilpi, Henri Engström, Szymon Bzoma, Thomas Bregnballe, Redik Eschbaum, Henri Engström, Eric Petersson, Janis Baumanis, Thomas Olesen, Vilju Lilleleht.

The general aim of the subgroup is to produce a leaflet "Cormorant versus Fisheries" for seven Baltic countries and Russia (contacts have been taken for co-operation). Target groups include the general public, stakeholders etc.

At the meeting Timo Asanti reported the subgroup has decided on the contents of the A4 leaflet which will consider three main points:

- "cormorant's history" dealing with historical information on the species distribution and numbers in each Baltic country;
- "actual situation" dealing with the current cormorant status;
- information on the food and diet composition in relation to claimed damage.

The subgroup will ask for information and data from the other WG1 subgroups (e.g. numbers and colony distribution) as well as other WGs for any other input.

It is intended to arrange a draft version for the next meeting in Saxony; a preliminary version will be published as .pdf file and circulated to INTERCAF members before printing.

Sub-group 4 (WG1) Baltic Sea Research

Responsible person: **Thomas Bregnballe** (absent)

Also Mindaugas Dagys, Linas Lozys, Mikael Kilpi, Henri Engström, Szymon Bzoma, Thomas Bregnballe.

It is still not clear whether this will behave as a distinct group. The plans is to describe the expansion of cormorants in the Baltic Sea region, identifying some of the factors that appear to limit numbers and distribution. Aims of this subgroup are clearly linked with the regional analysis of data collected within WG1.

Thomas Bregnballe reported that discussions on ways to look at the historical spread of the cormorant in the Baltic Region had started in co-operation with Andreas Linden and Aksu Lehikoinen (not INTERCAFE participants).

SUMMARY OF HOMEWORK FOR SAXONY

1. Water System Database (Responsible person: **Stef van Rijn**)

- Stef and Mennobart to provide overview (for all INTERCAFE participants) of RIZA's Water System. For the next meeting in Saxony, devise presentation detailing the status of the database and plans for the next stages of development/analysis.
- Participants to start collecting data to improve the coverage where necessary (e.g. parts of France) and to provide data 'missing' countries (i.e. Portugal and 'new' countries to the network). **Responsible person to send questionnaire forms by email to every participant in each country in order to find information on specific/important (parts of) relevant water systems.**

2. Status of Breeding Colonies in 2006 (Responsible person: **Thomas Bregnballe** [absent])

- Prepare forms and instructions for carrying out the colony counts
- Send such materials and a letter to national co-ordinators

- Research and coordinate sources of possible funding (e.g. DOEN foundation, The Netherlands, Whitley Laing Foundation etc. see above) Please bring information to Saxony and send to Stefano Volponi/Stef van Rijn.
- Find contacts for people outside of INTERCAFE (e.g. eastern countries such as Hungary, former Yugoslavia)

3. Historical Database of Breeding Colonies (Responsible person: **Stefano Volponi**) **SEE ALSO PAGE 14**

- National co-ordinators to look for published and unpublished data (most of them also involved in organising the pan-European breeding count in 2006). Please bring to Saxony and send to Stefano Volponi
- Start to plan the organisation of the GIS interface to allow presentation and analysis of historical breeding data.

4. Subgroup: Ecology of Pygmy Cormorants (Responsible person: **Zeev Arad** (absent))

- Establish connections with other possible countries such as Hungary, Croatia and Ukraine which hold large and partially unknown breeding population of the species. Some good contact have already established with people/organisation which can assist/join (?) INTERCAFE(e.g. Marko Tucakov from Croatia). Please bring details to Saxony and send to Zeev Arad.

5. Subgroup: The Baltic Sea Leaflet (Responsible person: **Timo Asanti**)

- Contributions to a draft version for the next meeting in Saxony; preliminary version will be published as .pdf file and circulate to INTERCAFE members before printing.
- Info and data needed (e.g. numbers and colony distribution) as well as to other information from WG2 and WG3 for any other input. Please contact Timo Asanti

6. Sub-group: Cormorant manual (Responsible person: **Josef Trauttmansdorf**)

Message from Josef:

Dear friends,

Maybe not all of you know, the cormorant-manual should be finished by July 2006. That means we still have a lot of work to do in the next year. Up to now we have a good structure for the paper, which needs to be filled with contents.

I want to give some homework to the people involved and to confirm what you will have to do. Below you will see the structure of the manual and the persons working on the different chapters.

- 1) **Introduction:** J. Trauttmansdorff (2 Pages)

- 2) **Diet:** 2.1 and 2.2 M. Enstripp (2 Pages); 2.3 M. Govedic, S. Bzoma (2 Pages); 2.4 to 2.6 J. Trauttmansdorff (3 Pages)

- 3) **Colony and roost counts:** 3.1 and 3.2 T. Bregnballe, S. Lorentzen or who is preparing the paper for the colony count 2006 (3 Pages); 3.3 R. Parz-Gollner (2 Pages)

- 4) **Breeding success:** B. Kiss, S. Volponi, T. Bregnballe (2 Pages)

- 5) **Sexing and aging birds:** 5.1 to 5.3 S. v. Rijn, M. v. Eerden, J.Y. Paquet (4 Pages); 5.4 and 5.5 R. Parz-Gollner, J.Y. Paquet (3 Pages)

- 6) **Fish density indicators:** S. Franca, C. Vinagre, R. Haunschmid (3 Pages); plus I. Russell fish refuges (1 Page)

- 7) **Indicators of damage:** D. Kortan, H. Engström (2 Pages)

If more than one person is working on a chapter, please exchange the files and work together. At the latest I need the results latest in the first half of September, in order to fit the results together. In Saxony we should be able to present more than the structure.

Preliminary contents of the Cormorant Manual

Responsible person: J. Trauttmansdorff

Contributors:

- (1) Diet (J. Trauttmansdorff, D. Kortan, S. Bzoma, M. Govedic, B. Kiss, M. Enstripp)
- (2) Colonies, roosts (T. Bregnballe, Svein Lorentzen, R. Parz-Gollner)
- (3) Breeding success (B. Kiss, S. Volponi, T. Bregnballe)
- (4) Sex & age (M. van Eerden, J.Y. Paquet, S. van Rijn, R. Parz-Gollner)
- (5) Fish density (R. Haunschmid, S. Franca, C. Vinagre, I. Russell)
- (6) Indicators of damage (D. Kortan, H. Engström)

0. Introduction

- What is the manual for (guide to work with cormorants for all interested people)
- Bird description (systematic status, distribution, size, social life, breeding time, etc)

1. Diet

Introduction and possibilities to gain results of cormorant diet

	observation	pellets	regurgitats	stomachs
which species	+/-	+	+	+
species composition		+	+/-	+
daily food intake				+/-
fish length/weight	+/-	+/-	+	+

1.1 Bioenergetics

What determines daily energy expenditure and factors influencing energy expenditure

- activity (time spent for flying, diving, resting, etc)
- environmental factors (temperature, dive depth, food availability)
- change with season
- Daily food consumption

From energy expenditure to food consumption: the "Gremillet model" for food consumption based on:

- time-activity information
- activity specific metabolic rates
- energy density of fish species taken (seasonal variation)
- dietary information

1.3 Pellets

- Table with aims of the study and best method (n. of visits, n. of pellets, ...)
- How to sample (randomisation of path/sampling, use of nets, ...)
- How many pellets (minimum number related to availability and aims),
- How to conserve pellets (bags, labelling, frigidare, ...)
- How to open (drying in stove, dissolving in water with soap/chemicals/enzymes)
- How to store the analysed bones and the remains
- How to analyse data (keybones, measuring, recalculating formula)

1.4 Stomach analysis

- How to conserve bird/stomach
- Labelling

1.5 Dissection (how to...)

Treatment of stomach content (whole prey, semi-digested, digested material)

1.6 Regurgitation

- How to sample the material
- How to measure the fishes (whole fish, semi-digested fish)
- How to recalculate partly digested fishes

1.7 Reference collection (remains, bones)

- How to establish the collection
- Who of our group has a collection (for help and questions)

2. Colony and roost counts

2.1 Introduction

- Cormorants are birds living in groups and breed in colonies and stay over night on roosts and therefore it is easier to get the numbers comparing to single living birds

2.2 Breeding colonies

2.1.1 Introduction

- definitions of a colony/subcolony??
- counting unit: apparently occupied nests AON);
- time of counting (in relation to breeding cycle): different for different countries; need for a national/regional list of recommended period according to breeding phenology and climate

2.1.2 Methods

- ground nesting (*carbo / sinensis?*): count from ground/plane/photos
- tree nesting (*sinensis*): count from ground/(plane? – photos)
- precautions: count from distance/risk of disturbing the colony/nest content not essential for this purpose

2.1.3 Info and potential contents for a pre-defined forms for collecting data (example to be downloaded from internet (Intercafe web-site):

- Colony name
- Is the colony divided in sub-colonies
- Country/region
- Geographical coordinates (main colony/subcolonies)
- Status of the land where the colony exist (private or state owned land)
- Date of the count (ddmmyy)
- Number of nests
- Accuracy of count (predefined)
- Weather conditions during count??? (predefined)
- The state of the colony in relation to the breeding cycle (predefined)
- Nest location (on the ground, in trees, species of tree,) (predefined)
- Subspecies breeding in the colony
- Habitat type (predefined)
- disturbance/predation by White-tailed Eagle, ground predators (predefined)
- Human interactions (predefined)
- Is the existence of the colony in conflict with humans – what type of conflict (forestry, fishery, ...aquaculture,no conflict (as far as is known)) (Comments/predefined?)
- What type of water are the birds feeding in during breeding? (marine, brackish, .. natural fresh water, artificial freshwater (predefined- Stef Water system database)
- Protection status of the site where the colony is located (nature reserve, national park, etc.
- (Is there public access to the site (is it permitted, is the site difficult to get to) ...)
- Name(s) of data provider(s)
- Restrictions on data use? (predefined??)

Literature (methods):

Lorentsen S.-H. 1989. The national monitoring programme for breeding seabirds. Counting manual *Det nasjonale overvåkingsprogrammet for hekkende sjøfugl. Takseringsmanual.* - NINA Oppdragsmelding 16: 1-27. (in Norwegian)

Walsh P.M., Halley, D.J., Harris, M.P., del Nevo, A., Sim, I.M.W. & Tasker, M.L. 1995. Seabird monitoring handbook for Britain and Ireland. JNCC / RSPB / ITE / Seabird Group, Peterborough.

Note:

(1) a paper for the 2006 colony count is in preparation and can be useful for this chapter

(2) time planning - Thomas Bregnballe and Svein Lorentzen communicates between the Gdansk and the Saxony meeting so to:

- finish the Manual for national co-ordinators shortly after Saxony meeting
- spreadsheet ready for entering new data - Shortly after Saxony meeting

2.3 Roosting sites

- Where/how to find roosting sites (day/night roosts)?
- When to count (morning/evening)?
- How long should the count take?
- Short description of the possible behaviour of birds around the roosting site (which is different for Great and Pygmy Cormorant)
- Taking care of combined roosting sites (Pygmies and Great Cormorants)
- How many people should count one roosting site?
- Location of the people counting (depending on the possible direction of the arriving birds, on the sunset/sunrise direction, on the local environmental conditions...).
- Data collection:
 - 1: periods (15 minutes, starting from an hour, not from the time of arriving of the counting people;
 - 2: flocks/individ. birds – written by the time of their appearance;
 - 3: distinguishing between individual birds flying close after each other and small flocks;
 - 4: direction of incoming birds (and if they follow natural corridors as channels, rivers etc.);
 - 5: height of flying of the incoming flocks;
 - 6: additional activities while counting roosting sites (age ratio, colour ringed birds, behaviour of birds as getting darker at dusk ...)

Note: The paper of R. Parz-Gollner for the European mid-winter census should be very useful for this chapter

3. Breeding success

- 3.1 Introduction (what is breeding success)
- 3.2 How and when (best time according to number of visits/efforts, colony occupation)
- 3.3 Single visit vs. multi-visit method
- 3.4 Nest success (Mayfiled and similar methods)

4. Sexing and ageing birds

- 4.1 Introduction (about aims and goals)
- 4.2 Nestling biometrics
 - growth
 - bill shape
 - weight
- 4.3 Full grown birds
 - wing length
 - bill shape
 - weight
- 4.4 Aging and sexing
 - Plumages
 - Behaviour
- 4.5 Subspecies *carbo* vs. *sinensis*

5. Ringing and colour-ringing

6. Fish density indicators

6.1 Indirect methods

6.1.1 Phosphorus concentration

- How to sample
- How to quantify

6.1.2 Nitrogen concentration

- How to sample
- How to quantify

6.1.3 Transparency

- How to measure transparency: the Secchi disc

6.1.4 Food administration monitoring system: periodic registration of how much food fish farmers put into the system and correlation with fish density (important: the amount of food fish eat depends on species, size, temperature and salinity).

6.2 Direct methods

6.2.1. Sampling methods (according to habitat and target species)

6.2.1.1 Coastal waters

- Trawling
- Gill nets

6.2.1.2 Estuarine waters

- Trawling
- Gill nets

6.2.1.3 River systems

- Electric fishing

6.2.1.4 Ponds

- Seine

6.2.1.5 Reservoirs

- Seine

7. Indicators of damage

7.1.1 Scars

7.1.2 Age distribution

7.1.3 Interaction with fish community

BREEDING COLONIES

Preliminary list of regional/national co-ordinators for the 2006 breeding colonies counts

Region I: Atlantic South

Regional coordinator: Stef van Rijn

National coordinators

Country	Preliminary national coordinator	Remarks
Spain	?	
France	Loic Marion	to be confirmed
Belgium	Jean-Yves Paquet	
The Netherlands	Stef van Rijn	

Problems to be solved

Region II: Atlantic North

Regional coordinator: Svein Lorentsen

National coordinators

Country	Preliminary national coordinator	Remarks
Ireland		
Great Britain		
Norway	Svein Lorentsen	
Murmansk coast etc.		
Iceland		
Føroyar (DK)		
Grenland (DK)		

Problems to be solved

Find co-ordinators for not yet covered areas

Region III: The Baltic Sea and neighbours

Regional coordinator: Thomas Bregnballe

National coordinators

Country	Preliminary national coordinator	Remarks
Germany	Wilfried Knief	
Denmark	Thomas Bregnballe	
Sweden	Henri Engström	
Finland	Aksu Lehikoinen	
Russia (San Peterburg region)	???	contact through J. Baumanis
Estonia	Vilju Lilleleht	
Latvia	Janis Baumanis	
Lithuania	Mindaugas Dagys / Linas Lozys	
Leningrad region	Anna Gaginskaya anna@angag.pu.ru Sergey Rezvyi Irene@is1137.spb.edu	to be confirmed contact through J. Baumanis
Kaliningrad region	GennadyGrishanov Dep. of Bioecology, Universitetskaya str. 2, 236 040 Kaliningrad, RUSSIA grishanov@email.albertina.ru	to be contacted/confirmed contact through J. Baumanis
Poland	Szymon Bzoma	

Problems to be solved

Latvia: Janis Baumanis reports problem with manpower and time; two large colonies and new scattered colonies, very widespread, some very small.

Region IV: Central Europe**Regional coordinator:** Stefano Volponi**National coordinators**

Country	Preliminary national coordinator	Remarks
Italy	Stefano Volponi	
Switzerland	Sempach Ornithological Institute	to be contacted
Austria	Josef Trauttmansdorf	
Czech Republic	Petr Musil	
Slovakia	Michal Adamec	
Hungary		
Slovenia		doesn't breed
Croatia	Marko Tucakov	
Bosnia and Herzegovina		
Serbia and Monte Negro		
Albania		
FYR Macedonia		
Greece	Savas Kazantzidis	

Problems to be solved

Difficulties for some countries such as Albania and/or former Yugoslavia for lack of personnel or difficulties into access the wetland areas

Region V: Black Sea and others**Regional coordinator:** missing**National coordinators**

Country	Preliminary national coordinator	Remarks
Turkey		
Bulgaria	Ivailo Nikolov	
Romania	Botond Kiss	
Moldova	?	
Ukraine		contact through RIZA - M. van Eerden?
Belarus	Irina Samusenko	to be confirmed

Problems to be solved

Still missing the regional and some national co-ordinators. Needs for funding field monitoring for some countries.

In Romania, for the effective monitoring of the Danube Delta colonies, has been reported the need of carrying out a pre-survey in winter 2005 by aeroplane to localise all the colony to be visited and counted the following spring (2006). For these activities, was estimated a budget of respectively 1.600 Euro (flight over the Delta with an Antonov II) and 2.000 Euro (3 team of 3 people involved for 4 days field work, inclusive of renting ships, fuel and accommodation).

Reported difficulties for covering the whole area of some country (e.g. Bulgaria). Problem for counting in Ukraine (contact through RIZA/Mennobart van Eerden?)

PART (2) Work Group Two: Cormorant management and resolution

Thomas Keller, Kareen Seiche, Ger Rogan, Nils Røv, Ian Russell, Petr Musil, Robert Gwiazda, Ion Navadaru, Daniel Gerdeaux, Redik Eschbaum, Timo Asanti, Mindaugas Dagens, Henrik Lykke Sørensen, Tamir Strod (attended one session).

1. Legal Frameworks

This aspect of WG2 is ongoing. There is a need for a basic understanding of how different countries handle cormorant/fishery conflicts and how this has changed over time. Daniel Gerdeaux has prepared a spreadsheet as a template for all participants to complete and has had six responses (Latvia, Greece, Denmark, Slovenia, Estonia, Bavaria), but too few to analyse. Thus:

- **We need everyone to complete spreadsheets asap and return to Daniel Gerdeaux – to allow compilation in time for Saxony meeting.**
- We recognise that the spreadsheet format might not be readily applicable for all countries, so provide additional information as necessary
- Daniel Gerdeaux's Spreadsheet includes data on numbers of birds shot (hence overlap with Stef's sub-group)
- Spreadsheets with data from France and Bavaria are attached as examples. Due to its federal structure, 16 spreadsheets for every state need to be completed for Germany. DG has asked Dr. Hilge for assistance for this job and has received information since the Gdansk Meeting.

Legal framework of Cormorants (<i>Ph.c. sinensis and carbo</i>) in France												
years	1981	1992	winter 1994-1995	1995-1996	1996-97	1997-98	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
legal status and French management rules	integral protection	sub-species <i>sinensis</i> , regulation is possible, killing allowed only on fish ponds if all other methods are not efficient,	it became easier to get this permission	first shots on roosts near fish ponds, and on rivers where there is endangered fish species		the goal is the stabilization of wintering birds in France at the number of birds in January 1997 : 75 000	On waterbodies not in the nearness of fish ponds, the first years of this period, only guards (hunt and fishery) were allowed to shot, and during the last years approved persons are allowed in addition.					
allowed quotas on fish ponds and near waterbodies				1236	no precise quotas			10682	12792	14823	15783	18411
allowed quotas in other waterbodies				0	742	1215	2365	3941	3991	7774	9434	12997
total quota				1236	6916	9710	10828	14623	16783	22597	25217	31408
total killed				3572	4480	7145	10472	12097	15693	18994	22046	25239
killed on fish ponds and near waterbodies				3572	4350	6272	8125	8755	11156	12679	14139	15170
killed on other waterbodies					130	873	2350	3256	4537	6315	7907	10069

Legal framework of Cormorants (<i>Ph.c. sinensis</i>) in Bavaria																
years	until autumn 1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	
legal status and Bavarian management rules	integral protection	shooting at aquaculture facilities, smaller isolated lakes and gravel pits, smaller rivers with Grayling populations; permits required in every single case.	Shooting generally allowed within a radius of 100 m next to all water bodies from August 16 to March 14; in general no permits required; regulation does not apply to national parks, nature reserves, large lakes, and certain stretches of large rivers, but additionally special permits for shooting in those particular areas can be obtained from the regional authorities.				shooting generally allowed within a radius of 100 m next to all water bodies from August 16 to March 31 (in some areas); in general no permits required; regulation does not apply to national parks, nature reserves, large lakes, and certain stretches of large rivers, but additionally special permits for shooting in those particular areas can be obtained from the regional authorities.				shooting generally allowed within a radius of 200 m next to all water bodies from August 16 to March 31 (in some areas); in general no permits required; regulation does not apply to national parks, nature reserves, large lakes, and certain stretches of large rivers, but additionally special permits for shooting in those particular areas can be obtained from the regional authorities.					
allowed quotas on fish ponds and near waterbodies	0	no precise quotas														
allowed quotas in other waterbodies	0	no precise quotas														
total quota	0	no precise quotas														
total killed	0	657	6304	3449	3640	2547	2857	4500	5862	4082	?	?	?	?	?	
killed on fish ponds and near waterbodies	0	657	?	?	?	?	?	?	?	?	?	?	?	?	?	
killed on other waterbodies	0	0	?	?	?	?	?	?	?	?	?	?	?	?	?	

2. Definitions

Ian Russell provided a brief presentation to stimulate initial discussion:

Definitions – Ian Russell

An over-arching goal of INTERCAFE is “... the development of policy aimed at maintaining the favourable conservation status of Europe’s cormorant populations whilst enabling the sustainable exploitation of fish stocks in a wide variety of aquatic habitats.” In developing the work within INTERCAFE, it was felt there was a need to establish and maintain a common understanding of relevant terminology and definitions among the participants. In the first instance, it was agreed that clarification should be sought on the terms: ‘favourable conservation status’, ‘sustainable fishery’, ‘serious damage’ and ‘successful conflict resolution’. Work Group 2 were tasked with taking this forward.

A presentation on the above terms was made to WG2 as a basis for discussion. Existing definitions were sourced where possible (e.g. views on ‘favourable conservation status’ from the Habitats Directive and Birdlife International documentation). In addition, complexities were recognised where it was apparent that explicit definitions may be impractical (e.g. in prescribing ‘serious damage’). It was agreed that the content of the presentation, and subsequent feedback from the WG, would be condensed into a short report (IR tasked with this). It is planned to circulate this to WG2 members for comment in advance of the next INTERCAFE meeting in Saxony. The report will subsequently be made available for wider consideration and comment by other WGs and the Management Committee.

The main discussion that followed highlighted several points:

- It will be difficult (probably impossible?) to provide succinct definitions acceptable to all;
- It is more realistic to provide short outline of each term – briefly describing key issues, caveats, etc.
- It is important to decide what purpose definitions will serve – need feedback from whole group on this and views on how best to take this forward.

- The basic requirement is to understand specifically what definitions are needed for.
- Possible development of glossary in long term?
- Dave Carss suggested that instead of working out its own definitions WG2 should better simply collect definitions already in use by stakeholders. This seems like a very good idea, but needs to be approved by WG2 members at the forthcoming meeting in Saxony.

3. Carp Pond sub-group - Case Studies

Dombes (France) – Daniel Gerdeaux

There are several pond areas in France: Brenne, Forez, Sologne, Lorraine. Dombes is one of the largest areas in France with carp ponds. It is located North of Lyon, between Rivers Saône and Ain in a “square” of 50x50 km. The total surface of 1,100 ponds is around 12,000 ha. The ponds were built in the 13th century and are very shallow (less than 2 meters in the deepest part). Historically, grasslands and forest (25%) were the main uses of the landscape with ponds. However, in the past 20 years maize agriculture has increased.

Total production of fish in these ponds is around 1,800 tonnes per year: 80% carp, 13 roach, 6% tench, 1% pike. They are sold for eating (40%) and stocking (60%). Stocking is a popular new trend.

The slopes of the shores are very gentle with a lot of macrophytes, which are very favourable for birds. Dombes is on a major migratory fly-way for birds: 250 migratory bird species and 130 breeding species are listed in this region. The conflicts between aquaculture and cormorants have existed for more than 15 years. There are around 2,000 wintering cormorants (during 4 months). For the past 10 years between 1,200 and 1,400 birds have been killed per year. There is only one roost inside the pond area. Other roosts are on the two rivers Saône and Ain (25-30 km at the periphery). Different experiments have been tested before resorting to lethal measures: scaring, laser guns, refuges (wires and harvesting maize leaving long stems) but they are considered to be inefficient by fish the farmers.

Today, fish farmers don't make enough profit with aquaculture. Hunting can give a bigger profit but more and more fish farmers are emptying ponds and planting maize. This is a serious risk for the conservation of these wetlands. A Natura 2000 project is on-going, but the cormorant conflict is a serious “stumbling block”.

Discussion

DG advised that efforts were made in 2004/05 winter to co-ordinate shooting efforts over the whole region. DG to see if it is possible to report further on this initiative (for Saxony).

Short report of the sub group “Cormorants in fish pond areas with a high value for nature protection”- Kareen Seiche

Members of the Carp sub-group include: participants from Poland, Czech Republic, France, Israel, Slovakia, Romania and Germany.

The task of this work group in Gdansk was to decide about the best way to compare the situation in different countries. That means (1) to decide on the data are needed in order to have comparable databases and (2) what data are available. In order to have a

good example, a table comparing France and Germany was prepared. The example is given below.

The next step will be to add study areas from Poland, Czech Republic and Israel and to refine the data. The homework for Saxony is the preparation of more details about management measures to deter Cormorants.

Case study areas in France and Germany*Comparison of databases from the case study areas in France and Germany*

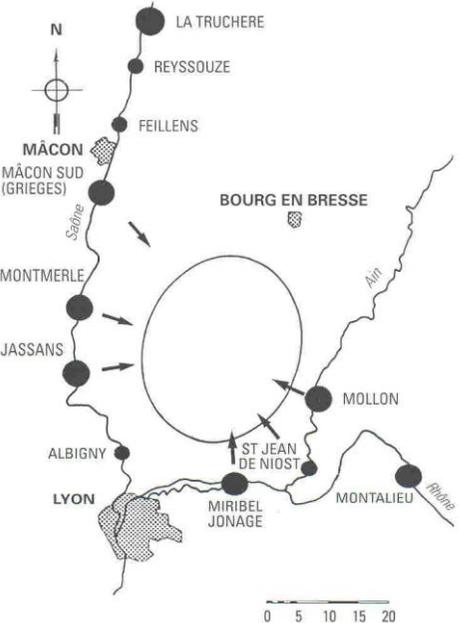
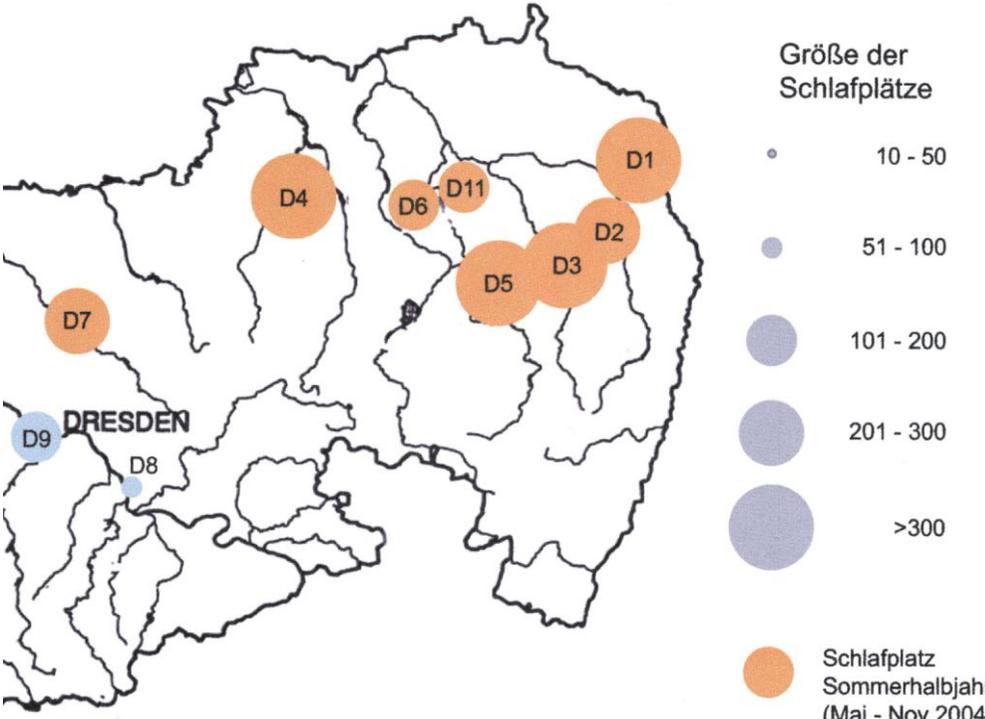
Case study region	France	Germany
	Dombes county, near Lyon	Upper Lusatia Heath- and Pond Landscape, Saxony
Basis data		
Total area		26.000 ha
Surface of waters	12.000 ha	2.114 ha
Number of ponds	1.100 ponds	335 carp ponds
mean surface	10 ha	6,3 ha
water depth	very shallow waters, 1,5m	Between 0,5 and 1,5 m
history	created in 13th century	Built in 15th century

Case study region	France	Germany
	Dombes county, near Lyon	Upper Lusatia Heath- and Pond Landscape, Saxony
Basis data		
Charakter of habitats	70% water, 30% reeds and other vegetation surrounding landscape: grasslands, forest, crop agriculture	8 % water area fish ponds
Status of Protection	Natura 2000	Natura 2000 (Flora Fauna- Habitat- Guideline and SPA), Biosphere Reserve
Protected species	List of protected species without birds: Cistude d'Europe (Emys orbicularis) Triton cr��t�� (Triturus cristatus)	15 fish species on the Red List in Germany 18 endangered reptiles and amphibians

	Leucorrhine à gros thorax (Leucorrhinia pectoralis) Grand Murin (Myotis myotis) Grand Rhinolophe (Rhinolophus ferrum-equinum) Petit Murin (Myotis blythii) Petit Rhinolophe (Rhinolophus hipposideros) Vespertilion à oreilles échancrées (Myotis emarginatus) Vespertilion de Bechstein (Myotis bechsteini) Caldésie à feuilles de Parnassie (Caldesia parnassifolia) Flûteau nageant (Luronium natans) Marsilée à quatre feuilles (Marsilea quadrifolia) Bouvière (Rhodeus sericeus amarus)	
Case study region	France Dombes county, near Lyon	Germany Upper Lusatia Heath- and Pond Landscape, Saxony
Birds in Pond habitats	Waterbird numbers, bird species (protected and endangered species), 250 migratory bird species, 130 breeding species Wintering cormorant : 2000 (mean) during 4 months	145 breeding birds

Case study region	France Dombes county, near Lyon	Germany Upper Lusatia Heath- and Pond Landscape, Saxony
Pond Management		
Management cycle	Traditional management : 2 years with water, one without water ,	Traditional management: 3 years, twice a year pond dewatering, harvest in autumn(3 summer carps are sold), 1 and 2 summer carps are taken to wintering ponds (deeper ponds, high fish density), in

		spring from wintering ponds back to normal ponds, normal ponds are dry during winter
Commercial fish species	Species : carp (80%), roach (13%), tench (6%), pike (1%), Size of carp 1-2 kg	carp, tench
Production level	Total production less than 1800 tonnes	700- 1000 kg/ ha
sale	40 % for eating, 60 % for stocking in rivers and fishing ponds	Mainly for eating
Other predators	Heron, gulls (particularly during emptying ponds for fishing)	Grey Heron, Otter
Cormorant data from 1990- 2004		
Breeding pairs	only some in a protected area	Only breeding attempts, nests are destroyed in an early stage
Resting and wintering birds	Wintering cormorant : during 4 months 1992/93 : 2300, 93/94: 3200, since annual mean 3500	Resting birds in a high number from July to October, app. 2.000
Killed birds	since 94/95, each year between 1200 and 1400	app. 200- 300 yearly
alternative feedings ground	rivers Saône, Rhône, Ain, 25-35 km, in river Ain, presence of Grayling	At the moment difficult, in future big waterbodies in old open cast minings

Case study	France	Germany
region	Dombes county, near Lyon	Upper Lusatia Heath- and Pond Landscape, Saxony
Situation of roosting sites	Roosting sites at the periphery of the pond area along rivers, see figure below	Day and night roosts in carp ponds
	 <p>ure 4. - Localisation des dortoirs</p>	

Great Cormorant (P.c. sinensis) in Czech fishponds – Petr Musil

The expansion of Great Cormorant populations in Europe resulted in increasing numbers of Cormorants and consequently in the establishment of a Czech Breeding population since 1982. Czech Breeding population size increased during the 1980s and reached a maximum in 1989-1992 exceeding 600 breeding pairs. The population then decreased and later stabilized at 200-240 pairs (2000 – 2004). Nevertheless, much higher numbers of Cormorants are recorded during the spring (March) and autumn (September-November) migrations (about 12 000 – 14000 birds). Wintering numbers are still increasing considerably reaching a maximum in winter 2004/2005, when around 9000 birds were counted.

This situation has caused many cormorant-fisheries conflicts in traditional fishpond regions (South Bohemia, South Moravia) and on the migratory fly-ways (esp. Central and North Moravia and Eastern Bohemia). In the past few years conflicts have also increased in marginal fishpond regions at higher altitudes. The Cormorant is protected under Czech Environmental law.

Carp, which is the most common species in this area, represented 79% of the food composition of Cormorants. The second important food item found was Tench (15% of the food) followed by Perch, Roach, Rudd and Crass Carp. The optimal size of consumed fishes is between 10-20 cm. Foraging Cormorants prefer fishponds with one-year old fish which reach the above body size. In 1999, the total damage caused by Cormorants were estimated at 64 698 000 Czech Crown (i.e. 2,156,600 euro).

Although an official Action plan for Great Cormorants doesn't exist, the following management tools are applied at local, regional and national levels:

- Flushing or shooting may be allowed by district government or Landscape Protected Area Administration. Permission is usually issued during the non-breeding season.
- District government could compensate damages caused by Cormorants all-year around.

Note: see also presentation given by Jaroslav Boháč in WG3

Overall Discussion

- Further presentations to be requested on situation in Poland & Israel at future meetings (and elsewhere?). Need to identify contributors and arrange presentations for Saxony.
- Develop links with WG3 on case studies.

4. Management measures

WG2 have been tasked with producing a leaflet summarising (and expanding on) REDCAFE results on management measures (Bruno Broughton leading). The leaflet is intended to be a 'user friendly' means of reporting on management tools for stakeholder groups. The group also noted the existing UK booklet 'Protecting your fishery from cormorants' which is available from Moran Committee website (www.cormorants.info).

New information on management techniques was presented and discussed by the Group with presentations from Ian Russell and Thomas Keller.

R&D on fish refuges in UK (England & Wales)-Ian Russell

As in many other parts of Europe, cormorant numbers have increased in England and Wales over the past 20 to 30 years and this has increasingly brought cormorants into conflict with inland fisheries. Research in the UK has demonstrated that, while cormorants may not be a general 'problem', impacts on fish stocks and fisheries can be substantial at some sites. While the shooting of cormorants is permitted under licence at some sites for the purpose of preventing serious damage to fisheries, it is recognised that alternative non-lethal techniques to reduce the impact of cormorants on fisheries need to be identified in order to strike an appropriate balance between protecting fisheries and the conservation of a protected species. To this end, the UK Department for Environment, Food and Rural Affairs (Defra) has been funding a programme of research into the potential of using underwater refuges for fish as a means of reducing impacts. This work is being undertaken by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) in collaboration with the Central Science Laboratory (CSL), and with active support from the UK Environment Agency. A presentation summarising progress on this project was made to WG2 during the course of the Gdansk meeting.

Underwater habitat plays a key part in the interaction between fish predators and their prey. Weed cover and other submerged structures are widely used by prey fish to reduce the risk of predation from pike and other predators. Research has shown that the survival of prey species increases and the growth of predators such as pike decreases, as vegetation density becomes greater. The extent to which this might apply to cormorant/fish interactions is less well established, but there is every reason to believe that similar factors will apply.

Cormorant numbers on inland waters in the UK vary over the year as birds move between breeding and over-wintering areas, but are highest during the winter period. Unfortunately, this is when the natural cover available to fish is at its lowest level because aquatic weed dies back. In addition, fish swimming speeds, which are governed in part by water temperature, are also at their lowest level, and cormorants can probably swim faster than most of their prey species at this time of year. It is therefore envisaged that refuges would provide fish with additional cover and reduce their accessibility to cormorants at a period of the year when they might otherwise be particularly vulnerable to predation.

The research has already provided very clear evidence that refuges can protect fish and reduce the foraging efficiency of cormorants. For example, in a series of four trials conducted in 2003 and 2004, two identical adjacent ponds, one with refuges and the other without, were stocked with equal numbers of fish (roach, perch and carp), and bird numbers and behaviour were then monitored closely. After 4 to 6 weeks, the ponds were drained and the surviving fish recovered. The results were consistent in all four trials. Cormorant dive duration in the refuge pond increased and the foraging efficiency of the birds (prey capture rate and the proportion of successful foraging bouts) decreased significantly in comparison with the control pond. In effect, the birds were working harder for fewer captured prey. As a result, birds found the refuge pond less attractive and used it less; on average, there were 72% fewer cormorant visits to the refuge pond than the control pond during the trials.

The effect of the above changes was to reduce the overall fish losses in the refuge pond by almost 80% and, when adjusted for numbers of bird visits to the respective ponds, this amounted to an average reduction of 67% in the weight of fish consumed per cormorant visit

for birds feeding on the refuge pond. This clearly demonstrates that, where alternative foraging sites are available, the presence of refuges can dramatically reduce the quantity of fish eaten by cormorants at a site.

Fish refuges are not expected to solve 'the cormorant problem' on their own, but they may well provide significant benefits for fisheries in many situations. They are expected to be particularly suitable for smaller stillwater coarse fisheries, and especially where fish such as roach, perch, rudd and bream are the main target species. However, there are still a number of issues to resolve in order to determine how best to apply this approach to a range of fishery types and to assess the extent to which fisheries might benefit. Work is therefore continuing to evaluate this management technique further. A more detailed summary of the work on fish refuges has been made available for anglers and fishery managers in an advisory leaflet. This can be found on the Defra website at: www.defra.gov.uk/wildlife-countryside/vertebrates

Discussion

- Encouraging results had been provided from experimental trials and this technique is being used by a number of recreational coarse fisheries in UK. Work is continuing to address optimum deployment issues and to assess then extent of benefits for fisheries.
- The group agreed that fish refuges should be considered “another tool in the toolbox” to ease cormorant conflicts at ponds. Technique may also be used at other small still waters and on slow flowing rivers. It was noted by some WG2 members that WG2 is not supposed to only work on ponds. Also large waterbodies, like bays and other coastal environments need to be covered.

High Pressure Water Hoses to protect fish ponds from avian depredation – Thomas Keller

A report from Germany has suggested that high-pressure water hoses (controlled by photocells and triggered by motion sensors) could be a new option for smaller fish ponds. In principle, high-pressure water beams were used as optical and mechanical barriers. A very positive side effect was that the ponds got aerated as, especially during the summer, oxygen levels in Carp ponds can fall to very low levels. The report stated that the system had successfully been tested on Carp ponds in Germany but no detailed information was available on efficacy as yet.

Reference: Kohlmorgen, J. (2001): Druckwassersperre – ein Schutzsystem gegen tierische Fischräuber. Fischer & Teichwirt 52(1): 15 – 16.

Discussion

- WG2 briefly discussed this system/technique. Nobody had heard of anything similar in other countries. It was suggested that the technique should be investigated further and reported back to the group at a future meeting. It was concluded that this technique could be considered to be “another tool in the toolbox” rather than an overall solution to the problem of Cormorant predation.
- Need short notes on progress on these new techniques for circulation to WG2 for comment – Ian & Thomas to action. Group to provide feedback by time of next meeting.

Update: Great Cormorant Population Control in Practice - Thomas Keller

From the winter of 1993/94 until the winter of 2002/03 the numbers of migrating and wintering Great Cormorants in Bavaria remained stable with mean numbers ranging between approx. 6,300 to 7,400 birds (winter maxima between 7,700 and 9,500 birds). For the first time, the number of birds exceeded this range in the winter of 2003/04 with a mean number of 8,222 birds (maximum: 9,595). The Cormorant population had stabilised two to three winters before the large scale shooting started in the winter of 1996/97. Since that winter, 2,547 to 6,258 Cormorants have been reported being shot in Bavaria annually (4,082 shot birds in the winter of 2003/04). The highest shooting pressure was in Oberbayern, Schwaben, and Mittelfranken with the numbers of shot birds often reaching, or even exceeding, the mean numbers of birds counted in almost all winters since 1996/97. Most of the birds were shot at large rivers (37.6%), followed by ponds (26.4%), small rivers (14.0%) and gravel pits (13.2%). Especially, in Oberbayern, Niederbayern, and Schwaben large proportions of Cormorants were shot at large rivers while in Mittelfranken and the Oberpfalz, the two most important regions for Carp production in Bavaria, most Cormorants were shot at ponds (67.3% and 74.3%, respectively). Although the bird population has remained stable since about the winter 1993/94, the number of roosts has increased steadily. At the same time, the number of small roosts (1 - 49 birds) has increased whereas the numbers of large (100 - 199 birds) and very large roosts (≥ 200 birds) have declined significantly. The uncoordinated shooting of large numbers of Cormorants (up to 102% of the mean Cormorant winter population and up to 66% of the maximum number in 1996/97, respectively) has not reduced the overall numbers of migrating and wintering Cormorants, on a Bavarian or on a regional scale. Consequently it is unlikely that the overall amount of fish consumed by Cormorants will have declined either. The most probable explanation for this lack of 'success' is a high turnover rate in the Cormorant winter populations. Shot birds are quickly replaced by other birds if the local resource is very attractive. This finding is in good concordance with other regions in Europe with Cormorant shooting. Climatic conditions and the local availability and density of food are thought to regulate the numbers and duration of stay of Cormorants in different migrating areas.

Discussion

- WG2 will discuss shooting as a management technique at future meetings.
- The group were asked to bring further new information on management measures to Saxony (to include reports, leaflets, etc as well as presentations). At the Saxony meeting there will be presentations from Norway & Denmark on the situation there.
- The whole of INTERCAFE will be asked to provide further information (even if only brief).
- Need to invite presentations from people outside WG2 (e.g. Stephano Volponi – management in Po Delta, France & others).
- Case studies presented at WG3 should (at least shortly) be presented to WG2 at the Saxony meeting.
- In the future WG2 and WG3 need to better coordinate their activities. At least presentations of case studies should be coordinated between both groups.

5. Summary of homework for Saxony

- All relevant parties in INTERCAFE to complete legal framework spreadsheet-Daniel, Thomas and Dave to discuss how to simplify this procedure.
- List of definitions used by stakeholders- WG1 and WG3 to contribute to this
- Management leaflet progress report
- Arrange presentations for Saxony meeting
- Prepare more details of management methods to deter Cormorants in carp ponds- carp pond sub-group.
- WG2 bring new further information on management methods (to include reports, leaflets)
- Thomas Keller to draft matrix for assessment of management techniques.

PART (3) Work Group Three: Linking science with policy and best practice

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This meeting focussed on “A Better Understanding of People’s Leisure/Livelihoods and Attitudes”. The three sessions were dedicated to investigating the four WG3 case studies chosen in Lisbon (Danish coastal, Czech Republic carp ponds, Bulgarian reservoir, Austrian rivers). The aim of the sessions was to get a better understanding, not just of the ecology but also of the relationships, values, politics, economics and other social and cultural aspects of specific conflicts. In simple terms: what are people fighting about and why?

The work plan – spread over three sessions/broad phases.

SESSION 1: Case study overviews and questioning

Four short **presentations**, after which the group raised a number of questions (some for clarity, some more general). Summaries of the presentations are included here.

(I) Danish coastal fisheries – Henrik Nielsen

Henrik Nielsen from Frederikshavn in north Denmark told participants the Cormorant situation in this part of Denmark, as a representative of a regional group of Danish fishermen with close connections to The Danish Anglers Association.

Interest in Cormorant problems began in 1997 when a new colony was established on an island in NE Jutland very close to an important fishing area for the coastal Danish fishery in Albaek Bay between Skagen and Frederikshavn. This colony increased from 3 nests in the first year to nearly 2,000 nests by 2004. Albaek Bay was once a very important area for

recruitment or reproduction of several fish species before Cormorants arrived. A few years later all fish (including Cod, Plaice, Sole and Eel) have disappeared from the territory.

The breeding Cormorants as well as over-summering, migrating and wintering birds feed intensively on fish caught in nets of local fishermen. Furthermore, it is presumed that the predation of Cormorants on small fish is a major reason for the reduction of fish stocks of interest to local fishery (mostly Cod, Plaice, Sole and Eel).

During the 2004 breeding season (May-August) we counted approximately 7,800 Cormorants (breeding and non-breeding) in our area. The Danish National Forest and Nature Agency concluded that Cormorants eat around 500g of fish per day with an average weight of 24 g. Thus birds around Albaek Bay were eating around 468, 000 kg fish, amounting to 19,656, 000 individuals. The amount of fish eaten during the rest of the year is unknown. The Albaek Bay area can not produce that number of fish with a Cormorant colony nearby.

Also in our small rivers and lakes in our country, the Cormorant is a disaster according to recreational anglers. Local fishermen as well as anglers have been active in the local debate concerning the Cormorant-Fishery conflict. A working group, including the regional authorities, has been formed and annual meetings held where several stakeholders are represented to debate how to handle the conflict, including the intensity of egg-oiling activities in the large local colony.

The Danish National Forest and Nature Agency refuse to face the facts regarding the Cormorant problem in our territory. The agencies deny that there is a problem. Several fishermen have carried out their own experiments in an attempt to protect fish from predation and to scare away Cormorants from nets, including shooting and the use of gas cannons with no success. Now in this territory there are hardly any fish left to catch and, without the fish, the natural balance near the coast has broken down. The whole area in Kattegat (with adjoining inlets) has now been invaded by a species of crab, especially in areas where the sea is rather salty. Today there are no fish but immense numbers of crabs that eat everything on the bottom – worms, shellfish, mussels, spawn etc – prey that was once the diet of fish. The natural balance has been completely spoiled in this territory and, unfortunately, nobody from the responsible authorities in Denmark is interested in this problem or appears prepared to listen.

This Cormorant influence is giving the fishermen in the north of Denmark the death blow because the area has never suffered a deficiency in oxygen and, according to the Department of Coastal Zone Ecology, the area from Hals to Skagen is free of pollution.

Outside the north of Denmark and see what the Danish National Forest and Nature Agency concluded (1995) that the Cormorant in the Belts and in Kattegat consumed in the breeding season 13 % of the weight of Cod that all the Danish fishermen caught in the whole year in the same area. Furthermore, the Agency does not mention how much the Cormorants eat during the rest of the year. With an average weight of 24g, Cormorants must eat an incredible number of fish.

In 1996, the Minister of Fisheries informed the Danish Parliament that the Cormorants in the

1990's in the Belts – Oresund and the Western Baltic - consumed up to 20 % of the population of small Cod. Further he stated this could have consequences for the total population of small Cod. Other species are also under heavy influence by the Cormorant. Today, Danes have Cormorants all over the country. I can imagine the Cormorant predation also has the same great influence on the Cod population near the Polish and German coast as it has in Denmark.

In 1996, the zoological institute at the University of Copenhagen investigated how many fish were damaged (not eaten or swallowed) by Cormorants in pound nets because of the growing problem. It appeared that up to 50 % of Cod, Herring, and Garfish had been spoiled by Cormorants, for Eel it amounted to 20 %. Most of the damaged fish die shortly after. We experience this on all natural coasts near Cormorant colonies and night roosts and within the accepted 50 km foraging radius of the birds.

The Cormorant is certainly not a scarce bird in Europe anymore: in 1997 the Danish Minister of the Environment informed the Danish parliament that the total European population is at least 194,000 pairs and the total winter population in Europe and North Africa is around 700,00 birds (International Workshop in Holland in 1996).

Questions:

(1) Are we overestimating total fish consumption by cormorants?

HN: *Not necessarily. There is evidence from Norway (reference needed!) that cormorants have an enormous impact on coastal fish populations.*

ES: *There is also evidence from N German coasts (reference needed!) that cormorants have a 46% impact on cod, 2.8 million fish are eaten along the whole coastline. Taking into account the losses of juvenile fish that would grow, this is equivalent to 5,000 tonnes of fish per year (and exactly the same amount as the quota figure for fishermen in the western Baltic). Cormorant pressure in E Baltic sea is a threat not accepted or dealt with by nature conservationists.*

(2) Is there cormorant regulation/shooting?

HN: *There is little shooting but a way has to be found to reduce cormorant numbers. Danes could learn a lesson from Norway – cormorants are tasty! Recently management has focussed on preventing the foundation of new colonies and limiting production by oiling eggs. The Govt. promised there would be no more colonies when there were 39 but now there are 59. Fishermen do not trust the authorities who make decisions in Denmark (e.g. Forest and Nature Agency).*

(3) Should responsibility for regulation be shared?

(4) Are fish stocks shared?

HN: *No, the cod stocks in the Baltic and separate from those in the North Sea.*

(5) Do fish caught in the Baltic breed in the Baltic?

RE: *Yes but breeding (especially of cod – a species of great concern) is affected by salinity in the Baltic (in turn, affected by the influx of sea water through the Kattegat. There have been recent (timescale?) changes in cod spawning grounds because we are going through a trough in salt water influx).*

(II) Cormorants in the Czech Republic: Conflicts with stakeholders in pond areas – Jaroslav Boháč

This presentation is based on a four year project- Biological, social and economic assessment of management tools reducing cormorant predation in the Czech Republic- run by the Faculty of Agriculture, University of South Bohemia and supported by the Ministry of Education and Health of the CR in association with INTERCAFE.

The aims of the project are:

- Comparison of evaluation of economical damages caused by cormorants and its biodiversity value by methods of neoclassical economy and by contingent valuation method (CVM)
- Assessment of actions and mitigation measures applied to cormorant-fisheries conflicts in relation to biological, social and economic factors in pond areas
- Monitoring of shooting activities, acquisition of information about place, time and numbers of birds shot in pond areas
- Sociological analysis of main groups of inhabitants in pond areas in relation to the occurrence of Cormorants
- Arrangement of exchange of actual information between scientists, fishermen, nature conservationists and members of state administration on local and national levels. Transfer of actual information from INTERCAFE research elsewhere in Europe to local stakeholders
- Evaluation of the impact of existing policy related to the cormorant-fishery conflict, supporting of best practice and proposal of potential new policy

The recent situation of cormorants in CR: The population of cormorants in CR has increased rapidly in the last 25 years, mainly in pond areas. The Cormorant was a rare species in the 1982 (only 30 breeding pairs in South Moravia, no known breeding pairs in Bohemia). However, the population increased to 600 pairs by 1991. The recent bird census (479 localities, more than 300 volunteers, winter 2004) indicated that the Cormorant was the second most prevalent bird species in the CR. The main problem is not with the breeding population of Cormorants but with migrants from northern Europe during winter (around 15,000 birds).

Economic damages and conflicts with fishermen: There is a problem with the data on economic damages -only classical economical methods are used. Also, commercial fishermen often increase the level of economic damages. The main Cormorant-fishery conflicts are as follows:

- Compensation is needed by commercial fishermen on ponds. Compensation payments are the main source of income in areas with high wintering Cormorant population (e.g. south Moravia). These fishermen support the protection of Cormorants.
- However, commercial fishermen from other areas argue that compensation is lower than the economic damage. Compensation paid to fishermen amounted to around 1 million Cz crowns in one pond area in south Bohemia (data from newspapers), but fishermen value the economic damage at around 8 million of Cz crowns (1 Euro – 30 Cz crowns).

- There are stronger conflicts between recreational anglers and nature conservationists than with commercial fishermen from pond areas. Recreational anglers believe the Cormorant impacts heavily on fishing success.
- Both commercial and recreational fishermen are calling for the reduction of the Cormorant population through shooting
- Shooting is regulated by the Ministry of Environment of CR, but it is not deemed sufficient by fishermen.

Nevertheless, other birds are also a source of conflicts between conservationists and fishermen. The Grey Heron and Otter are considered to be an important source of fish losses in pond areas.

Pond areas with main conflicts: The main pond areas with cormorant-fishery conflicts in CR are:

- South Bohemia – Hluboká above the Vltava river
- South Bohemia - Třeboňsko Biosphere reserve
- South Moravia – the area of Novomlýnské dam by the Morava Biosphere reserve

Research for the resolution of cormorant-fishery conflicts:

- Interdisciplinary integration of biological, social and cultural research to resolve cormorant-fisheries conflicts.
- Increase knowledge of sociological aspects of cormorant overpopulation (impacts on local stakeholders, tourists, fishermen).
- Evaluation of methods used to calculate economic damages. Look at using other methods for evaluating biodiversity cost.
- Identify methods of participatory management of the cormorant population in ČR.

Questions:

(1) How do you evaluate economic losses of fish to cormorants?

JB: *There is no exact data.*

(2) How is financial compensation for fish losses to cormorants given?

JB: *One of the things to find out was how the authorities decide on the appropriate level of financial compensation. There is no exact data on economical losses but fish farmers estimate more than 8 millions cz., Compensation given by the state amounts to 1 million.*

(3) What other wildlife is eating fish?

JB: *Other fish-eating birds, including white-tailed (sea) eagle, but they are present in very small numbers. Most do not take as many fish as the cormorants, although otters are considered to be serious predators at ponds. Cormorants are also viewed as being newcomers/aliens.*

(4) Are the carp ponds traditional?

JB: *Yes, for at least 500 years. These ponds have been used for extensive carp aquaculture since the Middle Ages (see small article of Fisheries in Europe).*

(5) How long have cormorants been the Czech Republic?

JB: *In 1994 they were regarded as a rare species, by 2004 they were the second most common wintering waterbird in the country (after mallard). In 1982 there were counts of 30 breeding pairs in Czech Republic, this number increased to 600 breeding pairs in 1991 and in 2004 cormorants are the second most numerous bird species in the country. Cormorants have been a problem for the past 10 years*

(6) Do you believe the fishermen?

There is a communication problem and fish farmers do not easily give data for the study in course

(7) What are the legal stipulations for shooting?

JB: Shooting is allowed but it is controlled by the Ministry of the Environment. A bounty scheme is operated whereby carcasses are produced as proof of killing (DNC: and a fee for each is paid – see REDCAFE report – end of section 6.5.4).

(8) What are the number of breeding pairs?

The most recent counts estimate 8000 migrating birds and about 300 breeding pairs.

(9) Why is fish loss not evident with aquaculture companies book-keeping (e.g. nos. fry bought, amount of food, growth period, nos. lost through disease etc, no harvested, no. unaccounted for)?

(10) Who are the stakeholders?

(11) Do you plan social studies?

JB: Yes, a student will work on an examination of the social issues.

(12) Is carp aquaculture profitable?

Not so much anymore

(13) Who owns the fish farms?

Fish Farms used to be state run but they are now leased to private companies

(14) Should fish farmers diversify (into different species)?

(15) What is the main diet of cormorants?

Carp, since no other fish are available.

(III) Bulgarian reservoir (cooling water, aquaculture and commercial fishery-Lake Ovcharitza) - Nikolay Kissiov

Great Cormorant in Bulgaria (1990 – 2005): The Great Cormorant was included in the Red Data Book of Bulgaria in 1985 as a species “threatened to extinction” because of the reduction of the total area of natural wetlands in Bulgaria from 200,000 ha to 11,000 ha in the middle of 20th century. During the second part of 20th century more than 2000 artificial reservoirs (dam-lakes) were constructed in the country. More than 20 of them are large (more than 1000 ha of water surface). Middle size lakes (100 – 500 ha) make up 50% of the total; the rest of these reservoirs are small (less than 100 ha). Many pond fish farms were constructed during the period as well.

In the middle of 80s the freshwater fish production in the country increased to 20 000 tons per year (60 % of which was produced in the farm and 40 % was caught from the dam-lakes). Until the end of the 1980s, inland lakes were the only ones not occupied by Great Cormorants, but in the past 15 years they have started to move into these areas intensively. The expansion of the Great Cormorant as a breeding bird in Bulgaria during the past 25 years seems to indicate that it is no longer “threatened to extinction”. Fish farmers believe that the cormorant’s conservation status has to be re-considered because of the increasing conflict between cormorants and fish resources.

Conflicts: Generally in Bulgaria, Cormorants reported to be involved in conflicts are *P.c. sinensis* and *P. pygmeus*. Cormorant conflicts in Bulgaria occur between late autumn and

winter, i.e. from October to April. The economic damages from the loss of fish are increasing every year. Unfortunately, there are no precise guidelines or criteria applied to assess the scale of alleged damage to fish stocks and fisheries. Several non-lethal methods have been developed to protect fish production from fish-eating birds but they are generally ineffective. According to existing Bulgarian law shooting cormorants at fish/aquaculture farms is not permitted. There is no compensation offered for losses either.

Conflict site - Artificial Dam-Lake Ovcharitza (warm water basin): A major cormorant conflict that has occurred over the past decade involves Lake Ovcharitza. Bulgaria is divided into four water basins regions: (1) The “Danube River water basin” located in the Northern part of the country between the Balkan mountain chain and the Danube River, (2) The “Black Sea water basin” located in the Eastern part of the country along the Black Sea Coast, (3) “Western White Sea water basin”¹ is located in the South-East part of the country along the Struma river, (4) The “Eastern White Sea water basin” in the South-Central part of the country along the Matitza river, Tundja river and Arda river.

Lake Ovcharitza is situated in the “Eastern White Sea water basin” along the Tundja River. It is an artificial warm water reservoir of more than 1000 ha, which is used as a cooling lake for the biggest Electricity Power Station EPS “Maritza-East-2”. The Lake remains unfrozen throughout winter with minimum water temperature of 8° – 10° C and a maximum water temperature in summer of 35° C. This Lake is used by recreational and commercial fishermen, aquaculturists and nature conservationists. It is unique for aquaculture as all fish species (domestic and introduced) are fast growing. The main species in the lake include Common Carp, European Catfish, Pike and especially Big-head Carp (White Big-head carp – *Hypophthalmichthys molitrix* and Spotted Big-head carp – *Aristichthys nobilis*), Grass carp (White amou – *Ctenopharingodon idella*) and Channel catfish which have been introduced.

Aquaculture focuses its attention on Black carp (Black Amou – *Milopharyngodon piceus*) as the main natural predator for a new species of small mussel which has become prevalent in the Lake since the mid-1990s. These mussels (*Dreissena polymorpha*) were transported by birds from the Black Sea Coast. The mussel causes problems for the cooling systems of the EPS.

The Lake is restocked every year with larvae and one summer old fingerling of all fish species (mentioned above), by the Fish Farming Company NOMIKOM. Some of the species are imported from Romania (especially Black Amou). pontoons of net-cages produce trout (in the winter), carp, channel catfish and sturgeons. The maximum reported Cormorant density at Lake Ovcharitza was 16 birds ha⁻¹. The impact of Dalmation Pelicans has also been noted over the last decade.

General information for cormorants in inland waters in Bulgaria - Ivailo Nikolov

Apart from the Danube River and the Black Sea coast, information on inland Great Cormorant colonies is lacking. Until 1996 there were no data available for inland localities

¹ White Sea is the common Bulgarian name for Marmara sea.

but since then four colonies have been established in Northern Bulgaria. Located in dam-lakes or little basins close to the riverbeds, two of them (dam-lake Gorni Dabnik and dam-lake Jovkovtsi) comprise only Great Cormorants (Spasov, 2002) while the rest (the ones situated in old river-beds along the Rivers Iskar and Vit) also consist of Night Heron and Little Egret. However, these colonies are few in number and still quite unstable with Cormorants numbering between 4 and 43 breeding pairs. The colony in dam-lake Gorni Dabnik was located in trees that were flooded. When the water level lowered at the end of 2000, the trees holding the 43 nests were felled for firewood. Such practices also reduced another colony (located along the Vit river close to Bivolare village) from 38 pairs in 1998 to 5 pairs during the period 1999-2002 (R. Tsonev & P. Shurulinkov – pers. comm.). Small breeding numbers mean that there is relatively little conflict between fisheries and Cormorants inland during the breeding season (until mid-July). After the breeding season, however, Cormorants spread into the big reservoirs where fishermen then note reduced catches.

Questions

(1) Is there financial compensation for fish losses to cormorants?

No, not even for very valuable fish species such as sturgeons.

(2) How are the fish farms stocked?

(3) Who is responsible for the stocking?

(4) Who is responsible for fingerling production?

(5) Who is responsible for harvesting?

NK: *There is very strong restocking in the reservoir. One company controls the reservoir and leases it from the State (a common practice in Bulgaria – different companies leasing different reservoirs). There are aquaculture cages in the reservoir and ponds on-shore to produce fingerlings. The reservoir is also used for angling. The company leasing the reservoir is responsible for the production of fingerlings, their stocking and the fish harvest.*

(6) Who has the power? Who are the main institutions?

The two companies, the Electricity authority and the Fisheries Department.

(7) Who are the stakeholders? Who makes decisions?

NK: *The reservoir is owned by the State but one company is responsibly for producing electricity and another for fisheries. The Electricity has a problem with introduced mussels and so about 6 years ago the fishery company re-stocked the reservoir with black carp to eat the mussels. Bulgarian business leases are usually only for 3 years but this reservoir has a lease/contract for 12 years (based on its good business plan to restock with black carp to eat the mussels).*

(8) What discussions have gone on and what arrangements are there to manage conflicts?

NK: *It's a real mess. Four agencies are involved, including the Ministry of the Environment, the Ministry of Agriculture (Fisheries Authority), and the Electrical power station. For all four – need to pay taxes.*

(9) Who takes responsibility for managing the conflict?

NK: *No-one takes responsibility for the conflict (or to improving the legislative system). There is illegal shooting of birds.*

(10) What do the fishermen want?

NK: *Under Bulgarian legislation, the shooting of cormorants is forbidden. Fishermen want permission to shoot cormorants like other EU countries (under derogation of the Birds Directive).*

(11) Are there any solutions besides shooting?

NK: *Yes. One organisation (The Society for Protecting and Feeding Fish-eating Birds) has rented a number of smaller reservoirs nearby and stocked them with fish. Birds scared from the reservoir then use these secondary feeding sites – it works.*

(IV) Cormorants in Austria – conflicts with stakeholders focusing on river-systems - Rosemarie Parz-Gollner

The recent situation - Since the mid-1980s cormorant numbers in Austria have increased with the cormorant becoming a frequent migrant during winter months. Cormorants have established new roost sites, mainly along big rivers indicating their main migration routes, but the birds have also explored new feeding areas (smaller rivers) and showed a wider spatial distribution.

Concern – focusing on rivers - It is not only bird-numbers that have increased; there has also been a sharp increase in numbers of fishing licences issued and therefore the number of anglers. This has led to increased pressure on rivers as habitats, economic driven interests and management opportunities.

It is not only smaller rivers but also bigger river systems that have been the source of discussion recently. The group voicing greatest concern are **private anglers** with discussions concentrating mainly on **grayling** and **trout** regions. Fishermen (anglers) complain about the impact of increasing number of cormorants on fish-communities and reproduction in general (species, age classes, biomass) and have asked for cormorant regulations.

Habitat situation- There has been a change in environmental conditions with problems of river fragmentation. **Environmental change** in wetlands and rivers as habitats for aquatic animals shows the risks and the opportunities for animals as well as for humans. On one side, the total numbers of water bodies (surface area) and many man-made wetlands have increased. Thus wetland-related fauna have also expanded in numbers and in regions which have sometimes been significantly modified by humans. On the other hand the same locations attract humans, offering new, in many cases economic driven opportunities (leisure- and sport-activities, many opportunities for various management actions, commercial fish production, private angling).

Environmental changes – rivers - The Austrian cormorant situation concerning the actual location of roosting-sites, phenology, number of migrating birds present during the winter months and the regional distribution, mirrors to a great extent the environmental changes that have occurred. Birds tend to install new roost sites and concentrate along the bigger, often dammed river-systems which mostly are divided into sections (compartments). Fish-migration from main rivers into tributaries in many cases is not possible due to **barriers** (e.g. energy production); also smaller rivers are often divided by man-made barriers. This increases the possibilities for cormorants to feed successfully on fish stocks.

Cormorant regulations exist to scare and shoot cormorants (area and time restricted). The aim is primarily to protect endemic trout and grayling regions in rivers and to reduce the impact of fish-eating birds on fish-species in general. Austria consists of 9 provinces - fishing, hunting and nature conservation laws are in the responsibility of the provincial governments;

so there are nine different possibilities and solutions to dealing with cormorants. No overall solution on a national level exists.

Problems

- The actual existing **legal framework** (national, international)
- The number and distribution of birds present differ in various provinces and changes during the winter migration period
- The attitudes of people concerned differs.
- Lack of **data** and data interpretation - discussion about existing fish-biomass (in many cases underestimates), stocking (material, genetics, amount, size), missing statistics (angling).

Very complex interactions between many environmental factors exist, any results obtained need careful interpretation. Quantifying any **impact** of fish-eating animals (birds, mammals) depends on the **view of the group involved** (ownership, rights, borderlines etc.), **time periods** investigated and on the **size of the area** under investigation. For example, the anglers view is, in many cases, restricted to their own fishing grounds - anglers pay for their fishing licences and therefore also expect a certain amount of fish. They fear a loss in fish catches and are concerned about age classes, population structure and species composition of fish.

Environment and management conditions highlights that barriers in many rivers inhibit fish migration, so fish populations cannot migrate and recover naturally. Stocking (amount, species, quality) makes the situation even more complicated. Environmental capacity, productivity of a river and habitat conditions should be taken into account

How to improve the situation solving the cormorant-fisheries conflicts-

- Encourage more interdisciplinary projects (new research methods, ecology, socio-economics)
- monitoring programs on a wider scale
- improve the quality of available fish statistics
- integration of social aspects into biological studies

Questions

(1) How can rivers be restored?

RPG: *Most rivers are now in sections – if the barriers can be removed, fish can migrate (e.g. to spawning areas).*

(2) How does this management affect fish communities and populations?

RPG: *If barriers are in place, fish have to be moved over them (e.g. fish ladders). If fish can't migrate, their populations may be limited in some way and be more vulnerable to cormorant predation.*

MJ: *The impacts of cormorants are much greater on these regulated rivers. Cormorants come on top of everything else that people have done to rivers and fish populations.*

(3) Environmental changes and cormorants?

RPG: *We are blaming cormorants for things (e.g. eating fish) that are an indirect result of our own direct actions (e.g. river habitat fragmentation).*

AAA: So it's not just a direct effect of the birds? DNC: No, the effect of cormorants would not be so bad if people hadn't destroyed/modified river environments.

(4) Do regional Governments communicate?

PGR: Yes they do but they do not change their ideas based on these flows of information.

(5) Is planning on an area basis effective?

No, because each province acting independently just means that the problem might be pushed between the various regions and river systems

(6) Is the creation of protected areas possible (like the Swiss cormorant management system)?

MJ: This seems a good solution. People decide which are the most vulnerable sites and which are less vulnerable. Cormorants are excluded (shot) in the vulnerable sites and left alone in the less vulnerable ones.

RPG: They tried this in Lower Austria too. There are 'retreat areas' where birds are safe but if you chase them around you increase their energy needs. There should be some planning to shift cormorants down to lowland regions (where they would cause fewer problems) but we need to make sure this works.

MJ: Nase should be included in the list of vulnerable species in these areas.

(7) One area of Austria provides unlimited shooting licences (unlimited birds to be shot)?

RPG: Yes, (within EU legislation, ref. to Art. 9 of EU Birds Directive) but numbers officially reported here very low; actually more birds are shot than officially reported.

(8) Why does shooting not affect the total number of cormorants?

PRG: This is because the cormorants in Austria are migratory, shot birds are replaced by new ones; climatic conditions and the winter situation in Austria (temperature, ice) is responsible for the amount of birds being present and the length of the stay as well as their distribution along running water systems; birds quickly leave areas with ice covered water bodies (means no food available).

SESSION 2: Identifying the central problem and the stakeholders involved and their interests

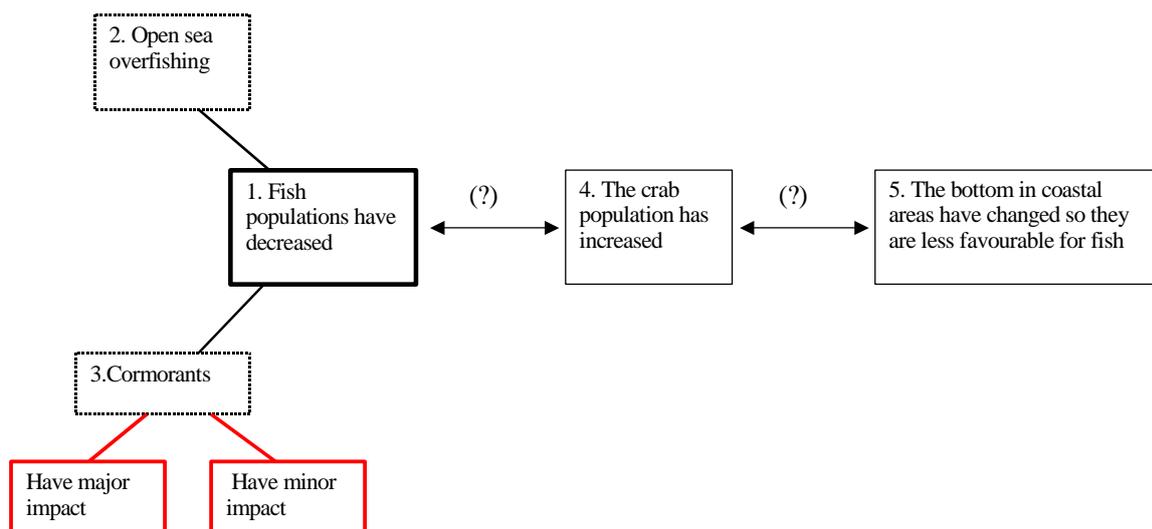
Participants were asked to consider two things:

- (a) Identify and agree on the central (or main) problem for each case study
- (b) Identify the stakeholders involved and their interests

Group 1: Danish coastal fisheries

(Sub-group comprised: Erik P, Henrik N, Vilju, Redik)

1. The main problem - can be illustrated in this way (see below). The main problem is that the fish populations in the coastal areas have decreased (1), which means that the commercial fishermen are not able to catch as many fish as they could do in the past. The reasons for this decrease can be due to (at least) two factors: over fishing at open sea (2), i.e. trawling, and predation on fish by cormorants (3). The main conflict here is that some stakeholders argue that cormorants have a major impact on fish population. Consequently this should mean that cormorant predation is one of the major reasons for declining fish stocks. Other stakeholders argue that cormorants have a minor impact, and that other factors are responsible for the decline of fish stocks.



Two other processes seem to run parallel with the decline of the fish stocks. First, the densities of a crab species (a native species) have increased (4), and second, the seabed has undergone a major environmental change in such a way that it is harder for fish to live there (5). It is not quite clear whether changes of the seabed induced an increase of the crab population or if the crabs changed the seabed by digging etc. It is also not clear whether the decline of the fish stocks made it possible for the crabs to increase or if the crabs increased for another reason and thus may be seen as another factor causing the fish populations to decrease.

(b) Seven (or eight) stakeholder groups were identified:

- (1) Coastal commercial fishermen – they want better conditions, better (sustainable fisheries), they are interested in economies and maintaining/improving their standard of living.
- (2) Sport fishermen (anglers) – they want to catch fish.
- (3) Open sea fishermen (trawlers) – they want to catch fish and are starting to listen to the coastal (i.e. inshore) fishermen now.
- (4) Ornithologists (= bird lovers) – they want to prevent the killing of cormorants.
- (5) Nature conservation groups – there is a huge diversity of opinions. Some say ‘let it be, things will solve themselves’, others want to find a balance.
- (6) (Government) Fisheries managers – they make the decisions and defend their positions.
- (7) Scientists/researchers – produce data and results, interpret them and defend their positions.
- (8?) Elected politicians might not be real stakeholders. Either they work through the groups above or they use the situation to get votes.

Group 2: Czech Republic carp ponds

(Sub-group comprised: Ana, Tamir, Jaroslav, Pekka)

(a) The main problem is that the fish farmers perceive the presence of cormorants as being responsible for large economic losses. However, no dialogue towards the resolution of the problem is being attempted.

(b) Six stakeholder groups were identified:

- (1) Fish farmers (the main stakeholders involved)

- (2) NGOs/scientists (grouped together because scientists are perceived to be 'conservationists')
- (3) Politicians: NGOs, National, Local
- (4) People selling ammunition (they are making a business out of the conflict/pushing people towards shooting)
- (5) Tourists
- (6) Tourism entrepreneurs

Five 'interests' were identified (but these were not necessarily restricted to one stakeholder group):

- (i) Economic
- (ii) Livelihoods
- (iii) Power
- (iv) Development of new activities (e.g. tourism)
- (v) Protect nature/natural beauty

Different roles within the conflict were identified:

- (I) *For cormorants*: NGOs, National politicians (although regulated shooting is permitted), tourist visitors.
- (II) *Against cormorants*: Fish farmers, local politicians
- (III) *Unknown*: Tourism entrepreneurs, local people (what is their opinion about cormorant and the conflict?)

Group 3: Bulgarian reservoir (cooling water, aquaculture and commercial fishery)

(Sub-group comprised: Nikolay, Susana, Faustas)

(a) The main problem is difficult to pin down – may be invasive species (e.g. mussels *Dreissena polymorpha*), or may be (lack of?) State support? The main problem is one of human:human conflicts (e.g. aquaculturists and fishermen vs. bird protectionists, these groups vs. the State as a whole [which doesn't care], the perception that NW European countries allowed cormorant populations to increase, and concerns over EU legislation – harmony of biodiversity protection and aquaculture development). Essentially there is a lack of harmony and consensus.

(b) Twelve stakeholder groups and their interests were identified (see table below).

This conflict was also discussed on a more philosophical level. Although, ultimately, conflicts were seen in monetary terms, they may be some conflicts (e.g. cormorants, flood protection) that 'help to integrate society' – it becomes a problem with common ownership (even though it only affects a relatively small proportion of the population in practice). Perhaps this is one way of looking at conflicts particularly within accession countries?

Stakeholder		Interests
(1)	Fishermen - economic	<ul style="list-style-type: none"> • State support for aquaculture • Compensation/support from Authorities (protecting sites from fish-eating birds is expensive) • Want the fish (or equivalent income) that the birds take • Sustainable livelihoods • Want to produce more valuable fish species – but cannot afford to protect them
(2)	Fish farmers - economic	
(3)	Anglers - leisure	<ul style="list-style-type: none"> • A cull of cormorants • Support for new ways of angling • More fish for their licence money
(4)	Tourists - leisure	<ul style="list-style-type: none"> • To see large numbers of cormorants • To see beautiful landscapes • To see (spectacular) trees killed by cormorant guano
(5)	Owners of DR	<ul style="list-style-type: none"> • Rental income from fish farmers etc. • To sell water (e.g. irrigation) • Economic profit – reduce affects of alien mussels • Good water quality • Resources for support/protection
(6)	EG	
(7)	Electrical Power Station	
(8)	Municipalities (smaller reservoirs nearby)	
(9)	Environmentalists (Govt. and NGOs) <ul style="list-style-type: none"> • Bird protection (most powerful: Bird Watch) • Fish protection • Water protection • Human protection • Tree (forest) protection 	<ul style="list-style-type: none"> • To maintain/keep their power • Species/biodiversity protection • Are these groups (acting) in harmony or not?
(10)	State (= policy maker?)	<ul style="list-style-type: none"> • Effective and quick solutions • No interest in scientific knowledge • Support biodiversity • Maintain harmony in legislation • Taxes! • Votes!
(11)	Fishery Administration	
(12)	Scientists (e.g. INTERCAFE)	<ul style="list-style-type: none"> • Policy makers to do fieldwork in order to gain 'real' experience
General philosophy: people always want (to find) problems		

Group 4: Austrian rivers

(Sub-group comprised: Dave, Rosemarie, Miha, Egon)

(a) The main problem is that river systems are “out of environmental balance” at the catchment scale. There is increased pressure on riverine/catchment habitats (and there may be subtle effects and interactions e.g. water temperature, chemistry, hormones, waterflow,

substrate, vegetation, invertebrate and fish communities). There are now too many demands on this limited resource – its primary function is environmental - as a natural system. This situation (of habitat fragmentation/degradation) makes fish more valuable but also more vulnerable to predation (its easier for top predators to take them) – which makes the situation worse. There was discussion on the relevance/lack of pressure coming through the Water Framework Directive.

(b) The group considered how specific their work should be (i.e. just to focus on Austrian rivers as being representative of ‘central Europe’) but decided to discuss European rivers more broadly/generally. The main issue for most river systems was considered to be damming (often for hydro-electricity generation) – resulting in ‘isolated’ river sections – this was broadened, more generally, to ‘river fragmentation’.

Eleven stakeholder groups and their interests were identified:

	Stakeholder	Interests
1)	Energy producers*	Financial – selling electricity
2)	Industrial users*	<ul style="list-style-type: none"> • Cheap power • Cooling water • Water for technological uses (e.g. paper making)
3)	Domestic users	<ul style="list-style-type: none"> • Cheap water • Clean water
4)	Water engineers (supported by local, regional, national Govts.)	<ul style="list-style-type: none"> • Flood protection • Gravel extraction • Water abstraction
5)	Recreation and sport	<ul style="list-style-type: none"> • Increased access to water (via increased leisure time) • Health benefits of recreation • Tourism • Angling
6)	Agriculture*	<ul style="list-style-type: none"> • Increased productivity • Food production • Economic profit
7)	Forestry*	<ul style="list-style-type: none"> • Increased productivity • Timber production • Economic profit
8)	Fisheries: commercial and aquaculture	<ul style="list-style-type: none"> • Increased productivity • Economic profit
9)	Government*	<ul style="list-style-type: none"> • National and international obligations (e.g. EU Directives, water quality/quantity, biodiversity (genes to habitats) • Navigation
	Neighbours and	<ul style="list-style-type: none"> • Have all the above interests but ‘problems’

10)	downstream users	arise when they are contradictory to the local ones
11)	NGOs	<ul style="list-style-type: none"> • Conservation/protection of habitats, flora and fauna
* these stakeholders were identified as having more power than the others (e.g. the needs of industrial users often over-rule private interests).		

SESSION 3: Deeper understanding of stakeholders and the structural aspects of conflicts

In order to stimulate thoughts and ideas, two possible tools were presented (Matrix Approach and Structural Aspects). Participants were asked to use either of these (or small sections of them) to reveal/document deeper understandings of the four case studies.

<u>MATRIX APPROACH</u>			
Issue for consideration	Name of group/Agency		
			...
Needs			
Concerns/fears			
Attitudes (to the conflict/to others) [+ , - , +/- , neutral , ?]			
Assumptions about others			
Values/beliefs			
Historical issues			
Types of power			

STRUCTURAL ASPECTS	
<p>SOCIAL</p> <ul style="list-style-type: none"> • Unequal or unrepresentative, unjust social structures • Insecure leases • Unequal education/income • Some parties less able to negotiate or use the law 	<p>LEGAL</p> <ul style="list-style-type: none"> • Legal systems favour certain stakeholders • Poverty • Language • Distance • Ownership/user rights • Custom/precedent
<p>ECONOMIC</p> <ul style="list-style-type: none"> • Economic or political power biased towards certain stakeholders • Permits • Commerce • Compensation/subsidy instruments • Taxation system 	<p>CULTURAL</p> <ul style="list-style-type: none"> • Deep-rooted values and beliefs that define a group/Agency's identity • Locals and migrants • Definitions of 'local' • Views of other groups

Group 1: Danish coastal fisheries

(Sub-group comprised: Erik P, Henrik N, Vilju, Redik)

Took the 'matrix' approach but were not able to complete it.

Table 1

Group	Coastal commercial fishermen	Anglers	Open sea fishermen
Needs	Fish for living. They need fish to catch for selling.	Fish for leisure fishing.	Fish for living. They need fish to catch for selling.
Concerns/Fears	The increase of cormorant population will go on and the situation will be worse. It will be hard or impossible to live on fishing.	The problem will spread to inland waters.	They have other concerns. The TAC's are low and so on.
Attitudes to the conflict and to other groups	"Difficult to get others group to listen to us". Actions to reduce number of cormorants have to be done.	"Difficult to get others group to listen to us"	"Difficult to get others group to listen to us". Up till now they have been ignorant. Argue that coastal problems are not their business.
Values/beliefs			
Historical issues			
Types of power			

Table 2

Group	Bird lovers	Nature conservationists	Fishery management	Scientists
Needs	Access to bird-rich areas. They like to see many different kind of birds. They do it for pleasure.	Biological diversity. Balance between different taxa (birds-fish-plants-etc.)	Sustainable fishery. Correct information about the issues in order to solve the conflict.	Stable founding for research. Access to different kind of data (catches, densities, etc.)
Concerns/Fears	Birds will be killed to too high numbers. Colonies will be destroyed.	Losses of habitats and biological diversity. The cormorant might be seen both as something that increase biodiversity (another species) or something that will decrease it (due to negative influence on other species)	Conflict will increase, which makes their work more complicated.	Not been able to draw good conclusions (due to insufficient time and resources their conclusions might be wrong).
Attitudes to the conflict and to other groups	“Difficult to get others group to listen to us”. Have a more or less expressed ‘let-go’ attitudes to the conflict. Like to protect colonies etc.	“Difficult to get others group to listen to us” Have a more or less expressed ‘let-go’ attitudes to the conflict. Some members are willing to accept some actions.	“Difficult to get others group to listen to us”	“Difficult to get others group to listen to us”
Values/beliefs				
Historical issues				
Types of power				

Group 2: Czech Republic carp ponds

Took the structural aspects approach and discussed a number of things:

Economic: The cormorant problem is considered an ‘economic problem’ but this is not supported by the data – this is an important issue that needs further thought (e.g. are there supporting data available somewhere?)

Social: Accession to the EU has led to a number of social changes from socialism to market economies. This has generated insecurities. There is a strong desire to develop the aquaculture industry. Fish farmers feel they are in competition with cormorants. One important aspect is that people feel they are losing control, that especially NGOs are interfering with their area of power (It is none of their business!!!) Decision making is not just the issue of reaching a solution but also about who is involved.

Legal: The Czech Republic is a new EU member state. People think that Community legislation is imposed on them. Is the Birds Directive still relevant (its 20 years old)? New countries have had the European legislation imposed without right of decision and often do not feel its purpose or need and have difficulties in enforcing it.

There are differences between a regulation and how it is enforced. E.g. in Israel, the regulations state that 5-6 cormorants per day can be shot if they are overwintering on fish farms but the regulation is fluid (and not controlled/checked) It is reasonable to assume that this rule is not followed by all the fish farmers but a number of fish farmers uses the regulation to kill not only cormorants but other birds as well which creates anger and discontent.

In the Czech Republic, the regulation applies to the number of cormorants allowed to be shot per region. It operates as a bounty scheme and has become a cultural issue – in relation to both hunting (the birds become ‘profitable’ as a hunting quarry species) and leisure (people like to go out hunting).

Social: Fish farmers/fishery communities are economically important at the local level – but not at the national/international level. This contributes to the way that problems are looked at and tackled.

However, it was difficult to comment on just one of the aspects at a time e.g. the legal dimension is rarely very interesting as such, but when connected to real practices (related to e.g. cultures) and (social/economic) problems, it becomes more fruitful to examine it. The political dimensions and the position of power in governance was also a common issue in this groups discussion.

Group 3: Bulgarian reservoir (cooling water, aquaculture and commercial fishery)

Issue for consideration	Name of group/Agency	
	Commercial fishermen and fish farmers	Environmentalists
Needs	<ul style="list-style-type: none"> • Income and profits 	<ul style="list-style-type: none"> • Biodiversity conservation
Concerns/fears	<ul style="list-style-type: none"> • Loss of production • No compensation • Future losses • Lack of understanding from other stakeholders 	<ul style="list-style-type: none"> • Birds will be killed – leading to extinction • Want more money from funders
Attitudes (to the conflict/to others)	<ul style="list-style-type: none"> • Engaged with the problem 	
Assumptions about others	<ul style="list-style-type: none"> • That ecologists are ‘conservationists’ • That the local Government does not care about the problem 	
Values/beliefs	<ul style="list-style-type: none"> • Little, beyond just caring about today 	
Historical issues	<ul style="list-style-type: none"> • These forms of fishing were a traditional way of life (long before the ‘cormorant problem’) -so it is important to solve it ! 	<ul style="list-style-type: none"> • Nature conservation was not a traditional activity
Types of power	<ul style="list-style-type: none"> • The ‘power of silence’ – individuals can regulate things within the fishing/aquaculture community – no-one from the ‘outside’ knows what they are doing 	<ul style="list-style-type: none"> • They have ‘big’ power – can get attention at the global scale

Fishermen

Commercial fisheries and fish farmers were identified as two of the most important stakeholder groups related to the Bulgarian reservoir. In order to reveal a deeper understanding of this case study, the matrix approach was considered:

The needs of the commercial fishermen and fish farmers are mainly related to their income and profits; this means that they are interested in conflict in the reservoir as a matter of survival; they need to make money by selling the fish to have their own profit. Consequently their fears are about the fact that they might not have enough fish due to Cormorants.

Cormorant predation implies loss of production and money. The fishermen also fear that there will be future losses the fish if cormorants' numbers continue to increase.

Another concern is the lack of understanding on the part of 'officials' and other stakeholders, since no compensation is given for their losses. As they don't have any direct compensation, fishermen assume that the local government doesn't care about their problems and also that ecologists are "conservationists" regarding cormorants. On the hand there is the argument that fishermen concentrate on immediate profits, little caring about future fish resources.

Commercial fisheries and fish farmers are powerful stakeholder groups because they establish their own rules, such as the illegal cormorant shooting, with no one knowing about it – they have the power of silence.

Group 4: Austrian rivers

Took the structural aspects approach and discussed a number of things:

Legal: There are numerous regulations/Directives at the international level (e.g. clean drinking water, waste water treatment, Birds Directive, Habitats Directive, Ramsar Convention). These are meant to favour all but in practice some (e.g. Birds Directive) are perceived to favour certain groups/stakeholders over others (e.g. there is no Fish Directive – this maybe a cultural issue, public perception of birds different to that of fishes). Questions or demands concerning "fish-related themes" seemed to be covered/included within the more general topics of the EU water framework (e.g. water quality).

There is concern that EU legislation (often initiated and certainly constructed) in NW Europe is being applied in blanket fashion across an ever-increasing EU. This international legislation has to be used to address local issues. This is an inflexible system in at least 2 ways: (1) appears to reduce the scope for interpretation, (2) may be irrelevant in both timescales (e.g. bird protection legislation founded decades ago – conservation status has now changed) and geographic applicability (e.g. ban on drift nets to prevent entanglement of cetaceans in NW Europe and N Sea also now applies to Poland – very little cetacean entanglement in Baltic and drift nets are mainstay of salmon fishery – coastal morphology does not allow use of fixed [shore-based] nets like pound nets and fykes – industry faces ruin).

There is considerable legislation that favours specific sectors (e.g. industry, water engineering, agriculture, fisheries).

At the regional/local level there are very complex issues of ownership/user rights. For example in the UK, rivers are often owned by individuals who lease the fishing rights to others. Salmonid fisheries tend to attract higher lease values whilst cyprinid ones attract lower leases. There are also **cultural/social aspects** – salmonid fisheries are termed 'game' fisheries and tend to have more restricted access (through increased costs), cyprinid fisheries are termed 'coarse' fisheries and, up until recently at least, have had more public access (and certainly less associated legislation).

Perception of people talking about impact of fish-eating animals (mammals, birds) concentrates on various spatial units (mainly from their point of view). The main problem is

the **area restricted view** of ownership and user rights (vs highly mobile bird populations or regarding fish-populations on a catchment scale).

In Austria the right to hunt and to fish is related to land ownership. Landowners can lease the fishing rights to other people; rivers with endemic brown trout and grayling are highly attractive for anglers (high value).

Economic: Power is biased towards stakeholders/groups that make money. Stakeholders engaged in 'protecting nature' or 'redressing the environmental balance' are not obviously money-making (indeed their activities often cost money) – this becomes a **cultural** issue too.

Post-meeting comments

(1) Cormorant's impact comes on top of environmental changes, primarily anthropogenic. It includes over-exploitation both by fishing and economical use.

(2) During the group discussions, participants did not limit their views just to the case studies (in Bulgaria, Austria, Czech Republic and Denmark) but also made general statements. However, it was noted that often there were gaps in knowledge about local situations. Thus we should address not only what we know but gaps in knowledge which will help link WG3 with WG2.

(3) Identifying the main problems in the case study regions (Session II) highlighted some interesting issues. Two of the groups saw the main problem as an ecological one while the other two groups included human stakeholders in a more central position. However, it remains to be discussed how much the 'identification' reflected the 'real' differences between the four case studies and how much they reflected the composition of the sub-groups (and disciplinary backgrounds of the people) who identified the problems.

Summary of homework for Saxony will be considered shortly and announced to participants in due course.

PART (4) Field Trip

As the meeting concentrated on issues surrounding commercial fisheries and cormorant ecology. Gdansk was an ideal setting for this meeting as there have been several studies (by INTERCAFE researchers and others) of cormorant impact on commercial fish stocks (and water quality) in the Gulf of Gdansk (Baltic Sea) and Vistula Lagoon. Furthermore, these and other studies (e.g. cormorant breeding biology, diet, foraging regimes) have mainly been conducted at the nearby Katy Rybackie colony (the largest in Europe).

Commercial fishermen are key stakeholders in cormorant conflicts (e.g. reduced fish stocks and catches, reduced fishery earnings etc.). One of the challenges for COST Action 635 is to improve information exchange and dialogue between natural and social scientists, policy makers and local stakeholders. Thus all participants spent a formal session discussing relevant issues in relation to dialogue with local stakeholders.

Issues were ultimately collated under two headings as follows:

(a) What do/might stakeholders want from INTERCAFE?

- How many cormorants do we need?
- Why don't we have an international management plan?
- To understand their viewpoint (they may not be interested in us-lack of trust)
- That we listen to their cases/stories
- Possible (quick) solutions
- Influence policy makers/managers
- Information on cormorant ecology, numbers, behaviour, management options, solutions, impacts on stocks and fisheries
- How to reduce the numbers of cormorants/ what methods are there?
- How or if they can ask for compensation

(b) What do we/INTERCAFE want from the stakeholders?

- What kind of information do you expect from us?
- Methods of fishing
- Information sources for fishermen
- How much do people depend on fishery income?
- Other income probabilities
- Who buys the catch
- How big is the conflict (context)?
- Estimate of extent of losses
- Information on catches and nature of fishery
- What are the issues? e.g. catch reduced, damaged fish, unemployment
- What are the suggestions for solving the problem?
- Is it a seasonal issue?
- Understanding our viewpoints
- Understanding the diversities/complexities of current conflicts.
- Interested in their livelihoods
- What is the socio-economic and political context?
- Interested in their system e.g. historical, future, methodological, biological/ecological

These issues would also set INTERCAFE in good stead for future interactions/dialogue with stakeholders in general, and for the forthcoming major conflict case study in the Hula Valley, Israel (January 2006).

The field trip included a short boat trip through the Vistula Lagoon, offering participants the chance to see at first hand many important features of the area including, habitat types, water quality, commercial fisheries in operation, the geographical location of the Cormorant colony and the sight of many thousands of cormorants in foraging flocks crossing between their feeding grounds and the colony.

Participants were also guided through the colony by a small team of local scientists who have studied there for several years. This was an opportunity for many to see for the first time 'life in a cormorant colony' at first-hand. Several issues arose during the colony tour, including census (nest counting) techniques, population dynamics, diet assessment (and, ultimately, fish stock 'impact' assessment).

Local stakeholders were also invited to dinner with INTERCAFE participants following the field trip, thus offering all the opportunity to continue their informal discussions. The day ended with an after dinner 'night school' where a number of items collected during the field trip (e.g. cormorant and grey heron pellets, discarded fish, fallen eggshells, etc) were passed amongst participants in order to spark discussion. This process allowed those who worked with such material to explain its significance and the identification/analysis techniques they used in their work to those for whom it was unfamiliar. Thus the process of breaking down disciplinary barriers (e.g. between fisheries and avian ecologists and between natural and social scientists) was continued. Given the success of this 'night school' as part of INTERCAFE's in-house information exchange process, further schools have been planned for future meetings.