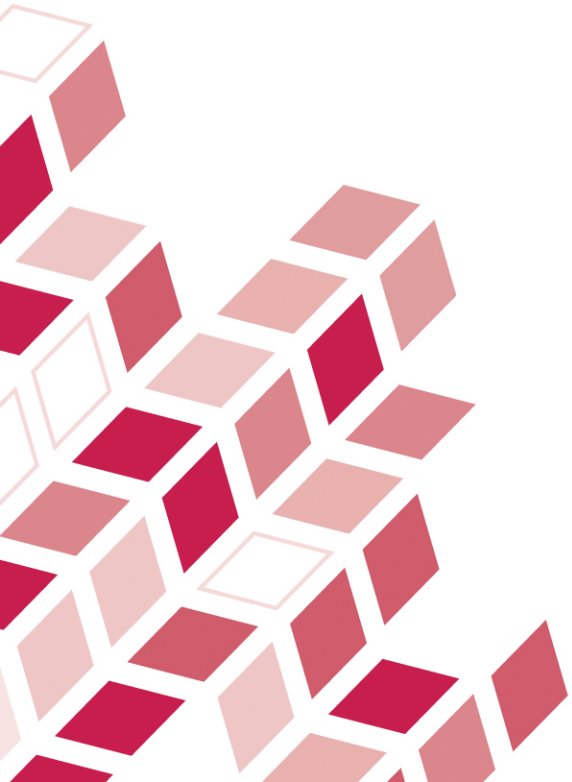
NOKUTs tilsynsrapporter

Application for accreditation PhD in Applied Ecology at Hedmark University College

Juni 2011



NOKUT Nasjonalt organ for kvalitet i utdanningen

Forord

Norske institusjoner som tilbyr høyere utdanning er delt inn i følgende kategorier:

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2. akkrediterte høyskoler
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4. universiteter

Kategorien angir institusjonenes selvakkrediteringsfullmakt. Det er kun universitetene som har selvakkrediteringsfullmakt til å opprette studier på alle nivåer: bachelor, master og ph.d. Institusjoner i de øvrige kategoriene kan etablere studier utenfor sine egne fullmakter dersom de, gjennom å søke NOKUT, oppnår slik akkreditering.

Søknad om akkreditering av doktorgradsprogram vurderes av en ekstern, uavhengig sakkyndig komité etter kvalitetskriterier som bestemt gjennom NOKUTs forskrift. I tillegg til å vurdere søknaden foretar sakkyndig komité også en faglig vurdering ved å besøke institusjonen og intervjue sentrale grupperinger der.

Høgskolen i Hedmark (kategori 2) sendte inn søknad om akkreditering av doktorgradsprogram i Anvendt økologi i august 2010. Sakkyndig komité hadde følgende sammensetning:

- Professor Nigel G. Yoccoz, Universitetet i Tromsø (komitéleder)
- Professor Lena Gustafsson, Sveriges lantbruksuniversitet
- Professor Jon Swenson, Universitetet for miljø og biovitenskap

Dette dokumentet inneholder rapporten fra den sakkyndige komiteen, Høgskolen i Hedmarks tilsvar på denne, samt tilleggsrapport fra den sakkyndige komiteen.

NOKUTs styre fattet 10. juni 2011 følgende vedtak:

1. *Doktorgradsstudiet ph.d. i anvendt økologi ved Høgskolen i Hedmark, tilfredsstiller alle kravene til akkreditering slik de er utformet i § 2-3 i NOKUTs forskrift om standarder og kriterier for akkreditering av studier og kriterier for akkreditering av institusjoner i norsk høyere utdanning (25.01.2006).*

2. *Det forventes at høgskolen gjør seg nytte av den sakkyndige komiteens vurderinger og anbefalinger til videre utvikling av studiet.*

For statlige høgskoler må Kunnskapsdepartementet godkjenne at høgskolen oppretter studier på dette nivået.

Oslo, juni 2011

Terje Mørland
direktør

Application for accreditation PhD in Applied Ecology at Hedmark University College

Report from the expert committee

PREFACE

This report contains the evaluations and conclusions of the appointed expert committee for accreditation of doctoral studies in 'Applied Ecology' at Hedmark University College. The report is based on the application 'PhD in Applied Ecology', including the application for accreditation according to NOKUT's standards and criteria for accreditation of doctoral studies submitted by Hedmark University College as described in letter dated 13 August 2010, supplementary information dated 20 December 2010, supplementary information dated 3 February 2011, and the committee's visit at Department of Forestry and Wildlife Management, Campus Evenstad 7-8 February 2011.

The committee thanks the Hedmark University College for excellent cooperation during our visits and for fast feedback on questions that came up during the process.

The committee's evaluations are unanimous.

Tromsø, Uppsala, Ås, 23 March 2011

Nigel G. Yoccoz, Professor and committee leader
Department of Arctic and Marine Biology
University of Tromsø

Lena Gustafsson, Professor
Department of Ecology
Swedish University of Agricultural Sciences

Jon Swenson, Professor
Department of Ecology and Natural Resource Management
Norwegian University of Life Sciences

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I. BACKGROUND AND BASIS FOR THE EVALUATION

Background

Hedmark University College (HiHm) submitted an application for NOKUT accreditation of a PhD program in *Applied Ecology*, dated 13 August 2010. The handling of the application was postponed until early November 2010, due to lack of personnel resources at NOKUT. In early November NOKUT requested supplementary information, which was submitted by HiHm on 20 December 2010. The applicant was also asked by the expert committee to supply additional information (dated 3 February) before the institutional visit to clarify issues related to the content of the application.

The proposed PhD program is based at the Faculty of Applied Ecology and Agricultural Sciences, Department of Forestry and Wildlife Management, Campus Evenstad, Hedmark University College. Three bachelor degrees are awarded at the campus. The department was accredited to award an English-language Master in Applied Ecology in 2006. The main focus has been on the management of fish and wildlife with direct or indirect economic value, such as meat or tourism. Specifically they have focused on conflict issues that often result from different values and attitudes between groups of people, such as the conflicts between domestic animals and large carnivores, cervids and biodiversity, cervids and forestry, regulation of rivers and fish production, and carnivore control to increase small-game populations. The Department of Forestry and Wildlife Management already has experience in hosting and supervising PhD students in cooperation with national (i.e. University of Oslo, University of Bergen, Norwegian University of Science and Technology, Norwegian University of Life Sciences, University of Tromsø) and international institutions (i.e. Swedish University of Agricultural Sciences, Uppsala University, Stockholm University, University of Karlstad, University of Washington, Manipal University, India). The Department of Forestry and Wildlife Management has developed a multi-disciplinary research over the years, focusing on terrestrial and aquatic ecosystems. By establishing the proposed PhD program in *Applied Ecology*, they intend to educate scientists and managers who can further develop applied ecology, both nationally and internationally.

Members of the committee

Applications for accreditation of PhD programs are evaluated by an expert committee. All members of the committee must have competence at the professor level. The committee for this accreditation was appointed on 2 December 2010 and consists of:

Professor Nigel G. Yoccoz
Department of Arctic and Marine Biology
University of Tromsø

Professor Lena Gustafsson
Department of Ecology
Swedish University of Agricultural Sciences

Professor Jon Swenson
Department of Ecology and Natural Resource Management
Norwegian University of Life Sciences

Nigel Yoccoz has been appointed leader of the committee, and PhD Åshild Ø. Pedersen, Department of Arctic and Marine Biology, University of Tromsø, has been appointed secretary of the committee.

The mandate of the expert committee is to evaluate the proposed PhD program in *Applied Ecology* at Hedmark University College according to the standards and criteria (Appendix 1) and the mandate (Appendix 2)

Organization of the report

The report is organized according to paragraph §2-3 of the *Regulations relating to standards and criteria for accreditation of program of study and criteria for accreditation of institutions in Norwegian higher education* (Appendix 1). The report is organized into four main sections:

- Chapter I of the report summarizes the background and basis for the evaluation.
- Chapter II of the report summarizes the evaluations from the expert committee.
- Chapter III of the report describes the evaluation performed by the expert committee and presents its results. The evaluations are organized as a point-by-point response to the criteria in § 2-3. The criteria listed in § 2-3 can be found in Appendix 1. Each section of Chapter III is divided into three subheadings: description, evaluation and conclusion. The description is mainly from the application submitted by Hedmark University College, Department of Forestry and Wildlife Management and complemented by the expert committee's discussions during the institution visit at Evenstad campus on the 7-8 February 2011 (Appendix 3).
- Chapter IV summarizes the conclusions from the expert committee.
- Chapter V includes four appendices.

The Committee's interpretation of the mandate

The expert committee received the mandate on 14 December 2010 (Appendix 2). In this mandate we were asked to assess whether the proposed PhD program in 'Applied Ecology' at Hedmark University College, Department of Forestry and Wildlife Management meets all the standards and criteria for accreditation of doctoral programs (§2-3, NOKUT's regulations; Appendix 1). We have been asked to:

1. Give reasons for our assessment and provide an unambiguous conclusion in this written report. We have also included assessments and recommendations for use by the institution to further enhance the study program in *Applied Ecology*.
2. Issue a quality-assured report based on our assessment of the institution's application, institutional visit, and other relevant written material that NOKUT and we have obtained from the Hedmark University College (listed in Appendix 4).

II. SUMMARY

The committee has considered all of NOKUT's standards and criteria for accreditation of doctoral studies described in its § 2.3.

The committee has based its evaluation on the application, the supplementary information received before the institution's visit in February 2011, and the discussions during the institution's visit. The committee has concluded that the application does not fulfill NOKUT's standards and criteria, because the following criteria were not fulfilled:

> *1.1 Regulations shall be in place for the doctoral program.*
>
> *1.3 The plan shall demonstrate that the doctoral program possesses an adequate academic level, breadth and depth, and coherence within its field.*
>
> *1.5 The plan shall demonstrate how the doctoral program is embedded in one or more core subject areas that are identifiable in an international context*
>
> *6 The institution shall state how the doctoral program is quality assured within the institution's quality assurance system.*

However, the committee believes these four criteria could be fulfilled if modifications were made along the lines suggested in this report.

The committee's evaluations are unanimous.

III. EVALUATION OF THE APPLICATION

The expert committee has based its evaluation on the application *PhD in applied ecology. Application for accreditation according to NOKUTs standard and criteria for accreditation of doctoral studies*. Supplementary information was requested from NOKUT (dated 18 November 2010) and received from Hedmark University College on 20 December 2010 (Appendix 4). This information included a revised English version of *Regulations for the degree Philosophiae Doctor (PhD) at Hedmark University College, including regulations for admission and examination from 01.12.2010, Regulations for PhD in applied ecology* and in-depth information about the Hedmark University College quality assurance system. After their first meeting (17 January), the expert committee requested additional information, which was submitted on 3 February. This information included a new revision of the revised English version of *Regulations for the degree Philosophiae Doctor (PhD) at Hedmark University College, including regulations for admission and examination from 01.12.2010* and answers to questions regarding recruitment, entry of doctoral candidates into the PhD program, considerations for female doctoral students in a study environment dominated by males, length of the study program and completion of PhD studies that exceed the normal 3-year duration, research visits abroad and financing of such stays, master courses and use of such courses in the PhD Program, courses not in the curriculum of the proposed PhD program (i.e. statistics, adaptive management, boreal forest ecosystems, freshwater ecology), PhD-level teaching competence and experience, and future plans for research projects to fund PhD students.

1. A plan shall be available for the doctoral program

1.1 Regulations shall be in place for the doctoral program

Description

The committee has evaluated three documents that were included in the application: 1) *Forskrift for graden Philosophiae doctor (PhD) ved Høgskolen i Hedmark*, 2) *Regulations for the degree Philosophiae doctor (PhD) at Hedmark University College, including regulations for admission and examination regulations*, and 3) *Reglement for PhD i anvendt økologi*. Document 1 and document 2, the latter being an English translation of document 1, are the regulations governing all PhD degrees to be given at Hedmark University College and are based on the University and College Act §3.3, whereas document 3 covers additional regulations specific for the proposed PhD degree in applied ecology within the regulations for Hedmark University College, as allowed in §21 of the Regulations.

Evaluation by the Committee

The committee returned document 2 and asked for a better English translation, which was provided. However, this translation is still inadequate for an institution with an ambition to have an international PhD program. As many of the PhD students who would be accepted into the proposed program are expected to be foreigners, it is very important that the English translations of the regulations are accurate and understandable. At this time, there is no English translation of document 3.

The committee noted concern about §16.1 in document 1. ”En enstemmig komitéinnstilling skal tas til følge såfremt et flertall av programutvalget stemmer for dette. Dersom et flertall finner at det - til tross for en enstemmig komitéinnstilling - foreligger begrunnet tvil om en avhandling bør godkjennes, skal programutvalget søke nærmere avklaring fra bedømmelseskomiteen eller oppnevne to nye sakkyndige, som avgir individuelle uttalelser om avhandlingen.” The rules governing how a program committee handles a unanimous decision from an evaluation committee vary among Norwegian universities. The University of Tromsø has a rule similar to the one proposed by Hedmark University College, whereas the Norwegian University of Life Sciences has a rule that states “En enstemmig uttalelse fra

bedømmelseskomiteen har status som et vedtak, og behandles ikke av flere instanser, med mindre PhD-studenten klager på vedtaket" (§3,5 i Veiledning om bedømmelse av PhD-graden ved UMB). The rule that Hedmark University College has proposed would allow a majority of the Program Committee to not accept a unanimous decision from the Evaluation Committee. Four of the five members of the proposed Program Committee would be people stationed at Evenstad and who therefore would know the candidate well. Although the proposed rule is legal, the committee would like Hedmark University College to consider whether it would not be better to always accept the external committee's evaluation when it is unanimous and the PhD student has not complained, especially considering the very small social environment at Evenstad.

Beyond this, the committee found the proposed regulations to adequately regulate the proposed PhD program.

Conclusion pt. 1.1

The committee considers the criterion as not fulfilled.

The committee concludes that the criterion would be fulfilled if correct and easily understandable English translations of the documents discussed above, were made available.

- *Forskrift for graden Philosophiae doctor (PhD) ved Høgskolen i Hedmark* must be retranslated to ensure that students who do not read Norwegian can be adequately and correctly informed about the regulations regulating their PhD study.
- *Reglement for PhD i anvendt økologi* must be translated into English.
- We ask Hedmark University College to consider the ramifications of §16.1 of their regulations regarding how the Program Committee should handle a unanimous decision from the Evaluation Committee.

1.2 The doctoral program shall have a representative name

Description

Applied Ecology is the suggested name for the PhD study program. The main focus will be to gain understanding on how ecological theory can be used to guide utilization of natural resources. A more specific aim is to increase the knowledge on terrestrial and aquatic systems and species in the boreal zone. The PhD studies are to be clearly linked to conditions in the Hedmark region, towards resource utilization of economic importance like hunting, fishing, bio-energy, and also nature tourism. (Application dated 13 August, Amendment 2 dated 3 February, Attachment 5).

Evaluation by the Committee

As with most terminology, there are numerous ways to define the discipline of *Applied Ecology.* During the interviews at Evenstad, we asked the question ”What is your definition of *Applied Ecology?*” to all groups. There was large agreement, from master’s students to senior staff, that applied ecology is ”ecological theory and principles applied to real-world problems” which corresponds with our own understanding of this broad discipline. The terminology is in line with the name of the faculty Applied Ecology and Agricultural Sciences.

The applicants have chosen to use the definition used by one of the leading journals in the field; Journal of Applied Ecology. In this, management from an ecological perspective is stressed, and in a recent update the editors of this journal also stress that applied ecology may include interdisciplinary approaches, relating to policy considerations, decision theory, and economics. In the application it is stated that the main focus of the PhD program is to ”gain an understanding of how we can sustainably manage natural resources based on the principles of ecological theory”. Priority is to be given to ”aquatic and terrestrial species and systems in the Boreal climatic zone which has a direct or indirect economic value.” (Application dated 13 August, Attachment 2, p. 9). This latter delimitation implies that the discipline of applied ecology is narrowed down considerably. In Attachment 5, p. 4 it is further specified that species and systems can be meat, fish, timber or raw materials for bio-energy. The direction of the research groups indicates that, in fact, the species of economic value are mainly small game (grouse, hares), moose and fish (salmon, trout, and grayling). Overall, this implies that,

in this context, *Applied Ecology* is clearly directed towards *Fish and Wildlife Ecology*. Another appropriate name for this proposed PhD program would be *Fish and Wildlife Management,* but we advise against this, because it would hinder a future expansion of the program into more basic ecology approaches.

The difficulty in identifying a relevant name was also reflected in the earlier evaluation (2005) of the application for the master's program with this direction at campus Evenstad. *Applied Ecology* was also then questioned as being too broad, and a clearer focus was requested. *Applied Boreal Ecology* and *Applied Vertebrate Ecology* were then given as alternative names. Nevertheless, a change in name was not given as a condition.

It will be very important for a PhD-student at Evenstad to be able to put his/her direction of studies into a larger context, and also to explain it to persons outside the academic community. Thus, the concept of *Applied Ecology* needs to be thoroughly discussed continuously through the research training, and especially so early in the program. Such a discussion should also be integrated into mandatory courses.

We would have preferred what we consider to be a more adequate name for the PhD study program, better reflecting the aim and scope, like *Fish and Wildlife Ecology.* Nevertheless, we acknowledge that by using *Applied Ecology* there will be more freedom of action to expand into other branches in the future. Thus, we recommend a change to *Fish and Wildlife Ecology*, although without this being strictly conditional.

Conclusion pt. 1.2

The committee considers the criterion as fulfilled.

1.3 The plan shall demonstrate that the doctoral program possesses an adequate academic level, breadth and depth and coherence within its field

Description

The PhD profile, as defined in the application is: "The application of ecological theory and methodology to develop comprehensive mitigation measures for the sustainable use, commercialization and management of natural resources. To validate the desired effect of mitigation efforts we need effective and long term monitoring of the natural environment. Hence the bulk of our research and education is focused towards the application of ecological principles for the mitigation, use and monitoring of natural resources". Further discussion during the institution's visit clarified that mitigations were not the only focus of the program but that use, management policy/actions, and monitoring were the important keywords.

The curriculum described in the application consists of one obligatory course *Scientific seminars in applied ecology* (10 ECTS credits), and 6 optional courses (5 or 10 credits each; a PhD degree must include 30 credits of courses): *Large herbivores and ecosystem interactions – top down or bottom up*, *Developing applied models for wildlife harvest management*, *Spatiotemporal scaling in ecosystem management*, *Environmental and social aspects of northern tourism, Animal positioning: techniques and analyses* and *Wound ballistics*. The obligatory course defines the core learning outcomes of the PhD curriculum, and combines seminars on philosophy of science as relevant to ecological and biological science, ethical conventions and guidelines, writing, reading and presenting scientific results to scientific and popular audiences, workshop on the referee process, and colloquiums in applied ecology. The latter part is the only one with a possible focus on applied ecology and is described as "foundations of biology and ecology" and "classical scientific historical papers in ecology".

Evaluation by the Committee

The obligatory course includes required teaching in Philosophy of Science and Ethics, as well as in general principles developed in ecological sciences, but little on applied ecology and its relationships to management and monitoring. Of the 43 papers listed for the colloquiums in *Applied Ecology*, there were none with a clearly applied content (except for those focusing for

example on general considerations related to climate change). The committee agrees that a good understanding of general ecological principles is necessary for developing e.g. relevant management policies, but it is mainly through relevant case studies that one can understand what kind of ecological knowledge is relevant in a specific situation. Good examples are described in the two papers used in the application to define applied ecology (e.g. Kilpatrick 2009[1] and Memmott 2010[2]).

The committee found therefore that the obligatory part of the curriculum does not cover what is defined as the core components of a PhD education in applied ecology, but focuses nearly exclusively on general ecology (i.e. the specificities of applied ecology do not appear clearly and the curriculum does not clearly delimitate the PhD program). Moreover, the obligatory part of the curriculum does not cover what the committee sees as necessary (i.e. the curriculum lacks breadth): specifically modelling (including harvesting models, but also important concepts, such as resilience and alternative states, which are best explained using models) and monitoring must be included in the obligatory part of the curriculum. The course on *Developing applied models for wildlife harvest management* is optional and focuses on wildlife only (i.e. does not include fish) and specific models (e.g. threshold management models), whereas a PhD student in applied ecology should be exposed to models relevant to both fish and wildlife (including small and large game, as well as interactions with plants and predators) and within a variety of social and ecological contexts. Other important issues, such as uncertainty related to modelling and management actions, should also be presented, as they have a major impact on the implementation of management policies (see the discussion around climate change, e.g., Hulme 2009[3]). Such a course could easily be based on the activities of the three main research groups identified in §2 (Research Environment), and parts of the course could be expanded as optional components in order to achieve a deeper coverage of specific issues (e.g. small game versus large game harvesting).

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[1] Kilpatrick A. M., Gillin C. M. & Daszak P. 2009 Wildlife-livestock conflict: the risk of pathogen transmission from bison to cattle outside Yellowstone National Park. *Journal of Applied Ecology* **46**, 476-85.

[2] Memmott J., Cadotte M., Hulme P. E., Kerby G., Milner-Gulland E. J. & Whittingham M. J. 2010 Putting applied ecology into practice. *Journal of Applied Ecology* **47**, 1-4.

[3] Hulme M. 2009. Why We Disagree About Climate Change: understanding controversy, inaction and opportunity. Cambridge: Cambridge University Press.

Monitoring has become an important topic linking management and science, and the discussion during the institution's visit made it clear that many members of the research groups agreed this topic should be part of the curriculum. There is now a large literature on monitoring with a clearly applied relevance and there are case studies illustrating what makes monitoring relevant or irrelevant (particularly with respect to the definition of objectives). Such a course on monitoring would be unique in a national context and important for defining the specificity of the PhD program.

The committee considered the inclusion of a course in statistical methods as part of the curriculum. Applied ecology requires advanced statistical designs and tools (e.g. one of the program's learning outcomes is "be capable of utilizing the most advanced and specialized methods and techniques", or in the course in *Animal positioning: techniques and analyses* a learning outcome is "knowledge of the most advanced techniques"), and whereas the local bachelor and master programs in applied ecology appear to include adequate courses in study design and statistical analyses, it is unknown whether students coming from all other institutions will in general have the necessary knowledge. The committee understands that such a course could tilt the balance of the curriculum too much towards methods (at the expense, for example, of case studies and monitoring principles), but strongly recommends that HiHm provide a clear list of courses that students could take at other institutions in order to acquire the statistical skills necessary for the completion of the degree and that this be done at the beginning of their PhD education.

Finally, the committee found some courses to be highly specialized (*Wound ballistics* and *Northern Tourism*) and suggests that a focus on more general issues, such as indirect/physiological effects of research and recreation/hunting on fish and wildlife would both be highly relevant for PhD students, correspond to the competences of the research group, and fit with the general profile of HiHm.

Conclusion pt. 1.3

The committee considers the criterion as not fulfilled.

The committee is willing to evaluate a revised course curriculum in which the following should be considered:

The obligatory part of the curriculum should:

- Cover core components of applied ecology.
- Provide a clear focus on monitoring, as one core area of applied ecology.
- Widen the perspectives on applied ecology including resilience, alternative states, and other related concepts.

The course on models for wildlife harvest management should:

- Include explicitly small game, large game, and fish and processes important for management, such as species interactions (e.g. predation). Such a course should be a bridge between the different research activities at Campus Evenstad.
- The name of the course should reflect this and be called for example *Models for fish and wildlife management*.
- Include ways to estimate and communicate uncertainty in management and modeling.

Finally, the specialized courses of *Wound ballistics* and *Northern Tourism* should be broadened, to focus more on general issues.

1.4 The plan shall set out how the doctoral program is linked with subject areas with adequate breadth and clear delineation from other subject areas

Description

The study plan defines ecology as the study of interactions determining the distribution and abundance of organisms, and applied ecology as "it is used in international scientific journals". The study plan specifies that "social, economic and political sciences" are not directly dealt with, and this point was emphasized in the supplementary material sent to the committee. The study systems are mainly located in the boreal climatic zone, even if other systems (in particular tropical systems in Africa and Asia, and Arctic systems) can be used in a comparative way.

Evaluation by the Committee

As detailed in 1.2 and 1.3, the committee would have appreciated a definition of applied ecology more explicit than "as it is used in international scientific journal". The discussions with the staff, as well as with the master and PhD students, made it clear that all had a common and clear understanding of applied ecology – how ecological knowledge can be used to achieve a better use and management of natural resources. This approach is both broad – use and management of natural resources require a large palette of ecological tools – and well differentiated from more basic or theoretical fields. The committee was concerned with the interface with other disciplines (for example economics, as the definition of applied ecology given in 1.2 refers explicitly to commercialization), and the fact that none of the staff had formal competences in disciplines other than ecology. The committee strongly encourages scientists at Evenstad to find new and develop existing collaborations with e.g. social scientists and economists in order to strengthen the specificity of the Evenstad program, while exposing PhD students to scientists working in other disciplines.

The study program and the research activities have a strong focus on regional problems relevant to management issues in Fennoscandia, but individual scientists have also research projects in Africa and Asia. Staff members and PhD students justified such work as being important for putting their work on boreal systems in a wider perspective. The committee fully agrees that a comparative approach is often illuminating, and should provide PhD students with a wider perspective on their research questions, but recommend a more explicit strategy with respect to the choice of research projects. This will provide PhD students with a more integrated research environment.

Conclusion pt. 1.4

The committee considers the criterion as fulfilled.

1.5 The plan shall demonstrate how the doctoral program is embedded in one or more core subject areas that are identifiable in an international context

Description

The proposed doctoral program is described as being rooted in ecology and further relevant research is defined with respect to international scientific journals, such as those published by the Ecological Society of America, the British Ecological Society or the Nordic Ecological Society. The application also refers to the existence of research departments devoted to *Applied Ecology*.

Evaluation by the Committee

Publications in international journals are clearly important to show that core areas of the program are relevant with respect to international research areas. However, these journals cover a wide range of topics, both applied and basic, so whereas the program is embedded in the discipline of ecology, the committee would have appreciated a more precise definition of some of the core areas within applied ecology (e.g. fish and wildlife ecology [see 1.2], and the research problems relevant to management and resource use). Also some important research directions in applied ecology, such as assessment and monitoring of ecosystem services, are not mentioned in the application, and how the program relates to these issues should be clarified. It is quite possible to use for example the main topics developed in Memmott et al. (2010), Sutherland et al. (2006)[1] or the main categories of papers published in Journal of Applied Ecology to define these core areas.

Conclusion pt. 1.5

The committee considers this criterion as not fulfilled, but the committee is willing to evaluate a revised description of the core areas developed in the program.

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[1] Memmott J., Cadotte M., Hulme P. E., Kerby G., Milner-Gulland E. J. & Whittingham M. J. 2010 Putting applied ecology into practice. *Journal of Applied Ecology* **47**, 1-4
Sutherland WJ et al. (2006) The identification of 100 ecological questions of high policy relevance in the UK. *Journal of Applied Ecology* **43**, 617-27.

1.6 The plan shall describe the doctoral program's academic objectives and what the program qualifies the student for. The plan shall also describe the necessary background for admission to the program

Description

The academic objectives are described in terms of the learning outcomes, which fall into three categories, knowledge, skills, and competence. The knowledge outcomes are both applied (contribute to new methodology or application of ecological theory) and basic (development of ecological theory and methods). The skills outcomes relate to methods and techniques, as well as to the ability to evaluate the relevance of ecological theory, and existing knowledge and practice. The competence outcomes are the ability to develop new ideas, complete a research project, and communicate research to scientists, stakeholders, and the public, both in written and oral terms.

The PhD in *Applied Ecology* should qualify for work in both educational/research institutions as well as management agencies.

Requirements for admission are a 5-year master degree in ecology and related disciplines (eg evolution) and for Norwegian students an average mark of B (for foreign students, this criterion will not be used and admission will depend on a case by case evaluation). The admission will also be based on a research project developed with one or more members of the faculty staff (see supplementary information from HiHm dated 3 February).

Evaluation by the Committee

The committee sees the learning outcomes as being necessary for a PhD program in applied ecology, even if some are rather ambitious ("be capable of utilizing the most advanced and specialized methods and techniques" – many such methods require quite sophisticated mathematical or statistical understanding which most students will not possess).

In addition, the committee recommends that learning outcomes should be better developed, with the inclusion of the following components:

Knowledge

- Have an understanding of how the boreal ecosystem is impacted by human interventions.
- Have an understanding of processes, dynamics, functions, and composition of the boreal ecosystem.

Skills

- Be able to critically evaluate scientific results and conclusions.
- Be able to identify key research problems.
- Be able to search knowledge through scientific media.

With respect to career opportunities, the fact that only "wildlife management" is considered as relevant in terms of management stresses again the focus on wildlife and fish ecology (that fish was not mentioned was most likely an oversight). There are not very many opportunities for jobs in the fish and wildlife management sector requiring an education at the PhD level (there is indeed a risk for them to be viewed as over-qualified job applicants), so having students with broader skills and competences should make them more attractive to various administrations or large industrial firms.

Conclusion pt. 1.6

The committee considers this criterion as fulfilled.

1.7 The plan shall describe compulsory and elective components

Description

The curriculum included one compulsory course called *Scientific Seminars in Applied Ecology* (10 ECTS credits) and 6 optional course (for a total of 35 ECTS credits). In addition, PhD-courses will be available through international schools, as for example through the International School in Applied Ecology run by Hedmark University College. Students can also follow optional courses at other institutions.

Evaluation by the Committee

The curriculum described compulsory and elective components. The committee has commented on the course curriculum in pt. 1.3, where a more comprehensive evaluation can be found.

Conclusion pt. 1.7

The committee considers this criterion as fulfilled.

1.8 The plan shall demonstrate that the work performed by the PhD student is put in a broader academic context

Description

The PhD dissertation should consist of 3-5 papers published or for publication in international scientific journals and it is required that at least one of these papers has been published or accepted for publication in a recognized refereed journal. In addition participations to conferences and the International School in Applied Ecology will allow students to discuss their research with other scientists.

Evaluation by the Committee

The goal of having dissertation consisting of 3-5 papers published or publishable in international journals seems quite attainable given the publication record of the main scientists involved in the proposed PhD program and the PhD degrees recently completed under the partial supervision of Evenstad's staff. PhD students at Evenstad receive the necessary financial support to travel to conferences and they are encouraged to do so. The IRSAE is also an excellent way for students to meet scientists. Discussion with PhD students, however, pointed to the importance of having supervisors in other universities in order to have a broader, international perspective on their research. We encourage that such co-supervision with scientists from other universities be continued even if this proposed PhD program is approved.

Conclusion pt. 1.8

The committee considers this criterion as fulfilled.

2. The institution shall maintain a stable body of academic staff assigned to the doctoral program

The committee received an overview of the 14 scientific staff members within the core group that would have responsibility for the proposed PhD program. Not all of these staff members have a 100% position and some of those with 100% positions do not have all of their wages secured permanently. Several staff members have been hired recently, as the number of staff has increased, and two staff members on this list have quit recently; one staff member will maintain a connection to the Evenstad Campus in a Professor II position and one will emigrate. We understand that the former position will be filled within a month. Thus, the last year or so has been rather unstable, with new staff members coming and some quitting. The committee recognizes that there will be turnover in every institution and that the rate of turnover will probably be higher in a small community such as Evenstad. However, it was our impression from the interviews that there is an excellent work environment at the Evenstad Campus, which of course promotes stability. Nevertheless, the number of staff members has been growing and the professional environment appears to be stable enough to secure a viable doctoral program. The committee recommends that the profile of new staff members fit the profile of the proposed PhD program and approves of the policy that staff members are stationed and work at the Evenstad Campus.

2.1 The size of the academic staff shall be adapted to the teaching, academic supervision and the research development work

Description

At the time of the application, the permanent academic staff at the Evenstad Campus consisted of 22 members; 8 full professors, 1 docent, 5 associate professors, 2 assistant professors, and 7 teachers. Fourteen academic staff members associated with the proposed PhD program are listed in the application; 8 full professors, 1 docent, and 5 associate professors. Their combined contributions to the proposed PhD program is described in Attachement 6 to the application, and sum to 10 full-time equivalents (2.9 full-time

equivalents of teaching, 6.7 of research and development, and 0.3 of "other"). According to the application, there are 12 PhD students on campus.

Evaluation by the Committee

The committee was provided more up-to-date information regarding the staff in the *Tilleggsinformasjon 2 av 03.02-2011*. From this, we learned that the vacant professor position in fish biology should be filled in the near future, but that this new staff member would only work at a 50% level until he completes a large research project that he is leading. Two other staff members at the Blæstad Campus, and at a different department at HiHm were mentioned, with competences in economics and sociology. Based on the information we received during our institutional visit, the committee has decided not to include these two staff members in the evaluation, because they were too new or too little involved directly in the application. Therefore, at this moment, the academic staff that is related to the proposed doctoral program, including the new professor in fish biology in a 50% position, comprises 9.7 full-time equivalents. This will decrease to 8.8 full-time equivalents when the associate professor leaves and increase to 9.3 full-time equivalents when the new professor increases his position to 100%. In the proposal, most of the staff will be involved in teaching, supervision (which we conclude is included within the research category in Application dated 13 August, Attachment 6), and research, although some will not be involved in all three aspects of the program. There are about 12 PhD students on campus, so the present staff level corresponds to 0.8 full-time equivalents per PhD student.

Conclusion pt. 2.1

The committee considers this criterion as fulfilled.

2.2 The academic staff shall engage in active research development work with proper academic breadth at a high international level

Description

The publications and research of the academic staff involved in the proposed PhD program have been documented in the application, including a short curriculum vitae for each member of the core group (Application dated 13 August, Attachment 7), publications from the staff at the campus during recent years (Application dated 13 August, Attachment 8), and a description of relevant research and other projects being conducted by the staff (Attachment 11). In addition, the CV of the new professor of fish biology was included in the *Tilleggsinformasjon 2 av 03.02.2011*. This information has been very helpful to help the committee evaluate this criterion.

Evaluation by the Committee

The members of the academic staff are engaged in active research work and are successfully publishing their research results in the international literature. A review of the CVs of the 15 staff members showed that they published an average of 1.1 papers per year during 2009-2010 in refereed international scientific journals. This is probably somewhat above average for most comparable departments in Norway. As expected, most of these papers were published in applied journals, but some were published in very highly rated journals with a more general focus, such as Proceedings of the Royal Society of London, Journal of Animal Ecology, and Evolution. In addition, there is obviously a wide academic breadth in the projects being conducted and the resulting publications.

Conclusion pt. 2.2

The committee considers this criterion as fulfilled.

2.3 The institution shall retain employees in main positions with qualifications within what are regarded as core subject areas for the doctoral program

Description

The expertise of the academic staff associated with the proposed doctoral program in relation to its core subject areas is described in the application. According to this, the subject areas of the positions comprising the core academic staff are: prof. in applied ecology (2), prof. in freshwater and fish biology (2), associate prof. in human dimensions in natural resource management (1), prof. or associate prof. in different types of population ecology (5), prof. in wildlife management (2), prof. in biomedicine (1), and prof. in bioenergy (1). In addition, in *Tilleggsinformasjon 2 av 03.02.2011* the committee was provided a description of the composition of the four research groups, as defined by members of the Evenstad Campus: *Cervids and their habitats, Large carnivores; their biology and management of conflicts, Small game biology and management*, and *Fish biology and management*. Some staff members are included in more than one research group.

Evaluation by the Committee

The qualifications of the staff are more in line with a PhD program in *Fish and Wildlife Ecology* than one in *Applied Ecology*. We refer to the discussion about the name of the program in section 1.2. Because *Applied Ecology* includes a large number of disciplines that are not covered by the current staff, it is important that the ties to qualified external staff within these disciplines (e.g. resource economics, sociology, etc.) be clarified better in the program description. Also, because the boreal system is so important in the definition of the program's profile, strategies defining research cooperation with relevant research groups in Nordic countries, other parts of Europe, and North America should be clearer. As it is, Africa is more profiled than these other, more natural, areas for cooperation.

The staff are divided into research groups. *Small game biology and management* is the largest and most robust group, with five staff members (two part-time) and three PhD students. The research group *Fish biology and management* has gone through a large change recently, with one staff member going from a 100% to a 20% position and the other two being hired

recently. There is one PhD student in this group. Nevertheless, it appears that this group is becoming well organized and should soon become a viable entity with a great potential. The research group *Large carnivores; their biology and management of conflicts* is not yet formally organized and seems to be relatively vulnerable, even though it consists of five staff members. None of its members has 100% financing from the Hedmark University College. In the *Cervids and their habitat* group, both PhD students will finish soon and two members listed as associate professors will leave Evenstad in the near future. The staff member with competence in human dimensions / tourism is not a member of these core research groups, but can be viewed as an important resource to all of them. It is difficult for the committee to see how bio-energy can be included into the proposed doctoral program.

Conclusion pt. 2.3

The committee considers this criterion as fulfilled.

2.4 At least 50% of the academic staff assigned to the doctoral program shall hold full professorships; the remainder shall be associate professors

Description

As described in section 2.1 above, the academic staff assigned to the proposed doctoral program at the time of writing is 9.7 full-time equivalents. Based on the information in Attachment 6 to the application and the *Tilleggsinformasjon 2 av 03.02-2011*, we calculate that 5.5 of these full-time equivalents are comprised of professor-competent staff and 4.2 full-time equivalents are comprised of associate professors and one docent.

Evaluation by the Committee

Based on the information given above, 57% of the full-time equivalent positions in the proposed doctoral program hold full professorships and the remainder are associate professors or docents.

Conclusion pt. 2.4

The committee considers this criterion as fulfilled.

3. Academic activities at the institution shall serve to support the doctoral program

Description

The PhD program in Applied Ecology is based on the master in *Applied Ecology*, accredited at the Evenstad campus in 2006, and further on bachelor degrees in *Forestry, Wildlife Management, Ecotourism, and Agronomy*. There is also a plan to develop a second master program (*Restoration and conflict resolution in ecosystem management*). Both the master and the bachelor programs have quite significant numbers of students (40 will start their bachelor this year and 28 their master).

All research activities are said to be somehow connected to applied ecology. A new project focusing on long-term research and monitoring of a boreal forest ecosystem is described briefly.

Applied ecology is supported by Hedmark University College as part of a larger project linked to the establishment of the Inland University (Innlandsuniversitetet). This project has made the recruitment of staff and PhD students possible.

Evaluation by the Committee

The teaching activities existing at Evenstad campus at the bachelor and master levels are clearly relevant to and support the proposed PhD program. In fact the committee was a bit surprised that courses taught at the master level could not be taken by PhD students coming from other institutions, as they seem to be quite relevant. Discussions with master students, as well as with PhD students who have had their whole education at Evenstad, clearly indicated that teaching activities were well integrated and with a clear focus.

Most research activities could be seen as relevant to applied ecological problems, either in terms of theoretical concepts (e.g., effects of fragmentation or consequences of small population size), or in terms of developing new methods or research frameworks (e.g., for monitoring). The committee sees the new project on boreal forest ecosystem as interesting, but it was not obvious how it would be integrated into the other activities, as it has not started yet and research questions were not precisely formulated. For example 1) even if monitoring

is clearly a core area of the PhD program, it was not obvious how this project would contribute to the program, and 2) having a project on a boreal forest ecosystem is likely relevant for the knowledge outcome "Have an understanding of processes, dynamics, functions, and composition of the boreal ecosystem" [1.8], but, again, it was unclear how.

The support from Hedmark College is clearly important and has been instrumental in building a staff of adequate size for a PhD program. It shows that the *Applied Ecology* program fits within the academic strategy developed within the College, and discussions with the College leadership (Rektor and Direktør) confirmed this strong support.

Conclusion pt. 3

The committee considers this criterion as fulfilled. The exact role played by the boreal forest ecosystem project should be clarified, however.

4. The institution shall participate actively in national and international cooperation and networks that are relevant to the doctoral program

Description

Most staff members have extensive external research networks, with cooperation within and outside Europe, and also in tropical regions (e.g. Costa Rica, India, Botswana, Tanzania). Large national and international cooperation is also reflected in the publication lists, with co-authorship being common with colleagues from institutions within and outside Norway. Some of the researchers have participated in major research programs funded by the Research Council of Norway, with national and international partnership. Among the scientific staff there are several persons with a non-Norwegian background (e.g. three professors from Sweden, one from the US, and an associate prof. from Canada). The Department of Forestry and Wildlife Management manages one international network in applied ecology directed towards fish and wildlife ecology, The International Research School in Applied Ecology (IRSAE). IRSAE is an international research school with 7-8 institutions in Norway, Sweden, Finland, Iceland, Lithuania, Latvia, Estonia, and Denmark, started by Hedmark University College and Karlstad University in 2009, and coordinated by the dean at Evenstad. It includes about 50 PhD-students, with the mission being to facilitate information exchange, and to encourage and help students to employ ecological theory in tackling management issues. Nordnatur is another network but only acts at bachelor's and master's levels. It is lead by an international coordinator at Evenstad, and has operated for five years with the aim to give future natural resource managers a broad Nordic-Baltic perspective, and to encourage movement of students between institutions (reference to Application dated 13 August, attachment 7, 9, 10 and 11).

Evaluation by the Committee

We find the national and international cooperation to have a high standard, and are impressed by the initiatives taken by the staff for further development. We acknowledge the value of the recently started IRSAE network and see a potential for the joint organisation of PhD courses

and student exchange within this. At the interviews with the research staff, it was stated several times that Evenstad is dependent on external cooperation, and we fully agree with this. For small campuses like Evenstad external networks and visits from outside are especially essential to uphold a dynamic and creative research environment. Interviewed PhD students stressed the value of visiting other institutions, for shorter or longer duration. Current PhD students have this as a natural component, as they are affiliated with other colleges and universities. We encourage the continuation of such visits, and that they be planned, budgeted for, and included in the students' PhD plans.

Conclusion pt. 4

The committee considers the criterion to be fulfilled.

5. Infrastructure shall be adapted to the characteristics of the study and relate to the aims of the doctoral program

5.1 The PhD-students shall be provided necessary and appropriate support and working conditions, e.g. adequate office space, equipment, administrative services and financial support

Description

The Department of Forestry and Wildlife Management has several years of experience in facilitating PhD students, at a similar number as is expected in the proposed doctoral program, by providing necessary assistance and administrative support services. These students have had access to office space, technical and administrative support services, and supervision.

Evaluation by the Committee

Most PhD students share office space in one common, large room, but several of them are located in a different building than their onsite supervisor's office. In the final phase of their study, students are offered their own, private office. Such offices are also available for use upon request at other times. Students have good access to technical and administrative support services and financial support for field work, travel (including conferences and course work), and equipment for their study. The department is planning to build a new building on campus where scientific staff (supervisors) and PhD students will be located together.

Conclusion pt. 5.1

The committee considers the criterion as fulfilled.

5.2 Library services shall be readily accessible and commensurate with the academic content and level of the doctoral program

Description

At Campus Evenstad the library is located in the heart of the main building by the cantina. Staff and students have easy access to the library (opening hours 08:00-15:30). The library has offices for two librarians. In total, the library at Hedmark University College has ca. 145,000 books, ca. 36,000 e-books, and 803 printed and 10,638 electronic journals. The Library subscribes to 17 databases and 22 full-text databases for literature searches. The relevant fields for the proposed 'Applied Ecology' PhD program are well covered. The library shares electronic resources with other academic and research libraries in Norway and internationally, and thus has access to national library resources. Two posts of totally 18,8 man-year at the Hedmark University College are located at the Campus Evenstad. The library has experience with PhD-students at campus and offers instructions on how to use the databases and reference tools regularly (or upon request).

Evaluation by the Committee

The library on Campus Evenstad is placed very centrally and in the same building as the PhD students have their offices. The library has good access to high-quality journals, both on paper and electronically, within the field of applied ecology, as well as a broad collection of text books on the subject. Students have access to several large color printers located in this building and in the building named Låven (i.e. where the scientific staff is located and where there are several group rooms). The library has librarians only during day-time work hours, but staff and students can access the library resources by using their key-cards outside work hours.

Conclusion pt. 5.2

The committee considers the criterion as fulfilled.

5.3 PhD students shall be provided with access to ICT services of adequate scope and quality

Description

The PhD-students are serviced in the same way as the academic staff with the ICT resources and related infrastructure. They have access to their own computer and relevant software for data acquisition (eg GPS sata), data analysis (e.g. SAS and R for statistical analysis; GIS-software such as ArcMap; MARK for mark-recapture data analysis and Distance Sampling for analyzing abundance of biological populations), and writing publications. Printers are located in the same building as their offices and a wireless broadband access is available in almost all buildings on campus. The ICT-team is located at the central administration outside campus, but they are present on Campus Evenstad 2 days a week. The ICT team is competent and is available for special assistance upon request from the PhD student.

Evaluation by the Committee

Access to ICT services at the campus seems to be of adequate scope and quality. Computers and relevant software for PhD-students are available. Even though the ICT team is not present at Campus daily, there seems to be well established routines for technical support when problems occur with computers and related software (through remote access, a common solution on many campuses). Assistance for the acquisition of new computers is also provided to students and their research projects.

Given that some research projects are increasingly using devices generating very large amounts of data (eg GPS collars, maps), the computing capacity of personal computers might become a limiting factor (particularly so if advanced techniques such as Bayesian estimation methods are used). HiHm should probably consider either acquiring its own server with large computing and storage capacity, or negotiate access to computing clusters existing at other institutions.

Conclusion pt. 5.3

The committee considers the criterion as fulfilled.

5.4 Technical and administrative support services shall be satisfactory

Description

The PhD students are employed at the Faculty of Applied Ecology and Agriculture, but work at the Department of Forestry and Wildlife Management, Campus Evenstad. They receive administrative support from the administration on campus, which includes staff in economy, personnel, study administration, and internationalization. The PhD students have one performance review ("medarbeidersamtale") with the administrative leader per year, where issues related to, for instance, progress in their study plan and supervision are discussed. Financial resources are provided to PhD students when needed, but are not canalized through specific independent annual budgets for each student. Three technicians are available to support research projects in field work (i.e. monitoring of large carnivores, small mammals, grouse surveys etc.) and laboratory analyses. In addition 3 technicians work at the fish hatchery and support research projects connected to fish and freshwater systems. Technical support related to maintenance of cars and buildings are also available on campus. In addition the Campus Evenstad administration assists the students in finding housing (i.e. the Campus offers housing to 90 students).

Evaluation by the Committee

The committee has a positive experience of the technical and administrative support services both at Campus Evenstad (local administration) and at the University College of Hedmark (central administration). We think that the present technical and administrative support services will be sufficient to fulfill the new duties related to the proposed PhD program.

Conclusion pt. 5.4

The committee considers the criterion as fulfilled.

6. The institution shall state how the doctoral program is quality assured within the institution's quality assurance system

Description

According to the application, Hedmark University College has a NOKUT-approved quality assurance program in place at the present time. The Quality System is available on two web sites called *Quality File* and *Handbook for Quality in Education* (www.hihm.no/om-hoegskolen/kvalitetssystem). This system will be expanded if the proposed doctoral program is approved to include: instructions for the doctoral committee, process description for admission of applicants, process description for follow-up of doctoral students, and description of the PhD student forum. In addition, the committee has evaluated several documents that were included in the application: 1) *Forskrift for graden Philosophiae doctor (PhD) ved Høgskolen i Hedmark*, 2) *Regulations for the degree Philosophiae doctor (PhD) at Hedmark University College, including regulations for admission and examination regulations*, 3) *Reglement for PhD i anvendt økologi*. Document 1 and document 2, the latter being an English translation of document 1, are the regulations governing all PhD degrees to be given at Hedmark University College and are based on the University and College Act §3.3, whereas document 3 covers additional regulations specific for the proposed PhD degree in applied ecology within the regulations for Hedmark University College, as allowed in §21 of the Regulations, and three appendices 1) Søknad om opptak til Ph.d.-program ved Høgskolen i Hedmark, 2) Avtale ved opptak til doktorgradsutdanning ved Høgskolen i Hedmark, and 3) Halvårlig framdriftsrapport for doktorgradsstudenter.

Evaluation by the Committee

The committee has commented on the regulations ("Forskrift" and "Reglement" in section 1.1 above). The proposed quality assurance seems to be adequate, as did the general Quality System, which has already been approved by NOKUT. Nevertheless, the problems with the poor English translation of the "Forskrift" and the lack of an English translation of the "Reglement" remain. In addition, the committee was not provided English translations of the other quality assurance documents (søknad, avtale ved opptak and framdriftsrapport) nor did the committee find an English version of the website for the *Quality System*. As many of the

PhD students who would be accepted in the proposed program are expected to be foreigners, it is imperative that correct and well written English translations of the regulations, quality control system documents, and associated websites are available.

Conclusion pt. 6

The committee considers this criterion not to be fulfilled.

The criterion would be fulfilled if correct English translations of the following quality documents, were to be made available:

1) The application for admission to the PhD program at Hedmark University College.

2) The contract when entering a PhD education at Hedmark University College (A, B, and C)
3) Semiannual progress report for PhD students.

In additon, prior to announcing the new PhD program, Hedmark University College should provide an English translation of the description of the PhD program's quality control system, as described in the document "*Kvalitetssikring for PhD-program ved Høgskolen i Hedmark*".

IV. CONCLUSION

Does Hedmark University College meet the standards and criteria for accreditation of the doctoral program in applied ecology?

The committee concluded that four criteria were not fulfilled:

1.1 Regulations shall be in place for the doctoral program.

1.3 The plan shall demonstrate that the doctoral program possesses an adequate academic level, breadth and depth and coherence within its field.

1.5 The plan shall demonstrate how the doctoral program is embedded in one or more core subject areas that are identifiable in an international context

6 The institution shall state how the doctoral program is quality assured within the institution's quality assurance system.

Therefore the doctoral program does not meet the standards and criteria for accreditation in its present form. The committee, however, believes these three criteria could be fulfilled if modifications are made along the lines suggested in the report.

Further we recommend that:

- The name of the program is changed to *Fish and Wildlife Ecology*.
- HiHm provides a clear list of courses that students could take at other institutions in order to acquire the statistical skills necessary for the completion of the degree and that this is done at the beginning of their PhD education.
- Learning outcomes should be better developed, with the inclusion of the following components:

  Knowledge

  - Have an understanding of how the boreal ecosystem is impacted by human interventions.
  - Have an understanding of processes, dynamics, functions, and composition of the boreal ecosystem.

Skills

- Be able to critically evaluate scientific results and conclusions.
- Be able to identify key research problems.
- Be able to search knowledge through scientific media.

- The obligatory parts of the curriculum need a stronger focus on core components, including monitoring
- A more explicit strategy with respect to the choice of research projects is needed. This will provide PhD students with a more integrated research environment.
- The exact role played by the boreal forest ecosystem project should be clarified.
- The profile of new staff members fits the profile of the proposed PhD program – specifically the focus on boreal wildlife and fish ecology. We approve of the policy that staff members are stationed and work at the Evenstad Campus.
- The research group *Cervids and their habitats* be strengthened with a new hiring as soon as possible, and that the two research groups *Large carnivores* and *Cervids and their habitats* be combined so as to consolidate these two groups and integrate their research in terms of top-down (predation) and bottom-up (herbivory) processes.
- In additon, prior to announcing the new PhD program, Hedmark University College should provide an English translation of the description of the PhD program's quality control system, as described in the document "*Kvalitetssikring for PhD-program ved Høgskolen i Hedmark.*".

The Committee's recommendation on areas of further development of the PhD program

Even if the present application does not fulfill the criteria and standards, during its evaluation and the visit to the campus the committee reflected on possible future development of the research and teaching activities. These recommendations are detailed below:

Given the small size of the research unit, it is important that research and teaching activities do not become fragmented. The committee has therefore considered two themes or perspectives that can better integrate the different research groups and provide a common underlying theme to the courses.

- Monitoring: As emphasized in §1.3, the committee sees monitoring as a core component of a PhD program in *Fish and Wildlife Ecology*, linking ecological theory, modeling and management. There are very few programs integrating monitoring of fish and wildlife populations, and the Evenstad Campus has the opportunity to create such a program. It would allow researchers to confront their approach to monitoring (e.g. the objectives and variables measured), and provide useful comparisons to the students (e.g. how models relevant for monitoring are built for fish and wildlife populations and why they differ).
- Ecosystem services and resilience: Fish and wildlife are important services provided by ecosystems (either as economic resources or as cultural and esthetic resources), and the services perspective is important in order to put fish and wildlife in a wider ecological and social context. Similarly the concept of resilience stresses that fish and wildlife dynamics should be placed in the wider context of ecosystem dynamics, with the possibility that ecosystems can shift between alternative states, that these changes can be irreversible, and that management can influence how sensitive ecosystems can be to stress factors. Again, there are differences between freshwater and terrestrial (boreal) ecosystems regarding e.g. evidence for such alternative states, and it would be an enriching experience for students to be aware of such differences.

V. APPENDICES

<u>Appendix 1:</u> Regulations relating to standards and criteria for accreditation of program of study and criteria for accreditation of institutions in Norwegian higher education, § 2-3.

Issued by the Norwegian Agency for quality Assurance in Education (NOKUT) 25 January 2006 pursuant to the Regulations concerning accreditation, evaluation and recognition no. 1040 issued 8 September 2005 by the Ministry of Education and research pursuant to the Act relating to Universities and University Colleges.

§ 2-3 Standards and criteria for accreditation of doctoral programs and institution-based fellowship programs for artistic development work.

§ 2-3 (1) A plan shall be available for the doctoral program.

1. Regulations shall be in place for the doctoral program.

2. The doctoral program shall have a representative name.

3. The plan shall demonstrate that the doctoral program possesses an adequate academic level, breadth and depth and coherence within its field.

4. The plan shall set out how the doctoral program is linked with subject areas with adequate breath and clear delineation from other subject areas.

5. The plan shall demonstrate how the doctoral program is embedded in one or more core subject areas that are identifiable in an international context.

6. The plan shall describe the doctoral program's academic objectives and what the program qualifies the student for. The plan shall also describe the necessary background for admission to the program.

7. The plan shall describe compulsory and elective components.

8. The plan shall demonstrate that the work performed by the PhD student is put in a broader academic context.

§ 2-3 (2) The institution shall maintain a stable body of academic staff assigned to the doctoral program.

1. The size of the academic staff shall be adapted to the teaching, academic supervision and the research development work.

2. The academic staff shall engage in active research development work with proper academic breadth at a high international level.

3. The institution shall retain employees in main positions with qualifications within what are regarded as core subject areas for the doctoral program.

4. At least 50% of the academic staff assigned to the doctoral program shall hold full professorships; the remainder shall be associate professors.

§ 2-3 (3) Academic activities at the institution shall serve to support the doctoral program.

§ 2-3 (4) The institution shall participate actively in national and international cooperation and networks that are relevant to the doctoral program.

§ 2-3 (5) Infrastructure shall be adapted to the characteristics of the study and relate to the aims of the doctoral program.

1. The PhD-students shall be provided necessary and appropriate support and working conditions, e.g. adequate office space, equipment, administrative services and financial support.

2. Library services shall be readily accessible and commensurate with the academic content and level of the doctoral program.

3. PhD students shall be provided with access to ICT services of adequate scope and quality.

4. Technical and administrative support services shall be satisfactory.

§ 2-3 (6) The institution shall state how the doctoral program is quality assured within the institution's quality assurance system.

<u>Appendix 2:</u> Program for institutional visit at Hedmark University College.

Institusjon / studiested: Høgskolen i Hedmark, Dato: 7.-8. februar 2011
Møterom: "Utsiktsposten", Kantina

Ansvarlig saksbehandler i NOKUT: seniorrådgiver Berit Kristin Haugdal, bkh@nokut.no
Ansvarlig ved HiHm: Instituttleder prof. Harry Andreassen

DAG 1:			
Tid	**Forslag**	**Tema**	**Deltakere**
	08.00 – 09.30	Formøte for komiteen	
		Pause - 15 min	
45 min	09.45 – 10.30	Møte med **ledelsen (direktør, rektor, event studiesjef, dekan, FOU-ansvarlig, studenttillitsvalgt)**	
		Pause - 15 min	
45 min	10.45	Møte med **mastergradsstudenter (**6-7 studenter fra Masterstudiet, representativt utvalg)	
45 min	11.30	*Lunsj - Komiteen alene*	
60 min	12.15 – 13.15	Møte med **faglig ledelse** på avdeling/ institutt/ fakultetsnivå – **dekan + nestleder + pro-rektor for forskning samt professoren fra Blæstad**	

		Pause - 15 min	
45 min	13.30 – 14:15	Møte med **ph.d-studenter/stipendiater** - Inntil 6 stipendiater – representativt utvalg	
		Pause - 15 min	
75 min	14.30 – 15.45	Intervju med fagmiljøet- gruppen deles i to slik at vi intervjuer 6-7 omgangen: Første halvdel av fagmiljøet: ***Resource Economy*** ***Ungulates and their habitats*** ***Small game group***	
		Pause - 15 min	
75 min	16.00 – 17.15	Intervju med fagmiljøet- Andre halvdel av fagmiljøet ***Carnivores*** ***Human dimension – Tourism*** ***Bioenergy*** ***Fish biology***	
		Pause - 15 min	
	17.15	*Komiteen oppsummerer dagen*	

DAG 2:			
60 min	09.00	**Besiktigelse av infrastruktur**	
		Pause - 15 min	
45 min	10.15 – 11.00	Møte med **administrativt personale (studie- og administrasjonssjef, stabsleder, studentadministrator, bibliotekar, prorektor for utdanning)**	
		Pause - 15 min	
60 min	11.15 – 12.15	Møte med **ledelsen (direktør, rektor, event studiesjef, dekan, FOU-ansvarlig, studenttillitsvalgt)** **+ ansvarlig for doktorgradsutdanningen**	
	12.15	*Lunsj - Komiteen alene*	
	13.00 – 16.00	*Oppsummering for komiteen etter begge dager*	

Appendix 3: Mandate for the expert committee on accreditation of PhD study programs

Adopted by the Board of the Norwegian Agency for Quality Assurance in Education (NOKUT) on 29 March 2006.

Pursuant to the Act relating to universities and university colleges of 1 April 2005 and the Ministry of Education and Research's regulations concerning accreditation, evaluation and recognition pursuant to the Act relating to universities and university colleges of 8 September 2005, the Expert Committee is assigned a mandate to:

Assess whether PhD in 'Applied Ecology' at Hedmark University College meets all the standards and criteria for accreditation of doctoral program (§2-3, NOKUT's regulations)

1. Give reasons for its assessment and provide an unambiguous conclusion in a written report.

The report shall contain assessments for use by the institution in further enhancement of the study program.

The report shall be quality-assured before it is issued.

2. Issue a report to NOKUT.

The formal basis for the Committee's assessment is constituted by:

Regulations relating to standards and criteria for accreditation of study programs and criteria for accreditation of institutions in Norwegian higher education adopted by NOKUT on 25 January 2006.

The Committee's assessment will be based on the following:

- The institution's application and other relevant written material which NOKUT and/or the Committee deem necessary for assessment purposes.
- The Committee's experiences from visits to institutions.

The assignment is concluded by NOKUT's decision.

Hedmark University College

NOKUT
v/ Seniorrådgiver Berit Kristin Haugdal
0121 Oslo

Contact person Harry P. Andreassen
Tel.no 62430852
Your ref 10/316-12
Ref. no 2010/1156
Date 06. Mai 2011

Responses to the report from The Expert Committee –
Hedmark University College: Application for accreditation of the PhD in applied ecology

We refer to the report of 23.03.2011 from NOKUT's expert committee in which it appears that 4 of NOKUT's standards and criteria for accreditation of a PhD were not met. We are grateful to the Committee for the thorough evaluation of our application, including the detailed description of recommendations for both the present and future development of our PhD in Applied Ecology. Below we describe how we have revised our application according to the comments from the Committee, and we attach the following revised documents:

- Attachment 1. Regulations governing the degree of Philosophiae Doctor (PhD) at Hedmark University College
- Attachment 2. Supplementary regulations for the PhD degree in Applied Ecology
- Attachment 3. Revised course curriculum
- Attachment 4. A description of the core area of the study program
- Attachment 5. The Quality Assurance System for PhD programmes at Hedmark University College

Responses to the Committee's recommendations to the standard and criteria
The committee concluded that the application did not fulfil NOKUT's standards and criteria because the following criteria were not fulfilled:

1.1 Regulations shall be in place for the doctoral program
1.3 The plan shall demonstrate that the doctoral program processes an adequate academic level, breadth and depth, and coherence within its field
1.5 The plan shall demonstrate how the doctoral program is embedded in one or more core subject areas that are identifiable in an international context
6. The institution shall state how the doctoral program is quality assured within the institutions's quality assurance system

Below we respond to each of these 4 standards and criteria preceded by the concluding recommendations from the Committee.

Point 1.1 – The Committee's conclusions
The Committee concludes that the criterion would be fulfilled if correct and easily understandable English translations of the following documents were made available:

- *"Forskrift for graden Philosophiae doctor (PhD) ved Høgskolen i Hedmark"*
- *"Reglement for PhD i anvendt økologi "*

In addition the Committee recommends that we consider the ramifications of §16.1 of the regulations regarding how the Program Committee should handle a unanimous decision from the Evaluation Committee.

Our responses to point 1.1
We agree with the recommendations from the Committee and we have commissioned a correct and understandable English translation of the following documents:

- Regulations governing the degree of Philosophiae Doctor (PhD) at Hedmark University College (Attachment 1)
- Supplementary regulations for the PhD degree in Applied Ecology (Attachment 2)

A Government Authorized Translator (Norwegian-English; Connie J. Stultz,1440 Drøbak), who has translated similar documents for The Norwegian Association of Higher Education Institutions (Universitets- og høgskolerådet) and Oslo University College, completed our translations.

In addition we have changed §16.1 of the regulations regarding how the Program Committee should handle a unanimous decision from the Evaluation Committee to resemble that of The University of Life Sciences. Hence §16.1 in Attachment 1 now reads:

§ 16.1 Procedures in the event of a unanimous committee report
A unanimous recommendation by the evaluation committee has the same status as a binding decision and will not be reviewed by other bodies, unless the doctoral candidate submits a formal complaint about the decision.

The regulations and supplementary regulations are now available at:
http://webfronter.com/hihm/kvalitetsarkiv_2/menu/mnu3.shtml#m-menu3_PhD_studier_PhD_English_.

Point 1.3 – The Committee's conclusions
The Committee is willing to evaluate a revised course curriculum in which the following should be considered:

The obligatory part of the curriculum should:

- *Cover core components of applied ecology*
- *Provide a clear focus on monitoring, as one core area of applied ecology*
- *Widen the perspectives on applied ecology including resilience, alternative states, and other related concepts*

The course on models for wildlife harvest management should:

- *Include explicitly small game, large game, and fish and processes important for management, such as species interactions (e.g. predation). Such a course should be a bridge between the different research activities at Campus Evenstad*
- *The name of the course should reflect this and be called for example Models for fish and wildlife management*
- *Include ways to estimate and communicate uncertainty in management and modelling*

Finally, the specialized courses of Wound ballistics and Northern Tourism should be broadened, to focus more on general issues.

Our responses to point 1.3
We have revised the curriculum (Attachment 3) considerably. The introduction was revised in accordance with the new description of core areas (see point 1.5 below). According to the recommendations in the Committee's conclusion we have also:

- Changed compulsory courses so that we now have 3 compulsory courses. These cover a total of 22.5 ECTS credits in the core components of applied ecology. Hence, we have increased

the amount of compulsory courses to make sure that the students complete a PhD in Applied Ecology. The following changes has been made to the compulsory courses:

  - In the compulsory course “Seminars in applied ecology” we cover some topics in the philosophy of science, and topics related to the scientific work. In addition we have now changed the reading list to include some profiled papers in core areas in applied ecology such as human impacts (habitat fragmentation and loss, pollution, climate change, alien species and biological control), management, mitigation and conservation. We have also included aspects of ecosystem services, biological diversity, state transitions, regime shifts and resilience as recommended by the Committee.
  - The compulsory course “Adaptive ecological monitoring” is new. This has been developed as a result of the constructive our discussions with the Committee. Hence, monitoring is now a compulsory part of the curriculum, as a core area in applied ecology.
  - The compulsory course “Applied models for fish and wildlife management” is a revised version of the previous course called ”Developing applied models for wildlife harvest management: From theory to robust local guidelines”. The course now includes a wider range of topics as recommended by the Committee, including ways to estimate and communicate uncertainty in management and modelling. The course discusses sustainable use of fish- and wildlife resources as sustainable use of biological resources is another core area in the study program.

- The three optional courses also cover topics we have defined as core areas of the study such as human impacts, sustainable use, mitigation and management. All optional courses have also been revised and we have broadened the scope of the course in tourism and recreation to focus more on issues of outdoor recreation and related ecosystem services.
- We have omitted the course of “Wound ballistics” and “Animal position: Techniques and analysis” from the PhD curriculum. We will rather put more effort in the other courses we have described now.

In addition we have changed and edited the learning outcomes as recommended by the Committee

The Committee recommended that we listed potential optional courses from other institutions.
We have chosen not to suggest optional courses from other institutions in the study plan because they may not be given regularly. Below is a list of courses that we today know we will advertise for our PhD students on campus, and which could be used as optional courses in 2011:

- Bio3123/8105 Ecological Methodology: Study design and statistical analysis. (10 ECTS credits). University of Tromsø.
- ECS530 – Analysing spatial data (7.5 ECTS credits). Norwegian School of Economics and Business Administration
- BIO8136 – Evolution, ecology and management of large herbivores (5 ECTS credits). University of Tromsø.
- BI8081 – Avansert Bevaringsbiologi (7.5 ECTS credits). Norwegian University of Science and Technology.
- BI8030 – Avansert Fiskebiologi (7.5 ECTS credits). Norwegian University of Science and Technology.
- Bio9150 – Bevarings- og forvaltningsbiologi (10 ECTS credits). University of Oslo.
- PNS0082 – Catchment science to support public policy: Defining the consequences of human impact and management (7 ECTS credits). Swedish University of Agricultural Sciences.
- Forest restoration in theory and practice (4 ECTS). NOVA PhD-course at Swedish University of Agricultural Sciences.
- Ecology and silviculture of multi-functional forests (7.5 ECTS credits). NOVA PhD-course at Swedish University of Agricultural Sciences.

- Ecology of animal migration. Lund University.
- Forests in a changing world - integrating values, interests and tradeoffs (7.5 ECTS credits). Swedish University of Agricultural Sciences.
- Social theory in natural resource management. University of Copenhagen.
- Model selection and multimodel inference (1.5 ECTS credits). Swedish University of Agricultural Sciences.
- Spatial analysis in wildlife management (2.5 ECTS credits). Will be given in August at Hedmark University College as part of our research school, IRSAE. Instructors will be Mark Boyce and Evelyn Merill from University of Alberta.

Point 1.5 – The Committee's conclusions
The committee is willing to evaluate a revised description of the core areas developed in the program.

Our responses to point 1.5
The Committee correctly points out that the core areas developed in the application are not well described and are not embedded in core subject areas identifiable in an international context. Actually, we apologize that our description of core areas of the study program in attachment 5 of the original application does not describe our intended core areas in the study program, but rather a strategy of how to improve R&D on campus by the establishment of research groups. The research groups describe some of the major ecosocial systems we use in our research. Our focus on the research groups has definitely narrowed our previous description of the study plan.

Our core areas of the study program are mitigation, (sustainable) use, monitoring and management as was described in our definition of our research profile: Applied Ecology. Human impact is also a core area of Applied Ecology and of the present study program, and generally underlies our concept of Applied Ecology. Nevertheless, we have chosen to focus our research profile definition on mitigation, use, monitoring and management, and the application of ecological theory to these core areas because these core areas allow development of solutions to human impacts on the environment.

Several of the comments in the Committee's report seem to relate to this mistake of ours: i.e. the confusion between core areas of study program and major research groups. We very much appreciate these comments because they have helped us improve our description of the study program.

We have revised the description of our core areas in Attachment 4.

We have developed a new course curriculum and reading lists according to the new definition of core areas (see attachment 3). All core areas are present in the courses described in the curriculum (see our response to point 1.3 above).

With regard to criteria 3 the Committee concludes that we should clarify the exact role played by the boreal forest ecosystem project. We expect that this comment is due to our confusion between core areas of the study and research groups. The boreal ecosystem project was not originally a direct part of the PhD program, but we now see the great potential for this study area to be used for exercises in PhD courses, as well as in the master- and bachelor study programs. It will be an area where we will sample data for exercises in the monitoring course, and we intend to use the area to test and monitor management decisions and models.

Point 6 – The Committee's conclusions

The Committee considers that this criterion would be fulfilled if correct English translations of the following quality documents were made available:

- *The application for admission to the PhD program at Hedmark University College*
- *The contract when entering a PhD education at Hedmark university College (A, B and C)*
- *Semiannual progress report for PhD students*

In additon, prior to announcing the new PhD program, the Committee recommended that Hedmark University College should provide an English translation of description of the PhD program's quality control system, as described in the document "Kvalitetssikring for PhD-program ved Høgskolen i Hedmark".

Our response to point 6

We agree with the recommendations from the Committee and we have translated the documents required by the Committee to English. We have translated the PhD program's quality control system, as described in the document "Kvalitetssikring for PhD-program ved Høgskolen i Hedmark" as The Committee recommended that we did before announcing the new PhD program. These translations are found in Attachment 5 called:

- The Quality Assurance System for PhD programmes at Hedmark University College

The Government Authorized Translator (Norwegian-English) (Connie J. Stultz, 1440 Drøbak) also completed these translations. These descriptions are now available in http://webfronter.com/hihm/kvalitetsarkiv_2/menu/mnu3.shtml#m-menu3_PhD_studier_PhD_English_.

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This completes our responses to the Committee. Again, we are grateful to the comments which helped us widen our view of the study program. We hope you now find the study program more in accordance with a PhD in Applied Ecology, and we are looking forward to your comments on the revisions done.

Please do not hesitate to contact me for further information.

Yours sincerely
Harry P. Andreassen
dean

Appendix 4: Information received by the expert committee

- Application by Hedmark University College; Application for accreditation of PhD in Applied Ecology. Application for accreditation according to NOKUT's standards and criteria for accreditation of doctoral studies (dated 13th August 2010).
- Hedmark University College,
  Tilleggsinformasjon (dated 20th December 2010).
  1. New version of regulations for the degree Philosophiae Doctor (PhD) at Hedmark University College, including regulations for admission and examination from 01.12.2010. (Previous version is attached in the application as attachment 2).
  2. Reglement for PhD i anvendt økologi
  3. Utdyping av kvalitetssikringssystemet for PhD-program ved Høgskolen i Hedmark med følgende vedlegg:
     1. Søknad om opptak til PhD-program ved Høgskolen i Hedmark
     2. Avtale ved opptak til doktorgradsutdanning ved Høgskolen i Hedmark
     3. Halvårig framdriftsrapport for doktorgradsstudenter
     4. Veileders halvårige framdriftsrapport for PhD-studenter
- Hedmark University College, Application for accreditation of PhD in Applied Ecology Tilleggsinformasjon 2 dated 3rd February 2011. Svar på spørsmål forelagt høgskolen i forkant av intervjuene: Momenter fra oppstartsmøtet for PhD-komiteen HiHm, Anvendt økologi – spørsmål forelagt HiHm i forkant av intervjuene.

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Extended evaluation of the application for accreditation PhD in Applied Ecology at Hedmark University College

May 2011

CONTENTS

1.1 REGULATIONS SHALL BE IN PLACE FOR THE DOCTORAL PROGRAM

Evaluation by the Committee March 2011

The committee returned document 2 and asked for a better English translation, which was provided. However, this translation is still inadequate for an institution with an ambition to have an international PhD program. As many of the PhD students who would be accepted into the proposed program are expected to be foreigners, it is very important that the English translations of the regulations are accurate and understandable. At this time, there is no English translation of document 3.

The committee noted concern about §16.1 in document 1. "En enstemmig komitéinnstilling skal tas til følge såfremt et flertall av programutvalget stemmer for dette. Dersom et flertall finner at det - til tross for en enstemmig komitéinnstilling - foreligger begrunnet tvil om en avhandling bør godkjennes, skal programutvalget søke nærmere avklaring fra bedømmelseskomiteen eller oppnevne to nye sakkyndige, som avgir individuelle uttalelser om avhandlingen." The rules governing how a program committee handles a unanimous decision from an evaluation committee vary among Norwegian universities. The University of Tromsø has a rule similar to the one proposed by Hedmark University College, whereas the Norwegian University of Life Sciences has a rule that states "En enstemmig uttalelse fra bedømmelseskomiteen har status som et vedtak, og behandles ikke av flere instanser, med mindre PhD-studenten klager på vedtaket" (§3,5 i Veiledning om bedømmelse av PhD-graden ved UMB). The rule that Hedmark University College has proposed would allow a majority of the Program Committee to not accept a unanimous decision from the Evaluation Committee. Four of the five members of the proposed Program Committee would be people stationed at Evenstad and who therefore would know the candidate well. Although the proposed rule is legal, the committee would like Hedmark University College to consider whether it would not be better to always accept the external committee's evaluation when it is unanimous and the PhD student has not complained, especially considering the very small social environment at Evenstad.

Beyond this, the committee found the proposed regulations to adequately regulate the proposed PhD program.

Conclusion pt. 1.1

The committee concludes that the criterion would be fulfilled if correct and easily understandable English translations of the documents discussed above, were made available.

- *Forskrift for graden Philosophiae doctor (PhD) ved Høgskolen i Hedmark* must be retranslated to ensure that students who do not read Norwegian can be adequately and correctly informed about the regulations regulating their PhD study.
- *Reglement for PhD i anvendt økologi* must be translated into English.
- We ask Hedmark University College to consider the ramifications of §16.1 of their regulations regarding how the Program Committee should handle a unanimous decision from the Evaluation Committee.

Evaluation by the Committee May 2011

Hedmark University College has provided an English translation of "Regulations governing the degree of Philosophiae Doctor (PhD)" and "Supplementary regulations for the PhD degree in Applied Ecology". Furthermore they have changed §16.1 of the regulations regarding how the Program Committee handles decisions from the Evaluation Committee.

The committee has found that the three modifications answer our concerns and the criterion is therefore fulfilled.

1.3 THE PLAN SHALL DEMONSTRATE THAT THE DOCTORAL PROGRAM POSSESSES AN ADEQUATE ACADEMIC LEVEL, BREADTH AND DEPTH AND COHERENCE WITHIN ITS FIELD

Evaluation by the Committee March 2011

The obligatory course includes required teaching in Philosophy of Science and Ethics, as well as in general principles developed in ecological sciences, but little on applied ecology and its relationships to management and monitoring. Of the 43 papers listed for the colloquiums in Applied Ecology, there were none with a clearly applied content (except for those focusing

for example on general considerations related to climate change). The committee agrees that a good understanding of general ecological principles is necessary for developing e.g. relevant management policies, but it is mainly through relevant case studies that one can understand what kind of ecological knowledge is relevant in a specific situation. Good examples are described in the two papers used in the application to define applied ecology (e.g. Kilpatrick 2009[1] and Memmott 2010[2]).

The committee found therefore that the obligatory part of the curriculum does not cover what is defined as the core components of a PhD education in applied ecology, but focuses nearly exclusively on general ecology (i.e. the specificities of applied ecology do not appear clearly and the curriculum does not clearly delimitate the PhD program). Moreover, the obligatory part of the curriculum does not cover what the committee sees as necessary (i.e. the curriculum lacks breadth): specifically modelling (including harvesting models, but also important concepts, such as resilience and alternative states, which are best explained using models) and monitoring must be included in the obligatory part of the curriculum. The course on *Developing applied models for wildlife harvest management* is optional and focuses on wildlife only (i.e. does not include fish) and specific models (e.g. threshold management models), whereas a PhD student in applied ecology should be exposed to models relevant to both fish and wildlife (including small and large game, as well as interactions with plants and predators) and within a variety of social and ecological contexts. Other important issues, such as uncertainty related to modelling and management actions, should also be presented, as they have a major impact on the implementation of management policies (see the discussion around climate change, e.g., Hulme 2009[3]). Such a course could easily be based on the activities of the three main research groups identified in §2 (Research Environment), and parts of the course could be expanded as optional components in order to achieve a deeper coverage of specific issues (e.g. small game versus large game harvesting).

Monitoring has become an important topic linking management and science, and the discussion during the institution's visit made it clear that many members of the research

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[1] Kilpatrick A. M., Gillin C. M. & Daszak P. 2009 Wildlife-livestock conflict: the risk of pathogen transmission from bison to cattle outside Yellowstone National Park. *Journal of Applied Ecology* **46**, 476-85.

[2] Memmott J., Cadotte M., Hulme P. E., Kerby G., Milner-Gulland E. J. & Whittingham M. J. 2010 Putting applied ecology into practice. *Journal of Applied Ecology* **47**, 1-4.

[3] Hulme M. 2009. Why We Disagree About Climate Change: understanding controversy, inaction and opportunity. Cambridge: Cambridge University Press.

groups agreed this topic should be part of the curriculum. There is now a large literature on monitoring with a clearly applied relevance and there are case studies illustrating what makes monitoring relevant or irrelevant (particularly with respect to the definition of objectives). Such a course on monitoring would be unique in a national context and important for defining the specificity of the PhD program.

The committee considered the inclusion of a course in statistical methods as part of the curriculum. Applied ecology requires advanced statistical designs and tools (e.g. one of the program's learning outcomes is "be capable of utilizing the most advanced and specialized methods and techniques", or in the course in *Animal positioning: techniques and analyses* a learning outcome is "knowledge of the most advanced techniques"), and whereas the local bachelor and master programs in applied ecology appear to include adequate courses in study design and statistical analyses, it is unknown whether students coming from all other institutions will in general have the necessary knowledge. The committee understands that such a course could tilt the balance of the curriculum too much towards methods (at the expense, for example, of case studies and monitoring principles), but strongly recommends that HiHm provide a clear list of courses that students could take at other institutions in order to acquire the statistical skills necessary for the completion of the degree and that this be done at the beginning of their PhD education.

Finally, the committee found some courses to be highly specialized (*Wound ballistics* and *Northern Tourism*) and suggests that a focus on more general issues, such as indirect/physiological effects of research and recreation/hunting on fish and wildlife would both be highly relevant for PhD students, correspond to the competences of the research group, and fit with the general profile of HiHm.

Conclusion pt. 1.3

The committee considers the criterion as not fulfilled.

The committee is willing to evaluate a revised course curriculum in which the following should be considered:

The obligatory part of the curriculum should:

- Cover core components of applied ecology.
- Provide a clear focus on monitoring, as one core area of applied ecology.

- Widen the perspectives on applied ecology including resilience, alternative states, and other related concepts.

The course on models for wildlife harvest management should:

- Include explicitly small game, large game, and fish and processes important for management, such as species interactions (e.g. predation). Such a course should be a bridge between the different research activities at Campus Evenstad.
- The name of the course should reflect this and be called for example *Models for fish and wildlife management*.
- Include ways to estimate and communicate uncertainty in management and modeling.

Finally, the specialized courses of *Wound ballistics* and *Northern Tourism* should be broadened, to focus more on general issues.

Evaluation by the Committee May 2011

Hedmark University College has made large changes in the curriculum. The obligatory part of the curriculum now includes three courses (22.5 ECTS in total out of 30 required for the PhD), "Seminars in applied ecology", "Adaptive ecological monitoring" and "Applied models for fish and wildlife management". The first course is a revised version of the previous course "Seminars in applied ecology", but the reading list has been completely revised and now includes key papers in applied ecology. The committee considers that this revised course now covers the core areas of applied ecology, including important concepts of resilience and alternate states in different ecosystems. The second course is new, and covers both classical concepts at the core of monitoring activities and in particular at different levels of organization ("genes to ecosystems"), as well as new developments associated with the new concept (in ecology) of adaptive monitoring. By creating an obligatory course on this topic, which is both wide ranging and introducing new thinking about ecological monitoring, HiHm has clearly put a strong focus on monitoring, answering the last concern of the committee regarding the obligatory part of the curriculum.

The course "Applied models for fish and wildlife management" is a revision of the previous course "Models for wildlife harvest management" and includes in its content a significant part on "adaptive management" and resilience. The reading list shows a nice balance between fish and wildlife (small and large game), as was recommended by the committee. Some papers

include interactions between harvesting and other ecological (e.g. predation by wolves on moose) and evolutionary (selective harvesting) processes, which should open interesting perspectives for the students. The content of the course has a strong focus on uncertainty through in particular adaptive management.

The list of optional courses has also been largely revised, with three courses (7.5 ECTS each) on "Spatiotemporal scaling in ecosystem management", "Large herbivores and ecosystem interactions – top-down or bottom-up", and "Environmental and human dimensions of nature tourism and outdoor recreation". The last course is a revision of "Northern tourism" and has now a much broader coverage, which is reflected both by the title of the course and by the reading list. The committee also appreciates that the two other optional courses have been revised, and fit better with the main research focuses of the staff.

The committee has found these changes satisfactory and the criterion is fulfilled.

1.5 THE PLAN SHALL DEMONSTRATE HOW THE DOCTORAL PROGRAM IS EMBEDDED IN ONE OR MORE CORE SUBJECT AREAS THAT ARE IDENTIFIABLE IN AN INTERNATIONAL CONTEXT

Evaluation by the Committee March 2011

Publications in international journals are clearly important to show that core areas of the program are relevant with respect to international research areas. However, these journals cover a wide range of topics, both applied and basic, so whereas the program is embedded in the discipline of ecology, the committee would have appreciated a more precise definition of some of the core areas within applied ecology (e.g. fish and wildlife ecology [see 1.2], and the research problems relevant to management and resource use). Also some important research directions in applied ecology, such as assessment and monitoring of ecosystem services, are not mentioned in the application, and how the program relates to these issues should be clarified. It is quite possible to use for example the main topics developed in Memmott et al.

(2010), Sutherland et al. (2006)[4] or the main categories of papers published in Journal of Applied Ecology to define these core areas.

Conclusion pt. 1.5

The committee considers this criterion as not fulfilled, but the committee is willing to evaluate a revised description of the core areas developed in the program.

Evaluation by the Committee May 2011

Hedmark University College has provided a new definition of the core topics defining applied ecology, and in particular a definition of the main research profile: "*The application of ecological theory and methodology to develop comprehensive mitigation measures for the sustainable use, commercialisation and management of biological resources. To validate the desired effect of mitigation efforts we need effective and long term monitoring of the natural environment. Hence, the bulk of our research and education is focused towards the application of ecological principles for the mitigation, use and monitoring of biological resources*". HiHm has chosen to have a strong focus on human impacts, how these impacts can be mitigated and monitored, and also on ecological management and how to interact with stakeholders and managers.

The committee has found these changes satisfactory and the criterion is fulfilled.

6 THE INSTITUTION SHALL STATE HOW THE DOCTORAL PROGRAM IS QUALITY ASSURED WITHIN THE INSTITUTION'S QUALITY ASSURANCE SYSTEM

Evaluation by the Committee March 2011

The committee has commented on the regulations ("Forskrift" and "Reglement" in section 1.1 above). The proposed quality assurance seems to be adequate, as did the general Quality

[4] Memmott J., Cadotte M., Hulme P. E., Kerby G., Milner-Gulland E. J. & Whittingham M. J. 2010 Putting applied ecology into practice. *Journal of Applied Ecology* **47**, 1-4
Sutherland WJ et al. (2006) The identification of 100 ecological questions of high policy relevance in the UK. *Journal of Applied Ecology* **43**, 617-27.

System, which has already been approved by NOKUT. Nevertheless, the problems with the poor English translation of the "Forskrift" and the lack of an English translation of the "Reglement" remain. In addition, the committee was not provided English translations of the other quality assurance documents (søknad, avtale ved opptak and framdriftsrapport) nor did the committee find an English version of the website for the *Quality System*. As many of the PhD students who would be accepted in the proposed program are expected to be foreigners, it is imperative that correct and well written English translations of the regulations, quality control system documents, and associated websites are available.

Conclusion pt. 6

The committee considers this criterion not to be fulfilled.

The criterion would be fulfilled if correct English translations of the following quality documents, were to be made available:

1) Søknad om opptak til Ph.d.-program ved Høgskolen i Hedmark,

2) Avtale ved opptak til doktorgradsutdanning ved Høgskolen i Hedmark (A,B og C), and

3) Halvårlig framdriftsrapport for doktorgradsstudenter.

Evaluation by the Committee May 2011

Hedmark University College has provided new translations of 1) the Quality Assurance System for PhD programmes at Hedmark University College, including the application form for admission to the PhD programme at Hedmark University College, and the contract upon admission to the PhD programme at Hedmark University College (answering points 1 and 2), 2) the six-month progress report for doctoral degree students, and 3) the supervisors' six-monthly report for PhD students (point 3).

The committee has found these changes satisfactory and the criterion is fulfilled.

Further Recommendations

The committee would like Hedmark University College to consider the following points:

- The term mitigation seems to be used with different meanings, and in the definition of the main research profile might be misleading "mitigation … of biological resources".

The committee strongly encourages HiHm to provide definition of mitigation (and perhaps also of the reasons they consider mitigation only and not adaptation, as is done for example for climate change policies).

- The compatibility between the curriculum and the regulations is not perfect: the requirements regarding the language of the dissertation and having at least one accepted manuscript are not identical. It would help students to have exactly the same requirements throughout the different documents.
- The content and learning outcomes of the course "Applied models" are somewhat different (e.g. the focus on adaptive management in the content, versus focus on models in the learning outcomes).
- For the seminars in applied ecology, one should refer to Ethical guidelines rather than conventions (like there exists one for example for biological diversity).
- The committee regrets that HiHm did not respond to our recommendation that the name of the PhD program be changed to "Fish and wildlife management". The committee still feels strongly about this, but did not require a change. Nevertheless, we encourage HiHm to give strong consideration to this recommendation.

OVERALL CONCLUSION

The committee after evaluating the revised application by Hedmark University College concludes that all criteria are now fulfilled and recommends that the PhD program in "Applied Ecology" is given accreditation.