Institution: Swansea University
Unit of Assessment: 7 – Earth Systems and Environmental Sciences
a. Overview

This UoA submission is composed of activities within the Department of Biosciences, one of the departments within the College of Science (CoS) at Swansea, along with Computer Science, Mathematics, Physics and Geography. CoS provides a structure that facilitates interdisciplinary research both within and external to the College, in addition to centralised administrative functions that release time for staff to devote to research. The Department of Biosciences now focuses on pure and applied ecology, and its composition and activities are very different from the RAE2008 submission to the Biological Sciences UoA following major strategic shaping and investment (see below). Activities, which best align with UoA7 for REF, can be divided into four groups. Each staff member is associated with at least one of the four groups. (12 staff submitted in total.)

Centre for Sustainable Aquatic Research (CSAR) 6 submitted staff (4 appointed post-RAE'08): Exploitation of aquatic resources (algal bioenergy, plankton, fisheries, aquaculture); impacts of eutrophication, temperature and ocean acidification. Research includes development of adaptive microalgal, plankton and fish models with empirical and theoretical interplay.
Dynamic Ecology Group (DEG) 6 submitted staff (5 appointed post-RAE'08): Cell ecophysiology (systems biology) to whole ecosystem (systems ecology), using mathematical, stochastic and statistical modelling approaches merged with traditional ecology and 'omics.
Swansea Laboratory for Animal Movement (SLAM) 7 submitted staff (3 appointed post-RAE'08): Animal movement in its broadest sense, from micro-movements indicating 'state' (e.g. well-being, hormonal) to trans-global migration patterns. SLAM develops bespoke 'smart-tags' with specialist software to understand 'rules' behind animal movement and their consequences.
Swansea Natural Products (SNaP) 3 submitted staff (2 appointed post-RAE'08): Organisms as a source of biomass and novel compounds (including chemical feedstocks, therapeutics and nutraceuticals), and as agents for biocontrol and bioremediation. SNaP develops novel, sustainable, environmentally friendly biocontrol agents for crop pests using fungal agents and is accredited by the Chemical Regulation Directorate.

b. Research strategy

The **key drivers** of our strategy are *excellence in scientific research and critical thinking in pure and applied ecology,* enhanced by an interdisciplinary approach*.* **Our aspiration** is to *provide deeper understanding of ecological processes to deal with theoretical and societal challenges.* **We aim** to *be an internationally excellent centre that enhances, supports and sustains research of the highest calibre*. We seek to: (i) maximize impact by capitalising on synergy between our 4 research groups; (ii) develop staff, especially early career researchers (ECRs), to enable them to excel in their research; (iii) secure research income from a wide range of private, public and third-sector sponsors to further enhance the research infrastructure and environment; and (iv) nurture a strong, vibrant postgraduate research community in environmental sciences. Our ambitious strategy is informed by advice from leading figures such as Professor Nigel Brown (Swansea Honorary Professor, current President of the Society of General Microbiology, member of the Scottish Science Advisory Council, and former Director of Science and Technology at the BBSRC) and Professor Hilary Lappin-Scott (Swansea Pro-Vice-Chancellor, and former President of both the Society of General Microbiology and the International Society for Microbial Ecology).

Following the disappointing outcome of our RAE 2008 submission to the 'Biological Sciences' UoA, a Vice-Chancellor-initiated review, led by PVC Professor Lappin-Scott, resulted in a thorough programme of restructuring and substantial investment to focus on, and enhance, our renewed strengths in pure and applied ecology, which will act as a platform for our future expansion into complementary environmental sciences. Over the REF period the University's Senior Management Team has overseen a more than doubling of our research-active staff, with the appointment of carefully selected scientists and a substantial investment in new facilities.

The synergy between all staff in the new environment of the College of Science has further enhanced our research and transformed ecological research at Swansea. Our research activity is well aligned with four NERC strategic themes: *climate system and earth system science*; *health*;

natural resources; and *biodiversity* (including marine food webs and their impacts on the ecosystem). Research is also well aligned with BBSRC priorities including: *food security*; *energy*; *data-driven biology*; *systems approaches to biosciences*; and *technology development for biosciences*. Particular efforts have been made to secure European Funding to support the development of our research infrastructure. Despite the strategic restructuring and re-focusing of our research activities, the RAE2008 objectives that remain relevant have been achieved:

1. **Eight key staffing appointments** made in support of the strategy (see section C)
2. The emphasis on **interdisciplinary research**, bolstered by the integration of Biosciences within the College of Science in 2010. Examples of interdisciplinary collaboration include:
   - Multiple EU-funded microalgal biofuel and related projects for algal harvesting and processing, which we lead in collaboration with Swansea's College of Engineering,.
   - The new Royal Society/Wolfson Foundation-supported visualization suite, which uses innovative visualization techniques developed by Swansea's Computer Scientists to signal-process diverse, animal-derived tag data.
   - The University's EPSRC-funded Bridging the Gaps programme that supported internal and external collaboration with Psychologists, Computer Scientists and Engineers.
3. Our **research income per academic FTE was £301,100** in 2011/12.
4. Significant investment in research facilities and infrastructure, including a **£6M refurbishment of laboratories**, research and teaching space; **a new visualisation suite**; and **an Arthropod Behavioural Laboratory**.
5. The award of **76 postgraduate scholarships** (MSc, MRes, PhD) between 2008 and 2013, creating a strong graduate research culture, with a current ratio of **5.5 postgraduate research students per academic FTE**.

Agenda-setting research achievements include those in **CSAR**, where research has diversified from optimisation of aquaculture practices to the effects of ocean acidification on aquatic organisms (end-to-end; plankton to fisheries), with strong practical-to-theory (modelling) linkages. Our work questions the very basis of the marine food web, indicating that much of the phyto' and microzoo-plankton are mixotrophic, with implications for trophic dynamics and climate change scenarios. Applied aspects also consider the value of algae as feed ingredients to the biofuels and food security agendas and, in **DEG**, how maximization of commercial biomass production of algae by genetic modification has huge potential for biofuels, although models predict that escape of algae would be environmentally disastrous. Our work is changing how scientists regard ecosystem function, with demonstration of links between predator diversity and ecosystem functioning. Models also explain how extinction risk is linked to environmental variation. **SNaP** is at the forefront of understanding the evolution and mechanisms of wood decay in higher fungi, describing their impact in the wild and exploiting them in novel lignocellulosic biorefineries. SNaP is also showing the mechanisms by which fungal biocontrol agents target and debilitate crop and human pests, this being hugely important in programmes to reduce harmful chemical pesticide levels and help secure future food supplies. **SLAM** has shown great success in the development of paradigm-shifting animal-attached tags and proposed tag-derived methods and/ or metrics for quantifying energy expenditure, behaviour and space use (all now adopted as standard worldwide). New theoretical and empirical work showing that it is energetically costly to turn, alters conclusions of all previous analyses of search efficiency and optimality in foraging. Pivotal research has also demonstrated the widespread ecological implications of environmentally variable movement costs.

Our **primary objectives over the next five years** are to deliver a truly **integrated, multidisciplinary research environment** that continues to attract world-class staff and excellent research students; to foster even stronger collaborative links with industry; and to further increase the quality and quantity of novel and rigorous applied research with international reach and significance. Our research activity will continue to be aligned to RCUK (especially NERC and BBSRC for marine and food security related topics for CSAR and SNaP, but also EPSRC and MRC for SLAM) and European Research Council priorities (marine, food security). As a partner in the Welsh Government's *Sêr Cymru* Low Carbon, Energy and Environment National Research Network (£10M), we will deliver transformative research to apply our knowledge for commercial

gain, stimulating effective engagement with industry and offering PhD studentships. We will also work with Natural Resources Wales to ensure outputs are aligned to UK priorities.

Sustained growth is projected in research income and staff and student numbers for at least the next five years. This is aligned with the University's strategic objective to **increase the quality and scale of its research**, with a focus on close engagement with industry. Our integrated College business plan will maintain our current high industry interaction, with increases due to the follow-on from ESF funding and from the *Sêr Cymru* project. The strategy for the next five years is to build on current strengths, consolidating activity within the research groups and developing the research base through further targeted appointments to maintain and grow research strengths. We will continue to support the development and promotion of our current ECRs, who, in turn, will provide future leadership. Our sustainability will be secured through development of **new, interdisciplinary collaborations** and emerging interdisciplinary research areas, such as the links with Computer Science (data visualisation techniques), Mathematics (mathematical ecology) and Engineering (especially bioprocessing). With the College of Engineering's planned move in 2015 to Swansea's new, £250M Science and Innovation Campus, the Department will benefit from access to purpose-built facilities that support world-class research in process engineering and biorefining. Nascent collaborations with the College of Medicine (natural products) will also be nurtured. We thus expect to attract **significant, cross-disciplinary research income**.

A key driver of our research over the next five years will be to provide **underpinning science** to inform decisions about the impact of proposed renewable energy installations (e.g. Swansea Bay Tidal lagoon) on the unique ecosystems in the Bristol Channel. During the next census period, we will replace the *RV Noctiluca* with a **new, twin-hulled research vessel** that provides support for the marine- and shore-based monitoring, measuring and modelling of biological and physical processes around the South Wales coast and Bristol Channel. We also plan to establish a **marine Mesocosm Laboratory** to complement CSAR. This will be a leading European resource for research on all aspects of the marine food-supply chain, from microalgal production upwards. Together with the research vessel, these laboratories will create an unparalleled resource to conduct research in estuarine and shallow seas and to predict and mitigate the biological impacts of activities such as marine renewable energy installations. These facilities will be complemented by the provision of in-house marine and terrestrial consultancy, a key component of the exit strategies of pan-Wales SEACAMS and WISE2 projects, which currently facilitate knowledge exchange with environmental sectors (with a total of 28 staff).

c. People, including:

I. Staffing strategy and staff development

Our activity centres on research, which is reflected in the recruitment, development and promotion of research-active staff. Our objective is to recruit internationally renowned scientists and ECRs (particularly those with fellowships) from both the UK and overseas, to produce a vibrant, interactive research environment where ECRs work alongside established leaders. In this REF period, all the research groups have recruited new staff, thereby enhancing the quality of their research portfolios aligned with the recommendations and actions of the institutional review (Lappin-Scott). **Eight new appointments** have been made since September 2010, with seven at an early career stage (having held four prestigious fellowships between them: AXA, Leverhulme, NERC, and Humboldt Foundation fellowships). There is significant collaboration between the groups but primary affiliations of the new appointments are:

- **CSAR:** *Tang* (Chair, plankton ecology), *Griffin* (marine community ecology)
- **DEG:** *Börger* (spatial ecology), *Fowler* (theoretical ecology)
- **SNaP:** *Bull* (pest ecology), *Eastwood* (molecular fungal ecology)
- **SLAM**: *Shepard* (movement ecology), *King* (behavioural ecology)

Four appointments are international: *Börger* (senior lecturer) was recruited from the CNRS, Niort, France; *Fowler* (senior lecturer) from the Institut Mediterranea d'Estudis Avançats (CSIC), Spain; *Griffin* (lecturer) from the University of Florida; and *Tang* was recruited to a personal chair from VIMS, USA. **Four additional staff will be appointed in 2013/14**. In addition, four new, student-facing staff are already enhancing teaching at all levels and ensuring research-facing appointees

are further empowered to develop their research interests. New staff have a three-year probation period, with mentors and comprehensive staff-training support. Over their first three years they have **an allocated minimum** of 70%, 60%, and then 40% FTE research time, with assured access to research infrastructure. A rolling programme of **sabbatical time** for periods of up to six months is implemented for all academic staff (e.g. 2011-12 *Flynn* to Durham; 2013-14 *Hays* and *Lee* to Deakin University, Australia). This is aided by teaching policies that seek to concentrate an individual's teaching commitments within a single teaching block.

We pride ourselves on maintaining a **highly collegiate, mutually supportive, intellectually stimulating research environment**. This is reflected in a full range of activities, from a packed seminar series and journal club (all documented in a blog) to the requirement of celebrating research successes. Our approach to staff development owes much to this culture, which has become a distinguishing feature of our department. This dovetails with the University's **Performance Enabling** process, which aims to empower staff to perform to their optimum level and provide clarity on the support and training available. The process incorporates individual staff KPIs (including research activity) into an on-line Professional Development Review, as conducted by the Head of Department. In 2012 the University won a Times Higher Leadership and Management Award and a UHR Excellence award for this initiative. The University is also committed to the implementation of the **Concordat to Support the Career Development of Researchers**, being one of the second tranche of HEIs to be awarded the *HR Excellence in Research Award* from the European Commission (successfully retained in 2013). Specific initiatives such as the Academic and Professional Enhancement Centre, Swansea (APECS), are also aligned with national priorities as put forward in the *Vitae Research Development Framework.* APECS coordinates a comprehensive skills development programme, established to support researchers in the post-Roberts environment. The contribution of research staff is therefore both recognized and celebrated at the Departmental to the University level.

The University makes every effort to promote **equality of opportunity** through its Strategic Equality Plan. 10% of the unit's staff and 20% of its research students are from overseas. The University's commitment to enhancing gender equality is evidenced by its retention of the **Athena SWAN Bronze Award** in 2013, which recognises excellence in the areas of Science, Technology, Engineering, Mathematics and Medicine for Women in the Higher Education Sector. The College is preparing its first application for its own Bronze Athena-SWAN award (November 2013) and the Department also has the support of the Women in Universities Mentoring Scheme (WUMS), an initiative by Welsh universities to enhance women's academic career progress.

c. II. Research students

There is a stimulating postgraduate research programme within the Department, with a vibrant community of 26 PhD candidates and 45 MRes students who interact with each other and staff through a collegiate culture, post-grad seminars and a blog. We aim to recruit high-quality students who produce clear and well-articulated research proposals. The unit operates a balanced approach between recruiting PGR students according to their potential and strategic positioning within the department. The **current staff:PGR student ratio is 1:5.5**. The doctoral programme provides guidance and supervision in a wide range of subject-specific and multi-disciplinary areas. The EU-supported Knowledge Economy Skills Scholarships (KESS) programme through European Social Fund (ESF) provides fully supported studentships, similar in financial terms to that provided by Departmental RCUK (NERC quota allocations and CASE awards), which has enabled us to recruit graduate candidates, and which has been influential in the development of a strong research ethos amongst research students and research staff. New staff are given preferential consideration when considering the supervisory placement of PGRs.

The University, College and Department provide a supportive and friendly environment in which to study. There is a College Director of PGR students and a Departmental Coordinator of PGRs. PGR students are fully integrated into the life of the Department and have their own desk and PC, access to all Departmental/College ICT, library and dedicated laboratory facilities and associated support staff. Supervision is undertaken within a robust framework, ensuring effective induction and incorporation into University and College culture, with a comprehensive programme of training tailored to individual needs. All PGR students have two supervisors and an additional independent

mentor. All PhD students meet with their supervisors frequently (at least fortnightly in their first year), and participate in research seminars. Students are encouraged and financially supported to go to international conferences, typically presenting research findings in their second and/or third years. From 2008–2011, the University made strategic use of Roberts Funding to develop a framework for research student training. This included the appointment of a full-time Research Students Skills Officer and the implementation of a **research-student training programme**. All PGR students now attend in-house training courses on (i) research-skill development, (ii) health and safety, and (iii) teaching skills. Students can also opt to attend additional training schemes to enhance their work with business. Broader research-skills training is co-ordinated by the Academic and Professional Enhancement Centre (APECS) at the University level. The success of our training programme is evidenced by our full-time **PhD students having an average of 3.0 peer-reviewed papers in press or print** at the time their theses are examined.

Progress of PGR students is formally monitored at least annually through reports prepared by supervisors, which are considered by both the Postgraduate Progress Committee of the College and the Academic Board for Research. Progress is also assessed centrally (and independent of supervisors) with six-monthly reports. The employment destinations of recently completed PhDs have been positive; doctoral degree graduates have taken up academic posts in the UK (50%) and overseas (19%). Others have taken positions in industry (12%) and the public sector (19%).

d. Income, infrastructure and facilities

HESA data (2011/12) show that research income in the unit is **£301,100 per academic FTE**. Research has been funded by a number of **national and international organisations**, including NERC, EU (ERDF, FP7), Welsh Government, the Carbon Trust, Royal Society Wolfson Foundation, and the Leverhulme Trust. The Department has been particularly successful in catalysing investment in infrastructure, scholarships and knowledge exploitation schemes with industry through European Funds. Since 2008, the Department led or participated in projects worth >£30M. The cumulative value of funding awarded over the census period was c. £17M with matched funding worth c. £14M from industry and other stakeholders. Future plans include a continuation of this strategy but with increasing emphasis on diversifying RCUK activities, enhancing research with companies with whom the unit has established strong links, and maintaining interactions with EU funding consortia.

Grant-capture activity is supported by **an effective institutional framework**. Our researchers work closely with the Department of Research and Innovation (DRI), which provides support for application and management of external funding, research advice, support and guidance to individual researchers, project groups and research administrators. The Planning and Strategic Projects Unit works with academics to support the development of funding proposals, and provides project management support to staff involved in running major projects.

The Department is housed in a single building (the Grade 2 listed Wallace Building), which has undergone a £6M renovation programme since 2011; all research facilities have been upgraded, with most spaces (e.g. molecular biology laboratory) completely rebuilt. Much of the research equipment has been purchased within the last three years, primarily associated with Royal Society, RCUK and EU–funded projects.

As part of the University and College strategy to promote interaction between disciplines, the Department has access to **all specialist infrastructure facilities** within the College of Science (including specialized analytical and ecological field-work equipment such as a multi-channel seawater nutrient analyser, FlowCam, Fourier transform infrared/Near infrared (FTIR/NIR) spectrometer and Gas chromatography–mass spectrometry, stable-isotope/elemental analyser) and elsewhere in the University (e.g. EPSRC National Mass Spectrometry Service Centre, confocal microscopy suite, Scanning Electron Microscope. Tunneling Electron Microscope, extensive nanotechnology facilities, wind tunnel). The Department's bespoke infrastructure extends to four specialist facilities:

- CSAR Aquatic Research Facility (ERDF/SRIF-funded; 2005) consisting of 750m^2 of controlled environment laboratories, with programmable recirculating aquatic systems, unique within the UK's higher-education sector. These are tailored for research on a diverse range of organisms,

ranging from temperate to tropical and marine to freshwater. Coupled with this are nutrient and biochemical analytical capabilities.

- SLAM Visualisation Suite (Royal Society Wolfson Laboratory–funded; £1.35M; 2013), incorporating an electronic wall (1.5 x 4 m) linked to a computer-tesla cluster for high-speed processing and visualisation of complex accelerometry and magnetometry data derived from animals. Coupled with this facility is the Electronics Lab with capacity for research, development and realisation of animal tags with new capacities (sensors, energy-harvesting systems, miniaturization, 3-D printing of housings etc.).
- The Arthropod Behavioural Laboratory (Royal Society Wolfson, funded as part of the above; 2013) is a bespoke lab where arthropod responses to e.g. semio-chemicals and behavioural changes when diseased can be studied using animal-attached sensors.
- Coastal research vessel, *RV Noctiluca* (JREI funded, originally commissioned in 2001), a 12.5 metre, diesel-powered catamaran equipped with the latest navigation aids enabling offshore operations for several days. The vessel is engaged in a wide range of scientific tasks, from hydrographic assessment to trawling and other forms of bottom sampling.

e. Collaboration and contribution to the discipline or research base

Our success is evidenced by the broad range, depth and complexity of our connections, including international collaborations with scientists, researchers, industry, policy makers, and other **research users from over 20 countries**.

We have held **Fellowships** with prestigious organisations, including: *King* (AXA Fellow 2009-10; NERC Fellow 2011-13), *Shepard* (Leverhulme Trust Fellow 2010-12; Wingate Scholar 2010-11); *Tang* (Humboldt Foundation Fellow 2010-13), and *Flynn* (Institute of Advanced Studies, Durham University 2011; Learned Society of Wales 2012-).

We have also attracted **international scholars** to conduct collaborative research, funded by their institutes or via joint grants. Examples include: Prof. Dubovskiy (Russian Academy of Sciences, Roy. Soc. Russia exchange 2010-12), Profs Granelli (Kalmar, Sweden), Hansen (Copenhagen, Denmark), Thingstad (Bergen, Norway) and Glibert (Hornpoint, USA) (all Leverhulme 2012), and Garcia-Vazquez (Oviedo, Spain) and Moran (Vigo, Spain) (both Erasmus Programme 2012-13). We have participated as a lead or partner in **over 100 collaborative projects** at UK, EU and international levels. The eight projects described below illustrate the diversity of projects, funding bodies and collaborators. **Titles in bold** indicate Swansea as the overall project lead.

Project	Funding body	Collaborators	Period
Innovative Biological Products for Soil Pest Control	EU FP7	15 partners in 8 countries	2012-15
EuroBASIN	EU Integrated Science	28 partners in 13 countries	2010-14
Ocean acidification	NERC	PML, Strathclyde & Exeter	2011-14
Modelling Plankton Mixotrophy	Leverhulme International Network	26 partners in 10 countries	2011-14
ENALGAE (algal biotechnology)	EU Interreg IVB	19 partners in 7 countries	2011-15
Protection of native fish in Chile and the Falklands	Darwin Initiatives (DEFRA)	Chile & Falklands	2010-12
ECOJEL (jellyfish)	EU Interreg	Cork	2009-12

We are, increasingly, **a hub for interdisciplinary and collaborative endeavours**, recognising the value of connecting with others to achieve research aims. Examples of interdisciplinary collaborations include:

- *Eastwood*: Fungal genome sequencing and analysis (with bio-informaticians and computer scientists in the USA and Asia). Funded by the US Department of Energy.

- *Eastwood:* Developing a novel biorefinery process (with chemists and engineers at the University of Warwick). Funded by EPSRC.
- *Flynn:* Microalgal biofuels (with engineers, empirical and theoretical ecophysiology in the UK and EU). Funded by the Carbon Trust and EU FP7.
- *Flynn, Tang:* Plankton biogeo-chemistry and ecology; food security (with mathematical modellers and field/experimental ecologists in the USA, EU, UK and Australia). Funded by EU FP7, NERC, NSF and Leverhulme Trust.
- *King*: Animal behaviour (with mathematical modellers in the EU and UK). Funded by NERC.
- *Shepard:* Integrating animal movement with meteorological models (with the Met Office and mathematicians at Bristol and Cambridge). Funded by the Leverhulme Trust.

Our engagement with **industrial research users**, frequently as partners in the research process, enhances the status of the discipline and drives key aspects of our impact strategy. Indeed a permanent Project Manager has been appointed to pursue our Knowledge Exploitation and near-market activities, exploit all potential linkages with industry, and ensure the effective delivery of all research projects supported by the Department. Notable examples include:

- The Welsh Government/ERDF-funded Sustainable Expansion of the Applied Coastal and Marine Sectors (**SEACAMS**) initiative (£24M), supporting research and consultancy for water quality, catchment processes and marine ecosystems. SEACAMS success is manifest in its selection as a preferred supplier of consulting expertise to the UK's Marine Management Organisation (DEFRA) in the fields of seagrass, marine mammals, plankton and general marine ecology. It also supplies consulting expertise to the Welsh Government's Natural Resources Wales National Research Network
- The Welsh Institute for Sustainable Environments (**WISE**) Network (£26M) is a collaborative, pan-Wales project that supports businesses to (i) develop sustainable products, processes and services, and (ii) become more economically, socially and environmentally sustainable.
- **Algal Biotechnology for Wales Knowledge Transfer Centre**; established with Welsh Government support (£0.4M) in 2010, to provide an interface between academia and business in the algal biotechnology sector. Over 70 UK-European companies have benefited.
- **Advanced Professional Training**; an EU-funded project (£1.3M) that provides training in a range of bioscience topics pertinent to industry to enhance their competitiveness. Over 60 companies have benefited from the training. The rapport with industry has created opportunities for staff to access additional resources, including EU funding opportunities.

We hold key roles in the academic community, contributing to the publication and dissemination of knowledge via **journal editorships** [*Hays* (Exec. Ed., J. Anim. Ecology), *Eastwood* (Ed. Fungal Biol.), *King* (Ed. Animal Behaviour), and *Wilson* (Ed. Mar. Ecol. Progr. Ser.)], as well as **high-profile commentaries,** including solicited articles on topical subjects, e.g. Current Biology 2011 (*Hays*), 2012 (*King*), Nature 2011 (*Wilson*), and TREE 2009, 2010 (*Hays*). We also give **plenary addresses** both within the scientific community (e.g. *Flynn* - GEOHAB, 2009, IMBER, 2010; *King* – PSGB, 2013) and beyond, including political (e.g. *Garcia de Leaniz* - Welsh Government Briefing, 2012), corporate (e.g. *King* - AXA Annual Corporate Meeting, 2012), and public understanding of science lectures (e.g. *Wilson* - Royal Geographic Society Christmas Lecture, 2010).

Our staff regularly sit on a **wide variety of scientific review panels**, e.g. RCUK (*Garcia de Leaniz; King*), British Ecological Society (*Börger*) and International Research Councils, e.g *Flynn* (USA, Norway, Israel), *Butt* (USA), *Eastwood* (ANR, France, USA), *Garcia de Leaniz* (Chile), *Wilson* (France, Germany, South Africa). In addition, many staff contribute to **national and international advisory groups** including: *Hays* (Foreign and Commonwealth Office appointment to the British Indian Ocean Territory Science Advisory Group and European Parliament); *Eastwood* (Joint Genome Institute); *King* (Animal-Human conflict management advisory group, Enhanced Research Capacity [PERC] Africa); *Garcia de Leaniz* (ICES Atlantic Salmon Working Group, WGERAAS; Environment Agency, Conservatoire National du Saumon Sauvage, CNSS (France), Falkland Islands Environmental Planning.