

**PROFESSOR ANNE SMITH (BROWN)**  
**BSc, PhD, ACIEEM**

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**KEY EXPERIENCE**

Professor Anne Smith has 40 years of experience in assessing the impacts of environmental variables on fish including the investigation of the effects of pollutants on fish. Her expertise includes the assessment of fish health and welfare, understanding the impacts of aquaculture and harvesting fish for the market place. She has provided expert advice to insurers and acted as an expert advisor and expert witness to a range of solicitors. Key Areas of experience are:

- Assessing the impacts of pollutants on freshwater fish and fisheries
- Assessing the impacts of oil and gas production on marine fish and fisheries
- Advice and monitoring of welfare of farmed fish and impacts of harvesting
- Health and normal physiological functioning of fish
- Impacts of water quality on fish and shellfish
- Expert Advisor and Expert Witness for solicitors dealing with prosecutions resulting from fish kills
- Expert advice to Insurance Loss Adjustors dealing with financial losses resulting from fish deaths
- Court compliant reports including drafting of the Schedules of areas of agreement and disagreement between experts
- Advice for planning applications and possible effects of engineering works on fish, including fish surveys to assess fish diversity
- Researching how fish, including non-native species, respond to natural variables in the environment.
- Ecological inputs for Habitats Regulations screening and Appropriate Assessment for Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)
- Education and communication

**NATIONALITY**

British

**ACADEMIC QUALIFICATIONS**

PhD University of Sheffield, 1976

BSc Zoology, First Class, University College of North Wales, Bangor, 1972; awarded the Sir Alfred Lewis Prize

## **CAREER HISTORY**

2004 - current	Director of Aquatronics Ltd
2005 - current	Emeritus Professor, School of Biosciences, University of Exeter
2000 -2005	Professor of Fish Physiology, School of Biological Sciences, University of Exeter
2000	Joined Aquatic Environmental Consultants (AEC), as a Director, on a part-time basis.
1990-1991	Nuffield Foundation Science Research Fellow; competitive award
1988 -2001	Lecturer, then a Reader in Department of Biological Sciences, University of Exeter
1979 -1988	Lecturer, Department of Zoology, University of Hull
1976 -1979	Research Fellow, Department of Zoology, University of Sheffield

## **SELECTED APPOINTMENTS BY PROFESSIONAL BODIES AND CHARITIES**

- Fisheries Society: Council & Studentship Awards Committee (2004 -2008); Convenor of Symposium on Non-Native Fishes (2006 -2007)
- Marine Biological Association: Member of Council; Member of MBA Education Committee (2002-2006)
- Environment Agency: South West Regional Fisheries Advisory Committee (1996-1997)
- General & Comparative Endocrinology: Journal Sub-Editor/Editorial Board (2001-2006)
- Home Office: Panel of Assessors Animals (Scientific Procedures) Act (1987-2007)
- Natural Environment Research Council: Member of Grant Awarding Committees (1992-1995)
- British Council: Adviser on research programmes (1992-1994)
- Society for Experimental Biology: Council member (1987-1990); Convenor of the Osmoregulation Group (1985-1991)
- Nuffield Foundation: Reviewer for Student Bursaries (1990-1993)

## **MEMBERSHIP OF PROFESSIONAL GROUPS**

Associate Member of the Chartered Institute of Ecology & Environmental Management (ACIEEM)

Member of the Estuarine, Coastal and Shelf Science Association (ECSA)

Member of the Marine Biological Association, UK (MBA)

## **CONTRACTS AWARDED TO PROF ANNE SMITH AND OTHER CONSULTATIVE WORK**

**2017**

### **Pennon Group**

Expert opinion and advice after a fish kill in a stream in SW England.

### **John Knowlson**

Site visit to provide advice after a fish kill.

**Manchester Airport**

Assistance with a survey of the River Bollin and Timperley Brook.

**Andrew Jackson (Solicitors)**

Expert Witness appointed to assess the impacts of dredging on cockle biology, health and condition.

**2016**

**Glastonbury Festival Ltd**

Expert Witness appointed by TLT Solicitors.

Advice to Glastonbury Festivals Ltd regarding water pollution incidents and fish kills.

**Bond Dickinson LLP**

Expert Witness for the Defence linked to a fish kill in SW England. The Environment Agency withdrew the fish kill aspect of this Case.

**Andrew Jackson (Solicitors)**

Expert Advisor appointed to monitor cockle health and condition.

**Manchester Airport**

Assistance with surveys of the River Bollin and Timperley Brook.

**2015**

**Glastonbury Festival Ltd**

Expert witness appointed by TLT Solicitors.

Advice to Glastonbury Festivals Ltd regarding a legal case linked to a pollution incident and fish kill.

**Bond Dickinson LLP**

Expert Witness for the Defence linked to a fish kill in SW England.

Post mortem examination of fish retrieved by the Environment Agency.

**Andrew Jackson (Solicitors)**

Expert Advisor appointed to monitor the impacts of dredging on cockle health and condition.

**Chris Blandford Associates/Paramount Pictures**

Intertidal survey around Swanscombe Peninsula as part of the EIA for the London Paramount Entertainment Resort.

**Manchester Airport**

Assistance in surveys of the River Bollin and Timperley Brook.

**2014**

**ING RED UK**

Fish survey Carnsew Pool, Cornwall to provide baseline data for assessment of impacts of changed sluicing regime.

**Andrew Jackson (Solicitors)**

Assessment of the impacts of dredging on cockle biology, health and condition.

**Exeter City Council/Dorset Land Surveying**

Assistance in assessment of water quality of urban watercourses and sewers.

**Yelland Quay Ltd**

Ecological surveys of intertidal habitats at Yelland Quay.

**ING RED UK**

Baseline survey to assess impacts of sluicing on benthic invertebrates & contaminants, Carnsew Pool, Hayle.

**EAD Ltd**

Survey of intertidal habitats at Clyde Quay, Millbay, Plymouth. Algal identifications.

**Manchester Airport**

Survey of the River Bollin.

**2013**

**Linden Homes**

Ecological survey for development on Plymouth waterfront.

**Symmetry Law**

Survey in NW England after a spill of caustic soda (sodium hydroxide) to a canal.

**Nicholas James Group**

Surveys of *Zostera* (seagrass) bed.

**Marine Minerals Ltd**

Marine mammal observation during collection of grab samples as part of the EIA for obtaining tin from subtidal sands, North Cornwall.

**Andrew Jackson (Solicitors)**

Assessing the impacts of dredging on cockle biology, health and condition; experts' meetings and data presentation.

**2012**

**South West Water**

Expert Witness appointed by the Defence. Reports on post mortem examination of fish, impacts of dissolved oxygen on mortalities, aluminium analysis of fish tissues. The Environment Agency withdrew the fish kill aspect of this case.

**PB World & Cornwall Council**

Surveys at Hayle, Cornwall of hard and soft substrates, benthic invertebrates, lugworm (*Arenicola marina*) casts. Algal identifications. Sample processing for metal analysis.

**PB World & Cornwall Council**

Fish survey of Copperhouse Pool to assess any impacts of North Quay developments at Hayle, Cornwall.

**Andrew Jackson (solicitors)**

Assessment of the impacts of dredging on cockle biology, health and condition.

**Greengage LLP**

Intertidal survey, Wandsworth, London.

**Manchester Airport**

Ecological survey of the River Bollin.

**2011**

**South West Water**

Advice relating to a pollution incident and fish kill in the East Looe River, Cornwall.

**PB World & Cornwall Council**

Assessment of the effects of a trial tidal exclusion of Copperhouse Pool, Hayle on water quality

**PB World & Cornwall Council**

Report on monitoring of suspended solids during construction activities in Hayle, Cornwall and potential impacts on fish.

**Symmetry Law**

Site visits to an industrial site in NW England to assess impacts of chemical spills.

**Andrew Jackson (solicitors)**

Assessment of the impacts of dredging on cockle biology, health and condition.

**Seafeld Partnership Ltd**

Report on fish issues for the Addendum to the Environmental Statement for a proposed new Power Station at Hunterston, Ayrshire Power.

**St Francis Group/Environ**

Survey work for advice on aquatic ecology (freshwater and marine) aspects of a proposed quarry development at Penlee, Cornwall.

**Marine Bio-images**

Statistical analysis of biological data.

**2010****Hill Dickinson & Andrew Jackson (solicitors)**

Assessment of the impacts of dredging on cockle biology, health and condition.

**PB World & Cornwall Council**

Surveys at Hayle, Cornwall of hard and soft substrates, benthic invertebrates, lugworm (*Arenicola marina*) casts. Algal identifications. Sample processing for metal analysis.

**Manchester Airport**

Survey of the River Bollin.

**PB World & Cornwall Council**

Baseline fish survey of Copperhouse Pool, Hayle, Cornwall.

**Environmental Sciences Ltd, Trinidad**

Assistance with fisheries aspects of EIAs for the oil and gas industry in Trinidad.

**Waterman Energy & Design Ltd**

Ecological appraisal and advice regarding potential development of a commercial site in Devon.

**Environmental Sciences Ltd, Trinidad**

Advice on development of a Fisheries Complex in Trinidad.

**2009****AECOM (formerly Faber Maunsell)**

Ecological survey of an intertidal site near a proposed marina on the Torridge estuary, Devon.

**Buro Happold**

Ecological surveys of intertidal and subtidal habitats at Mill Bay, Plymouth. Algal identifications.

**EAD & Dart Harbour & Navigation Authority**

Ecological survey of an intertidal site at Hoo Down, near Kingswear on the Dart estuary.

**Hammonds Solicitors**

Site visit relating to suspected water pollution incident due to run-off from a composting site.

**Hill Dickinson & Andrew Jackson (solicitors)**

Assessment of the impacts of dredging on cockle biology, health and condition.

**Falmouth Boat Construction**

Ecological survey of a proposed pontoon development, Fal estuary.

**Manchester Airport**

Spring and Autumn surveys of the River Bollin

**2008**

**NoCatch Ltd (funded by Scottish Aquaculture Research Forum (SARF) and Defra)**

Development of welfare indices for farmed cod, Shetland.

**Hill Dickinson & Andrew Jackson (solicitors)**

Assessment of the impacts of dredging on cockle biology, health and condition.

**ING Real Estate**

Biotope surveys of the Hayle estuary complex, Cornwall. Algal identifications.

**Marine Hotel, Salcombe**

Ecological surveys of the foreshore to assess possible impacts of a proposed pontoon at Salcombe, Devon.

**2007**

**NoCatch Ltd (funded by Scottish Aquaculture Research Forum (SARF) and Defra)**

Development of practical and meaningful welfare indices for farmed cod by on-farm assessments and laboratory analyses of blood samples.

**Enfusion**

Ecological input for Habitat Regulations Appropriate Assessment of Local Development Framework Core Strategies for Dartford and Gravesham Borough Councils (Thames Estuary and Marshes and Medway Estuary and Marshes SPAs).

**Marine Bio-Images**

Statistical analysis of data from diver surveys of *Modiolus* (horse mussel) populations for Scottish Natural Heritage.

**Enfusion**

Ecological inputs and advice on impacts on protected fish species (salmonids and lampreys) in River Avon SAC for Habitat Regulations, for Appropriate Assessment of Minerals and Waste Core Strategies for Wiltshire County Council and Swindon Borough Council.

**URS Corporation Ltd/BioLab Ltd**

Ecological survey of an English river following a fire and chemical spill (repeat survey).

### **Environmental Perspectives**

Strand line survey and protected species' surveys of tidal habitat at Brentford, Thames.

### **The Environment Practice and ING Real Estate**

Intertidal surveys of Carnsew Pool and PenPol, for the Hayle Harbour development, Cornwall.

### **2006**

#### **Johnson's Seafarms (funded by Scottish Aquaculture Research Forum (SARF) and Defra)**

Pilot studies to assess viable behavioural, physical and physiological parameters as welfare indices for cod farmed in Shetland.

#### **URS Corporation Ltd**

Ecological survey of an English river following fire and release of contaminants.

#### **Ecological Planning and Research**

Survey of intertidal habitats at Lyme Regis as part of the ecological impact assessment of Phase IV of the sea defence programme.

#### **Environmental Resources Management**

Part of the team undertaking a repeat ecological survey of a stream and river affected by a diesel spill.

### **2005**

#### **Insurance Company**

Expert opinion and advice to the insurer of a major power company regarding a financial claim for damages due to fish mortalities. Advice given on extent and cause of fish mortalities and the financial losses.

#### **Prior to 2005**

##### **Wessex Water**

Advice on sensitivity of salmon and sea trout to river flows.

##### **Highland Regional Council / Watson Hawksley**

Review of salmonid physiology and behaviour in relation to sewage discharges as a part of an EIA of the Inverness Main Drainage Scheme for Highland Regional Council.

##### **Devon County Analyst**

Post mortem of brown trout



## RESEARCH

Research has been funded by 40 grants totalling approximately £1 million from UK Research Councils, EU, Defra, Nuffield Foundation, Leverhulme Trust and appropriate industries, such as Amerada Hess, AstraZeneca and the aquaculture industry. Funding has also been obtained to support the research of about 25 research students, and provide the facilities and research support for self-funded and international research students. The research results have been presented at many International and European conferences and workshops. These include EU COST 867 Fish Welfare Workshop, International Congress on the Biology of Fishes, SETAC, International Workshop on Biological Invasions, International Symposia on Fish Endocrinology, International Symposia on Comparative Endocrinology, Society for Experimental Biology Symposia, European Comparative Endocrinology Conferences; International Symposia on Produced Waters, American Physiological Society; International Union of Biological Sciences, Estuarine and Coastal Sciences Association (ECSA).

More than 100 publications (mainly as J. Anne Brown) have emerged from the research; the list below provides selected examples.

## SELECTED SCIENTIFIC PAPERS IN JOURNALS, BOOK CHAPTERS AND PRESENTATIONS

Smith, P., Smith, A. and Rabineau, J. (2012). The Hayle estuary complex - detecting modern anthropogenic disturbance in a highly polluted and physically amended estuarine system. Oral presentation at the 50th ECSA Conference, Venice.

Smith, P., Snook, D., Muscutt, A. and Smith, A. (2010). Effects of a diesel spill on freshwater macroinvertebrates in two urban watercourses, Wiltshire, UK. *Water and Environment Journal*. 24(4): 249-260.

Brown, J.A., Watson, J., Bourhill, A., Wall, T. (2010). Physiological welfare of commercially reared cod and effects of crowding for harvesting. *Aquaculture* 298: 315-324.

Brown, J. A., Bourhill, A., Watson, J., Hodgson, D. (2009). Development of practical on-farm cod welfare indices (SARF 021). Scottish Aquaculture Research Forum.

<http://www.sarf.org.uk/Project%20Final%20Reports/SARF021%20-%20Final%20Report.pdf>

Brown, J. A., Bourhill, A., Watson, J. (2009). Atlantic cod (*Gadus morhua*) fin erosion key. Scottish Aquaculture Research Forum.

<http://www.sarf.org.uk/Project%20Final%20Reports/SARF021%20Atlantic%20cod%20fin%20erosion%20key.pdf>

Brown, J.A., Watson, J., Bourhill, A., Wall, T (2008). Evaluation and use of the Lactate Pro, a portable lactate meter, in monitoring the physiological well-being of farmed Atlantic cod (*Gadus morhua*). *Aquaculture* 285: 135-140.

Scott, D.M., Rabineau, J., Wilson, R.W., Hodgson, D.J., and Brown, J.A. (2008). Can pikeperch colonise new freshwater systems via estuaries? Evidence from behavioural salinity tests. *Marine and Freshwater Research* 58: 694-702.

Scott, D.M, Wilson R.W., Brown J.A. (2007). Can sunbleak *Leucaspinus delineatus* or topmouth gudgeon *Pseudorasbora parva* disperse through saline waters? Journal of Fish Biology 71: Supplement D: Non-native Fishes: Integrated Biology of Establishment Success and Dispersal 70-86.

Brown, J.A., Scott, D.M., Wilson, R.W. (2007). Do estuaries act as saline bridges to allow invasion of new freshwater systems by non-indigenous fish species? Chapter 21 In: 'Biological Invaders in Inland Waters: Profiles, Distribution and Threats'. Invading Nature - Springer Series in Invasion Ecology Vol 2. Editor: Francesca Gherardi. Springer.

Brown A., Bourhill, A., Watson, J., Wall, T., Ellis, T., Zuur, A., Ieno, E. N. (2007). Understanding the welfare of farmed cod under commercial conditions: integration of physiological, behavioural and physical approaches. Comparative Biochemistry and Physiology Part A 146: S75-86.

Scott, D. M., Wilson, R. W., Brown, J. A. (2007). The osmoregulatory ability of the invasive species sunbleak *Leucaspinus delineatus* and topmouth gudgeon *Pseudorasbora parva* at elevated salinities, and their likely dispersal via brackish waters. Journal of Fish Biology 70: 1606-1614.

Scott, D. M., Brown, J. A., Stakenas, S., Wilson, R. W., Copp, G. H. (2007). Pikeperch (*Sander lucioperca*) dispersion through brackish waters - can they and do they? Comparative Biochemistry and Physiology Part A 146 S77.

Brown, J.A., Hazon, N. (2007). The renin-angiotensin system of fish and their role in osmoregulation. In 'Fish Osmoregulation' (Eds. B. Baldisserotto, J. M. Mancera & B.G. Kapoor). Science Publishers, Inc. Enfield (NH), USA & Plymouth, UK.

Crane, H.M., Pickford, D.B., Hutchinson, T.H., Brown, J.A. (2006). The effects of methimazole on development of the fathead minnow, *Pimephales promelas*, from embryo to adult. Toxicological Sciences 93: 278-285.

Crane, H. M., Pickford, D. B., Hutchinson, T. H., Brown, J. A. (2005). Effects of ammonium perchlorate on thyroid function in developing fathead minnows, *Pimephales promelas*. Environmental Health Perspectives 113, 396-401

Gollock, M. J., Kennedy, C. R., Brown, J. A. (2005). European eels, *Anguilla anguilla* (L.), infected with *Anguillicola crassus* exhibit a more pronounced physiological stress response to severe hypoxia than uninfected eels. Journal of Fish Diseases 28: 429-436.

Gollock, M. J., Kennedy, C. R., Brown, J. A. (2005). Physiological responses to acute temperature increase in European eels (*Anguilla anguilla* L.) infected with *Anguillicola crassus*. Diseases of Aquatic Organisms 64: 223-228.

Gollock, M. J., Kennedy, C. R., Quabius, E. S., Brown, J. A. (2004). The effect of parasitism of European eels with the nematode, *Anguillicola crassus* on the impact of netting and aerial exposure. Aquaculture 233: 45-54

Crane, H.M., Pickford, D.B., Hutchinson, T.H., Brown, J.A. (2004). Developmental changes of thyroid hormones in the fathead minnow, *Pimephales promelas*. General and Comparative Endocrinology. 139: 55-60.

- Quabius, E. S., Brown, J. A., Nolan, D. T., Wendelaar Bonga, S. E. (2002). Organic pollutants and their effects on the stress response in fish. *Comparative Biochemistry & Physiology Part A*. 132: S3.
- Cramb, G., Cutler, C.P., Lignot, J-H, Martinez, A-S., Chesman, B.S., Frankling, S.C., Brown, J.A. (2002). Expression of multi-drug resistance (MDR) p-glycoprotein and associated proteins (MRPs) in the flounder: effects of exposure to the polyaromatic hydrocarbon, benzo(a)pyrene. *Proceedings of the International Congress on Biology of Fishes. Aquatic Toxicology: Mechanisms & Consequences* (Eds C.Kennedy, A.Kolak, D. MacKinlay). American Fisheries Society.
- Quabius, E.S., Brown, J.A., Nolan, D.T., Wendelaar Bonga, S.E. (2002). Dietary exposure to PCB 126 and B(a)P interferes with the stress response of teleost fish at the pituitary level of the HPI axis. *Proceedings of the International Congress on Biology of Fishes. Endocrine Disruptors: Mechanisms and Impacts* (Eds M. Vijayan, A. Hontela, D.MacKinlay) American Fisheries Soc.
- Cobb, C.S., Frankling, S.C., Rankin, J.C., Brown, J.A. (2002). Angiotensin -converting enzyme-like activity in tissues from the river lamprey or lampern, *Lampetra fluviatilis*, acclimated to freshwater and seawater. *General & Comparative Endocrinology* 127: 8-15.
- Brown, J. A., Moore, W. M., Quabius, E. S. (2001). Physiological effects of saline waters on zander. *Journal of Fish Biology* 59: 1544-1555.
- AlKindi, A.Y.A., Brown, J.A., Waring, C.P. (2000). Endocrine, physiological and histopathological responses of fish and their larvae to stress with emphasis on exposure to crude oil and various petroleum hydrocarbons. *Science and Technology, Special Review* 1-30.
- Kelly, C. E., Kennedy, C. R., Brown, J. A. (2000). Physiological status of wild European eels (*Anguilla anguilla*) infected with the parasitic nematode, *Anguillicola crassus*. *Parasitology* 120: 195-202.
- Stephens, S. M., Frankling, S. C., Stagg, R. M., Brown J. A. (2000). Sub-lethal effects of exposure of juvenile turbot to oil produced water. *Marine Pollution Bulletin* 40: 928-937.
- Brown, J.A., Rankin, J.C. (1999). Lack of glomerular intermittency in the river lamprey, *Lampetra fluviatilis* acclimated to sea water and following acute transfer to iso-osmotic brackish water. *Journal of Experimental Biology* 202: 939-946.
- Stephens, S. M., Brown, J. A., Frankling, S. C. (1997). Stress responses of larval turbot, *Scophthalmus maximus* L., exposed to sub-lethal concentrations of petroleum hydrocarbons. *Fish Physiology & Biochemistry* 17: 433-439.
- Waring, C.P., Brown, J.A. (1997). Plasma and tissue thyroxine and triiodothyronine contents in sublethally stressed, aluminium-exposed brown trout (*Salmo trutta*). *General and Comparative Endocrinology* 106: 120-126.
- Stephens, S.M., AlKindi, A.Y.A., Waring, C.P., Brown, J.A. (1997). Corticosteroid and thyroid responses of larval and juvenile turbot, *Scophthalmus maximus* L. exposed to the water soluble fraction of crude oil. *Journal of Fish Biology* 50: 953-964.

AlKindi, A., Brown, J. A., Waring, C. P., Collins, J. E. (1996). Endocrine, osmoregulatory, respiratory and haematological parameters in flounder *Pleuronectes flesus* exposed to the water soluble fraction of crude oil. *Journal of Fish Biology* 49: 1291-1305.

Brown, J.A., Waring, C.P. (1996). The physiological status of brown trout exposed to aluminium in acidic soft waters. In: 'Toxicology of Aquatic Pollution. Physiological, Cellular and Molecular Approaches' (Ed. E. W. Taylor), Society for Experimental Biology Seminar Series Vol 57, pp 115-143, Cambridge University Press.

Stephens, S.M., Brown, J.A., Ferguson, M.A. (1996). Sub-lethal effects of oil-produced water on the early life stages of turbot. In: 'Produced Water 2: Environmental Issues and Mitigation Technologies' Eds. M Reed & S Johnsen. pp 101-112, Plenum Press, New York.

Waring, C.P., Brown, J.A., Collins, J.E., Prunet, P. (1996). Plasma prolactin, cortisol and thyroid responses of the brown trout (*Salmo trutta*) exposed to lethal and sublethal aluminium in acidic soft waters. *General and Comparative Endocrinology* 102: 377-385.

Brown, J.A., Whitehead C. (1995). Catecholamine release and interrenal response of brown trout, *Salmo trutta* exposed to aluminium in acidic water. *Journal of Fish Biology* 46: 524-535.

Waring, C.P., Brown, J.A. (1995). Ionoregulatory and respiratory responses of brown trout, *Salmo trutta*, exposed to lethal and sublethal levels of aluminium in acidic soft waters. *Fish Physiology & Biochemistry* 14: 81-91.

Brown, J.A. (1993). Endocrine Responses to Environmental Pollutants. In 'Fish Ecophysiology' (Ed. J.C. Rankin & F.B. Jensen) pp 274-294. Chapman & Hall, London.

Brown, J.A., Whitehead, C., Edwards, D. (1989). Cortisol and thyroid responses to acid stress in the brown trout, *Salmo trutta*. *Journal of Fish Biology* 35: 73-84.

Whitehead, C., Brown J.A. (1989). Endocrine responses to acid stress in brown trout held in a soft water Welsh stream. *Journal of Fish Biology* 35: 59-71.