

REFERENCES

- Adams, J.N. and Beschta, R.L. (1980) Gravel bed composition in Oregon coastal streams. *Canadian Journal of Fisheries and Aquatic Sciences*, **37**, 1514-1521.
- Aherne, B. (2002) *Temporal and Spatial variability in dissolved oxygen concentrations in two contrasting rivers: the Rye Water, Co. Kildare and the Derreen river, Co. Carlow*. MSc Thesis.
- Alabaster, J.S. and Lloyd, R. (1980) *Water Quality Criteria for Freshwater Fishes*, London, Butterworth Scientific.
- Anon (2003) *Boyne/Liffey Water Quality Monitoring and Management, Status Report*. Three Rivers Project. 1-58pp.
- Angermeier, P.L. and Karr, J.D. (1986) Applying an Index of Biotic Integrity based on stream-fish communities: Consideration in sampling and interpretation. *North American Journal of Fisheries Management*, **6**, 418-429.
- Angermeier, P.L. and Davideanu, G. (2004) Using Fish Communities to Assess Streams in Romania: Initial Development of an Index of Biotic Integrity. *Hydrobiologia*, *511* (1), 65-78.
- Appelberg, M. (2000) Swedish standard methods for sampling freshwater fish with multi-mesh gillnets. *Fiskeriverket Information*, **1**, 3-32.
- Appelberg, M., Bergquist, B.C. and Degerman, E. (2000) Using fish to assess environmental disturbance of Swedish lakes and streams – a preliminary approach. *Verh. Internationale Verein. Limnologie*, **27**, 311-315.
- Argent, D.G. and Flebbe, P.A. (1999) Fine sediment effects on brook trout eggs in laboratory streams. *Fisheries Research* **39**, 253-262
- Armstrong, J.D. and Herbert, N.A. (1997) Homing movement of displaced stream-dwelling brown trout. *Journal of Fish Biology*, **50**, 445-449.
- Armstrong, J.D., Kemp, P.S., Kennedy, G.J.A., Ladle, M. and Milner, N.J. (2003) Habitat requirements of Atlantic salmon and brown trout in rivers and streams. *Fisheries Research*, **62**, 143-170.
- Barbour, M.T., Gerritsen, J. Snyder, B.D. and Stribling, J.B. (1999) Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers, in: *Periphyton, Benthic Macroinvertebrates and Fish*. Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water, Washington D.C.
- Baroudy and Elliott, J.M. (1993) The effect of large-scale spatial variation of pelagic fish on hydroacoustic estimates of their population density in Windermere (northwest England). *Ecology of Freshwater Fish*, **2** (4), 160-166.
- Batschelet, E. (1981) *Circular Statistics in Biology*, London: Academic Press.
- Beaumont, W.R.C., Clough, S., Ladle, M. and Welton, J.S. (1996) A method for the attachment of miniature radio tags to small fish. *Fisheries Management and Ecology* **3**, 201-207.
- Belpaire, C., Smolders, R., Auweele, I.V., Ercken, D., Breine, J., Van Thuyne, G. and Ollevier, F. (2000) An Index of Biotic Integrity characterizing fish populations

- and the ecological quality of Flandrian water bodies. *Hydrobiologia*, **434**, 17-33.
- Berkman, H.E. and Rabeni, C.F. (1986) Biomonitoring of stream quality in agricultural areas: Fish versus invertebrates. *Environmental Management*, **10** (3), 413-419
- Bohlin, T. (1995) Estimation of population parameters using electric fishing: aspects of the sampling design with emphasis on salmonids in streams, in: Cowx, J. (Ed.) *Developments in electric fishing*, pp.156-173.
- Bohlin, T. and Cowx, I.G. (1990) Implications of unequal probability of capture by electric fishing on the estimation of population size. In: Cowx, I.G. and Lamarque, P. (Eds) *Fishing with electricity*. 145-155. Fishing News Books, Blackwell Scientific Publications, Oxford, UK.
- Bohlin, T., Heggberget, T.G. and Strange, C. (1990) Electric fishing for sampling and stock assessment. In: *Fishing with electricity* (Cowx, I.G. and Lamarque, P.eds). pp 112-139. Fishing News Books, Blackwell Scientific Publications, Oxford, UK.
- Boon, P.J., Holmes, N.T.H., Maitland, P.S. and Rowell, T.A. (1994) A system for evaluating rivers for conservation ("SERCON"): An outline of the underlying principles. *Verhandlungen Internationale Vereinigung für Theoretische und angewandte Limnologie*, **25** (3)
- Bowman, J.J. and Clabby, K.J. (1998) Water quality of rivers and lakes in the Republic of Ireland, in: Wilson, J.G.W (Ed.) *Eutrophication in Irish Waters*, Royal Irish Academy, Dublin. pp.55-63.
- Bremset, G. and Berg, O.K. (1997) Density, size-at-age and distribution of young Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) in deep river pools. *Canadian Journal of Fisheries and Aquatic Sciences*, **54**, 2827-2836.
- Bridcut, E.E. and Giller, P.S. (1993) Diet variability in relation to season and habitat utilisation in brown trout, *Salmo trutta*, L. in a southern Irish stream. *Canadian Special Publications of Fisheries and Aquatic Sciences*, **54**, 2827-2836.
- Buckley, P. (1993) The bird communities and general ecology of Rahasane Turlough and the Dunkellin/Lavally river system. Ph.D. thesis, University College Galway.
- Callaghan, R. (1993) *Fish species assemblages of the Dunkellin River system, with particular reference to the ecology of the European eel, *Anguilla anguilla* L.* Ph.D. thesis, University College Galway.
- Carle, F.L. and Strub, M.R. (1978) A new method for estimating population size from removal data. *Biometrics*, **34**, 621-630.
- CEC (2000) Directive 2000/60/EC of the European Parliament and of the Council: establishing a framework for Community action in the field of water policy. Official Journal of the European Communities, Luxembourg, 72pp.
- CEN (2003) Water Quality – Sampling of fish with electricity. European standard. Ref. No. EN 14011:2000.
- Champ, W.S.T. (1983) Quantification of Trout Stocks in an alkaline river fishery. *Irish Fisheries Investigation Series A*, **23**, 47-51.

- Champ, W.S.T. (1998) Phosphorus/Chlorophyll relationships in Irish lakes: ecological consequences and suggested criteria for ecosystem management. In: Wilson, J. (Ed.) *Eutrophication in Irish Water*, 91-105. Royal Irish Academy, Dublin.
- Champ, W.S.T (2000) Habitat Quality for Fishes. In: Sixteenth Annual Environmental Conference: *Water – Is its quality deteriorating*. Sherkin Island Marine Station, Sherkin Island, Co. Cork.
- Champ, W.S.T. (2003) The Effects of Pollution on Freshwater Fish Stocks, In: Proceedings of the Nineteenth Annual Environmental Conference : *Tackling Pollution of Ireland and Coastal Waters*. Sherkin Island Marine Station, Sherkin Island, Co. Cork.
- Chapman, D. (1996) *Water quality assessment*. UNESCO/WHO/UNEP. GB University press, Cambridge.
- Chapman, D.W. (1988) Critical review of variables used to define effects of fines in redds of large salmonids. *Transactions of the American Fisheries Society*, **117**, (1), 1-21.
- Chapman, D.W. and Bjornn, T.C. (1969) Distribution of salmonids in streams with special reference to food and feeding. In: *Symposium on salmon and trout in streams*. Lectures in fisheries (T.G. Northcote, ed.). The University of British Columbia.
- Clabby, K.J., Lucey, J.L.M., McGarrigle, M.L. Bowman, J., Flanagan, P.J. and Toner, P.F. (1992) *Water Quality in Ireland 1987-1990*. Part One: General Assessment. Environmental Research Unit, Dublin. 189pp.
- Clabby, K.J., Lucey, J. and McGarrigle, M.L. (1993) *Interim report on the biological Survey of river quality results of the 1991 investigations*. Environmental Research Unit, Co. Dublin.
- Clabby, K.J., Lucey, J. and McGarrigle, M.L. (2001) *Interim report on the biological Survey of river quality results of the 2000 investigations*. Environmental Protection Agency, Wexford
- Clabby, K.J., Lucey, J. and McGarrigle, M.L. (2002) *Interim report on the biological Survey of river quality results of the 2001 investigations*. Environmental Protection Agency, Wexford
- Clarke, R. T., Furse, M. T., Wright, J. F. and Moss, D. (1996) Derivation of a biological quality index for river sites: comparison of the observed with expected fauna. *Journal of Applied Statistics*, **23**, 311-322.
- Clarke, K.R. and Gorley, R.N. (2001) Primer Version 5: User Manual/Tutorial. Plymouth Marine Laboratory, U.K.
- Clarke, K.R. and Green, R.H. (1988) Statistical design and analysis for “biological effects” study. *Marine Ecology Progress Series*, **46**, 213-226.
- Clarke, R. T., Furse, M. T., Wright, J. F. and Moss, D. (1996) Derivation of a biological quality index for river sites: comparison of the observed with expected fauna. *Journal of applied Statistics*, **23**, 311-322
- Clenaghan C. (1996) *The spatial and temporal variation in the freshwater ecology and hydrochemistry of an Irish conifer afforested catchment*, PhD Thesis (unpublished), National University of Ireland (University College Cork).

- Clenaghan, C., Giller, P. S., OHalloran, J. and Hernan, R. (1998) Landscape and fine scale habitat associations of the loggerhead shrike. *Wilson Bulletin*, **110**, 474-482.
- Cole, R.A. (1973) Stream community response to nutrient enrichment. *Journal of the Water Pollution Control Federation*, **45**, 1874-1888
- Cowx, I.G. (1995) Fish Stock Assessment – A biological basis for sound ecological management. In: *The Ecological basis for River Management* (Harper, D.M. and Ferguson, A.J.D. eds). pp: 375-388. John Wiley and Sones, Chichester, UK.
- Cowx, I. G. and Welcomme, R.L. (Eds) (1998) *Rehabilitation of Rivers for Fish*. A study undertaken by the European Inland Fisheries Advisory Commission of FAO. Oxford: Fishing News Books, Blackwell Science, 260pp.
- Crisp, D.T. (1993) The ability of U.K. salmonid alevins to emerge through a sand layer. *Journal of Fish Biology*, **43**, 656-658.
- Crisp, D.T. (2000) *Trout and Salmon: Ecology, Conservation and Rehabilitation*. Fishing News Books, Blackwell Scientific Publications, Oxford, UK
- Crisp, D.T. and Carling, P.A. (1989) Observations on siting, dimensions and structure of salmonid redds. *Journal of Fish Biology*, **34**, 119-134.
- Crisp, D.T., Mann, R.H.K. and McCormack, J.C. (1974) The populations at Cow Green, Upper Teesdale, before impoundment. *Journal of Applied Ecology*, **11**, 969-996.
- Crook, D. (2004) Is the home range concept compatible with the movements of two species of lowland fish? *Journal of Animal Ecology*, **73**, 353-366.
- Crouse, M.R., Callahan, C.A., Malueg, K.W. and Dominguez, S.E. (1981) Effects of fine sediments on growth of juvenile coho salmon in laboratory streams, **110**, 281-286.
- Crozier, W.W. and Kennedy G.J.A. (1994) Application of semiquantitative electrofishing to juvenile salmonid stock surveys. *Journal of Fish Biology*, **45**, 159-164.
- Crozier, W.W. and Kennedy, G.J.A. (1995) The relationship between a summer fry (0+) abundance index, derived from semi-quantitative electrofishing, and egg deposition of Atlantic salmon, in the River Bush, Northern Ireland. *Journal of Fish Biology*, **47**, 1055-1062.
- Davies, J.C. (1975) Minimum dissolved oxygen requirements of aquatic life with emphasis on Canadian species: a review. *Journal of the Fisheries Research Board of Canada*, **32**, 2295-2332
- Delanty, K. and O' Grady, M. (2001) *Lough Melvin Fish Stock Report*. Central Fisheries Board, Unpublished report.
- Dill, L.M. and Northcote, T.G. (1970) Effects of some environmental factors on survival, condition, and timing of emergence of Chum salmon fry (*Oncorhynchus kete*). *Journal of Fisheries Research Board of Canada*, **27** (1), 196-201.
- Dodkins, I.R. (2003) Developing a Macrophyte Index of Ecological Status for Northern Ireland's Rivers. Ph.D. Thesis, University of Coleraine.

- Donaghy, M.J., Verspoor, E. (1997) Egg survival and timing of hatch in two scottish atlantic salmon stocks. *Journal of Fish Biology*, **51**,211-214.
- Donnelly, R.E., Caffrey, J.M. and Tierney, D.M. (1998) Movements of a bream (*Abramis brama* (L.)), rudd x bream hybrid, tench (*Tinca tinca* (L.)) and pike (*Esox lucius* (L.)) in an Irish canal habitat. *Hydrobiologia*, **372**, 305-308.
- Donohue, I., McGarrigle, M.L. and Mills, P. (2006) Linking catchment characteristics and water chemistry with the ecological status of Irish rivers. *Water Research*, **40**, 91-98.
- Doudoroff, P. and Shumway, D.L. (1970) Dissolved oxygen requirements of freshwater fishes. pp.291. *FAO Fisheries Technical Report* **86**.
- Duncan, A., Schmid, P.E. and Kubecka, J. (1998) Aspects of spatial dispersion of coarse fish densities in lowland rivers by acoustic survey. *Verhandlungen Internationale Vereinigung fur Theoretische und angewandte Limnologie*, **27** (5), 3015-3018.
- Eckblad, J.W. (1991) How many samples should be taken? *Biosciences*, **41**, 346-348.
- ECOSTAT (2003) *Overall approach to the Classification of Ecological Status and Ecological Potential*. Water Framework Directive Common Implementation Strategy Working Group 2A Ecological Status (ECOSTAT).
- Ekloev, A.G., Greenberg, L.A., Bronmark, C., Larsson, P. and Berglund, O. (1999) Influence of water quality, habitat and species richness on brown trout populations. *Journal of Fish Biology*, **554**, 33-43.
- Elliott, J.M. (1981) Some aspects of thermal stress on freshwater teleosts. In: *Stress and Fish* (A.D.Pickering, ed.). pp209-245. London, Academic Press.
- Elliott, J.M. (1994) *Quantitative Ecology and the Brown Trout*. Oxford University Press, Oxford, UK.
- Elliott, J.M. (2000) Pools as refugia for brown trout during two summer droughts: trout responses to thermal and oxygen stress. *Journal of Fish Biology*, **56**, 938-948.
- Elliott, J.M., Elliott, J.A. and Allonby, J.D. (1994) The critical thermal limits for the stone loach, *Noemacheilus barbatulus*, from three populations in North-west England. *Freshwater Biology*, **32** (3), 593-601.
- Elso, J.I. and Giller, P.S. (2001) Physical characteristics influencing the utilization of pools by brown trout in an afforested catchment in Southern Ireland. *Journal of Fish Biology*, **58**, 201-221.
- Embody, G.C. (1981) Relation of temperature to the incubation period of eggs of four species of trout. *Transactions of the American Fisheries Society*, **64**, 281-292.
- Environment Agency (2000a) Review of Eutrophication -related RandD. Technical Report P408.
- Environment Agency (2000b) De-oxygenation: practical self-help for fishery owners and managers. Environment Agency, UK
- FAME CONSORTIUM (2004) Manual for the application of the European Fish Index – EFI. A fish based method to assess the ecological status of European rivers in support of the water Framework Directive. Version 1.1, January 2005.

- Fausch, K.D., Karr, J.R. and Yant, P.R. (1984) Regional application of an index of biotic integrity based on stream fish communities. *Transactions of the American Fisheries Society*, **113**, 39-55.
- Fausch, K.D, Lyons, J., Karr, J.R. and Angermeier, P.L. (1990) Fish communities as indicators of environmental degradation. *American Fish Society Symposium*, **8**, 123-144.
- Ferguson, A. (1986) Lough Melvin – A unique fish community. *Occasional papers in Irish Science and Technology*, **No. 1**, 17pp.
- Ferguson, A. and Taggart, J.B. (1991) Genetic differentiation among the sympatric brown trout (*Salmo trutta*) populations of Lough Melvin, Ireland. *Biological Journal of the Linnean Society*, **43 (3)**, 221-237.
- Fitzmaurice, P. (1974) Occurrence of roach, *Rutilus rutilus* (L.) in the Shannon catchment. *Irish Naturalists Journal*, **18 (1)**, 1
- Fitzmaurice, P. (1981) The spread of Roach *Rutilus rutilus* (L.) in Irish waters – *Proceedings of the Second British Freshwater Fisheries Conference* 154-161. Liverpool.
- Fitzmaurice, P. (1983) Carp (*Cyprinus carpio* L.) in Ireland. *Irish Fisheries Investigation Series A*, **No. 23**, 5-10.
- Fitzmaurice, P. (1984) The effects of freshwater introductions into Ireland. – *EIFAC Technical Paper*, **42(2)**, 449-458.
- Flanagan, P.J. (1990) *Parameters of Water Quality. Interpretation and Standards*. 2nd edition, ERU, St. Martin's House, Waterloo Road, Dublin 4, Ireland. 153pp.
- Flanagan, P.J. and Larkin, P.M. (1992) *Water Quality in Ireland 1987-1990*.
- Flanagan, P.J. and Toner, P. F. (1972) *The National Survey of Irish Rivers*. A Report on Water Quality. An Foras Forbatha, Dublin.
- Flanagan, P.J. and Toner, P. F. (1975) *A Preliminary Survey of Irish Lakes*. An Foras Forbartha, Dublin.
- Fox, P.J.A., Naura, M. and Scarlett, P. (1998) An account of the derivation and testing of a standard field method River Habitat Survey. *Aquatic Conservation: Marine and Freshwater Ecosystems*, **8 (4)**, 455-475.
- Gerritson, J. (1995) Additive biological indices for resource management. *Journal of the North American Benthological Society*, **14**, 451-457.
- Girvan, J. and Foy, R. (2003) *Water Quality and Limnology of Lough Melvin (cSAC) – 1990 and 2001/02 (EHS CON 4/4/42)*. Report prepared for Environment and Heritage Service by Queens University Belfast and Department of Agriculture and Rural Development Northern Ireland.
- Godin, J.-G.J., Ed. (1997) *Behavioural Ecology of Teleost Fishes*. Oxford: Oxford University Press.
- Gowan, C., Young, M.K., Fausch, K.D., Riley, S.C. (1994) Restricted movement in resident stream salmonids: A lost paradigm? *Canadian Journal of Fisheries and Aquatic Sciences*, **51**, 2626-2637.

- Harcup, M.F., Williams, R., Ellis, D.M. (1984) Movements of brown trout, *Salmo trutta* L., in the river Gwyddon, South Wales. *Journal of Fish Biology*, **24**, 415-426.
- Harper, D (1990) *Eutrophication of Freshwaters: Principles, problems and restoration*. Chapman and Hall, New York.
- Harris, G. S. (1973) A simple egg box planting technique for estimating the survival of eggs deposited in stream gravel. *Journal of Fish Biology*, **5**, 85-88
- Harris, J.H. (1995) The use of fish in ecological assessments. *Australian Journal of Ecology*, **20**, 65-80.
- Harris, J.H. and Silveira, R. (1999) Large-scale assessments of river health using an Index of Biotic Integrity with low-diversity fish communities. *Freshwater Biology*, **41**, 235–252
- Harshbarger, T.J. and Porter, P.E. (1979) Survival of brown trout eggs: Two planting techniques compared. *The Progressive Fish Culturist*, **41 (4)**, 206-209
- Harshbarger, T.J. and Porter, P.E. (1982) Embryo survival and fry emergence from two methods of planting brown trout eggs. *North American Journal of Fisheries Management*, **2**, 84-89.
- Hausle, D.A. and Coble, D.W. (1976) Influence of sand in redds on survival and emergence of Brook trout (*Salvelinus fontinalis*). *Transactions of the American Fisheries Society*, **105**, 57-63.
- Hawkins, C. P., Norris, R. H., Hogue J. N. and Feminella, J. W. (2000) Development and evaluation of predictive models for measuring the biological integrity of streams. *Ecological Applications*, **10**, 1456-1477.
- Hayes, J. W., Leathwick J. R. and Hanchet S. M. (1989) Fish distribution patterns and their association with environmental factors in the Mokau River catchment, New Zealand. *New Zealand Journal of Marine and Freshwater Research*, **23**, 171-180.
- Heaney, S.I., Foy, R.H., Kennedy, G.J.A., Crozier, W.W. and O'Connor, W.C.K. (2001) Impacts of agriculture on aquatic systems: lessons learnt and new unknowns in Northern Ireland. *Marine and Freshwater Research*, **52**, 151-163.
- Heggenes, J. (1988) Effect of experimentally increased intraspecific competition on sedentary adult brown trout (*Salmo trutta*) movement and stream habitat choice. *Canadian Journal of Fisheries and Aquatic Sciences*, **45**, 1163-1172.
- Heggenes, J., Bagliniere, J.L., and Cunjak, R.A. (1999) Spatial niche variability for young Atlantic salmon (*Salmo salar*) and brown trout (*S. trutta*) in heterogenous streams. *Ecology of Freshwater Fish*, **8**, 1-21.
- Heimbuch, D.G., Wilson, H.T., Weisberg, S.B., Volstad, J.J.H. and Kazyak, P.F. (1997) Estimating fish abundance in stream surveys by using double-pass removal sampling. *Transactions of the American Fisheries Society*, **126**, 795-803.
- Hendry, K, Cragg-Hine, D., O'Grady, M., Sambrook, H. and Stephen, A. (2003) Management of habitat for rehabilitation and enhancement of salmonid stocks. *Fisheries Research*, **62**, 171-192.

- Hestagen, T. (1988) Movement of brown trout, *Salmo trutta*, and juvenile Atlantic salmon, *Salmo salar*, in a coastal stream in northern Norway. *Journal of Fish Biology*, **32**, 639-653.
- Hill, M.O. (1979) *DECORANA- a FORTRAN program for detrended correspondence analysis and reciprocal averaging*. Ithaca, New York: Ecology and Systematics, Cornell University.
- Hill, M.O. (1994) *DECORANA and TWINSpan, for ordination and classification of multivariate species data*. Institute of Terrestrial Ecology, England, 58pp.
- Hladik, M. and Kubecka, J. (2003) Fish migration between a temperate reservoir and its main tributary. *Hydrobiologia*, **504**, 251-266.
- Hohausova, E. (2000) Exchange rate and small-scale movements of fish between a river and its backwater. *Archiv für Hydrobiologie*, **147**, 485-504.
- Hooge, P.N. and Eichenlaub, W.B. and Solomon, E.K. (1997) Animal movement extension to Arcview v2. (<http://www.absc.usgs.gov/glba/gistools/>)
- Huet, M., (1959) Profiles and Biology of Western European Streams as Related to Fish Management. *Transactions of the American Fisheries Society*. **88**, 3, 155-163
- Hughes, S. and Hateley, J. (2002) Hydroacoustic fish stock assessment in lakes in England and Wales, in: Cowx, I. (Ed.) *Management and Ecology of Lake and Reservoir Fisheries*. Blackwell Science, UK, pp. 3-11. 2002
- Hynes, H.B.N. (1970) *The Ecology of Running Waters*. Liverpool University Press, Liverpool.
- Inoue, M. and Nunokawa, M. (2002) Effects of longitudinal variations in stream habitat structure on fish abundance: an analysis based on subunit-scale habitat classification. *Freshwater Biology*, **47**, 1594-1607.
- Irvine, K., Boelens, R., Fitzsimmons, J., Kemp, A. and Johnston, P. (2002) *Review of Monitoring and Research to Meet the Needs of the EU Water Framework Directive (2000-DS-5-M1) Final report*. Environmental protection Agency, Ireland, 147pp.
- Isaak, D.J. and Hubert, W.A. (2000) Are trout populations affected by reach-scale stream slope? *Canadian Journal of Fisheries and Aquatic Sciences*, **57**, 468-477.
- ISFC (2004) *Irish Specimen Fish 2004*. Annual Report of the Irish Specimen Fish Committee.
- Jackson, D.A. and Harvey, H.H. (1993) Fish and benthic invertebrates: community concordance and community-environment relationships. *Canadian Journal of Fisheries and Aquatic Sciences*, **50**, 2641-2651.

- Johnson, I.W. and Law, F.M. (1995) Computer models for quantifying the hydro-ecology of British Rivers. *J. COWEM*, **9**, 290-297
- Jonsson, B, (1985) Life history patterns of freshwater resident and sea-run migrant brown trout in Norway. *Transactions of the American Fisheries Society*, **114**, 182-194.
- John, D.M., Champ, W.S.T., and Moore, J.A. (1982) The changing status of *Characea* in four marl lakes in the Irish midlands. *Journal of Life Sciences*. Royal Dublin Society **4**, 47-71.
- Jordan, P. and Griffiths, D. (2005) *Salmonid populations and water quality in the Oona Water, Co. Tyrone*. Unpublished project report.
- Jordan, P., Menary, W., Daly, K., Kiely, G., Morgan, G., Byrne, P. and Moles, R. (2005) Patterns and processes of phosphorus transfer from irish grassland soils to rivers – integration of laboratory and catchment studies. *Journal of Hydrology* (special issue), **304**, 20-34.
- Joy, M.K. and Death, R.G. (2000) Development and application of a predictive model of riverine fish community assemblages in the Taranaki region of North Island, New Zealand. *New Zealand Journal of Marine and Freshwater Research*, **34**, 243-254.
- Joy, M. K. and Death, R. G. (2001) Control of freshwater fish and crayfish community structure in Taranaki, New Zealand: dams, diadromy or habitat structure? *Freshwater Biology*, **46**, 417-429.
- Joy, M. K. and Death, R. G. (2002) Predictive modelling of freshwater fish as a biomonitoring tool in New Zealand. *Freshwater Biology*, **47**, 2261-2275.
- Joy, M. K. and Death, R. G. (2003) Biological assessment of rivers in the Manawatu-Wanganui region of New Zealand using a predictive macroinvertebrate model. *New Zealand Journal of Marine and Freshwater Research*, **33**, 367-379.
- Joy, M.K. and Death, R.G. (2004) Application of the Index of Biotic Integrity Methodology to New Zealand Freshwater Fish Communities. *Environmental Management*, **34** (3), 415-428
- Karr, J.R. (1981) Assessment of biotic integrity using fish communities. *Fisheries*, **6** (6), 21-27
- Karr, J.R., Fausch, K.D., Angermeier, P.L., Yant, P.R. and Schlosser, I.J. (1986) Assessing biological integrity in running water: a method and its rationale. Illinois natural History Survey, Special publication 5
- Karr, J.R., Yant, P.R., Fausch, K.D. and Schlosser, I.J. (1987) Spatial and temporal variability of the index of biotic integrity in three Midwestern streams. *Transactions of the American Fisheries Society*, **116**, 1-11.
- Karr, J.R. (1991) Biological integrity: A long-neglected aspect of water resource management. *Ecological Applications*, **1**, 66-84
- Kelly, F. (1996) Fisheries Enhancement of the Rye Water, a tributary of the River Liffey. Ph.D. Thesis, National University of Ireland.
- Kelly, F.L. (2001) *Standard survey methodologies*. Unpublished EPA Q-values and fish project report. 18pp.

- Kelly, F.L. and Bracken, J.J. (1998) Fisheries enhancement of the Rye Water, a lowland river in Ireland. *Aquatic Conservation: River Restoration: The Physical Dimension*, **8 (1)**, 131-143.
- Kelly, M.G. and Whitton, B.A. (1998) Biological monitoring of eutrophication in rivers. *Hydrobiologia*, **384**, 55-67.
- Kelly-Quinn, M., Tierney, D. and Bracken, J.J. (1993) Survival of salmon, *Salmo salar L.*, eggs planted in upland streams. *Aquaculture and Fisheries Management*, **24**, 791-796.
- Kelly-Quinn, M., Tierney, D., Coyle, C. and Bracken, J.J. (1996) Factors affecting the susceptibility of Irish soft-water streams to forest-mediated acidification. *Fisheries Management and Ecology*, **3**, 287-301.
- Kennedy, G.J.A. and Strange, C.D. (1982) Efficiency of electric fishing for salmonids in relation to river width. *Fisheries Management*, **12**, 55-60.
- Kennedy, M. and Fitzmaurice, P. (1968) The biology of the bream *Abramis brama* (L.) in Irish waters. *Proceeding of the Royal Irish Academy*, **67 (section B)**, (5), 95-157.
- Kennedy, M. and Fitzmaurice, P. (1970) The biology of the tench *Tinca tinca* (L.) in Irish waters. *Proceeding of the Royal Irish Academy*, **69 (section B)**, (3), 31-82
- Kennedy, M. and Fitzmaurice, P. (1971) Growth and food of brown trout *Salmo trutta* L. in Irish waters. *Proceeding of the Royal Irish Academy*, **71 (section B)**, (18), 269-352
- Kennedy, M. and Fitzmaurice, P. (1972) Some aspects of the biology of the gudgeon *Gobio gobio* (L.) in Irish waters. *Journal of Fish Biology*, **4**, 425-440.
- Kennedy, M. and Fitzmaurice, P. (1973) Occurrence of cyprinid hybrids in Ireland. *Irish Naturalists Journal*, **17 (10)**, 349-351.
- Kennedy, M. and Fitzmaurice, P. (1974) Biology of the rudd *Scardinius erythrophthalmus* in Irish waters. *Proceeding of the Royal Irish Academy*, **74 (section B)**, (18), 245-303.
- Kenward, R. (2002) Radiotracking, A manual for wildlife radio tagging.
- Kenward, R.E. and Hodder, K.H. (1996) *Ranges V. An analysis system for biological location data*. Institute of Terrestrial Ecology, Wareham, UK.
- Kesminas, V. and Virbickas, T. (2000) Application of an adapted index of biotic integrity to rivers of Lithuania. *Hydrobiologia*, **422/423**, 257-270.
- Kestemont, P., Didier, J., Dewandel, F. and Micha, J.C. (1998) Preliminary results on the adaptation of a biotic index of fish integrity to a European river basin (The Meuse, Belgium). *Verh. Internationale Verein. Limnologie*, **26**, 1243-1244.
- Kilgour, B.W. and Barton, D.R. (1999) Associations between stream fish and benthos across environmental gradients in southern Ontario, Canada. *Freshwater Biology*, **41**, 553-556.
- Kondolf, G.M. and Wolman, M.G. (1993) The sizes of salmonid spawning gravels. *Water Resources Research*, **29 (7)**, 2275-2285.

- Krueger, C.C. and Waters, T.F. (1983) Annual production of macroinvertebrates in three streams of different water quality. *Ecology*, **64** (4), 840-850.
- Kubecka, J., Duncan, A., Duncan, W., Sinclair, D. and Butterworth, A. (1994) Brown trout populations of three Scottish lochs estimated by horizontal sonar and multimesh gillnets. *Fisheries Research*, **20**, 29-48.
- Ladle, M. and Casey, H. (1971) Growth and nutrient relationships of *Ranunculus pennicillatus* var. *calcareous* in a small chalk stream. In *Proceedings of the European Weed Research Council 3rd International Symposium on Aquatic Weeds*. pp.53-64. Oxford. Blackwell Scientific.
- Larkin, P.A. and Northcote, T.G. (1969) Fish as indices of eutrophication, in: *Eutrophication, Causes, Consequences, Correctives*. Proceedings of a Symposium, June 11-15, 1967, Madison, Wisconsin. National Academy of Sciences, Washington, D.C., pp.256-273.
- Le Cren, E.D. (1961) How many fishes survive, Yb. River Boards Association, **9**, 57-64.
- Lee, G., and Jones, A. (1991) Effects of Eutrophication on Fisheries. *Reviews in Aquatic Sciences*, **5**(3-4), 287-305.
- Lehane B.M., (2000) *The influence of afforestation on fish populations*, PhD Thesis (unpublished), National University of Ireland (University College Cork).
- Lehane, B.M., Walsh, B., Giller, P.S. and O'Halloran, J. (2001) The influence of small-scale variation in habitat on winter trout distribution and diet in an afforested catchment. *Aquatic Ecology*, **61**, 61-71.
- Lennox, L.J. and Toner, P.F. (1980) *The National Survey of Irish Rivers*. A third report on water quality. An Foras Forbartha, Water Resources Division. 104pp.
- Lisle, T.E. and Lewis, J. (1992) Effects of sediment transport on survival of salmonid embryos in a natural stream: A simulation approach. *Canadian Journal of Fisheries and Aquatic Sciences*, **49**, 2337-2344.

- Lobon-Cervia, J. and Utrilla, C.G. (1993) A simple model to determine stream trout (*Salmo trutta* L.) densities based on one removal with electrofishing. *Fisheries Research*, **15**, 369-378.
- Lobon-Cervia, J. and Fitzmaurice, P. (1988) Stock assessment , production rates and food consumption in four contrasting Irish populations of brown trout (*Salmo trutta* L.). *Polskie Archiwum Hydrobiologie*, **35**, 3-4.
- Lucas, M. C., Mercer, T., Batley, E., Frear, P. A., Peirson, G., Duncan, A. and Kubecka, J. (1998) Spatio-temporal variations in the distribution and abundance of fish in the Yorkshire Ouse system. *The Science of the Total Environment*, **210**, 437-455.
- Lucas, M.C. (2000) The influence of environmental factors on movements of lowland-river fish in the Yorkshire Ouse system. *Science of the Total Environment*, **251**, 223-232.
- Lyons, J. and Lucas, M.C. (2002) The combined use of acoustic tracking and echosounding to investigate the movement and distribution of common bream (*Abramis brama*) in the River Trent, England. *Hydrobiologia*, **483**, 265-273.
- Mac Lennan, D.N. and Simmonds (Eds.) (1992) *Fisheries and Plankton Acoustics*. Proceedings of an ICES International Symposium held in Aberdeen, Scotland 12-16 June 1995. *ICES Journal of Marine Sciences*, 535 pp.
- Mac Lennan, D.N. and Holliday, D.V. (1996) Fisheries and plankton acoustics: past, present, and future. *ICES Journal of Marine Science*, **53** (2), 513-516
- Maitland, P.S. and Campbell, R.N. (1992) *Freshwater Fishes*. Harper Collins, UK. 368pp.
- Manel, S., Dias, J. and Ormerod, S.J. (1999) Comparing discriminant analysis, neural networks and logistic regression for predicting species distributions: a case study with a Himalayan river bird. *Ecological Modelling*, **120**, 337-347.
- Manel, S., Williams, H.C. and Ormerod, S.J. (2001) Evaluating presence-absence models in ecology: the need to account for prevalence. *Journal of Applied Ecology*, **38**, 921-931.
- Mason, C.F. (1996) *Biology of Freshwater Pollution*. Pp.356. Longman group UK.
- McCarthy, D. and Kennedy, M. (1965) *The Biology of Irish Coarse Fishes: A Synopsis of Published Irish, British and Continental Data and of Current Irish Research on the Species found in Ireland*. Inland Fisheries Trust. Unpublished internal document.
- McCormick, F.H., Hughes, R.M., Kaufmann, P.R., Peck, D.V., Stoddard, J.L. and Herlihy, A.T. (2001) Development of an Index of Biotic Integrity for the mid Atlantic Highlands region. *Transactions of the American Fisheries Society*, **130**, 857-877.
- McCune, B. and Grace, J.B. (2002) *Analysis of Ecological Communities*. MJM Software Desing, USA. 300pp.
- McCune, B. and Mefford, M. J. (1997) *Multivariate Analysis of Ecological Data*. Gleneden Beach Oregon USA: MJM Software.
- McCune, B. and Mefford, M. J. (1999) *Multivariate Analysis of Ecological Data*. Version 4. MJM Software, Gleneden Beach Oregon USA.

- McDonnell, N. (2005) *The Relationship between Water Quality and Fish Stocks in Irish Rivers*. A Ph.D. thesis presented to the National University of Ireland.
- McGarrigle, M.L. (1998) Impact of eutrophication on Irish river water quality, in: Wilson, J.G. (Ed.) *Eutrophication in Irish Waters*, pp. 82-90, Royal Irish Academy, Dublin.
- McGarrigle, M.L. (2001) Eutrophication of Irish waters - from science to legislation and management. Went memorial Lecture. *Occasional papers in Irish science and Technology*, **24**, 1-17. Royal Dublin Society.
- McGarrigle, M.L., Bowman, J.J., Clabby, K.J., Lucey, J., Cunningham, P., MacCarthaigh, M., Keegan, M., Cantrell, B., Lehane, M., Cleneghan, C. and Toner, P.F. (2002) *Water Quality in Ireland 1998-2000*. Environmental Protection Agency, Wexford, Ireland. 128pp.
- McGinnity, P., O' Hea, B., Gallagher, T., Mills, P., Steinberg, H., Fitzmaurice, P., Delanty, K., O Maoileidigh, N., Mitchell, S. and Kelly, A. (1999) *A GIS Supported Estimate of Natural Atlantic Salmon Smolt Production for the river catchments of Northwest Co. Mayo, Ireland*. Final Report submitted in fulfilment of marine Research measure Research Contract 97.IR.MR.015. 44pp.
- McGinnity, P., Gargan, P., Roche, W., Mills, P. and McGarrigle, M. (2003) Quantification of the freshwater salmon habitat asset in Ireland using data interpreted in a GIS platform. *Irish Fisheries Ecology and Management Series: Number 3*, Central Fisheries Board, Dublin, Ireland
- McGovern, P. and McCarthy, T.K. (1992) Local movements of freshwater eels (*Anguilla anguilla* L.) in western Ireland. In: I.G. Priede and S.M. Swift (Eds.) *Wildlife Telemetry: remote monitoring and tracking of animals*, pp. 319-327. Chichester: Ellis Horwood.
- McCune, B. and Mefford, M. J. (1999) *Multivariate Analysis of Ecological Data*. Glenden Beach Oregon USA: MJM Software.
- MacKenzie, C. and Moring, J.R. (1988) Estimating survival of Atlantic salmon during the intragravel period. *North American Journal of Fisheries Management*, **8**, 45-49.
- Meador, M.R. and McIntyre, J.P. (2003) Effects of electrofishing gear type on spatial and temporal variability in fish community sampling. *Transactions of the American Fisheries Society*, **132**, 709-716.
- Mebane, C.A., Maret, T.R. and Hughes, R.M. (2003) An index of biological integrity (IBI) for Pacific Northwest Rivers. *Transactions of the American Fisheries Society*, **132**, 239-261.
- Met Eireann (2002) *Monthly Weather Bulletin*
- Met Eireann (2003) *Monthly Weather Bulletin*, No. 212, Met Eireann, Glasnevin Hill, Dublin 9.
- Milner, N.J., Wyatt, R.J., Barnard, S. and Scott, M.D. (1995) Variance structuring in stream salmonid populations, effect of geographical scale and implications for habitat models. *Bulletin Francais de la Peche et Pisciculture*, **337**, 387-339.

- Miltner, R.J. and Rankin, E.T. (1998) Primary nutrients and the biotic integrity of rivers and streams. *Freshwater Biology*, **40**, 145-158.
- Miranda, T.E. and Schramm, H.L. (2000) Selecting gear for monitoring fish assemblages. In: I.G. Cowx (ed). *Management and Ecology of River Fisheries*. Fishing News Books, Blackwell Science, Oxford, UK. pp 3-14
- Miranda, T.E., Driscoll, M.P., Allen, M.S. (2000) Transient physicochemical microhabitats facilitate fish survival in inhospitable aquatic plant stands. *Freshwater Biology*, **44**, 617-628.
- Mitro, M.G. and Zale, A.V. (2000) Predicting fish abundance using single-pass removal sampling. *Canadian Journal of Fisheries and Aquatic Sciences*, **57** (5), 951-961
- Moriarty, C. and Dekker, W. (1997) Management of the European eel. *Fisheries Bulletin (Dublin)*, **15**, 1-25.
- Moriarty, M. and Fitzmaurice, P.F. (2000) Origin and diversity of freshwater fishes in Ireland. *Verhandlungen Internationale Vereinigung fur Theoretische und angewandte Limnologie*, **27**, 128-130.
- Moss, D., Furse, M. T., Wright, J. F. and Armitage, P. D. (1987) The prediction of the macro-invertebrate fauna of unpolluted running-water sites in Great Britain using environmental data. *Freshwater Biology*, **17**, 41-52.
- National Salmon Commission (2006) *The Status of Irish Salmon stocks in 2005 and Precautionary Catch Advice for 2006*. Report of the Standing Scientific Committee of the National Salmon Commission.
- Norris, R.H. (1996) Predicting water quality using reference conditions and associated communities. In: Bailey, R.C., Norris, R.H. and Reynoldson (Eds.) *Study Design and Data Analysis in Benthic macroinvertebrate Assessments of Freshwater Ecosystems using a reference site approach*, pp. 32-52. Technical Information Workshop, North American Benthological Society, 44th Annual Meeting, Kalispell, Montana.
- Oberdorff, T., Pont, D., Hugueny, B. and Chessel, D. (2001) A probabilistic model characterizing fish assemblages of French rivers: a framework for environmental assessment. *Freshwater Biology*, **46**, 399-415.
- O'Connor, W.C.K. (1998) The effects of siltation on Atlantic salmon, *Salmo salar* L., embryos in the river Bush. *Fisheries Management and Ecology*, **5**, 393-401.
- O'Grady, M.F. (1981) Some direct gillnet selectivity tests for brown trout populations. *Irish Fisheries Investigations, Series A (Freshwater)*, **No. 22**, 9pp.
- O'Grady, M.F., King, J.J. and Curtin, J. (1991) The effectiveness of the physical instream works programmes in enhancing salmonid stocks in a drained Irish lowland river, in: Mills, D. (Ed.). *Strategies for the rehabilitation of salmon rivers*. Linnaean Society, London.
- O' Neill, I.J. and Hale, P.R. (1998) *The Biological Quality of Northern Ireland Rivers during 1997 and 1998*. IRTU Technical report. TI 199805282.
- O' Neill, I.J. and Hale, P.R. (2000) *The Biological Quality of Northern Ireland Rivers during 2000*. IRTU Technical report. TI 200000324.

- Olden, J. D., Jackson, D. A. and Peres-Neto, P. R. (2002) Predictive models of fish species distributions: A note on proper validation and chance predictions. *Transaction of the American Fisheries Society*, **131**, 329-336.
- Ormerod, S.J. and Edwards, R.W. (1987) The ordination and classification of macroinvertebrate assemblages in the catchment of the River Wye in relation to environmental factors. *Freshwater Biology*, **17**, 533-546.
- Ottaway, E.M. and Carling, P.A. (1981) Observations on the structure of brown trout, *Salmo trutta* Linnaeus, redds. *Journal of Fish Biology*, **19**, 593-607.
- Ovidio M. and Phillippart, J.C. (2000) Methodological bias in home range and mobility estimates when locating radio-tagged trout, *Salmo trutta*, at different time intervals. *Aquatic Living Resources*, **13**, 449-454.
- Paavola, R., Muotka, T., Virtanen, R., Heino, J. and Kreivi, P. (2003) Are biological classifications of headwater streams concordant across multiple taxonomic groups? *Freshwater Biology*, **48**, 1912-1923.
- Parr, L.B. and Mason, C.F. (2003) Long-term trends in water quality and their impact on macroinvertebrate assemblages in eutrophic lowland rivers. *Water Research*, **37**, 2969-2979.
- Parsons, M. and Norris, R.H. (1996) The effect of habitat-specific sampling on biological assessment of water quality using a predictive model. *Freshwater Biology*, **36**, 419-434.
- Paskowski, C.A. and Tonn, W.M. (2000) Community concordance between the fish and aquatic birds of lakes in northern Alberta, Canada: the relative importance of environmental and biotic factors. *Freshwater Biology*, **43**, 421-437.
- Penczak, T. (1985) Influence of site area on the estimation of the density of fish populations in a small river. *Aquaculture and Fisheries Management*, **1**, 273-285.
- Peterson, R.H. and Metcalfe, J.L. (1981) Emergence of atlantic salmon fry from gravels of varying composition: A laboratory study. *Canadian Technical Report of Fisheries and Aquatic Sciences*, **1020**, 1-13.
- Plafkin, J.L., M.T. Barbour, K.D. Porter, S. K. Gross, and R.M. Hughes. (1989) *Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish*. EPA/444/4-89-001. U.S. Environmental Protection Agency, Washington, D.C.
- Pont, D., Hugueny, B., Beier, U., Goffaux, D., Melcher, A., Noble, R., Rogers, C., Roset, N. and Schmutz, S. (2006) Assessing river biotic condition at a continental scale: A European approach using functional metrics and fish assemblages. *Journal of Applied Ecology*, **43**, 70-80.
- Pretty, J.L., Harrison, S.S.C., Shepherd, D.J., Smith, C., Hildrew, A.G. and Hey, R.D. (2003) River rehabilitation and fish populations: assessing the benefit of instream structures. *Journal of Applied Ecology*, **40**, 251-265.
- Raven, P.J., Holmes, N.T.H., Dawson, F.H., Fox, P.J.A., Everard, M., Fozzard, I.R. and Rouen, K.J. (1998) *River Habitat Quality: the Physical Character of Rivers and Streams in the UK and Isle of Man*. Environment Agency, River Habitat Survey Report No. 2, 84pp.

- Reynolds, J.D. (1998) *Ireland's Freshwaters*. 130pp. The Marine Institute, Dublin.
- Reynolds, L., Herlihy, A.T., Kaufmann, P.R., Gregory, S.V. and Hughes, R.M. (2003) Electrofishing effort requirements for assessing species richness and biotic integrity in western Oregon streams *North American Journal of Fisheries Management*, 23, 450-461.
- Reynoldson, T.B. and Bailey, R.C. (1995) Biological guidelines for freshwater sediment based on Benthic Assessment of Sediment (the BEAST) using a multivariate approach for predicting biological state. *Australian Journal of Ecology*, 20, 198-219
- Riley, S.C. and Fausch, K.D. (1995) Trout population responses to habitat enhancement in six northern Colorado streams. *Canadian Journal of Fisheries and Aquatic Sciences*, 52, 34-53.
- Roche, W. (1995) River Crana habitat monitoring programme: Substrate analysis study No.2. Central Fisheries Board.
- Rosell, R. (2001) Changes in the fish populations of Lower Lough Erne, 1970-2000. In: Moriarty, Christopher (ed.). Proceedings Institute of Fisheries Management 31st Annual Field Study Course : Catchment Management Trinity College, Dublin p.74-78.
- Rosenfeld, J.S. and Boss, S. (2001). Fitness consequences of habitat use for juvenile cutthroat trout: energetic costs and benefits in pools and riffles. *Canadian Journal of Fisheries and Aquatic Sciences*, 58, 585-593.
- SAS (2000) *SAS/STAT Version 8.2*. Cary, North Carolina: SAS Institute Inc.
- Schmutz, S., Kaufmann, M., Vogel, B., Jungwirth, M. And Muhar, S. (2000) A multi-level concept for fish-based, river-type-specific assessment of ecological integrity. *Hydrobiologia*, 422/423, 279-289.
- Scott, M.C. and Hall, Jr. L.W. (1997) Fish assemblages as indicators of environmental degradation in Maryland coastal plain streams. *Transactions of the American Fisheries Society*, 126 (3), 349-360.
- Seaby, R., Henderson, P., Predergast, J. and Somes, R. (2004) *Community Analysis Package 3.0 – Searching for structure in community data*. Pisces Conservation Ltd, UK. 119pp.
- Sedgwick, S.D. (1982) *The Salmon Handbook*. 242PP. Andre Deutsch Ltd. London.
- Shumway, D.L., Warren, C.E. and Doudoroff, P. (1964) Influence of oxygen concentration and water movement on the growth of steelhead trout and coho salmon embryos. *Transactions of the American Fisheries Society*, 93 (4), 342-356
- Silver, S.J., Warren, C.E. and Doudoroff, P. (1963) Dissolved oxygen requirements of developing steelhead trout and chinook salmon embryos at different water velocities. *Transaction of the American Fisheries Society* 92, 327-343
- Simpson J. and Norris R. H. (2000) Biological assessment of water quality: development of AUSRIVAS models and outputs. In: Wright, J. F., Sutcliffe, D. W. and Furse, M. T. (Eds.) *Assessing the biological quality of freshwaters. RIVPACS and other Techniques*, pp. 125-142. Ambleside, UK: Freshwater Biological Association.

- Smith M. J., Kay W. R., Edward D. H. D., Papas P. J., Richardson K. S. J., Simpson J. C., Pinder A. M., Cale D. J., Horwitz P. H. J., Davis J. A., Yung F. H., Norris R. H. and Halse S. A. (1999) AusRivAS: using macroinvertebrates to assess ecological condition of rivers in Western Australia. *Freshwater Biology*, **41**, 269-282.
- Soulsby, C., Youngson, A.F., Moir, H.J. and Malcolm, I.A. (2001) Fine sediment influence on salmonid spawning habitat in a lowland agricultural stream: a preliminary assessment. *The Science of the Total Environment*, **265**:295-307.
- Southwood, T.R.E. and Henderson, P.A. (2000). *Ecological Methods*. Blackwell Science Publications, Oxford, UK.
- Strahler, A.N. (1952) Hypsometric (area-altitude) analysis of erosional topography. *Bulletin of the Geological Society of America*, **63**, 1117-1142
- Stichert, N.D., Hubert, W.A. and Skinner, Q.D. (2001). A test of factors hypothesized to influence biomass of salmonids in Rocky Mountain streams. *Journal of Freshwater Ecology*, **16**, 493-500.
- Stoneman, C.L. and Jones, M.L. (2000) The influence of habitat features on the biomass and distribution of three other species in southern Ontario stream salmonines. *Transactions of the American Fisheries Society*, **129**, 639-657.
- Strahler (1952) Hypsometric (area-altitude) analysis of erosional topography. *Bulletin of the Geological Society of America*, **63**, 1117-1142.
- Strange, C.D., Apprahamian, M.W. and Winstone, A.J. (1989). Assessment of a semi-quantitative electric fishing sampling technique for juvenile Atlantic salmon, *Salmo salar* L. and trout *Salmo trutta* L. in small streams. *Aquaculture and Fisheries Management*, **20**, 485-492.
- Sweeney, J., Donnelly, A., McElvain, L. and Jones, M. (2002) *Climate Change Indicators for Ireland*. ERTDI report series, No. 2. Environmental Protection Agency, Wexford.
- Ter Braak, C.J.F. (1986) Canonical Correspondence analysis: a new eigenvector method for multivariate direct gradient analysis. *Ecology*, **67**, 1167-1179.
- Ter Braak, C.J.F. and Prentice, I.C. (1988) A theory of gradient analysis. *Advances in Ecological Research*, **18**, 93-138.
- Ter Braak, C. J. F., and P. Smilauer (1998) CANOCO Reference Manual and User's Guide to CANOCO for Windows: Software for Canonical Community Ordination (version 4). Microcomputer Power (Ithaca, NY USA) 352 pp.
- Thiel, R., Sepulveda, A., Kafemann, R. and Nellen, W. (1995) Environmental factors as forces structuring the fish community of the Elbe Estuary. *Journal of Fish Biology*, **46** (1), 47-69.
- Tikkanen, P., Huhta, A. and Muotka, T. (2000) Determinants of substrate selection in lotic mayfly larvae: is cryptic coloration important? *Archiv fur Hydrobiologie*, **148**, 45-57.
- Townsend C. R., Hildrew A. G. and Francis J. (1983) Community structure in some southern English streams: the influence of physicochemical factors. *Freshwater Biology*, **13**, 521-544.

- Turnpenny, A.W.H., Sadler, K., Aston, R.J., Milner, A.G.P. and Lynam, S. (1987). The fish populations of some streams in Wales and northern England in relation to acidity and associated factors. *Journal of Fish Biology*, **31**, 415-434.
- Turnpenny, A.W.H. and Williams, R. (1980) Effects of sedimentation on the gravels of an industrial river system. *Journal of Fish Biology*, **17**, 681-693.
- Turnpenny, A.W.H. and Williams, R. (1981) Factors Affecting the Recovery of Fish Populations in an Industrial River. *Environmental Pollution Series A*, **26**, (1), 39-58
- Vannote, R.L., Minshall, G.W., Cummins, K.W., Sedell, J.R. and Cushing, C.E. (1980) The river continuum concept. *Canadian Journal of Fisheries and Aquatic Sciences*, **37**(1), 130-137,
- Walley, W. J. and Fontama, V.N. (2000) New approaches to river quality classification based upon Artificial intelligence. In: *Assessing the biological quality of freshwaters. Rivpacs and other Techniques* (Eds. Wright, J.F., Sutcliffe, D.W. and Furse, M.T.). Freshwater Biological Association, UK.
- Wallin, M., Wiederholm, T. and Johnson, R.K. (2003) *Guidance on Establishing Reference Conditions and Ecological Status Class Boundaries for Inland Surface Waters*. CIS Working Group 2.3-REFCOND)
- Walsh, C.T. and Pease, B.C. (2002) The use of clove oil as an anaesthetic for the longfinned eel, *Anguilla reinhardtii* (Steindachner). *Aquaculture*, **33**, 627-635.
- Weatherley, N.S., Rogers, A.P., Goenaga, X. and Ormerod, S.J. (1990) The survival of early life stages of brown trout (*Salmo trutta L.*) in relation to aluminium speciation in upland Welsh streams. *Aquatic Toxicology*, **17**, 213-230.
- Welcomme, R.L. (1985) *River Fisheries*. FAO Fisheries Technical Paper (262), 330pp.
- Went, A.E.J. (1945) The Distribution of Irish Char (*Salvelinus* spp.). *Proceedings of the Royal Irish Academy*, **50B**, 8.
- Went, A.E.J. (1950) Notes on the introduction of some freshwater fish into Ireland. *Journal of the Department of Agriculture* **47**, 3-7.
- Went, A.E.J. (1957) The pike in Ireland. *Irish Naturalists Journal*, **12**, 177-182.
- Went, A.E.J. (1979) Two Elasmobranchs Scarce in Irish Waters. *Irish Naturalists Journal*, **19**(11), 381-383.
- Went, A.E.J. and Kennedy, M. (1969) List of Irish Fishes. Stationery Office.
- Went, A.E.J. and Kennedy, M. (1976) List of Irish Fishes. Stationery Office.
- White, G.C., and Garrott, R.A. (1990) *Analysis of Wildlife Radiotracking Data*. Academic Press, Inc., Toronto, Canada, 383pp.
- Williams, R.J., White, C., Harrow, M.L. and Neal, C. (2000) Temporal and small-scale spatial variations of dissolved oxygen in the river Thames, Pang and Kennet, UK. *The Science of the Total Environment*, **251/252**, 497:510
- Wills, D.W. and Murphy, B.R. (1996) Planning for sampling. In: B.R. Murphy and D.W. Mills (eds.) *Fisheries Techniques*, second edition. Bethesda, MA: American Fisheries Society, pp 1-15.

- Witzel, L.D. and MacCrimmon, H.R. (1983) Embryo survival and alevin emergence of brook charr, *Salvelinus fontinalis*, and brown trout, *Salmo trutta*, relative to redd gravel composition. *Canadian Journal of Zoology*, **61**, 1783-1792.
- Wootton, R.J. (1992) *Fish Ecology*. Blackie and Son Ltd. Glasgow, UK.
- Wright, J. F. (1995) Development and use of a system for predicting the macroinvertebrate fauna in flowing waters. *Australian Journal of Ecology*, **20**, 181-197.
- Wright, J. F., Furse, M. T. and Armitage, P. D. (1993) RIVIPACS- a technique for evaluating the biological quality of rivers in the UK. *European Water Pollution Control*, **3**, 15-25.
- Wright, J.F., Moss D., Armitage, P.D. and Furse, M.T. (1984) a preliminary classification of running water-sites in Great Britain based on macro-invertebrate species and the prediction of community type using environmental data. *Freshwater Biology*, **14**, 221-256.
- Wright, J.F. (2000) An introduction to RIVPACS, in: Wright, J.F., Sutcliffe, D.W and Furse, M.T. (Eds.) *Assessing the Biological Quality of Freshwaters*, 1-24. Freshwater Biological Association, UK
- Wyatt, R.J. (2002) Estimating riverine fish population size from single- and multiple-pass removal sampling using a hierarchical model. *Canadian Journal of Fisheries and Aquatic Sciences*, **59**, 695-706.
- Young, M.K. (1994) Mobility of brown trout in south-central Wyoming streams. *Canadian Journal of Zoology*, **72**, 2078-2082.
- Young, M.K. (1999) Summer diel activity and movement of adult brown trout in high-elevation streams in Wyoming, U.S.A. *Journal of Fish Biology*, **54**, 181-189.
- Zalewski, M. and Cowx, I.G. (1990) Factors affecting the efficiency of electric fishing. In: *Fishing with electricity* (Cowx, I.G. and Lamarque, P. eds). Fishing News Books, Blackwell Scientific Publications, Oxford.
- Zar, J.H. (1999) *Biostatistical Analysis (Fourth Edition)*, New Jersey: Prentice Hall.
- Zippin, C. (1956) An evaluation of the removal method of estimating animal populations. *Biometrics*, **12**, 163-169.
- Zippin, C. (1958) The removal method of population estimation. *Journal of Wildlife Management*, **22** (1), 82-90.

