

10. Data & research requirements

10.1. Evaluation of current data

The adequacy of current local and national data for assessing the status of fish and fisheries in Argyll are described;

10.1.1. Juvenile fish

There are three main methods of undertaking electrofishing surveys to provide estimates of juvenile salmonid fish distribution & abundance in Argyll;

Survey Method	Advantages	Disadvantages	Adequacy
Fully quantitative	Higher confidence Robust estimates	Resource intensive Fewer sites sampled <10m wide sites	Only used in impact assessments
Semi-quantitative	Resource efficient	Lower confidence Semi-robust estimates <10m wide sites	Used to assess tributary streams
Timed	Resource efficient >10m wide sites	Lower confidence Semi-robust estimates No established protocols	Used to assess all main river sites >10m wide

10.1.2. Adult fish counts

There are four main methods used to estimate adult fish abundance in Argyll;

Survey Method	Advantages	Disadvantages	Adequacy
Fish Counter	Higher confidence Robust estimates Real-time data	Resource intensive Fewer sites sampled Site specific	One sampling point in Argyll
Rod catch data	Resource efficient	Moderate confidence Semi-robust estimates Under-reporting	Used to assess general trends
Snorkel survey	Resource efficient High confidence	Site specific Robust estimates No established protocols	Used to assess priority populations
Genetic sampling	Higher confidence Robust estimates Other benefits	Resource intensive	Has been used to great effect in exploitation control & overall management

10.1.3. Spawning activity

There is one main methods used to estimate spawning activity in Argyll;

Survey Method	Advantages	Disadvantages	Adequacy
Redd survey	Resource efficient High confidence Complements habitat data	Site specific Semi-robust estimates No established protocols	Used to assess priority populations

10.1.4. Habitat survey

There are two main methods used to estimate adult fish abundance in Argyll, but data collected with SFCC protocols do not translate well for reporting or management requirements in Argyll.

Survey Method	Advantages	Disadvantages	Adequacy
Full SFCC	High definition Electrofishing sites	Resource intensive No ID of river processes Not GIS based Poor data for analysis	No longer used
Short SFCC	Resource efficient	Lower definition No ID of river processes Not GIS based Poor data for analysis	Used to assess general characteristics

10.1.4. Post-smolt sampling

There is one methodology currently used to assess the health of post-smolt sea trout in Argyllshire sea lochs.

Survey Method	Advantages	Disadvantages	Adequacy
Seine net & coble	Fish friendly	Resource intensive Low productivity	Has been relatively successful

10.2. Future research priorities

There are a number of knowledge gaps that require further research to improve our understanding of the fisheries resources and inform best-practice management.

A. Identify factors underpinning productivity of fisheries

A1. Understand fish population structures

Genetic research & management information

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| a. Identify genetic structuring of priority species |
| b. Establish life-history & behavioural traits linked to genetic & environmental factors |
| c. Estimate abundance & identify vulnerable sub-components |
| d. Assess exploitation of sub-components by fisheries |

A2. Understanding fish ecology

Assessment of fish populations & habitats across the region

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| a. Develop guidelines for robust broad-scale monitoring programmes of fish populations |
| b. Fine-tuning of classification scheme to assess juvenile fish abundance across a range of habitat types |
| c. Quantify the relative severity of common factors limiting productivity of priority species & habitats |
| d. Translate the potential affects of limiting factors into prioritisation of management activities |

A3. Management of aquatic ecosystems

Maximise potential benefits of holistic conservation approach to management

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| a. Identify & quantify benefits of multi-species approach to fisheries management |
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B. Improve Management of the fishery resource

B1. Fisheries administration

Produce a Strategic Fisheries Management Plan for Argyll

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| a. Identify & quantify benefits of an all-species regional fisheries management structure |
| b. Identify improved pathways of communication between national, regional & local groups |
| c. Identify & quantify cost benefits to nurturing the development of a full network of local management groups |
| d. Identify & quantify cost benefits of improving communications & cross-sector working with non-fishery management groups |

B2. Exploitation of fish resources

Develop a regional strategy for controlling exploitation of resources

- a.** Identify & quantify benefits of establishing a network of fish counters to provide real-time information on migratory fish abundance
- b.** Provide robust information & guidance to regional groups on benefits & challenges of estimating conservation limits/spawning targets for priority fisheries

B3. Informing regional improvement initiatives

Provide information to support demonstration & education projects

- a.** Establish robust guidelines for fine-scale pre and post habitat improvement project assessment of changes in fish & habitat variables
- b.** Develop information pack on benefits to salmonid recruitment & consequential improvements of fish populations to support catch & release workshops
- c.** Develop information pack on biology & ecology of salmonid recruitment to support redd survey workshops
- d.** Develop information pack on benefits of fishery management techniques to inform local management groups

C. Improving the management of land and water resources.

C1. Understanding & mitigating potential impacts of aquaculture related issues

Inform development of the Area management Agreement process

- a.** Provide a robust assessment of the mitigation required by the developing aquaculture industry to sustain wild fisheries populations & fisheries
- b.** Provide clear information on relative biological and ecological affects of variable lice burdens on post-smolts of salmon & sea trout
- c.** Provide robust monitoring protocols that will detect percentage changes in the abundance of priority fish populations affected by aquaculture developments
- d.** Provide robust guidelines on management strategies to maximise benefits of restoration initiatives (particularly stocking) to wild fish populations
- e.** Establish techniques to identify & quantify genetic related impacts of interactions between wild & escapee farmed salmon

C2. Understanding & mitigating potential impacts of the use of water resources

Provide information to better manage water resources

- a.** Provide robust estimates of changes in productivity as a consequence of a range of common water development types
- b.** Establish estimates of exacerbated changes in productivity as a consequence of multiple uses of water resources
- c.** Establish robust estimates of changes in productivity as a consequence to impoundment on river processes, such as bed material transport,
- d.** Identify & quantify benefits of a range of mitigation initiatives

C3. Understanding & mitigating potential impacts of the use land resources

Develop regional plan to engage land resource users & minimise impacts

- a.** Provide robust estimates of changes in productivity as a consequence of a range of common land development types
- b.** Establish estimates of exacerbated changes in productivity as a consequence of multiple uses of land resources
- c.** Establish robust estimates of changes in productivity as a consequence to climate change & associated land use on river processes, such as bed material transport,
- d.** Identify & quantify benefits of a range of mitigation initiatives

D. Engage with wider management considerations

D1. Understand mechanisms & mitigation required to prevent decline in productivity

Develop strategic bio-security management plan

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| a. Identify & quantify benefits of maintaining & improving bio-security of the resource |
| b. Identify all vectors & pathways of potential threats to bio-security |
| c. Identify & quantify methodologies & resources requires to remove threats to bio-security |

D2. Inform public awareness of fishery issues

Identify pathways & methodology to inform other interests of fishery issues

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| a. Identify effective strategies for communicating priority fisheries issues to the general public |
| b. Identify effective strategies for communicating priority fisheries issues to the angling fraternity |
| c. Identify cost effective scales & procedures to deliver an expanded schools education programme |

D3. Improve the quality of fisheries data

Develop improvements to survey techniques & protocols

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| a. Identify ways of improving cost effectiveness of existing juvenile fish sampling techniques & programmes for both broad & fine-scale monitoring |
| b. Develop protocols for snorkel survey counts of adult fish |
| c. Develop protocols for Redd survey counts |
| d. Develop a more cost effective and end-user friendly habitat survey technique with full GIS compatibility |

E. Develop fisheries management at the local scale

E1. River Management & Fisheries Restoration

Inform River Management & Fisheries Restoration Plans

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| a. Identify a robust framework for planning river management & restoration of fisheries |
| b. Develop protocols for cost-effective initiatives to mitigate against priority limiting factors |
| c. Develop protocols for cost-effective sampling techniques to evaluate progress |
| d. Identify opportunities for a cross-sector approach to catchment-wide habitat & resource management |

E2. Local management of fishery resource

Provide mechanisms to improve the accessibility & quality of fish habitats

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| a. Establish criteria upon which to assess data on habitat accessibility & quality |
| b. Provide targets for optimal stocking density of a range of habitat types |
| c. Establish criteria upon which to assess spatial distribution of habitats suitable for each life-stage of priority species |
| d. Provide best-practice guidelines for removing & breaching obstacles to fish migration |

10.3. Research methodology

The data collection methods and sampling sites required to achieve research priorities in Argyll are described;

10.3.1. Identify factors underpinning productivity of fisheries - Understand fish population structures in priority catchments

Genetic sampling & identification of structuring - Methods
a. Broad-scale sampling of juvenile fish populations
b. Scale sampling & age determination
c. Length-frequency distributions
d. Assessment of catchment scale topographical features

Management Unit	Catchment	Species	No. Sites	No. Samples
A. Loch Linnhe	R. Creran	Salmon & trout	4 x 50	200
	R. Etive	Salmon & trout	2 x 50	100
	R. Kinglass	Salmon & trout	4 x 50	200
	R. Awe / Orchy	Salmon & trout	8 x 50	400
	Loch Awe	Trout	8 x 50	400
B. Lower Firth of Lorn	R. Add	Salmon & trout	10 x 50	500
C. Kintyre	Barr Water	Salmon & trout	2 x 50	100
	Machrihanish	Salmon & trout	4 x 50	200
	Glenlussa W.	Salmon & trout	4 x 50	200
	Carradale W.	Salmon & trout	4 x 50	200
D. Loch Fyne	R. Kinglas	Trout	2 x 50	100
	R. Fyne	Salmon & trout	2 x 50	100
	R. Shira	Salmon & trout	2 x 50	100
	R. Aray	Salmon & trout	4 x 50	200
E. South Argyll	R. Ruel	Salmon & trout	4 x 50	200
	R. Eachaig	Salmon & trout	6 x 50	300
	R. Goil	Salmon & trout	2 x 50	100
F. Isle of Mull	R. Aros	Salmon & trout	2 x 50	100
	R. Forsa	Salmon & trout	2 x 50	100
	R. Lussa	Salmon & trout	4 x 50	200
	R. Ba	Salmon & trout	6 x 50	300
G. Islay & Jura	R. Laggan	Salmon & trout	4 x 50	200
	L. Gorm	Trout	1 x 50	50
H. Isle of Arran	Iorsa Water	Salmon & trout	4 x 50	200
	Machrie W.	Salmon & trout	4 x 50	200
	Glenrosa W.	Salmon & trout	4 x 50	200

10.3.2. Understanding fish ecology**Assessment of fish populations across the region**

a. Broad-scale electrofishing sampling programme of juvenile fish in priority catchments across the region

b. Fine-scale electrofishing sampling programme of juvenile fish in priority catchments

c. Baseline electrofishing sampling programme of juvenile fish in all catchments

d. Baseline surveys of loch habitats in all catchments

A. Broad-scale sampling programme in priority catchments across the region (3 year)

Area	Catchment	Main factors	No. sites	Other factors
A. Loch Linnhe & Firth of Lorn	R. Creran	Restoration	6	AMA monitoring
	R. Etive	Stocking	6	Stocking
	R. Kinglass	Stocking	8	Stocking
	R. Awe / Orchy	Exploitation	12	AMA monitoring
	Loch Awe	Exploitation	12	Stocking
B. Lower Firth of Lorn	R. Nell	Exploitation	8	AMA monitoring
	R. Euchar	Exploitation	8	Hydro
	R. Add	Exploitation	12	Hydro
C. Kintyre	Barr Water	Exploitation	6	AMA monitoring
	Machrihanish	Exploitation	6	Habitat
	Glenlussa W.	Exploitation	6	Hydro
	Carradale W.	Exploitation	8	Habitat
D. Loch Fyne	R. Kinglas	Restoration	8	AMA monitoring, hydro
	R. Fyne	Restoration	10	stocking, hydro
	R. Shira	Restoration	8	Hydro
	R. Aray	Restoration	10	AMA monitoring
E. South Argyll	R. Ruel	Restoration	8	AMA monitoring, hydro
	R. Eachaig	Exploitation	10	AMA monitoring
	R. Goil	Exploitation	6	AMA monitoring
F. Isle of Mull	R. Aros	Exploitation	6	AMA monitoring stocking
	R. Forsa	Exploitation	6	AMA monitoring
	R. Lussa	Exploitation	8	stocking
	R. Ba	Exploitation	8	
G. Islay & Jura	R. Laggan (Islay)	Exploitation	8	AMA control
	R. Sorn (Islay)	Exploitation	6	
	R. Lussa (Jura)	Exploitation	6	hydro
H. Isle of Arran	Iorsa Water	Restoration	6	AMA monitoring, stocking
	Machrie W.	Restoration	6	
	Glenrosa W.	Exploitation	6	
		Total sites	224	

Argyll Fisheries Trust – 10. Data & Research requirements

B. Fine-scale sampling programme of juvenile fish in priority catchments (yearly)

Area	Catchment	Main factors	No. sites	Other factors
A. Loch Linnhe & Firth of Lorn	R. Creran	Restoration	10	AMA monitoring
	R. Awe / Orchy	Exploitation	12	AMA monitoring
	Loch Awe	Exploitation	12	Stocking
D. Loch Fyne	R. Kinglas	Restoration	8	Stocking
	R. Fyne	Restoration	10	Stocking
	R. Shira	Restoration	8	Habitat
	R. Aray	Restoration	10	Stocking
E. South Argyll	R. Ruel	Restoration	8	Stocking
	R. Eachaig	Exploitation	10	Stocking
		Total	88	

C. Repeat baseline sampling in medium priority catchments (5 years)

Area	Catchment	Main factors	No. sites	Other factors
A. Loch Linnhe & Firth of Lorn	R. Nant	AMA monitoring	6	Hydro
	Loch Avich	Exploitation	6	Aquaculture
B. Lower Firth of Lorn	Barbreck R.	AMA monitoring	8	AMA monitoring
	R. Oude	Hydro	8	Aquaculture
	Kilmelford lochs	Exploitation	4	Aquaculture
C. Kintyre	Ormsary W.	AMA monitoring	6	Hydro
	Clachan Burn		6	Hydro
	Breackerie W.		6	Habitat
	Conieglen W.		6	Habitat
	Saddell W.		6	Habitat
	Claonaig W.		6	
D. Loch Fyne	Kilfinan R.	AMA monitoring	6	Hydro Abstraction
	Douglas W.		6	
	Leacann W.		6	
E. South Argyll	Ardyne Burn	AMA monitoring	8	Habitat
F. Isle of Mull	Coilador River	AMA monitoring	6	Habitat
	Bunessan River		6	Abstraction
	R. Bellart		8	Habitat
	R. Coladoir		8	Habitat
H. Isle of Arran	Slidery Water	AMA monitoring	6	Stocking
		Total sites	128	

Argyll Fisheries Trust – 10. Data & Research requirements

D. New baseline sampling in medium priority catchments (5 years)

Area	Catchment	Main factors	No. sites	Other factors
A. Loch Linnhe & Firth of Lorn	R. Noe R. Liver	AMA monitoring	6 6	Species distribution
B. Lower Firth of Lorn				
C. Kintyre	Bardaravine R. Skipness R.	AMA monitoring	6 6	Species distribution
D. Loch Fyne	Auchalick R.	AMA monitoring	6	Species distribution stocking
E. South Argyll	Glen Finart B. Croe Water Loin Water	AMA monitoring	6 6 6	Species distribution
F. Isle of Mull	Mingary Burn Leidle River Kilfinchin River	AMA monitoring	6 6 6	Species distribution
G. Islay & Jura	River Leoig Kilbride River Carrabus Burn Crackaig River Glenbatrick R. Shian River	AMA monitoring	6 6 6 6 6 6	Species distribution
H. Isle of Arran	N. Sannox W. Sannox Water Kilmory Water Black Water	AMA monitoring	6 6 6 6	Species distribution
		Total sites	126	

Argyll Fisheries Trust – 10. Data & Research requirements

E. New baseline & Repeat sampling in low priority catchments (10 years)

Area	Catchment	Main factors	No. sites	Other factors
A. Loch Linnhe & Firth of Lorn	Stockdale	Baseline	3	AMA monitoring Species distribution Hydro
	An Iola	Baseline	3	
	Abhainn Teithil	Baseline	3	
	Dearg Abhainn	Baseline	3	
	Esragan Burn	Repeat	3	
	Abhainn Dalach	Baseline	3	
	Allt Easach	Baseline	3	
	Allt Coire	Baseline	3	
	Allt Ghiusachan	Baseline	3	
	Lusragan Burn	Baseline	3	
B. Lower Firth of Lorn	Black Lynn B.	Baseline	3	AMA monitoring
	Allt Chriche	Baseline	3	
	Allt Dallermaig	Baseline	3	
	A. na Cille	Repeat	3	
C. Kintyre	Linne Burn	Repeat	3	AMA monitoring
	The Lussa	Baseline	3	
	Allt Cinn-locha	Baseline	3	
	Barranlongart	Baseline	3	
	Crear Burn	Baseline	3	
	A.L.an Uinnsinn	Repeat	3	
	A. nan Gillean	Repeat	3	
	A. na Cuile	Baseline	3	
	Bardaravine R.	Baseline	3	
	Ballochroy Burn	Baseline	3	
	Killeen Burn	Baseline	3	
	Allt Beachaire	Baseline	3	
	Clachaig Water	Baseline	3	
	Tangy Burn	Baseline	3	
	Smerby Burn	Baseline	3	
	Strone Water	Repeat	3	
D. Loch Fyne	Stronchullin B.	Repeat	3	AMA monitoring & stocking
	Inverneil Burn	Baseline	3	
	Cuilarstich Burn	Baseline	3	
	Abhainn Mhor	Baseline	3	
	Strathlachlan	Baseline	3	
	Lephinmore B.	Baseline	3	
	Lephinchapel B.	Baseline	3	
	Kilail Burn	Baseline	3	
	Allt Osda	Baseline	3	
Crarae Burn	Repeat	3		
E. South Argyll	Tamhnich Burn	Baseline	3	AMA monitoring
	Inverneil Burn	Baseline	3	
	Balliemore Burn	Baseline	3	
	Glentarsan B.	Baseline	3	
	Invervegain B.	Baseline	3	
	Inverchaolain B.	Baseline	3	
	Balgaidh Burn	Baseline	3	
	Milton Burn	Repeat	3	
	Stronchullin B.	Repeat	3	
	Coilessan Burn	Baseline	3	

Argyll Fisheries Trust – 10. Data & Research requirements

	Lettermay Burn	Baseline	3	
F. Isle of Mull	Tobermory R.	Baseline	3	AMA monitoring & stocking
	Abhain Lirein	Baseline	3	
	Scallastle River	Baseline	3	
	Abh. Chaiginn	Baseline	3	
	Abh. Nan Torr	Baseline	3	
	Allt a Mhuilinn	Baseline	3	
	Allt Ardnacross	Baseline	3	
G. Islay & Jura	Kintour River	Baseline	3	Species distribution
	Claggain River	Baseline	3	
	A.na h-Uainaire	Baseline	3	
	A. Ghlean	Baseline	3	
	A.L. a Mhuillin	Baseline	3	
H. Isle of Arran	Glencloy Burn	Baseline	3	AMA monitoring & stocking
	Benlister Burn	Baseline	3	
	Monamore Burn	Baseline	3	
	Glenashadale B	Baseline	3	
	Abhainn Mhor	Baseline	3	
	Chalmadale W.	Baseline	3	
I. Coll	Phuill Burn	Baseline	3	Species distribution
	Bhasapol Burn	Baseline	3	
	Crossapol Burn	Baseline	3	
	L.An Fhaodhail	Baseline	3	
J. Tiree	Gorton Burn	Baseline	3	Species distribution
	Ronard Burn	Baseline	3	
	Ghruibe Burn	Baseline	3	
	L. Fada Burn	Baseline	3	
	Cloich Burn	Baseline	3	
	Mill Aird Burn	Baseline	3	
	Claid Burn	Baseline	3	
		Total	240	

Argyll Fisheries Trust – 10. Data & Research requirements

F. New & repeat baseline sampling of hill lochs (20 years)

Area	Catchment	Main factors	No. sites	Other factors
A. Loch Linnhe & Firth of Lorn	Loch Awe	Char, roach, pike & perch	1	Repeat sampling
	Loch Avich		1	Repeat sampling
	Loch Tulla	Pike & perch	1	Repeat sampling
	Other hill lochs		133	Species distribution
B. Lower Firth of Lorn	Kilmelford lochs	Char	15	Repeat sampling
	Loch Seil	Char	1	Repeat sampling
	Loch Charn		1	Repeat sampling
	Other Hill lochs		73	Species distribution
C. Kintyre	Knapdale lochs	Beaver	6	Species distribution
	Other Hill lochs		126	Species distribution
D. Loch Fyne	Hill lochs		47	Species distribution
E. South Argyll	Loch Eck	Char & Powan	1	Species distribution
	Loch Tarsan		1	Species distribution
	Loch Fad	Pike & coarse fish	1	Species distribution
	Loch Ascog	Pike & coarse fish	1	Species distribution
	Other Hill lochs		8	Species distribution
F. Isle of Mull	Hill lochs		39	Species distribution
G. Islay, Jura & Colonsay	Hill lochs		197	Species distribution
H. Isle of Arran	Hill lochs		12	Species distribution
I. Coll	Hill lochs		29	Species distribution
J. Tiree	Hill lochs		20	Species distribution
		Total sites	1,074	

Argyll Fisheries Trust – 10. Data & Research requirements

G. New baseline & Repeat habitat survey of priority catchments

Area	Catchment	New sites	Repeat sites	Other factors
A. Loch Linnhe & Firth of Lorn	R. Creran		1	AMA monitoring
	R. Etive		1	Stocking
	R. Kinglass		1	Stocking
	R. Awe / Orchy		1	AMA monitoring
	Loch Awe		1	Stocking
B. Lower Firth of Lorn	R. Nell	1		AMA monitoring
	R. Euchar	1		Hydro
	R. Add	1		Hydro
C. Kintyre	Barr Water		1	AMA monitoring
	Machrihanish		1	Habitat
	Glenlussa W.		1	Hydro
	Carradale W.		1	Habitat
D. Loch Fyne	R. Kinglas		1	AMA monitoring, hydro
	R. Fyne		1	stocking, hydro
	R. Shira		1	Hydro
	R. Aray		1	AMA monitoring
E. South Argyll	R. Ruel	1		AMA monitoring, hydro
	R. Eachaig	1		AMA monitoring
	R. Goil	1		AMA monitoring
F. Isle of Mull	R. Aros	1		AMA monitoring
	R. Forsa	1		stocking
	R. Lussa	1		AMA monitoring
	R. Ba	1		stocking
G. Islay & Jura	R. Laggan (Islay)	1		AMA control
	R. Sorn (Islay)	1		
	R. Lussa (Jura)	1		hydro
H. Isle of Arran	Iorsa Water	1		AMA monitoring,
	Machrie W.	1		stocking
	Glenrosa W.	1		
	Total sites	16	13	

Argyll Fisheries Trust – 10. Data & Research requirements

H. New baseline & Repeat habitat survey of medium priority catchments

Area	Catchment	New sites	Repeat sites	Other factors
A. Loch Linnhe & Firth of Lorn	R. Noe	1		Hydro
	R. Liver	1		Aquaculture
	R. Nant	1		
	Loch Avich	1		
B. Lower Firth of Lorn	Barbreck R.	1		AMA monitoring
	R. Oude	1		Aquaculture
	Kilmelford lochs	1		Aquaculture
C. Kintyre	Ormsary W.	1		Hydro
	Clachan Burn		1	Hydro
	Breackerie W.		1	Habitat
	Conieglen W.		1	Habitat
	Saddell W.		1	Habitat
	Claonaig W.		1	
	Bardaravine R.	1		
Skipness R.	1			
D. Loch Fyne	Auchalick R.	1		Hydro
	Kilfinan R.	1		Abstraction
	Douglas W.	1		
	Leacann W.	1		
E. South Argyll	Ardyne Burn	1		Habitat
	Glen Finart B.	1		
	Croe Water	1		
	Loin Water	1		
F. Isle of Mull	Coilador River	1		Habitat
	Bunessan River	1		Abstraction
	R. Bellart	1		Habitat
	Mingary Burn	1		Habitat
	Leidle River	1		
	Kilfinchin River	1		
H. Isle of Arran	Sliddery Water	1		Stocking
	N. Sannox W.	1		
	Sannox Water	1		
	Kilmory Water	1		
	Black Water	1		
	Total	29	5	

10.3.3. Adult fish abundance & spawning activity

Adult fish abundance & spawning
a. Investigate & verify fish count data
b. Snorkel surveys in selected catchments
c. Redd distribution surveys

A. Assessing adult abundance & spawning activity in priority catchments

Area	Catchment	Counter validation	Snorkel surveys	Redd Surveys
A. Loch Linnhe & Firth of Lorn	R. Creran	1	1	1
	R. Kinglass		1	1
	R. Awe / Orchy		1	1
	Loch Awe		1	1
B. Lower Firth of Lorn	R. Nell			1
	R. Euchar			1
	R. Add		1	1
C. Kintyre	Barr Water		1	1
	Machrihanish			1
	Glenlussa W.			1
	Carradale W.		1	1
D. Loch Fyne	R. Kinglas			1
	R. Fyne		1	1
	R. Shira			1
	R. Aray		1	1
E. South Argyll	R. Ruel		1	1
	R. Eachaig			1
	R. Goil		1	1
F. Isle of Mull	R. Aros		1	1
	R. Forsa			1
	R. Lussa			1
	R. Ba			1
G. Islay & Jura	R. Laggan (Islay)		1	1
	R. Sorn (Islay)			1
	R. Lussa (Jura)			1
H. Isle of Arran	Iorsa Water			1
	Machrie W.		1	1
	Glenrosa W.			1
	Total sites	1	12	28

10.3.4 Informing regional improvement initiatives

Provide information to support demonstration & education projects**a. Fine-scale pre and post habitat improvement project assessment**

Area	Catchment	Project	No. sites	Note
A. Loch Linnhe & Firth of Lorn	R. Awe / Orchy	Allt Kinglass W of Tulla	1 1	Fish & habitat survey
	Loch Awe	Tribes	1	
B. Lower Firth of Lorn	R. Add	Abh. Tunns	1	Fish & habitat survey
	R. Euchar	Braglenmor	1	
	R. Nell	Lonan	1	
C. Kintyre	Machrihanish	Chiskin W	1	Fish & habitat survey
	Carradale W.	Mainstem	1	
D. Loch Fyne	R. Kinglas	Abersynia	1	Fish & habitat survey
	R. Fyne	Mainstem	1	
		Gravel pit	1	
	R. Shira	Mainstem	1	
		Trib.	1	
	R. Aray	Tom Breach	1	
E. South Argyll	R. Ruel	Garvie Burn	1	Fish & habitat survey
F. Isle of Mull				
G. Islay & Jura				
H. Isle of Arran	Glenrosa W.	Agriculture	1	Fish & habitat survey
		Total sites	16	

10.3.5. Understanding & mitigating potential impacts of aquaculture related issues

Inform development of the Area management Agreement process**b. Investigations of sea lice burdens on post-smolts of salmon & sea trout**

Area	Catchment	Main factors	No. sites	Method
A. Loch Linnhe & Firth of Lorn	Loch Creran		2	Seine net & coble
	Loch Etive		1	
B. Lower Firth of Lorn	Loch Feochan		1	Seine net & coble
	Loch Crinan		1	
C. Kintyre	W. Loch Tarbet Carradale Bay		1	Seine net & coble
D. Loch Fyne	Dubh Loch		1	Seine net & coble
	Head of Loch Fyne		1	
	Lower Fyne		1	
E. South Argyll	Loch Riddon		2	Seine net & coble
F. Isle of Mull	Loch na Keal		1	Seine net & coble
H. Isle of Arran	West Sannox Bay		1	Seine net & coble
			1	
		Total sites	14	

10.3.6. Understanding & mitigating potential impacts of the use of water resources**Provide information to better manage water resources**

a. Provide robust estimates of changes in productivity as a consequence of a range of common water development types

b. Establish estimates of exacerbated changes in productivity as a consequence of multiple uses of water resources

c. Establish robust estimates of changes in productivity as a consequence to impoundment on river processes, such as bed material transport,

d. Identify & quantify benefits of a range of mitigation initiatives

A. Loch Linnhe

Catchment	Code	Pressure	No. Sites	Industry Sector
Abhainn Teithil	1a	Abstraction	1	Hydroelectric scheme
Esragan Burn	4a	Morphological alterations	1	Hydroelectric scheme
	4a	Flow regulation		Hydroelectric scheme
	4a	Abstraction		Hydroelectric scheme
R. Kinglass Allt Hallater	4a	Morphological alterations	1	Hydroelectric scheme
	4a	Flow regulation		Hydroelectric scheme
	4a	Abstraction		Hydroelectric scheme
R. Liver	1a	Abstraction	1	Hydroelectric scheme
R. Noe	1a	Abstraction	1	Hydroelectric scheme
Loch Nant	1a	Morphological alterations	1	Hydroelectric scheme
	1a	Flow regulation		Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
	1b	Flow regulation		Hydroelectric scheme
R. Nant	1b	Point source pollution	1	Sewage disposal
R. Awe	1a	Morphological alterations	1	Hydroelectric scheme
	1a	Flow regulation		Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
	1a	Point source pollution		Fish farm
Loch Awe (north)	1a	Morphological alterations	1	Hydroelectric scheme
	1a	Point source pollution		Fish farm
Loch Awe (south)	1b	Morphological alterations	1	Hydroelectric scheme
	1b	Point source pollution		Fish farm
Abhainn Fionain	1a	Flow regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
Cladich River & Allt an Stacain	1a	Morphological alterations	1	Hydroelectric scheme
	1a	Flow regulation		Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
Abhainn a Bhealach	1b	Flow regulation	1	Horticulture
	1b	Abstraction		Horticulture
	1b	Morphological alterations	1	Horticulture
	1b	Flow regulation		Hydroelectric scheme
Allt Cruachan	1a	Morphological alterations	1	Hydroelectric scheme
	1a	Flow regulation		Hydroelectric scheme
Allt Mhoillie	1a	Flow regulation	1	Water supply
	1a	Flow regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
Allt Kinglass	1a	Morphological alterations	1	Flood defence
	1a	Flow regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
River Strae	1b	Abstraction	1	Water supply
	1b	Morphological alterations		Impoundment
		Total	20	

B. Lower Firth of Lorn

Catchment	Code	Pressure	No. Sites	Industry Sector
Black Lynn Burn	1a	Flow regulation	1	Impoundment
	1a	Abstraction		Water supply
	1a	Morphological alterations		Reinforcement
	1a	Point source pollution	1	Urban development
	1a	Diffuse source pollution		Urban development
R. Euchar Allta Choromaig	3a	Abstraction	1	Hydroelectric scheme
	3a	Habitat connectivity		Hydroelectric scheme
R. Nell (Feochan Mhor) & Loch Nell	1a	Abstraction	1	Water supply
	1a	Morphological alterations		Impoundment
	1a	Abstraction	1	Fish farm
R. Oude & Loch Tralaig	1a	Flow regulation	1	Hydroelectric scheme
	1a	Abstraction	1	Hydroelectric scheme
	1a	Morphological alterations		Impoundment
	3c	Point source pollution		Fish farm
L. a Phearsain	4a	Abstraction	1	Water supply
L. Losgainn Mor	3a	Point source pollution	1	Fish farm
R. Add Abhainn Bheag an Tunns	1b	Abstraction	1	Hydroelectric scheme
	1b	Morphological alterations		Forestry
	1b	Flow regulation	1	Hydroelectric scheme
Total			11	

Ci. Kintyre West

Catchment	Code	Pressure	No. Sites	Industry Sector
Barranlongart Burn / Eas Dubh	1a	Flow regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
Ormsary Water Abhainn Mhor Allt Doire Duibhe	1a	Flow regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
	1a	Morphological alterations		Hydroelectric scheme
	1a	Flow Regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
Abh. L.Uinnsinn	4a	Abstraction	1	Hydroelectric scheme
Abhainn nan Gillean	4a	Abstraction	1	Hydroelectric scheme
	4a	Flow regulation		Hydroelectric scheme
Abhainn na Cuile	1b	Flow regulation	1	Water supply
Clachan Burn Loch Ciaran	1a	Flow regulation	1	Impoundment
	1b	Morphological alterations		Impoundment
Killean Burn	3c	Morphological alterations	1	Impoundment (Dam)
Clachaig Water	3a	Stocking / escapes	1	Fish farm
	3a	Point source pollution		Fish farm
Barr Water Abhainn a Chnoeain	1b	Flow regulation	1	Hydroelectric scheme
	3a	Morphological alterations		Weirs – Fishing pools
	1a	Flow regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
Machrihanish	3a	Morphological alterations	1	Impoundment
Backs Water	1a	Diffuse source pollution	1	Sewage disposal
Chiscan Water	1a	Diffuse source pollution	1	Sewage disposal
Glenlussa Water Lussa Loch	1a	Flow regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
	1a	Flow regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
	1a	Morphological alterations		Impoundment
Total			16	

Di. Lower Loch Fyne

Catchment	Code	Pressure	No. Sites	Industry Sector
Stronchullin Burn	3a	Morphological alterations	1	Impoundment (Dam)
Cuilarstich B.	1a	Diffuse source pollution	1	Service activities
Badden Burn	1b	Morphological alterations		realignment
Abhainn Mhor Loch Glashan	1a	Flow Regulation	1	Hydroelectric scheme
	1a	Morphological alterations		Hydroelectric scheme
	1a	Flow Regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
Allt Osda / Craignafeoch Burn	1b	Morphological alterations	1	Water supply
	1b	Flow Regulation		Water supply
	1b	Abstraction	1	Water supply
	1b	Morphological alterations		Impoundment
Leacann Water	1b	Flow Regulation	1	Fish farm
Douglas Water	4a	Morphological alterations	1	Hydroelectric scheme
	4a	Flow Regulation		Hydroelectric scheme
R. Shira	1a	Morphological alterations		Impoundment
	1a	Flow Regulation	1	Hydroelectric scheme
Lochan Shira	1a	Abstraction		Hydroelectric scheme
	1a	Morphological alterations		Hydroelectric scheme
Kilblaan Burn	1a	Flow Regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
Brannie Burn	1a	Flow Regulation	1	Hydroelectric scheme
	1a	Abstraction	1	Hydroelectric scheme
Erallich Water	1a	Abstraction		Hydroelectric scheme
R. Fyne	1a	Flow Regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
	1a	Morphological alterations		Hydroelectric scheme
	1a	Flow Regulation	1	Hydroelectric scheme
Allt na Lairge	1a	Abstraction	1	Hydroelectric scheme
Kinglas Water	1a	Morphological alterations	1	Impoundment
	1a	Abstraction	1	Hydroelectric scheme
	1a	Morphological alterations		Realignment
	1a	Diffuse source pollution	1	Service activities
		Total	18	

E. South Argyll

Catchment	Code	Pressure	No. Sites	Industry Sector
R. Ruel	1b	Morphological alterations	1	Hydroelectric scheme
Garvie Burn	3a	Abstraction		Hydroelectric scheme
Tamhnich Burn	1b	Morphological alterations	1	Hydroelectric scheme
Balliemore Burn	2a	Morphological alterations	1	Hydroelectric scheme
	2a	Flow regulation		Hydroelectric scheme
Garbh Allt	1a	Morphological alterations	1	Hydroelectric scheme
Loch Tarsan	1a	Morphological alterations		Hydroelectric scheme
	1a	Flow regulation	1	Hydroelectric scheme
	1a	Abstraction		Hydroelectric scheme
R. Eachaig	1a	Abstraction	1	Hydroelectric scheme
	1a	Flow Regulation		Hydroelectric scheme
R. Masson	1b	Abstraction	1	Water supply
R. Curr	1b	Abstraction	1	Water supply
R. Shellish	1b	Diffuse source pollution		Water supply
	1b	Abstraction	1	Water supply
	1b	Flow Regulation		Water supply
Loch Eck	1b	Morphological alterations		Transport
Little Eachaig	1b	Abstraction	1	Hydroelectric scheme
Balgaidh Burn	3c	Morphological alterations	1	Impoundment
Milton Burn	3a	Morphological alterations	1	Urban development
	3a	Point source pollution		Sewage disposal
Croe Water	1b	Morphological alterations	1	Hydroelectric scheme
	1b	Abstraction		Hydroelectric scheme
	1b	Point source pollution	1	Refuse disposal
		Total	14	

F. Isle of Mull

Catchment	Code	Pressure	No. Sites	Industry Sector
Tobermory	1a	Abstraction	1	Water supply
River	1a	Abstraction	1	Manufacturing
	1a	Flow regulation	1	Impoundment
R. Aros	3c	Point source pollution	1	Fish farming
R. Forsa	3c	Morphological alterations	1	Fisheries
R. Ba	3c	Morphological alterations	1	Fisheries
Loch Ba	3c	Abstraction	1	Fish farm
	3c	Point source pollution		Fish farm
Bunessan	1a	Flow regulation	1	Water supply
River	1a	Abstraction		Water supply
Loch Assapol	1a	Flow regulation		Water supply
Mingary Burn	1b	Flow regulation	1	Impoundment
		Total	9	

Gi. Isle of Islay

Catchment	Code	Pressure	No. Sites	Industry Sector
R. Laggan	1a	Abstraction	1	Water supply
Duich River	1a	Diffuse source pollution	1	Water supply
R. Sorn	1b	Point source pollution	1	Sewage disposal
	3a	Morphological alterations	1	Impoundment
		Total	4	

Gii. Isle of Jura

Catchment	Code	Pressure	No. Sites	Industry Sector
Lussa River	1b	Morphological alterations	1	Fisheries
	1b	Morphological alterations	1	Fisheries
	4a	Flow regulation	1	Hydroelectric scheme
	4a	Abstraction		Hydroelectric scheme
Abh. G. Aoistail	3c	Morphological alterations	1	Impoundment
Allt L. a Mhuillin	3c	Morphological alterations	1	Impoundment
		Total	5	

H. Isle of Arran

Catchment	WFD Cat.	Pressure	No. Sites	Industry Sector
Glenrosa Water	1b	Diffuse source pollution?	1	Water supply
Glenashadale B.	3c	Morphological alterations	1	Urban development
Iorsa Water	1b	Diffuse source pollution?	1	Water supply
	1b	Flow regulation		Water supply
	1b	Morphological alterations		Fisheries
Abhainn Mhor	1a	Diffuse source pollution	1	?
Chalmadale W.	1a	Abstraction	1	?
		Total	5	

C3. Understanding & mitigating potential impacts of the use land resources

Develop regional plan to engage land resource users & minimise impacts
a. Provide robust estimates of changes in productivity as a consequence of a range of common land development types
b. Establish estimates of exacerbated changes in productivity as a consequence of multiple uses of land resources
c. Establish robust estimates of changes in productivity as a consequence to climate change & associated land use on river processes, such as bed material transport,
d. Identify & quantify benefits of a range of mitigation initiatives

A. Loch Linnhe

Catchment	Code	Pressure	No. Sites	Industry Sector
Stockdale B.	3c	Point or Diffuse pollution	1	Farming of animals
R. Creran	3a	Morphological alterations	1	Forestry
	2a	Diffuse source pollution		Forestry
Abhainn Teithil	1a	Morphological alterations	1	Forestry
Dearg Abhainn	1b	Morphological alterations	1	Forestry
Abh. Dalach	1b	Morphological alterations	1	Forestry
	3c	Diffuse source pollution		Forestry
Allt Easach	1b	Morphological alterations	1	Forestry
	3c	Diffuse source pollution		Forestry
R. Etive	3a	Morphological alterations	1	Forestry
	3a	Riparian habitat diversity		Farming of animals
	3c	Diffuse source pollution		Forestry
Loch Nant	1a	Morphological alterations	1	Forestry
Loch Awe	1a	Morphological alterations	1	Forestry
	1b	Diffuse source pollution		Forestry
Abhainn Fionain	1a	Morphological alterations	1	Forestry
	1a	Diffuse source pollution		Forestry
Cladich & Stacain	4a	Diffuse source pollution	1	Windfarm
Abh.a Bhealaich	1b	Morphological alterations	1	Forestry
River Orchy	1b	Morphological alterations	1	Forestry
Allt Mhoillie	3a	Riparian habitat diversity	1	Farming of animals
Allt Kinglass	3a	Riparian habitat diversity	1	Farming of animals
River Strae	3a	Riparian habitat diversity	1	Farming of animals
		Total	16	

B. Lower Firth of Lorn

Catchment	Code	Pressure	No. Sites	Industry Sector
Allt Chriche	3c	Morphological alterations	1	Farming of animals
	3c	Riparian habitat diversity		Farming of animals
R. Euchar	3a	Riparian habitat diversity	1	Farming of animals
Allt Braglenmore	3a	Riparian habitat diversity		Farming of animals
R. Nell	3a	Morphological alterations	1	Farming of animals
Allt Cabrachan	3a	Riparian habitat diversity	1	Farming of animals
River Lonan	3a	Morphological alterations	1	Farming of animals
Feochan Bheag	3a	Riparian habitat diversity	1	Farming of animals
	3a	Morphological alterations		Farming of animals
	3a	Riparian habitat diversity		Farming of animals
	3c	Diffuse source pollution		Forestry
Allt Dallermaig	3a	Morphological alterations	1	Farming of animals
	3a	Riparian habitat diversity		Farming of animals
R. Oude	1a	Morphological alterations	1	Forestry
Staing Mhor	3c	Morphological alterations	1	Farming of animals
R. Add	3c	Riparian habitat diversity	1	Farming of animals
Abhainn Bheagan Tunns	1b	Diffuse source pollution	1	Forestry
	1b	Morphological alterations		Forestry
Kilmartin Burn	3a	Morphological alterations	1	Farming of animals
	3a	Riparian habitat diversity		Farming of animals
R. Barbreck	3c	Morphological alterations	1	Farming of animals
	3c	Riparian habitat diversity		Farming of animals
		Total	13	

C. Kintyre West

Catchment	Code	Pressure	No. Sites	Industry Sector
Linne Burn	3a	Morphological alterations	1	Forestry
The Lussa	1a	Morphological alterations	1	Forestry
Crear Burn	3c	Diffuse source pollution	1	Forestry
Abh. L. Uinnsinn	1a	Morphological alterations	1	Forestry
Allt Caoi-rain	3c	Diffuse source pollution		Forestry
Abhainn nan Gillean	3c	Morphological alterations	1	Forestry
	3c	Diffuse source pollution		Forestry
Abhainn na Cuile	1b	Morphological alterations	1	Forestry
Bardaravine River	3c	Morphological alterations	1	Forestry
	3c	Diffuse source pollution		Forestry
Clachan Burn	1a	Morphological alterations	1	Forestry
Ballochroy Burn	1b	Morphological alterations	1	Forestry
Barr Water	1a	Morphological alterations	1	Forestry
Machrihanish Backs Water	3a	Riparian habitat diversity	1	Farming of animals
	1a	Morphological alterations		Farming
	1a	Point source pollution		Farming
Chiscan Water	1a	Morphological alterations	1	Farming
	1a	Point source pollution		Farming
Strone Water	3a	Riparian habitat diversity	1	Farming of animals
	3a	Morphological alterations		Farming of animals
Breackerie Water	3a	Riparian habitat diversity	1	Farming of animals
	3a	Morphological alterations		Farming of animals
	3a	Riparian habitat diversity	1	Forestry
	3a	Diffuse source pollution		Forestry
The Lone	3a	Riparian habitat diversity	1	Farming of animals
	3a	Morphological alterations		Farming of animals
Conieglen Water	3a	Riparian habitat diversity	1	Farming of animals
	3a	Morphological alterations		Farming of animals
Kerran Water / Homeston Burn	3a	Riparian habitat diversity	1	Forestry
	3a	Diffuse source pollution		Forestry
Corachan Burn	3a	Riparian habitat diversity	1	Farming of animals
	3a	Morphological alterations		Farming of animals
Smerby Burn	3c	Riparian habitat diversity	1	Forestry
	3c	Riparian habitat diversity		Farming
Glenlussa Water	1a	Diffuse source pollution	1	Forestry
Saddell Water	3a	Riparian habitat diversity	1	Farming of animals
	3a	Morphological alterations		Farming of animals
Guesdale Water	3a	Riparian habitat diversity	1	Forestry
Ifferdale Burn	3a	Diffuse source pollution		Forestry
Carradale Water / Narachan Burn	1b	Morphological alterations	1	Forestry
	1b	Diffuse source pollution		Forestry
	1b	Diffuse source pollution	1	Farming
Ronadale Burn	3a	Riparian habitat diversity		Farming of animals
	3a	Morphological alterations	1	Farming of animals
Claonaig Water	1b	Morphological alterations	1	Forestry
	1b	Diffuse source pollution		Farming of animals
	3a	Riparian habitat diversity	1	Farming of animals
Skipness River	3c	Diffuse source pollution	1	Forestry
		Total	27	

Di. Lower Loch Fyne

Catchment	Code	Pressure	No. Sites	Industry Sector
Inverneil Burn	3c	Diffuse source pollution	1	Forestry
Cuilarstich Burn / Dippen Burn	1a 1a	Morphological alterations Morphological alterations	1	Forestry Forestry
Auchoish Burn / Baden Burn	1a 1b 1b 1b	Diffuse source pollution Morphological alterations Diffuse source pollution Morphological alterations	1 1	Forestry Forestry Forestry realignment
Abhainn Mhor Loch Glashan	1a 1a	Morphological alterations Morphological alterations	1	Forestry Forestry
Strathlachlan Water	3c 3c	Morphological alterations Diffuse source pollution	1	Farming Forestry
Lephinmore Burn	3c 3c	Morphological alterations Diffuse source pollution	1	Farming Forestry
Kilail Burn	3c	Diffuse source pollution	1	Forestry
Kilfinan Burn	3c 3a	Diffuse source pollution Morphological alterations	1 1	Forestry Farming
R. Auchalick	3c	Diffuse source pollution	1	Forestry
Crarae Burn	3c	Diffuse source pollution	1	Forestry
Leacann Water	1b	Morphological alterations	1	Forestry
Douglas Water	3a 3a	Diffuse source pollution Morphological alterations	1	Forestry Forestry
R. Aray	3a 3a 3a	Diffuse source pollution Morphological alterations Morphological alterations	1 1 1	Forestry Forestry Farming
R. Shira Kilblaen Burn	1a 3a 3a	Morphological alterations Morphological alterations Riparian habitat diversity	1 1	Forestry Farming Farming
Brannie Burn	1a 1a	Morphological alterations Morphological alterations	1	Forestry Forestry
Erallich Water	1b	Morphological alterations	1	Forestry
R. Fyne	3a 3a 1a	Morphological alterations Riparian habitat diversity Morphological alterations	1 1 1	Farming Farming Forestry
Kinglas Water	1a 1a	Morphological alterations Diffuse source pollution	1 1	Forestry Farming
		Total	24	

E. South Argyll

Catchment	Code	Pressure	No. Sites	Industry Sector
R. Ruel	1b	Morphological alterations	1	Farming
	1b	Diffuse source pollution	1	Forestry
	1b	Diffuse source pollution		Farming
	3a	Riparian habitat diversity	1	Farming
	1b	Morphological alterations	1	Forestry
Loch Fad	3c	Diffuse source pollution	1	Farming
Glenmore Burn	3c	Morphological alterations		Farming
Greenan Burn	3c	Morphological alterations	1	Farming
Balliemore Burn	3c	Diffuse source pollution	1	Forestry
Garbh Allt	1b	Morphological alterations	1	Forestry
Loch Tarsan	1b	Diffuse source pollution		Forestry
Invervegain Burn	3c	Diffuse source pollution	1	Forestry
Ardyne Burn	1b	Morphological alterations	1	Forestry
	1b	Diffuse source pollution		Forestry
	3c	Morphological alterations	1	Farming
R. Eachaig	1b	Morphological alterations	1	Forestry
R. Masson	1b	Diffuse source pollution		Forestry
R. Curr	1b	Morphological alterations	1	Forestry
R. Shellish	1b	Diffuse source pollution		Forestry
	1b	Morphological alterations	1	Forestry
Loch Eck	1b	Morphological alterations		Transport
Little Eachaig	1b	Morphological alterations	1	Forestry & farming
	1b	Diffuse source pollution		Forestry
Balgaidh Burn	3c	Diffuse source pollution	1	Forestry
Milton Burn	3a	Morphological alterations	1	Urban development
Stronchullin Burn	3a	Morphological alterations	1	Forestry
	3a	Diffuse source pollution		Forestry
Glen Finart Burn	2a	Morphological alterations	1	Forestry
Clunie Burn	2a	Diffuse source pollution		Forestry
	3c	Morphological alterations	1	Farming
Coilessan Burn	3c	Morphological alterations	1	Forestry
	3c	Diffuse source pollution		Forestry
Croe Water	1b	Point source pollution	1	Farming
	3c	Morphological alterations	1	Forestry
	3c	Diffuse source pollution		Forestry
Loin Water	3c	Morphological alterations	1	Farming
	3c	Diffuse source pollution	1	Forestry
Lettermay Burn	3c	Morphological alterations	1	Forestry
	3c	Diffuse source pollution		Forestry
R. Goil	3c	Morphological alterations	1	Farming
Allt Clinne Mhoir	2a	Morphological alterations		Forestry
Donich Water/Allt	2a	Diffuse source pollution	1	Forestry
Coire Odhair	1a	Morphological alterations		Forestry
	1a	Diffuse source pollution	1	Forestry
		Total	29	

F. Isle of Mull

Catchment	Code	Pressure	No. Sites	Industry Sector
R. Aros	3c	Diffuse source pollution	1	Forestry
Loch Frisa	3c	Morphological alterations	1	Farming
R. Forsa	3c	Diffuse source pollution	1	Forestry
	3c	Morphological alterations	1	Farming of animals
	3a	Riparian habitat diversity		Farming of animals
R. Lussa	3c	Diffuse source pollution	1	Forestry
	3c	Riparian habitat diversity	1	Farming of animals
Coilador River	1b	Diffuse source pollution	1	Forestry
	3c	Riparian habitat diversity	1	Farming of animals
R. Ba Glencannel R. River Clachaig	1b	Diffuse source pollution	1	Farming of animals
	3a	Riparian habitat diversity		Farming of animals
	1b	Diffuse source pollution		Farming of animals
	3a	Riparian habitat diversity		Farming of animals
Bunessan River	1a	Morphological alterations	1	Forestry
R. Bellart	3a	Diffuse source pollution	1	Forestry
	3a	Riparian habitat diversity		Farming of animals
	3c	Morphological alterations	1	Farming of animals
	3c	Morphological alterations		Forestry
Mingary Burn	1b	Diffuse source pollution	1	Forestry
		Total	13	

Gi. Isle of Islay

Catchment	Code	Pressure	No. Sites	Industry Sector
R. Laggan Duich River	3a	Riparian habitat diversity	1	Farming
	3a	Riparian habitat diversity		Farming
	1a	Morphological alterations	1	Farming
	1b	Morphological alterations		Farming
Carrabus Burn	1a	Morphological alterations	1	Farming
	3c	Riparian habitat diversity		Farming
R. Sorn Ballygrant Burn	3c	Morphological alterations	1	Farming of animals
	1b	Diffuse source pollution		Farming
	1b	Morphological alterations	1	Farming
River Leoig	1a	Morphological alterations	1	Farming
	3c	Riparian habitat diversity		Farming
Kilbride River	3c	Morphological alterations	1	Farming
	3c	Riparian habitat diversity		Farming
		Total	7	

Gii. Isle of Jura

Catchment	Code	Pressure	No. Sites	Industry Sector
Lussa River	3a	Riparian habitat diversity	1	Farming

H. Isle of Arran

Catchment	WFD Cat.	Pressure	No. Sites	Industry Sector
N. Sannox Water	1a	Diffuse source pollution	1	Forestry
	1a	Diffuse source pollution	1	Farming of animals
Glenrosa Water Glenshurig Burn	1b	Diffuse source pollution	1	Farming of animals
	3c	Riparian habitat diversity	1	Forestry
Glencloy Burn	2a	Morphological alterations	1	Farming
	3c	Diffuse source pollution	1	Forestry
	3c	Riparian habitat diversity		Forestry
Benlister Burn	3c	Morphological alterations	1	Farming
Monamore Burn	3c	Diffuse source pollution	1	Forestry
	3c	Riparian habitat diversity		Forestry
	3c	Morphological alterations	1	Farming
Glenashadale Burn	3c	Diffuse source pollution	1	Forestry
	3c	Riparian habitat diversity		Forestry
	3c	Morphological alterations	1	Urban development
Torrylin - Kilmory Water	3c	Diffuse source pollution	1	Forestry
	3c	Riparian habitat diversity		Forestry
	1b	Morphological alterations		Forestry
Sliddery Water	2a	Diffuse source pollution	1	Farming of animals
	2a	Diffuse source pollution	1	Forestry
	2a	Morphological alterations		Farming
Black Water The Canal Clauchan Water	2b	Morphological alterations	1	Farming
	3c	Riparian habitat diversity		Farming
	3c	Morphological alterations		Farming
	3c	Riparian habitat diversity		Farming
	3c	Diffuse source pollution	1	Forestry
Machrie Water Ballymicheal B. Allt Dubh	3c	Riparian habitat diversity	1	Farming
	3c	Morphological alterations		Farming
	3c	Diffuse source pollution	1	Forestry
Iorsa Water	1b	Diffuse source pollution	1	Farming of animals
		Total	19	

10.4 Legislative Framework

10.4.1. Animal (Scientific Procedures) Act 1986

Scientific research involving animals is covered by the Animals (Scientific Procedures) Act 1986 (<http://www.archive.official-documents.co.uk/document/hoc/321/321-xa.htm>) which came into force on 1 January 1987.

The Act makes provision for the protection of animals used for experimental or other scientific purposes in the United Kingdom and regulates any experimental or other scientific procedure applied to a “protected animal” that may have the effect of causing that animal pain, suffering, distress or lasting harm. Such a procedure defined by the Act is referred to as a “regulated procedure”.

The Act defines a “protected animal” as any living vertebrate, other than man and including fish, from the time at which they become capable of independent feeding (although there are some exemptions for this definition). In countries implementing the relevant EU Directive 86/609/EEC, a common threshold has been standardised for regulating the use of animals for experimental or other scientific purposes.

It is considered that the work which is typically carried out by Argyll Fisheries Trust and RAFTS members e.g. electro-fishing for local management purposes is exempt from the Act as the data is used for “animal husbandry” purposes rather than for scientific research. This ruling has been recently confirmed to Ayrshire Fisheries Trust by the Animal Inspectorate based in Dundee.

A summary of the basis of this assessment is set out below.

There are several exemptions to the Act including:-

“procedures applied to animals in the course of recognised veterinary, agricultural or animal husbandry practice”.

It is this exemption to which the activities of the Argyll Fisheries Trust apply. Electro-fishing, where the data obtained by the survey is used for management purposes and there is a management plan produced or in place, is considered exempt. If data collection were to extend beyond that required for local management purposes then this exemption may be subject to challenge or the activity would be acknowledged as subject to the Act and an appropriate Home Office licence required.

Related activities undertaken by Argyll Fisheries Trust which are relevant to the act include the use of anaesthetics. However, as anaesthetics are used only in the gathering of information and data related to management rather than scientific activities this too is considered exempt. However, there may be instances in the future when the work of the Argyll Fisheries Trust is required to be registered under the Act and appropriate licences sought and put in place with required additional training activities for staff. Where, and if, the Trust undertakes such activities it will comply with legislative requirements.

As part of this compliance Argyll Fisheries Trust will consider the instruction set out in the Act which specify when scientific activity pain, suffering, distress or lasting harm thresholds are exceeded. The threshold is defined as “the skilled insertion of a hypodermic needle”. The most significant activities undertaken and the management activities to which they relate are summarised the table below. However, there may be instances in the future when the work of the Argyll fisheries Trust is required to be registered under the Act and appropriate licences sought

Argyll Fisheries Trust – 10. Data & Research requirements

and put in place with required additional training activities for staff. Where, and if, the Trust undertakes such activities it will comply with legislative requirements.

Summary of activities exempt from the Animal (Scientific Procedures) Act 2006 due to their links to local management

Relevant Activity	Information or physical outcome	Additional assessment to confirm management action	Possible resultant management activities
Electrofishing survey (includes capture by electric fishing and anaesthesia)	<p>Fish population information including:</p> <ul style="list-style-type: none"> • Species distribution • Density of fish populations • Identification of weak, strong and absent fish populations <p>Assessment or effectiveness of restoration measures</p>	<p>Confirm cause or causes of weak fish populations that require remedial management action:</p> <ul style="list-style-type: none"> • Barrier to fish passage preventing habitat use? • Poor quality habitats limiting carrying capacity at site? • Overall strength of stock (numbers of adults returning to utilise available habitats) • Anthropogenic impacts including chronic or episodic pollution and acidification • Overexploitation of stocks at sea or in river 	<p>Stock restoration activities including:</p> <ul style="list-style-type: none"> • Replenishment stocking from hatchery reared fish • Habitat restoration schemes to increase carrying capacity • Removal of physical barriers to fish migration to allow use available habitat • Limits set on local exploitation rates to safeguard critical populations or components of stock <p>Application of refined management or restoration activities based on response of fish populations to initial interventions.</p>
Fish stripping and hatchery activities (can include: manual handling, fish anaesthesia, removal or milt or ova from broodfish, on site medication and ova or fish transport to release sites)	<p>Gathering of fertilised ova for use in river specific stock restoration or replenishment programmes.</p> <p>Production and rearing of fertilised ova and/or juvenile fish for release and introduction to appropriate stocking or restocking sites.</p>	<p>Identification of sites appropriate for restocking activities and release of resultant fertilised ova and hatchery reared fish.</p>	<p>Placement of ova and juvenile fish in appropriate locations in order to:</p> <ul style="list-style-type: none"> • Replenish weak populations to ensure their ongoing presence • Restore populations to sites where stocks have been lost due to fish kill events e.g. pollution events • Mitigate for the effects of man made impassable barriers to ensure juvenile production for inaccessible areas and contributions to overall fishery
Fish marking or tagging (may include fin clipping, tagging or other identification marking)	<p>The marking of fish is used for a number of purposes including:</p> <ul style="list-style-type: none"> • As part of mark – recapture studies estimating total fish populations • Assessment of management activities e.g. rate of recapture following adult river or loch stocking programmes • The identification of released fish in later life stages to confirm river of origin or that they are the product of a specific management activity e.g. adult fish returns from hatchery released juveniles 	<p>Depending on the objective of the fish marking or tagging exercise this may include:</p> <ul style="list-style-type: none"> • Calculation of total fish population estimate and assessment as part of local population trend • Relation of data to specific management activities e.g. rate of capture from stocking activities and reassessment of value or effectiveness of management activity • Calculate relationship and numbers of stocked fish to management activity to inform reassessment of this activity e.g. do numbers of adult returns justify hatchery expenditure 	<p>Data and information from marking or tagging activities can:</p> <ul style="list-style-type: none"> • Help to determine the efficiency or value of specific management activities to the fishery as a whole • Help determine the efficiency or value of specific management activity to production from sites or locations where the activity is applied <p>Therefore these determinations can:</p> <ul style="list-style-type: none"> • Confirm and quantify the contributions of specific management activities to an area or of a planned programme of management to the system as a whole. • Allow management decisions to be made which maintain, revise or terminate specific or general programmes of management.

In summary, the work of Argyll Fisheries Trust is considered to be undertaken for local management purposes as part of the implementation of a plan and programme of management. The activities undertaken are considered to be equivalent to recognised veterinary, agricultural or animal husbandry practice. On this basis it is considered to be exempt from the provisions of the Animals (Scientific Procedures) Act 1986.

If the Trust were to undertake activities extending beyond this exemption and captured by the Act we will seek to comply with legislative requirements.

10.4.2. Health and Safety Policy and Procedures:

Argyll Fisheries Trust seeks to carry out its work and activities safely and to protect staff from unnecessary risk. As required by law Argyll Fisheries Trust has a Health and Safety Policy/Statement for all staff which includes appropriate risk assessments for field working and other activities, COSHH assessment and confirmation of first aid provision.

Knowledge and confirmation of acceptance of The Health and Safety Policy / Statement is a requirement for all staff (permanent or fixed term appointments) and the Policy / Statement is subject to regular review by Directors.

Incidents or accidents which do occur are appropriately logged and reported and remedial actions to policy or staff training required as a consequence are taken.

10.4.3. First Aid Provision

Argyll Fisheries Trust has appropriately staff appropriately qualified to comply with First Aid at Work requirements. First aid materials are available in all vehicles and offices and on site where field work is undertaken.

10.5 Quality assurance and auditing of scientific / management activities

Argyll Fisheries Trust is committed to the collection, analysis and management use of high quality and rigorously gathered data and information.

To ensure that this is the case we have the following protocols and commitments to quality assure and audit our data:

Use of accredited methods:

As a member of the Scottish Fisheries Coordination Centre (SFCC) (<http://www.sfcc.co.uk/>) we use methods accredited by them in relevant field work.

This currently applies to electro-fishing surveys where our methods are approved by SFCC (<http://www.sfcc.co.uk/protelf.asp>). In addition data gathered using these protocols is submitted to a common data base (<http://www.sfcc.co.uk/protelfd.asp>) held nationally by SFCC and locally by Argyll Fisheries Trust. The submission of data to this system ensures a further quality check during submission.

Habitat surveys are also undertaken to recognised protocols. Principally these are methods approved by the SFCC (<http://www.sfcc.co.uk/prothab.asp>) or to national River Habitat Survey (RHS) standards.

Use of trained staff:

Field data is gathered by trained staff at all times. Argyll Fisheries Trust staff are trained in SFCC methods and protocols before gathering data for use by the trust. This training is

Argyll Fisheries Trust – 10. Data & Research requirements

delivered by approved trainers and ensures that staff are familiar with methods and standards of use.

In addition the trust takes the following actions to help quality assure its activities:

- Random checks on grid references of field work data records
- Refresher training courses as required
- Visits to other trust areas to complete joint field work where good practice can be shared and gathered.