

Supplementary Material

Appendices A – RUV Abundance Studies

Country	Waterbody	Species of interest	Camera Deployment	Analysis method	Bait	Objective	Reference
USA	Volusia Blue Spring	All species	RUV	MaxN and SumMaxN	No bait	Approximate total fish abundance	[Work & Jennings, 2019]
South Africa	Krom River	Ghost Frog ( <i>Heleophryne depressa</i> )	RUV	MaxN	No bait	Assess the impact of rainbow trout ( <i>Oncorhynchus mykiss</i> ) on the native ghost frog abundance	[Avidon et al. 2018]
South Africa	Rondegat River	All species	RUV	MaxN	No bait	Gain an understanding of the abundance of native and invasive fish prior to rotenone treatment	[Weyl et al. 2013]
South Africa	Rondegat River	All species	RUV	MaxN	No bait	Assess abundance of native fish that had re-colonised river after rotenone treatment	[Weyl et al. 2016]
Canada	Kiamichi River	All species	RUV	MaxN	No bait	Assess how freshwater mussels ( <i>Actinonaias ligamentina</i> and <i>Amblema plicata</i> ) altered fish distributions and abundance	[Hopper, 2019] [Hopper et al. 2019]

USA	US Geological Survey Facility Ponds	All species	RUV	MaxN	No bait	Assess densities and then drain the pond to obtain true densities and assess the efficiency of RUVs	[Wilson et al. 2014]
USA	Shenandoah National Park	Brook charr ( <i>Salvelinus fontinalis</i> )	RUV	MaxN	No bait	Assess abundance of juveniles and adults, comparing results to SCUBA and e-fishing	[Hitt et al. 2021]
Canada	Credit River	All species	RUV	MaxN	No bait	Assess abundance of all species observed	[Tweedie, 2018] [Tweedie et al. 2018]
USA	Lake Superior Tributary Stream	Salmonids	RUV	MaxN	No bait	Assess abundances in a range of different microhabitats	[Leitrants, 2019]
Canada	Fourteen Mile Creek	Redside Dace ( <i>Clinostomus elongatus</i> )	RUV	MaxN	No bait	Assess the abundance of redbside dace in a range of microhabitats	[Smith, 2022]
Canada	Don River & Credit River watersheds	All species	RUV	MaxN	No bait	Assess abundances of all species during winter periods	[Davis, 2016]
South Africa	Rondegat River	Vulnerable fish species	BRUV	MaxN	Bread & Marmite	Assess abundance of vulnerable species and different bait efficiency	[Bajaba et al. 2021]

South Africa	Swartkops & Kouga Watersheds	All species	RUV	MaxN	No bait	Assess abundance of species and compare abundances with results obtained through snorkelling surveys	<b>[Castañeda, 2019]</b> <b>[Castañeda et al. 2020a]</b>
Hong Kong	Tung Chung River	Predaceous chub ( <i>Parazacco spilurus</i> )	RUV	MaxN	No bait	Assess the effectiveness of restoration events	<b>[Wang &amp; Wai, 2007]</b>
South Africa	Fernkloof & Waterkloof Stream	All species	RUV	MaxN	No bait	Assess abundances and compare results to e-fishing survey	<b>[Ellender et al. 2012]</b>
South Africa	Swartkops River	Eastern Cape Redfin ( <i>Pseudobarbus afer</i> )	RUV	MaxN	No bait	Assess abundance of redfin	<b>[Hannweg et al. 2020b]</b>
South Africa	Rondegat River	Native Cyprinid Fish	RUV	MaxN	No bait	Assess the abundance of native fish after a restoration event	<b>[Broom et al. 2023]</b>
Malawi	Lake Niassa	All species	BRUV	MaxN	Crushed Usipa	Assess the abundance of all species observed within the lake	<b>[van Wyk et al. 2017]</b> <b>[van Wyk, 2019]</b>
Brazil	Capivara Stream	All species	BRUV	MaxN	Corn & sardines	Assess the abundance of each species observed	<b>[Carvalho, 2021]</b>
Brazil	Do Mangue Stream	All species	BRUV	MaxN	Fish feed	Assess the abundance of each species and the time taken for MaxN to be achieved	<b>[Melo, 2018]</b>

Brazil	Piraquara I & Passauna Reservoirs	All species	RUV	MaxN	No bait	Assess the abundance of each species observed and compare these to those from a visual census	<b>[Frehse et al. 2020]</b>
Australia	Mulgrave & Russel Rivers	All species	BRUV & RUV	MaxN	Pilchard, prawn & mullet	Assess the abundance of each species observed and compare results between baited & unbaited	<b>[Cousins et al. 2017]</b>
Australia	Magela Creek	All species	RUV	MaxN	No bait	Assess the abundance of each taxonomic family group observed	<b>[Crook et al. 2021]</b>
Australia	Lake MacLeod	All species	Stereo-RUV	MaxN	No bait	Assess the abundance of each species observed	<b>[Cameron-Caluori, 2014]</b>
Australia	Kakadu National Park Billabongs	All species	RUV	MaxN	No bait	Assess the abundance of different species observed & how different placements effected abundance	<b>[King et al. 2018]</b>
Australia	Harvey Creek	All species	BRUV	MaxN	Pilchard, prawn & mullet	Assess the abundance of all species observed and compared to snorkel study conducted alongside	<b>[Ebner et al. 2015]</b>
Germany	Mulde River	All species	RUV	MaxN	No bait	Assess the abundance of all species observed, using	<b>[Anlanger et al. 2022]</b>

						increments of five when densely populated	
Australia	Lake in Victoria state	All species	BRUV	MaxN	Not stated	Assess the abundance of all species observed, comparing results to traditional methods	[Iervasi et al. 2014]
USA	Buffalo Lake	Northern Crayfish ( <i>Orconectes virilis</i> )	BRUV	MaxN	Tuna	Assess the abundance of a non-native crayfish species	[Loffredo, 2018]
Russia	Lake Baikal	Amphipods	RUV	Total count	No bait	Assess the abundance of amphipods in the lake	[Batranin et al. 2019]
USA	Okanogan River	Salmonids	RUV	Total count	No bait	Assess the abundance of salmonids passing upstream	[Johnson et al. 2007]
Australia	Freshwater Environments	Crayfish	BRUV	Total count	Not stated	Assess the abundance of endemic freshwater crayfish	[Skorulis et al. 2021]
Australia	Goobarragandra & Cotter Rivers	Murray River Crayfish ( <i>Euastacus armatus</i> )	BRUV	Total count	Beef & chicken liver	Assess the abundance of native crayfish present within the river	[Fulton et al. 2012]
Brazil	Xingu River	River turtles, dolphins & caiman	BRUV	Total count	Sardines, cat food, corn & croaker	Assess the abundance of larger aquatic fauna observed during long term fish monitoring	[Schmid & Giarrizzo, 2019]

Canada	Keogh River	All species	RUV	Total count	No bait	Assess the abundance of each species observed	[Bailey et al. 2019]
Czech Republic	Římov Reservoir	All species	RUV	Total count	No bait	Assess the abundance of each species observed	[Holubová et al. 2019a]
Norway	River Tana	All species	RUV	Total count	No bait	Assess the abundance of each species observed	[Pedersen, 2021]
USA	Lake Michigan	Round goby ( <i>Neogobius melanostomus</i> ) & Rusty crayfish ( <i>Orconectes rusticus</i> )	BRUV	Total count	Lake trout eggs	Assess the abundance of different invasive species that are present in the lake	[Robinson, 2014]
Australia	Cotter River	All species	RUV	Total count	No bait	Assess the abundance of each species observed	[Ebner et al. 2009]
Canada	Kennebecasis River	Shortnose sturgeon ( <i>Acipenser brevirostrum</i> )	RUV	Total count	No bait	Assess the abundance overwintering sturgeon populations under ice	[Usvyatsov et al. 2012]
North America	Lake Erie	All species	RUV	Total count	No bait	Assess the abundance of each species observed	[Cooke & Schreer, 2002]
USA	St Johns River Spring complex	All species	RUV	Total count	No bait	Assess the abundance of each species observed	[Work, 2021]

USA	Lake Champlain	Opossum shrimp ( <i>Mysis diluviana</i> )	RUV	Total count	No bait	Assess the abundance of shrimp within the lake	[O'Malley et al. 2018]
Czech Republic	Želivka Reservoir	Bleak ( <i>Alburnus alburnus</i> )	RUV	Total count	No bait	Assess the abundance of bleak within the reservoir	[Šmejkal et al. 2017]
USA	Lake Michigan	Freshwater mussels	RUV on a sled	Percentage cover	No bait	Assess the abundance of mussels on the lakebed	[Karatayev et al. 2018]
USA	Lake Erie	Freshwater mussels	RUV on a sled	Percentage cover	No bait	Assess the abundance of mussels on the lakebed	[Karatayev et al. 2021]
USA	Cayuga Lake	Round goby	RUV	Mean count per quadrant	No bait	Assess the abundance of invasive goby & estimate gobies per meter square	[Andres et al. 2020]
Canada	Kiamika River	All species	Stereo-RUV	Cumulative density	No bait	Assess the abundance of all species observed and gain an estimate for the density of fish in the river	[Gueveneux-Julien, 2021]
USA	Lake Superior	Brook Trout ( <i>Salvelinus fontinalis</i> )	RUV	MaxN	No Bait	Identify the abundance of brook trout present in the survey area	[Wiebe, 2023]
Peru	Multiple survey sites	Farmed Trout	RUV	Biomass coverage	No Bait	Identify the abundance of trout in a fish farm	[Fernandez et al. 2023]
China	Taihu Lake	Macrophytes	RUV	Percentage covered	No Bait	Identify changes in abundance of macrophytes over time	[Li et al. 2023]

Australia	Mudginberri Billabong	All species	RUV	MaxN	No Bait	Monitor the abundance of different fish species at the survey site	[Jansen et al. 2024]
Australia	Multiple sites in Boodjamulla National Park	Gulf snapping turtle ( <i>Elseya lavarackorum</i> )	BRUV	MaxN	Sardines in oil	Assess turtle abundance after a flooding event	[Ezzy et al. 2024]
USA	Coral Gables Waterway	All species	BRUV	MaxN	Menhaden chum	Assess the abundance of fish species within a canal network	[Schmidbauer, 2024]
England	River Test & River Itchen	All species	RUV	SumMaxN	No Bait	Obtain population estimates of fish speices	[Dolman, 2024]
USA	Ocqueoc River	walleye ( <i>Sander vitreus</i> ) & common carp ( <i>Cyprinus carpio</i> )	RUV	Total counts	No Bait	Train AI for auto detection of fish	[Connolly et al. 2023]
Australia	Multiple streams in the Northern Tablelands	Freshwater turtle species	BRUV	MaxN	Sheep liver	Identify abundance of freshwater turtles	[Coleman et al. 2023]
Canada	Credit River	Small bodied fish	RUV	MaxN	No bait	Identify the abundance of all observed species within the study site	[Tweedie et al. 2023]

Argentina	Lake Nahuel Huapi	Caddisfly larvae (Trichoptera)	RUV	MaxN	no bait	Identify the abundance of Trichoptera in the survey area	<b>[Fernandez &amp; Trobbiani, 2023]</b>
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*Appendices A: A breakdown of the different Abundance studies conducted using RUVs.*

Appendices B – RUV Species Richness Studies

<b>Country</b>	<b>Waterbody</b>	<b>Species of interest</b>	<b>Camera Deployment</b>	<b>Analysis Method</b>	<b>Bait</b>	<b>Objective</b>	<b>Reference</b>
Australia	Lake in Victoria state	All species	BRUV	Full species list	Not stated	Assess the species richness of the waterbody	[Iervasi et al. 2014]
Australia	Archer River	All species	BRUV	Full species list	Sardines	Provide a baseline assessment into the impact of feral pigs on species richness	[Waltham & Schaffer, 2017]
Australia	Magela & Nourlangie Creeks	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody	[King et al. 2018]
Canada	Lake Opinicon	All species	BRUV	Full species list	Corn, cat food & sardines	Assess the species richness of the waterbody	[Glassman et al. 2022]
North America	Laurentian Great Lakes	All species	BRUV	Full species list	Lake trout eggs	Assess the species richness of the waterbody	[Robinson et al. 2019]
Norway	River Tana	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody	[Pedersen, 2021]
Czech Republic	Římov Reservoir	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody	[Holubová et al. 2020]

Canada	Lake Erie	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody	<b>[Cooke &amp; Schreer, 2002]</b>
Malawi	Lake Niassa	All species	BRUV	Full species list	Crushed Usipa	Assess how species richness differed on different habitats	<b>[van Wyk et al. 2017]</b>
Zambia	Lake Tanganyika	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody	<b>[Widmer et al. 2019]</b>
Hong Kong	Tung Chung River	All species	RUV	Full species list	No bait	Assess how habitat quality impacted species richness	<b>[Wang &amp; Wai, 2017]</b>
Canada	Credit River	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody	<b>[Tweedie, 2018]</b> <b>[Tweedie et al. 2018]</b>
Italy	Tagliamento River	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody	<b>[Tricini et al. 2020]</b>
Brazil	Rio das Mortes	All species	BRUV	Full species list	Fish feed	Assess the species richness of the waterbody	<b>[Melo, 2018]</b>
USA	Chicago River	All species	RUV	Full species list	No bait	Assess the species richness of a specialised rewilding habitat	<b>[Lant, 2018]</b>
Australia	Cotter River	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody	<b>[Ebner et al. 2009]</b>

Brazil	Piraquara I and Passauna Reservoirs	All species	RUV	Full species list	No bait	Assess how species richness differs in different habitats and gain an understanding of associations	<b>[Frehse et al. 2020]</b>
Brazil	Rio das Mortes	All species	BRUV	Full species list	Sardines, fish food & corn	Assess the species richness and determine which bait type is more efficient in species richness surveys	<b>[Tibúrcio, 2018]</b>
South Africa	Rondegat River	All species	RUV	Full species list	No bait	Assess the effectiveness of piscicide treatment on invasive fish and monitor species richness recovery	<b>[Weyl et al. 2016]</b>
South Africa	Rondegat River	All species	RUV	Full species list	No bait	Determine species richness after rotenone treatment on invasive smallmouth bass & validate the need for further treatment	<b>[Castañeda et al. 2020b]</b>
South Africa	Swartkops River	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody and compare RUV results to those from e-fishing	<b>[Ellender et al. 2012]</b>
USA	Kiamichi River	All species	RUV	Full species list	No bait	Assess how species richness changes in areas with different	<b>[Hopper et al. 2019]</b>

						freshwater mussel populations, seeing if live mussel presence, or the biogenic habitat of shells increased diversity	
Australia	Mulgrave & Russel Rivers	All species	RUV & BRUV	Full species list	Pilchard, prawn & mullet	Assess the species richness of the waterbody and compare the efficiency of baited vs non-baited	<b>[Cousins et al. 2017]</b>
Australia	Metolius & Deschutes Rivers	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody	<b>[Zamarripa, 2020]</b>
USA	Volusia Blue Spring	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody and compare results to seine netting	<b>[Work &amp; Jennings, 2019]</b>
USA	St Johns River Spring	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody	<b>[Work, 2021]</b>
Brazil	Olho d'Água River	All species	RUV	Full species list	No bait	Assess how species richness differed in different habitat types	<b>[Nunes et al. 2020]</b>
Canada	Ganaraska River	All species	RUV	Full species list	No bait	Assess the species richness of the waterbody and repeated two months after to gauge the repeatability of interpretations	<b>[Frezza et al. 2003]</b>

Australia	Harvey Creek	All species	BRUV	Full species list	Pilchard, prawn & mullet	Assess the species richness of the waterbody and the time to first observation of each species	<b>[Ebner et al. 2015]</b>
USA	Kootenai River	All species	RUV	Lowest taxonomic level	No bait	Assess the species richness of the waterbody	<b>[Branigan et al. 2018]</b>
Brazil	Xingu River	All species	BRUV	Lowest taxonomic level	Sardines, cat food, corn & croaker	Assess the species richness of the waterbody	<b>[Schmid et al. 2017]</b>
Australia	Magela Creek	All species	RUV	Full family list	No bait	Assess the species richness of the waterbody	<b>[Crook et al. 2021]</b>
Brazil	Capivara Stream	All species	BRUV	Full family list	Corn & sardines	Assess the species richness of the waterbody	<b>[Carvalho, 2021]</b>
Australia	Fortescue River	All species	BRUV & RUV	Maximum species richness in a single frame	Pilchard, mullet & prawns	Assess the species richness of the waterbody and the efficiency of baited vs non-baited RUVs	<b>[Ebner &amp; Morgan, 2012]</b> <b>[Ebner &amp; Morgan, 2013]</b>
England	River Test & River Itchen	All species	RUV	Full species list	No Bait	Identify all species present within the survey sites	<b>[Dolman, 2024]</b>

Australia	Maroochy River	All species	BRUV	Full species list	pilchards ( <i>Sardinops sagax</i> )	Assess restoration success and inform management strategies	<b>[Rummell et al. 2023]</b>
Brazil	Xingu River	All species	BRUV	Full species list	ungutted sardine ( <i>Sardinella brasiliensis</i> )	Asses the effect of hydroelectric dam on fish composition	<b>[Schmid et al. 2024]</b>
Australia	Multiple streams in the Northern Tablelands	Freshwater turtle species	BRUV	Full species list	Sheep liver	Identify the species richness of each site in regards to freshwater turtle species	<b>[Coleman et al. 2023]</b>
Canada	Credit River	Small bodied fish	RUV	Full speices list	No bait	Identify the species richness of different sites along the river	<b>[Tweedie et al. 2023]</b>
USA	Coral Gables Waterway	All species	BRUV	Full species list	Menhaden chum	Identify the species richness within a canal network	<b>[Schmidbauer, 2024]</b>
Australia	Magela Creek	All fish species	RUV	Full species list	no bait	Assess have species richness varies in response to wastewater	<b>[Crook et al. 2023]</b>
Australia	Maroochy River	All fish and crustaceans	BRUV	Full species list	pilchards ( <i>Sardinops sagax</i> )	Assess the species richness of scavenger fish at a carcass	<b>[Rummell et al. 2024]</b>

*Appendices B: A breakdown of the different Species Richness studies conducted using RUV*

Appendices C – RUV Spawning/Mating Studies

Country	Waterbody	Species of interest	Camera Deployment	Analysis Method	Bait	Objective	Reference
USA	Devils Hole Spring	Devils Hole Pupfish ( <i>Cyprinodon diabolis</i> )	RUV	Deployment at known spawning site	No bait	Determine the timing and frequency of spawning events	[Chaudoin, 2014] [Chaudoin et al. 2015] Chaudoin et al. 2022]
Australia	Mann River	Eastern freshwater cod ( <i>Maccullochella ikei</i> )	RUV	Deployment at nesting site	No bait	Observe breeding and spawning behaviour of the endangered species	[Butler & Rowland, 2009] [Butler et al. 2014]
USA	Snake River	Chinook salmon ( <i>Oncorhynchus tshawyscha</i> )	RUV	Deployment at known spawning site	No bait	Accurately describe habitat used by spawning individuals and their redds	[Groves & Chandler, 1999]
Argentina	Nahuel Huapi Lake	Ceole Perch ( <i>Percichthys trucha</i> )	RUV	Deployment at known spawning site	No bait	Observe spawning and determine the relationship between spawning aggregations and the lunar cycle	[Fernández et al. 2021]

North America	Lake Champlain	Lake trout ( <i>Salvelinus namaycush</i> )	RUV and time synchronised acoustic recorder	Deployment at known spawning site	No bait	Determine the sounds produced by spawning individuals and the behaviours associated with them	<b>[Johnson et al. 2018]</b>
USA	French Broad River	Eastern Hellbenders ( <i>Cryptobranchus alleganiensis</i> )	RUV	Deployment outside shelter	No bait	Observe breeding behaviours of the Hellbenders	<b>[Unger et al. 2020]</b>
USA	Columbia River	Chum salmon ( <i>Oncorhynchus keta</i> )	RUV	Deployment at known spawning site	No bait	Confirm SONAR images of spawning and observe the release of gametes during spawning	<b>[Tiffan et al. 2005]</b>
China	Yangtze River	Chinese sturgeon ( <i>Acipenser sinensis</i> )	RUV	Deployment at known spawning site	No bait	Assess riverbed structure of spawning sites and the suspended materials surrounding them	<b>[Du et al. 2011]</b>
Canada	Moyie Lake	Burbot ( <i>Lota lota</i> )	RUV	Deployment at known spawning site	No bait	Observe spawning activities and aggregation under ice	<b>[Grabowski et al. 2019]</b>
Japan	Kindai University Reservoirs	Japanese Rosy Bitterling ( <i>Rhodeus ocellatus</i> )	RUV	Deployment at known spawning site	No bait	Observe spawning activities in a controlled habitat	<b>[Shirai et al. 2018]</b>

Japan	Tokimae & Onbetsu Rivers	Amemasu charr ( <i>Salvelinus leucomaenis</i> )	RUV	Deployed in front of nests	No bait	Observe spawning acts and postspawning behaviour	[Esteve et al. 2010]
Canada	Kushog Lake	Lake trout	RUV	Deployment at known spawning site	No bait	Observe courting behaviour and spawning activities and timings	[Esteve et al. 2008]
Canada	Grand River	Greater Redhorse ( <i>Monostoma valenciennesi</i> )	RUV	Deployment at known spawning site	No bait	Observe spawning events and the timings and conditions they occur under	[Cooke & Bunt, 1999]
Spain, Canada & USA	Range of locations	Salmonids	RUV	Deployment at known spawning site	No bait	Observe instances of false spawning in females and males and the time to actual spawning after this	[Esteve, 2007]
India	West Bengal	Zebrafish	RUV	Deployment into habitat	No bait	Unexpected observation of mating outside of the known mating season	[Sundin et al. 2019]
North America	Lake Michigan & Lake Superior	Suckers ( <i>Catostomus</i> )	RUV	Deployment into habitat	No bait	Observe behaviours during spawning events	[Lant, 2019]
Ecuador	Lago San Pablo	Andean catfish	RUV	Deployment into habitat	No bait	Observe copulation and provide the first record of their mating sequence	[Mena-Valenzuela et al. 2022]

USA	Oconee River	Robust redbhorse ( <i>Moxostoma robustum</i> )	RUV	Deployment into habitat	No bait	Observe spawning events	<b>[Jennings et al. 1996]</b>
France	Seine River	Lake sturgeon ( <i>Acipenser fulvescens</i> )	RUV	Deployment into habitat	No bait	Confirm spawning occurrence and the timings it occurs at	<b>[Haines, 2017]</b>
USA	Plummer Stream	Moapa Dace ( <i>Moapa coriacea</i> )	RUV	Deployment into habitat	No bait	Observe spawning events and the activities that occur during spawning	<b>[Ruggirello et al. 2020]</b>

*Appendices C: A breakdown of the different Spawning/Mating studies conducted using RUVs.*

Appendices D – RUV Behaviour Studies

Country	Waterbody	Species of interest	Camera Deployment	Analysis Method	Bait	Objective	Reference
USA	Minnesota Lakes	All species	RUV & hydrophone array	Response to external stimuli	No bait	Observe fish behaviour and residency prior to, during and after exposure to anthropogenic noise	[Fleissner, 2021] [Fleissner et al. 2022]
USA	Lake Oneida	All species	RUV & hydrophone array	Response to external stimuli	No bait	Observe fish behaviour in response to noise produced by passing boats	[Pucylowski, 2013]
Canada	Detroit River	All species	BRUV	Response to external stimuli	Atlantic Menhaden	Determine if noise from passing boats reduced presence and foraging behaviour	[Pieniazek, 2020]
Canada	Oscar Creek	All species	RUV	Response to external stimuli	No bait	Observe the anti-predatory behaviour that occurs when chemical alarm cues are released	[Friesen & Chivers, 2006]
USA	Minnesota Lakes	All species	RUV	Response to external stimuli	No bait	Observe behaviour in response to chemical alarm cues and post-predator behaviour	[Wisenden et al. 2004]

Canada	Keogh River	All species	RUV	Response to external stimuli	No bait	Observe behaviour in response to the release of pink salmon ( <i>Oncorhynchus gorbuscha</i> ) eggs	[Bailey et al. 2019]
North America	Lake Champlain	Opossum shrimp	RUV	Response to external stimuli	No bait	Observe shrimp behaviour in response to red light	[O'Malley et al. 2018]
Canada	Headwater channel pool	All species	RUV	Response to external stimuli	No bait	Observe fish fright response to shadows, noise and surface disturbances produced by researchers	[Smith, 2022]
Canada	Kootenai River	All species	RUV	Response to external stimuli	No bait	Observe general behaviour before and after the deployment of PAED - Prepositioned Aerial E-fishing Device	[Branigan et al. 2018]
Canada	Stream in Ontario	Small fish	RUV	Observation in natural environment	No bait	Observe overwintering behaviour under ice	[Davis et al. 2017]
Netherlands	Goeree-Overflakkee	All species	RUV	Observation in natural environment	No bait	Observe the different activities conducted and the species doing them	[van Dijk et al. 2020]

Italy	Tagliamento River	All species	RUV	Observation in natural environment	No bait	Observe the swimming behaviour of fish interacting with woody feature in the river	[Trinci et al. 2020]
UK	River Itchen	Atlantic salmon ( <i>Salmo salar</i> ) & Sea trout	RUV	Observation in natural environment	No bait	Observe the swim-up and downstream movement behaviours of newly emerged fry	[Moore & Scott, 1988]
UK	River Dee	Atlantic salmon	RUV	Observation in natural environment	No bait	Observe general behaviour within an enclosed area of the river	[Armstrong et al. 1999]
Norway	Store Sandungen Lake	Noble crayfish	RUV	Observe populations	No bait	Observe behaviours, specifically fighting, between individuals in traps	[Raugstad, 2019]
Australia	Coastal Stream	Cleft-lipped goby ( <i>Sicyopterus cynocephalus</i> )	RUV	Observe populations	No bait	Observe territorial behaviour of elusive species	[Ebner et al. 2017]
Australia	Wildes Meadow Creek	Fitzroy Falls Spiny Crayfish ( <i>Euastacus dharawalus</i> ) & Common Yaby ( <i>Cherax destructor</i> )	BRUV	Observe populations	Pilchard	Observe interspecies interactions between a critically endangered native crayfish species and invasive crayfish species, assessing dominance of contest	[O’Hea Miller et al. 2022]

Australia	Cotter River	All species	RUV	Observe population	No bait	Observe interspecies interactions, specifically chase-flee and aggression	[Ebner et al. 2009]
Czech Republic	Římov Reservoir	All species	RUV	Observe in open water	No bait	Observe grouping and shoaling behaviours	[Holubová et al. 2019b]
Canada	Lake Simpson	Brook charr	RUV	Observe in open water	No bait	Characterise swimming and feeding behaviours	[Marchland et al. 2002]
Australia	Mann River	Freshwater cod	RUV	Observe in open water	No bait	Observe behaviour after being released	[Butler et al. 2014]
India	West Bengal	Zebrafish	RUV	Observe in open water	No bait	Observe shoaling behaviour and group sizes	[Sundin et al. 2019]
Canada	Otonabee River	Rock Bass ( <i>Ambloplites rupestris</i> )	RUV	Observation in natural environment	no bait	Identify sound produced by rock bass	[Bowman & Raby, 2023]
Australia	Magela Creek	All fish species	RUV	Response to external stimuli	no bait	Assess the behavioural response by fish to mine wastewater	[Crook et al. 2023]

*Appendices D: A breakdown of the different Behaviour studies conducted using RUVs.*

Appendices E – RUV Migration Studies

Country	Waterbody	Species of interest	Camera Deployment	Analysis Method	Bait	Objective	Reference
USA	Columbia & Snake River	Pacific lamprey ( <i>Entosphenus tridentatus</i> )	RUV in fish ladder	Passing an obstacle	No bait	Identify movement and count occurrences to track migration	[Negrea et al. 2014]
USA	Columbia River	Chinook salmon ( <i>Oncorhynchus tshawytscha</i> )	RUV in fish ladder	Passing an obstacle	No bait	Count salmon passing through the ladder	[Eder et al. 2011]
USA	Beaver Lake	Anadromous alewives ( <i>Alosa pseudoharengus</i> )	RUV at fishway exit	Passing an obstacle	No bait	Count the total number of alewives passing through fishway	[Limaye, 2019]
USA	Situk River	Rainbow trout	RUV at gate of weir	Passing an obstacle	No bait	Count the total number of kelts passing through the weir	[Marston, 2014]
Laos	Mekong River	All species	RUV in fish pass	Passing an obstacle	No bait	Identify species and count fish passing in an upstream direction	[Hawkins et al. 2018]
Canada	Skeena River	Sockeye salmon ( <i>Oncorhynchus nerka</i> )	RUV upstream of weir	Passing an obstacle	No bait	Count upstream facing juveniles that come from the weir	[Sweeney-Bergen et al. 2021]
USA	Bronx River	Anadromous alewives	RUV in fish pass	Passing an obstacle	No bait	Observe upstream migration of alewives	[Balster, 2019]
Austria	Multiple locations	All species	RUV in fish pass	Passing an obstacle	No bait	Count all fish that migrate through the fish pass	[Mader et al. 2016]

Germany	Bavaria	All species	RUV in fish pass	Passing an obstacle	No bait	Count all fish that migrate through the fish pass	[Egg et al. 2018]
USA	Lake Michigan	Longnose sucker	RUV	Passing in open water	No bait	To understand the timings of migration	[Lant, 2019]
Canada	Grand River	Silver shiners ( <i>Notropis photogenis</i> )	RUV	Passing in open water	No bait	Observe schools migrating upstream to overwinter habitats	[Bunt, 2016]
Russia	Lake Baikal	Benthic amphipods	RUV	Passing in open water	No bait	Observe the vertical migration of benthic amphipods in the lake	[Takhteev et al. 2019]
Norway	Series of rivers	Atlantic salmon	RUV	Passing in open water	No bait	Identify the timings of Atlantic salmon migration in the rivers	[Svenning et al. 2017]
USA	Neva Lake	Sockeye salmon	RUV	Pass through specialised chute	No bait	Count the total number of salmon that enter the lake	[Musslewhite, 2020]
USA	Freshwater Creel	Rainbow trout	RUV	Pass through specialised chute	No bait	Count the total number of trout entering upstream	[Ricker, 2003]
Finland	River Utsjoki	Atlantic salmon	Array of RUVs	Track migration	No bait	Gain an understanding of the annual numbers ascending the river and how sizes determine timings of migration	[Borgström et al. 2010]

Finland	River Utsjoki	Atlantic salmon	Array of RUVs	Track migration	No bait	Monitor the smolt run and count the number of migrating smolts and the number of smolts per shoal	<b>[Davidsen et al. 2005]</b>
USA	Santuit Pond	River Herring ( <i>Alosa pseudoharengus</i> )	RUV in fish ladder	Passing an obstacle	No bait	Record river herring that pass through fish ladder	<b>[Bennett et al. 2023]</b>

*Appendices E: A breakdown of the different Migration studies conducted using RUVs.*

Appendices F – RUV Foraging Studies

Country	Waterbody	Species of interest	Camera Deployment	Analysis Method	Bait	Objective	Reference
UK	River Idle	Barbel ( <i>Barbus barbus</i> )	RUV	Observation in natural environment	No bait	Describe different food interactions and feeding modes	[Pledger et al. 2014]
Australia	Goodradigbee River	Murray River crayfish	RUV	Observation in natural environment	No bait	Observe feeding aggregations and behaviours in piles of woody debris and leaf litter	[Starrs et al. 2015]
Canada	Lake Simpson	Brook charr	RUV	Observation in natural environment	No bait	Calculate the attack rates of charr on zooplankton	[Marchand et al. 2002]
Czech Republic	Želivka Reservoir	Bleak	RUV	Observation in natural environment	No bait	Observe bleak predation on asp ( <i>Leuciscus aspius</i> ) eggs when asp spawning is high	[Šmejkal et al. 2017]
North America	Lake Erie	Round goby	RUV	Observation in natural environment	No bait	Observe goby predation and consumption of smallmouth bass eggs in nests	[Steinhart et al. 2004]
Brazil	Olho d'Água River	All species	RUV	Observation in natural environment	No bait	Count the number of bites that each fish took in the substratum	[Nunes et al. 2020]

						and note how this differs with size and species	
Canada	Lentic Waterbodies	All species	RUV	Observation in natural environment	No bait	Count the number of times individual fish were recorded feeding in their natural habitat types	[Pratt et al. 2005]
Canada	Lake Cromwell	Scavenger species	BRUV	Bait interactions	White sucker carcass	Quantify interactions that species had with a decaying carcass	[Chidami & Amyot, 2008]
Canada	Lake Cromwell	Scavenger species	BRUV	Bait interactions	Rainbow trout carcass	Identify scavengers and assess their level of interactivity with the carcass	[Chidami et al. 2007]
USA	Oconaluftee River	Scavenger species	BRUV	Bait interactions	Brook trout	Identify different scavenging behaviours occurred on the carcass	[Unger & Hickman, 2019]
USA	Lake Waban	Bluegill sunfish ( <i>Lepomis macrochirus</i> )	BRUV	High framerate review	Earthworm	Observe in slow motion the kinematics of feeding events on tethered prey	[Moran et al. 2019]
Sri Lanka	Belihul Oya River	<i>Schistura notostigma</i>	RUV	Observation in natural environment	no bait	Observe opportunistic feeding behaviour	[Bandara et al. 2024]

Australia	Maroochy River	All fish and crustaceans	BRUV	Bait interaction	pilchards ( <i>Sardinops sagax</i> )	Assess carrion consumption by fish and crustaceans in relation to wetland restoration	<b>[Rummell et al. 2024]</b>
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*Appendices F: A breakdown of the different Foraging studies conducted using RUVs.*

Appendices G – RUV Size Studies

Country	Waterbody	Species of interest	Camera Deployment	Analysis Method	Bait	Objective	Reference
Canada	Kiamika River	All species	RUV	Compare to object of known size	No bait	Use a marked plate of known size as reference to estimate the size of fish	[Guéveneux-Julien, 2021]
Canada	Credit River	Atlantic salmon	RUV	Compare to object of known size	No bait	Use a banded stake of known size as reference to estimate fork-lengths of salmon	[Tweedie et al. 2018]
USA	Buffalo Lake	Northern crayfish	RUV	Compare to object of known size	No bait	Use a scale bar to measure the carapace lengths of invasive crayfish	[Loffredo, 2018]
USA	Kiamichi River	All species	RUV	Compare to object of known size	No bait	Assign fish a size class by estimating their total length relative to a basket of known size	[Hopper, 2019]
Australia	Multiple locations	Crayfish	RUV	Compare to object of known size	No bait	Estimate the size of crayfish by comparing to those caught in traps	[Skorulis et al. 2021]
Norway	Multiple rivers	Atlantic salmon	RUV	Compare to object of known size	No bait	Use the known dimensions of the fish ladder to estimate the length of fish passing through it	[Svenning et al. 2017]

Brazil	Piraquara I and Passauna reservoirs	All species	RUV	Compare to object of known size	No bait	Use a range of objects of known size within the footage as reference to estimate fish total lengths	[Frehse et al. 2020]
Australia	Lake MacLeod	All species	Stereo-RUV	EventMeasure software	No bait	Use specialist software to accurately measure fish lengths	[Cameron-Calouri, 2014]
Malawi	Lake Niassa	Malawian chambo ( <i>Oreochromis lidole</i> )	Stereo-BRUV	EventMeasure software	Crushed Usipa	Use specialist software to accurately measure the fork-length of fish	[van Wyk, 2019]
Canada	Kennebecasis River	Shortnose sturgeon	RUV	Parallel lasers	No bait	Obtain accurate measures of the length of fish passing perpendicular to the camera	[Usvyatsov et al. 2012]
Reunion Islands	Saint-Etienne River	Red-tailed goby ( <i>Sicyopterus lagocephalus</i> )	RUV	Counting pixels	No bait	Estimate the total length of fish passing the camera	[Boussarie et al. 2016]
Canada	Credit River	Small bodied fish	RUV	Compare to object of known size	No bait	Use pixel to length ratio to assess fish sizes	[Tweedie et al. 2023]
Australia	Multiple streams	Freshwater turtle species	BRUV	EventMeasure software	Sheep liver	Use specialist software to identify the size of individuals	[Coleman et al. 2023]

*Appendices G: A breakdown of the different Size studies conducted using RUVs.*

Appendices H – RUV Habitat Use Studies

Country	Waterbody	Species of interest	Camera Deployment	Analysis Method	Bait	Objective	Reference
South Africa	Eastern Cape headwater stream	Eastern Cape redbfin & Cape kurper ( <i>Sandelia capensis</i> )	RUV	Natural habitat use	No bait	Gain a snapshot of habitats used by threatened species and calculate the proportional occupancy of each habitat type by the fish	[Hannweg et al. 2020a] [Hannweg et al. 2020b]
South Africa	Rondegat River	Native Cyprinid Fish	RUV	MaxN	No bait	Assess community composition in response to habitat after a restoration event	[Broom et al. 2023]
Canada	Credit River	All species	RUV	Natural habitat use	No bait	Note the geomorphic habitat and unit refuge features used by schools and individuals	[Tweedie, 2018]
Canada	Saint John River	Shortnose sturgeon	RUV	Natural habitat use	No bait	Gain an understanding of overwintering habitat use	[Andrews et al. 2020]
Canada	Lentic systems	All species	RUV	Artificial habitat use	No bait	Determine the different usages between artificial and natural habitat features by different fish species	[Pratt et al. 2005]
Australia	Cotter River	Macquarie perch ( <i>Macquaria australasica</i> )	RUV	Artificial habitat use	No bait	Confirm the use of artificial structures by perch	[Lintermans et al. 2013]

USA	Sam Rayburn Reservoir	All species	RUV	Artificial habitat use	No bait	Observe fish occupancy in plastic fish attractors used in habitat enhancement	[Driscoll et al. 2020]
USA	Cayuga Lake	Round goby	RUV	Seasonal habitat use	No bait	Observe how invasive goby habitat usage differs between seasons	[Andres et al. 2020]
Canada	Headwater channel	Redside dace	RUV	Seasonal habitat use	No bait	Observe how dace habitat usage changes in different seasons	[Smith, 2022]
Portugal	Avelames River	Cyprinid fish	Stereo-RUV	Refuge use	No bait	Determine if fish use lateral low-flow refuges in response to hydropeaking from a hydropower plant upstream	[Boavida et al. 2021]
USA	San Joaquin River	Chinook Salmon ( <i>Oncorhynchus tshawytscha</i> )	RUV	Natural habitat use	no bait	Assess the role the habitat has in restoration of juvenile populations	[Reynaud, 2024]
Russia	Lake Ladoga	All species	RUV	Natural habitat use	no bait	Assess the association between organisms and the benthic landscape	[Dudakova et al. 2024]

*Appendices H: A breakdown of the different Habitat Use studies conducted using RUVs.*

Appendices I – RUV Presence Studies

Country	Waterbody	Species of interest	Camera Deployment	Analysis Method	Bait	Objective	Reference
Canada	Ontario stream	Redside Dace	RUV	Single deployment location	No bait	Determine the presence of dace in the stream	[Castañeda, 2019] [Castañeda et al. 2020c]
UK	Unnamed pond	White-clawed crayfish ( <i>Austropotamobius pallipes</i> )	BRUV	Single deployment location	Sardine	Confirm the presence of native crayfish and assess the effectiveness of the Ark site	[Rosewarne, 2013]
Finland	River Utsjoki	Atlantic salmon	RUV	Single deployment location	No bait	Establish the presence of juveniles under the ice	[Erkinaro et al. 2018]
Australia	Coastal stream	Cleft-lipped goby	RUV	Single deployment location	No bait	Confirm the presence of the species and provide the first official record of the species in Australia	[Ebner et al. 2017]
UK	Loch Leven	Macrophytes	RUV	Multiple deployment locations	No bait	Note the different macrophytes present at each position in the Loch	[Spears et al. 2009]

Norway	Series of rivers	Atlantic salmon	RUV	Multiple simultaneous deployments	No bait	Establish the presence and location of escaped farmed salmon throughout Norway	[Svenning et al. 2017]
Australia	Deception Creek	Running River rainbowfish (Melanotaenia sp.)	BRUV	Multiple deployment locations	not specified	Identify fish populations after captive breeding and release	[Moy et al. 2023]
Italy	Piras River	Mediterranean Trout ( <i>Salmo ghigii</i> )	RUV	Multiple deployment locations	no bait	Identify the spatial distribution of an endangered fish species	[Palmas et al. 2023]
Argentina	Lake Nahuel Huapi	Caddisfly larvae (Trichoptera)	RUV	Single deployment location	no bait	Identify the different species of caddisfly larvae present within the study site	[Fernandez & Trobbiani, 2023]

*Appendices I: A breakdown of the different Presence studies conducted using RUVs.*

Appendices J – RUV Nesting Studies

Country	Waterbody	Species of interest	Camera Deployment	Analysis Method	Bait	Objective	Reference
USA	Series of ponds	Largemouth bass ( <i>Micropterus salmoides</i> )	RUV	Deployment outside of nest	No bait	Observe nest guarding male activity following catch-and-release angling	[Cooke et al. 2000]
USA	French Broad River	Eastern Hellbender	RUV	Deployment outside of nest	No bait	Observe nest guarding and maintenance behaviour of males	[Unger et al. 2020]
Japan	Umemoto River	Bagrid catfish ( <i>Pseudobagrus nudiceps</i> )	RUV	Deployment outside of nest	No bait	Observe male interactions with foreign eggs placed within its nest	[Yamane et al. 2016]
Japan	Lake Nojiri	Smallmouth bass	RUV	Deployment outside of nest	No bait	Observe nest guarding behaviours	[Peterson & Kitano, 2022]
Africa	Lake Tanganyika	Cichlid fish ( <i>Neolamprologus bifasciatus</i> )	RUV	Deployment outside of nest	No bait	Observe subordinates present within the nests of breeding pairs sheltering with juveniles and acting towards cooperative breeding	[Satoh et al. 2022]

Africa	Lake Malawi	Catfish ( <i>Bagrus meridionalis</i> )	RUV	Deployment outside of nest	No bait	Observe the placement of cichlid <i>Ctenopharync pictus</i> & <i>Copadichromis pleurostigmmoides</i> young into the nests and the in-nest interactions between these species	[McKaye et al. 1992]
USA	Tallapoosa River	Redbreast sunfish ( <i>Lepomis auratus</i> )	RUV	Deployed in commonly used habitat	No bait	Observe nesting behaviour in substrate commonly used by nesting sunfish	[Martin & Irwin, 2010]

*Appendices J: A breakdown of the different Nesting studies conducted using RUVs.*

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