



ENVIRONMENT AND SUSTAINABILITY

An International Specialised Skills Institute Fellowship.

BRAEDEN LAMPARD

Sponsored by George Alexander Foundation

© Copyright January 2020

Table of contents

1. Acknowledgements	1
2. Executive summary	4
3. Fellowship background	5
4. Fellowship Learnings	9
5. Personal, Professional and Sectoral Impact	11
6. Recommendations and Considerations	14
7. References	16

1. Acknowledgements

The Fellow would like to thank the following individuals and organisations who generously gave their time and expertise to assist, advise and guide him throughout the Fellowship.

Awarding Body – International Specialised Skills Institute (ISS Institute)

The ISS Institute plays a pivotal role in creating value and opportunity, encouraging new thinking and early adoption of ideas and practice by investing in individuals.

The overarching aim of the ISS Institute is to support the development of a 'Better Skilled Australia'. The Institute does this via the provision of Fellowships that provide the opportunity for Australians to undertake international skills development and applied research that will have a positive impact on Australian industry and the broader community.

The International Specialised Skills Institute was founded 29 years ago, by a small group of innovators including Sir James Gobbo AC, CVO, QC, and former Governor of Victoria, who had a vision of building a community of industry specialists who would lead the up-skilling of the Australian workforce. The Fellowship program builds shared learning, leadership and innovation across the broad range of industry sectors worked with. Fellows are supported to disseminate learning's and ideas, facilitate change and advocate for best practice through the sharing of their Fellowship learning's with peers, colleagues, government, industry and community. Since its establishment, ISS Institute has supported over 450 Fellows to undertake skill and knowledge enhancement across a wide range of sectors

which has led to positive change, the adoption of best practice approaches and new ways of working in Australia.

The Fellowship Programs are led by investment partners and designed in a manner which ensures that the needs and goals desired by the partners are achieved. ISS Institute works closely to develop a Fellowship program that meets key industry priorities, thus ensuring that the investment made will have lasting impact.

For further information on ISS Institute Fellows, refer to www.issinstitute.org.au

Governance and Management

Patron in Chief: Lady Primrose Potter AC

Patrons: Mr. Tony Schiavello AO and Mr. James MacKenzie

Founder/Board Member: Sir James Gobbo AC, CVO

Board Chair: Professor Amalia Di Iorio

Board Deputy Chair: Mark Kerr

Board Treasurer: Jack O'Connell AO

Board Secretary: Alisia Romanin

CEO: Wendy Draayers

Sponsor – The George Alexander Foundation

The Fellow sincerely thanks The George Alexander Foundation for providing funding support for the ISS Institute and for this Fellowship. In 1972, George Alexander AM (1910 - 2008) set up an independent philanthropic Foundation as a way of sharing his wealth and giving back to the community. Today, the main focus of The George Alexander Foundation is access to education for promising young people, particularly students with financial need and those from rural and remote areas.

The George Alexander Foundation (GAF) Scholarship and Fellowship Programs form the core of the foundation's work, operating in partnership with major tertiary institutions, while our Fellowships and other Education grants provide a variety of other unique and challenging educational experiences. George Alexander believed in the notion of 'planting seeds and hoping they grow into pretty big trees'. The programs supported by the Foundation endeavour to support this ideal and as GAF students graduate and go on to contribute to the community, George's legacy and spirit lives on through their achievements. George Alexander came to Australia as a child migrant, and went on to become a mechanic, an entrepreneur and a businessman and later, a generous philanthropist, who held that you do not own the possessions you have, 'you're just minding them'. This philosophy guided him to give during his lifetime and to hope that through his example, he might inspire others to do the same.

Marika Lampard: Thank you for your patience and upmost support throughout the Fellowship.

OzFish Unlimited: Thank you for supporting the Fellow while undertaking the Fellowship in New Zealand and seeing the relevance that his findings have towards the environmental industry within Australia.

Matt Barwick: Thank you for showing such interest in the Fellow's growth, being a mentor and writing letters of recommendation.

The Fellowship has been invaluable in providing key links to individuals, research and key companies of who the Fellow would otherwise, have been unaware of. These networks and knowledge gained have provided the Fellow with references, learnings and the confidence to work alongside community groups, government agencies and experts within the Murray Darling Basin. Without the assistance from the above individuals, the Fellowship would not have been possible.



2. Executive summary

Installing fish screens on irrigation pumps within the Murray-Darling Basin may just be one of the most important restoration projects of our time. This huge ecological problem has a simple solution and can be implemented quite easily. In many countries irrigators and environmental agencies utilise fish screens on irrigation offtakes to decrease the numbers of fish being lost. However, to date in Australia, only a small number of fish-friendly screens have been installed. Why is a world-leading country like Australia so far behind on this issue, and what can be done about it? The Fellow went to New Zealand to meet with the industry leaders and find out the answer.

There is mounting evidence that suggests millions of native fish are lost each year from water bodies within the Murray Darling Basin as they are sucked into irrigation pumps and lost forever. One of the most common tools used to combat this loss internationally is the use of self-cleaning, fish-friendly screens on the intake of pumps.

In many parts of the world, including the United States (USA), Europe and New Zealand, diversion screens are considered a critical component of any best-practice, whole-of-farm approach to irrigation modernisation planning or scheme. Large investments are being made within New Zealand in modernising ageing and inefficient irrigation delivery systems to achieve water savings. Diversion screens are a reliable way to prevent fish losses from rivers, as well as improving the efficiency of water delivery and profitability of irrigation.

In Canterbury, there are around 1400 water extraction offtakes and consents that take water from the rivers. The Fellow spent all his time in Canterbury as over 70% of the irrigation water used in New Zealand is in Canterbury, so most

of the agencies involved in irrigation and infrastructure are Canterbury based. Each exaction offtakes have specific guidelines that were released in 2007. The guidelines were prepared by NIWA in consultation with Irrigation NZ consulting with Environment Canterbury (ECan), Fish and Game New Zealand, Irrigation New Zealand and the Department of Conservation, Fish and Game, the Jet Boat Association and Whitewater NZ. The Fellow visited over 10 waterbodies within Canterbury with the above-mentioned organisations, each waterbody visited had different types of fish screens. While undertaking the visits, the Fellow discussed the fish screening criteria, fish screening efficiency, the community awareness and opinions of fish screens and past engagement events undertaken.

To enhance the necessity of fish screens in Australia, government agencies need to engage with key industry and stakeholders, including recreational anglers and irrigators. This would involve increasing the key stakeholder's knowledge and establishing priority case studies in partnership with the key stakeholders. Additional funding or incentives also need to be established to support the costs of fish screens to the irrigators. In addition to this, an effective engagement and installation strategy needs to be developed and published. The Fellow believes that these recommendations will assist to promote fish screens on irrigation structures.

The Fellowship was an excellent opportunity to meet and network with managers and researchers internationally and gain insights into the modernised technique - fish diversion screens. The Fellow benefitted greatly from the trip and since returning to Australia in September 2019 has already started to work alongside Australian experts to implement and create networks and awareness within the key community groups.

3. Fellowship background

Fish screens have been used in New Zealand since the 1980s, by early 2005 fish screens were required by regulatory authorities on irrigation and stock water intakes within New Zealand, as organisations recognised that having no fish screens on such offtakes was causing significant problems for both irrigators and for fisheries management. The New Zealand irrigation community, indigenous community and recreational angling community have embraced the fish friendly screens as they realise the severe impacts that irrigation offtakes can cause. In 2005, a New Zealand Fish Screen Working Party lead by ECan and included groups such as DOC, F&G and Irrigation NZ developed guidelines for fish screening in Canterbury and later published the document, Fish Screening: Good Practice Guidelines for Canterbury. These guidelines are in place to ensure the past and future fish screens are kept at the same standard and are working efficiently and effectively.

Fish screens in Australia have been a relatively new technology. However, over the past five years scientist and government agencies have adapted and trialled fish screens within the Murray Darling Basin. This research by Australian scientists has shown that hundreds to tens of thousands of fish a day can be removed from rivers by a single pump, of which there are over 4500 with diameters greater than 200 millimetres, licensed within New South Wales alone. By adopting diversion screens there is great potential for irrigators and other water users to be stewards for native fish recovery in the Murray Darling Basin, and, by doing so, reduce the operational costs and improve the profitability of their businesses. Fish biologists and irrigation engineers have already completed preliminary investigations that suggest diversion screening have immense potential to deliver benefits for farmers and the environment in the Murray Darling Basin. Preliminary screening design criteria has been created for Murray-Darling Basin, with laboratory and field trials

estimating that if applied correctly, screens could reduce the loss of fish from our rivers by over 90 per cent.

Community involvement enables the public to provide ongoing and in-depth input into planning, development of solutions and resources that are best able to meet the community's needs. It also enables the community and service users to have substantial input into the development of services. Community engagement also has the potential to empower communities and to enable community members to gain skills in community participation

Recreational fishing is the beating heart of regional economies throughout Australia. Overall recreational fishing generates over 95,000 jobs nationally and contributes billions to our national economy. The Australian community is continually becoming increasingly aware of fish screens and the adverse effect they are having on the native fish population, there is also growing interest within the irrigation community to begin trialling self-cleaning screens. However, to make the environmental progress required, organisations need to enhance the current skills, knowledge, and capability of Australia's recreational fishing and irrigation community when it comes to fish habitat and rehabilitation techniques. This will bring benefits to the recreational fishing community, local environments and to the broader community.

There have been impressive results so far, but we need more, and we won't restore our rivers and fisheries to their rightful condition without the active support and involvement of the recreational fishing community.



Fellow viewing one of five fish screening techniques in New Zealand

Fellowship Context

Native fish populations in the Murray-Darling Basin are estimated to be at 10% of pre-European settlement levels. This low abundance of native fish is alarming and has occurred due to a largely changed ecosystem. Whilst multiple key threatening processes have contributed to this decline, the impact of fish losses at water diversions has been largely underestimated and remains unaddressed. There is a problem regarding the unnecessary large volume of native fish being lost every year to irrigation offtakes, and that problem has been fixed overseas – so a solution exists. Water managers and researchers within Australia have been promoting the need to install fish screens on irrigation pumps and the positive results that could be achieved, however a large proportion of the key stakeholders are currently not adopting the technique and are not willing to change their practices.

In New Zealand the installation of fish screens on irrigation pumps has become a normalised element of owning an irrigation offtake, and this has occurred largely from advocacy by irrigators, recreational anglers, traditional owners and general community members. Unfortunately, this is not the case in Australia and the same type of individuals are still sceptical of the modernised equipment and unsure if they are worth their cost. Recreational fishing and the irrigation community within the Murray-Darling Basin contributes 100's of millions of dollars towards the economy each year, and healthy native fish are vital to each sector and the general community. If native fish populations continue to plummet then the unique fishing opportunity's, the health of waterways and the local produce could fall which would cause a significant decline to the economy to the Murray-Darling Basin.

In Australia, it is the community itself that is most directly affected by changes to the environment. With the community's (both irrigation and recreational fishing) close connection to the Murray-Darling Basin the need to engage with them in up most necessary. The Australia's community is a major beneficiary of this project and installing fish screens on irrigation structures within the Murray-Darling Basin needs to work closely and collaboratively with the community, both recreational anglers and irrigation community, throughout its implementation. Fish screens can be used to protect fish populations whilst maintaining irrigator entitlements. Although several different screening approaches are currently applied elsewhere in the world, most of which would be suitable for application in the Murray-Darling Basin, it is essential that technologies are designed with the needs of Murray Darling Basin fish species in mind.

Braeden's study tour examined the current types of fish screens being utilised within New Zealand, the past use of collaborative approach to address the impacts of irrigation methods on fish, and the communication techniques that have been used overseas. Whilst on the Fellowship tour, he continually considered how each question and learnings can be adapted and utilised in Australia conditions.

Fellowship Methodology

The Fellowship was undertaken in the South Island of New Zealand over a four-week period in 2019. The Fellowship drew on international experience via several avenues, during that time the fellow visited series of fish screening designs and attended numerous meetings with government and non-government organisations of which he presented at one. The Fellowship involved multiple key approaches and components; thus, the Fellow discussed the current challenges that has risen from the installation of fish screens, past engagement techniques used, and key processes undertaken with irrigation, government, non-government, researcher and community organisations.



Fellow viewing and discussion fish screening techniques and technologies at one of the first fish screen sites in New Zealand

Fellowship Period

The international experience occurred in August to September 2019, with additional research undertaken within Australia in September to November 2019. However, the Fellowship has enlightened Braeden's passion to continue to develop and grow in this industry and he plans to be one of the key influencers in the future.

Fellow's Biography

The Fellow, Braeden Lampard, has over 7 years' experience working in local stakeholder engagement and communications and within the environmental science industry. Braeden is a dedicated, highly motivated, goal-oriented professional who has an interest in the environment industry which started from camping, bushwalking and fishing along the Murray river as a child. Braeden is interested in the sustainable management of aquatic freshwater ecosystems especially native fishes, particularly the Murray-Darling Basin, including the efficient and effective use of environmental water to deliver ecological benefits.

Braeden is highly regarded within the Sunraysia region due to being involved in various volunteer groups and his strong interest in engaging the community to both develop and promote projects. This is a role of which he constantly undertakes during his current employment and in his volunteer role at the Sunraysia OzFish and the Nangiloc Fishing Club. He believes that educating and engaging with the community on the range of programs that he is coordinating is essential to ensure the success of the program.

Abbreviations / Acronyms / Definitions

Biodiversity The variety of plant and animal life in a defined region

Diversity A range of different things, e.g. different plant species

Ecosystem A biological community of interacting organisms and their physical environment

Floodplain An area of low-lying ground adjacent to a river and subject to flooding

Fisheries management The activity of protecting fishery resources so sustainable exploitation is possible, drawing on fisheries science, and including the precautionary principle.

Irrigation The supply of water to land or crops to help growth

Infrastructure A flow gauging device or any other appliance that is used to measure the height of a river relative to a known datum point, from which the flow in the river can be calculated

Licence Holder Person or company who holds the rights granted by way of a licence. The holder may gain the rights by being in occupation of the lands on which the licence authorises works to be constructed and used. They might not be the owner of those lands

Local management plan or local management rules Local management plans or rules are developed and signed off. A local management plan or local management rules are for an area with a Permissible Consumptive Volume and include appropriate tools such as trading rules, triggers for restrictions and monitoring requirements.

Murray-Darling Basin Catchment area of the Murray River, Darling River and associated streams

Murray-Darling Basin Plan Legislative framework to guide management of water in the Murray-Darling Basin

Off take A controllable device usually located within a Weir or a Channel which allows water to be diverted to a stream other than the main Water Course, or to a storage area

OzFish Unlimited Key recreational angling and non-for-profit environmental organization

Stream Also variously referred to as River; or Water Course. It is the path of the main flow of surface water along its extent

Restoration projects Projects that attempts to restore, improve or create particular ecosystem functions

Restoration ecology The scientific study supporting the practice of ecological restoration, which is the practice of renewing and restoring degraded, damaged, or destroyed ecosystems and habitats in the environment by active human intervention and action

4. Fellowship Learnings

Restoration ecology is a new and vital area of ecology, which aims to underpin and improve current management to restore degraded landscape elements. There has been a significant amount of restoration projects undertaken within the Murray Darling Basin; however these projects have not entirely been commenced as a collaboration, but only by individual states. Projects, such as fish screens on irrigation pumps, should be undertaken in a collaborative manner that includes all the different state-managed, private research institutions and involve community members, to undertake on-ground research and promote the necessity of the fish screens on irrigation structures. Significantly, addressing and installing fish screens on irrigation infrastructures can present opportunities for community engagement and involvement in research and on-ground works. Specifically, irrigators should be engaged and need to have ownership when determining potential solutions to mitigate the impacts of irrigation infrastructure on fish. This could be facilitated through the development of effective demonstration reaches that attempt to showcase ecological improvements to the wider-community, especially where large-scale structures could enhance fish communities on a large-scale.

The success of screening programs in New Zealand have been based upon having well-developed guidelines on screen design, that provide guidance on maximum velocities rates in front of the screen and the types of material that screens are made from.

The Fellowship was an excellent opportunity to meet and network with managers, researcher's community groups and irrigators internationally. The Fellowship has been invaluable in providing key links to individuals and research. The Fellowship has assisted with understanding the importance of fish screens on irrigation structures and the need to ensure the science is key to informing decisions and

the importance of process, structure, project management and communication. The main benefits from the Fellowship have come from increased networks and awareness of relevant research and researchers. From the tour, the Fellow established that the key to ensuring the success of fish screens on irrigation structures is the incorporation of knowledge from other relevant sources and key influencers.

The Fellow's study tour allowed him to consult, engage and learn from one of the world leaders in fish screening on irrigation structures, thus, there was countless points studied and absorb. The Fellow was able to meet many New Zealand's specialised and inspiring individuals, with the information gathered he now plans to work alongside Australia's industry specialists and inaugurate the information learnt.



Fellow viewing a fresh water stream that has had a range of restoration projects completed

The Fellow would summarise his learnings into these points:

Government organisations:

- » Discover the importance of writing and implementing effective strategies for resourcing and managing environmental projects, such as fish screens on irrigation structures and;
 - » Create templates to ensure efficiency and effective fish screening designs to suit the Murray Darling Basin conditions
 - » Ensure there is a designated individual company involved in the installation of fish screens to ensure the effective and operational obligations are consistently met for each project
 - » Develop an effective communication plan that covers the following points; promotes the importance of fish screens, outlines and targets key irrigation companies to create case studies, create terms of references for key organisations, target key waterbodies within the Murray Darling Basin that should be the initial restoration sites, determine which funding source will be used to implement the fish screens on irrigation structures technique.
- » Australia's government agencies need to create a incentive program where the irrigation industry feels obligated to reciprocate and provide their equipment for trials and studies. This could be achieved by providing financial incentive programs and or support throughout the process.
- » Australia's government and specialists need to work alongside willing industry individuals to develop their confidence, skills and knowledge in fish screens to ensure future discussions are industry individuals discussing with industry individuals. These willing industry individuals would undertake trials at their irrigation structure with the established technology.

- » Validate and develop the economic, social and environmental benefits of fish screens that can be achieved so future discussions with irrigation organisations are based on science and relevant information.
- » Ensure the information collected from any study, discussion or road show is collaborated and undertaken by the relative state and federal authorities with involvement and effective community engagement.

Key stakeholders (recreational anglers, irrigation, interested parties)

- » Develop a key "Murray Darling Basin Fish Screening Advisory Committee who will oversee all development, coordinate and inform future priorities of fish screens on irrigation structures. The group to be represented by all key stakeholders and involve the key stakeholders; freshwater researchers, engineers, irrigators and recreational anglers.
- » Target "key influencers" in each stakeholder group, for instances, utilise the large following of recreational angling individuals to promote the projects, the research and the necessity of fish screens on irrigation structures.

5. Personal, Professional and Sectoral Impact

The Fellow met with numerous science researchers, irrigators and key community individuals across New Zealand. The Fellow has developed an understanding of the future problems that could be faced within the Murray Darling Basin. The Fellowship has enabled the Fellow to have the confidence in facilitating future discussions with the key government agencies and community members. The Fellow also witnessed the successful communication techniques that have been utilised in New Zealand and the necessity of having key influencers within the key stakeholders. The Fellow developed their skills in networking, the Fellowship also exposed the Fellow to new ideas on how to communicate with the key stakeholders. One of the most important aspects that the Fellow achieved from the trip is the large network of experts internationally, this network will allow the Fellow to connect with, and connect others with, to engage Australia in a global conversation on how best to restore our waterways. Key to any sort of research is the incorporation of knowledge from other relevant sources.

The Fellowship has been invaluable in providing links and networks to individuals, research and communication products. These networks and knowledge will provide the Fellow with references and the required information to assist government agencies to new analysis and communication techniques.

Restoration ecology is a new and vital area of ecology, which aims to underpin and improve current management to restore degraded landscape elements. There has been a significant amount of restoration projects undertaken within the Murray Darling Basin, however these projects have not entirely been commenced as a collaboration, but only by individual states. Projects, such as fish screens on irrigation pumps, should be undertaken in a collaborative manner that includes all



Fellow viewing one of five fish screening techniques in New Zealand

the different state-managed, private research institutions and involve community members, to undertake on-ground research and promote the necessity of the fish screens on irrigation structures. Importantly, addressing and installing fish screens on irrigation infrastructures can present opportunities for community engagement and involvement in research and on-ground works. Specifically, irrigators should be engaged and need to have ownership when determining potential solutions to mitigate the impacts of irrigation infrastructure on fish.

As this restoration technique is relatively new and small field, the fellow believes that he will play a major role soon with the engagement of the key stakeholders and government agencies. The fellow works for a non-for-profit organisation

that specialises in the engagement of recreational anglers to deliver on-ground restoration projects within the Murray Darling Basin. Thus, the Fellowship has been an invaluable opportunity for the Fellow to further their career as they now have links to a network of international and national professionals.

The skills and knowledge learned through the Fellowship will have a positive impact on the Fellow's future work, the use of engagement techniques, involving the community, and fostering a sense of pride in one's local environment and learn the recipe for successful projects, and, conversely, what to avoid. By adopting diversion screens there is great potential for irrigators and other water users to be stewards for native fish recovery in the Murray-Darling Basin.

The Fellow plans to work alongside the industry leaders to assist them in developing the key learning from the fellow's tour of New Zealand, which will in turn assist with the implementation of fish screens on irrigation structures.

The Fellowship has been influential in shaping and develop skills and attributes to effectively deal with complicated social and environmental situations as will have occurred in New Zealand and have a greater resilience in developing and implementing programmes in Australia based on understanding the paths to success that have been followed in New Zealand.

A coalition of the willing including government agencies, scientists, OzFish Unlimited and other community groups have been working towards that goal by taking action to remove unnecessary dams, weirs and road crossings which stop fish migration, improve fish habitat, control pest species, restore the naturalness of river flows, restore waters downstream of dams to natural temperatures and inform community groups.

The Fellowship learnings demonstrate that there is great opportunity for Australia's government leaders to work alongside industry individuals and move toward using more creative communications methods in sharing the message and the ways to address these issues.

The ongoing responsibility of the fellow will be to promote the Fellowship findings and recommendations and to remember that my journey is continuing.



Fellow discussing fish screens with New Zealand researchers

Social media Impact:

Social media allows industries to engage and connect and motivate industry key stakeholders.

While on tour:

While the fellow was undertaking the tour in New Zealand, the Fellow uploaded movies, pictures and information that covered:

- » Who he had met (companies and individuals)
- » What discussions he had

» Pictures and movies of the sites he saw

Overall, the updates on Facebook had over 600 interactions and 255 on Instagram.

Returning home:

Since returning to Australia, the Fellow has assisted in writing two articles that are “call for action” for the key stakeholders to get involved. These articles have been uploaded to social media and have had over 5,000 interactions.

Applying the knowledge:

The Fellow visited key organisations in New Zealand that have been crucial in the development and installation of fish screens in New Zealand. The companies visited have been coordinating research into the effectiveness and applicability of fish screening methods used in New Zealand and have been successful in engaging with the community and irrigators.

The outcomes of the Fellowship will be incorporated into existing and future projects, through workshops, discussions with research collaborators and discussions with the project management teams. Relevant resources, such as scientific papers, best practices and key influencers will be shared with project collaborators, project management teams and industry stakeholders through effective engagement. Additional engagement with the external stakeholders and broader community will be necessary to ensure project success. After researching the problem and what is currently known about the issue, the Fellow plans to work alongside government agencies and key industry stakeholder to develop a project proposal and communication plan that will raise the profile of the issue. The Fellowship report will be disseminated through the Fellows networks, including on social media and through key recreational angling and irrigation groups. The

recommendations and applying the knowledge will focus on enhancing the success of internationally projects and enhance the skills, including:

- » Continue to work with government agencies to create key influencers to ensure future effective engagement
- » Work alongside government agencies and assist with a Murray Darling Basin fish screening advisory committee
- » Distribute of long-term monitoring and effectiveness of fish screens on irrigation structures
- » Continue to advocate key stakeholders and government agencies for funding arrangements that span multiple financial years
- » Continue to recognise the value of collaboration and engagement between all agencies. This may be in the form of knowledge sharing through meetings, tours, social media and field trips
- » Advocate for the participation of key influencers and stakeholders in research and monitoring projects to enhance their knowledge
- » Engage with key communicators to assist with creating an effective communication plan and in the translation of modern research productions into communication products.

Murray Darling Basin Fish screen



6. Recommendations and Considerations

Given the extensive nature of water diversion in the Murray-Darling Basin and the mounting evidence that a significant number of fish and life history stages are vulnerable to extraction from river ecosystems, native fish recovery in the Basin will be hampered without a concerted effort being made to screen fish at water diversions.

Fish screens are a necessity to protect the native fishery within the Murray Darling Basin, they also are vital in maintaining irrigation longevity. In order to ensure sustainable and long-term development of the native fishery within the Murray Darling Basin, there needs to be a major thinking shift in Australia regarding the fish screens on irrigation structures. This will be a major challenge to balance social, economic and ecological benefits, across all critical components.

Recommendations span all the skill enhancement areas identified and should be a matter of priority to ensure the effectiveness and efficient installation of fish screens, especially the development collaboration between Australian and International research programs, as well as internally within Australia.

The recommendations focus on processes, enhancing of knowledge and ensuring incentives are sought, the success of these tasks will assist with the role out of fish screens on irrigation structures within the Murray Darling Basin. The knowledge around the application of fish screens should be enhanced between government agencies and between the key stakeholders, these skills are extremely valuable and can be completed through communication and collaboration.

- » Irrigator contributions can include in-kind labour or materials which reduce the need for individuals to meet substantial capital costs.

- » Ongoing maintenance and ongoing monitoring are critical for the effective and maximum screen efficiency and consistency of a screening program
- » Key stakeholders are vital for the future and they need to be involved and supported in the fish screen design and project engagement
- » Develop the screening criteria for Australian freshwater fishes and the Murray Darling Basin
- » Develop communication or engagement strategy and a slogan to assist with fish screens going viral, like:
 - » Keep calm and swim on
 - » Silver screens and native fish
 - » They see me rolling and surviving
 - » I scream, you scream, we all scream fish screens
- » Develop a standardised procedure on how to install fish screens on irrigation structures
- » Within three months of the installation of the fish screening structure, the site and fish screen must be viewed by an independent individual who is either on the Murray-Darling fish screening advisory committee or by AWMA water solutions.
- » Have one independent individual who is either on the Murray-Darling fish screening advisory committee or by AWMA water solutions to assist with the installation of the fish screens to ensure the standardised procedure is followed

- » Recognition that we need to work with key industry individuals to build capacity and enhance their knowledge so effective future discussions can occur
- » Timeframes for resolution of ineffective fish screens – determine an agreed timeframe
- » Improving knowledge, practices and guidance that is applicable nationally & could be formally adopted

We should all be working towards a healthy future; including government agencies, community groups and recreational anglers. If we all joined forces to work towards a one world, one basin one future we would see significant changes in a short time.

7. References

Aljon Salalila, Z. D. (2019). Evaluation of a fish-friendly self-cleaning horizontal irrigation screen using autonomous sensors.

Barrett, J. (2004). Introducing the Murray-Darling Basin Native Fish Strategy and initial steps towards demonstration reaches. Ecological Management and Restoration-Linming science and practice.

Blackey, T. (2003). Screening Irrigation Offtakes in the Murray-Darling Basin to Reduce Loss of Native Fish.

Craig Boys, L. B. (n.d.). Development of fish screens criteria for water diversions in the Murray-Darling Basin. Port Stephens : NSW Department of Primary Industries .

Prof. A. McManus, D. W. (2011). Identifying the health and well-being benefits of recreational fishing . Curtin University: Centre of Excellence for Science, Seafood and Health; Curtin Health Innovation Research Institute.

Solutions, A. W. (2019, October 23). Cohuna Irrigation Diversion Screen Project. Retrieved from AWMA Water Control Solutions: <https://www.awmawatercontrol.com.au/project/gunbower-fish-exclusion-screen-project-cohuna/>

Zealand), M. B. (2014). Findings from field investigations of six fish screens at irrigation intakes. Christchurch: NIWA.



ISS Institute
Level 1, 189 Faraday Street
Carlton VIC 3053

T 03 9347 4583
E info@issinstitute.org.au
W www.issinstitute.org.au

Published by International Specialised Skills Institute, Melbourne | www.issinstitute.org.au

© Copyright ISS Institute January 2020

This publication is copyright. No part may be reproduced by any process except in accordance with the provisions of the Copyright Act 1968.

Whilst this report has been accepted by ISS Institute, ISS Institute cannot provide expert peer review of the report, and except as may be required by law no responsibility can be accepted by ISS Institute for the content of the report or any links therein, or omissions, typographical, print or photographic errors, or inaccuracies that may occur after publication or otherwise. ISS Institute do not accept responsibility for the consequences of any action taken or omitted to be taken by any person as a consequence of anything contained in, or omitted from, this report.