#56, September 2016

Newstreams

News, research, on-ground works, innovation and events with a focus on improving fish habitat

This issue of *Newstreams* is proudly brought to you by Ozfish Unlimited as part of a project to build the capacity of recreational fishers in Australia to address fish habitat issues. The project is funded by the Fisheries Research and Development Corporation. Over the next couple of years the project will develop the framework for an action plan to guide fish habitat action in Australia. To find out more: www.ozfish.org.au

Australian News

Banks stumped

Unwanted tree stumps are being recycled to help protect more than three kilometres of the Bellinger, Nambucca, Macleay and Hastings River estuaries, in coastal New South Wales. As well as around 600 tree stumps and 1600 timber pins sourced from clearing associated with nearby upgrades of the Pacific Highway, 120 tonnes of rocks are also contributing to the bank protection structures. One of the benefits of using timber as well as rocks is the delivery of additional carbon into the estuary food chain as the timber rots down. Read more: http://www.environment.nsw.gov.au/media/OEHMedia16080402.htm

Estuarine restoration using timber and rocks from nearby road works. Photo: NSW OEH.

Letting the tides back in brings the fish back

Researchers have studied the impact of reopening tidal floodgates allowing more natural tidal flow into and out of a coastal wetland. Many tidal wetlands have been lost as fish nurseries when flood mitigation structures, such as floodgates, have been installed. Over the period of 11 years, the fish response to the incremental opening of eight gates in a tidal creek in the Hunter estuary was monitored. The researchers found that both water quality improved and fish responded to the return of the tides. Many important species increased in abundance, including School Prawn (15 times more), Yellowfin Bream (62 times more), and Flat-tailed Mullet (10 times more). Once all eight gates were opened, the creek recovered to a condition similar to creeks that had not had floodgates installed. Read more of this research by Boys and Pease in *Marine and Freshwater Research:* http://dx.doi.org/10.1071/MF15445.

An example of a tidal floodgate operating in the Hunter estuary. Photo: NSW DPI.

Fish physiology might be the key to adaptation

Fish haemoglobin (the molecule that transports oxygen in the blood) is unique: not only does it allow enhanced oxygen delivery to tissues under stressful conditions, but it also delivers oxygen up to 50-times more efficiently than the haemoglobin of air-breathers. However, fish haemoglobin is much more pH-sensitive than in other vertebrates so researchers are studying what the impact of the warming climate and ocean acidification might be. Global warming also means an increase in the extent and frequency of hypoxia, or low oxygen zones, in the oceans. While the success of the fishes over their long evolutionary history is thought to have hinged on their capacity for oxygen transport, ocean acidification is occurring at a rate 100-times faster than has occurred in over a million years. For an interview with a fish physiologist doing this research:
http://www.abc.net.au/radionational/programs/ockhamsrazor/14-august-2016/7687698 [click on 'Show Transcript']

Managing streams for fish

The Proceedings of the recent Australian Stream Management Conference cover a wide range of topics (http://rbms.com.au/event/asm/8asm/ Open access after creating a log in). While improving water quality, flows and vegetation will bring benefits for fish, there were some projects that primarily targeted outcomes for fish, including:

- *Bringing Back the Fish to the Horton River*. This paper documents the process of using habitat mapping along the Horton River, northern NSW, to target in-stream and on-ground works to improve fish passage and habitat.
- *Instream Habitat Works Trial for Macquarie Perch in Hughes Creek*. Hughes Creek, Victoria, has been affected by a large sand slug which formed in the early 1900s. It is also home to a remnant population of Macquarie Perch. This paper documents the project to reinstate instream habitat, using large wood and rock to promote bed scour and reinstate depth, and to improve connectivity and the condition of refuge pools.
- *Reflections on Riparian Management and Recreational Fishers*. This paper reflects on the practical aspects of engaging with recreational fishers when developing and implementing willow control works. 3 projects showcase how different partnerships have delivered on-ground outcomes.

Fish hotels just the start for Myall Creek

This time last year 53 fish hotels were installed in Myall Creek, near Dalby, central Queensland, to both stabilise the creek bank and provide shelter and food sources for native fish. This was followed up with the planting of native reeds and rushes, and of riparian vegetation. The community is now seeing maturing vegetation already providing cover and food for wildlife. Underwater, the plants root systems bind together soil and rocks, and dangle into the underwater caves created, forming habitat for tiny shrimp that feed the small fishes and providing the surfaces for fish to secure their eggs to. More:
http://www.condaminealliance.com.au/#!news-myall-creek-continues-to-thrive/sgi5p.

The changing face of Myall Creek: plantings in October 2015 (left) and progress by April 2016 (right). Photos: Condamine Alliance.

Restoring ancient aquaculture

Lake Condah, in south-western Victoria, is one of the world's most ancient examples of traditional aquaculture. The Gunditjmara used a complex system of traps and ponds over 100 sq.km to collect Short-finned Eel. Drainage structures around the lake, installed in the 1800s, rendered the eel traps inoperable. Now, a project involving the Gunditjmara people has led to the restoration of the Lake and major parts of the traditional aquaculture system. Rose and others provide an overview about this project and how effective use of 'two-way learning' across western scientific and indigenous knowledge systems was an important aspect of its success in *Reviews in Fish Biology and Fisheries*: http://dx.doi.org/10.1007/s11160-016-9426-1. For more about the Gunditjmara eel fishing and farming tradition: http://www3.slv.vic.gov.au/latrobejournal/issue/latrobe-85/t1-g-t8.html.

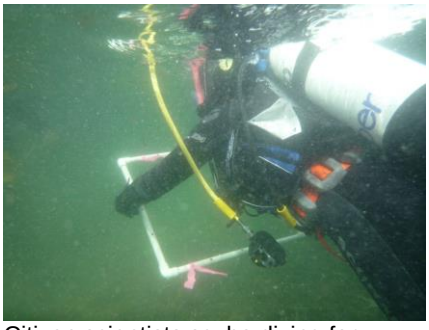
Ancient aquaculture that farmed eels up until the late 1800s. Photo: Tyrrell Collection, Australian Geographic. Sourced from http://www.australiangeographic.com.au/topics/history-culture/2015/03/gallery-aboriginal-inventions/fish-traps

North-west marine habitat suits fish

Researchers surveyed the nearshore Pilbara bioregion of north-western Australia to look at diversity of habitat and fish. This marine environment is characterised by large bays and numerous islands and islets. It is highly biodiverse and plays an essential role in the recruitment of important species of fish. The researchers recorded 343 species of fish from 58 families. The abundance and distribution patterns of both important species and of the five most common and abundant species were linked positively with areas of high relief, hard coral cover, reef and macroalgae and negatively with the distance to the nearest oceanic waters. Read more of this work by McLean and others in *Estuarine, Coastal and Shelf Science*: http://dx.doi.org/10.1016/j.ecss.2016.05.026.

Marine users willing to get into citizen science

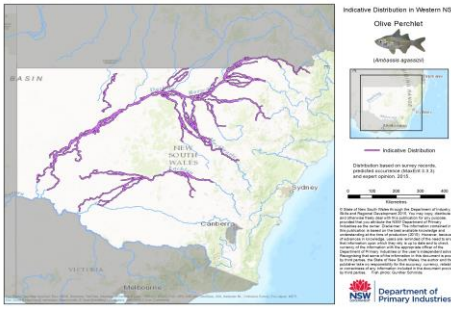
A survey of marine users has found most are more than willing to get involved in citizen science projects. The people surveyed felt strongly that the marine environment contributed to their quality of life and wellbeing and they mostly agreed that they would be personally affected if the health of the marine environment declined. Respondents were interested in the range of ways in which they could be involved in marine environment projects but data collection held the highest appeal across all users. Feedback from the scientists was emphasised as being a highly important aspect of being involved. Read more about this work by Martin in *Bioscience*: http://dx.doi.org/10.1093/biosci/biw070 [Open access].



Citizen scientists scuba diving for scientific research off Albany, WA. Photo: University of Western Australia

NSW fish communities on the map

A large scale analysis of the status of fish communities and threatened fish species distributions across NSW has been completed. The project consolidates 20 years of data from biological surveys and, combined with complex species distribution modelling, provides insight into the status of fish communities and threatened freshwater fish species distributions across the state. It is anticipated that this mapping will inform and guide regional planning. To access: http://www.dpi.nsw.gov.au/fishing/species-protection/threatened-species-distributions-in-nsw



An example of the distribution maps – this one is for the Olive Perchlet. Photo: NSW DPI

A 2kg Goldfish?

One of the Goldfish collected as part of the research weighed just under 2kgs. Photo: Murdoch University.

The Vasse River, south-west Western Australia, had Goldfish introduced into it more than two decades ago. Researchers have been studying the surge in the Goldfish population over the past 12 years. By tagging Goldfish in the river near Busselton and tracking their movements for 12 months they found that the species could move much further than originally suspected, heading to a wetland system to spawn throughout the year. One fish moved over 230 kilometres during the year. The Goldfish are particularly a problem because they feed along the bottom, stirring it up, with the result that more nutrients are suspended in the water column which increases algal blooms. They also eat other fish's eggs. In addition, the Goldfish are suspected to have introduced at least one disease to the region already, and are responsible for a decline in native freshwater fish species. Read more about this research by Beatty and others in *Ecology of Freshwater Fish*: http://dx.doi.org/10.1111/eff.12288; or read a summary: http://www.sciencealert.com/pet-goldfish-dumped-into-lakes-are-growing-into-monsters.

INTERNATIONAL NEWS

Fish food affected by hydropeaking

Daily changes in river flow based on energy demand are known as 'hydropeaking'. Flow is increased during the day when energy demand is high, and decreased at night. As a result water levels downstream of a dam can change by the hour, creating an artificial intertidal zone along the river shore. It is this area where the vast majority of aquatic insects attach their eggs to rocks or other surfaces. Researchers have found that such daily changes in river flow can wipe out some groups of aquatic insects, such as mayflies, that are accustomed to laying their eggs on surfaces near the river's edge. However, the results also suggest that modifying hydropeaking practices could help alleviate some of these negative impacts. Read more of this research by Kennedy and others in *BioScience:* http://dx.doi.org/10.1093/biosci/biw059 [Open access].

Beavers bring fish habitat benefits

In an experiment that started in 2009, researchers in central Oregon, USA, monitored the impact of the engineering work done by beavers on river health, fish habitat and fish numbers. In July this year, researchers recorded a 175 percent increase in juvenile Steelhead in the streams where beavers had been encouraged to build their dams. There were also real changes in the streams themselves. The beaver dams raised the water level, creating large pools where sediment was deposited, and also lowered the water temperature slightly. The previously incised channels began filling in, and water spread out onto the adjacent floodplain. This, in turn, helped re-establish riparian vegetation. The creation of side channels and backwaters and a deeper, more complex stream channel means much improved fish habitat. The researchers found that the beaver ponds also held more juvenile Steelhead than adjacent upstream areas. Read more about this work: https://www.nwfsc.noaa.gov/news/features/oregon_beaver/index.cfm.

The story of a fish ladder

Built to 1950's standards, the removal of this fish ladder, and the dam it serves, will benefit fish. Photo: Kevin N. Hume.

The fish ladder at the John C. Boyle Dam on the Klamath River, Oregon, USA, is due to be removed along with the dam itself and three others that have disrupted fish migration and movements along the 423km river. The 173 metre long fish ladder was completed in 1957, and comprises 63 different pools, with 30cm steps to allow Trout to rise about 18m to get up and through the dam. It was the only fish ladder installed at any of these dams. The reasoning was that this ladder would allow resident fish, primarily Trout, to pass through the dam, since the lower dams did not have fish ladders to allow Salmon up that far. However, it was not particularly effective. A fish trap constructed shortly after the dam's completion found that approximately 5,000 Trout made it through the ladder. By 1991, the number of trout moving through the ladder had fallen to 70. Read more: http://www.heraldandnews.com/news/local_news/community/object-lesson-john-c-boyle-dam-fish-ladder/article_d62ab58c-0c1b-5387-be68-bc7a60671cee.html.

Fishers' conservation work undone

The fishers of the Grantham Angling Association, Lincolnshire, England, have been awarded £36,000 compensation (A$62,000) after the River Witham was polluted by approximately 6,000 litres of liquid fertiliser. The fertiliser spill was estimated to have killed over 2,000 wild brown trout and countless fish of other species in the river. It spread over 13km of the river, causing the closure of four sections of the angling club's waters. The club is well recognised for its conservation efforts and disappointed that one careless act by a farmer has undermined their efforts - it estimated that the river would take around six to eight years to fully recover. More: http://fishlegal.net/page.asp?section=1190&sectionTitle=Fish+Legal+Secures+%A336%2C000+for+Member+Club

Protecting the river after the fire

One of the log-jams put in place to help the post-fire recovery process. Photo: US Forest Service.

A 110,000 acre fire burnt much of the catchment of Canyon Creek, in Oregon, USA, leaving it susceptible to erosion in the event of major rainfall. The restoration of the catchment forest has included restoring miles of drainage ditches, repairing and modifying culverts and applying wood mulch treatments to 329 acres of severely burned hillside to absorb and slow runoff. Fourteen log jams were placed in streams to prevent stream blowouts and protect fish habitat. Some damaged trees that still had their root balls attached were placed in streams to slow the velocity of the water and help catch debris and sediment and improve stream banks. Read more: http://www.bluemountaineagle.com/Local_News/20160809/post-fire-rehab-a-community-effort

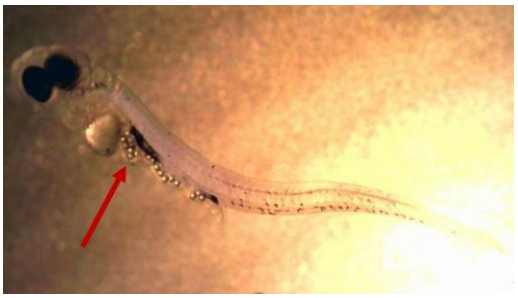
Reclaiming Eel River fish habitat

The second largest dam removal project has begun with the demolition of Benbow Dam, on the Eel River, California, USA. Before the dam was built in the 1930s, roughly 20,000 Chinook and as many as 17,000 Coho Salmon swam past the dam site. When the dam was built, a large lake formed and the lack of natural flow reduced the quality of habitat near the dam. In 2010, there were only 1,000 Chinook and 500 Coho in this part of the Eel River. When the removal is complete, the process will improve fish passage to nearly 50 miles of high-quality spawning and rearing habitat, assisting with the recovery of Salmon and Steelhead. More: http://www.habitat.noaa.gov/highlights/secondlargestdamremovalincalifornia.html .

30 years of restoration for the Mississippi River

Long-term monitoring is showing that efforts to improve the water quality of the Mississippi River appear to be paying off with the return of several important fish species. The work has included the rehabilitation of more than 100,000 acres of habitat important for fish and other wildlife. One aspect of the work has been to protect and/or restore river islands lost to changes in water flow and river regulation. In one region there had been 74 acres of islands present shortly after inundation by a dam in 1940. The project protected 10 existing islands and constructed nine new islands, providing 49 acres of habitat. Backwater dredging has also been done to increase water depths for fisheries and more than 600 acres of an area known as Pool 9 has been restored in this way. Monitoring has found a Burbot, after a 16 year absence, while Mississippi Silvery Minnows and Yellow Bass were found after a 10 year absence. Lake Sturgeon have now been found in six of the last 23 years. To read more about this project: http://www.wisfarmer.com/story/news/2016/08/08/dnr-habitat-restoration-efforts-contribute-larger-mississippi-river-goals/88404398/

Hooked on plastic



Young Perch preferred plastic particles over natural foods – the micro-plastic particles can be seen in the stomach here. Photo: Oona Lonnstedt.

Young fish are becoming hooked on eating micro-plastic and this unhealthy diet is affecting them individually and as populations. Researchers in Sweden exposed perch at different life stages to varying concentrations of polystyrene in water tanks. They found that the presence of large quantities of micro-plastic reduced egg hatching success from 96 percent to 81 percent and the fish that hatched in micro-plastic contaminated water were smaller, slower and less able to avoid predators. The finding that surprised the researchers was the way that plastic changed food preferences. All the larvae had access to zooplankton, but those in the presence of micro-plastics chose to eat it in preference. Read more: http://www.bbc.com/news/science-environment-36435288.

Cold water refuges help Salmon fight parasites

Researchers have found that the effects on juvenile Salmon of a naturally-occurring parasite decline when the fish move into areas of cooler water. In these refuges on the Klamath River, part of the Columbia River Basin, USA, not only is the exposure to the parasite lower, but the effects of the disease decline in severity. The parasite causes an intestinal disease in Salmon that increases in severity as temperature increases, often resulting in death. In addition, the parasite is more abundant as temperatures rise. Salmonids in the Klamath River must contend with summer water temperatures that reach levels that stress the fish and can sometimes be lethal. With climate change, the water temperature in the Klamath River has been rising 0.5 degrees Celsius every decade since the early 1960s. This means the cool water refuge pools are important habitat, helped by the preservation or restoration of riparian vegetation along river margins, and restoration or maintenance of snow-fed or spring fed streams that provide refuges where they connect with the river mainstem. Read more of this research by Hallett and others in *Transactions of the American Fisheries Society* (http://dx.doi.org/10.1080/00028487.2016.1159612) or a summary here: http://www.cbbulletin.com/437131.aspx .

Fish in decline as Lake Tanganyika stratifies

Africa's Lake Tanganyika is bordered by Tanzania, Burundi, Zambia and the Democratic Republic of the Congo and is the second largest freshwater lake in the world by volume. It's a vital source of food in the region, producing more than 200,000 tons of fish in a year. However both the fish and edible molluscs are in decline and these declines began well before commercial fishing started in the mid-20th century. Researchers have used paleoecological records to understand what is happening in the Lake. They have found that global warming has intensified the stratification of the water column, with the result that the seasonal 'turning over' of the Lake water is becoming less frequent. This means nutrients are trapped in deep water where they cannot fuel primary production and food webs. Simultaneously, warming has enlarged the low-oxygen zone, considerably narrowing the coastal habitat where most of Tanganyika's endemic species are found. Read more of this research by Cohen and others in *PNAS* here: http://www.pnas.org/content/113/34/9563.abstract; or read a summary here: https://www.washingtonpost.com/news/energy-environment/wp/2016/08/09/the-waters-of-this-huge-african-lake-arent-mixing-and-the-consequences-could-be-devastating/?utm_term=.2fde2725e41b.

Trout long for the return of the Giant Salmonfly

For hungry Trout, few meals compare to the finger-size slug of protein offered by a Giant Salmonfly, a species of insect known as a Stonefly. But on the Arkansas River, Colorado, USA, this insect has been absent for about a 100 years following an era of unchecked mine waste flowing into the river. New water treatment measures began in the early 1990s and eventually spawned one of the Colorado's most popular fisheries. However, while other aquatic insects, and the fish that eat them, have returned, the once common Giant Salmonfly has not and efforts to reintroduce it have not yet been successful. The Giant Salmonfly is known for its sensitivity to pollution. Mayflies and Caddisflies can tolerate some level of heavy metals, for example, but Stoneflies need pristine, fast-moving, highly oxygenated streams with large cobble bottoms. More on this story: http://gazette.com/researcher-hopes-t-bone-steak-will-enhance-fishing-on-colorados-arkansas-river/article/1582774.

Giant Salmonfly larvae grow up to 7.5cm long, and their annual hatches in May and June induce feeding frenzies in streams where they occur, making for well-fed fish and happy anglers. Photo: Greg Policky, Colorado Parks and Wildlife.

RESOURCES

Proceedings of the 2016 Australian Stream Management Conference

A range of conference papers from the Conference held in July-August 2016: http://rbms.com.au/event/asm/8asm/

Guidelines for coastal habitat rejuvenation

This set of guidelines is based on an analysis of results from 235 projects and approximately 1000 observations for restoration of coral reefs, seagrass, mangroves, saltmarshes and oyster reefs. The developers intend it assist stakeholders and decision-makers improve their conservation planning in aspects of marine coastal restoration. Access this resource developed by Bayraktarov at: https://www.uq.edu.au/news/article/2016/06/researchers-release-ultimate-guide-coastal-habitat-rejuvenation.

About Newstreams

Newstreams is an email newsletter to keep people up to date about fish habitat activities and important developments in fish ecology and habitat. It is free by email subscription.

To **subscribe** use the form.

You can send in your habitat news by emailing the editor, Liz Baker.

Back issues can be accessed from http://www.fishhabitatnetwork.com.au/archive.

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Recreational Fishing Trusts

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Australian Fishing Trades Association http://afta.net.au

Australian National Sportfishing Association - NSW www.ansansw.com.au

Capital Region Fishing Alliance http://crfa.org.au/

Ecofishers www.ecofishers.com

Fisheries NSW www.dpi.nsw.gov.au/fisheries/habitat

Fisheries Victoria www.dpi.vic.gov.au/fisheries

Freshwater Fishing & Stocking Association of Queensland (FFSAQ) www.ffsaq.com.au

NSW Council of Freshwater Anglers www.freshwateranglers.com.au

NSW Fishing Clubs Association www.nswfca.com.au

PIRSA Fisheries and Aquaculture www.pir.sa.gov.au/fisheries

Recfish Australia http://recfishaustralia.org.au/

RecfishSA www.recfishsa.com.au

RecfishWest www.recfishwest.org.au

Recreational Fishing Alliance of NSW www.rfansw.com.au

SUNFISH www.sunfishqld.com.au

Sweetwaterfishing http://www.sweetwaterfishing.com.au

Victorian Department of Environment and Primary Industries www.depi.vic.gov.au

VRFish www.vrfish.com.au

Western Australia Department of Fisheries: www.fish.wa.gov.au/Pages/Home.aspx