#71, June 2020

Newstreams

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

Welcome to* Newstreams #71. It has been a challenging last 3 months, hasn't it! The restrictions we have all been under have limited on-ground works to improve fish habitat however there are still stories to tell and research to report on. I have targeted Open Access research and reports that I hope you will find interesting. And I hope something in this issue's* 'Lockdown Reading' *section gets you hooked!*

Newstreams is brought to you in partnership by the Fish Habitat Network, with funds from the NSW Recreational Fishing Trust. As well as Newstreams, the recreational fishers of NSW also support fish habitat action on the ground through the Habitat Action Grants, website and Facebook.

Liz Baker, Editor

Australian News

Seagrass gains equate to millions of dollars

An analysis of the gains to fishing from seagrass coverage varied with each fishing location. In areas of low seagrass coverage, the gain was near-zero. However, in areas of high seagrass coverage, a 10% increase in seagrass area led to a gain of $19.18 per fishing trip, and a 30% increase led to $85.55 gain per trip. Given that there are two million fishing trips annually in Victoria's Port Phillip Bay and one million in Western Port, the aggregated benefit could scale up to $6.2 million per annum with a 10% increase in seagrass coverage, and $22 million per annum with a 30% increase in seagrass. The bay-wide seagrass ecosystem loss over recent decades is estimated in the study to equate to a loss of an estimated $86.7 million per annum. Read more of the study by Huang and others in *Science of The Total Environment*: https://doi.org/10.1016/j.scitotenv.2019.134680.

Re-purposing burnt trees as fish habitat

More than 65 large trees damaged by bushfires have been used to stabilise banks on the Upper Murray River and provide habitat for fish, in particular Trout Cod. The trees, in the bushfire-affected area of Towong Shire in southern NSW, had been deemed dangerous and had to be removed. They were turned into snags and used to stabilise the banks of the river, which are prone to erosion. The post-fire rains led to significant amounts of sediment and ash entering the river, and this caused localised fish deaths. More: https://www.abc.net.au/news/2020-04-25/bushfire-recovery-work-to-save-endangered-trout-cod/12182940.

Bushfires rendered these trees burnt and dangerous however they make great snags and will help stabilise the riverbank. Photo: Murray Local Land Services.

200 years of change for Oysters

The populations of the Sydney Rock Oyster along the coast of central and southeast Queensland have been reconstructed by looking at the archaeological, anthropological, fisheries literature, and government and media accounts. Prior to the 1870s, wild oysters were relatively abundant with subtidal oyster reef structures present where today oysters are absent or scarce. These reefs then declined by the late 19th century. During the 1890s, floods and land-use changes introduced large quantities of silt into estuaries which ultimately decreased the carrying capacity of the system. Oyster production in central and southeast Queensland is now less than one-tenth of its historical peak. Read more of this study by Thurstan and others in *Global Environmental Change:* https://doi.org/10.1016/j.gloenvcha.2020.102058 [Open Access].

Understanding the past distribution of oyster reefs, such as this intertidal oyster bank, Toorbul Point, Queensland, c.1906, can assist contemporary projects to restore shellfish reefs. Photo from John Oxley Library, sourced from https://www.researchgate.net/figure/ntertidal-oyster-bank-Toorbul-Point-c-1906-Photo-from-John-Oxley-Library_fig3_263211511.

Another history of Queensland's oyster industry is available here: https://espace.library.uq.edu.au/data/UQ_241127/s00855804_1981_82_11_3_45.pdf [Open Access]

Research showing oysters can use Hercules Club Mud Whelk as a substrate on which to grow, which in turn helps oysters build reefs in areas that are originally soft mud: https://blog.nature.org/science/2020/05/27/how-hitchhiking-oysters-build-new-reefs/.

Spangled Perch on the move again

Spangled Perch have once again been found swimming along rain-soaked roadways and from puddle to puddle in areas of western Queensland. The fish had not fallen from the sky with the rain from ex-tropical cyclone Esther but had taken the opportunity the overland flows provided to disperse from the isolated and drying waterholes they had used to survive the drought. These freshwater fish have a very strong instinct to disperse when conditions allow. Read one town's experience here: https://www.abc.net.au/news/2020-03-05/raining-fish-in-outback-queensland-weather-phenomenon/12028868.

Spangled Perch take advantage of rainfall events to disperse. Photo: Rick Shiells.

Resnagging the latest habitat improvement for Butlers Creek

Additional snags have been installed in Victoria's Butlers Creek as part of the ongoing habitat improvement project. The habitat was installed in key sections that were identified with the consultation of local expertise guided by previous habitat mapping. The additional instreams structure will complement the riparian replanting, pest fish removal and installation of fish hotels that have already helped native fish in the creek. More: https://ozfish.org.au/projects/butlers-creek-habitat-project/.

A Barramundi's 1000km journey

A 170mm Barramundi was tagged and released into Bedford Weir at Blackwater on Queensland's Mackenzie River in 2014. Six years and 1,150km later the fish, now 1,150mm long, was recaptured in the Proserpine River. Only one other Barramundi in more than 30 years of tagging is known to have travelled over 1,000km. More: http://www.fishingworld.com.au/news/tagged-barra-reveals-1-000km-journey.

The Coorong and Lower Lakes were a freshwater system

An independent review of scientific studies about the Coorong, Lower Lakes and Murray Mouth in South Australia has found that the Lower Lakes were largely a freshwater system prior to European settlement. The long-term average annual Murray River inflow pre-European and pre-development would have filled the lakes more than eight times in a year, on average. Using palaeoecological records, water balance estimates, modelling, traditional knowledge of the Ngarrindjeri People and anecdotal accounts of early explorers and colonists, the study concluded that the Lower Lakes were largely fresh prior to European settlement, with moderate tidal influence and incursion of seawater during periods of low Murray River inflow. More: https://www.abc.net.au/news/2020-05-12/murray-river-lower-lakes-ramsar-listed-as-freshwater-ecosystem/12234322.

A smoky rescue mission

The Stocky Galaxias is one of the native fish that live in pools, creeks and rivers across Australia. It is small and hard to find, and the summer of drought and bushfires meant that finding and rescuing remnant populations became critically important. Researchers, with a Rural Fire Service escort, made it through to Tantangara Creek in southern NSW to catch and rescue fish threatened by the impact of ash and debris being washed into the creeks once rain arrived. The fish are being kept safe in a hatchery until they can be released. More: https://finterest.com.au/researchers-dash-to-save-stocky/.

Surrounded by smoke, the rescue mission was successful. Photo: M. Lintermans.

Ningaloo Canyon exploration

Nearly 30 new species have come to light during exploration using an underwater robot and dives at depths to 4,500 metres in the Ningaloo Canyons off the coast of Western Australia. Octopus squid, long-tailed sea cucumber, and other molluscs, barnacle and squat lobster species were among those species that had not been seen before. More: https://schmidtocean.org/new-species-discovered-during-exploration-of-abyssal-deep-sea-canyons-off-ningaloo/.

Fish sizes changing with warming water

Regular fish surveys by over 100 volunteer Reef Life Survey divers at over 1000 sites around Australia has provided insights into the response of fish to warming water. While temperature has a significant impact on fish size, it caused different fish species to react differently. In around 55% of species the average fish body size got smaller as predicted, but in around 45% of species it increased. In general, larger species tended to get even bigger in warmer waters, while smaller species tended to get smaller. Read more of this work by Audzijonyte and others in *Nature Ecology & Evolution*: https://doi.org/10.1038/s41559-020-1171-0 or a summary: https://www.sciencedaily.com/releases/2020/04/200406112528.htm.

Mangroves building their own ground

A study of mangroves in the Tweed estuary, NSW, has shown how some mangrove systems are building up the ground surface level to keep up with increases in the tide level by growing dense root mats of pneumatophores (peg roots) and their feeder roots. Sediment cores have shown that between about the 1900s and 1940s, sediment settling out in the mangrove system was the primary builder of ground surface, not root production. Read more of the study by Marx and others in *Estuarine, Coastal and Shelf Science* and the full article is available to Newstreams readers until 17th July at: https://authors.elsevier.com/c/1b8To~1MBZO7T.

INTERNATIONAL NEWS

Green gravel success for Kelp restoration

It might not look exciting, but green gravel holds promise for the restoration of Kelp forests. Photo: S. Fredriksen.

Kelp forests are valuable ecosystems but are in decline globally. Restoration efforts have had limited success however researchers have had good results using so-called 'green gravel'. Small rocks were seeded with kelp and reared in the laboratory until 2–3 cm, before out-planting to the field. The out-planted kelp had high survival and growth over nine months, even when dropped from the surface. Unlike manipulating adult kelp, green gravel is easily handled and transported in manageable batches and large volumes can be deployed across large areas. Reproductive material to seed the gravel can be collected from source populations from a vessel using, for example, rakes, reducing the impact of harvest and transplantation of large quantities of whole adult donor plants. Read more of this research by Fredriksen and others in *Nature Scientific*: https://doi.org/10.1038/s41598-020-60553-x [Open Access].

Tropical seaweed meadows important for juvenile fish

A study of tropical seaweed meadows in 23 sites in 11 countries has clarified the importance of this habitat for fish. More than 627 fish species were documented in these seaweed meadows, while 218 were more abundant within this habitat compared with nearby coral reef during at least one life-history stage. The prominence of the juvenile fish that were found, suggests that this habitat is important for a range of species. The researchers found a connection between seaweed meadows canopy structure and juvenile abundance, which suggests the condition of the habitat can influence levels of productivity in tropical fish populations. Many of these fish species are targeted by recreational fishers. Read more of this work by Fulton and others in *Fish and Fisheries*: https://doi.org/10.1111/faf.12455.

Severn fish rescue

Salmon numbers have dropped dramatically on the Severn in recent years, so this Salmon parr amongst the rescued fish was a welcome sight, proving that successful spawning is still taking place. Photo: Angling Trust.

Sometimes fish need rescuing from receding floodwaters and this is what happened at the Pitchcroft Racecourse next to the Severn River at Worcester, England. The position and shape of the racecourse on the floodplain means that it floods regularly – providing a haven for fish escaping high flows in the river. However, it also recedes to a large pool without ready access back to the river. The latest rescue included almost all species that are found in this part of the Severn River, including; Gudgeon, Bream, Perch, Pike, and some Salmon Parr. Barbel were not found however, being strong swimmers, these fish generally stay in the main river. The fish were released back into the Severn River. More: https://linesonthewater.anglingtrust.net/2020/03/19/after-the-floods-a-fish-rescue-in-action/.

Virgin Island Mangroves

Work has begun to restore Mangrove forests in areas of Jost Van Dyke in the Virgin Islands where they were destroyed by hurricanes in 2017. A large part of the restoration involves harvesting mangrove seed pods from other locations where they are more abundant, allowing them to grow in the waters of the inlet, and then planting them in biodegradable containers with a mix of sand, mud from the mangrove forests, and seawater. The different techniques that are being used reflect the wave conditions at different beaches. These include experiments with using a diluted concrete mixture to house the young trees, which they should be able to break out of as they grow. More: https://www.bvibeacon.com/mangroves-on-the-move-habitat-restoration-efforts-underway/.

The local College is involved in establishing a mangrove nursery and is experimenting with different establishment techniques. Photo: DANA KAMPA.

Deepwater disappointment

A decade after the 2010 BP oil spill at the Deepwater Horizon rig, a survey of thousands of fish in the Gulf of Mexico has found evidence of oil exposure in all of them. Yellowfin Tuna were among the fish species with the highest levels of oil exposure, which researchers were surprised to see as this species is not found at the bottom of the ocean where most oil pollution in the Gulf occurs. A study of the oil pollution in the liver tissue and bile, found the Yellow Edge Grouper had levels that increased more than 800 percent from 2011 to 2017. Read more of this work by Pulster and others in *Nature Scientific Reports*: https://www.nature.com/articles/s41598-020-62944-6 [Open Access] or a summary: https://www.wtsp.com/article/news/regional/florida/usf-research-deepwater-horizon-10-years-later-fish-gulf-of-mexico/67-038da6b2-7c48-49ef-9968-0904415a64d4.

A video documenting the **restoration and recovery projects** is available here: https://videos.fisheries.noaa.gov/detail/videos/banner-videos/video/6150799131001/restoring-the-gulf:-10-years-after-deepwater-horizon.

Heavily impacted streams need more time

Woody structures (snags) and leaf packs were added to eight streams impacted by siltation, deforestation, and habitat homogenisation in an agricultural landscape in Brazil's Upper Paraná River Basin. As a result, instream habitat diversity increased, and fish species abundance changed. Some fish species increased in numbers while others decreased, indicating species responded differently to the changed habitat. However, overall species richness, diversity, and community functional traits remained unaltered. Read more of this study by Manzotti and others in *Neotropical Ichthyology*: https://doi.org/10.1590/1982-0224-2019-0052 [Open Access].

Complexity and connection vital to juvenile Chinook Salmon habitat

A study of the Chinook Salmon habitat within the Lemhi River in Eastern Idaho, USA, looked at the relative importance of riparian and floodplain habitat, the river and creek bed material, deep water refuges, and water flow and temperature. The work found that a reduction in diverted flows is not enough to improve habitat quality for the fish, potentially because stream straightening and wood removal has reduced the complexity of the habitat. The more complex habitat has different features, such as deep holes, riffle beds, woody debris, and this along with connections to side channels and margin areas are key elements to sustain or promote growth of individuals and populations. Read more of this work by Carmichael and others in the *Canadian Journal of Fisheries and Aquatic Sciences*: https://doi.org/10.1139/cjfas-2019-0136.

Benefits to restoring both boulder reefs and shellfish reef together

A review of the issues associated with reef restorations has concluded that an integration of multi-habitat restoration provides benefits and opportunities for fish and shellfish. Recent research has suggested that it is important to consider the restoration of both shellfish and boulder reefs as they support different species and the combined benefits would be substantial. Read more of the review by Liversage in *Ecological Engineering*: https://doi.org/10.1016/j.ecoleng.2019.105659.

The reinvention of a New Mexico trout stream

The Rio Chama below Abiquiu dam in New Mexico, USA, is part of the region's flood control and water storage infrastructure and during irrigation season the river below the dam runs high. When the water drops and clears, there are some big Brown Trout to be found. However, due to an overwide channel and the silt it accumulates, the fishery has been dependent on hatchery stock. Local fishers decided to repair some habitat and see if spawning could be encouraged in the river. The rehabilitation of approximately one mile of the Chama's channel and riparian area immediately below the dam has now created a functioning low-flow channel, as well as new runs and riffles. Fish migration has also improved. Now, local fishers are waiting for the spawning season to see if the fish like the improved habitat. More: https://www.tu.org/blog/chama-2-0/.

Fishers are saying that already habitat work means the new Abiquiu is worlds better than old Abiquiu. Photo: Trout Unlimited.

Watch this Seagrass space

Work has now started on recreating seagrass meadows in Dale Bay, off the coast of Pembrokeshire in Wales. Last summer, 750,000 seeds were gathered from sites around the British coast and stored before being transferred into small hessian sandbags. These bags are now on the seabed. More: https://www.bbc.com/news/uk-wales-51804404.

Alaskan Salmon get the connectivity treatment

Most of the rivers in Alaska in the USA have not been dammed, however, poorly designed road crossing culverts present the biggest fish passage problems for Salmon. Rather than simply put in culverts that allowed flow to pass under roadways unimpeded, the general goal is to return streams to as natural a condition as possible. For these projects, that means not thinking in straight lines and a minimal emphasis on steel and concrete. Rock banks are incorporated directly into culverts to provide the edges and niches young salmon need for resting, feeding and hiding from predators. Read more: https://medium.com/@AlaskaUSFWS/alaskan-women-engineer-passage-for-wild-salmon-7f32c6654116.

Lake Orbin contained a lot of juvenile Coho Salmon and during the very hot summer they were suffocating, stressed out by a lack of oxygen and hot water temperatures. Once the flow was re-established, the juvenile fish just barrelled up through the culvert and into the cool groundwater fed stream. Photo: USFWS/Katrina Liebich.

RESOURCES

Coral Reef Restoration database

The database is based on 362 case studies on active coral restoration spanning four decades in 56 countries: https://www.tropwater.com/news/new-global-database-to-guide-coral-restoration/.

Natural Flood Management (UK)

An illustrated resource summarising the issues and actions associated with natural flood management. It includes activities for primary school children, and lesson plans for teachers: https://www.wildtrout.org/news/learning-about-natural-flood-management.

New advice to protect England's seahorses and seabream

One of the Conservation Advice packages available to enable developers to understand the impact of their proposed activities on habitats and species in protected sites across England: https://www.gov.uk/government/news/new-advice-to-protect-homes-of-englands-seahorses-and-seabream.

Lampreys like being 'stuck at home'

An educational resource providing facts about Lamprey, habitat use and issues and links to other resources: https://usfwspacific.tumblr.com/post/615304245912141824/creature-comforts-i-like-being-stuck-at-home.

Home schooling with Salmon

An educational resource providing facts about the different species of Pacific Salmon, habitat use and issues and links to other resources: https://www.facebook.com/notes/usfws-columbia-pacific-northwest/creature-comforts-home-school-with-us-learn-how-to-give-salmon-a-home-from-the-c/3105864259465034/.

Infographic: Value of Coastal Wetland Habitat

Outlines the valuable benefits that wetlands provide to people, wildlife, and communities: https://www.fisheries.noaa.gov/infographic/infographic-value-coastal-wetland-habitat.

Aquatic animal diseases significant to Australia: identification field guide

This includes 53 aquatic animal diseases of significance to Australia that affect species of finfish, crustaceans, molluscs and amphibians: https://www.agriculture.gov.au/animal/aquatic/guidelines-and-resources/aquatic_animal_diseases_significant_to_australia_identification_field_guide.

A global database for metacommunity ecology

The *Global Database for metaCommunity Ecology: Species, Traits, Environment and Space* assembles data from studies that analysed empirical multivariate trait-environment relationships between 1996 and 2018, specifically community data, species traits, environmental variables, and spatial coordinates: https://www.nature.com/articles/s41597-019-0344-7 [Open Access].

Living Shorelines

Everything you wanted to know about how living shorelines work and how to create them: https://www.livingshorelinesacademy.org/.

LOCKDOWN READS

100 facts about Trout

100 facts about Trout, from genetics to habitat use, to how to fish for them.
https://www.wildtrout.org/trout-facts.

The Compleat Angler – or - What it meant to be a recreational angler in 1653

This celebration of the art and spirit of fishing by Isaac Walton is one of the most reprinted books in English. First published in 1653, Walton continued to add to it for another 25 years. Read: https://archive.org/details/compleatangler00gallgoog/page/n11/mode/2up.

A rod's length between us

A reflection on uncertainty and the solace of fishing: https://www.tu.org/blog/a-rods-length-between-us/.

Stories of fish and fishing in the Murray-Darling Basin

Talking Fish: 12 booklets of oral histories and snippets of archival material about fish and the people who love fishing from the Condamine River in Queensland to the Coorong in South Australia: https://www.fishhabitatnetwork.com.au/talking-fish. All the interviews and collected material are available here: https://researchdata.ands.org.au/dharmae-talking-fish-history-collection/563377.

Bluenose, Slimeys and Cod… : This collection of newspaper articles, oral histories and photos tells a clear story about the changes in the Goulburn River, and how this impacted fish health and populations: https://arrc.com.au/goulburn-river-stories-bluenose-slimeys-cod/.

True Tales of the Trout Cod: A collection of oral histories, science, newspapers, diaries, and photographs relating to the historic occurrence of Trout Cod. The book, available as individual chapters and as 'river histories' is based on interviews of nearly 140 people and a collection of photographs dating as far back as 1862. https://finterest.com.au/true-tales-of-the-trout-cod/.

Historical evidence of native fish in the Murray-Darling Basin at the time of European settlement from the diaries of the first explorers: observations from the diaries of the early explorers and settlers during the early 19th century.
http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/186951/Historical-evidence-of-native-fish-in-the-Murray-Darling.pdf.

Fish Everywhere – an oral history of fish and their habitats in the Gwydir River: ecological change through the memories of long-term residents from different communities within the catchment area below Copeton Dam. Their recollections date back to the early 1900s and are supported by historical documents from as early as 1827.
https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0017/634004/oral-history-gwydir-river.pdf.

River restoration success stories

River restoration projects can take many forms and vary in quality and results. Here are restoration success stories that highlight projects of different types and scales, and in different environments across the USA: https://www.americanrivers.org/river-restoration-success-stories/.

FISH magazine

The official newsletter of Australia's Fisheries Research & Development Corporation. The latest edition (March 2020) contains an article about recreational fishers' involvement in citizen science: http://frdc.com.au/media-publications/fish.

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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