

# Newstreams

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

**Welcome to Newstreams #72.** *While our lives remain challenging, many of you continue to improve fish habitat - having to practice social distancing and wear a mask are not stopping you from getting your hands dirty and your feet wet for fish! Your stories and research are good news for fish and fishers everywhere.*

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](#)

## Get involved in fish habitat!

If you've got a fish habitat project in mind, have a look at the many examples of projects that have been funded through the [NSW Habitat Action Grants](#) (HAG). The HAGs are funded from the NSW Recreational Fishing Trusts which direct a proportion of the funding generated by the NSW Recreational Fishing Fee towards onground actions to improve fish habitat and recreational fishing in NSW. Angling clubs, individuals, community groups, local councils and natural resource managers interested in rehabilitating fish habitats in freshwater and saltwater areas throughout NSW can apply for small grants of \$2,000 or large grants of up to \$40,000. Habitat rehabilitation projects that have been funded include:

- removal or modification of barriers to fish passage;
- rehabilitation of riparian land;
- re-snagging waterways with timber structures;
- removal of exotic vegetation from riverbanks and replace with native species;
- bank stabilisation works; and
- reinstatement of natural flow regimes.

For more information: <http://www.dpi.nsw.gov.au/hag>.

## AUSTRALIAN NEWS

### Fish on the new Port Stephens oyster reef

Port Stephens oyster reef restoration project placed 3,300 tonnes of rock and 180 cubic metres of recycled oyster shell on two restoration sites, creating more than 10,000 square metres of reef base for oyster colonisation. Fish and invertebrates are already utilising the new reefs and settlement of oysters began within days of the rocks being placed. Read more: <https://www.dpi.nsw.gov.au/about-us/media-centre/releases/2020/oyster-reef-restoration-pilot-builds-one-hectare-of-habitat> or watch underwater footage: <https://spaces.hightail.com/space/WYH12YEas3/files>.

## Protection to create a fish nursery

The installation of a log fillet will control severe bank erosion along Emigrant Creek on the NSW North Coast. Log fillets are built in front of an eroding bank to absorb wave action and create an area of still water, encouraging the collection of sediment and the regeneration of mangroves. The growth of this future fish nursery will be helped by placing mangrove seeds into the area. More: <https://www.lis.nsw.gov.au/news-and-events/news/nc-news/2020/innovative-erosion-control-provides-habitat-for-mangroves-and-fish>.



A complex log fillet design to address erosion and support the return of mangroves. Photo: North Coast Local Land Services.

Not far north of this project, bank erosion stabilisation works have also been completed on 600m of Dunbible Creek, close to where it joins the Tweed River. A series of rock and log structures have been installed to replicate naturally occurring snags, and five 'fish hotel' units were placed into a small embayment within the site. More: <https://ozfish.org.au/2020/07/tweed-river-supercharged-fish-habitat-installed/>.

## More snags for South Australia's Murray River

Twenty-three additional structures have been installed in the River Murray at Bookpurnong and Overland Corner in South Australia, adjacent to Banrock Station Wetland that were completed in 2019. Several species of native fish are already using the new structures including juvenile Murray Cod, Bony Herring and Australian Smelt. The snags were typically made up of rootballs, trunks or limbs, and adding more to the existing Bookpurnong site supports a bigger population of fish which will be more resilient to changing conditions.

More: <https://www.environment.sa.gov.au/news-hub/news/articles/2020/08/resnagging-the-river>.



Increasing the density of snags to 'fish up' earlier resnagging efforts in a denuded stretch of the River Murray. Photo: SA Department of Environment.

## Artificial reefs help when there is no natural structure

Researchers installed six constructed reefs in estuaries with little natural reef and found overall fish abundance increased up to 20 times in each reef across a two-year period. The installed reefs were each made up of 30 commercially made concrete domes with holes and were positioned on bare sand. Fish populations were monitored for three months before installing the reefs and then at one year and two years afterwards. Snapper, Bream and Tarwhine increased up to five times and, compared to the bare sand habitat before the reefs were installed, there were up to 20 times more fish overall. In addition, there was no evidence of decline in abundance at the nearby natural reefs where fish abundance also went up two to five times. The artificial reefs appear to create additional rocky habitat for the juvenile fish coming into the estuaries from the ocean, enabling more fish to survive. Read the study in the *Journal of Applied Ecology*: <https://doi.org/10.1111/1365-2664.13666> or a summary: <https://newsroom.unsw.edu.au/news/science-tech/fish-reef-domes-boon-environment-and-recreational-fishing>.



The reef ball installation at 4 months. Photo: UNSW Science.



The reef ball installation at 18 months. Photo: UNSW Science.

## More habitat in Tarcutta Creek

More than 20 large woody logs and 150 tonnes of rocks have been positioned in Tarcutta Creek, in southern New South Wales, to support the riverbank, reduce further erosion and create a variety of available habitat for native fish, including the local favourites, Murray Cod and Golden Perch. Recent flooding had severely eroded sections of the creek causing water quality, turbidity, and sedimentation issues. More: <https://ozfish.org.au/2020/08/tarcutta-creek-restoration-delivers-better-fish-habitat/>.

## Recreating wetlands in the tropics

A five-year effort to recreate a tropical wetland and reconnect sea level rainforests on the site of an abandoned sugarcane farm is now seeing fish and other wildlife taking advantage of the habitat. The plot at Thomatis Creek, north of Cairns in far north Queensland, was an almost 400-metre stretch of a 90 year old abandoned sugarcane farm, on a floodplain bordered by a rapidly deteriorating riverbank. It was full of weeds and had chemicals in the soil. For decades, the saltmarsh resembled a desert. Despite major setbacks – including losing about 500 mangrove plants when major flooding following Cyclone Trevor caused several metres of the creek bank to wash away – the native plants are taking hold and reflooding of the floodplain is providing fish with habitat. More: <https://www.abc.net.au/news/2020-06-29/wildlife-corridor-tropical-rainforest-re-established-volunteers/12397592>.



The early signs of the regeneration of an abandoned sugarcane field. Photo: Rowan Shee.

## More in-stream woody habitat means more fish

Researchers have found that there is a strong positive relationship between fish abundance and the density of in-stream woody habitat (IWH), such as snags, although the strength of this relationship varies between species and waterways. They examined the habitat and fish abundance at 335 sites spanning eight streams across south-eastern Australia, and Murray Cod displayed the strongest association with IWH density. River Blackfish also showed a significant relationship with IWH, but this effect was waterway specific. River Blackfish was the only species for which there was a relationship between IWH and body length. Read more of this research by Tonkin and others in *Aquatic Conservation*: <https://doi.org/10.1002/aqc.3352>.

## Understanding the environmental water needs of Daly River fish

Water extraction and the modification of flow regimes of rivers has raised questions about what proposed future increases in water use from the Daly River, in the wet-dry tropics of northern Australia, are likely to mean for fish. Researchers studied fish assemblages at 55 locations during the dry season to establish the key landscape-scale and habitat drivers of fish species distribution in this river. They found that aquatic habitats within the Daly River are highly connected. Many fish species are distributed widely, dispersing within the river and its floodplain, and in some cases, using the highly productive intermittent streams as nursery habitat. Given the assemblages and dispersal patterns they found, the researchers concluded the use of groundwater is likely to reduce dry-season flows, alter connection periods between perennial and intermittent habitats and contribute to the loss of perennial refugial habitats for fish. They argue that the maintenance of flows sufficient to maintain high connectivity within the river landscape must be a priority in any consideration of the environmental flow needs of the river. Read more of this work by Pusey and others in *Aquatic Conservation*: <https://doi.org/10.1002/aqc.3347> [Open access].

## Helping fish through smooth box culverts

While culverts are important as road crossings and flood mitigation structures, they are known to have negative impacts on freshwater and estuarine fish passage. The creation of barriers to upstream habitats is particularly important for small-bodied fish and juveniles. New guidelines have been developed for fish-friendly multi-cell smooth box culvert designs, with a focus on small-bodied Australian native fish species and juveniles of larger fish and taking into consideration the swimming performance and behaviour and maximum prolonged swimming speed of target fish species. Read more of this work by Leng and others in the *Australasian Journal of Water Resources*: <https://doi.org/10.1080/13241583.2020.1792091>.

## Juvenile Grayling get a little fresh and move upstream

The transition between marine and freshwater habitats is a critical component of the life cycle of the Australian grayling. Researchers studied four creeks in south-east Australia over three years and found that the juvenile Grayling migrated into freshwater from marine areas from September to December, with peak abundances around the end of October. The migration was also highest when the preceding 7 days had had intermediate flows at about 100–150 ML per day. Read more of this research by Koster and others in *Marine and Freshwater Research*: <https://doi.org/10.1071/MF20039>.



Moderate flows encourage juvenile Grayling to move into freshwater habitats. Photo: Corangamite CMA.

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## INTERNATIONAL NEWS

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### 100 years of habitat barrier gone

The Rattlesnake Creek Dam in Montana, USA, was built in 1904; it has now been demolished, re-establishing a natural river connection between the Rattlesnake Wilderness and the Clark Fork River for the first time in over 100 years. The creek is an important stream for Cutthroat Trout, Bull Trout and Mountain Whitefish and with the dam gone, fish will have access to about 15 miles (24 km) more of Rattlesnake Creek. The next stage of the project will reconstruct 1,000 feet of the stream and 5 acres of wetland and floodplain. More: <https://nbcmontana.com/news/local/rattlesnake-creek-dam-undergoes-demolition>.

### 110 years of habitat barrier gone

The Pilchuck River will be redirected to its original channel, after the removal of two dam structures, located upriver from the City of Snohomish in Washington State, USA, that have held it back since 1912. With the dams removed, in winter this river will run high and fast enough to reach the top of the bluffs about two stories overhead. The water here fluctuates dramatically. Chinook Salmon runs were recorded at 15,000 but returns dropped as low as just 50 fish in recent years. The 37 miles (59 km) of habitat that the fish now have access to, including cooler water temperatures, more complex habitat – everything that Salmon need to really survive and to thrive in terms of spawning and rearing – promises to help bring the fish back. More: <https://www.knknx.org/post/pilchuck-dam-removal-nearing-completion-37-miles-good-fish-habitat-upstream>.



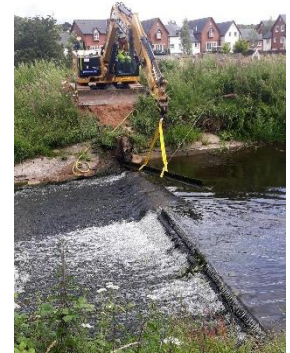
The removal of this barrier opens access to 37 miles of habitat. Photo: Parker Miles Blohm \_ KNKX.

## 150 years of habitat barrier bypassed

The installation of fish passes on the Armley and Newley weirs on the River Aire in Leeds in England will enable Salmon to swim up this river for the first time in 150 years. Two additional fish passes at Saltaire and Kirkstall weirs are also almost complete. These four installations mean Atlantic Salmon can complete their migration from the sea to spawning habitat beyond Skipton and into the Yorkshire Dales, along with other migratory fish including Trout, Eels and Lamprey. More: <https://www.thetelegraphandargus.co.uk/news/18636454.next-step-starts-get-salmon-river-aire/>.

## And another habitat barrier gone

A weir on the River Petteril in Carlisle, England, was disused and its removal will combat long-term declines in fish stocks in the River Eden and its tributaries. The River Eden has been declared a Site of Special Scientific Interest, and a Special Area of Conservation and this is one of several projects which are underway to allow fish to move freely and reach their natural spawning grounds. More: <https://www.newsandstar.co.uk/news/18586897.weir-removed-carlisle-river-help-halt-decline-fish-wildlife/> or watch: <https://www.youtube.com/watch?v=1b7h4kxuzcg>.



It might not look like much, but small weirs like this one had big impacts on fish. Photo: Eden Rivers Trust.

## 3D printing for coral restoration

128 pieces of 3D printed terracotta 'reef tiles' seeded with coral fragments have been installed at three sites within the Hoi Ha Wan Marine Park in Hong Kong waters. The Marine Park is a local biodiversity hotspot accounting for more than three-quarters of reef-building corals in Hong Kong and more than 120 fish species. However, in recent years, there has been a gradual deterioration of the coral habitat, coupled with coral bleaching and mass mortality events in 2015-2016. The artificial reef tiles provide a structurally complex foundation for coral attachment and prevent sedimentation, one of the major threats to coral. They provide anchors for dislodged coral fragments that are unlikely to survive on their own, giving them a second chance to thrive. The tiles are printed in clay and then hardened to terracotta (ceramic) in a kiln and it thought these materials will be more eco-friendly than the conventional use of concrete and metal. More: <https://www.miragenews.com/hku-architects-and-marine-scientists-co-develop-novel-3d-printed-reef-tiles-to-repopulate-coral-communities/>.



The 3D printed tiles provide a structurally complex foundation for coral attachment and aid the removal of sediments from the corals. Photo: AFCD.

## Seabed wind turbines and fish

Researchers have found that the seabed and marine life around the five turbines of the Block Island Wind Farm off Rhode Island, in the USA, is undergoing some changes. The wind farm is located three miles off Block Island and began operation in December 2016. The researchers found that the impact of sound is minimal once the turbines are in operation. The impacts were much more significant during construction of the turbines. There was a diverse ecosystem found in the area: Rock Gunnels, Cunners, Atlantic Striped Bass, Bluefish, Scup, Spiny Dogfish, Monkfish, Black Sea Bass, Dog Fish, Squid, Skate, and Sea Robin, with diverse species of worms, Blue Mussels and barnacles on the seafloor and dense assemblages of mussels and other species including sponges, anemones, and coral on the turbine structures themselves. Within the turbine footprints worm species were migrating to coarser sand sedimentation, and mussels were being found in finer sedimentation. There were also substantial increases in the abundance of larger mobile predators and scavengers around the turbines. Read more: <https://www.blockislandtimes.com/article/seabed-and-around-turbines-undergoing-change/57781>.

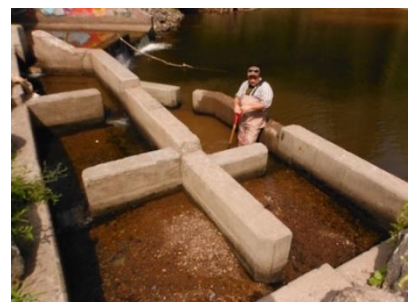


Offshore wind turbines appear to be providing some habitat benefits for fish and benthic species. Photo: Monique LaFrance Bartley.

In related research, researchers studied two commercial species of fish at a Belgian offshore wind farm. They found evidence that the wind turbines not only attracted fish, providing both shelter and food (from the organisms that grew on the turbines), but also served a role in their life cycle. The young fish were attracted to the wind farm where they would grow, then leave to spawn. In a separate study, they also found that the presence of filter feeders on the turbines, such as mussels, increased the nutrients in the seafloor around the turbines. In areas where the turbines are located where seabed was heavily degraded, the mussel shell fallout onto the seabed habitat seems to be restoring benthic habitats and increasing biodiversity. More: <https://seagrant.gso.uri.edu/offshore-renewable-energy-improves-habitat-increases-fish/>.

## Making streams come true for Nova Scotia fish

Cape Breton's Stream Team were installing baffles in Leitches Creek, a tributary to Georges River in Nova Scotia, Canada, and fitting a chute that will join a large pool to the upstream portion of the waterway when a few curious onlookers arrived. The chute and baffle were just being tested when some Chub and a little Trout went up it, following their instinct upstream to cooler water. The baffles slow the flow of water, allowing the water to deepen and creating a series of pools with riffles. Some of the main problems for fish passage here are undersized culverts and fish ladders filled with sediment and small boulders. In addition to the chutes and baffles, the team have removed debris that was clogging fish ladders in Big Brook and Grantmire Brook and deepened the tailwaters downstream of culverts in Beechmont Brook and Crawley Brook. More: <https://www.journalpioneer.com/news/canada/making-streams-come-true-local-environmental-group-restoring-cape-breton-waterways-484412/>.



The fishway clogged with sediment and boulders. Photo: SaltWire Network.



The cleaned up fishway. Photo: SaltWire Network.

## New for old fish cribs

In the 1980s and '90s, about 150 fish cribs (also known as fish hotels) were placed in Big Green Lake in Wisconsin, USA. The cribs were designed to protect small fish from larger fish and add to the fish habitat in the lake. 30 to 40 years later, many of those cribs have deteriorated, the interior of thick brush and tree branches having disintegrated and leaving the only exterior skeleton intact. Most of the land surrounding the lake is developed, with the result that there are very few natural structures in the lake, such as fallen tree branches and other brush. Ten new fish cribs have now been installed. Each was constructed using 4-by-6 foot oakwood boards, stuffed with brushwood, with rebar on the corners to hold everything together and cinder blocks on the bottom for added weight. More: [https://www.riponpress.com/news/green\\_lake/providing-fish-a-habitat-for-the-future/article\\_120470c8-dcab-11ea-9eb5-5f80ee9ad45c.html](https://www.riponpress.com/news/green_lake/providing-fish-a-habitat-for-the-future/article_120470c8-dcab-11ea-9eb5-5f80ee9ad45c.html).



The replacement fish cribs being installed in Big Green Lake. Photo: Joe Schulz.

## Fish-friendly vineyards

90 percent of grape vineyards in California's Napa Valley, USA, are now certified under the Fish Friendly Farming (FFF) program. The program is designed to improve water quality and to restore and sustain habitat for fish species like Chinook Salmon and Steelhead Trout. FFF assessors visit the farms and work with the farmers to collect information on erosion, native vegetation, drainage systems, how vineyards are winterized, chemicals usage, and wells and legal surface water rights. The result is a Farm Conservation Plan, which ensures the farm practices are beneficial to the fish as well as beneficial to the vines. More: [https://napavalleyregister.com/community/calistogan/news/fish-friendly-farming-certifies-90-of-napas-vineyards/article\\_6541c3c4-aeaa-5357-bdb2-9a3987354fe9.html](https://napavalleyregister.com/community/calistogan/news/fish-friendly-farming-certifies-90-of-napas-vineyards/article_6541c3c4-aeaa-5357-bdb2-9a3987354fe9.html).

## Levee work provides an opportunity to improve fish habitat

Lake Monticello in Arkansas, USA, has had to be drained completely to enable repair work to its failing levee. This has provided an opportunity to install a range of fish habitat structures within the 1,520 acre lake, including fish cribs; pyramid-shaped constructions made with 2-inch-by-2-inch boards to create small gaps and provide protection for baitfish and juvenile fish. Elsewhere, hundreds of pallet structures have been staked down along the lakebed near humps and old roads. Unlike many pallet structures placed after a lake is flooded, these were given the added enhancement of hardwood brush, cut from trees surrounding the shoreline. Added to this were 41 larger brush piles created by cutting full-sized trees and dragging them into place with the use of a tractor. More: <https://www.swtimes.com/news/20200806/biologists-plant-seeds-for-future-fishing-at-lake-monticello>.



The advantage of installing fish habitat in a drained lake – building fish cribs in-situ. Photo: Special to The Commercial.

## Solar powered aerators helping fish

Two solar-powered aeration systems have been installed at the Haverhill Newt Pond and Washlands Haverhill in Essex, England. The aeration helps to increase oxygen levels in the water, which will reduce the risk of fish dying. As it gets hotter during the summer months, temperatures increase, which lowers dissolved oxygen levels and causes fish to become stressed. Aerating the water improves the water quality, which helps create better conditions for fish. More: <https://www.gov.uk/government/news/green-energy-to-help-fish-suffering-effects-of-dry-weather>.

## Restore it and they will spawn

At Friars Meadow on the River Stout in Sudbury in England, there have been huge numbers of Roach and Rudd spawning after large scale removal of silt and vegetation, and tree surgery. Before the project, that area of the river was heavy with silt and vegetation. The recreation of spawning areas and shallow diverse river habitats means that fish are spawning around the whole island. The water also has a higher levels of oxygen now which benefits fish and other aquatic life, including the insects fish feed on. The before and after are pictured below. More: <https://www.gov.uk/government/news/fish-start-to-spawn-again-after-successful-restoration-work>.



The Friars Meadow before restoration works. Photo: Environment UK.



The Friars Meadow after restoration works. Photo: Environment UK.

## A 'Stage Zero' approach to river restoration

As part of the Cumbria River Restoration Strategy, a 'stage zero' approach has been used to restore the Bessy Gill near Thrimby Cottages, England. Usually, river restoration involves re-meandering straightened river channels. However, the 'stage zero' restoration involved filling in the existing river channel where it entered a culvert under a highway and creating a channel to allow the river to spill out into its natural floodplain. This will allow the river to behave as it would have done before any human interference, creating multiple channels, pools, and riffles. This area had previously been planted with native broadleaf trees, to provide a more natural habitat and increase the natural flood management capacity of the site. Historically, there had also been a ponded area on the site and this has also been recreated. The works mean that 1 km of river is developing its own natural course and has linked up with the downstream channel, 23 ha floodplain habitat is improved or reconnected and the 1.6 ha pond is helping to slow the water, keeping it in the Bessy Gill. More: <https://edenriverstrust.org.uk/taking-a-stage-zero-approach-to-river-restoration/>.



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## RESOURCES

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### **Habitat Restoration Webinar Series (US)**

A webinar series for habitat restoration practitioners sharing new approaches, best practices, and innovative techniques: <https://www.fisheries.noaa.gov/feature-story/restoration-webinars-share-best-practices-across-nation>.

### **Coastal Restoration Toolkit (US)**

Tools and information to assist the community in engaging in local coastal habitat restoration projects: <https://restoreyourcoast.org/>.

### **Students for Salmon virtual learning (US)**

A set of videos and resources about Salmon and their habitat: <https://www.n-sea.org/sfs-virtual-learning>.

### **Infographics (US)**

Value of Oyster Habitat: <https://www.fisheries.noaa.gov/infographic/infographic-value-oyster-habitat>.

Habitat Conservation: <https://www.fisheries.noaa.gov/infographic/habitat-conservation-infographics>.

### ***Magnificent Mighty Mussel named Mallee (Aus)***

Mallee the Mighty Mussel is the latest storyteller to highlight the importance of healthy waterways in Victoria's Wimmera region: <https://www.youtube.com/watch?v=ixr6LQgcxc>.

### **Saltmarsh restoration: What have we learnt? (Aus)**

As more restoration of saltmarshes projects get underway, this talk looks at what is known about restoring saltmarshes: <https://www.youtube.com/watch?v=rWsrGWomGg&feature=youtu.be>.

### **Habitat Restoration Projects Atlas (US)**

The latest, redesigned version of the Restoration Atlas is an interactive tool that provides access to more than 3,100 habitat restoration projects by location, habitat type, or restoration technique: <https://www.fisheries.noaa.gov/feature-story/explore-thousands-habitat-restoration-projects-noaa-restoration-atlas>.

### **Freshwater fish research (Aus)**

An updated interface for freshwater fish research in New South Wales: <https://www.dpi.nsw.gov.au/fishing/recreational/fresh-rec-fish-research>.

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## ABOUT NEWSTREAMS

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*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.

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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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