Received: 11 March 2021 | Revised: 14 September 2021 | Accepted: 22 September 2021

DOI: 10.1002/rra.3887

SPECIAL ISSUE PAPER

WILEY

Rivers—mouths—tides—memories: A creative, inter-deep-mapping of two river/tidal places. Love of place, memory and affect; movements, patterns, marks, and practices of care

The River Severn Estuary UK | Bahía Adair, Sonora, Mexico | Owain Jones[1] | Heather Green[2]

[1]Church Farm Cottage, Bath, UK

[2]Herberger Institute School of Art, Arizona State University, Tempe, Arizona, USA

Correspondence
Owain Jones, Church Farm Cottage, 2 Church Farm Lane, Priston, Bath, UK.
Email: owain.oj@btinternet.com

Abstract

This article sets out the authors' attachments to, and memories of, two tidal river/channel landscapes and how these are being folded into collaborative work, which brings these places to attention through art practice and shared reflection. The rivers/channels in question are given voice in the introduction and ideas of the ecologies of mouths and river mouths, particularly those tidal, are explored in the following sections. Aspects of polyvocality and deep mapping are employed to reveal the unique characteristics of these places—particularly their tidal patterns and rhythms and our concerns for them. An art project, *Tidal Timespace*, lies at the heart of this article with the role of memories, shared memories, and our relationships to place as key themes. The descriptive accounts of the authors' respective place memories are set in the margins of the article in two columns. We conclude with considerations of expanded notions of ecology, and we add that loss of place, the passing of time, and wider senses of ecocide and extinction run like shadows through this narrative.

KEYWORDS

art practice, delta, estuary, intertidal, mouth, patterns, rhythms, river

1 | RIVER BIOGRAPHIES

The River Severn (Welsh: *Afon Hafren*), at 220 miles (354 km) long, is the longest river in Great Britain.[4][5] It is also the river with the most voluminous flow of water by far in all of England and Wales, discharging an average of 107 m3/s (3,800 cu ft/s) into the Bristol Channel, which runs westward to join the Celtic Sea and Atlantic Ocean. The Severn rises in the Cambrian Mountains in mid Wales at an altitude of 2,001 ft (610 m) on the Plynlimon massif and then flows through the English counties of Shropshire, Worcestershire, and Gloucestershire. The lower reaches of the river are tidal and form the Severn Estuary. This is described in more detail in what follows and is, according to Bristow (2015), "among the world's natural wonders" (1).

Bahía Adair, located in the Upper Gulf of California in Sonora, Mexico, extends 26 miles (43 km) from east to west and 12 miles (19 km) from north to south. The coastline consists of 104,800 acres of wetlands. There are three different habitats: the wetlands, artesian wells, also known as *pozos*, and salt pans. The wetlands extend along 47 miles (76 km) of the coast, from Punta Borrascoso in the north to Estero La Cholla in the south. All six wetlands are inverse hypersaline estuaries, created by tidal inflow in river-like channels. Bahía Adair is part of the Alto Golfo de California Biosphere Reserve, a UNESCO Biosphere Reserve (1995) that includes El Pinacate volcanic region and Gran Desierto de Altar, the largest sand sea in North America.

2 | CONTEXTS AND BACKGROUND

This article is a co-evolved expression of memories: of places where patterns and marks made in tidal streams discharge into oceans; of places where tides come and go and create the quintessentially liminal space of intertidal zones; and in tidal river reaches and marshes. Our account charts the physical distinctions of two distant landscapes and the process of collaborating on writing about our memories for the project *Tidal Timespace: Imprints & Palimpsests*. This project aims to creatively explore the loved details and ecologies of each landscape—their uniquenesses as well as their shared traits. These characteristics are very much about rhythmic flows of water, often tide-driven, and the ecologies these are bound into. Drawing upon the practice of deep mapping, an emerging method of intensive topographical exploration that "works horizontally across the terrain and vertically through time" (Pearson, 2006), these ecologies interweave nature and culture, past, present, and future, dry and watery, and fresh and salty space. They include very rich biodiversities in the classic sense but also ecologies of memory—as each landscape has been known to one or other author since earliest childhood—Heather Green with Bahía Adair in the Gulf of California (Mexico) and Owain Jones with the Severn Estuary (UK).

Once complete, the project will include many more elements—sculptural, audial, and interactive. But here, we focus on the written memory fragments of our two estuarine landscapes that have been in part lost to development. They are inscribed in the margins of this article: Owain's memories are on the left in italic, and Heather's are on the right in roman text. These vignettes offer a collaborative, conversational script, gently inviting readers into a multisensory timespace that textually moves back and forth like the tides.

We explore these landscapes as *river mouths*, and how these embody corporeal, ecological, historical, and political attributes and stand as metaphor for creative exchange. A river's mouth expresses the essence of polyvocality—that is the mixing of voices and languages, both human and nonhuman. It is our intention to relisten and reblend the voices and dialects of humans, animals, plants, waters, and minerals. This is not to say all voices will be in harmony in terms of register and/or desire. But perhaps as in Latour's notion of ecological politics and democracy (See Revill, 2021), sustainable futures can only arise from letting the world speak again, together. Through our conversations and expression about our shared care, recollections, and concerns about these tidal landscapes, we submit to an immersive, collaborative, musing of, and witnessing to, more-than-human timespace entanglements, for example, Anna Tsing et al (2017); Deborah Bird Rose et al (2017); Thom van Dooren et al (2016); Donna Haraway (2016). As such, we see this article as part of a wider global movement in arts and scholarship in which water is being creatively explored and appraised as an active and embodied, lively, life-enhancing element, fundamentally linked with bodies and places, as in hydrofeminisms (Neimanis, 2017). The voicings of water, and water becomings, such as rivers, are perhaps only just beginning to emerge. For example, Richard Bright interviews Basia Irland about her explorations on world rivers:

> RB: "You have written a series of essays for National Geographic about seeing from the perspective of a river. Can you say more about this?"
>
> BI: "It is indeed a privilege to be a writer transcribing the stories of our rivers' moist stories. It has opened my eyes and my heart to the depth of knowledge a river accumulates over thousands of years as it traverses the land… *because every river has its own voice, personality, and problems*. I have written about rivers around the world, including ones in Thailand, Cambodia, India, China, Japan, Nepal, Canada, the United States, and Europe. Lucy Lippard writes, 'The genius of these essays, [] is the fact that they are written in the first person, the persona of the river herself.'" (Bright & Irland, 2018, emphasis added).

TIDAL TIMESPACE: OWAIN JONES

The sea wall on the eastern side of the mouth of the Rhymney River turned inland leaving a 150 or so acres of flat tidal grassland open to the higher tides of the wider Severn estuary. This was the Lamby. The other margin of the Lamby was made by the embankment of the railway heading into the centre of Cardiff. The river, flowing down from the inland hills, from up "the valleys", wanders with a few final meanders to the sea, and the Lamby is held in the eastern folds of these last meanders, isolating it from the city. This was a land for summer grazing of sheep and cattle from our farm. Animals we drove there and back each spring and autumn. It was inundated by the higher tides. The seawalls doing the work at the very highest. The estuary water washing up the river, until returning on the ebb.

The grass was marked by thin meandering braids of jetsam left by the mid-range tides. Sometimes three or four in broken, rough parallels, marking the retreating extent of days of lessening tides. Ascending tides would pick up these previous lines and make them into one heavier fresh one, to be moved on yet again at the next high tide. We followed these tatty weaves of seaweed, grass stalks, sticks, plastic bottles, small dead crabs, hoping to find the odd broken, sun bleached toy or football. Once we found a beautiful, perfect, but dead fox which had floated to rest on the tide. We cried. We never like the hunt, or shooting on the farm.

In some places the turf had been cut to leave wide, shallow rectangular pools of water, which, in the wind, charged and rush the far bank like miniature seas at storm. In these, inexplicable lumps of remaining turf formed mazes of small islands over which we tried to find jumpable routes.

3 | MOUTHS

Think of your mouth; its beauty and its complexity. Think of its ecology. Of the role it plays in *your* ecology; physical, cultural, social. Touch your mouth; someone else's? Kiss someone? Now think of a river mouth. Think of an estuary or delta[i]. Mouths speak; mouths kiss; mouths eat; mouths breathe; mouths disgorge. If healthy, mouths are wet. Mouths teem with organisms. Mouths are sensual. Mouths sing. Mouths can be gagged, blocked. Mouths are key ecological thresholds; so for humans, so for animals, so for rivers. This article is a construct of words. Before written, words were spoken, they were mouthed. This could be read out loud, mouthed into whatever air, whatever space, is around you. You breathe in air, you speak out. Rivers take in, they give out.

4 | RIVER MOUTHS (ESTUARIES/DELTAS) AND GLOBAL ECOLOGY

In terms of global biodiversity, river mouths, where rivers discharge into larger bodies of water, are critical thresholds of ecology. Where the body of water is the sea or ocean, fresh water meets salt water, and these mix to make brackish water. Flora and fauna, organic and inorganic matter, and human movement all pass through river mouths, and distinctive ecologies and cultures form in these unique places.

Where the lower reaches of a river are tidal, water flows up the river through the mouth as the tide rises, and out again as the tide ebbs. The mixing of fresh and salt water is much more varied and dynamic, and liminal intertidal zones are also often present. A disproportionate amount of global biodiversity is in coastal zones, and within that in deltas, estuaries, and liminal coastal margins such as these.

This is why estuaries are such vital habitats and landscapes. The word estuary is derived from the Latin "*aestus*" meaning tide, referring to a tongue of the sea reaching inland (Hardisty, 2008:3), a rhythmic conversation and exchange between two bodies. But as well as a "tongue of the sea" reaching inland on tidal rivers, all river mouths extend a tongue, a plume of fresh water into the sea. Smith (2002) in his study of the extraordinarily rich ecologies and cultures of the Amazon

[i]We see estuaries and deltas as closely related landscapes and ecosystems. Although they vary in a number of respects, from here on we mostly just use the term estuary.

river mouth, retells reports from early European explorers, who, while still sailing far off the coast in Atlantic waters, knew they were on course for the mouth of some huge river by realising they were sailing in streams of differing colored waters.

In the book *Wildwood* Roger Deakin (2007) makes the point that it is the rivers, which connect the ecologies of woods and forests to ecologies of the oceans. For example, rivers carry organic matter such as leaf and wood litter and discharge it into the sea where it is an important foundation of ocean ecology. This is just one example of the profound power of water(s)—differing waters—to shape the world very directly—physically, and all the cultural, ecological, and political diversity that does, and does not, gather around that. Water has the power to move, hydraulically, emotionally, and affectively. Water is a key vector of life—the life blood of Gaia; rivers are central to its circulation.

Michael Welland (2009) similarly considers that rivers are the "arteries" of the earth as they transport sediment and organic material from evolving land to evolving oceans over eons. This is anthropomorphic, yes, but expressive of the idea of the earth as a body of processes, which modernity has been so dismissive of. Welland goes on to point out that "around a third of this natural volume is [now] prevented from reaching the oceans as a result of being trapped behind dams and other man-made obstructions" (81). In other words, the mouths of many rivers are silenced, parched, degraded, or starved. We need to be thinking about the performativities of nature as embodied in the agencies of things like rivers. For Serres, this is the bringer of new life and energy "the great primal or recursive rising of waters, the chaos that mixes the things of the world—causes, forms, attributions—and that confounds subjects" (2003:53).

Rivers and floods are makers of life and landscape. How do we embrace that? And today more than ever, rivers also are a major part of the toxic ecology of industrialization, modernity, and globalized consumer culture, carrying plastic and other pollutants such as waste pharmaceuticals to the oceans. In a wider view of ecology (Guattari, 2000), water and memory are utterly intertwined. (See also Illich, 1986). We all in some way or otherlive with water. We are all embedded in catchments, both in the water we consume and the waste we generate, and in all the different ways, we use water; for sustenance, cleansing and cleaning, transportation, recreation, aesthetic production, and consumption. Our bodies and our houses are part of the local water catchment,

TIDAL TIMESPACE: HEATHER GREEN

. . . . . .

It flowed in serpentine arcs,
clear aquamarine in places,
murky with mud in others.

We pretended we were
explorers discovering a new
territory, drawing maps in the
damp sandy floor.

. . . . . .

Shell beds lined the high banks
of the estero, and seemed to be
a kind of currency—

We were rich!

. . . . . .

The shells were diverse and abundant:
pink tellins, white razor clams, smooth
caramel-colored moon snails, ridged
chione clams, large melangenas, ornate
murexes, shiny olives—so many species!

My grandmother would inevitably
find a broken, malformed or strange
accumulation growing together and
call me over, declaring how beautiful
it was, even more beautiful than the
perfect ones we collected.

. . . . . .

Stranded at low tide and protruding
out like some kind of whale vertebrae,
a rotting, split-open panga sat heavy
with mud in its belly—the sandblasted
blue-green of its sides seeming more
like beach glass than fiberglass. Like
Bishop's pilings of stove-in boats—
absorbing, rather than being absorbed,
like torn-open, unanswered letters.

The bight is littered with old
correspondences.

. . . . . .

Sometimes it was all still, except for the heat gently shimmering the horizon, the close around but distant city rumbling softly, the trains passing, and the black headed gulls calling as they moved down the river to the shore.

These are the third highest tides in the world. And here, on the Lamby, we played at the precise fractal margin of their progress. You could see the edge of the advancing water creeping through the grass. Then it floated the grass stems, and they swayed with the movement, then it just hid them, and then the feet of our wellies in the swelling, silky, heavy brown of the coming flood. We turned and casually walk hand in hand with the tide, and I suppose you could say with the moon as well, towards the sea wall, up which we climbed and turned to see how high it would follow.

We made other trips, special trips, when the tides were high enough to cover the unprotected land and the stock had to be guided to the seawall in case they got cut– off on the seaward side, down on the lower wharf. At home, in all the chaos of the old desk in the corner of the living room that seemed to bulge with papers and folders like stuff coming out of an old mattress, and which caused rows, the little yellow "Arrows Tide Timetable" for the Bristol Channel was always in its place, never lost.

We wonder at the fish that are swimming where the sheep had grazed a few hours before. And on the tide the ships are moving in and out of the docks, returning, or setting sail onto the great trade routes of the world. A deep long blast of a ship's horn rolls across the flatness and over us like some huge flexing bubble of plasma, up into the hills, where it stops and rolls back with an echo, and then away over the level towards home where it might just be heard too.

just as the drains, streams, rivers, and estuaries are. We are cellular beings (as are all living beings). Water is key to the life of all cells, as an active agent, with many functions still not fully understood, for example that of "slow water" in cells (Ball, 2017). Memory is a cellular process and thus a process of water.

5 | SEVERN ESTUARY: TIDAL RIVER(S)

As the water reaches the end of its journey down the river, the channel slowly widens out into the great Severn Estuary. This is a key example of one of the 1,200 river mouths around the world that are the ecological wonders of estuaries. Many of these are fragile systems subject to degradation by pollution, resource extraction, reclamation, and increasingly multiple risks relating to climate change, sea level rise, and storm events. As Uchiyama (2007:1015) puts it.

> "...intertidal sediments play a key role in providing habitat for resident infauna, which act as a food resource for large communities of shorebirds []. Even when slight erosion occurs on tidal flats, it may have significant impact on the resident benthos."

The Severn estuary is 557 km^2 with 18% of this being intertidal (100 km^2). It is macro-tidal (Haslett, 2008), having the highest tidal range in Europe and the third highest in the world, with the sea level rising by as much as 14.5 m (Avonmouth) in the space of about 7 hr at the highest tides, and then falling away again. Approximately, 80% of the estuary's 370 km shoreline is lined with sea defenses, which stop the very highest tides flooding low lying surrounding land (often reclaimed wetlands and salt marshes). Thus, the ecology of this estuary and river mouth has already been seriously reduced by human intervention. But the sea walls are, in many places, openly accessible and used for agricultural and recreational purposes (e.g., a long-distance footpath; The Severn Way) and accessing and witnessing the intertidal areas, the ever-changing views, and the natural wonders and cultural curios that remain.

Generated by the never-ending gravitational *pas de trois* of earth, sun, and moon, in conjunction with the Coriolis effect from the spin of the earth and other factors, the tidal rhythms are a key part of the aliveness of this landscape (and other tidal places) in process terms, creating huge, ever morphing vistas of shore, intertidal areas, sea, sky, space and light, and shaping elements of its physical features, ecology, economy, and culture in terms of spacetime rhythms. The higher tides wash up the tidal reaches of a number of major rivers (some through urban centers) that drain into the estuary.

So, the Severn estuary is, in fact, a polyvocality of rivers with, in clockwise order, the rivers Taff, Rhymney, Usk (all in Wales), Wye (Wales England border), Avon and Parrett (England), opening into it and generally receiving tides each day. The exception being the Taff river, where a barrage built for "urban regeneration purposes" (begun in 1994) across the mouth of this smaller estuary effectively stops the tides and the river's mouth. On the River Severn, the incoming tide, compressed into an ever-narrowing channel, creates the famous Severn Bore, a tidal wave that runs back up the river about eighteen miles, to above the city of Gloucester. This entire rhythmic spectacle is ecologically and culturally significant, attracts residents, tourists, surfers, and artists, and remains entangled in many forms of economy and land use.

The tides are entangled with a multitude of materialities, practices, and ecologies. The powerful flows, which are forever mixing the salty ocean waters with the fresh water discharge of the river, carry huge amounts of sediment in suspension with a highly complex and always transient geography of mud, sand banks, and channels. Shifting, elemental landscapes engage all manner of social processes, which include transport, recreation, conservation, archaeology, rambling, bird watching, and beach tourism. These have complex temporal rhythms geared to the multiple sequences embedded in tidal cycles. The main sequences are the daily rise and fall of the tide in a semi-diurnal rhythm (tide rising and falling roughly twice in 24 hr); the monthly (lunar) cycle, which shows a progression from spring to neap tides in response to the phases of the moon, and the seasonal (yearly) sequence of the tidal ranges, which respond to the relative positions of the planets (e.g., spring tides at the equinoxes). It is important to note that, firstly, these sequences do not correspond to the more ubiquitous hourly, daily, and monthly grids in any simple ratio, and, secondly, that the precise heights and times of tides vary with local conditions such as wind speed and direction, atmospheric pressure, and the amount of fresh water issuing from the rivers.

Some 1,000,000 people live around the estuary (Barker, 2008) in large urban conurbations and smaller, remoter rural settlements. The management of the estuary, and its margins poses considerable challenges due to the highly dynamic nature of the tidal systems. The reach of the estuary across local and national legislative boundaries and the many competing ecosystem services the tidal flows bring compound this complexity.

The first tienda along the bay was run by Nacho, later by Patty and Ramon. We cheerfully traipsed over hot sandy streets to buy firecrackers, bottles of Fanta and candy necklaces. You'd enter through a screen door, and once inside it took a few moments to adjust your eyes. It was dark inside, the cool floor covered in sand, dusty jars of jawbreakers, saliditos, and candied tamarindo lined up along the wood counter, its blue paint cracked and splitting. A jumbled display of firecrackers loomed in the shadowy vitrine beneath; Chinese helicopters, M-80's, bottle rockets, mortars, sparklers, boxes of Roman candles.

Enormous bird congregations gathered on the flats—Avocets, Spoonbills, gulls and Black-necked Stilts. Though far away, you could see their colorful movements, a kind of exotic choreography in the middle distance. Despite our careful approach, they were easily scared off—a sudden flurry with clamorous alarm.

A megaphone mounted to the radio room periodically called out a string of scratchy undecipherable messages—possibly ordering boat launchers to come fetch fishing boats out of the high water…

A squabbling of pelicans and gulls gathered awkwardly on the nearby stone quay in anticipation of scraps they could steal. The fetor of gasoline and viscera in the afternoon heat emanated from an iridescent pool below the scales where they weighed the fish.

*On the other side of the Rhymney River there were rickety allotments, with sheds made of scrap wood, old doors, even an old rowing boat stood on end. Then there was a modern, concrete motel-*cum*-pub, already going to seed with fading pink and cream awnings and weeds flourishing in the always empty car park. And behind them there was the East Moors steelworks, clanking and steaming (and although we did not know it, dying) and behind that fragments of the docks skyline. The steelworks, a series of huge, connected metal sheds, hung from the wide sky by fat billowing plumes of white steam, and, every now and then, emitted huge, softly loud, languorous clangs which echoed all around the inland hills. Other sounds emphasised the distance made by the flatness. One time we watched a small figure in the allotments belting something with a big hammer, an old boat trailer we thought. Tiny, his arm fell, stopped, and lifted up again, with the pulse and ring of each blow thrillingly reaching us as the hammer almost reached the top of the next swing.*

From the sea wall, we watch the tide reach full flood. The eastern Atlantic is swelling up into a huge shallow dome and moving our way as the moon swings over the earth's shoulder and lines up, for a while, with the sun. The rising water washes along the South Wales coast, pushes a spearhead of floodwater up the Severn Estuary and deep into the flank of England. It gradually covers all the inter-tidal lands like the Lamby, and then gently starts to examine the flood defences formed of the snaking earth bank sea walls.

A set of sometimes conflicting demands is placed upon the tidal estuary, for example between recreational use, resource extraction, nature conservation, nuclear power generation, waste discharge, agriculture (grazing of salt marshes), transport needs, coastal management and development, and public access. There are significant pressures on the tidal Severn and its intertidal areas and eco-system services, as there are on estuaries and delta areas worldwide.

Barker (2008) suggests that the communities who live around the estuary (especially those in large conurbations) have "lost touch" with the tidal/estuarine landscape and its rhythms, as technologies, work, transport, and lifestyle practices have changed. For example, tide-determined ferry schedules have been replaced by large road bridges. The large ports around the estuary were, for centuries, tidal ports in the heart of the cities, with their laboring and commercial rhythms tide-determined rather than day-/night-determined. Over time, the main ports were made nontidal through large-scale engineering, and, in some instances, (as in the Port of Bristol) new dock facilities were built downstream, taking them away from the city center. Many smaller tidal harbors, which were hubs in busy coastal trading routes, have now closed.

Lefebvre (2004) describes four alignments of rhythms, arrhythmia, polyrhythmia, eurhythmia, and isorhythmia, which together represent a range of dissonance or consonance between rhythms and the varying consequences of such. We feel examples of these, particularly the first three, abound in and around the tidal landscapes of the Severn. And a key question now is what kind of physical and cultural traces, patterns, do these leave?

Today local residents are generally not connected to the tidal Severn by work, leisure, or casual acquaintance of locality and may only occasionally experience a clash of tidal and diurnal rhythm such as a swing bridge disrupting rush hour traffic as a boat passes into port. Some cities might be at risk of flooding if high rainfall coincides with high tides (arrhythmia). Farmers who get the benefit of grazing livestock on the salt marshes will, on occasions, have to ensure their livestock is moved to safety at the very highest tides (polyrhythmia). Visitors to this landscape might notice the coming and going of birds, birdwatchers, and pleasure and commercial sea crafts, and other travelers that are timed to make the most of the tides (eurhythmia). These characterizations of rhythms are initially useful but we feel are not a sufficiently subtle and flexible framework to appropriately deal with the

complexity of the rhythmic exchanges between inhabitants and landscape. In an effort to express differing patterns of tidal rhythms, Palmer (née Reiser and Jones (2014) have explored the potentialities of sonification to interweave rhythms of these types into representations that engage with the complexity and interchange between them.

The upper estuary, or tidal river channel, at low tide, is a remarkable place to explore. Care is always needed, but, in some places, it is easy to walk out onto firm sandbanks or rocky platforms at low tide, and walk where, a few hours later, the incoming tide will be running, and maybe the famous fish of the Severn; the salmon, eel, and lamprey will be swimming. Although, sadly, their populations are vastly reduced (See Green, 2020 online https://www.heathergreen-art.com/tidal-timespace).

6 | BAHÍA ADAIR: INVERSE TIDAL CHANNELS AND SPRING MOUTHS

Beyond the classic river estuary form, there are other types of mouths, channels, and estuaries to be considered. Located in the Sonoran Desert in Mexico along the Gulf of California, Bahía Adair, is a large wetland complex fringed with six separate estuaries. These meandering, serpentine channels are not created by river outflow but by the ingress and egress of tidal water. They are ephemeral streams also known as "negative" estuaries or *esteros*. As no river is feeding them, they are created by an influx of water at high tide and then exposed to evaporation, becoming hypersaline. The result is a two-layer circulation but with a reverse movement; ocean water entering the estuary during high tides in the upper layer, and the hypersalty water leaving the lower layer. So, it has an inverse or negative circulation. These estuaries are saltier at the top of the channel and less salty toward the sea (Lavin, Godínez, & Alvarez, 1998).

Bahía Adair has the third largest tidal range in North America, with a 26 ft. vertical shift during spring and neap tides (Flessa & Fürsich, 1991), moving in a semi-diurnal tidal rhythm, much like that of the Severn Estuary. At low tide, a vast expanse of tidal flats is exposed, but unlike the Severn, its flats are firm underfoot throughout. This creates an extensive area of uninterrupted flats to explore at low tide, where all manner of traces can be seen. Much of the surface has a sandy, shelly texture

There was a sanddollar bed in the outer flats that could only be reached during the lowest tides of the year; we knew we'd arrived when we heard the muffled sound of crunching underfoot. Many sanddollars were wedged in the mud, or just under, wearing their bristly violet-brown coats.

Once while exploring the flats, we were astonished to discover a flood of bleached and lifeless sanddollars nearly filling the main tidal creek. How did so many perish? We used the fronts of our t-shirts as aprons, carefully picking up as many as we could, carrying home dozens of perfect keyhole specimens, our wet shirts bulging from their weight.

Fiddler crabs congregated in the narrow tidal channels, creating a kind of humid hissing and clicking that seethed up from the sulfuric mud.

Walking the upper estero could be a bit cumbersome, as we tried to sidestep the lacerating halophytic grasses and the many assemblages of crabs' sand balls.

The tide always offered up such dreamlike objects, and we'd become completely immersed in examining them: a half-buried flounder camouflaged in the mud, the shredded remains of a leopard shark, an octopus hiding in a turritella shell, a sea hare's heap of spaghetti egg cases—then one of us would glance up, seeing the water had risen and cut off any way to walk out! We'd have to swim across the rushing water, and in a hurry!

Tiny streams began in the grass and snaked down to the shore, growing into to miniature canyons in the mud, a challenge to jump, or follow down to the ragged edge of the land. This was a zigzaggy, sheer mud cliff, about six feet high, with the wiry turf making a quiff over-hanging the top. This marked where the levels, the slab of rich alluvial soil, gave way to the flowing, oozing mud beds of the estuary. Small islands of green, dying fragments of turf, standing atop crumbling columns of soil split way from the cliff, tilting and sinking at crazy angles, studded the near of the huge reaches of mud that glistened and veined out to the vague but always there, never the same distance away, water line.

Standing on the edge of this, you looked across the apron of mud, and then the 'sea', all pewters and greys and browns and slate blues, forming textures of ripples which immediately smudged into each other and then reformed. Ships heading past Cardiff to Newport, and "the other side", England, the mysterious further shore of the estuary stood out unreally sharp and close in lilting light, or appeared as thick, oily shadows, or as pale ghosts suspended in the sky, or not at all. West, along the shore, the city and the docks still hummed and grumbled.

Standing in the middle of the Lamby, and looking inland, thousands of tiny windows stared or winked reflected sun back at us from the suburban houses on the inland hills. We, the land, the animals, the tides, the birds were part of their view.

caused from the bioturbation of stingrays and ghost shrimp. These feeding excavations are created by burrowing and sifting, bringing up tiny shells to the surface and compacting sediments underneath.

Although the tidal channels and creeks of Bahía Adair are inverse, and so no fresh water is mixing with them—just 62 miles (100 km) to the north lies the mouth of the Colorado River, which ran freely from its headwaters in the Rocky Mountains into the Gulf of California until the early 20th century. This interchange of fresh and salt water created a giant estuarine delta and a rich, biodiverse sea. Like other desert rivers, such as the Nile and the Indus River deltas, the Colorado River has been greatly altered by human activity. Decades of dam construction and water diversions in the United States and Mexico have reduced the delta to a remnant system of small wetlands and brackish mudflats. As reservoirs have filled behind dams and captured floodwaters, freshwater can no longer reach the delta, resulting in an altered seawater composition, and impacting species such as the endemic Vaquita porpoise, the most endangered cetacean in the world.

Due to another anthropogenic flow of water created from accidental agricultural runoff, there is a new wetland at the mouth of the Colorado called *La Cienega de Santa Clara*. Created in 1976, it is fed by drain water from California farmlands and has become the largest wetland in the Sonoran Desert. (Brusca, Alvarez-Borrego, Hastings, & Findley, 2017) The Cienega supports rare and endangered bird and fish species and is a nesting and feeding site for shorebirds and marsh birds on the Pacific Flyway. A separate project is currently in place, which aims to rejuvenate the wetlands by releasing a pulse of water down the river delta. One can hope that the conversation between the river and sea can resume, if only intermittently.

In *The Secret Knowledge of Water*, Craig Childs (2000) counts the steady rate of water dripping from a desert spring and describes how water can be calculated to the minute from one century to the next with the exactitude of a clock. Earthtime can be counted in water, not only from the rhythmic drops or flow from springs, but also by its weight—the memory recorded by transfigured stream beds, and from the ebb and flow of oceans and glaciers. Part of this memory for the Colorado River and Gran Desierto de Altar where Bahía Adair is located, exists underground along ancient fault lines, and seeps up in a series of spring-fed wetlands. Locally known as *pozos*, these springs have provided vital fresh water resources to diverse flora and fauna and to travelers who have visited the area for centuries, and are peppered along the periphery of Bahía Adair. One can surmise that, deep underground an ancient

network of fresh water is flowing. So the myriad of tidal channels of Bahía Adair become a kind of double negative, inverted in the travel from the sea inland, and mirrored from below in the veins of an unseen network that course upward in the mouths of springs.

Historically, the coastal areas of Bahía Adair and the Northern Gulf of California have been sparsely populated because of the lack of abundant fresh water. Tohono O'odham pilgrims traveled on foot or horseback for days to collect salt and shells and perform initiation ceremonies into the 1950s, and it has been home to the Cucupá and Tohono Cei'd people, who developed ingenious methods of harvesting the dew that collect overnight for drinking water (Nabhan, Hodgson, & Fellows, 1989).

The small fishing village of Puerto Peñasco grew quickly between the 1960s–90s, becoming a popular tourist destination for US citizens from Arizona because of its proximity to the sea, a 4-hour drive from either Tucson or Phoenix. Located just south of Bahía Adair, Puerto Peñasco is now a bustling tourist town, with fresh water being trucked in from aquifers further north. The landscape of the Upper Gulf can be a place of extremes and contrasts: from the quiet, arid desert beside a teaming aquamarine sea; the ostentatious American tourists, or *gringos*, alongside the modest existence of Mexican locals and fishermen; to the many half-finished block and mortar buildings, their skeletal rebar ribs rusting in the gritty salt air, adjoined by the ever-expanding construction of piers, condo resorts, and golf courses growing like cancer all along the coast.

Of the six esteros of Bahía Adair, La Cholla is the only one that is easily reached and has open public access. Much of Bahía Adair's tidal sea and estero channels remain sequestered either because of lack of roads or private, gated ingress. For most, it remains a vastly unexplored, mysterious landscape only navigable by boat. Local fishermen launch their pangas from Bahía La Cholla during high tide, at low tide tourists explore tide pools and birdwatch, and clammers walk out on the flats to rake for clams (eurhythmia). In winter months, the lowest tides take place after dark and require proper gear and flashlights to continue fishing (isorhythmia). These daily tidal rhythms create an ever-shifting liminal space of constant emptying and filling, revealing and concealing—a vast landscape of encounter in a more-than-human world, and a space that demands one's careful attention and consideration because of the quick moving tides.

Without warning the tide turned, sneaking up mud-ripple corduroy, runnels and creeks. Imperceptibly erasing whole islands of *cerithium* snails—a rising sequence from beige, green, to blue.

While trying to outpace the ascending water, a thick fever of stingrays encircled us. Afraid to take step or swim out, we froze, looking for help. Just onshore a sputtering boat launcher slowly backed into the water to retrieve an incoming panga, belching clouds of diesel into the pregnant air. Its scaffolded frame swayed with bunting fashioned from faded floats and scrim—but the driver took no notice of us.

Looking back down, the rays had stirred up an impossible grey slurry, but somehow we mustered through, unscathed.

My father and I set out on his Hobie Cat as the tide began to ebb. We were steadily tacking westward, a breeze behind us—when suddenly the mast came flying down, only missing his head by a few inches! With the mast down, the outgoing tide quickly drew us out to sea, the land receding. Still recovering from shock, I tried to help him wrestle the drifting, half-submerged sail.

Dolphins appeared out of nowhere, encircling us and nursing the boat. They surfaced occasionally with reassuring squeaks, which I found delightful—but vexed my father, who maintained a stern hold on the downed mast. They stayed with us for what seemed like twenty minutes or more, until the rescue boat came to pull us back to shore.

Then, as surely as it came, the water stops rising, pauses, and goes. The gravity which pulled it up and out over the land is fading as the moon moves on. A blackened, sea-washed tree trunk has been dumped by the tide. It stands out in the distance on the flat ground like some prehistoric creature washed up from the deep. We go to see, through a labyrinth of shallow tide pools which mark the lower wharf, and huge swirls of sodden debris left here and there.

The whole landscape softly crackles as the last of the water reluctantly seeps back to its home. A few battered post and wire fences trail across the Lamby, hooking over the seawall at one end, and decaying twisted and broken into the shore mud at the other. These, like tidal fishing nets after the tides, flicker with soon to desiccated debris caught from the tide's scum. The sheep wander back out onto the salty grass. We go home.

And other people, from the nearby houses used the Lamby. Some walked the sea walls with their dogs, with sticks and coats, others with binoculars to look at birds and ships. We would inspect the sites of fires made from driftwood, and the tracks made by cycles and scramblers up and over the seawall and the tracks of horses. Unknown others used this place, a wide, wild place, right in the guts of the city. In the winter, empty of stock, the hardy users shared it with the gulls, the tides, the wind, the rain and the trains.

7 | SHARING MEMORIES AND LOVE OF PLACE

Humans are embodied and thus emplaced beings. Our becoming through our lives is always somewhere. There has been much discussion in environmental literatures and human geography on the role of place and the loss of connection to place in the current ecological crisis that is modernity. The eminent philosopher of place Edward Casey (1998) suggests that modern enlightenment thought has disregarded place. Wendell Berry (1991) made the memorable statement that.

> "Our present 'leaders'–the people of wealth and power–do not know what it means to take a place seriously: to think it worthy, for its own sake, of love and study and careful work. They cannot take any place seriously because they must be ready at any moment, by the terms of power and wealth in the modern world, to destroy any place." (1991–cited by Heat-Moon 1991).

Place is inevitably entangled with memory. We are always in place; we are always in memory. How these two forces constantly fold and refold in everyday becoming is vital in how we live, live with each other, and live with the earth through memories of places. Rivers (and river mouths and coasts) being what they are, as such active and forceful shapers of life and land, are key makers of places and memories or are places where memorable memories form.

This is the "ecology of memory" that Owain has previously written about (Jones, 2005) and Heather explores in her work. Living with this *wake* in time of affective becoming as Slaby (2020) puts it is a key element of personal and wider politics. Places are always in tension between stability, known form, and change. Where places are destroyed, and/or people move on or are displaced, ruptures in their ecology of memory occur (Jones, 2015). In the current era of environmental trauma, the displacement of people is increasingly common, yet further ruptures become a staple of modernity. It is something to care for a place, and to care for places, and lost places through memory. It is something again to share these processes, to begin to care for each other's places, each other's ecologies of memories, and each other's remembered places. Perhaps, that is a key part of caring for the earth as an ecology of places again.

A river is, in a way, an articulation of memory. Water runs, it affects where it runs, thus it remembers where it runs, and follows and follows and follows, and a channel forms. The mature river course is a memory of

the first stream that begat it. Of course, like historic maps of the shifting meanders of the Mississippi show, the channels do not stay in the same place, they creep and flex over time (Simmon, 2011), as memory itself does.

Jenny Uglow (2006) makes the same point about a river, and memory and history in her biography of the famous engraver of nature and English rural scenes, Thomas Bewick. Uglow starts her account of his life with an entanglement of history of the River Tyne and Bewick's childhood on its banks, seeing this as the source of his life and his art.

> "The Tyne has changed often since Thomas Bewick was born here two hundred and fifty years ago. Swollen by floods, checked by salmon weirs, hemmed in by railway embankments, it has swung from side to side of its deep valley, cutting under wooded banks, baring strands of pebbles, tangles of roots and ridges of sand, creating smooth tables lush with grass where once the current ran swift. Across the years the river has flowed on [.] We can trace its old path like an individual life, from documents, maps and prints, signs and crosses, relics on the shore [] – evidence and guesswork." (3).

To return to Slaby's idea of the wake,

> "I outline the contours of a temporal account of affectivity that foregrounds the past. Subsequently I relate this outlook to Christina Sharpe's (2015) powerful conceptual metaphor 'the Wake', suggesting that this is not historicity as such but a particular ongoing history of violent appropriation, oppression and displacement that keeps setting the tone for affective being-in-the-world in this day and age." (Slaby, 2020, 173).

The Wake, he sums up, is "the weighty path that historical events draw through time."

It is important for us to point out that other artists have also worked in relation to the rivers and landscapes in question, both in collaborations with the authors and separately. This again speaking of efforts of polyvocality about these places. Owain has collaborated with the artist Louisa Fairclough on the article *Sounding Grief*, and the artist Davina Kirkpatrick about dealing with loss and the estuary as a setting for that in ways which the wake of time and memory and loss is enfolded, in different creative acts, into the flows of the river itself. (Jones and Fairclough, 2016).

Recently, the Newnham-on-Severn based artist Carolyn Black has made a short art film of the Severn Bore in the 2020 COVID pandemic UK lockdown. Normally, any big bore (at the highest tides) would be accompanied by surfers, people in kayaks and dinghies. But in the lockdown, the bore progressed with no water riders, and Carolyn filmed the river from the shore as an expression of loving the living waters (Black, 2020) (https://vimeo.com/438829349).

Following a shape on the horizon, we unearthed an abandoned crab trap lodged in the mud, its skeletal remains flaking with rust. Seizing the opportunity, we freed the caged blue crabs from within—an operation that involved bending the bars and carefully prodding them out with a shell—while trying to avoid getting pinched. There was one crab that stubbornly and defiantly refused to come out, not realizing that we weren't part of the mob that impounded him…

My dad had a few stories he told about the bay: how once when he went walking at night he glanced back, and his footprints were glowing a sulfuric yellow-green! Perhaps it was bioluminescence from some kind of algae? Another story involved encountering a hammerhead shark while swimming at high tide. This was uncommon. I wonder if he saw its silhouette swimming above him, or from a distance, and how fast his heart must have pounded!

In order to reach the estero we needed to set out early—navigating a vast expanse of never-ending tidal flats. This walking was most meditative, conducive to memorizing song lyrics and stories, or inventing whole plots and imaginary places. *Giant steps are what we take, walking on the moon*… The walking only interrupted by subtle shifts of mudflat textures felt with our bare feet, fast-moving tidal creeks that needed to be crossed, or occasional treasures found in a ray pit.

We jumped down onto the slithers of land splitting off the bank of the river and slowly, over weeks, sinking into the river, trying to feel their creeping, tilting dissent. But my dad was angry, again, at the river authority and complaining at this erosion of land and property.

In the low tide mud of the Rhymney, disreputable old boats stuck at odd angles, painted in garish reds and blues, and dirty whites, the umpteenth layer. Blackened, rickety jetties stuck out from the far bank, constructed and used by some mysterious class of poor urban boatmen. Once there was a fuss when some of our cows started to lick the heavy, toxic paint off an old boat moored or marooned on our side of the river. We climbed down off the grass and onto the mud to see—our wellies slipping and sucking in the slick mud—it was holed in its far side. Undercut by the river on our side, big slithers of land would sheer away and then imperceptibly slide, week by week, down into the water, to make more mud in the endless mud of the estuary.

We walked along the shore, around the "pill", a bigger inlet where a stream flowed out of the levels, and down to the very farthest corner to the near bank of the river where it finally makes the shoreline. It felt as remote as I imagined the steppes to be. Turning around, the bridge, the car on the sea wall, our father and brothers amongst the stock, were tiny, far away, almost hidden by the flatness.

Many other artists and writers have been drawn to the river, the Severn Bore, and the ceaseless ebb and flow of the tides. Poets too, both past a present. The Gloucestershire First World War poet Ivor Gurney, who spent the final years of his life in a mental asylum after the traumas of the war, wrote a series of poems called *Severn and Somme*, some poems remembering his times on the tidal river. More recently, Alice Oswald wrote an extended poem, *Sleepwalk on the Severn* (see Bristow, 2015) and Philip Gross's collection of poems, *The Water Table*, won the prestigious T.S. Elliot poetry prize in 2009. This was based upon a series of visits to, and road trips over the Estuary where, perhaps, the river does end and sea begins, The Second Severn Crossing.

Most of Bahía Adair is remote and difficult to access, but a few artists have focused on it, including Tucson based poet Katherine Larson (2011) who describes the complex ecological and cultural landscape of the Upper Gulf in a suite of lyric poems, *Ghost Nets*, published in her book *Radial Symmetry* (2011) that were originally part of a larger collaboration with Green in *The Ghost Net Project* (Green, 2009).

> Every day, it happens like this.
> We emerge from the pale nets of sleep like ghost shrimp.
> in the estuaries–
> The brain humming its electric language.
> Touching something in a state of becoming.
> –Ghost Nets, VII

The bi-national organization N-Gen: Next Generation Sonoran Desert Researchers recently solicited six collaborations in a project called *6&6: Six Artists/Six Scientists*. Four of the six collaborations focused on the Gulf of California and two exclusively in Bahía Adair (Green/Edwards' (2019) project *Isle of Sauromalus* examines a sequestered population of chuckwallas in Bahía La Cholla, and Johnson/Wilder's (2019) project *Hidden Water: Pozos of the Gran Desierto* explores the ancient fresh water of the pozos, 2019). So as in the Severn Estuary, here artists and writers seek to speak for the rivers, the watery landscapes, and ecologies that are often ignored, hidden, dismissed, degraded, disrupted, and damned.

8 | TIDAL TIMESPACE

Our collaborative project, *Tidal Timespace: Imprints & Palimpsests* examines, contrasts, and celebrates the ecology and culture of these two diverse estuarine landscapes. It is a project steeped in the specificity of place and embedded in the practice of deep mapping, intertwining ecological and historical narratives, personal and communal memory, scientific data, and a wide range of media into a rich, multivocal installation. McLucas (2010) describes how deep mapping "brings together the amateur and the professional, the artist and the scientist, the official and the unofficial, the national and the local." The use of deep mapping as an aesthetic and methodological instrument democratizes knowledge by weaving temporal, spatial, and disciplinary threads into one practice (Springett, 2015).

Although much of our collaborative work is accomplished at home or through long distance correspondence, the spirit of our project is performed in the field—images and ideas string together in walking, listening, tracing, conversing, reflecting, and collecting. As Les Roberts (2016) states, "The 'map' is lodged in the more immaterial spaces of the body and imagination. Its performativity is made flesh in the way the walker inhabits and dwells within the space that both map and walker conjure into being." Timing our fieldwork on the flats during low tide, we submit to chance encounters and discoveries, to weather, and to spaces of silence and exchange.

The finished installation will consist of a series of plaster casts of mudflat textures from each site, an ambient soundscape created from artistic interpretations of tidal data, and an artist book that includes a lexicon listing historical details, scientific phenomena, colloquial names, species, and site-specific culture and vocabulary in both English and Welsh for the Severn Estuary, and English and Spanish for Bahía Adair. This naming preserves personal, ecological, and cultural heritage, even in the face of possible new developments and altered landscapes. As Lucy Lippard (1997) states, "untold land is unknown land," "naming is the way we image (and imagine) communal history and identity."

Interspersed among the lexicon entries are our childhood memory fragments you see here in the margins of this article in which we endeavor to remember our lost tidal landscapes. In the early 1990s, 80% of Estero La Cholla was destroyed to build a golf course and housing development, and in the 1980s, the salt marsh flats called The Lamby, where the mouth of the river Rhymney joins the Severn estuary, was taken by Cardiff City council for the site of a large landfill facility to process and dispose of the city's waste. As such, these written fragments exist as a kind of watery recasting of places

A feisty group of giant hermit
crabs startled us while exploring
a tide pool near Pelican Point.
Their telescoping eyes and antennae
protruded from ill-fitting murex shells,
clumsy claws dangling like hands
of a marionette. Our probing flashlights
must have seemed an interrogation,
or maybe we woke them from sleep,
as they snapped and protested loudly—
they were so big, larger than our hands!

It was not uncommon to find a
mysterious mass of welded-together
creatures deposited on the flats—
we studied them with scientific and
artistic inquiry. It was hard to discern
where one thing ended and another
began… clamshell-sponge-tunicate-
barnacle-bryozoan-limpet-wormsnail…
the visceral and encrusted textures
entwined in an impossible matrix.

One quiet night during one of the
lowest tides we ventured seaward.
We walked and walked in knee-deep
water with a rhythmic splashing—
plodding along with flashlights in hand.
We hoped to find evidence of the tideline
by reaching higher water, or something
emerging from the fathoms that would
let us know we had reached a boundary,
but we never did. The water level never
changed no matter how long or far we
dared to walk. It seemed to go on forever—
as though we could walk all the way to Baja!
Looking out in the distant fog we could
just make out the silhouettes of sleeping
herons, and high overhead the Milky Way
spread over us like a sequined seine. After
awhile an uneasy feeling of getting too far
out and not knowing when the tide would
turn overcame our original excitement, so
with a quickened step we headed back.

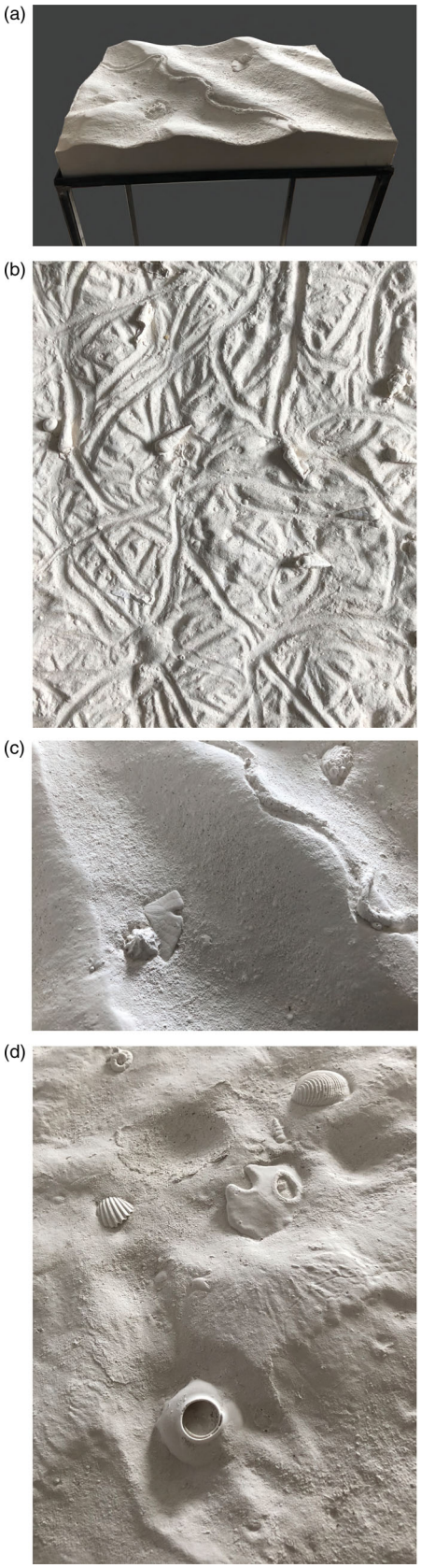

FIGURE 1 (a–d) The casts made by heather of the sand ripples in Bahía Adair [Color figure can be viewed at wileyonlinelibrary.com]

and people that are no longer with us. Much like the plaster mudflat casts that create a facsimile of the fleeting patterns, scripts, and traces, these memories exist as registers, preserving moments that have imprinted on who we are.

The countless textures left at low tide uphold the patterns of tidal rhythms and flows of water, casting wavelets that have been reworked as a palimpsest and lay ground for what will soon be erased and rewritten again. As Jones states (Jones, 2011:2287).

> "Rhythm is to time what pattern is to space, and these need to be considered together. Tidal processes offer fertile ground on which to explore such ideas as they are so obviously temporal and spatial at once."

As we find ourselves immersed in the complexity of these visual rhythms etched in the benthos, we are also drawn to the intricacy of sound, as the places in question are extraordinary soundscapes. And of course, one can be immersed in air, and in sounds, and sounds of water, as well as in water itself. As Foley states "The idea of immersion draws on phenomenological concerns, updated within NRT [non-representational theory] with person-place interactions and the specific relations between bodies, practices and multi-sensual environments, where surround-sounds, touch, and proprioception have explicitly embodied dimensions" (Foley, 2015:2018–19).

There is a musicality to this immersive becoming; the world as waterscape, as soundscape, or perhaps a series or ecology of soundscapes. Serres begins *Biogea*, his raging lament for the destruction of the earth and its waters, with two quotes. The second (quoting George Bernanos) containing these words; "…for forests, hills, fire and water alone have voices, speak a language. We've lost the secret of it… The voice that we no longer understand is still friendly, fraternal. A maker of serene peace." Serres (2012: preface).

Through reflecting upon the Severn Estuary and Bahía Adair side-by-side, we hope the finished installation can instill a sense of attention, appreciation, as well as a feeling of communal care through articulating the specificity of their shared characteristics and striking distinctions. Just as the tide creates an interchange between water and land, and salt and fresh water—there is also a cultural mixing and exchange that occurs—resulting in fertile ground for greater awareness, conservation, and stewardship of these important tidal, riverine and riparian environments. (Figure 1)

9 | CONCLUSIONS

In this account of our relatively new and ongoing collaboration which sprang out of a realization that we shared similar interests, loves, and concerns for two river/tidal landscapes, we have tried to creatively capture our sharing across continents, sharing memories of lost and remaining places, and trying to voice the rivers, tidal channels, and tidal flats in question through walking, writing, comparing, making, and remembering.

We have sought to deploy what could be termed, overall, a non-representational approach in so far as a creative account is needed to bring these physical places to life through various means and practices. These include aspects of autotopographical writing, elements of deep mapping, and elements of polyvocality. In contrast to modern approaches of knowledge, which can be summarized as divide, rule, and often, it is sad to say, despoil, we hope our approach offers at least a *potentially* ecological form of knowledge creation, which seeks to creatively embrace the interconnectivity of all processes, and evolutionary understandings of how the earth and cosmos advance through space–time in a burgeoning, creative becoming of which they, and we, are a collective part. It is for these reasons there is a close affinity between these critical-creative approaches in geography and other subjects and the creative practices of the arts.

As the impacts of modern consumption and globalized capitalism are toxic in nature both on a local and worldwide level—perhaps love is the one strand of "true" ecology that modern humans still have capacity for. Love for place, for community, and for each other, and maybe most importantly in ecological terms, love of others' love. If love is about deep levels of interconnection, interbecoming, can these stories of shared care of place become part of a wider process of ecological healing?

ACKNOWLEDGMENTS

Thanks to Peter Reason for the introduction to this project. Thanks to the editors and those who made comments on early drafts of this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in the supplementary material of this article. Citations are in-text and references formally listed in the References section below.

ORCID

Owain Jones https://orcid.org/0000-0003-4548-8735
Heather Green https://orcid.org/0000-0003-2647-0214

REFERENCES

Ball, P. (2017). Water is an active matrix of life for cell and molecular biology. *The Proceedings of the National Academy of Sciences (PNAS)*, *114*(51), 13327–13335.

Barker, N. (2008). Managing tidal change, final project report of Winston Churchill Memorial Trust. *Travelling Fellowship Award 2006*.

Berry, W. (1991). Out of your car, off your horse. *The Atlantic*, *February*, 1991. https://www.theatlantic.com/magazine/archive/1991/02/out-your-car-your-horse/309159/ (accessed November 16, 2021).

Black, C. (2020). When you call I shall come. (Film, Online) Vimeo https://vimeo.com/438829349.

Bright, R., & Irland, B. (2018). Reading the river (interview). *Interalia Magazine; Interconnecting Water*, *44*(September). https://www.interaliamag.org/interviews/basia-irland/ (accessed October 2, 2018).

Bristow, T. (2015). Bioregional biography and the geography of affect: Spatialised Somnambulance in Alice Oswald's sleepwalk on the Severn. *Australasian journal of ecocriticism and cultural Ecology*, *4*, 1–21.

Brusca, R., Alvarez-Borrego, S., Hastings, P., & Findley, L. (2017). Colorado River flow and biological productivity in the northern gulf of California, Mexico. *Earth-Science Reviews*, *164*, 1–30.

Casey, E. (1998). *The fate of place. A philosophical history*. Berkley: University of California Press.

Childs, C. (2000). *The secret knowledge of water*. New York: Back Bay Books.

Deakin, R. (2007). *Wildwood*. London: Hamish Hamilton.

Flessa, K., & Fürsich, F. (1991). Ecology, Taphonomy, and paleoecology of recent and Pleistocene molluscan faunas of Bahia La Choya, northern gulf of California. *Zitteliana*, *18*, 5–180.

Foley, R. (2015). Swimming in Ireland: Immersions in therapeutic blue space. *Health and Place*, *35*, 218–225.

Green, H. (2009). *Ghost Net Project*. https://www.heathergreen-art.com/ghost-net-project.

Green, H. (2020). *Tidal Timespace*. https://www.heathergreen-art.com/tidal-timespace.

Green, H., Edwards, T. (2019). *Isle of Sauromalus*. https://www.heathergreen-art.com/6-6-six-artists-six-scientists.

Guattari, F. (2000). *The three ecologies*. London: Athlone Press.

Haraway, D. (2016). *Staying with the Trouble, Making Kin in the Chthulucene*. Durham, UK: Duke University Press.

Hardisty, J. (2008). *Estuaries: Monitoring and modelling the physical system*. Oxford: Blackwell.

Haslett, S. (2008). *Coastal systems* (Second ed.). London: Routledge.

Heat-Moon, W. L. (1991). *PrairyErth*. London, UK: André Deutsch Ltd.

Illich, I. (1986). *H_2O and the waters of forgetfulness*. London, UK: Marion Boyars.

Johnson, B. and Wilder, B. (2019). *Hidden Water: Pozos of the Gran Desierto*. https://www.benjohnsonart.com/artwork/hidden-water-pozos-of-the-gran-desierto/

Jones, O. (2005). An emotional ecology of memory, self and landscape. In J. Davidson, L. Bondi, & M. Smith (Eds.), *Emotional geographies* (pp. 205–218). Oxford: Ashgate.

Jones, O., & Fairclough, L. (2016). Sounding Grief: The Severn Estuary as an Emotional Soundscape in 'emotional geographies of sound. *Emotion, Space and Society*, *20*, 98–110.

Jones, O. (2011). Lunar-solar ryhthmpatterns: Towards the material cultures of tides. *Environment and Planning A*, *43*, 2285–2303.

Jones, O. (2015). Not promising a landfall. An autotopographical account of loss of place, memory and landscape. *Journal of Environmental Humanities*, *6*, 1–27.

Larson, K. (2011). *Radial symmetry*. New Haven & London: Yale University Press.

Lavin, M. F., Godínez, V. M., & Alvarez, L. G. (1998). Inverse-estuarine features of the upper gulf of California. *Estuarine, Coastal and Shelf Science*, *47*, 769, ec980387–795.

Lefebvre, H. (2004). *Rhythmanalysis: Space, time and everyday life*. London: Continuum Books.

Lippard, L. (1997). *The lure of the local: Senses of place in a multicentered society* (p. 46). New York: The New Press.

McLucas, C. (2010), There are ten things that I can say about these deep maps, http://metamedia.stanford.edu/~mshanks/projects/deep-mapping.html. Accessed (by Biggs, I.) March 28, 2010.

Nabhan, G. P., Hodgson, W., & Fellows, F. (1989). A meager living on lava and sand? Hia Ced O'odham food resources and habitat diversity in

Oral and documentary histories. *Journal of the Southwest*, Winter 1989, *31*(4), 508–533.

Neimanis, A. (2017). *Bodies of water; Posthuman feminist phenomenology*. London: Bloomsbury.

Palmer (née Reiser), M., & Jones, O. (2014). On breathing and geography: Explorations of data sonifications of timespace processes with illustrating examples from a tidally dynamic landscape (Severn estuary, UK). *Environment and Planning A*, *46*(1), 222–240.

Pearson, M. (2006). *In comes I: Performance, memory and landscape*. Exeter: University of Exeter Press.

Revill, G. (2021). Voicing the environment: Latour, Peirce and an expanded politics. *Environment and Planning D: Society and Space*, *39*(1), 121–138.

Roberts, L. (2016). Deep Mapping and Spatial Anthropology. *Humanities*, *5*(5), 1–7.

Rose, D. B., van Dooren, T. & Chrulew, M. (eds.). (2017). *Extinction Studies: Stories of Time, Death, and Generations*. New York, NY: Columbia University Press.

Serres, M. (2012). *Biogea*. Minneapolis: Univocal.

Sharpe, C. (2015). *In the Wake. On Blackness and Being*. Durham, NC: Duke University Press.

Simmon, R. (2011). Map of the ancient Mississippi. *Earth Observatory*: (online). https://earthobservatory.nasa.gov/blogs/elegantfigures/May11,2011/map-of-the-ancient-mississippi/.

Slaby, J. (2020). The weight of history: From Heidegger to afro-pessimism. In L. Guidi & T. Rentsch (Eds.), *Phenomenology as performative exercise* (pp. 173–195). New York & Leiden: Brill.

Smith, N. (2002). *Amazon Sweet Sea: Land, life, and water at the River's mouth*. Austin: University of Texas Press.

Springett, S. (2015). Going deeper or flatter: Connecting deep mapping, flat ontologies and the democratizing of knowledge. *Humanities*, *4*, 623–636. https://doi.org/10.3390/h4040623

Tsing, A. L., Swanson, H. A., Gan, E. & Bubandt, N. (2017). *Arts of Living on a Damaged Planet. Ghosts and Monsters of the Anthropocene*. Minneapolis, MN: University of Minnesota Press.

Uchiyama, Y. (2007). Hydrodynamics and Associated Morphological Variations on an Estuarine Intertidal Sand Flat. *Journal of Coastal Research*, *23*(4), 1015–1027.

Uglow, J. (2006). *Nature's engraver. A life of Thomas Bewick*. London: London.

van Dooren, T., Kirksey, E., & Münster, U. (2016). Multispecies Studies: Cultivating Arts of Attentiveness. *Environmental Humanities*, *8*(1), 1–23.

Welland, M. (2009). *Sand. A journey through science and imagination*. Oxford: Oxford University Press.

How to cite this article: The River Severn Estuary UKBahía Adair, Sonora, Mexico, Jones, O., & Green, H. (2022). Rivers—mouths—tides—memories: A creative, inter-deep-mapping of two river/tidal places. Love of place, memory and affect; movements, patterns, marks, and practices of care. *River Research and Applications*, 1–17. https://doi.org/10.1002/rra.3887