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'Ichthyologue': Freshwater Biology in the Poetry of Ted Hughes

Contemporary ecocriticism has examined the cultural values inherent in science, interrogated its limitations and posited how other forms of discourse can interact with it, but perhaps not enough attention has yet been paid to the often key role that science and scientific discourse play in inspiring ecopoetry. Dana Phillips has warned against a radical opposition of disciplines that might bring about the 'Mutually Assured Deconstruction' of different discourses (Phillips 88). Timothy Clark comments that the 'cultureless' ideal of pure, objective fact to which scientific writing aspires might lead to 'a total and uncrossable dualism between the natural world and the human observer' (Clark 149). However, there is no shortage of dialogue between poetry and science within creative publications. Poets such as John Kinsella and Gary Snyder are not only writers, but also committed environmental activists. Some ecopoets, such as David Morley, are trained scientists. One of the most important environmental writers of the twentieth century, Rachel Carson, majored in biology and studied English literature as a minor subject. These writers are acutely aware of environmental destruction, through their scientific research. This article explores just one poet of the twentieth century whose work was extensively informed by his reading of scientific publications: Ted Hughes.

Hughes, Poet Laureate from 1984-1998, is a key figure in British writing about landscape and environment. He is often remembered for his marriage to the American poet Sylvia Plath, and his poignant elegies for her in *Birthday Letters* (1998) won him multiple literary awards. However, another facet of Ted Hughes's poetic output, his environmental activism and his engagement with environmental science, is often overlooked. Fishing expeditions, sometimes with Hughes's son, the freshwater biologist Nicholas Hughes, played a significant role in

shaping Hughes's work. This article examines Ted Hughes's use of scientific language in his poems, explores the scientific publications that he read, and details the common ground between his work and that of his son.

Occasionally, Hughes uses scientific data in his poetry. The question of whether or not scientific data should be included in ecopoetry remains problematic. In the opinion of the present critic, if scientific data can be deployed in a way that adds to the aesthetic value of the poem without sounding propagandist, it can enhance the quality of the writing in a startling and unsettling way. Hughes found that some of his more strident protest poetry was unsuccessful: "I've tried to write sort of semi-protest pieces of verse about this sort of thing, but I don't think it works" (Gifford, *Green Voices*, 149). One such protest piece identified by Hughes (Gifford, *Green Voices*, 155) that uses scientific data is 'Lobby from Under the Carpet', published in *The Times* in April 1992. This poem has Hughes's muse proclaim that sperm counts in Britain 'are down forty/ Per cent in real terms' (Hughes, *Collected Poems*, 837, ll. 11-12); the poem later repeats this alarming statistic in figures (l. 22). Another of these protest-poems that Hughes identified (Gifford, *Green Voices*, 155) is '1984 on 'The Tarka Trail''. There, Hughes relates the measures of Nitram fertiliser that farmers use on fields: 'Three hundredweight of 20-10-10 to the acre,/ A hundredweight and a half straight Nitram' (*Collected Poems*, p. 843). Knowingly, he writes that 'you are as loaded with the data [...] As this river is' (*Collected Poems*, p. 843). Hughes's use of scientific data is not always as heavy-handed and propagandist as this. One of the most elegant examples, a detail about the temperature of the Gulkana river in the poem 'The Gulkana', will be discussed later. The ecocritic Terry Gifford calls for a more extensive use of environmental science, and scientific data, in ecopoetry: 'Don't we now need to know the data in our poetry?' (Gifford, *Green Voices*, 12). We do need to know it, and if it can be deployed as well as the details of

water temperature and river location in 'The Gulkana', the poetry gains in depth and precision. The data used by Ted Hughes in the above poems about British rivers comes from his own reading. 'The Gulkana', however, has more in common with Nicholas Hughes's work.

Nicholas Hughes¹ was a freshwater biologist. He read Zoology at Oxford University, and took a PhD in biology at the University of Alaska, Fairbanks, where he eventually progressed to become Assistant Professor at the School of Fisheries and Ocean Sciences. It is possible that his father's interest in fish, fishing and aquatic environments encouraged him to pursue this career. Ted had been reading scientific publications, especially those relating to water quality, long before Nicholas was born. He recalled in a letter to the ecocritic Terry Gifford that his 'greening' had been brought about by his reading of 'an article about marine pollution in the journal *The Nation* in 1959 when he was in America', and afterwards, his reading of Rachel Carson's *Silent Spring* (1962), a warning about the environmental and human cost of pesticide use (Gifford, 'Hughes's Social Ecology' 86). Carol Hughes recalls that he read *New Scientist*, *National Geographic* and *Trout and Salmon*, all of which informed his knowledge of conservation and freshwater environments;² indeed, he wrote to *Trout and Salmon* in July 1998 detailing the history of campaigns for better water quality in the Devon rivers from the 1980s onwards (Gifford, 'Hughes's Social Ecology' 88). The Manuscripts, Archives and Rare Books Library at Emory University, Atlanta, contains many manuscript and typescript drafts of Ted's work, in addition to books, articles and personal effects that he owned. Scientific articles such as 'The effects of surfactants in the Rivers Exe and Creedy' (Gifford, 'Hughes's Social Ecology' 88) show that he informed himself

¹ Ted and Nicholas Hughes are henceforth referred to by their first names for the sake of brevity.

² Letter from Carol Hughes to Yvonne Reddick, 23rd January 2013.

extensively about the problems caused by pollution in the Devon rivers near where he lived for much of his adult life. These articles provided the empirical evidence behind his campaigns in the 1980s and 1990s against the pollution of the Devon rivers where he fished. Ted's reading of *Silent Spring* has been documented by scholars such as Terry Gifford and Gillian Groszewski, while Gifford has researched his campaigns for water quality in detail. Ted's interest in environmental science was the result of his extensive reading and his passionate engagement in conservation. The fishing expeditions, and later the interest in freshwater biology, that Ted shared with his son were one of the many sources from which Ted gained his knowledge of aquatic ecosystems. This article focuses on the ways in which Ted and Nicholas's interests, and sometimes their published work, overlap and demonstrate their engagement in environmental issues.

Ted seems to have been a powerful influence on his son. When Ted wrote to Nicholas in 1986, 'As Buddha says: live like a mighty river' (Hughes, *Letters of Ted Hughes* 515), he showed how important rivers and river-landscapes were to the imaginations of the two men. Both read the same books about river-creatures, both real and imagined. Their concern for environmental destruction is illustrated by their reading of a 1991 volume called *Influences of forest and rangeland management on salmonid fishes and their habitats*, edited by William R. Meehan. Father and son are mentioned in the catalogue at Emory University's Manuscripts, Archives and Rare Books library, where many of Hughes's manuscripts and books are kept, as former owners of the book. Both Ted and Nicholas were also interested in the more mythical, esoteric and downright crazy dimensions of pseudo-freshwater biology, for the two of them owned a 1968 edition of *The great Orm of Loch Ness: a practical inquiry into the nature and habits of water-monsters* by F.W. Holiday. Several poems in Hughes's 1983 poetry collection *River* were inspired by a trip that Nicholas and Ted Hughes made to

Alaska to fish for salmon, and Ted's letters show that several of their fishing expeditions inspired poems. Hughes wrote of his son in 1988, 'Nicholas is my mentor . . . I go to stay with him, & we wander about in that fantastic land [Alaska], catching the fish' (Hughes, *Letters*, 545). Nicholas did not become a poet, as his father had perhaps hoped; however, the two men shared a keen interest in fish, fishing and aquatic creatures; this was just one facet of the very close bond between them.

Ted Hughes's poetry, especially the drafts of *River*, contains references to scientific language. Some are more explicit than others, and many of them relate specifically to Ted's reading of scientific publications, and to the career that Nicholas was later to pursue. A manuscript draft of 'The Gulkana' reads:

~~Archaeologue for the glyph in a fish's eye~~

~~Ichthyologue,~~

~~Antique, Romantic, Observed by the lost and was of a sudden~~ (Hughes, MARBL, c. 644, b. 74, fol. 20, 'With deliberate steps. But it came with me,' MS).

The word 'ichthyologue' is not present in the 1989 edition of the *Oxford English Dictionary*. 'Ichthyologist' is the closest word to it, and it is defined as 'One versed in ichthyology; a student of the natural history of fishes'. An 'Ichthyologue', Hughes's neologism, is someone who utters a *logos* connected to fish, a poet inspired by fishing. Yet it also has something to do with ichthyology, the study of fish. An 'ichthyologue' might also be a dialogue between freshwater biology and poetry. There are multiple instances in Ted's poetry, and in the drafts of his poetry, where scientific language makes its influence felt. At this stage, this probably

reflects the knowledge that Ted derived from his extensive reading of scientific publications, rather than any information he might have obtained from Nicholas.

Nicholas and Ted Hughes enjoyed many shared fishing trips, sometimes with Nicholas's sister Frieda as well. Ted wrote to his brother Gerald in 1966 about fishing expeditions in Ireland where they had moved.

This morning I went fishing to a lake about 2 miles away – I took Frieda & Nick. Blue, dead still morning. The lake was like glass. Within an hour I had 3 fish – lovely trout. The first about 1 ½ lb, the second – 3 ½, the 3rd, again about 1 ½ lb. The second is the biggest trout I've ever seen alive. I've let the children hold the rod awhile each time, to arouse any dormant passion for the art they may have. Frieda thinks it's cruel – [*marginal insertion*: (but she's quite keen)] Nicky is very keen (*Letters* 257).

Ted's letter suggests that Nicholas showed an enjoyment of fishing from about the age of four. Ted wrote to Gerald and Joan Hughes in 1977 that Nicholas caught the 'Biggest pike alive I've ever seen' (*Letters* 388) during a fishing expedition to Ireland. Ted's 1980 letter to the fisherman Barrie Cooke shows that Nicholas was present on Ted's first expedition to Alaska, which he described as 'as I imagined . . . the most fantastic land I've ever been in' (*Letters* 434). The two of them fished for king salmon, and Hughes's description of how they caught the fish is striking:

King salmon are not easy to get at. Usually it's guide business – quite expensive – boat onto river to special holes etc.

But there is just one point, where the Moose – a broad quiet river – meets the colossal glacier-green torrent of the Kenai – where you can get at them, on the Kenai, from the bank.

We'll describe that fishing to you. You should have been there. Nicky kept saying "If only Barrie were here!" (*Letters* 437).

Hughes's evocative description of the 'colossal glacier-green torrent of the Kenai' adumbrates his poem 'The Gulkana'. Yet it also brings to mind Nicholas's much later work on the fish inhabiting Alaskan rivers. The picture one derives from reading the letters is one of a partnership between father and son that spanned decades, from Nicholas's earliest childhood to the later trips to Alaska.

Nicholas's most notable early research trip, to Lake Victoria, took place after his father had published *River*, the poetry collection that is most concerned with all things fluvial and aquatic. The first of his ichthyological research trips, however, took place in 1981, when he was an undergraduate at Oxford University. In the 'Relevant Experience' section on p.2 of his 'Oxford University Nile Perch Project', Nicholas mentioned a trip to Alaska: 'In 1981: Four months' work as Field Research Assistant at the Alaska Cooperative Fisheries' Research Unit' (N. Hughes, *NILE PERCH PROJECT* 2). He made a research trip to Kenya the following year: 'In 1982: Two months as research associate with the Tilapia Research Institute in Nairobi, Kenya. During this time I had the opportunity for a reconnaissance expedition to the prospective field site of the 1983 Nile Perch Expedition.' (*NILE PERCH PROJECT* 2). I wish to suggest that the two men's work reflected a common interest when Ted's 1983 poetry collection *River* was being compiled for publication, and that the two men published work on similar environmental issues. There is necessarily a time lag between the inception of a research project and its publication, and so Nicholas's published scientific

research of the late 1980s and 1990s can be said to have had its inception while his father was investigating the pollution of West Country rivers.

While Hughes supported his son's decision to pursue a career as a freshwater biologist, he seems to have been concerned that a scientific career would not allow Nicholas to express himself artistically. A poignant letter that Hughes wrote to Keith Sagar in 1983, when explaining his poem 'Milesian Encounter on the Sligachan' from *River*, mentions the reason why Nicholas stopped writing poetry:

[Nicholas] was talking the other day of "the very moment" that his English teacher stopped him writing poetry. He'd written a (I thought) marvellous poem about a dead salmon he found under the river bridge. He pulled it out, and noticed, as he waded there, salmon eggs coming up out of the gravel. He scooped up the gravel, & salmon eggs poured out & downstream. The fish was lying actually on top of a redd – right under the town bridge. He was about thirteen. His English teacher said, evidently "Don't try to write about things outside your experience". Nicholas said it was just like a guillotine – he cut off, from that second, from any interest in English lessons. No doubt he needed another way forward. But now he's evidently regretting it. He says he has a constant craving to be doing his potting – he makes very good primaeval animals & fish (didn't I show them to you?) – and his printing. He's an interesting mix. Some sort of artist (*Letters* 478).

Ted had been writing poetry about fish since his boyhood. Keith Sagar cites part of a poem called 'On Catching a 40lb Pike', which Hughes wrote as a schoolboy (Sagar 248). His published poetry about salmon begins with 'The River in March', which was first published in *The Listener* in August 1973 (Notes to Hughes, *Collected Poems* 1260). Nicholas was

eleven years old at that time. Salmon redds were an important focus of Ted's collection *River*; this focus on the salmon reflects his interest in fishing and also shows that he and Nicholas even wrote about a similar topic in their poetry, but at different dates.

One of the most important facets of Nicholas Hughes's career was his study of the Nile perch, *Lates niloticus*. As an undergraduate at Oxford, Nicholas had conducted groundbreaking research about the Nile perch. Ted went to visit Nicholas when he was working on Lake Victoria on the Nile Perch Project. On the 23rd of October 1983, Hughes wrote to Barrie Cooke that

He lived there [on Rusinga Island in Lake Victoria] in the chief's hut (9 mud huts in the whole village) for 10 weeks, & gutted about 1500 fish – inspected their diets etc – and measured about 3 to 4,000. A far bigger & fuller sampling (all-sizes) than in any earlier Nile Perch research published. (*Letters* 465).

A postscript of this letter reads, 'I've sent my book "River" to Sonia – where you can pick it up' (*Selected Letters* 470). When Nicholas Hughes was catching and studying Nile perch, Ted was disseminating his most aquatic collection.

This interest in the Nile perch continued to be a central part of Nicholas Hughes's academic career. Outright engagement with environmental issues begins to characterise his work in the mid-eighties, and this is when his career dovetails most noticeably with that of his father. His contribution to a 1985 co-authored article in the journal *Nature* is an impassioned plea to the fishing industry to try to preserve the badly damaged ecosystem of Lake Victoria. The abstract of the paper sets a dire tone:

The introduction of the Nile perch into Lake Victoria, East Africa, has had disastrous consequences. Fisheries have been not merely damaged but destroyed.

Lake Malawi has the world's most species-rich fish fauna and the prospect of introduction of alien species could mean disaster (Barel et al 19).

Nicholas Hughes and his colleagues explain that *Lates niloticus* has badly damaged Lake Victoria's fisheries by preying on indigenous fish stocks.

The establishment of *Lates* [sic] is not only an economic and ecological tragedy but also an enormous loss to evolutionary biology. Lake Victoria is the site of a remarkable radiation of cichlid fishes which has given rise to several hundred endemic species. As an example of explosive speciation this assemblage is of immense scientific interest and the loss of these fishes, often before their biology has been elucidated, is incalculable.

Irreversibility

We also wish to stress the irreversibility of introductions into large lakes – removal of *Lates* from Lake Victoria is now impossible – and to emphasize that the introduction of this fish is seen as a failure, not merely by a small group of concerned scientists who think they know best and who find the endemic faunas of African lakes of academic interest, but by the people it was meant to benefit (Barel et al 20).

The scientists continue to address those directly concerned with African fisheries, urging them to manage aquatic ecosystems effectively:

With one disaster accomplished in Africa, we urge those interested in improving the fisheries of Lake Malawi, whether in FAO or other bodies offering technical and scientific assistance, to concentrate on rational exploitation of the indigenous fish stocks, efficient distribution of catches and the reduction of unnecessary

losses during preservation and storage. It is in addressing these questions, rather than indulging in potentially dangerous introductions, that true progress can be made (Barel et al 20).

Nicholas Hughes and his colleagues make a bold statement to those in charge of fisheries, addressing them directly, in an article written for a major scientific journal. This is environmental campaigning every bit as fearless as that which Ted did for the water quality of the West Country rivers. In 1985, the year when Nicholas published his high-profile article, Ted made a very public statement about salmon conservation. The critic Terry Gifford writes: ‘Hughes was a well-known fisherman so his concern about the water quality in rivers is understandable. In a long letter to the *Times* in 1985 he was concerned mainly about the effects upon “the employment and economy of their home rivers” of the 77,000 returning salmon caught by the Northumbrian driftnet fishery (13 Aug 1985)’ (Gifford, ‘Rivers and Water Quality’ 84). Hughes had written about earlier campaigns than this, at a far later date. As I mentioned above, Gifford writes that ‘In a letter to *Trout and Salmon* in July 1998, the poet charted the history of campaigns for improved water quality in Devon’s rivers since the early 1980s and the 1985 Bideford estuary, but noted that “a river that is nothing but a fishery has a poor prognosis”’ (‘Rivers and Water Quality’ 84). Nicholas Hughes writes about fisheries on the subsistence and commercial scale, whereas Ted was more concerned with fishing as a recreational pursuit. Yet both the poet and the scientist warn against the mismanagement of freshwater fisheries. They do so in high-profile media, targeting a wide readership.

The two men were not only concerned about the economy of fisheries and the dangers of overfishing, but also about introduced predators. Nicholas’s work on the introduction of the Nile perch complements Ted’s poem ‘The Merry Mink’. The mink, like the Nile perch, is a

species that has escaped into an aquatic ecosystem that is not its usual habitat. Olivia Laing writes of American mink introduced to her home county of Sussex, England, that ‘these American mink, escaped or released by activists from fur farms, have decimated populations of water voles, which are critically low in Sussex and indeed across the country’ (Laing 233). Ted once tried to persuade his brother Gerald to go into mink farming with him (*Letters* 26-27), and so it is an ambiguous animal in his work: foreign and uneasily naturalised, useful as a farmed animal but celebrated in its wild state. Hughes’s poetry about the mink is ambivalent, stressing its resilience as much as its destructive potential. The survival instinct that this creature possesses is phenomenal:

Since he’s here, he’s decided to like it.

.....

Jolly goblin, realist-optimist

(Even his trapped, drowned snake-head grins)

As if he were deathless. Bobs up

Ruffled with a tough primeval glee. Crams trout, nine together,

Into his bank-hole – his freezer –

Where they rot in three days (*Collected Poems* 648, l.4; ll. 14-19).

Ted, unlike Nicholas, does not create a straightforward criticism of the introduction of a foreign species. Rather, the poem shows an admiration for this creature, with its mythic associations. Yet still, underlying the optimistic realism of the mink is an acknowledgement

of its rapacity, its seeming indestructibility. A non-endemic creature that catches nine trout and leaves them to rot might bother a keen fisherman like Ted Hughes. Both Ted and Nicholas explore the problems that come with the introduction of a foreign predator to aquatic ecosystems.

Nicholas analysed the idea of introduced species in detail during his time working on the Nile perch. He published extensively on this particular species during the early 1990s. In an article for *Environmental Biology of Fishes*, he explored the impact of this non-endemic predator on prawn populations in Lake Victoria:

The recent population explosion of Nile perch in Lake Victoria has produced radical changes in the lake's ecology (Barel et al. 1985, FAO 1985, 1988, Ribbink 1987). Predation by Nile perch in the Nyanza Gulf, where the present population explosion began, has eliminated most of the haplochromine cichlids, and the Nile perch now feed mainly on the freshwater prawn *Caridina nilotica*, a benthic detritivore, small Nile perch, and *Rastrineobola argentea*, a small pelagic zooplanktivore (Hughes 1986, Ogari & Dadzie 1988). The great significance of the spread of Nile perch in Lake Victoria and the importance of *Caridina* as its prey justifies a detailed study of the relationship between these two species (N. Hughes, 'Growth and Reproduction of the Nile perch' 307).

While the 1985 article that Nicholas co-wrote with Barel et al. explores the impact of the Nile perch on cichlids in particular, this 1992 article details the relationship between the Nile perch and the prawn *Caridina*. He was interested in the way in which an introduced predator affects prey species in its ecosystem – as was his father.

Nicholas did other work on the Nile perch, and there is a significant overlap between his work and Ted's poetry. One of his studies was on sexual dimorphism, focusing on the relative sizes of male and female fish in Lake Victoria. He proposed that the Nile perch might be capable of changing sex from male to female:

[I] think it possible that the Nile perch is a protandrous hermaphrodite, with a few fish maturing as primary females. Support for this idea comes from a comparison of Nile perch with the barramundi, *Lutes calcarifer*, which grows to a similar size and is known to change sex (Moore 1979, Davis 1982). A comparison of Figure 4 in this paper with Figure 6 in Moore (1979) shows that the size distribution of male and female Nile perch is very similar to that for the barramundi. Sex change is known to be the cause of this sexual dimorphism in the barramundi and this makes it a likely explanation for sexual dimorphism in the Nile perch (N. Hughes, 'Growth and Reproduction of the Nile perch' 304).

This article was published in 1992, although the first page states that it was received in 1989, and accepted in 1990 ('Growth and Reproduction of the Nile perch' 229). Far earlier than the inception of this article, Ted had written about sex changes in fish in one of his poems.

Gifford, writing about the work of Hughes and the novelist Brian Clark, states that ' "stains" [in river-water, from pesticides and fertilisers] would lead to gender changes in the fish, a phenomenon also observed by Ted and his friend Ian Cook in the fish of the rivers of Devon' (Gifford, 'Rivers and Water Quality' 79). In a letter to Gifford, Ted had outlined the work of Professor Sumpter of Brunel University, who had been researching sex changes in male fish, 'known about since 79 – when the Govt suppressed a full report' (letter from Ted Hughes to Terry Gifford, 24th June 1994, Terry Gifford's private archive). This is noteworthy because it shows that Nicholas's work on sex changes in fish was preceded by his father's research into

the effects of surfactants. The European eel, *Anguilla anguilla*, was hypothesised to be able to change sex as early as 1982, when the journal *Cytogenetics and Cell Genetics* received an article on sex change in eels (Wiberg, 'Sex determination in the European eel'). 'It is tentatively hypothesized that sex determination in *A. Anguilla* [sic] may be metagamic and that sex inversion may occur in this species,' ('Sex determination in the European eel' 589) wrote U.H. Wiberg. The earlier parts of Hughes's poem 'An Eel' is strongly inflected by scientific theories and vocabulary.

I

The strange part is his head. Her head. The strangely ripened

Domes over the brain, swollen nacelles

For some large containment. Lobed glands

Of some large awareness. Eerie the eel's head.

This full, plum-sleeked fruit of evolution.

Beneath it, her snout's a squashed slipper-face

The mouth grin-long and perfunctory,

Undershot predatory. And the iris, dirty gold

Distilled only enough to be different

From the olive lode of her body,

The grained and woven blacks. And ringed larger

With a vaguer vision, an earlier eye

Behind her eye, paler, blinder,

Inward.

.....

This is she

Suspends the Sargasso

In her inmost hope (*Collected Poems* 675, ll. 1-14; 23-25).

Ted's evocation of the eel anatomises it as minutely as a scientific textbook, describing the glands on its head, the primitive, vestigial eyes near its main eyes, its pectoral fin.

Significantly, Hughes's eel starts off as male and becomes female in the first line. This is a transformation at once Protean and miraculous, and also scientifically verifiable. A metamorphosis is at work within the poem: it begins by being strongly influenced by science, and ends by channelling mythologies and metaphors. The word 'nacelle', meaning a small boat or 'gen. Any hollow vessel or object resembling a boat in shape. rare,' (*The Oxford English Dictionary*, online version, consulted on 22. 01. 2012) is a peculiar river-word, an obscure word chosen for its poetic beauty. Scientific language inflects the penultimate line, with its suggestion of spiral galaxies.

Some drafts and fragments in the Emory archive contain sections that sound very scientific indeed. Hughes even puts forward a hypothesis about the sea-lice found on sea-run fish – in verse, of course. An unfinished draft (Emory Manuscripts, Archives and Rare Books Library, c. 644, b.74, fol. 29, n.d.), perhaps originally part of 'An August Salmon' or 'October Salmon', contains detailed descriptions of the anatomy of salmon, and the parasitic sea lice. Hughes's reading of *Silent Spring* informed him of the behaviour of the Coho and other salmonids: 'Like other species of salmon, the Coho has a strong homing instinct, returning to

its natal stream' (Carson 129). But when one looks at the published version of 'October Salmon', another facet of the inspiration behind this poem emerges: Hughes's evocation of the salmon as a 'veteran' (*Collected Poems* 677, l. 9) recalls his father, William Hughes. The image of the salmon as a veteran encapsulates both William Hughes's experiences and the trials faced by salmon, which must survive marine and river pollution on their journey from the sea to their natal stream. Ted remembers that 'I had gone to visit my father who was very ill at the time and I stopped by a nearby salmon river. This was in the autumn, in the early 1980s. And from a bridge I saw this one fish, a little cock salmon, lying motionless in [sic] the clear shallow water – the only fish in a long pool that in October 1961, . . . had held more than 100' (Pero 57). A contributing factor to Ted's 'greening' was 'his experience of the rivers of his childhood' (Gifford, 'Hughes's Social Ecology' 86). His realisation that rivers such as the Calder and Don near where he grew up in Yorkshire had become increasingly polluted shows that his acute observations of the natural world inform some of his most moving poetry.

Nicholas later became an expert on the Arctic grayling as well as the Nile perch, and perhaps we can detect his father's influence in his choice of a salmonid as a major focus of his research. One of the most significant overlaps between Ted's poetry and Nicholas's scientific papers is their use of setting. Both describe interior Alaskan streams in detail. The tenor of these descriptions is necessarily very different, but there are important similarities between the work of the two men. Terry Gifford identifies 'That Morning' as an 'Alaska poem', inspired by Ted and Nicholas Hughes's shared visit to Alaska in 1980 ('Hughes's Social Ecology' 91). He calls it 'one of [Hughes's] most ecstatic poems of ecological integration' ('Hughes's Social Ecology' 91-92). It is also a very ichthyological poem, showing a close scrutiny of the movement of salmon in an Alaskan river. Their swimming en masse is described in metaphorical, mythical terms in Ted's poem, but underlying this mythical tenor

is a realistic awareness of the salmon's instinct to return to its native stream. In its earliest form, the poem was published in 1981, in *A Garland for the Laureate: Poems Presented to Sir John Betjeman, Nov 1981 (Collected Poems, Notes, 1288)*, a very public platform to publish a biocentric hymn celebrating the creatures of the river. This was a year after Ted and Nicholas's first Alaskan expedition.

That Morning

We came where the salmon were so many

So steady, so spaced, so far-aimed

On their inner map, England could add

Only the sooty twilight of South Yorkshire

Hung with the drumming drift of Lancasters

Till the world had seemed capsizing slowly.

Solemn to stand there in the pollen light

Waist-deep in wild salmon swaying massed

As from the hand of God (*Collected Poems* 663, ll. 1-9).

The mass migration of the salmon to their spawning grounds is compared to Lancaster bombers, but this metaphor is bracketed by scrupulously observed descriptions of the movements of the fish. They are 'so steady, so spaced, far-aimed/ On their inner map': Ted captures the steady pace of the anadromous fish swimming upstream, the space between

them, their instinct to return to the redds, or gravel nests, where they were spawned. The fourteenth line mentions ‘their formations’, which shows that Ted also scrutinised the way they moved. Nicholas was interested in the movements of fish, and in a 1996 article co-authored with L. H. Kelly, he pioneered the technique of filming fish swimming to study their movements (N. Hughes and Kelly, ‘New techniques for 3-D video tracking’). This paper was published far later than Hughes wrote the poem, but it shows that father and son had a shared interest.

This poem evokes an entire ecosystem. Abiotic elements – the river, the mountains – join the biotic elements of lupins, salmon, bears and fishermen to create a poem that ends with an epiphany. One of Ted’s letters to Nicholas shows that the two of them saw bears during one of their Alaskan expeditions. In 1987, Ted wrote to Nicholas about the possibility of returning to Alaska. Ted had just watched a program about grizzlies, and wrote that ‘It gave me a great pang to see it [a sequence filmed at Brooks Camp, a famous bear-watching area], and that long arm of Naknek lake. I suppose the Bears were some of them the very ones we watched there’ (*Letters* 540). (Naknek lake is a lake connected to the sea in southern Alaska, through which salmon swim to reach the rivers.)

There, in a mauve light of drifted lupins,

They hung in the cupped hands of mountains

Made of tingling atoms. It had happened.

Then for a sign that we were where we were

Two gold bears came down and swam like men

Beside us. And dived like children.

And stood in deep water as on a throne

Eating pierced salmon off their talons.

So we found the end of our journey.

So we stood, alive in the river of light

Among the creatures of light, creatures of light (*Collected*

Poems 663-4, ll. 20-30).

The first person plural pronoun shows that this is a poem about Ted and Nicholas watching the bears and the salmon. ‘‘So we found the end of our journey’, father and son, poet and scientist, social ecologist and scientific ecologist’ (‘Hughes’s Social Ecology’ 92),³ writes Terry Gifford. Nicholas was only eighteen on their first Alaska trip, and cannot be said to be a fully qualified ‘scientific ecologist’ at that time. However, his interest in ecology was developing, and the Alaska trip foreshadows his later research interests.

‘The Gulkana’, Hughes’s longer Alaskan poem, dovetails significantly with Nicholas’s work.

Ted’s poem begins:

³ Terry Gifford applies Murray Bookchin’s term ‘social ecology’, which suggests that ecological problems originate in deep-rooted social problems, to the writing and environmental campaigns of Ted Hughes in the article cited above. Nicholas Hughes’s article on the Nile perch in *Nature* journal, which examines the problems with large-scale fisheries and attitudes towards Africa’s natural resources, contains elements of social ecology. However, he was mainly concerned with scientific perspectives on ecology in his published work; this is why Gifford calls him a ‘scientific ecologist’.

Jumbled iceberg hills, away to the North –

And a long wreath of fire-haze.

The Gulkana, where it meets the Copper,

Swung, jade, out of the black spruce forest,

And disappeared into it.

Strange word, Gulkana. What does it mean?

A pre-Columbian glyph.

A pale blue thread – scrawled with a child's hand

Across our map. A Lazarus of water

Returning from seventy below (*Collected Poems* 665, ll. 1-10).

The precision of this description is remarkable. It details the position of the river, the location of the confluence with the Copper, the species of spruce that grows in this part of the boreal forest, the water temperature and the appearance of the river on the map. Scientific data on water temperature are included seamlessly and elegantly in the poem. Further information about the territory is given in subsequent lines. In line 38, p. 666, Ted mentions the 'permafrost', the ground in Arctic regions that never thaws. Ted's description of himself and Nicholas as 'Prospectors for the lode in a fish's eye!' (*Collected Poems* 666, l. 43) recalls the practice of panning for gold in Alaskan creeks. Ted and Nicholas are prospectors for salmon,

referred to as 'bars of gold' or 'bars of silver' by many fishermen,⁴ but the image of gold has multiple resonances. It brings to mind the Grail and treasure metaphors that Hughes uses so often for fish. Yet gold mining particularly harms fish, as Nicholas's later research was to show. The poem shows us Hughes's awareness of the entire ecosystem, his meticulous recording of its every detail.

Nicholas studied the movement of Arctic grayling in Twelvemile Creek, a small stream that feeds a tributary of the Yukon. (The Yukon and its tributaries are situated further north than the Gulkana, which flows through southeastern Alaska.) The locality where Nicholas and Ted fished is not identical to the creek where Nicholas studied Arctic grayling, but there are aspects common to both places. When one compares his description of Twelvemile Creek to Ted's description of the Gulkana, some significant similarities come up. Here is part of Nicholas's scientific paper:

Study area

Twelvemile Creek is a small mountain stream in interior Alaska (Fig. 3), it is a tributary of Birch Creek, which is in turn a tributary of the Yukon River, and similar to the headwater reaches of most larger rivers in this part of Alaska. The climate is subarctic continental, with long cold winters and short summers, the mean annual temperature is -5.5°C and the annual precipitation about 288mm.yr^{-1} . Twelvemile Creek starts to freeze up in September and is ice-covered from October through May. Breakup, in late May and early June, is a period of high flow, with the water colored by dissolved organic matter and suspended particulate matter. From mid-June through August the stream generally runs low and clear except after summer rainstorms. Low water

⁴ Letter from Carol Hughes to Yvonne Reddick, 23rd of January 2013.

discharge during the summer months varies from about $0.03 \text{ m}^3 \cdot \text{s}^{-1}$ at the upstream limit of Arctic grayling distribution to about $0.6 \text{ m}^3 \cdot \text{s}^{-1}$ just before its confluence with Birch Creek.⁵

Twelvemile Creek contains a small isolated population of Arctic grayling because Birch Creek has been heavily polluted by placer gold mining since about 1975, and Arctic grayling avoid the high turbidity this creates (McLeay et al. 1987; Reynolds et al. 1989). From mid-June to early September this population exhibits the size gradient typical of much larger systems. In September most fish larger than about 250mm migrate some tens of kilometers downstream to overwinter in Birch Creek, while smaller fish actually migrate upstream (N. Hughes and Reynolds, 'Why Do Arctic Grayling (*Thymallus arcticus*) Get Bigger As You Go Upstream?' 2157-58).

When reading Nicholas Hughes's report, one has the feeling that one is reading something familiar. There is a family resemblance between Ted's description of the Gulkana and Nicholas's description of Twelvemile Creek. The progression of images and ideas in 'The Gulkana' is very similar to this report. Nicholas describes the river and its location in relation to other rivers, the temperature, the colour of the water, the gold mining, and finally the position of the fish.

What is noteworthy about Nicholas's research is that it takes into account the negative impact that scientific studies might have on the life of the fish. Ted's poetry, especially the long manuscript draft I mentioned above, tends to frame the catching and eating of fish as a sacrament. Admittedly, there is a difference between catching a fish with a hook and line, as

⁵ The equation is a Laplace Transform, part of a differential, which describes how low water discharge increases from up the stream to down the stream from 0.03 to 0.6 cubic metres: a twentyfold increase.

Ted did, and larger-scale electrofishing,⁶ which Nicholas did for his research. Despite having relied on electrofishing, Nicholas was critical of the damage it could do to Arctic grayling. We are shown two contrasting views of fishing: one small-scale and recreational, the other on the larger, scientific scale. Both, however, show a concern about the damage done to caught fish. In a 1998 article, Nicholas stresses the adverse impact that electrofishing and tagging have on the growth of Arctic grayling. He finds that fish whose growth has thus been impaired are less able to maintain an optimum place in the dominance hierarchy:

[W]e have experimental evidence that Arctic grayling are competing for positions in headwater reaches and that large fish exclude small fish from these desirable positions (Hughes and Reynolds 1994). We also know that injuries from tagging can lower a fish's rank in a dominance hierarchy (Vascotto 1970; but see Swanberg and Geist 1997). The logical conclusion from these findings is that reductions in growth, vigor, and size produced by electrofishing and tagging will reduce a fish's ability to move upstream in the whole-stream dominance hierarchy, making it more likely to stay put or be displaced downstream by more vigorous individuals (N. Hughes, 'Reduction in Growth' 1076).

This observation of the detrimental effect of electrofishing on Arctic grayling is similar to a concern with animal suffering expressed in Ted's letters at that time. Carol Hughes recalls that Ted's visits to Alaska became less frequent later in his life,⁷ but the two men retained a similar interest in conservation. Nicholas's 1998 publication resonates with a letter that Ted wrote to Keith Sagar in August 1997. Despite writing about the appealing prospect of 'knocking over the occasional deer – subsistence' (*Letters* 691),

⁶ Electrofishing uses a device to charge a localised area of a body of water, stunning the fish for ease of capture.

⁷ Letter from Carol Hughes to Yvonne Reddick, 23rd of January 2013.

in Devon, Ted's later letters show an acute awareness of the suffering of certain animals. On the 15th of August 1997, he wrote to Sagar that 'I've known for some years what a hunted deer goes through physically. And a hunted fox. And a fish being caught, for that matter' (*Letters* 691). Ted states that he became aware of the suffering of the animals he hunted or captured from about the age of fifteen. 'Finally as I have said, at about fifteen my life grew more complicated and my attitude to animals changed. I accused myself of disturbing their lives', he wrote in *Poetry in the Making* in 1967 (*Winter Pollen* 11). He had also been campaigning for the quality of West Country rivers for some years by the time of his letter to Sagar, but this empathy for captured fish shows a far deeper concern for the individual creature than he had expressed before. His concern for the lives of fish complements his son's research into the effect of electrofishing. Indeed, Carol Hughes recalls that he would sometimes use barbless hooks in order to minimise the damage done to the fish he caught.⁸

The picture one derives from reading Ted Hughes's poetry and letters alongside Nicholas Hughes's scientific writing is one of a rich interfusion of mutual influence. It seems that fishing expeditions that Ted organised during Nicholas's boyhood and adolescence influenced his poems considerably. When Ted's poems examine the bodies of fish minutely, he recalls his son's scientific research into fish anatomy, especially his dissections of Nile perch. Ted's concern about environmental destruction dates from before the birth of his son, but Nicholas's research on the environmental disaster in Lake Victoria complements Ted's campaigns to preserve the water quality of British rivers. Ted also uses the vocabulary of aquatic science to enrich and expand his poetic lexicon. Their shared interest in fishing inspired a large corpus of Ted's work. Yet it is clear that Ted believed that artistic creation

⁸ Letter from Carol Hughes to Yvonne Reddick, 23rd of January 2013.

was also essential to his son's wellbeing. His own poetry shows a diverse blend of scientific terms, meticulous first-hand observation and archetypal myth. It is clear that freshwater biology was instrumental in the creation of his most riverine poetry.

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