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Inured to Empire: Wild Rice and Climate Change

On a cold day in December, Sir Joseph Banks told members of the Horticultural Society of London he had discovered a proven method for making warmer-climate plants frost resistant. While the method could be applied to tropical plants, it was North American wild rice (*Zizania aquatica*) that provided the inspiration for his lecture, later published as the essay “Some Hints Respecting the Proper Mode of Inuring Tender Plants to Our Climate.” Banks described acclimatization experiments with specimens of *Zizania*, transplanted from Canada to the pond on his Spring Grove estate outside London and in the fens on his property in Lincolnshire. Banks—president of the Royal Society from 1778 to 1820 and the most powerful scientific patron in the Anglophone world—had been interested in *Zizania*’s special qualities since the 1770s, believing it to be a highly adaptable plant. Through the 1810s, he tried developing a cultivar hardy enough to “endure the ungenial summer of England,” which would, in turn, prepare it for service in cooler climate colonies. Inoculated against severe cold, wild rice seeds could be sown in British and Irish bogs to feed the poor and in New South Wales as a frontier staple. Going further, Banks believed his success with “the experiment on *Zizania* points out the road” to habituating other nonnative species to the recent sharpening in English weather: “the ungenial springs, the chilly summers, and the rigorous winters, by which, especially for some years past, we have been perpetually visited.” Wild rice, inured to the hazards of a changing climate, would be the pioneer plant of a responsive imperial ecology, on the path paved by learned men associated with a variety of British scientific or government institutions.¹

Banks’ sustained interest in this plant was not merely an eccentric experiment in acclimatization. Wild rice was the only native North American food plant that was a subject of significant, if subsequently forgotten, investigation in America and Europe.² Beginning in the late seventeenth century, travelers, fur traders, and colonists remarked on the watery habitats in which it flourished, as well as Native practices of reaping and eating it. The plant the English and French called wild rice (*riz sauvage*) or wild oats (*folle avoine*), seemed to grow nearly everywhere: from the seaboard to the Mississippi River, from the Plains to Hudson Bay. From the 1740s through the 1790s, British officials and fur traders who traveled through the Upper Midwest subsisted on wild rice procured from Algonquian, Iroquoian, and Siouan suppliers. Drawing on Dutch, French, and Swedish accounts, they recorded the most widely cited English descriptions of the plant’s prolific growth in swamps, rivers, and ponds; the ease of harvesting and cooking it; and its resemblance in shape and flavor to domesticated grains like white rice, oats, maize, and millet. Moreover, all European observers assumed that *Zizania* “sows itself”—that Indians only harvested but did nothing to control or develop the plant, which reproduced as independently and copiously as a weed. Believing that *Zizania* thrived “in Abundance spontaneously,” requiring little expertise or labor to gather and prepare, one Englishman concluded it “is the most valuable grain that grows spontaneously, perhaps in the whole world, not even excepting tropical productions.”³

¹ Joseph Banks, “Some Hints Respecting the Proper Mode of Inuring Tender Plants to Our Climate (Read December 3, 1805),” *Transactions of the Horticultural Society of London* vol. 1 3rd ed., (London: 1820): 22-25.

² Albert E. Jenks, *The Wild Rice Gatherers of the Upper Lakes: A Study in Primitive Economics* (Washington, DC: Smithsonian Institution, 1901); Thomas Vennum, *Wild Rice and the Ojibway People* (St. Paul: Minnesota Historical Society Press, 1988).

³ Arthur Dobbs, *An Account of the Countries Adjoining Hudson’s Bay* (London, 1744), 51; Alexander Baxter, “On the North American Wild Oats,” *Annals of Agriculture* 6 (1786): 392.

Taking these factors into account, John Mitchell inserted a long footnote on wild rice into his 1767 treatise, *The Present State of Great Britain and North America*. Mitchell, the Virginia-born physician and botanist best known for his map of North America produced for the Board of Trade, was vehemently opposed to the expansion of empire in northern latitudes but nevertheless recommended wild rice as part of a broader strategy for Britain to gain control of its food supply. To increase self-sufficiency, Mitchell encouraged a dietary shift from wheat to alternative staples. In Britain, providing rye, oats, barley, and buckwheat to the poor would “lessen their numbers” and to “Labourers and Workmen, would increase the export of Wheat”; in northern colonies wild rice would supply frontier settlements, reducing their dependence on imports. Once improved for commercial cultivation wild rice would also provide a unique article into the imperial trade. If “duly cultivated” like white rice, Britain “might have rice from our northern as well as our southern colonies.”⁴

A decade later, outbreaks of Hessian fly-infested wheat, the Bengal famine, the loss of exports from the United States, destructive hurricanes in the Caribbean, and serious harvest shortfalls in Britain and Ireland combined to give renewed urgency to policies promoting a wider range of starches for cheaply feeding slaves, the poor, and import-dependent colonies.⁵ It was in this context that a number of people revived Mitchell’s idea of incorporating *Zizania* into the imperial economy. Much as Banks had perceived the value of breadfruit “procur’d with no more trouble than that of climbing a tree and pulling it down,” so too did he become intrigued by proposals for growing wild rice as a low-cost subsistence crop suited to colder regions with limited agricultural potential. Harvest shortfalls and interruptions to the provisions trade through the period of the Napoleonic Wars stimulated continued experimentation with wild rice in the hope that it might help diversify and secure the grain supply.⁶ If this wild food could be improved it would yield the multiple benefits of abundance and the productive transformation of wastelands with little effort. In his fitting epigraph to “The Natural History of the Wild Rice,” Thomas Holt White, brother of Gilbert White, quoted *Ecclesiastes 11. 1*: “Cast thy bread upon the waters: for thou shalt find it after many days.” The potential rewards of this North American grass recalled a biblical parable: one could simply broadcast seeds into unimproved wetlands and return later to find a harvestable foodstuff.⁷

Naturalists’ interest in exploiting wild rice was thus an attempt to respond to various contingencies the empire faced after the late eighteenth century. Following the Seven Years’ War, the unprecedented expansion of colonial territory encouraged investigation of plants like wild rice, one among many attempts to address the scaled-up problem of provisioning through initiatives to promote a more efficient use of natural resources. Banks’ work on wild rice aligned with his much broader goal of achieving what historian Richard Drayton calls a “nature’s government”: a comprehensive vision for creating a more effective empire by manipulating its diverse colonial environments—from tropical islands to boreal forests—through expert knowledge, ecological exchanges, and scientific agriculture.⁸

⁴ John Mitchell, *The Present State of Great Britain and North America* (London, 1767), 71-72, 76, 78.

⁵ [n.a.], “Fall in the Price of Rice,” *Annals of Agriculture* 26 (1796), 315; Alessa Johns, ed. *Dreadful Visitations: Confronting Natural Catastrophe in the Age of Enlightenment* (New York: Routledge, 1999), 81-112, 145-182.

⁶ J. C. Beaglehole, ed., *The Endeavour Journal of Joseph Banks 1768-1771* (Sydney: Angus & Robertson, 1962), vol. 1: 341; Richard B. Sheridan, “The Crisis of Slave Subsistence in the British West Indies During and After the American Revolution,” *WMQ* 33, no. 4 (Oct., 1976), 615-641.

⁷ T.H.W. [Thomas Holt White], “The Natural History of the Wild Rice,” *The Gentleman’s Magazine* 65 (February 1789), 127-128.

⁸ Richard Drayton, *Nature’s Government: Science, Imperial Britain, and the ‘Improvement’ of the World* (New Haven: Yale University Press, 2000).

What few historians have appreciated, however, are the several ways in which this vision was intertwined with debates about climate, including the possibility that climate had been subject to physical transformations over the very long and short terms. The climate had always been an element of the colonial environment itemized and described in official correspondence or popular print culture. With the establishment of the Royal Society and Board of Trade, administrators increasingly considered climatic geography in formulating policies. By the second half of the eighteenth century, however, natural historians became increasingly alert to what they perceived as acute changes in regional climates.⁹ As a result, for Banks the unique attraction of wild rice was its versatility as a subsistence crop that could be made insensitive to climatic variability, particularly to what he perceived as the most worrisome change: a cooling planet. Convinced that wild rice could become a grain for all political seasons and for untold natural upheavals, naturalists and officials fantasized about its agricultural potential. All they had to do was learn how to grow it themselves.

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Wild rice is a common name for an edible annual aquatic grass indigenous to North America. Although its name suggests that it is a cousin to white rice (*Oryza sativa*), the two plants are unrelated.¹⁰ Writers sometimes called it Indian rice and dubbed entire groups Wild Rice Indians, including the Menominee, whose name is a variation of *manoominiig*, the Algonquian word meaning wild rice people. For the Naudowessie and other nations, wild rice was a key element of ceremonial feasts and sacred rituals. Other observers suggested that Native Americans were mainly interested in attracting migrating ducks, geese, and bobolinks, also known as ricebirds, to the grasslands. John Bartram believed that Native people had “formerly” eaten wild rice but now left it as fodder for birds and other game. If colonists were uncertain about its function and meaning in Native societies it is because they were more interested in understanding what they believed was the autonomous botanical culture of the plant.¹¹

Travelers in northern regions east of the Rocky Mountains observed several different species of wild rice, including *Zizania aquatica* (meaning water weed) and the closely related *Zizania palustris* (marshy weed); south of the Great Lakes, they were more likely to observe *Zizania miliacea* (millet weed).¹² French botanist André Michaux identified *Zizania palustris* flowering on Georgia’s Ogeechee River and in South Carolina. Another botanist was unsure of whether to identify a flowering native grass growing in the Great Salt River in Arkansas as *Zizania aquatica* or *miliacea*.¹³ However, the majority of travelers identified wild rice plants as *Zizania aquatica*, which the renowned Swedish naturalist Carolus Linnaeus first listed in his 1753 *Species Plantarum*. Although in 1745 Linnaeus asked his disciple Pehr Kalm to retrieve a “kind of Rice” from America, Linnaeus had already received specimens through a chain of transatlantic and European transfers. In the 1730s, Virginian botanist John Clayton shipped a number of

⁹ Fredrik Albritton Jonsson, *Enlightenment’s Frontier: The Scottish Highlands and the Origins of Environmentalism* (New Haven: Yale University Press, 2013); Jan Golinski, *British Weather and the Climate of Enlightenment* (Chicago: University of Chicago Press, 2007).

¹⁰ Gardner Stickney, “Indian Use of Wild Rice,” *American Anthropologist* 9, no. 4 (1896): 115-122.

¹¹ Francis Parkman, *La Salle And The Discovery Of The Great West: France And England In North America* (Boston: Little, Brown, 1897), vol. 3: 61; Carver, *Three Years Travels*, 87, 245-246; Jenks, *The Wild Rice Gatherers*, 1024; Vennum, *Wild Rice and the Ojibway*.

¹² Vennum, *Wild Rice and the Ojibway*, 12-14.

¹³ C.S. Sargent, ed. “Portions of the Journal of André Michaux, Botanist, Written During His Travels in the United States and Canada, 1785 to 1796,” *Proceedings of the American Philosophical Society* 26: 129 (Jan. – Jul. 1889): 11-12, 40; Thomas Nuttall, “Collections towards a Flora of the Territory of Arkansas,” *Transactions of the American Philosophical Society*, new ser., 5 (1837): 153.

plants, including wild rice, to Mark Catesby in London. Catesby forwarded these them to Dutch botanist Johan Frederik Gronovius, who, in turn forwarded them to Linnaeus, where he named Clayton's dry specimen *Zizania aquatica*.¹⁴

Its species names *aquatica* and *palustris* signal that travelers always found it growing in fresh or brackish marshes, shallow rivers, and lakeshores. The earliest accounts of the plant's habitat were those of Jesuit missionaries in New France, like Jacques Marquette's 1681 description of "a kind of grass that grows naturally in the bottom of the mud in small rivers and in marshy places." When Kalm referred to it by its botanical name, he translated the Latin as "the water tare grass." As its genus and common names suggest, Europeans believed it was wild and grew as vigorously as a weed.¹⁵ Most British descriptions of the plant's culture followed Joseph-Francois Lafitau's description in *Moeurs des sauvages americains* (1724), which reinforced the idea of self-reproduction: it grew "without requiring" Indians "to plow or sow it."¹⁶ Officer Robert Rogers explained that Nipissings ate only "what the lake and wild desarts afford them," including "a kind of wild maize or rice," which he thought they "never pretend to plant or improve." A British naturalist in Quebec seemed delighted by the fact that Indians' "rude kind of Harvesting" allowed a considerable quantity of grain to fall into the water, which waterfowl proceeded to eat—a desirable result, but one that he assumed was wholly unintentional.¹⁷

As was typical of both chauvinistic and romantic ideas about Native American knowledge colonial accounts produced an image of instinctive foraging rather than agricultural technique. For Europeans, wild rice represented an absolute distinction between hunting and gathering versus agricultural societies, an idea evoked in many of their common names for it. The interchangeability between wild foods and primitive people was clear in the term *riz sauvage*, which could carry several connotations, including uncultivated rice or the savage's rice. They were correct that *Zizania* was wild but modern ethnobotanists argue that it is more accurate to understand the differences between Indian and European horticulture in terms of a "spectrum of increasing intervention" in the natural world, rather than a rigid division between entirely distinct practices. From this perspective, while Indians did not subject the plant to thorough domestication they cultivated particular stands to ensure they would regularly produce grain. Moreover, intensive cultivation was peculiar to northern nations in the Great Lakes region—the Chippewa, Menominee, Naudowessie, Potawatomie, and Winnebago—who harvested wild rice for their own subsistence and also to exchange it for trade goods. In northern regions, where stands were widespread and abundant, some limited archeological evidence suggests Indians might have sown seeds.¹⁸

Europeans implicitly recognized the geography of Native horticulture. While varieties of *Zizania* grew throughout eastern North America, the majority of accounts focused on northern

¹⁴ Koerner, *Linnaeus*, 117, 241; Johan Frederik Gronovius to Carl Linnaeus, 26 July 1740, Letter 388, *The Linnaean Correspondence* <linnaeus.c18.net>, accessed 5 Aug. 2014; James L. Reveal, "Significance of Pre-1753 Botanical Explorations in Temperate North America on Linnaeus' First Edition of *Species Plantarum*," *Phytologia* 53.1 (Mar. 1953), 38.

¹⁵ [J. Marquette et P. Joliet], *Voyage et découverte de quelques pays et nations de l'Amérique septentrionale* (Paris: 1845 [1681]), 2-3; Pehr Kalm's *Travels in North America* 2 vols. (New York: Dover, 1964), vol. 2: 533.

¹⁶ Joseph-Francois Lafitau, *Moeurs des sauvages americains* (Paris, 1724), 87.

¹⁷ 16 October 1794, *Nooth-Banks Letters*; Robert Rogers, *A Concise Account of North America* (London, 1765), 154-155.

¹⁸ Paul E. Minnis, *People and Plants in Ancient Eastern North America* (Washington, DC: Smithsonian Institution, 2003); William E. Doolittle, *Cultivated Landscapes of Native North America* (New York: Oxford University Press, 2002), 24-47.

territories. Since most descriptions of the plant were embedded in narratives intended to promote trade and settlement, territories travelers judged to be exceptionally rich in wild rice acquired evocative place names. In northern Minnesota, where “the swamps are full of wild rice and cranberries” fur trader John Long noted that Lake Schabeechevan was also known as “Weed Lake.” Another trader noted that in Green Bay “the Bottom of the Bay Produces a Large Quantity of Wilde Rice.” In July 1750 Kalm spotted rice “in the mud, and in the most rapid parts of brooks” on the shores of Lake Champlain and St. Lawrence River. Jonathan Carver, a Seven Years’ War veteran who in 1766 began exploring a river route west from the Mississippi to the Pacific, claimed that at Lake Winnebago in late September “it is with difficulty that canoes can pass, through the obstructions they meet with from the rice stalks, which are very large and thick, and grow here in great abundance.” Colonists traveling through “watered lands” from northern Minnesota to Quebec enthused about the bounty of this “luxuriant grass” growing in “swamp, or overflowed country.”¹⁹

They also remarked that frigid winters and a short growing season did not prevent the plant from sprouting or growing to maturity. Arthur Dobbs, a member of the Irish Parliament and investor in efforts to find a northwest passage, was impressed that “a Kind of wild Oats, from which the Natives get plentiful Crops” grew not only on the shores of Lake Huron, a region possessing “one of the best climates in the world,” but also in the more northern latitudes around Hudson’s Bay. Conversely, wild rice provided evidence of the fertility and temperateness of northern regions. Lake Winnipeg, though surrounded by “barren” mountains and plains, was also the site of “an amazing quantity of rice, which proves,” Carver wrote, “that grain will flourish in these northern climates as well as in warmer.” Alexander Henry, a founder of the North West Company, marveled at the “beauty of the scene” of wild rice growing in northern Minnesota in the summer of 1775, which recommended the area’s “fitness for agricultural settlements.”²⁰

Traders watched Indian men and women harvesting wild rice “at the time of maturity,” which varied somewhat by region and seasonal conditions, but usually occurred in late summer or early fall. According to Kalm, on the border between New York and Quebec, *Zizania* that was “in full bloom” in July was harvested in October.²¹ Carver offered the most detailed, if still generic, description of indigenous techniques for threshing wild rice:

Nearly about the time that it begins to turn to a milky state and to ripen, they run their canoes into the midst of it, and tying bunches of it together, just below the ears, with bark, leave it in this situation three or four weeks longer, till it is perfectly ripe. About the latter end of September they return to the river, when each family having its separate allotment and being able to distinguish their own property by the manner of fattening the sheaves, gather in the portion that belongs to them. This they do by placing their canoes close to the bunches of rice, in such a position as to receive the grain when it falls, and then beat it out, with pieces of wood formed for that purpose.

Catching grain in a canoe while gliding past ripe plants seemed effortless compared with the

¹⁹ John Long, *Voyages and Travels of an Indian Interpreter* (London, 1791), 108; Dobbs, *Countries Adjoining Hudson’s Bay*, 46, 51, 62; Carver, *Travels through the Interior Parts*, 110, 524; Pehr Kalm’s *Travels* vol. 2: 389, 401, 533; Alexander Henry, *Travels and Adventures in Canada and the Indian Territories Between 1760 and 1770* (New York, 1809), 242; Alexander Mackenzie, *Voyages from Montreal* (London, 1801), *lvi*; Charles M. Gates, ed., *Five Fur Traders of the Northwest* (Minneapolis: University of Minnesota Press, 1933), 34.

²⁰ Carver, *Travels through the Interior Parts*, 38; Henry, *Travels and Adventures in Canada*, 242.

²¹ Lafitau, *Moers*, 87; Pehr Kalm’s *Travels*, vol. 2: 389.

backbreaking toil required in harvesting other cereals. Winnowing wild rice was also quick work. Green rice was parched by heating it with smoke, in a skillet, or laying it on blankets in the sun. Once dry, it was rubbed between hands or feet to remove the husk. Stored in barrels or leather sacks and buried underground, wild rice could be preserved for years without spoiling.²² Henry reported that he bartered with Chippewa women for over 120 bags of rice “each nearly a bushel measure each” in July 1775, which suggests this was stored rice from a previous harvest. Alexandre-François La Rochefoucauld-Liancourt reported that Indians brought “four to five hundred pounds of this rice,” to market in Upper Canada in September. In addition to supplies kept in reserve, such high yields likely reflect the temptation for men with commercial interests in these territories to exaggerate quantities. Whether or not fertile flowering and ample harvests were the norm, colonists’ reports were intended to convey this impression. But whatever the precise quantities of annual harvests, Henry asserted that his company depended on these provisions because traveling by foot, canoe, and portage over long distances required a steady supply of enormous quantities of wild rice.²³

Beyond satisfying their immediate needs, travelers often judged it to be “a good food.” Though Carver remarked with some disbelief that “many of the Indian nations neither make use of bread, salt, or spices,” he knew that boiled wild rice was a nutritious replacement for bread. He and other introduced readers to wild rice through analogies to Old World cereals or to New World crops like maize that were already familiar to European palates. Mitchell wrote that wild rice had “a sweetness in it like Indian corn.” Wild rice grasslands resembled fields of wheat and the grain looked like unpolished white rice. All of the common names Europeans’ employed—wild rice, Canada rice, *folle avoine*, water oats, *Avena fatua*, *riso selvatico*—were another way of assimilating this lesser known food into the culinary imagination as a variation on standard fare. Kalm referred to wild rice as one of the Mohawks’ “dainty dishes,” prepared like “groats, which taste almost as good as rice.” Liancourt wrote “this rice is of a smaller and darker grain than that, which comes from Carolina, Egypt, & c. but grows as white in the water, is of as good a flavour, and affords full as good nourishment, as the latter.” In addition, because *Zizania* was “fit for the food of man and beast,” it provided rich fodder for wildlife that enhanced the flavor of meat. “The sweetness and nutritious quality of it attracts an infinite number of wild fowl of every kind, which flock from distant climes to enjoy this rare repast and by it become inexpressibly fat and delicious,” raved Carver. Wild rice was like a frontier fast food: “an immediate resource for necessary food” on which colonists could instantly rely until “other supplies may be produced,” especially since, even in regions where “the climate is temperate and the soil good, the first settlers are often exposed to great hardships.”²⁴

Mitchell argued that wild rice excelled white rice, oats, “and all other grains that are known, in many remarkable properties” because it “neither requires reaping, threshing, cleaning, grinding, bolting, nor baking; the grain is easily gathered with the hand, and is fit to eat, boiled like rice, as soon as it is gathered; it neither adheres to the husk, like rice, barley and oats, nor has

²² Carver, *Three Years Travels*, 523-524. See also Jonathan Carver, [John Coakley Lettsom?], *Three Years’ Travels Through the Interior Parts of North America ...* (London, 1789), 272; [George Warburton], *The Conquest of Canada* 2 vols. (London: R. Bentley, 1849), vol. 2: 433-434.

²³ Duke de la Rochefoucauld Liancourt, *Travels through the United States of North America* (London, 1799), 518; Henry, *Travels and Adventures*, 241-244; Gates, *Five Fur Traders of the Northwest*, 194, 253; Carolyn Podruchny, *Making the Voyageur World: Travelers and Traders in the North American Fur Trade* (Lincoln: University of Nebraska Press, 2006), 118-120, 276-277.

²⁴ *Kalm’s Travels*, V1: 250, V2: 533, 642; Carver, *Three Years Travels*, 262-263, 522-523; Luigi Castiglioni, *Viaggio negli Stati Uniti dell’ America Settentrionale* (Milano, 1790), 220; Henry, *Travels and Adventures*, 240; Hosack, *Hortus Elginensis*, 60; Liancourt, *Travels*, 518-19; Baxter, “On the North American Wild Oats,” 392; Mitchell, *Present State*, 71.

it any bran like wheat, which create a great expense in these sorts of grain.” Since wheat would not grow “any where to the north ward of Boston,” he singled out wild rice as “the only sort of Corn proper for the northern parts of America.” Notwithstanding his skepticism about the north in general, he thought *Zizania* might be exploited on a larger scale as a novel, undemanding, cold-climate staple. Since the ancestors of all “the best” domesticated cereals were wild grasses, he reasoned that *Zizania* might also be easily “improved by culture.” People with interests in colonizing the trans-Mississippi West further publicized these endorsements of wild rice, emphasizing the ways in which it could feed poor populations or be a surrogate grain during wheat shortages.²⁵

They were responding to parliamentary debates about regulating the Atlantic provisions trade after 1783, debates that turned in part on competing perceptions of the climate in Britain’s remaining northern colonies. In his influential *Observations on the Commerce of the American States* Lord Sheffield, allied with Banks in the mission to promote self-sufficiency through corn laws, enclosures, and improvement schemes, urged Britons not to “exaggerate the loss” of the Thirteen Colonies. Sheffield argued that Canadians could supply grain. In response, advocates of free trade like the Jamaican planter Edward Long—guided by Mitchell’s deeply pessimistic and widely reprinted account of northern climates—ridiculed the notion that “shriveled barley, oats and rye” produced under the “transient gleam of sunshine” of northern summers could be “excellent substitutes for the flour of New York and the rice of Carolina.” In later pamphlets, while Sheffield’s optimism about the northern colonies faded, he and other improvers continued pursuing a broad agenda of domestic and colonial self-sufficiency through incentives to diversify food production on marginal lands.²⁶

Caribbean planters’ attempts to introduce breadfruit as a slave provision was only the most sensationalized response to this remedial food policy. In Britain and Ireland, potatoes provided another answer. Easy to propagate, prolific, and dense in starch, potatoes became an important food in this period for the growing population of rural poor displaced by enclosures as well as a supplemental winter fodder. Along similar lines, Banks was interested in grains that ripened quickly, like “Indian hill wheat,” a South Asian variety that was planted in the spring and harvested in late summer or early fall. In another early essay for the Horticultural Society, Banks indicated the parallel histories and virtues of potatoes—successfully transplanted from South America to Europe—and Indian hill wheat, which he also grew in his experimental garden. As northern counterparts to breadfruit in tropical plantations, hill wheat and potatoes would be “very satisfying” foods “proper for hard-working people.”²⁷

Aware of these advantages, improvers familiar with wild rice believed it could be an even more promising candidate for addressing the problems of food supply. Among wild rice’s additional qualities was that it grew in waterlogged areas. Wild rice “never” grew “on dry land,” so it required the maintenance of wetlands. Since Native Americans proved to travelers that

²⁵ Mitchell, *Present State*, 71-72.

²⁶ *Observations on the Commerce of the American States with Europe and the West Indies* (London, 1783), 27-28, 62; *Remarks on the Deficiency of Grain after the Bad Harvest of 1799* (London, 1801); [Edward Long], *Free and Candid Review of a Tract entitled “Observations on the Commerce of the American States with Europe and the West Indies”* (London, 1784), 39, 45; John Gascoigne, *Science in the Service of Empire: Joseph Banks, the British State, and the Uses of Science in the Age of Revolution* (New York: Cambridge University Press, 1998), 71-74.

²⁷ Joseph Banks, “An Attempt to Ascertain the Time when the Potato ... was First Introduced into the United Kingdom; with some Account of the Hill Wheat of India (Read May 7, 1805),” *Transactions of the Horticultural Society of London* vol. 1, 8-12; John Ellis, *A Description of the Mangostan and the Bread-Fruit* (London, 1775), 13.

Zizania was a nutritious plant, improvers elevated it above other wild plants and, even more unusually, commended its tendency to proliferate in bogs and marshes. Their curiosity about this aquatic plant represents one of few exceptions to a general intolerance of wetlands, which early modern agricultural treatises usually denigrated as noxious wastes unless improved through labor-intensive reclamation or, as with *Oryza*, the construction and continuous management of irrigation ditches. While nearly all agriculturalists exhorted landowners to drain wetlands, discussions surrounding the feasibility of improving wild rice encouraged just the opposite. White suggested that in cultivating wild rice the British could heed the example of Chinese farmers who, “instead of laying their fens and swamps dry, convert them to utility by raising in them esculent aquatics.” With little to no intervention wild rice enhanced the value of otherwise unproductive bodies of water.²⁸

In the 1786 issue of his periodical *Annals of Agriculture*, Arthur Young excerpted Mitchell’s footnote on wild rice next to two letters describing experiments with wild rice acclimatization written by Alexander Baxter, an English partner of the North West Company. Baxter sent seeds to Young and Banks, asking them to perform “an intelligent trial” to ascertain “if they may vegetate in this climate.” Young endorsed *Zizania* as “an object that certainly demands attention,” promising to “distribute some to many skilful and patriotic cultivators.” He also distributed Baxter’s seeds to “various societies in several parts of Europe,” including Bohemia, Germany, and several Italian cities and noted that a Royal Society fellow translated Carver’s travelogue into Italian. White’s *Gentleman’s Magazine* article was inspired by Carver’s suggestion that, “in future periods,” wild rice could “be of great service to the infant colonies, as it will afford them a present support, until, in the course of cultivation, other supplies may be produced.” White encouraged English farmers to create an “enlarged” variety with a hypertrophied fruit like other grains “we have at present in common use.” Once domesticated, seed could be planted as “a substitute for rice in our lately-attempted settlement in the Southern hemisphere, where the climate may be too cold for that grain, it should seem to be a very desirable acquisition, and well worth introduction, to sow in the morasses and stagnated waters that always abound in uninhabited countries, and which require a greater number of hands and more labour to drain, than new establishments can afford.”²⁹ And Aylmer Lambert, Vice President of the Linnean Society in London, cited Carver and Kalm when he told members that *Zizania aquatica* “might be sown with some advantage where no other grain will grow, in many shallow pieces of water in Great Britain and Ireland, especially in the latter country, where I have seen several extensive lakes which appear well suited for the purpose.”³⁰

In order to acclimatize and domesticate wild rice for reliably feeding the hungry masses or for delivery to Ireland and the antipodes, improvers first had to understand how to reliably export it to Britain. Most *Zizania* seeds sent from North America did not survive the transatlantic journey. Lambert reported that “the seed of *Zizania aquatica* in a vegetating state from America was long a *desideratum* among the botanists of this country,” but “although seeds were received here at different times, yet none of them grew.”³¹ Among the first problems improvers encountered was whether to send entire stalks of the plant or only its seed and, in either case, how it should be packaged for shipment. Once they ascertained that it was not a perennial plant some

²⁸ White, “Wild Rice,” 128; cf. Lisbet Koerner, *Linnaeus: Nature and Nation* (Cambridge: Harvard University Press, 1999), 116; Baxter, “On the North American Wild Oats,” 390.

²⁹ White, “Wild Rice,” 128 (including direct quote from Carver 1778).

³⁰ Arthur Young, “*Zizania Aquatica*,” *Annals of Agriculture* 17 (1792): 31-33; Carver, *Three Years Travels* 1st ed. (1778), preface, 543; Aylmer Bourke Lambert, “Observations on the *Zizania aquatica* (Read December 6, 1803),” *Transactions of the Linnean Society of London* (London, 1804), vol. 7: 264-265.

³¹ Lambert, “Observations on the *Zizania aquatica*,” 264-265.

decided that *Zizania* seeds, like those of most annuals, should be stored dry to remain viable during dormancy.³²

White initially asked his supplier in Quebec for entire stalks, thinking it would be “much more likely to retain its vegetative faculty” in this form. His correspondent was Nooth, an Edinburgh-trained physician and Fellow of the Royal Society, who came to North America in 1779 as superintendent general of the British and Foreign Hospitals. From 1788 to 1799 he headed the Royal Hospital in Quebec, helped found the Quebec Agricultural Society, hosted Liancourt and Michaux, and corresponded regularly with Banks.³³ Banks, Baxter, Nooth, and White considered a number of methods for transporting *Zizania* seeds to Britain: drying seeds “without smoke” in anticipation that they would sprout during shipment; stuffing “well-dried” bottles “with the ripe ears, cork them tight, and dip the noses in melted wax”; or filling bottles with unprocessed wild rice seeds floating in water, wet moss, or “the mud of the River where they grow.” The wet method proved to be necessary but insufficient to ensuring seed viability. Eventually, once Nooth realized that *Zizania* seeds required a moist, cold medium like the frozen waters in which they naturally wintered, he began sending Banks seeds drenched in cold water or sphagnum moss packed in sealed jars.³⁴

The more perplexing challenge was how to recreate the proper growing environment. Baxter sowed *Zizania* in a variety of wet conditions, “in pots in a pond or tank; some in hot beds, &c. &c. and some in water only, within the house.” He also tried what he considered “the most favourable situation”: planting seeds in a pot of water set inside a tank in his garden. These seeds, he was “sorry to say” did not sprout, “nor do I expect them.” Yet Baxter was undeterred because he knew of seeds that “succeeded to a wonder in a pond in the neighbourhood of Paris.” These plants were “unluckily destroyed,” but only as a result of “a gardener’s cleaning out the pond who happened to know nothing of the matter.” Young also attempted to grow Baxter’s *Zizania* seeds, “but none vegetated.” He was heartened to report, however, that the seeds he sent to a Bohemian estate had grown so well that his correspondent requested 100 pounds of additional seed.³⁵

Banks planted wild rice in the open air in his Lincolnshire fens and in an artificial pond at Spring Grove into which household wastewater was discharged. Following several unsuccessful attempts, in 1790 Nooth supplied jars of seed that “produced strong plants” at Spring Grove. By the third year, the plants were “sensibly stronger than their parents,” and “in this manner the plants proceeded, springing up every year from the seeds of the preceding one, every year becoming visibly stronger and larger, and rising from deeper parts of the pond.” By 1804, after fourteen generations of self-seeding, the entire pond was covered with six-foot tall stalks standing “as thick as wheat grows on a well managed field.”³⁶

Banks’ simile implies that he thought wild rice could be roughly interchangeable with wheat. By making this imported grain “as vigorous as our indigenous plants are, and as perfect in

³² Young, “*Zizania Aquatica*,” 33.

³³ *Papers and Letters on Agriculture* (Quebec, 1790), 1; *Recueil de lettres autographes signées du docteur J. Mervin Nooth, 1789-1799, 1902, Ville de Montréal—Section des archives* [hereafter Nooth-Banks Letters].

³⁴ White, “Wild Rice,” 127-128; Nooth to Banks 25 Oct. 1789, 5 Nov. 1790, Nooth-Banks Letters; Lambert, “Observations,” 264-265; P. M. Hayes, “The Domestication of American Wildrice,” *Economic Botany* 43: 2 (April - June, 1989), 203-214.

³⁵ Young, “*Zizania Aquatica*,” 33; Baxter, “On the North American Wild Oats,” 390-392.

³⁶ Banks, “Some Hints”; idem., “An Account of the Method of Cultivating the American Cranberry,” *Transactions of the Horticultural Society of London* vol. 1, 75; 2 November 1791, Nooth-Banks Letters; Lambert, “Observations on the *Zizania aquatica*,” 264.

all its parts as in its native climate,” he was producing reliable seed stock for other growers. In this sense, his experiment with *Zizania* was typical of acclimatization as it had been practiced, with less deliberation or theoretical motivation, since the beginning of colonization. In the eighteenth century, naturalists became more alert to the idiosyncrasies and limitations of local environments. Successfully transplanting a species required understanding the commensurability between its native and adopted climate. Descriptions of seasonal shifts and air temperatures proliferated in the early modern period in published natural histories, travelogues, and chorographies. After the late seventeenth century, they often appeared at the beginning of such texts, following a template made explicit in Robert Boyle’s instructions to gentlemen, seamen, and other travelers for recording “the natural history of a country great or small.”³⁷

Despite this accumulating information, knowledge about climates remained equivocal. In practice, naturalists’ methodology for understanding climate was more limited and subjective compared with the empirical study of other aspects of the physical world. While naturalists collected, contained, preserved, transported, and compared specimens of minerals, plants, and creatures, they could not so easily isolate, objectify, and circulate weather or climate. Instead, they relied on three indirect approaches. First, to predict local conditions in distant locations they referred to the ancient model of frigid, temperate, and tropical zones based on latitude—despite the fact that it turned out to be a faulty guide to American climates. Second, naturalists developed qualitative and quantitative proxies: descriptive reports, weather diaries, and instrumental measurements of air temperature, pressure, humidity, and wind speed using thermometers, barometers and other devices of varying reliability. Finally, they extrapolated conditions from observations of transoceanic ecological exchanges—the success or failure of immigrants to adapt in new environments, an ongoing process of biogeographical shuffling enabled by empire that offered clues to understanding the relative healthfulness and other characteristics of local climates. Acclimatization thus served to naturalize settler populations, diversify imperial trade, and provide a method of comparing habitats.³⁸

For Banks, this third mode of thinking about climates—their capacity to sustain traffic in living things—was paramount to improving nature for empire. Likewise, the Horticultural Society’s primary mission was to learn how best “to produce the necessary changes in the constitution and habit of plants” imported from abroad to augment animal acclimatization societies “established, with success, in almost every district of the British Empire.” Banks reinforced this objective in the opening lines of “Some Hints” when he wrote that nothing was “more interesting to the public, or more likely to prove advantageous” than the naturalization of species outside their home range.³⁹

Most scholars assume that Banks believed in an unchanging climate: the stable geography of cold, temperate, and hot climates provided a natural order for the imperial economy—wool produced in Britain, timber in New England, sugar in the West Indies—and acclimatization served as a principal technique for enhancing it. While Banks was thoroughly committed to improving and moving species across the empire, he seldom extended this interventionist approach to climate, as did many of his contemporaries. Prominent figures in

³⁷ Robert Boyle, *General Heads for the Natural History of a Country Great or Small Drawn Out for the Use of Travellers and Navigators* (London, 1691), 2-3.

³⁸ Jonsson, *Enlightenment’s Frontier*, 60-68; Martin J. S. Rudwick, *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution* (University of Chicago Press, 2005), 75-80.

³⁹ Thomas A. Knight, “Introductory Remarks Relative to the Objects which the Horticultural Society Have in View (Read April 2, 1805),” *Transactions of the Horticultural Society of London* vol. 1 3d ed., (London: 1820), 3-4; Drayton, *Nature’s Government*; Gascoigne, *Science in the Service of Empire*.

America, Scotland, Ireland, and Africa thought the climate had recently changed for better or worse, becoming milder and less humid: the air was warmer in northern regions, cooler in the tropics, and drier everywhere that had been subject to forest clearance and improvement. Banks knew about these theories not only from the published work of well-known writers such as Hume and Jefferson, but also from private correspondents who wrote to him about local climate amelioration. Harvard professor Samuel Williams announced to Banks he was “convinced that the heat of the earth has been gradually increasing” following a century of colonization in New England. Nooth speculated that the turn to milder weather in Quebec, documented in his journal of daily thermometer readings and anecdotes from “the oldest inhabitants,” was due to another cause: volcanic activity in the province. Other colonial naturalists were skeptical of climate change, particularly the possibility of improving the northern climate, “which is much worse,” wrote Mitchell, “than is generally apprehended.” Some, like Mitchell and Long, altogether rejected climatic improvement, believing “there is nothing to be done against nature”; others attributed the “more inconstant” winter weather to mere variability. Despite the currency of discussions about climate change and Banks’ proximity to them, he remained mostly silent on the topic.⁴⁰

Banks’ *Zizania* experiment offers the earliest glimpse of his considerable interest in understanding and responding to the climatic instability he perceived through the end of this life. In 1789, White questioned “whether the summer would be warm or long enough in the Northern part of Europe to bring this sort of corn to perfection.” Banks managed to do it. However, in his breathless 1805 lecture, Banks was not only boasting about a gardening victory. He was also airing his concern about recent changes in England’s climate: he intended to make wild rice frost hardy enough to withstand what seemed to him to be the country’s unseasonable temperatures. *Zizania* acclimatization also suggested a program for toughening other “natives of warmer climates” so they could be grown in other places subject to cold, wet summers. Buoyed by his success with a foreign plant initially “scarce able to endure the ungenial summer of England,” Banks wanted to test “the theory” by applying his cold-hardening methods to other “tender plants” to be grown in Britain, Ireland, Canada, and southern Australia.⁴¹

Banks could not have known that he was living at the end of an era of global cooling, which modern climatologists dubbed the Little Ice Age, let alone its geographical and temporal scope or depth of temperature variations. Instead, Banks combined his experience with an eclectic range of scientific explanations for climatic instability. As Royal Society president, Banks was familiar with the latest work in geology. He tacitly accepted historical accounts for the fossils of extinct creatures found in Siberia and other northern regions that seemed to correspond to living species in the tropics, the most prominent of which was George-Louis Leclerc, comte de Buffon’s argument for global cooling. Naturalists had begun to piece together geological evidence suggesting that continents, oceans, and climates had undergone profound physical changes over millennia, on a much larger timescale than the biblical account allowed. A premise for these secular accounts of long-term climate change was that the Earth was originally very hot, like the

⁴⁰ Samuel Williams to Joseph Banks, 16 September 1789, Box 2, Samuel Williams Papers, Special Collections, University of Vermont Library; 2 January 1792, Nooth to Banks, Nooth-Banks Letters; House of Commons, “Report from ... the Sierra Leone Company,” (London, 1802), 744; Mitchell, *Present State*, 166-167; Noah Webster, “A Dissertation on the Supposed Change in the Temperature of Winter, (Read before the Connecticut Academy of Arts and Sciences, 1799),” *Memoirs of the Connecticut Academy of Arts and Sciences* (New Haven, 1810), vol. 1: 68. Grove, *Green Imperialism*; Jonsson, *Enlightenment’s Frontier*; Brant Vogel, “The Letter from Dublin.” *Osiris* 26.1 (2011): 111–128; James R. Fleming, *Historical Perspectives on Climate Change* (New York: Oxford University Press, 1998), 11-32. Nooth was wrong: there are no volcanoes in Quebec.

⁴¹ Banks, “Some Hints”; White, “Wild Rice,” 128.

Sun, and had gradually cooled. At the same time, others insisted that deforestation and agricultural improvement had warmed cold climates in the Northern Hemisphere from the Scottish Highlands to North American colonies. Buffon offered a compelling synthesis: in the deep past, global cooling began in the North Pole and proceeded southward, a process of displacement that forced the migration and dispersal of plants and animals through relatively warmer latitudes in Eurasia, Africa, and the Americas. In the eighteenth century, glaciers were continuing to encroach on habitable climates. Buffon accepted that agricultural improvement could stall, perhaps for millennia, but not prevent the inexorable process of cooling that would eventually engulf the whole earth.⁴²

Banks was also alert to the environmental implications of new work on the physics of heat developed by Scottish chemist John Leslie, with whom he communicated after the publication of Leslie's *An Experimental Inquiry into the Nature and Propagation of Heat* (1804), in which Leslie explained his opposition "to the favorite hypothesis of the celebrated Buffon." In Leslie's "opinion the earth is growing continually warmer" or, at least it was "unquestionable, that the climate, over the whole of Europe, has assumed a milder character." Europe's warming climate resulted from "extremely slow" melting glaciers in the Alps, where he had recently done fieldwork, as well as in the Arctic. "Human industry" might reduce seasonal extremes, but it had "no influence whatever in altering the average of temperature." Banks never explicitly endorsed Leslie's explanation for climate warming, but he wrote to congratulate him on this work.

Through the next decade, Banks maintained that the precise causes of climate change were "inexplicable to us at present." If Banks remained agnostic, the widespread circulation and combined force of various ideas about climate change, together with his sense that Britain's climate had become "perpetually" colder, do help make sense of an otherwise baffling line in his 1805 essay on wild rice in which he alluded to a climatic theory of species migration in the distant past. He explained that his method for hardening *Zizania* reinforced that there was "some reason to believe, that every" tropical or temperate plant acclimatized in Britain was actually "originally the native of a cold climate, though introduced to us through the medium of a warm one." Banks' success with wild rice, the fact that his plants lived through what London's "ungenial" climate, suggested that acclimatization could also be used for manipulating a plant's latent resilience to variability. Whether Banks and his colleagues believed that colonial climate warming or the intensifying "cold and unsteady climate of Britain" was an indication of variability or permanent change, what mattered to them immediately was to prepare for its possible continuation. Banks urged naturalists to follow his example for producing hardy plants that could reliably weather such changes as far away as the frost-prone southern coast of Tasmania.⁴³

His attention to climatic instability, which surfaced in "Some Hints," continued through the next decade, peaking dramatically in 1817, after the so-called year without a summer. Banks and Leslie were intrigued by the whaling captain William Scoresby's 1816 reports rising sea temperatures and the exceptionally large hunks of ice floating off Greenland's western coast. In 1817, Banks wrote to Scoresby that the "decrease of the Polar Ice" in the Arctic had important

⁴² George-Louis Leclerc, comte de Buffon, *Les époques de la nature*, in *Histoire Naturelle* vol. 5 (Paris, 1778), 241; Rudwick, *Bursting the Limits of Time*.

⁴³ John Leslie, *An Experimental Inquiry into the Nature and Propagation of Heat* (London, 1804), 181-182, 536-37; 19 April 1805, Banks to Leslie; Banks to Robert Saunders Dundas, in Neil Chambers, ed., *The Letters of Sir Joseph Banks: A Selection, 1768-1820* (London: Imperial College Press, 2000), 291; Thomas A. Knight, "Observations on the Method of Producing New and Early Fruits (Read November 4, 1806)," *Transactions of the Royal Horticultural Society*, 30-31; Banks, "Some Hints," 25.

implications for understanding climate change. Employing language strongly reminiscent of his remarks about the British climate a decade earlier, Banks believed Scoresby provided an alternative explanation for “the Frosty Springs & Chilly Summers we have been Subject to for many years Past.” The cooler seasons had been a side effect of melting glaciers: “If” cool weather was “caused by the increase of Ice which seems to have accumulated for Many years past,” then it would “seem to Prove a diminution of Cold in the upper Regions of the air.” The fact that “the Atlantic has been unusually clogged with Islands of ice” invalidated Buffon’s theory of glaciation and, Banks cautiously hoped, confirm Leslie’s theory about glacial retreat and climate warming. As he wrote to the Horticultural Society’s president a few days later: “Possibly, I am too sanguine, but as I have always attributed the increasing Coldness of our Climate to the increase of Polar Ice, I feel a hope that we should be indulged with better Springs than have lately been provided for us.”

Banks immediately grasped the broader implications of a sustained warming trend—“a matter in my judgement of Great importance to the Prosperity of this Countrey.” Melting glaciers signaled that Britain should rush to claim possession of circumpolar territories. In November 1817, Banks recommended that the Admiralty take action by ordering new surveys of the Arctic. There was now “ample proof” he wrote to Robert Dundas, First Lord of the Admiralty, “that new sources of warmth have been opened and give us leave to hope that the Arctic seas may at this time be more accessible than they have been for centuries past.” Climate change was “not only interesting to the advancement of science, but also to the future intercourse of mankind and the commerce of distant nations.”⁴⁴

While Banks acted quickly on his prediction that warming would stimulate another imperial scramble for the Northwest Passage, it is unknown whether his new optimism diminished his interest in wild rice. Through 1819, he maintained a patch of wild rice at Spring Grove, where he appointed a gardener experienced in cold climate horticulture (the man had managed imperial gardens in Russia). But the plants in Lincolnshire he had intended to use for popularizing wild rice “as a food for the poor,” died out when he drained the fens. Despite Banks’s confident outlook when he published “Some Hints,” he never tested his vision for establishing wild rice plantations across the cooler temperate climates of the empire.⁴⁵

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The short story of *Zizania*’s transatlantic career and abortive attempts to naturalize it in Britain contrasts with the global commodity histories of domesticated plants like potatoes, corn, wheat, and white rice. Colonial botanists, farmers, and slaves went to great lengths to learn how to transform these foods into staples or cash crops through long-distance transfer, acclimatization to nonnative environments, and extensive cultivation for domestic or colonial consumption, including as crucial provisions for plantation colonies. Improvers believed that *Zizania*, although it was an undomesticated plant, could be subjected to much the same processes, assuming that it was a feasible goal because it had succeeded in colonizing so many North American

⁴⁴ 8 September 1810 and 22 September 1817, Banks to Scoresby; 26 September 1817, Banks to Thomas A. Knight; 20 November 1817, Banks to Dundas, in Chambers, *Letters of Sir Joseph Banks*, 291, 334 (inexplicable).

⁴⁵ Chambers, *Letters of Sir Joseph Banks*, 332-333 (footnote on gardener); Richard A. Salisbury, “Some Account of the *Chiogenes Serpyllifolia*, or Snowberry, a Fruit Nearly Allied to the Cranberry (Read Dec. 6, 1813),” *Transactions of the Horticultural Society of London* vol. 2 (London, 1822), 95; Jenks, *The Wild Rice Gatherers*, 1037 (1819); John Smith, *A Dictionary of Popular Names of the Plants which Furnish the Natural and Acquired Wants of Man* (London: Macmillan, 1882), 83.

environments, seemingly on its own. So why did they abandon this project?

Part of the answer lies in the broader landscape of Banks' sponsorship of science in Britain and the empire during his long tenure as President of the Royal Society. All the individuals interested in wild rice were connected to Banks. Henry corresponded with him about the utility of wild rice in 1781; Henry, Carver, and Long all dedicated their narratives of travel in the Great Lakes Region to Banks.⁴⁶ Historians have rarely discussed Banks' relationships with North Americans interested in natural history. Scholarly neglect of Banks' connections to American naturalists in the late eighteenth century stems in part from the coincidence that he began his tenure at the Royal Society during the American Revolutionary War, which obscures two significant features of Atlantic history at the turn of the eighteenth century: one, scientific networks became increasingly international in this period, including the crucial relationships that naturalists in the new nation maintained with British patrons after independence; and two, these international networks facilitated and encouraged ecological exchanges, especially of plants that might prove useful for basic subsistence or profitable as commercial crops.

Despite these links, however, northern species were relatively negligible objects of British metropolitan interest. Compared to the much larger imperial project of acclimatizing and improving a wide variety of plants and animals in the far more productive growing environments of the tropics and subtropics, these attempts in promoting the study and economic botany of northern species were meager. Wild rice acclimatization was only one of many projects discussed among Banks' large circle of naturalists around the world and one of few such projects that focused on species from the northern regions of British territories.

The minor status of northern acclimatization experiments in imperial science is reflected in their small numbers and their relative obscurity. In his early trips to Newfoundland and Labrador in 1766, Banks had been impressed by the quality of garden produce in northern North America, but his trip to the South Pacific with Cook just a few years later seems to have convinced him that even England's climate was too "changeable" to compete with the botanical potential of tropical and subtropical flora in the West Indies, Africa, South Asia, and Oceania which were increasingly important to the empire in the nineteenth century. The small proportion of material related to species from colder temperate climates compared to tropical climates in his papers suggests that, at least in his official roles, Banks became relatively less interested in plants like *Zizania*.⁴⁷ Aside from his involvement in Iceland and an enduring fascination with the possibility of a northwestern passage to the Pacific Ocean, northern territories were of comparatively minimal interest to the imperial enterprise or Banks and, therefore, to most naturalists and improvers under his patronage, perhaps especially once he accepted the positive news about climate warming.⁴⁸

But low priority only partly accounts for why improvers relinquished wild rice. *Zizania's* unique physiology was incompatible with their grand designs. It is an exceptionally finicky, erratic plant. Although naturalists solved the problem of seed storage for export, they did not entirely understand all of the plant's characteristics, including its unpredictable responses to

⁴⁶ Carver, *Three Years Travels*, preface; *Recueil de lettres autographes signées d'Alexander Henry et John Henry*, Ville de Montréal—Section des archives [hereafter Henry-Banks Letters]; Henry, *Travels and Adventures*, [iii]; Long, *Voyages and Travels*, preface.

⁴⁷ Patrick O'Brien, *Joseph Banks: A Life* (London: Harvill Press, 1987), 52-57, 91, 128.

⁴⁸ Jonsson, *Enlightenment's Frontier*; Sverker Sorlin, "Ordering the World for Europe: Science as Intelligence and Information As Seen from the Northern Periphery," in *Nature and Empire: Science and the Colonial Enterprise*, ed. Roy MacLeod, *Osiris* 15 (2001), 51-69.

vagaries of weather. Though *Zizania* is an annual plant capable of self-seeding, germination is highly variable, subject to microclimatic and seasonal variations, and shifts in water level, which determines the depth to which seeds sink into muddy soils. As Bartram noted, the fruit sometimes ripens “very unevenly and not all simultaneously.” Heavy rains in late spring may “drown” seeds; exceptionally hot, dry summers inhibit germination and fruiting. In any particular wild rice stand, harvest failure has typically occurred every four years.⁴⁹

Nooth noticed some of the plant’s responses to climatic variation. In 1791 he told Banks he was “mortified to find that there is reason to believe that the Seed will not often ripen in Britain.” He decided that *Zizania* required North America’s extreme conditions: cold winters with hard frost and very hot, humid summers. Nooth also noted that, when the plant blossomed under water, as he had observed that summer in northern Quebec, “even the Heat of a Canadian Summer is not capable of bringing it to maturity.”⁵⁰ Banks and other naturalists might have concluded that their experiments failed due to subtle but decisive climatic differences between America and England’s climates.

Botanists’ inability to control wild rice probably resulted as much from their narrow focus on manipulating the plant’s environmental requirements as on their unwillingness to learn Native American horticulture. If they had consulted Indian cultivators, they might have predicted the difficulties in breeding *Zizania*.⁵¹ Native American approaches to wild rice were tolerant of the plant’s irregular patterns of sprouting and growth. As a result of multiple factors, wild rice yields have been historically unpredictable and highly localized. Sometimes harvest failure was critical enough to cause nations to migrate. But Indians who exploited wild rice beds cultivated a diverse range of staples. In a bad rice year, they could rely on corn, meat, or non-local foods acquired through trade. Their food culture was structured by a high degree of responsiveness and adaptability to prevailing but necessarily variable conditions. They manipulated wetlands to ensure better harvests, but they also moved camp when circumstances changed or they found more predictable areas of food production.⁵²

By contrast, British naturalists sought to make the plant reliably productive no matter what the prevailing conditions. Although they admired its vigor as a wild plant, they ultimately wanted to domesticate it.⁵³ Historians have long noted that British naturalists followed Linnaeus

⁴⁹ Minnis, *People and Plants*, 179, 202-204; Doolittle, *Cultivated Landscapes of Native North America*, 24-27, 34, 46; Vennum, *Wild Rice and the Ojibway*, 42; John B. Moyle, “Wild Rice in Minnesota,” *Journal of Wildlife Management* 8.3 (July 1944), 177-184.

⁵⁰ 2 November 1791, Nooth-Banks Letters.

⁵¹ Susan Scott Parrish, *American Curiosity: Cultures of Natural History in the Colonial British Atlantic World* (Chapel Hill: University of North Carolina Press, 2006); S. Max Edelson, “Beyond “Black Rice”: Reconstructing Material and Cultural Contexts for Early Plantation Agriculture,” *American Historical Review* 115: 1 (Feb. 2010), 125-135.

⁵² John L. Riley, *The Once and Future Great Lakes Country: An Ecological History* (Montreal: McGill-Queens University Press, 2014), 12-13 (camps near food sources), 17.

⁵³ Most of wild rice in today’s supermarkets is a domesticated hybrid with a glossy, shatterproof outer layer that allows the rice to be mechanically harvested and processed. It is this variety, developed with difficulty in the late nineteenth through mid-twentieth centuries by breeders at the Royal Botanic Gardens, Kew and the United States Department of Agriculture, that is now grown on a commercial scale in California, Minnesota, Manitoba, Australia, and Hungary. George Vasey, *The Agricultural Grasses of the United States* (Washington, DC: USDA Botanical Division Special Bulletin 1889), 47; W. J. Bean, “The Canadian Wild Rice. (*Zizania aquatica*, Linn.),” *Bulletin of Miscellaneous Information (Royal Gardens, Kew)* 9 (1909), 381-385; J.H. Holland, “Food and Fodder Plants,” *Bulletin of Miscellaneous Information (Royal Gardens, Kew)* 1/2 (1919), 22.

in trying to apply knowledge about climate to orchestrating species transfers for the benefit of the nation and empire. What naturalists' particular interest in wild rice reveals, however, is that they also tried to grapple with the possibility that climates were undergoing continuous, perhaps permanent, change. If Banks became certain only in 1817 that climatic instability was real, his earlier experiments with *Zizania* suggest he was already exploring a contingency plan for his belief in "a considerable change of climate." Neglecting Native American practices, the exploitation of *Zizania* on a larger scale would be the realization of a biblical and imperial dream of guaranteed abundance: a self-reproducing, prodigious staple impervious to unexpected changes, including "inexplicable" changes in the climate.⁵⁴

Zizania never fulfilled this dream. The very idiosyncrasies of the plant that naturalists admired prevented such standardization. In spite of its many apparent advantages, it did not conform to acclimatizers' demands and expectations. Wild rice might have become the consummate alternative foodstuff of the British Empire, but when improving it was not as simple as it first appeared, Banks and other enthusiasts simply gave up. *Zizania* briefly inspired their beliefs in the malleability and improvement of nature. Ultimately, it confronted them with the limits of their ability to subsume local climates and the species they deemed useful into the political economy of empire.

⁵⁴ Banks to Robert Saunders Dundas, in Chambers, *Letters of Sir Joseph Banks*, 334.