

INVASIVE OPPORTUNITIES AND ECO-CULINARY ACTIVISM

The Harvesting, Marketing and Consumption of Tasmanian Sea Urchins

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Abstract

Since the 1960s the *Heliocidaris erythrogramma* (purple sea urchin), which has been observed to be endemic to the Tasmanian coastline since the earliest stages of European visitation and settlement, has been joined by a second species, the long-spined sea urchin (*Centrostephanus rodgersii*). The new, invasive species has been significantly disruptive of Tasmanian marine environments and has been the subject of numerous research projects and, more recently, ventures aimed to limit its spread. This article addresses the role of the sea urchin in 20th-21st Century cuisine, fisheries and aquaculture in Tasmania and the manner in which consumption of the invasive sea urchin has been promoted as a strategy to control its spread in coastal waters. The article discusses some of the complexities of such eco-culinary activism with particular regard to the Tasmanian Museum of Old and New Art's 'Eat The Problem' event in Summer 2012-13 and, in parallel, evaluates the extent to which sea urchin consumption might be developed as a facet of culinary tourism in the state.

Keywords

Sea urchins, Tasmania, invasive species, eco-culinary activism

Introduction

In November 2012 Tasmania's iconoclastic Museum of Old and New Art (MONA) announced the theme of their summer market season as 'Eat the Problem', a theme and approach that MONA curator Kirsha Kaechele described as focusing on "solving ecological problems by eating invasive species—a kind of culinary ecological engineering" (MONA Market Blog, 2012: online). Prime amongst the culinary delicacies available at the markets were sea urchins. The prominence of the sea urchin in MONA's typically colourful take on state environmental issues (discussed further in Section IV) reflects the extent to which sea urchins have invaded the marine spaces and public consciousness of Australia's southern island state.

Sea urchins are small, spiny, orb-shaped marine animals that are widespread throughout the world's oceans, living in a variety of eco-systems ranging from shallow tidal waters to deep ocean slopes and floors. Sea urchins mainly consume algae but their diet may also include small invertebrates. The gonads of male and female sea urchins (most often—but erroneously—referred to as sea urchin *roe*) are prized as a delicacy in various cold and temperate water locations. In Japan the product is referred to as *uni* and is consumed raw, often served on rice as sushi. In countries such as Italy and in Chile, the gonads are marinated in lemon juice, referred to as *ricci* in Italy and as *erizos* in Chile. Known in France as *oursin*, the dish is a feature of traditional coastal Provençal cuisine. In New Zealand sea urchins are a traditional Māori food known as *kina*.¹ In recent years the dish has also begun to attract the attention of mainstream western restaurateurs; a *New York Times* article published in 2009, for instance, identified sea urchins as being the "latest rich plaything of chefs", characterised the product as evoking "the flavor of caviar, the trembly texture of panna cotta and the briny but bracing strangeness that comes with eating live oysters" and commenting that "like foie gras, egg yolks and pork belly, sea urchins have a lusciousness and weight that make chefs drool" (even quoting one chef's characterisation that "the mouth-feel is pure cholesterol") (Moskin, 2009: online). Similarly an article on the website CulinaryTrends.Net (which appears with the byline 'Inspiration for Executive Chefs'), declares that "uni has become the 'it' ingredient of contemporary dining, gracing the plates of restaurant goers dining in

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California, French and Italian-inspired restaurants” (2010: online). In addition to their textural aspects, sea urchin gonads are a healthy food, high in protein, in Omega 3 fatty acids and minerals such as zinc and calcium and vitamins.²

In terms of wholesale and retail of the product, sea urchins do not easily sustain their quality when transported whole (unless opened and eaten relatively rapidly) and, as a result, sea urchin gonads are commonly extracted from the shell (and separated from adjacent flesh). They are usually retailed and exported as either intact product, as fresh fragmented product (known as *vani* in Japan) or else processed as pastes. In global terms Japan is the biggest consumer and imports the gonads of various species from countries such as the United States and Korea to supplement those caught in its own waters. In recent years Tasmania has joined the list of regions supplying Japanese wholesalers, such as Tokyo’s iconic Tsukiji fish market (although the high exchange rate of the Australian dollar in recent years has moderated Tasmanian suppliers’ export expansion).



Figure 1 – Raw sea urchin gonads (with lemon) on ice in a cleaned out sea urchin half shell served as a decorative entre

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The Tasmanian Industry

*In the early days of Hobart Town, whales were so plentiful in the River Derwent they endangered fishermen. Oysters were so prolific they became one of the colony's first exports, while their shells provided lime for the mortar in many of the city's first official and commercial buildings. Today, whales are returning to the Derwent; the farmed oyster industry produces 3.6 million dozen oysters worth \$20 million a year and Tasmanian salmon, ocean trout, scallops, mussels and other seafood are on menus around the world. Now the State is adding two introduced marine pests – wakame (*Undaria pinnatifida*) seaweed and long-spined sea urchins (*Centrostephanus rodgersii*) – to its commercial menu. (Phillips, 2012: online)*

This above quotation, extracted from an article in the monthly *Brand Tasmania Newsletter*, treads a delicate balance between emphasising the environmental credentials of the island and its waterways (an important aspect of Brand Tasmania's 'Green and Gourmet' packaging of its state) and its current exploitation of invasives. In marketing terms, the development of Tasmanian sea urchin harvesting has to be carefully managed so as not to damage the state's environmental image and brand by tarnishing it through association with invasives such as the long-spined sea urchin (*Centrostephanus rodgersii*), which can decimate kelp forests and destroy the habitats of small sea animals and the larger fish that follow up the food chain (threatening Tasmania's lucrative abalone and rock lobster fisheries). Early publicity around the sea urchins' population rise tended to the apocalyptic, the Australian Broadcasting Corporation (ABC) radio program 'The World Today', for example, ran an item on the topic, broadcast on August 23rd 2002³, that opened with an introduction by compere Eleanor Hall that declared:

The animals create a moonscape of bare rocks and black spikes, destroying the kelp and stripping algae from the rocks until they're the only creature that can survive in the barren ocean floor.

This has been continued to the present with a 2011 item on ABC TV Tasmania's 7pm News featuring an interview with Dave Allen (from Seafoods Tasmania) who was quoted as saying:

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It's like a nuclear holocaust basically, going off underwater, there's basically nothing left but bare rock and sea urchins.⁴

Recent research, much of which has been undertaken by staff and doctoral students at the University of Tasmania, led by Professor Craig Johnson, has supported such characterisations by documenting the extent of the problem and the extent to which over-fishing of urchin predators, such as the lobster, has allowed sea urchins to gain such a stranglehold on particular locales, creating the 'barrens' referred to above.

Given the lack of evidence to identify indigenous Tasmanians' consumption of sea urchins in the pre-contact era⁵, the earliest documented attempts at sea urchin harvesting as anything other than an occasional subsistence activity date from the 1960s, with harvesting of the endemic Australian purple sea urchin (*Heliocidaris erythrogramma*). The author of a 1996 report on the consolidation of the Tasmania sea urchin fishery observed that more sustained enterprises began in the early 1980s, supplying a small volume to Melbourne markets, and then expanded in 1986 when three divers began to export regularly to Japan, "sparking a speculative demand for licenses" that resulted in 250 commercial licences being awarded in that year. By the mid-1990s, the author identified that there were:

about 15 commercial divers working on sea urchins between St Helens on the east coast and Dover in the south. Most are part timers, but about 6 work systematically for not less than eight months a year, each aiming to land an average of 1 tonne (live weight) a week. (Sanderson, 1996: 5)

In addition to identifying that there was "scope to increase the size and returns to the community of the Tasmanian urchin fishery" (ibid: 3), the author's report identified an associated benefit to harvesting sea urchins which "would include husbandry of sheltered coastal reef areas where there is an over abundance of urchins resulting in 'barren' areas" (ibid)—and specifying that the latter areas comprised "up to twenty five percent of all sheltered coastal reef areas between Coles Bay on Tasmania's east coast and Southport in the south" (ibid). As he also noted, such "urchin husbandry

will not occur through the current management regime and requires a coordinated effort involving processors and divers” (ibid).

While concerted “husbandry” did not develop to any appreciable extent in the 1990s, this principle has informed discourse around the more recent revival and expansion of the Tasmanian sea urchin fishery and, in particular, its focus on harvesting the invasive long-spined sea urchin. This subtropical/temperate species is endemic to the east coast of continental Australia, ranging from southern Queensland to southern New South Wales. Its diet includes algae and seagrass and its consumption of these within its endemic range serves to create a patchwork of habitats that are important to maintaining aquatic biodiversity. Research by Johnson, Ling and Ross et al. (2005) suggests that the species initially became established in Tasmanian waters in the mid-1960s, when a slight warming of the East Australian Current began to allow larvae to be transported south and successfully reach maturity in southern waters. With this tendency likely to be exacerbated by global warming, the conditions conducive to its consolidation and spread look likely to continue for the foreseeable future. On stretches of Tasmania’s east coast it has now become the dominant invertebrate in shallow-water reef areas, creating ‘barrens’ devoid of substantial sea plant forms and microalgae, due to its avaricious grazing of these food sources and the low density of predators such as the (now over-fished) rock lobster that might otherwise limit sea urchin numbers.

The *Brand Tasmania Newsletter* story referred to in the Introduction (above) was one of a number of press items that reported on the Seafoods Tasmania company’s entry into the sea urchin business in 2011–2012. These stories tended to suggest that sea urchin exploitation was new. In this, Brand Tasmania’s coverage essentially repeated earlier news moments. In 2008, for instance, Qantas’s ‘Travel Insider’ newsletter ran an item headed ‘Tasting Tasmania’ that featured a large coloured photo of a sea urchin in a net and went on to discuss the product supplied by Aquanec Marine, in Franklin, which has been operating since the early 1990s. Similarly, in 2011 The Hobart *Mercury* ran a news item under the headline ‘Urchin invaders prove tasty’ that described how Scamander fisherman David Allen was harvesting them to sell in Sydney fish markets and how local company Mures was processing urchin gonads

with an eye to a local market (Glaetzer, 2010). In an online debate on the *Mercury's* webpage following the publication of Glaetzer's article, readers proffered a number of responses, including the characterisation that:

Tasmanian urchin roe IS already being sold overseas at amazingly expensive prices, and they are not sent as whole live animals to japan. That would involve exporting a whole animal. The roes are graded locally and arranged in cute little wooden boxes, and it costs a fortune to buy in japan. All the money is kept by processors and exporters and minimal returns for divers and processing staff locally as you would expect. Its another ripoff industry that japanese exporters have been making oodles of cash by underpaying locals for decades. ('hugoagogo', May 19)⁶

While the issue of payment for divers in various product areas in Tasmania merits further research, the issue concerning profitability and export-orientation is similar to that to other premium product, such as bluefin tuna, in that local suppliers can obtain high prices from customers in locations that place a higher value on the product due to the established market niche and/or scarcity in that location than in home markets where (as in the case of both bluefin tuna and sea urchin) raw fish is less well established as a high cost culinary item. As a result of the high demand from the Japanese market there is no pressing commercial logic for sea urchin harvesting operations to substantially develop local Tasmanian and/or Australian markets for their product. The sales made to local retail operations constitute a minor element of their market (aside from as 'hedge' against temporary downturns in export to Japan caused by the high Australian dollar). Notably in this regard, despite Tasmania's reputation as a gourmet destination, local chefs have neither perceived a significant rise in interest in sea urchin dishes in recent years nor met with unqualified success in introducing them as elements in other dishes.⁷ Chefs have also cited uncertainty of seasonal supply and variability in quality as being factors that inhibit their culinary engagement with the food.⁸ The larger metropolitan market of Sydney, with its concentration of Japanese restaurants, has proven a more reliable national market providing companies such as Seafoods Tasmania with around 70% of their national market.

Festivals and Theme Events

Culinary tourism is now a well recognised phenomenon (see Long [ed], 2002) and it is widely acknowledged that food festivals play a significant role in attracting tourists and creating brand images for particular destinations (ibid). Despite this, and reflecting the tentative place of sea urchins in Tasmanian cuisine, there have been no concerted attempts to market the product via focal events in the manner of festivals that celebrate the product in other regions. To give three examples, the annual *Uni Matsuri* held on Teuri island, off the north west coast of Hokkaido in late summer (to mark the end of the fishing season), attracts visitors to an otherwise unremarkable and somewhat remote location to sample *uni* dishes and enjoy associated festivities. Similar European events are contemporary interpretations of traditional festivities. The Bogamari Festival in Alghero, in north western Sardinia, for example, is organised by the provincial Department of Economic Development to attract visitors during the early Spring and includes opening events where local fresh *ricci* and wine can be consumed followed by a more novelty occasion, the preparation of a 50 metre long sourdough bun, filled with *ricci* and sliced up for consumption after the photo opportunity has been fully exploited.⁹ Along Provence's so-called 'Blue Coast', *oursin* festivals are held in January and February (in the middle of the season for urchin harvesting) in locations such as Sausset les Pins, Fos sur Mer and Carry le Rouet. These are modern formalisations of patterns of public consumption that previously occurred in local contexts. Carry le Rouet's *oursinade* is particularly well-known. The event dates back to 1952, when a group of local fishermen offered their mayor his weight in *oursin* for a festivity. Since then the *oursinade* has been a substantial tourist attraction and has been complemented with other local signifiers of tradition such as performances of traditional Provençal drum and flute music by performers dressed in period costume.¹⁰



Promotional image for 2011 Sagra del Bogamari, Alghero

The element common to the previously discussed local festivals is a local history of sea urchin consumption that underpins the events' attraction to tourists—a sense of regional heritage authenticity to the dish and its marine harvesting practice. There is clearly no such heritage 'hook' for similar events in Tasmania. But culinary traditions, like any other, are entities that are created and promoted through various means (and with various degrees of success and longevity). Similar factors have not prevented events such as Western Australia's annual 'Truffle Kerfuffle' festival¹¹ attracting visitors to consume a product that has far less traditional connection to Australia than the sea urchin (varieties of which are, at least, native to local waters). But while it might be possible to imagine Australia hosting a similar kind of sea urchin based festival to the French or Japanese ones described above, MONA's 'Eat the Problem' event in Summer 2012/2013 was notable for representing a distinct local engagement with invasive sea urchin species and for offering a new kind of Tasmanian 'foodway', in which collective action and cartographies of food taste were mobilised by and deployed in the service of environmental beliefs and activism.¹²

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Eco-Culinary Activism

In her introduction to what she describes as a “community summer market installation”, Kirsha Kaechele colourfully declared:

This year at MoMa¹³ we are solving problems by eating them. We have decided that, being human, and therefore the earth’s biggest problem, we should make up for our evil existence by out-parasiting the parasites. We won’t eat tapeworms, but we will feast on a plethora of ecological disasters, each a delicacy. (2012b online)

The “ecological disasters” prepared for patrons included sea urchin butter and “an invasive paella”, made with rabbits and snails and topped with sea urchin gonads. Given that the patrons attending the summer markets largely comprise tourists and residents of Hobart and surrounds willing to travel to such an event at an out-of-centre arts venue¹⁴; Kaechele has identified that:

Getting people to eat sea urchin wasn’t an enormously difficult task as it already features on many menus, particularly in Japanese cuisine, and is understood by many to be a delicacy. Starfish were a bit more tricky. We tried to glamorize them with flame torching and Sichuan butter, but it might take Heston Blumenthal to get that one across the void. There were certainly invasive converts as a result of the market, and many of the stall-holders have continued to feature invasive species in their menus. It’s the new thing in foodie culture-invasive-chic. (p.c. April 2013)

Discussing the apparent dichotomy between “the growing ethos of eating local and organic, and connecting with our food” and actively seeking and eating invasives, she argued that:

I see no conflict. If anything, eating invasive is taking the philosophy a step further: Eat organic AND carbon neutral. Eat local (albeit locals who are new to the neighborhood) AND restore native habitat. Eat local, organic WHILE solving ecological problems. Invasive species are as organic as organic can be. It is essentially foraging with a purpose. So it is a natural extension of the organic,

local philosophy. Gathering invasive plants and animals is an immersive experience, expanding our awareness and connectivity to the environment. Furthermore, invasive species are often pests to the organic gardener (rabbits, deer, snails and weeds) so eating them is the little bonus that comes with protecting your crop. The truth and beauty in eating invasive animals is that, from an environmental perspective, it makes perfect sense. Eating invasive species requires foraging, which requires an engagement, a connection, with nature. But more critically, dining on the source of an imbalance actively addresses environmental concerns. By eating the problem, we help restore the native ecosystem. This may be philosophically challenging for some, as it is always difficult to say what changes in an ecosystem is simply nature taking its course- evolution in motion, and what changes are problematic- introduced species proliferating too quickly for the ecosystem to adapt. (ibid)

Kaechele's statements propose a form of eco-culinary activism¹⁵ aimed to combat the spread of invasives. Her perspective interfaces awkwardly with the very different take on the existence of another alien species in Tasmanian waters (the Atlantic Salmon) proposed by Lien (2005). Lien's reflection on the politics of 'belonging' of the species in Tasmania and on the social-industrial system that enables and profits from its exploitation stresses (particularly modern) environmental places as hybridised and networked to such an extent that the notions of 'endemic' and 'invasive' are increasingly problematic and polarised in a manner that distorts debate. As I have discussed elsewhere (Hayward, 2011), this line of argument reflects the lack of significant concern for the environmental impacts of salmon farming in Tasmania voiced to date—a situation diametrically opposed to that of the long-spined sea urchin, whose environmental impacts are all too-well known.

The particular strategy presented at the MONA's summer markets and explicated by Kaechele above reflects a similar international focus that has seen aggressive invasives such as the Indo-Pacific lionfish (*Pterois volitans*), which has come to infest an area of ocean from the North Carolina shore to the Caribbean over the last fifteen years, promoted as a food source. As Elperin (2010) has emphasised:

Sustainable-seafood advocates typically advise consumers to stay away from overfished, endangered species, but in this case they're taking the opposite tack.

Federal officials have joined with chefs, spear fishermen and seafood distributors to launch a bold campaign: Eat lionfish until it no longer exists outside its native habitat. (2010: online)

While this strategy may be ecologically sound, the lionfish presents distinct challenges to fishers, wholesalers, retailers and chefs on account of the poisonous spikes that have to be removed before its sweet white flesh can be extracted. In an effort to build a consumer demand and base for lionfish, a new product in the domestic fish market with no pre-established product image or culinary tradition, the US-based Reef Environmental Education Foundation (whose website identifies it as “a grass-roots organization that seeks to conserve marine ecosystems by educating, enlisting and enabling divers and other marine enthusiasts to become active ocean stewards and citizen scientists”) published a ‘Lionfish Cookbook’ in 2010 (Ferguson and Akins, 2010). While hard data on the extent to which the product has been a success with fishers, wholesalers, retailers and the public has yet to emerge, anecdotal evidence of the product’s popularity on local menus in Caribbean locations such as Bonaire island¹⁶ indicate that it has become well-established as a culinary item and preliminary scientific surveys indicate that harvesting is having a significant impact on fish numbers in focal areas¹⁷ This integration of traditional ecological activism and culinary promotion adopted to combat environmental menaces offers a model for other creatures and regions.¹⁸ While MONA’s summer market theme only offered a fleeting engagement with such an integrated strategy it pointed the way for further developments to consolidate exploitation of local invasives such as long spined sea urchins.

Sea Urchin aquaculture, sourcing and marketing issues

Despite the ready availability of both invasive and indigenous sea urchins in Tasmanian waters, another area that is attracting rising attention is sea urchin aquaculture. One of the leaders in this field is the Hobart based company Installed Logic founded by two former wild sea urchin harvesters, Simon Firth and Will James, who obtained four leases to trial sea urchin aquaculture in the early 2000s and received a \$110,000 grant from the Federal New Industries Development Program in

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2002 to test farmed sea urchins in various markets. Their operation, which utilised the trade name Tasmania Sea Urchin Developments (TSUD), attempted to put the sea urchin industry on a more lucrative commercial footing by extending the product's growing season. Company publicity materials made available at the time of their receipt of their initial federal grant¹⁹ reflected their perception that much of the stock they obtained from diving was not of an export standard in terms of size and quality of gonads and only had a three month peak season. Through aquaculture they aimed to extend that season to eight months. The farming method involved the company's cultivation of kelp and location of urchins in outgrowth systems that could then be easily harvested.²⁰ Evaluation of TSUD's initial sea trials, around Meredith Point on Tasmania's east coast and Hope Island, off southern Tasmania, conducted by J.C Sanderson (1996) showed some potential for kelp regrowth and seeding of areas with juveniles for cultivation.

Reliable and extended duration supply of high-quality gonads to local markets could also address another issue that is rising in prominence in the seafood (and other) markets, namely 'food miles' concerns (i.e. the carbon cost of shipping materials over considerable distances to markets). In this regard it is notable that the online activists have identified that the supply of Chilean sea urchins to the Sydney market through Christie's Seafood²¹ represents an unjustifiable practice, asking the following questions of Sydney restaurants such as Kabuki Shoroku and Quadrant:

So where do these restaurants get their sea urchins from?

Are the sea urchins poached from wildlife sanctuaries?

Are the sea urchins endangered?

How would diners know?

Do diners care?²²

These questions are pertinent ones for any agency involved in developing marketing campaigns for Tasmanian (and/or other regional Australian) sea urchin providers but the challenge lies in unraveling the tangle of answers involved so as to provide coherent promotional angles. There is a case for regional branding that serves to

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emphasise minimal food miles to market (giving local product a clear edge over Chilean supplies, for instance). Similarly, Australian licensing of fishery activities provides assurances that indigenous sea urchins (of the sort *not* currently readily available on Tasmanian market) are not poached from marine sanctuaries but the question for the invasive spiny species is better inverted, i.e. via a marketing hook that stresses them as being removed from national marine environments with a view to endangering their existence. As discussed above with regard to MONA's intervention, getting traction from this angle is a difficult operation. The final question is also pertinent. Do those (relatively few) Australian diners who consume sea urchins (currently) care about their provenance? And is the consumer base for sea urchins likely to grow if greater publicity over the origins of local supplies and/or the ecological values of 'eating invasives' is established by marketing campaigns? Given the under-developed nature of the local market, the answer to both questions may unfortunately be 'no'. An issue bracketing many of the questions posed above concerns consumer product knowledge and related expectations. While the use of sea urchins in various sauces and cooked dishes does not develop (or require) an appreciation of the quality or nature of the raw food material; the product sold at Japanese restaurants and sushi bars in Australia – usually identified on menus as *uni* – is variable, often being lower cost fragmented *vani* or paste products rather than the richer and fuller tasting and textured whole gonads. These cheaper products are overwhelmingly sourced from Chile and represent the lower quality end of their export products, with higher quality material sold into the more lucrative Japanese market. This compromises the premium product experience and brand image of sea urchins to the disadvantage of local producers trying to sell a fresher premium product. Leading Tasmanian producers have also identified a threat to the market in terms of hygiene issues. As an emergent sector, hygiene standards – and the necessity of their implementation – are not always recognised by smaller harvesters. As David Allen, from Seafoods Tasmania has identified:

We are at jeopardy of one of these operators harming someone's health and doing irreparable damage to the product reputation before the industry grows large enough to be properly scrutinised by the relevant regulatory bodies. (p.c. March 2013)

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Allen's statement does not just represent a more established operators' concern over more opportunistic market rivals; the reputational damage and decline of sales in Australian oysters during the late 1970s for example, following cases of food poisoning from oysters sourced from George's River, provides a salutary example of the necessity for reliable product standards.

Conclusion

There is a familiar paradox to discourse about exploiting invasives as a means of controlling their spread. While it is easy to identify the ecological benefits of harvesting sea urchins for consumption as a human food product (in terms of limiting their numbers and/or controlling their infestation zone), there are complications to this. In commercial terms it is important for harvesting operations to limit their activity so as to not deplete stocks in a manner that will destabilise their supply chain by 'over-fishing' and to allow for the potential of expanding the harvest to cope with future market growth. Both situations imply a management of invasive species numbers, the first case requiring (at least) a stability of supply and the second requiring the potential to increase supply over (either in terms of the zones being harvested and/or the density of invasives in those zones). Yet, that said, such concerns have manifestly *not* inhibited the disastrous over-fishing of a range of global species (such as the cod, that has been driven to the brink of extinction in the North Atlantic²³). Either way, the volume of harvesting activity is not likely to have a drastic impact on the local sea urchin invasives (let alone their erasure) around the Tasmanian coast since the cost-effectiveness of dive harvesting means that no comprehensive clearance will be achieved (and especially not on volume in difficult to access places) unless the demand/price for sea urchins increases exponentially. There is also a further issue. If a large and relatively stable market for sea urchins can be created, reliable supply of the product is likely to be better served by aquacultural systems, thereby leaving the invasive to flourish unchecked outside of these. Such paradoxes are not insoluble but evidence and analysis suggests that eco-culinary activism of the type discussed in this article needs to develop and adapt in a strategic and programmatic manner in order to have significant success in its enterprise.

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Endnotes

¹ For a detailed discussion of various uses of sea urchins in international cuisine see Lawrence (2007).

² They area also notable for containing an anadamide that has similar psychoactive action on humans to the THC contained in marijuana (although research has yet to be undertaken as to the effect of this on humans consuming sea urchin gonads). See Schuel, Goldstein, Mechoukam et al (1994) for further discussion.

³ A transcript of which is available online at:
<http://www.abc.net.au/worldtoday/stories/s657194.htm>

⁴ Archived online at:
<http://www.abc.net.au/news/video/2011/05/23/3224786.htm?site=northtas>

⁵ Thanks to Don Ranson, senior research archaeologist with Aboriginal Heritage Australia for his assistance with my inquiries on this matter.

⁶ Online at: http://www.themercury.com.au/article/2010/05/17/146585_lifestyle.html

⁷ Several chefs and restaurateurs contacted during research for this article noted limited customer interest in dishes centred on sea urchins and identified it as mainly an accompaniment to another main course. Simon Pockran, chef at Saffire restaurant, on the Freycinet peninsula, for instance, identified the following recipe “snapper, baked in salt and seaweed, buckwheat risotto, prawn, sea urchin roe, shellfish bisque” (p.c. March 2012). A report on Byron Bay FM’s food program ‘Belly’, broadcast on 19.12.2011 corroborated this research, identifying that “Luke Burgess, chef at Les Garagistes in Hobart, has urchins on the menu pretty much all the time. He has now started to offer them as an optional extra because

lots of customers were leaving them on the plate” – audio online at:
<http://www.belly.net.au/?p=1985>).

⁸ One chef identifying that “The supply of good quality fresh roe was a bit of a struggle to source. At times we received nice fresh orange roe, while at other times it was the more greyish roe and not great quality.” (p.c. March 2012).

⁹ See http://www.comune.alghero.ss.it/eventi/2011/sagra_bogamari/ for further details.

¹⁰ See Long (ed) (2003) for a study of various aspects of culinary tourism and Section 3, in particular, for discussion of culinary tourism in “constructed and emerging contexts”.

¹¹ See <http://www.trufflekerfuffle.com.au/>

¹² See Rath and Assmann (2010: 1) for a discussion of foodways that encompasses such a project.

¹³ The abbreviation MoMa here refers to the MONA Market.

¹⁴ MONA is housed in the Moorilla vineyard and winery on the Berriedale peninsula in the northern suburbs of Hobart.

¹⁵ Eco-culinary activism can be defined as the production, consumption and promotion of particular food products as a means of engaging with ecological problems.

¹⁶ See, for instance, Ann Phelan’s description of local fishing and consumption on:
<http://bonairebliss.com/2012/12/01/lionfish-and-cactus-blue-food-truck/> (accessed April 2013)

¹⁷ See, for instance, Barbour, Allen, Frazer and Sherman (2011).

¹⁸ And is one that is also being explored by eco-culinary avant-garde enterprises such as xClinic’s xSpecies Adventure Club – see
<http://www.environmentalhealthclinic.net/xooz/projects/xspecies-adventure-club/>

¹⁹ See, for instance, the item on the Growfish webpage uploaded in 2002:
<http://www.growfish.com.au/grow/pages/News/2002/Feb2002/29702.htm>

²⁰ This approach is essentially a ‘catch and grow’ one that is regarded as one of the least environmentally disruptive forms of aquaculture. [See for example references to the practice on the Marine Stewardship Council website: <http://www.msc.org/> (accessed April 2013)]

²¹ A major wholesale operation based in Sydney Fish Market, located in the inner-city suburb of Pyrmont.

²² Online at: <http://www.habitatadvocate.com.au/?tag=sea-urchin-sauce>

²³ See Kurlanksy (1998) for an accessible historical account of the rise and near-terminal decline of cod stocks and Frank, Petrie, Choy and Leonard (2005) for a detailed study of the broader environmental impact of the decline of cod numbers on broader eco-systems in which it was formerly dominant.

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