Anyone familiar with the Clarence Valley, on the North Coast of NSW, or even those passing through along the Pacific Highway, could hardly miss noticing the beautiful Scribbly Gum forest bordering the highway at Halfway Creek.

Standing proudly, their smooth, gnarled, orange-tinged limbs standing out against the dark green foliage of the forest, many of those old-growth giants have stood there since long before the sound of the first axe rang through those forests nearly 180 years ago. That 250 hectare property has recently been purchased by a blueberry grower, and industry leaders are on record as lobbying Government to relax native vegetation laws to allow this, and other forests, to be cleared for blueberry plantations. We have strong reasons to be concerned.

Those concerns were magnified when we learned that the new owners had shown an interest in a series of waterholes in a drainage line along the western boundary as a possible water source, critical to the growing of blueberries.

That drainage line runs in and out of private rural residential properties, and feeds directly into a series of significant wetlands to the south-east, so the thought of seeing the waterholes possibly enlarged as a water storage is untenable, both from an ecological perspective, and the perspective of neighbours' lifestyle choices which will be severely impacted.
The NSW Northern Rivers region is world renowned as a biodiversity hotspot, and the healthy under-storey vegetation associated with lowland Scribbly Gum forests are some of the most diverse and, like all forests, provide a crucial water filtering service.

Having been approached by concerned residents, a Clarence Environment Centre representative, accompanied by an accomplished botanist/ecologist, visited the area to determine the values of the wetland around the waterholes in question; what we found was amazing.

Within minutes we had discovered two threatened species, Noah's False Chickweed (*Lindernia alsinoides*), and the Slender Screw Fern, (*Lindsaea incisa*), both species listed as endangered under the State's *Threatened Species Conservation Act*. 

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Portion 108 Halfway Creek, outlined in orange. The waterholes occur in the red circles at the south west corner, along a drainage line that feeds into significant wetlands to the south-east.

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The violet flowers of the endangered Noah's False Chickweed (*Lindernia alsinoides*).

The endangered wetland fern species, *Lindsaea incisa*. 
Shortly after those initial discoveries, we came across 3 ground orchids in flower, one of which, *Corunastylis acuminata*, when referred to an orchid expert, was deemed to be very rare. There is anecdotal evidence of the species being sighted before in the Clarence Valley, however, at this stage the only official records have come from the Central Coast.

Other ground orchids that were found included the Cow Orchid, *Cryptostylis subulata*, and the Elbow Orchid *Arthrochilus prolixus*.

So many of our coastal floodplain wetlands have either been drained, flooded to form dams, modified (saline to fresh water), or become choked by exotic weeds since European settlement, that the flora communities they once supported in abundance, are now rare, so it was a delight to see an unspoiled wetland ecosystem such as this, supporting a profusion of relatively uncommon species.

Christmas Bells and the Swamp Boronia which, along with all ground orchids, are protected under the *NSW National Parks and Wildlife Act*; growing side by side amongst some of the most diverse reed beds we had seen in the valley.
Of course, every ecosystem supports its own unique fauna, and one such species spotted, and photographed, by our ecologist on the day, was the extremely rare and endangered Coastal Petaltail Dragonfly (*Petaleura litorea*).

Sightings of this species have been very rare, particularly on the North Coast, with the then Roads and Traffic Authority making the following observation in its 2006 Environmental Impact Statement for the Pacific Highway upgrade: “*There is a minimal potential of it (the Dragonfly) being present in the project boundary*”, pointing out that: “*The majority of wetland areas in the lower catchment, such as those on the Clarence floodplain illustrate degradation as a result of land clearance and stock access*”, concluding that: “*Such wetlands are unlikely to hold populations of the Giant Dragonfly given that degradation of wetland habitats is thought to be a contributing factor in its decline, and the absence of records on the Clarence floodplains.*”
However, in 2009, several sightings of the dragonfly were reported by a resident south of Tyndale, providing photographs of both male and female specimens. That photographic evidence was sufficient for the Australian Museum to confirm the specie's identification, and the fact that it was not yet extinct in the Clarence Valley.

There are also a number of Endangered Ecological Communities associated with the wetlands, including Subtropical Coastal Floodplain forest, Swamp Sclerophyll, and Freshwater Wetlands Forests.

We were not the first to discover the conservation values of the Halfway Creek wetlands, although our work has undoubtedly added to those values. In 2008, The NSW Department of Environment and Climate Change undertook a Federal Government funded evaluation of the conservation values of wetlands across the north coast, which resulted in the publication of the “Conservation Assessment of Wetlands in the Clarence Lowlands IBRA Subregion”.

From that research document we learn the following about the extensive Halfway Creek wetland complex:

Hydrology and drainage:

*Freshwater wetlands depressions that typically fill during significant rainfall events.* Limited drainage, although rural residential development and roads have created some barriers to flow.

Land use and tenure:

Predominately freehold tenure although also some areas of unreserved Crown land. Land uses include rural residential development and grazing. The Pacific Highway passes through the Halfway Creek cluster.

Conservation values:

**General:** A highly valuable area of lowland and wetland vegetation, which forms a key habitat link between existing reserves. Habitat is present for many threatened flora and fauna species restricted to lowland and wetland habitats. The area samples Swamp Sclerophyll Forest and Freshwater Wetland endangered ecological communities.

**Flora:** There are examples of Freshwater Wetlands and Swamp Sclerophyll Forest EEC present along creeks and floodplains in the area. The threatened Slender Screw fern (Lindsaea incisa) occurs in the area. Adjoining areas of dry sclerophyll forest contain populations of the vulnerable Square-fruited Ironbark (Eucalyptus tetrapleura).
**Fauna:** The lowland and wetland habitats of the Halfway Creek cluster provide habitat for numerous native fauna, including threatened species (26 species). Potential habitat also present for the Giant Dragonfly (Petalura gigantea).

**Significant wetland areas within cluster:** Wells Crossing Flora Reserve. A number of other wetlands are also considered significant. More detailed investigation is suggested to identify the most outstanding sites.

**Threats:** Under considerable threat of continued habitat fragmentation due to land clearing, inappropriate rural subdivisions, road construction and logging.

**Management / Rehabilitation:** Protection of key habitats and restoration and maintenance of wildlife corridor values.

**Proximity to existing protected areas:** A number of wetlands in this cluster are adjacent to Sherwood NR and Yuraygir SCA. Flaggy Creek NR is located 2.5km south west.

**Potential contribution to NRS:** A priority for the maintenance and restoration of highly important regional wildlife corridor linking Sherwood Nature Reserve to Yuraygir State Conservation Area. Linkages via corridors are essential to ensure the viability and adequacy of conservation of the national reserve system. Encourage investment in off park conservation mechanisms such as incentives, and conservation covenants. Also investigate possible acquisition of lands adjoining Sherwood Nature Reserve and Yuraygir State Conservation Area.

It is significant to note that all the “considerable threats” identified in that document, “continued habitat fragmentation due to land clearing, inappropriate rural subdivisions, road construction and logging”, continue unchecked. Despite acknowledgement of the environmental threat posed by rural residential development, the 2006 Regional Strategies failed to act to wind back the vast areas zoned for that purpose. Only last year, another subdivision allowing large area rural residential blocks along Gilmores Lane, all of which cut across the wetland complex, was approved by Council.

As well, the Pacific Highway upgrade will see a 200m wide corridor cleared through the area, including the Wells Crossing Flora Reserve.

In 2011, a large area of land was illegally cleared along the southern end of Gilmores Lane which also caused massive erosion and siltation of Dundoo Creek, part of the wetland complex, and resulted in a $150,000 fine.
This was the result for Dundoo Creek, major erosion and siltation.

However, the subsequent subdivision and reported sale of that land for blueberry growing, suggests fines of that magnitude are merely considered a cost of doing business, and no deterrent whatsoever.

All the identified values of the Halfway Creek wetlands could be under threat if this latest blueberry venture is allowed to proceed, so it is imperative that decision-makers fully assess the risks.

So what are the risks? According to the NSW Department of Primary Industries, “Primefacts”, “Blueberries prefer a deep, well-drained soil such as coarse sandy loam, high in organic matter but low in clay”, something that is in short supply in the Coffs Clarence region. As a result we are told: “Current best practice in the blueberry industry is to supply nutrients to plants via the irrigation system, which is called ‘fertigation’”. This involves adding Nitrogen; Phosphorous; Potassium; Calcium; Magnesium; Sulphur; Zinc; and Boron to irrigation water, at concentrations that are unsuitable for most types of Australian native plants.

Bear in mind that we live in a high rainfall area where run-off of those nutrients is assured, and will only benefit, and encourage, introduced weed species to become established throughout the wetlands and elsewhere in the environment.

Again, according to “Primefacts”, “Blueberry plants have a shallow, fibrous root system and as such require supplementary irrigation throughout the growing season”, and that “Water storage facilities of 2–3 megalitres per hectare are required for blueberry production”.

'Milkmaids' a common wetland herb, Burchardia umbellata.
We do not yet know the extent of blueberry plantings that are proposed for the 250ha property, but water storage is clearly a problem, with even a conservative 20 hectares requiring a dam holding the equivalent of 50 Olympic sized swimming pools.

Then there are the pests and diseases growers have to contend with. Weed control is crucial and, according to “Primefacts), “should begin before the soil is prepared or beds formed. The use of herbicide, competitive green manure crops and a fallow period prior to planting will help to reduce the resident weed population”.

Disease control is also critical, and growers are advised, “to become familiar with the diseases that affect blueberries”, and develop a “spray strategy” to “ensure that plants can function to their optimum level”. The list of “main diseases” affecting blueberries (seemingly there are others) are: Pucciniastrum - blueberry rust; Botrytis spp. – twig and blossom blight; Phomopsis spp. – cane dieback; Guignardia – tip dieback; Botryosphaeria – stem canker; Phytophthora spp. – root rot; Rhizoctonia – death of plants; Crown gall - growths just above ground level; Anthracnose – affects leaves, stems and fruit; Mycosphaerella – leaf disease; Septoria – leaf disease; Cercospora – leaf disease; Alternaria – fruit disease, and Phyllosticta – leaf disease.

Apparently these fungus and insect pest problems can be overcome through the “spray strategy”, with regular drenching with a variety of pesticides, which have been approved for use in blueberries by the DPI, and there are 52 of them, making them the dirtiest berry on the market. 8 are known or probable carcinogens; 22 are likely hormone disruptors, 14 are neurotoxins, 7 are developmental or reproductive toxins, and 17 kill honeybees and other insects, many of which are crucial to healthy ecosystems.

To overcome problems with chemical intolerance, these pesticides are usually rotated, so most of those 52 will likely get a run at some stage. Again we should remember the high rainfalls that can occur here, and the likelihood of those chemicals ending up in downstream wetlands and waterways.

Reading the literature on these chemicals is a sobering experience, Dimethoate, for example can impact all 5 categories of human and environmental health mentioned above. It is a systemic insecticide, which means it enters the sap stream of the plant through roots and foliage and is distributed throughout the plant, meaning residues cannot be washed from the produce. While only moderately toxic to humans, and relatively non persistent in the environment, Dimethoate is highly toxic to beneficial insects such as bees.

Human exposure to Dimethoate can have impacts on practically every organ in the body, and while potential human impacts through anything but direct contact are low, the toxicity for aquatic organisms and birds is considered moderate to high. One study found that it causes temporary rhythm alterations in some seed-eating birds which may be critical for the birds’ food-finding ability.
It has also been found to cause jumping, and erratic movement imbalance in mice, and death in fish. Dimethoate is highly toxic to bees on an acute contact basis. In fact labels on products containing Dimethoate warn it should not be applied to crops in flower nor even when flowering weeds are present.

All the evidence suggests that the establishment of blueberry farms in the vicinity of the Halfway Creek wetlands, would ensure the local extinction of the Coastal Petaltail Dragonfly, and pose a major threat to all species occurring in those high conservation value wetlands. They must be protected.

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Endangered Swamp Sclerophyll Community, common in the Halfway Creek wetlands.

Compiled by John Edwards
for the Clarence Environment Centre