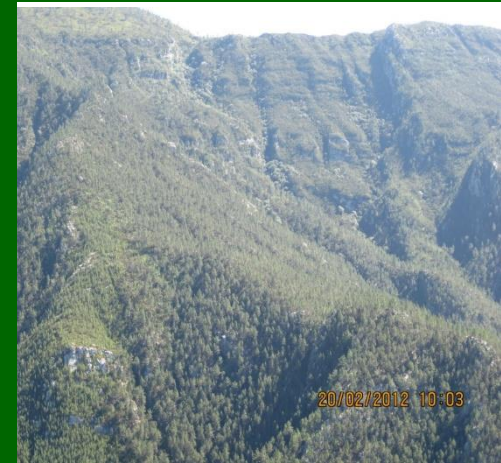


Investing in Sustainable Wildlife Ranching – Biosecurity Threats and Opportunities



Guy Preston
Department of Environmental Affairs
South Africa

International Wildlife Ranching Symposium
Safari Court Hotel, Windhoek, Namibia
13 September 2016



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



Investing in Sustainable Wildlife Ranching – Biosecurity Threats and Opportunities

Extraordinary industry that should be nurtured and grown.

1. Invasive species: greatest long-term threat to sustainable wildlife ranching.
2. Optimal land-use practice to conserve biodiversity and ecosystem services.
Islands of plenty cannot survive in a sea of ecological poverty.
3. Optimise combatting poverty, inequality and unemployment.
Transformation is not a threat; it's an opportunity, an investment with returns.
4. Wildlife Ranching needs regulation.
Laissez faire = death.

Beware of greed! “ *For the loser now will be later to win; for the times, they are a-changin’* ”



Species produce sufficient offspring to ensure the survival of the species, given the prevailing threats and competition in their natural habitats – in general, that they are replaced by their offspring. When moved to new habitats, they may both escape their predators and be able to out-compete the indigenous species, leading to an invasion where each individual produces massive numbers of offspring that themselves live to reproduce.





These invasive species may be:

- **Plants** – such as these black wattles (*Acacia mearnsii*) from Australia, coming up like hairs on a dog's back, after a fire which killed the parent plant (the burnt tree in the foreground).
- **Animals** – like these common starlings in the USA. Someone wanted all the birds mentioned in Shakespeare to be introduced into America – with catastrophic impacts, in terms of the starling.
- **Microbes** – like this *Phytophthora*, a fungus-like species whose invasions have been responsible for problems such as potato blight, the rotting of soya beans, sudden oak death, and many others, including needle disease (above) in Chilean plantation of the Monterey pine (*Pinus radiata* – ironically itself an invasive tree in South Africa).

The Threat of Invasive Species

Exponential Growth Experiment

Doubling the wheat grains every day.



Day One: 1 wheat grain

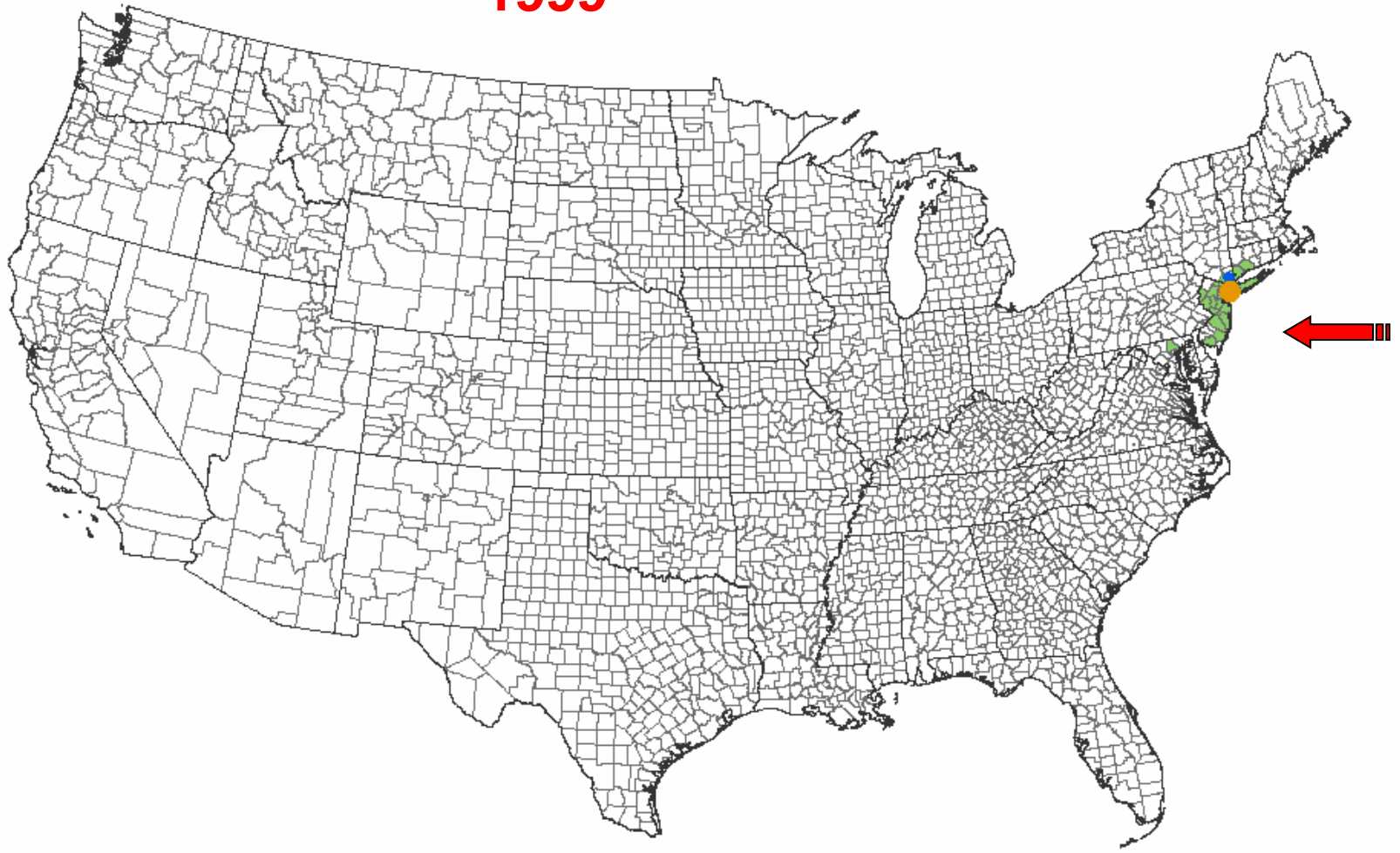


Day 12: 2,048 wheat grains

West Nile Virus

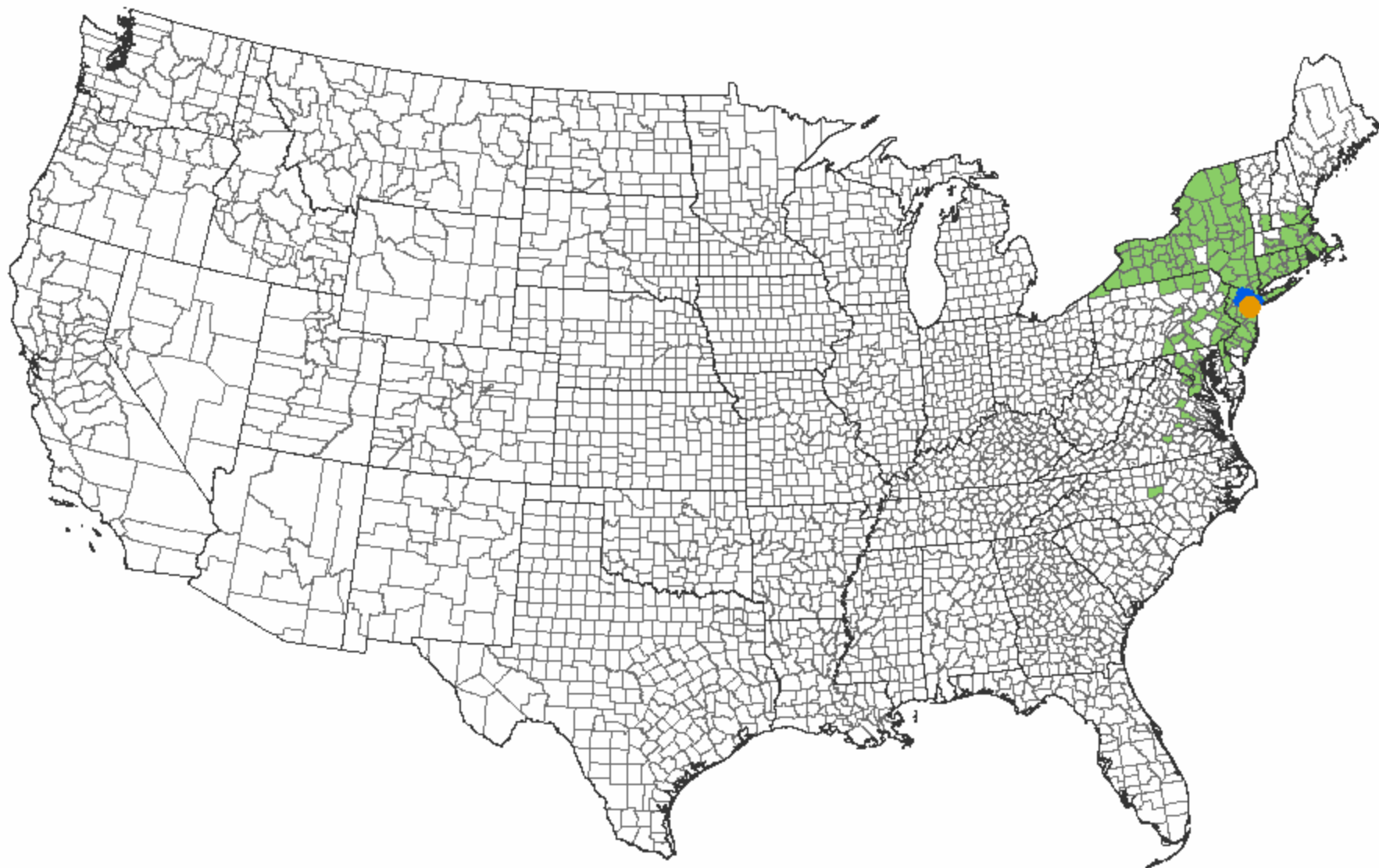
Neuro-invasive Disease Incidence, by County

1999

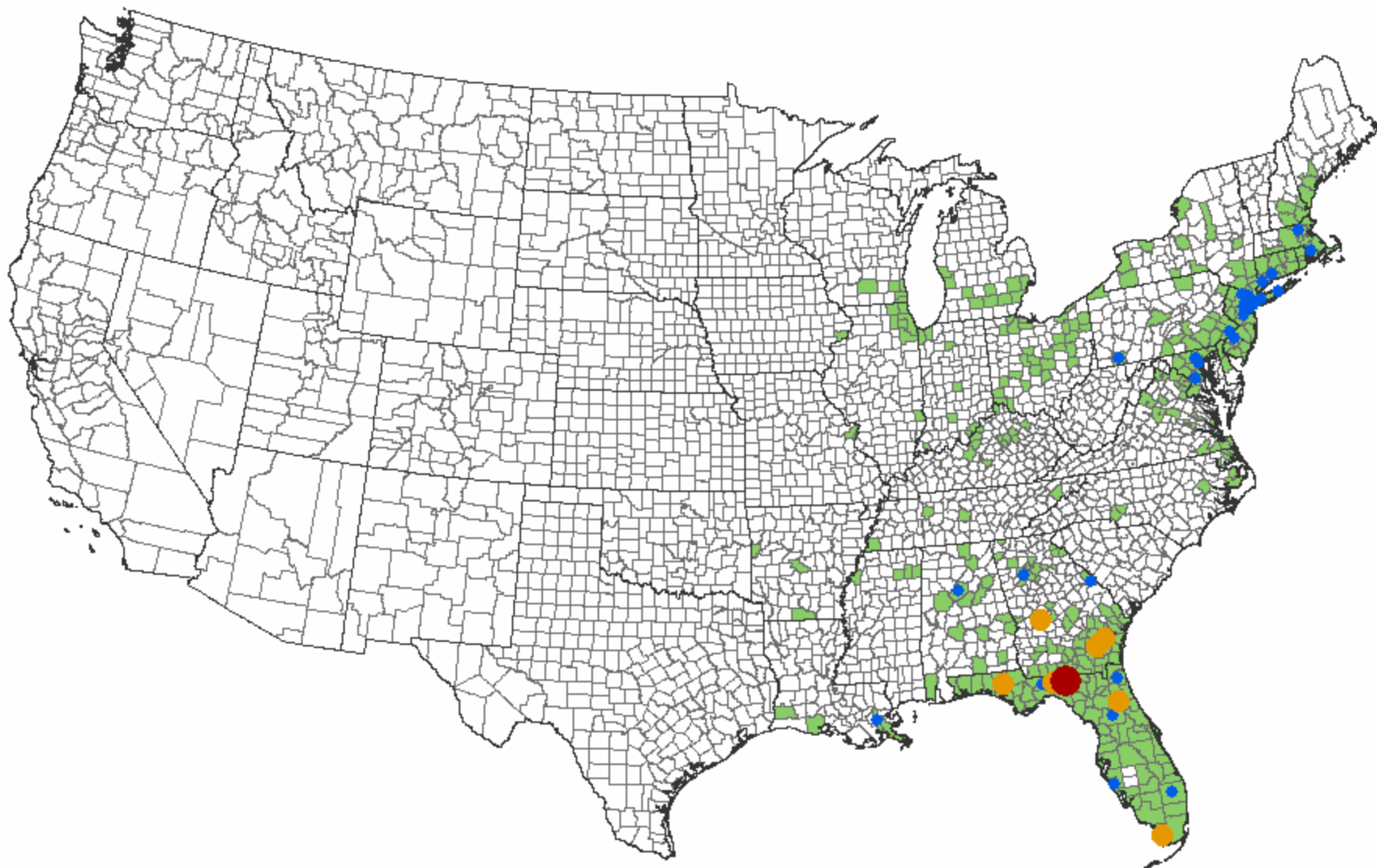


This sequence shows the spread of West Nile Virus in the USA from 1999. It was introduced through mosquitoes breeding in water trapped in car tyres being taken by ship from Africa to the USA. It is a particular threat to birds, and can kill people. It is now in South Africa.

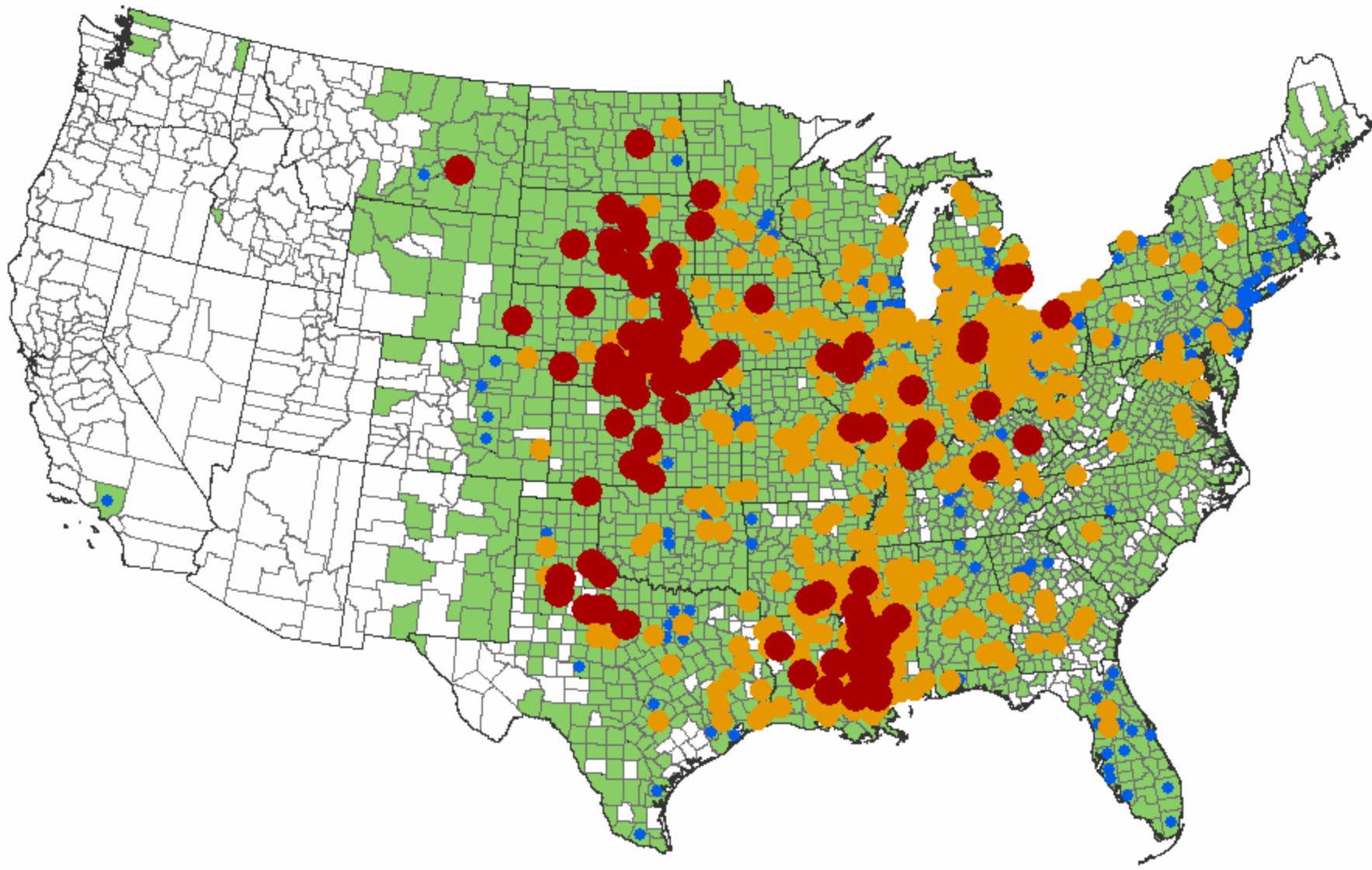
2000



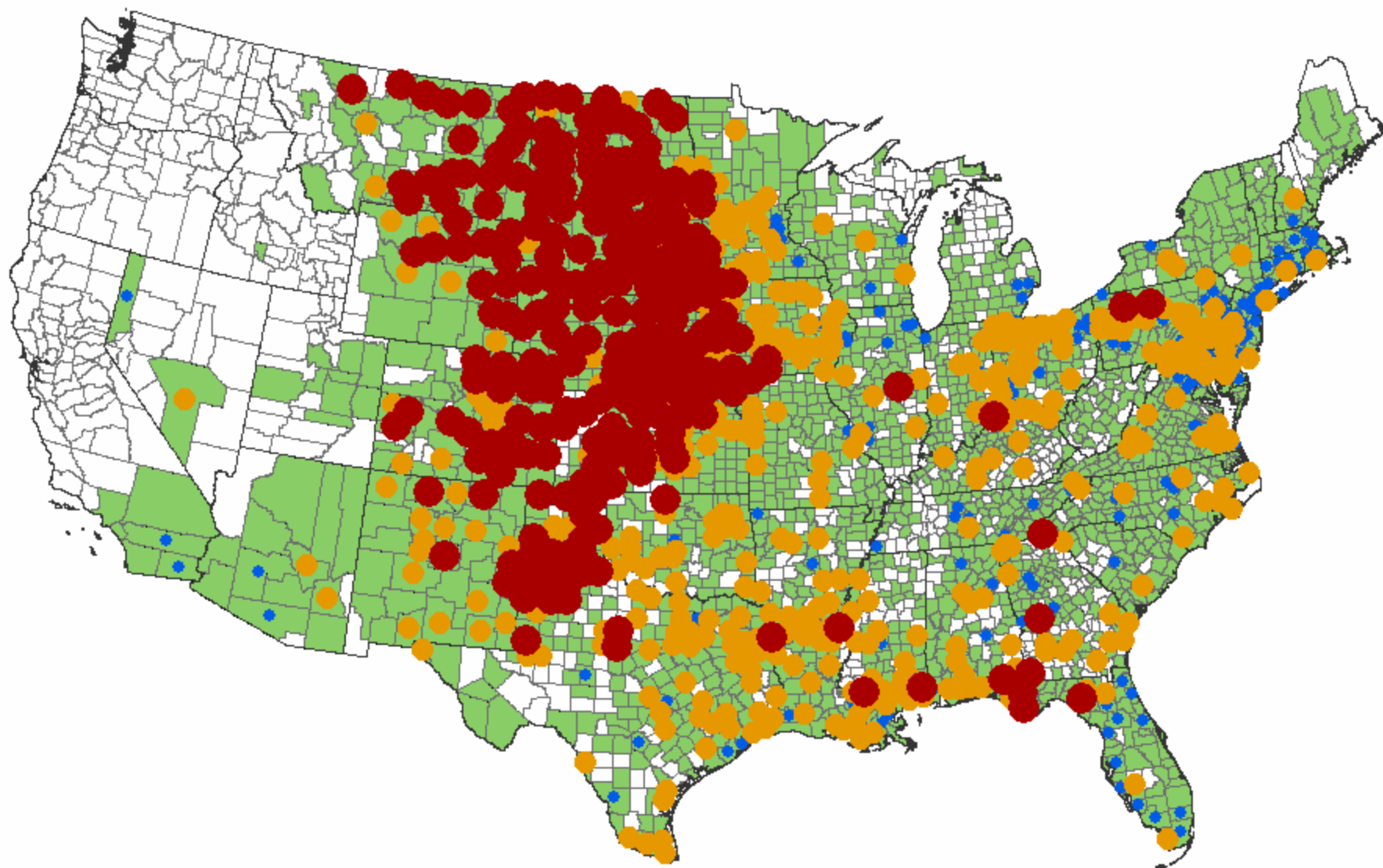
2001



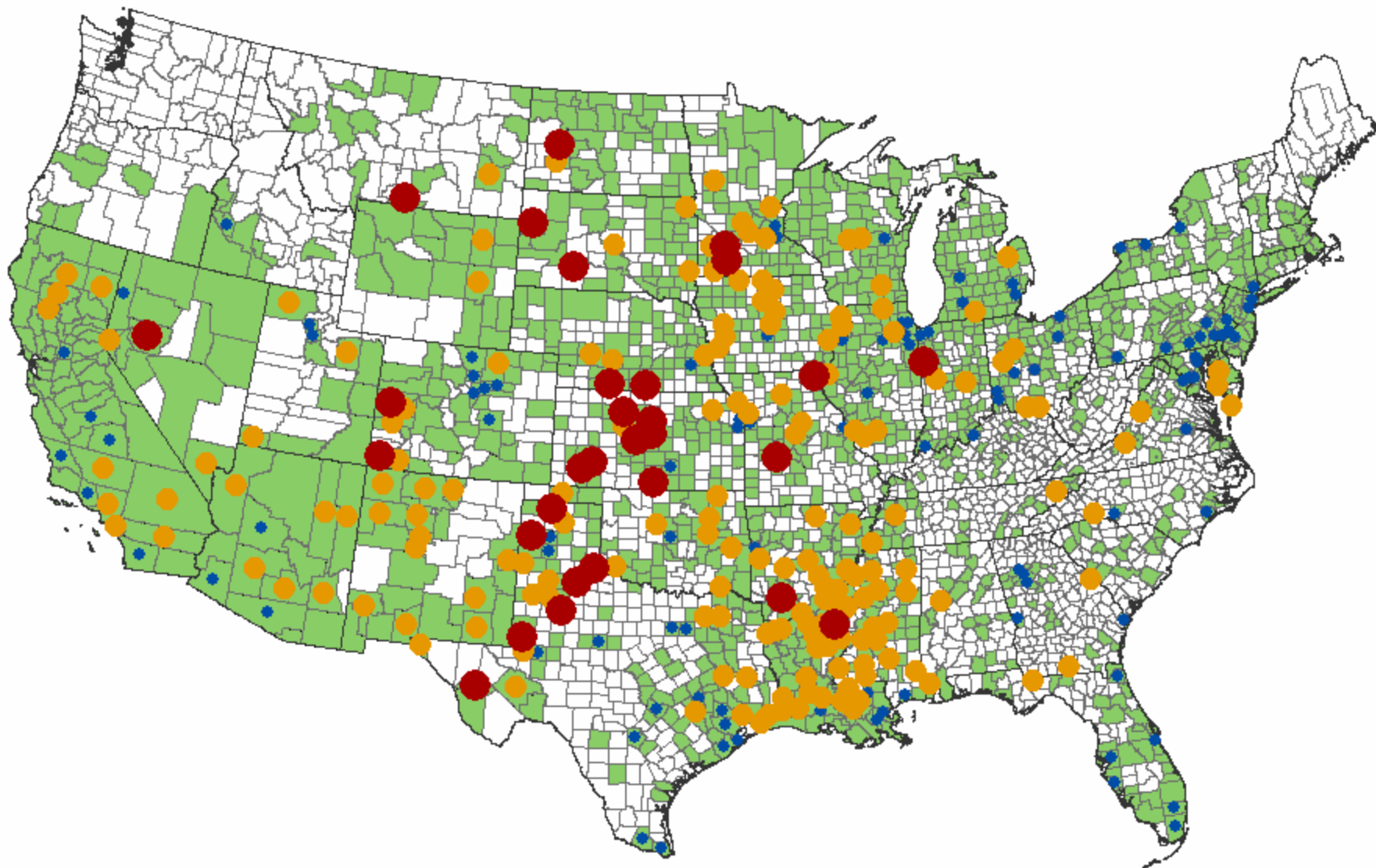
2002



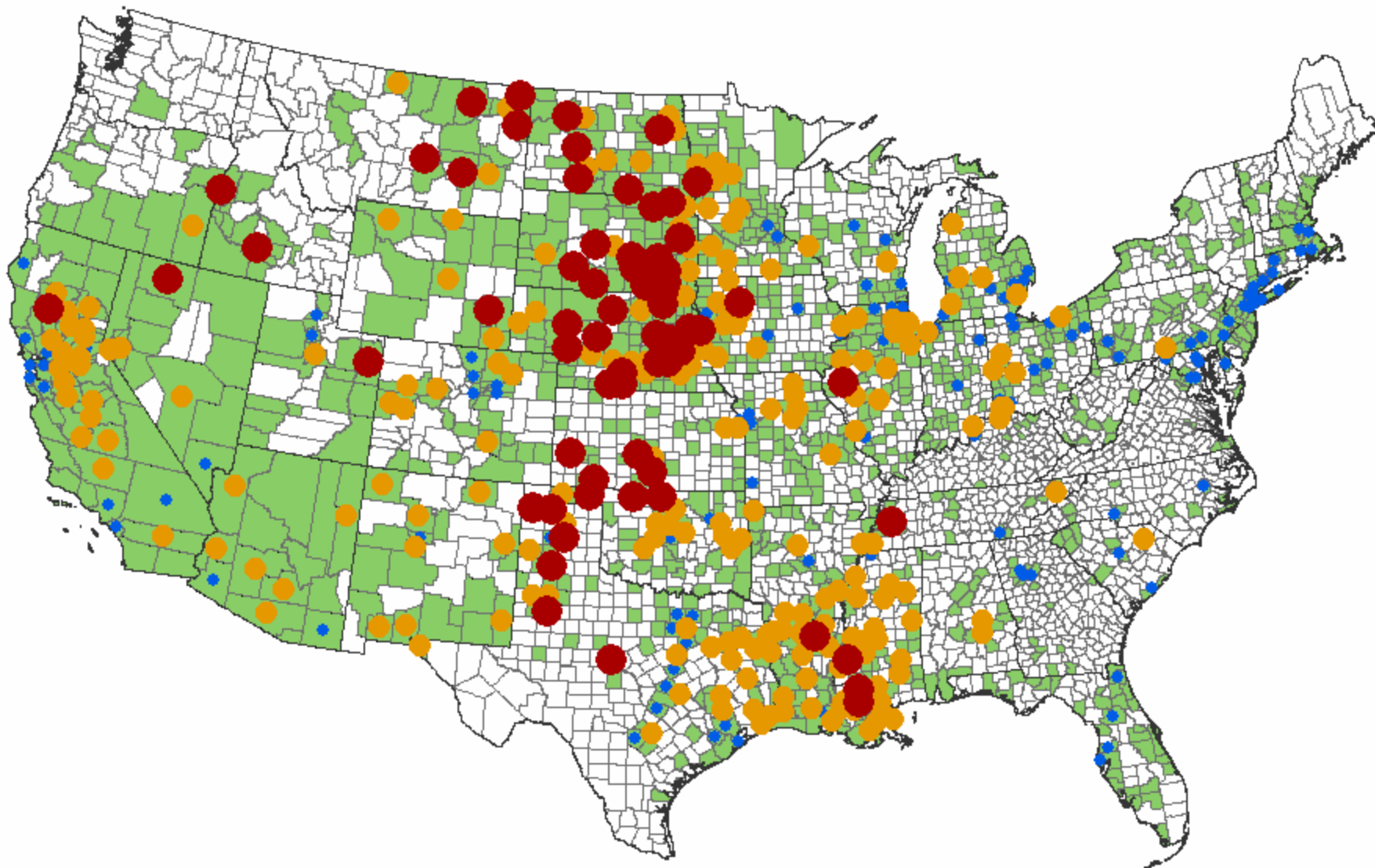
2003



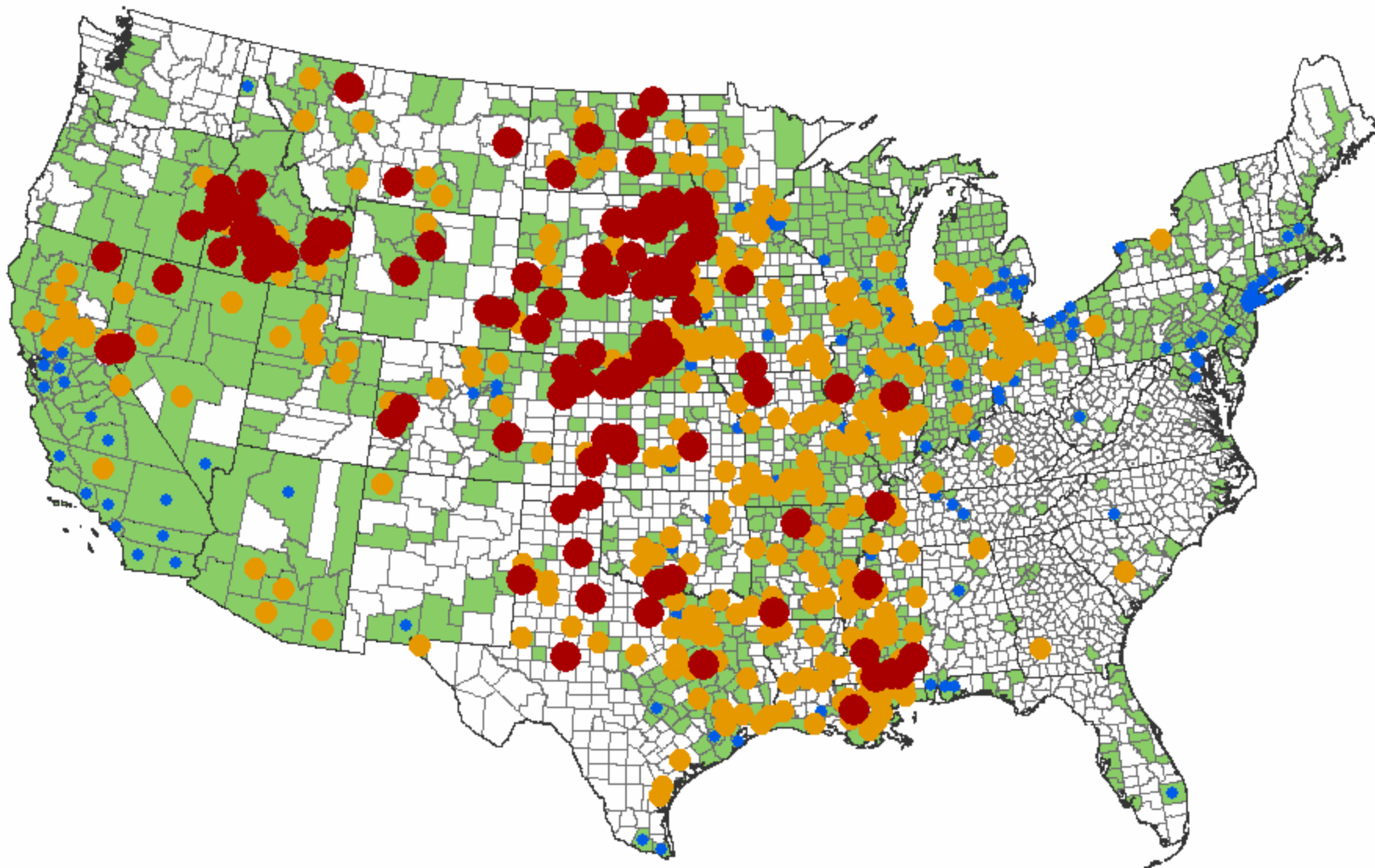
2004

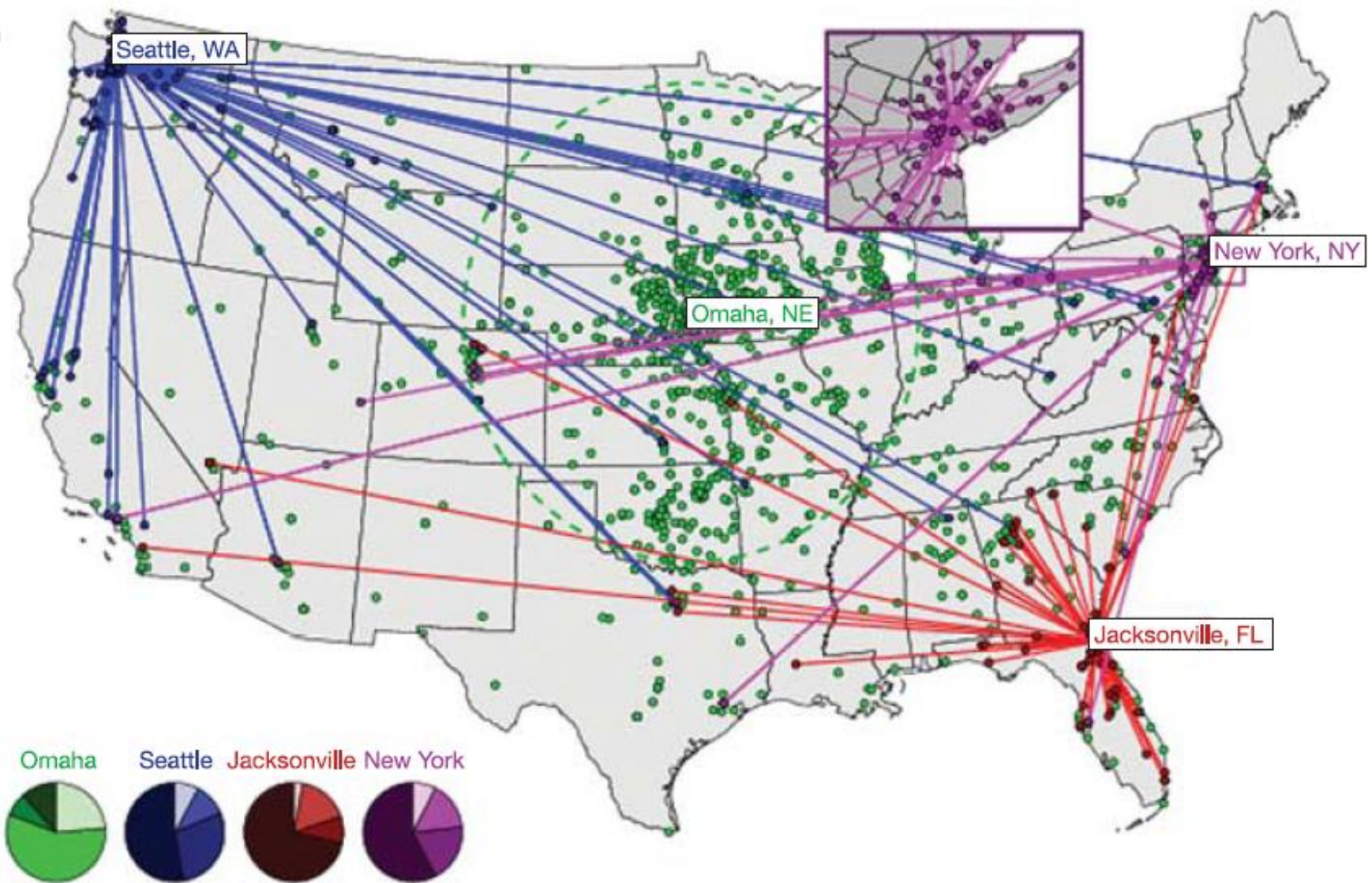


2005



2006

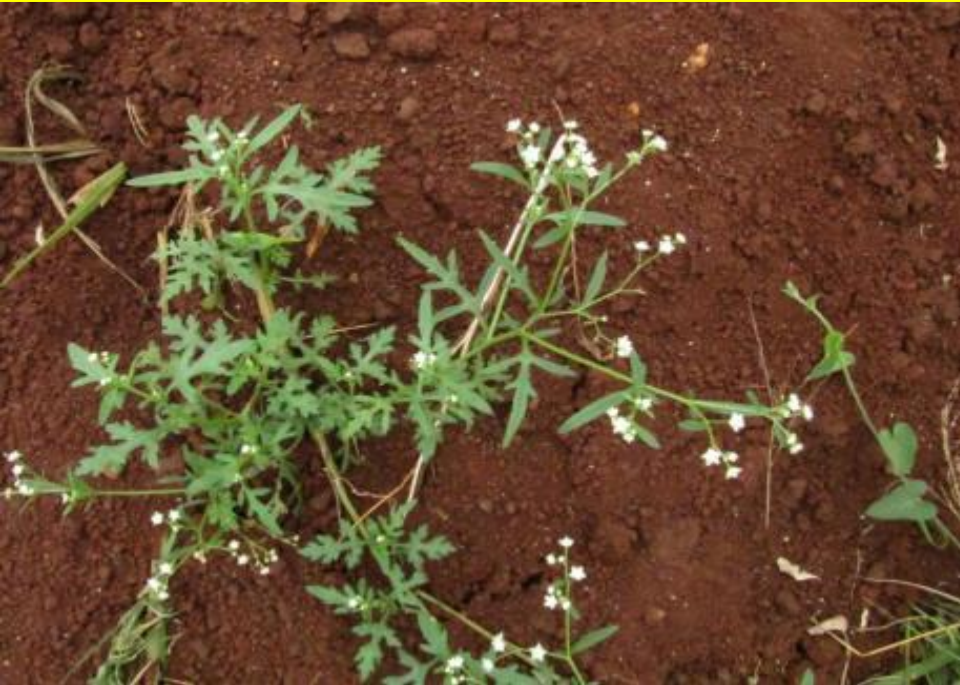




Fascinating research by D Brockmann, L Hufnages and T Geisel (*The Scaling Laws of Human Travel*, Nature, 2006) shows the spread of almost half-a-million dollar bills in the USA over a period of two weeks, from just four cities. Dollar bills are far more likely to travel in pockets than in the past. It is another indication of how we have the potential to move species around the globe – including all manner of diseases.

Famine Weed (*Parthenium hysterophorus*)

Insignificant-looking, but a devastating invader



A daisy from the Caribbean, famine weed is invading many part of Africa, Asia and Australasia. It may become our worst invasive plant.

Guy Preston, DDG, Environmental Programmes, Department of Environmental Affairs



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



EXPANDED PUBLIC WORKS PROGRAMME

FAMINE WEED: SO WHAT? – 1

- Usually spread by wind, its seeds are spread in car tyres and grills, by animals, by our clothing, etc.
- Famine weed is therefore establishing rapidly along roads, and especially in degraded areas.
- Once established, it can set seed within 4 weeks in the growing season.
- Through allelopathy (chemical secretions), it inhibits the growth of other plants.
- It can grow to over 1.8 metres high, and each plant can set tens of thousands of seeds per year.
- In Australia, no treatment of invaded areas has reversed seed banks in soil to below 5,000 seeds/m².
- Its seed are viable for over 50 years.



FAMINE WEED: SO WHAT? – 2

Famine Weed can cause allergic reactions in humans. Skin lesions and rashes are impacts that worsen over time, and people may need to move away from invaded areas. It also causes respiratory problems in humans, which can exacerbate existing human health invasives, such as tuberculosis.



FAMINE WEED: SO WHAT? – 3

Famine weed thrives in degraded land, which is especially typical of the land of resource-poor farmers. It may force people to abandon their crops and grazing land, and even to leave their lands. These pictures show high densities of famine weed destroying the productive potential of land.



FAMINE WEED: SO WHAT? – 4

Excessive exposure to famine weed by livestock may lead to allergic reactions to the plant. This can destroy the productive potential of land for grazing of livestock.



FAMINE WEED: SO WHAT? – 5

Famine weed is catastrophic for biodiversity. Will wildlife species may develop allergic reactions? (Red lip of rhino?) Even if no allergy, famine weed will displace grazing, compounding bush-encroachment problems associated with climate change. Note rubbing post used by rhino (centre) spreading famine weed.



Where famine weed invades, a dramatic drop in carrying capacity of game or stock is inevitable.

FAMINE WEED: SO WHAT? – 6



The implications of famine weed for the conservation agencies is dramatically shown by this effort to spray along the fence-line in Hluhluwe-Imfolozi Park, with high densities of famine weed on the other side of the fence.

Spraying down vehicles is a consideration. But there are at least 13 gates into the Park, most without water or electricity. Ironically, the Working for Water teams will be spreading famine weed, after picking up workers in infested areas. So too will the rangers, anti-poaching teams and tourists.



FAMINE WEED: SO WHAT? – 7

The impacts of famine weed have been estimated in Australia, India and Ethiopia, three of the at least 30 countries in which it is invading. Notwithstanding the rather large ranges in the figures (due to different conditions and limited research), they do indicate how devastating this invasion could be in South Africa.

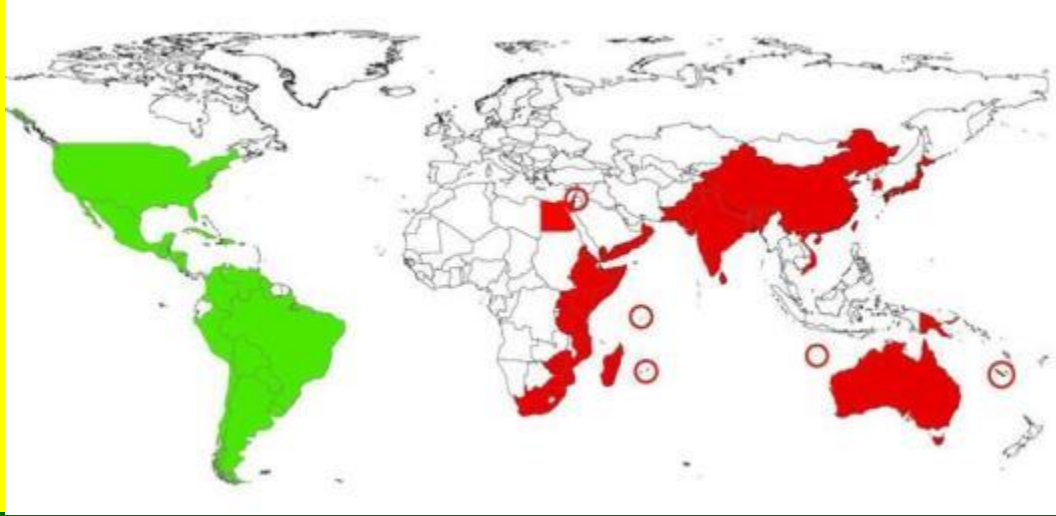
Table 7: A summary of the impacts of parthenium weed on agricultural productivity, human health and the environment, as reported in the literature and by experts. Detailed explanations and the references for these data are presented in Appendix 6.

LAND-USE TYPE	IMPACT	COUNTRY
Agriculture		
Sorghum	45% to 80% yield reduction	Ethiopia
	35% (from 6.5 to 4.3 t ha ⁻¹) yield reduction	India
Cattle	25 to 80% yield reduction	Australia
Pasture/forage	10 to 90% yield reduction	India
Environment		
Species loss (forest gaps)	69 to 95%	India
"Total habitat change" ¹	100%	Australia
Human health²		
Allergies (e.g., rhinitis)	20% of population in infested area affected	Australia
	7 to 42% of population in infested area affected	India

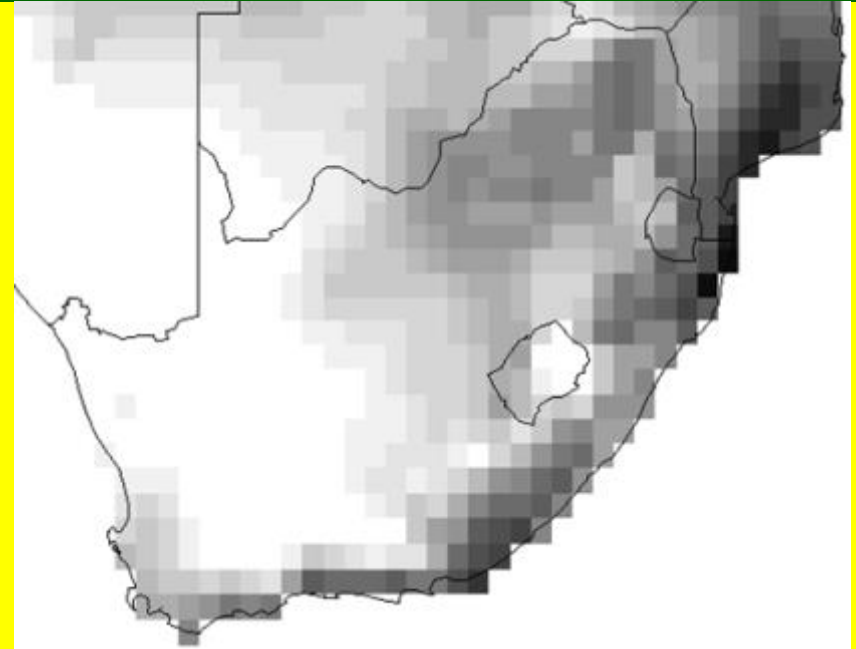
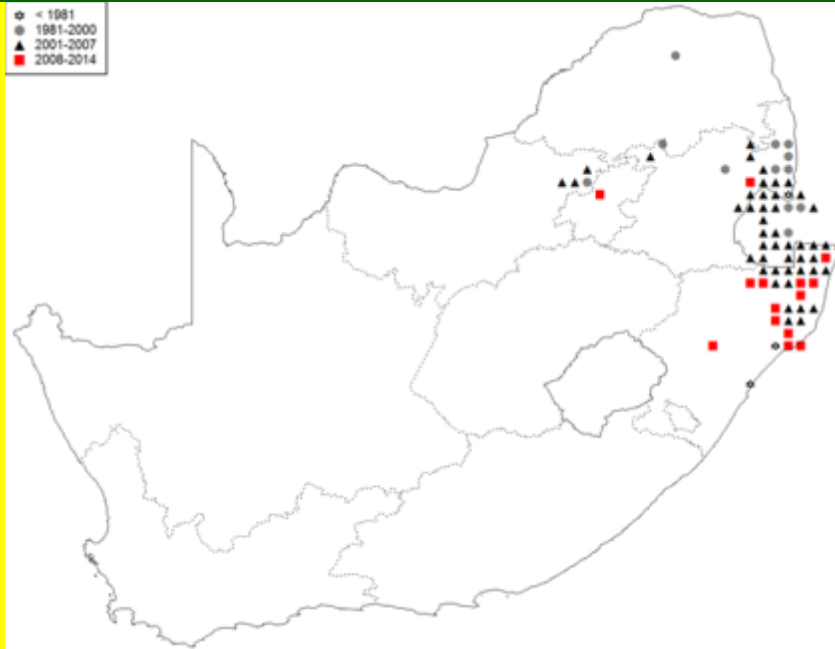
¹ *Of grasslands, open woodland, riverbanks & flood plains*

² *Measured as a % of the population in the infested area*

FAMINE WEED: SO WHAT? – 8



Indigenous to the Americas, famine weed is invading in 30 countries. All tropical and sub-tropical regions of Africa are vulnerable. Its invasion is accelerating, and could invade all but the driest parts of South Africa.



Abandoned rural homestead, invaded by famine weed.



Abandoned rural homestead, invaded by famine weed.



Ndumo Nature Reserve, KZN - famine weed invasion



Ndumo Nature Reserve, KZN - famine weed invasion



The poor are particularly vulnerable to the invasions by famine weed.



The poor may be forced to abandon their ancestral homes.



Chromolaena odorata in South Africa's Hluhluwe-Imfolozi Park



The threat of invasion by *Chromolaena odorata* in the third-oldest National Park in the world, and efforts to control it using labour-intensive clearing, fire management and biological control.

***Chromolaena odorata* (triffid weed), from Central / South America, has invaded the Hluhluwe-Imfolozi.**
Our wild (and domestic) animals do not eat *Chromolaena*.

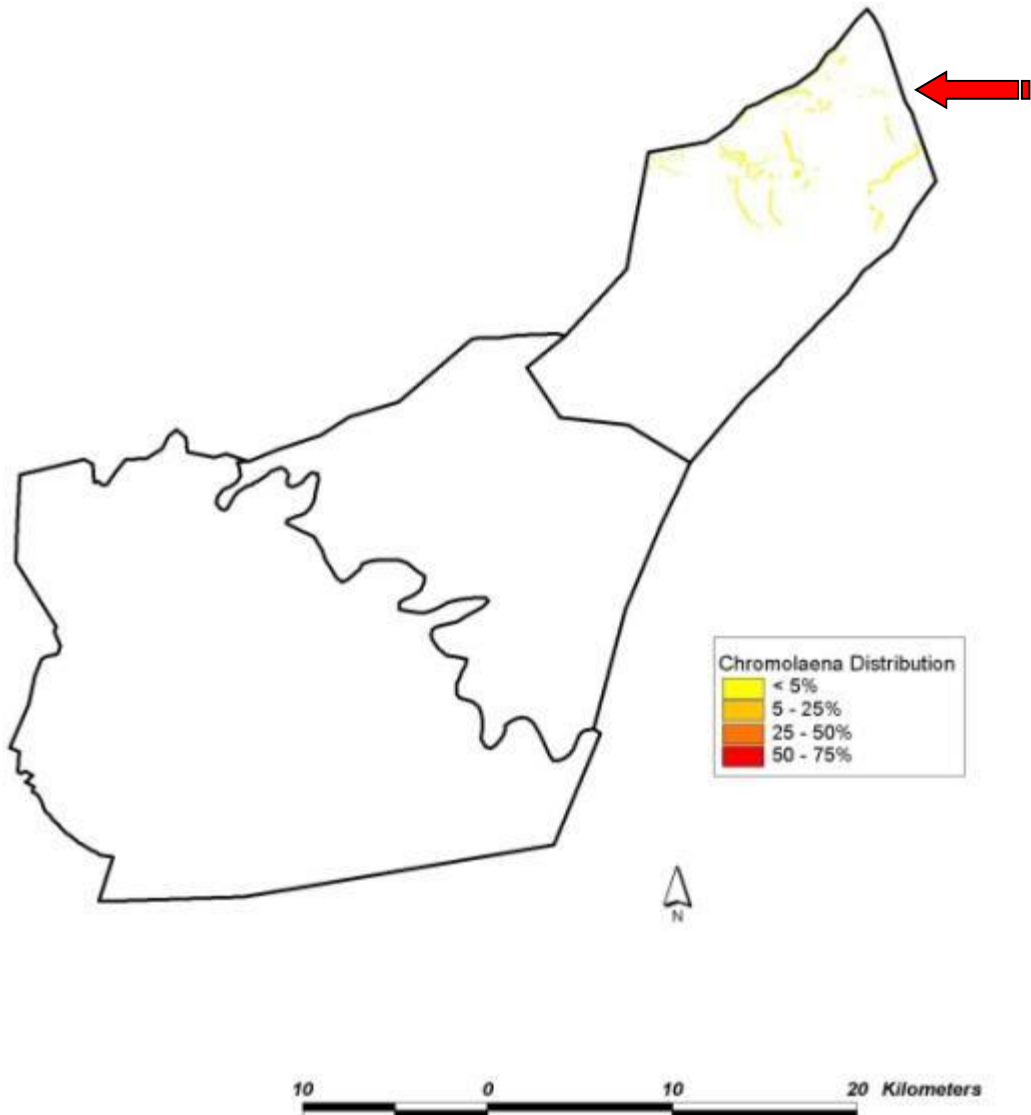




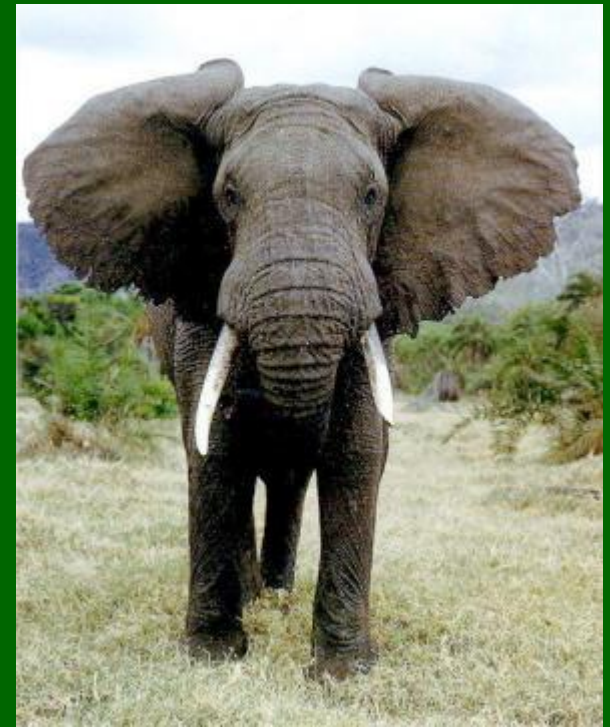
Chromolaena

In South Africa's Hluhluwe-Imfolozi Park, what looks like land with a high carrying capacity for game, is land increasingly invaded by *Chromolaena odorata*.

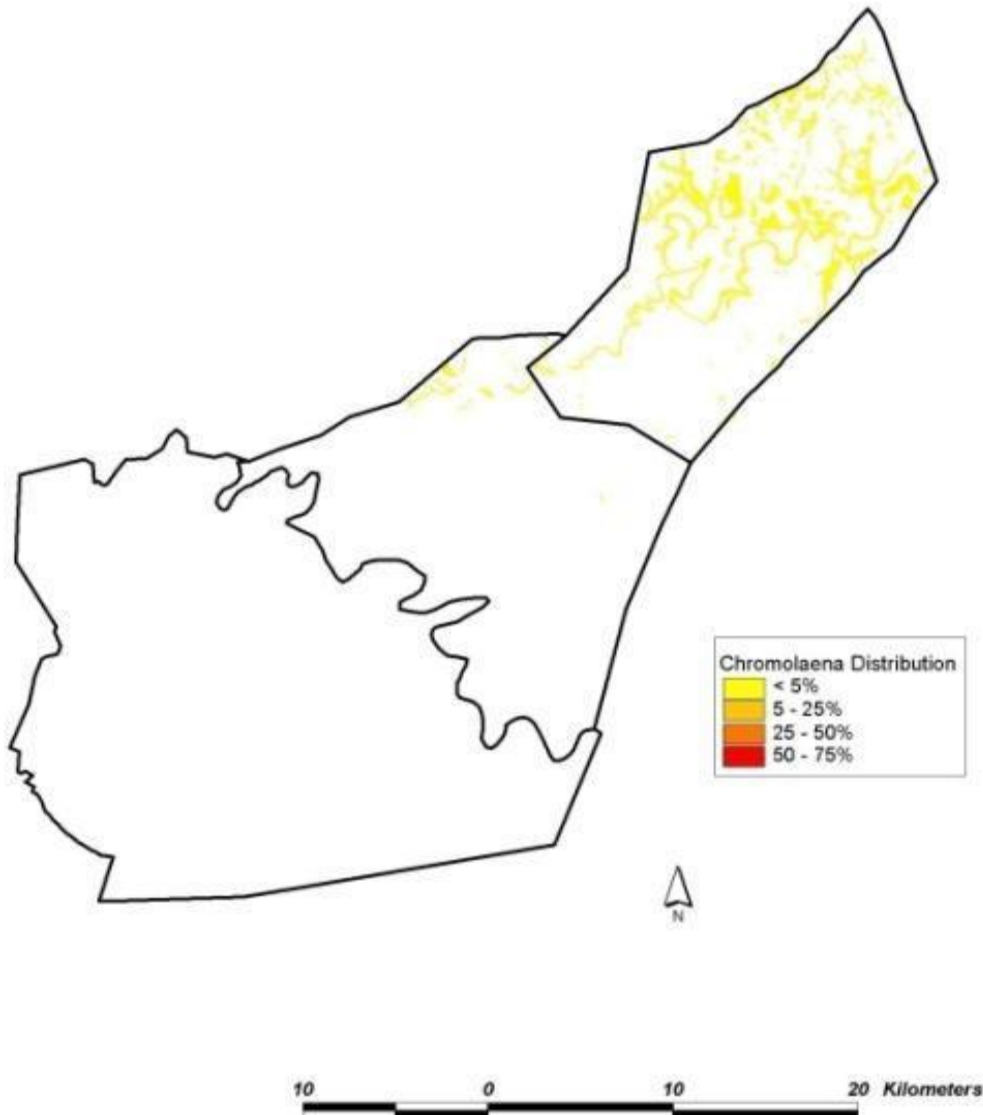
Distribution of *Chromolaena odorata*
in HIP in 1985



***Chromolaena* was mapped when invading the north-east section of the Hluhluwe-Imfolozi Park in 1985.**



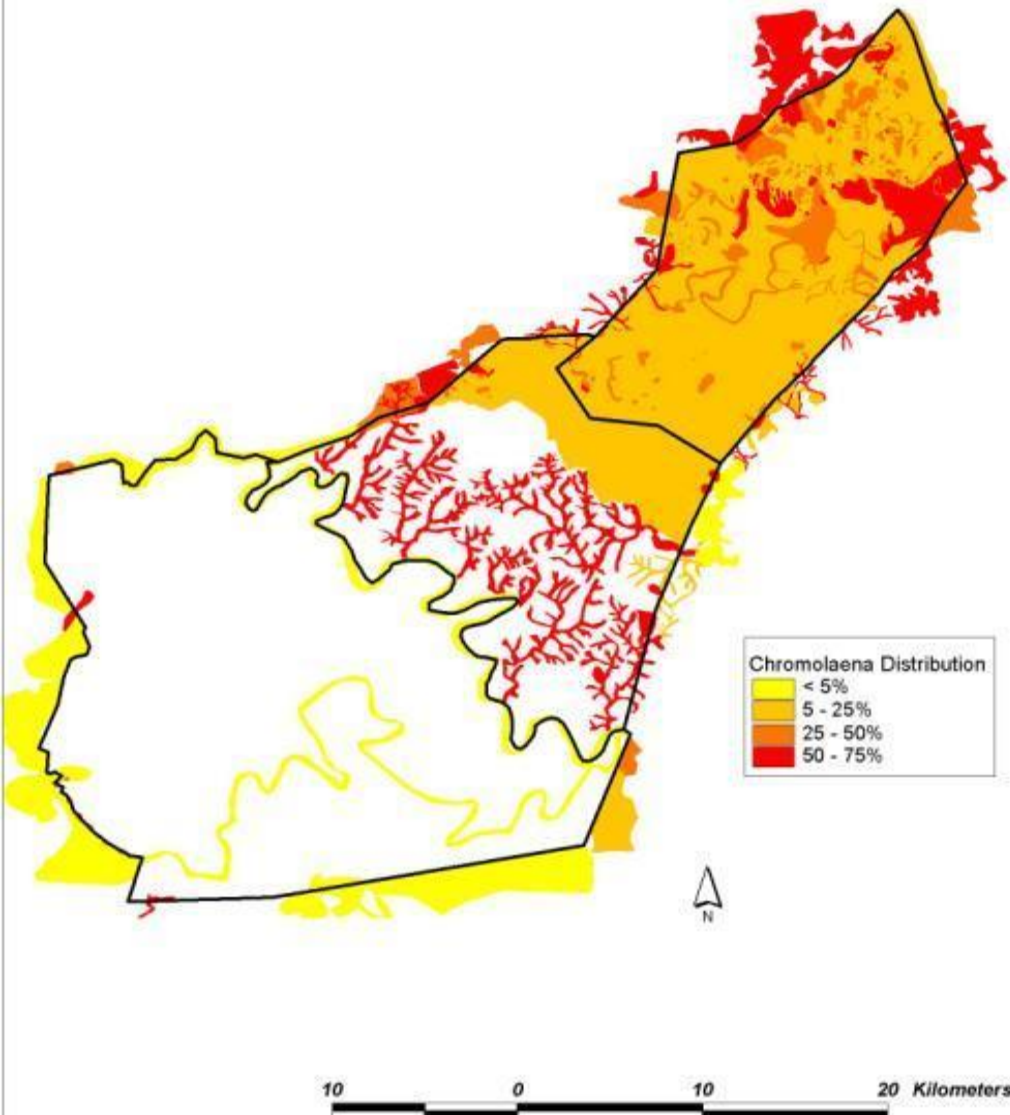
Distribution of *Chromolaena odorata*
in HIP in 1998



By 1998, the *Chromolaena* was far more widespread in the Park, although still at low densities.



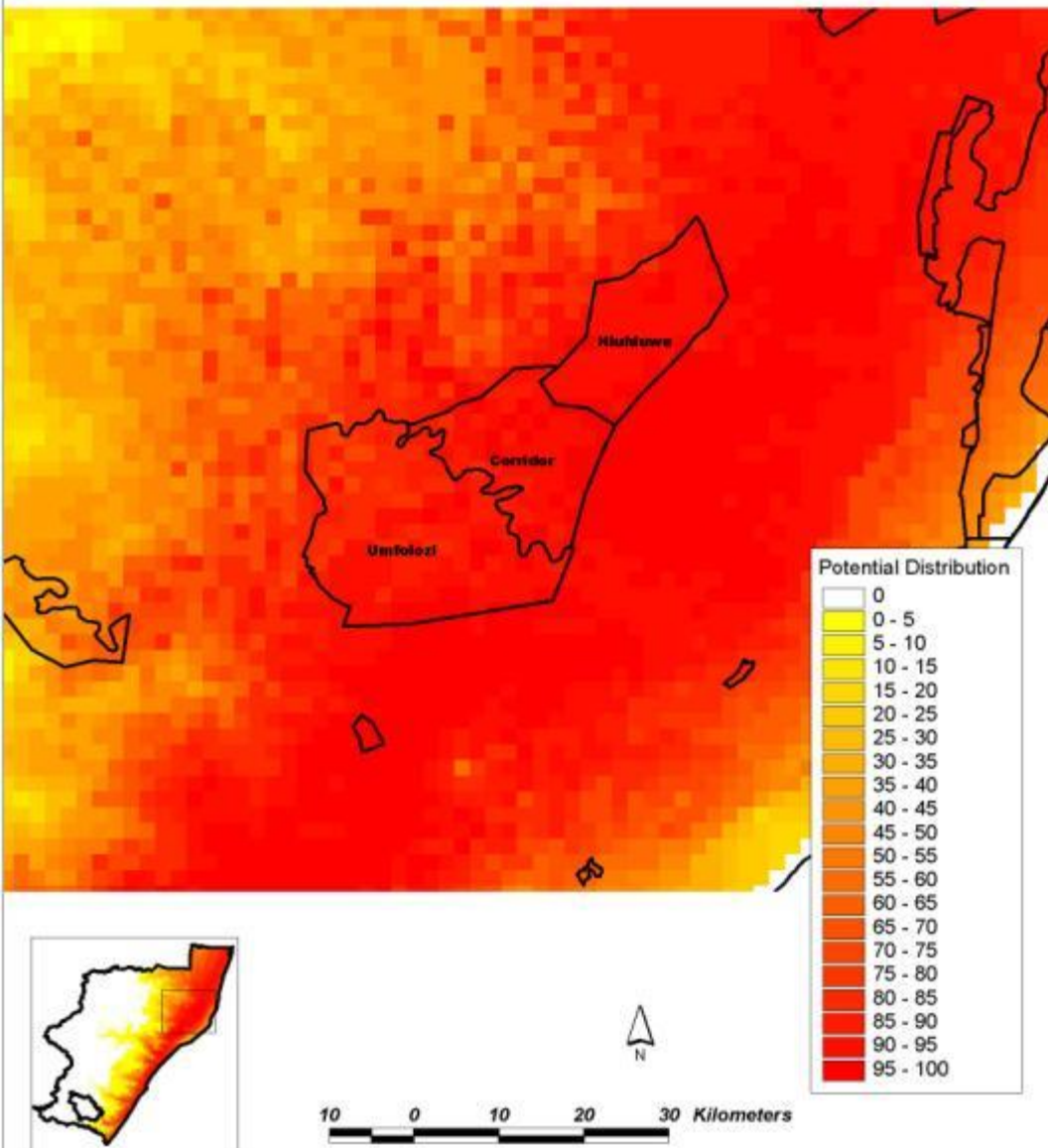
Distribution of *Chromolaena odorata*
in HIP in 2002



However, by 2002 (just four years' later) the level of invasion had changed dramatically. The *Chromolaena* had spread and grown across much of the Park, and the densities had become far greater as well.



Potential Distribution of *Chromolaena odorata* in HIP



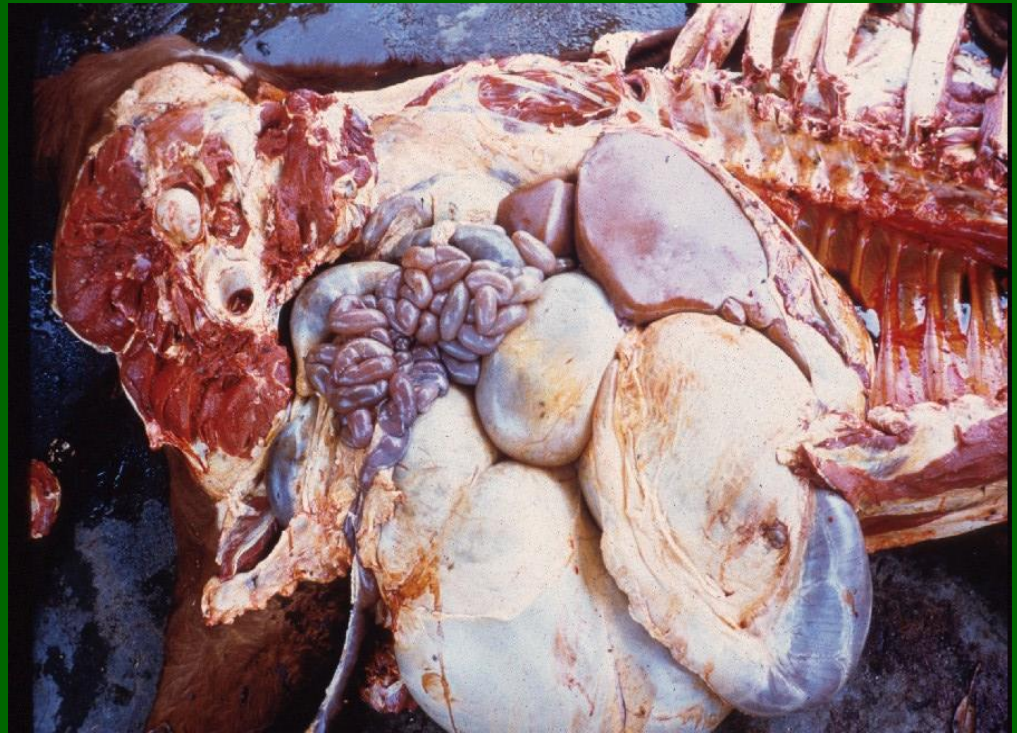
Our 2005 assessment of the invasion by *Chromolaena* was that it could engulf Hluhluwe-Imfolozi Park within ten years. If that was allowed to happen, then the impacts would be predictable:

- ▶ Little for animals to eat.
- ▶ No animals, no tourists.
- ▶ No tourists, no jobs.
(Loss of 3,000 jobs.)
- ▶ Loss of over R100 million p.a. revenue in 2005. [It could be double that today.]
- ▶ Devastating impact on local economy, in an impoverished part of the country.
- ▶ A further financial impact would, however, be felt by the broad support industries that benefit from the tourism in the Hluhluwe-Imfolozi Park – and all of the other Parks that would inevitably face the same fate.

Stock poisoning by *Lantana camara*



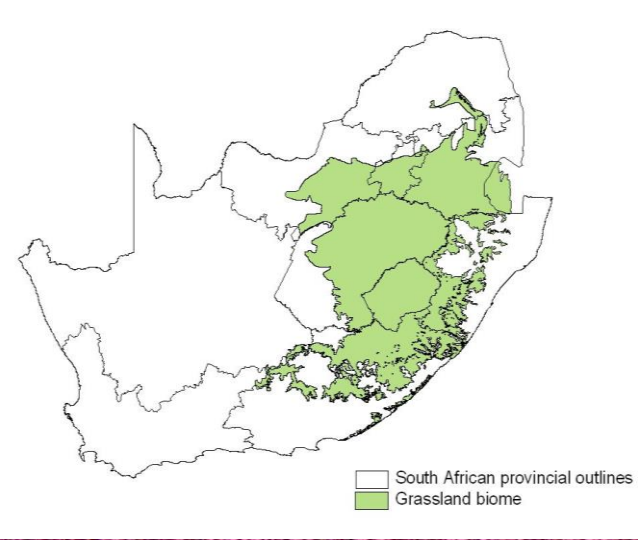
Severe photo-sensitisation of the muzzle of a cow after it had ingested lantana.



Carcass of a cow that died from lantana poisoning, showing enlarged liver and gall bladder.



Pom-pom weed (Campuloclinium macrocephalum) is unpalatable for both stock and game. It can invade Southern Africa's grassland biome.





Terrestrial invasive plants (such as the pines escaping from the plantation) can destroy the productive potential of our catchments – already 5% of mean annual runoff and 4% of yield is lost, and this could worsen by four-fold or more (with climate change).

In specific catchments, a reduction of over 100% of MAR can occur through invasions.

The impacts on erosion, especially after fire, and consequently on siltation of dams and rivers, exacerbate the situation further.

The Impact of Invasive Waterweeds on Water Security



Roodeplaats Dam



- Water hyacinth can double the area it invades on a dam in 10 days.
- It increases evaporation levels by over 40%.
- It adds to water quality impacts and costs (and exacerbates risks of toxic algae).
- It causes damage to infrastructure (insert: *hydrilla* impact on a pump, that cost R1.6m).
- It leads to eutrophication (oxygen depletion) and fish deaths – and bad smells.
- It results in a loss of recreational activities (e.g. fishing, rowing, sailing, swimming).
- It worsens diseases problems, such as bilharzia and (in malaria areas) malaria.
- It has caused people and cattle to drown.
- Hartbeestpoort Dam reputedly has up to 12 metres of goo-like sludge at the bottom, from invasives – depleting water-storage capacity.
- Herbicides are often necessary to contain the water hyacinth, with secondary impacts.

Invasive plants have devastating impacts on water supply, on the productive use of land, on the intensity of wild fires, on soil erosion, on flooding, on disease and many other negative impacts. Their impacts are measured in hundreds of billions of Rands.

Photo: Dr Brian van Wilgen.





Four WfW workers died in this vehicle when trying to outrun a wild fire in the Craggs area, in 1999. Nine workers jumped out of the vehicle, and lay in a stream. However, because of the invasions there was little water in the stream, and all suffered major injuries (particularly respiratory problem/singeing of lungs).

An example of the impact of the Working on Fire Programme

“[W]ere it not for the assistance rendered to the [Forestry] Industry by the Working on Fire Programme, in all its many guises, at a minimum, the damage to the Industry would have been twice what I have assessed it to be [R3.675 billion] in my report .”

Mike Edwards, CEO, Forestry South Africa, 17 August 2007.

Note: This was just to the Forestry Industry. There was far greater damage in these fires, including over 30 deaths. The Working on Fire budget in 2007/8 was R123 million.



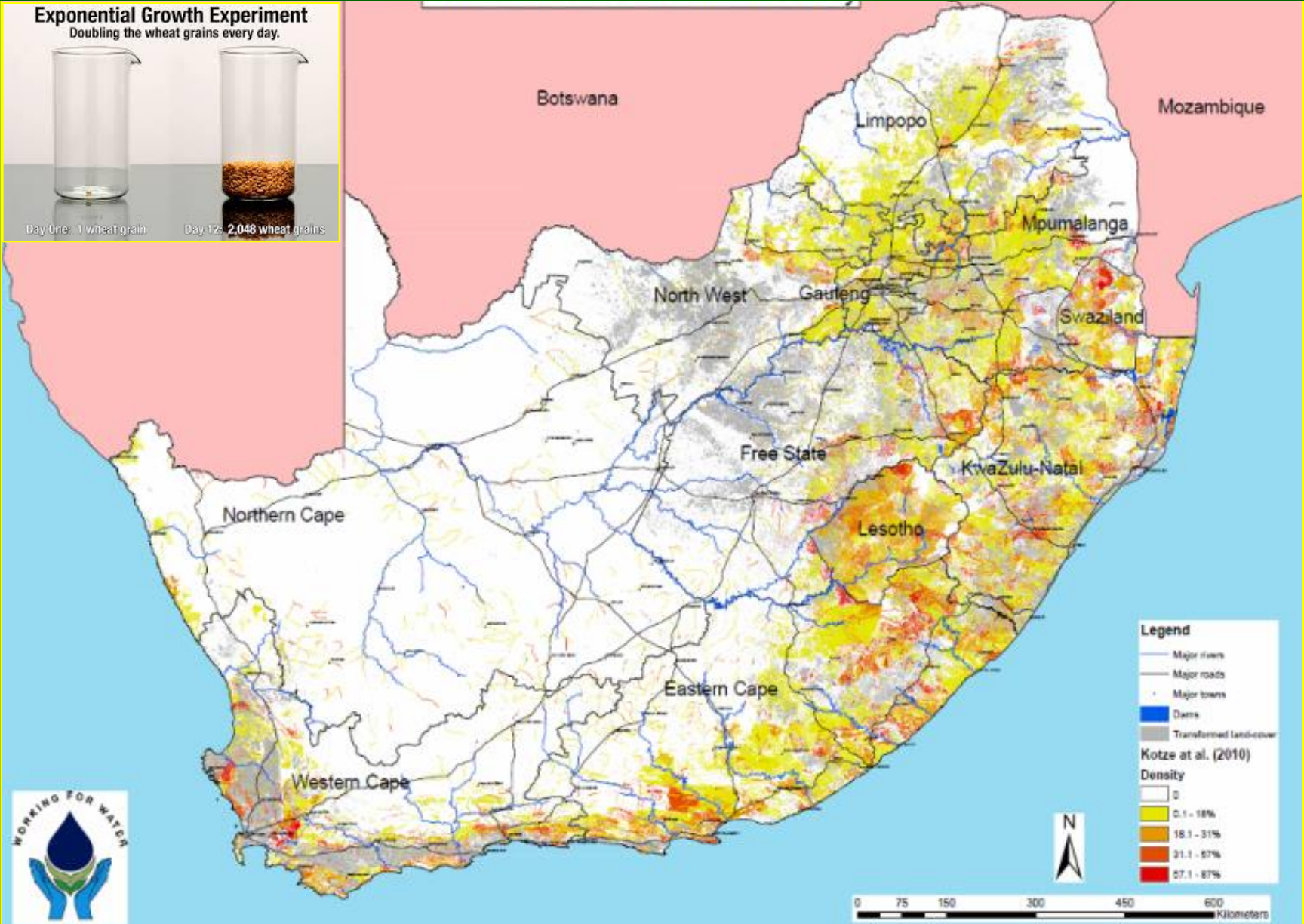
**Wild fire on the
slopes of Table
Mountain in
January 2000.**

**Over 80 houses
and other
structures were
destroyed or
damaged.**

**Every one was
surrounded by
invasive plants.**



Invasives were estimated to have covered over 20 million hectares of land in 2008 (Kotzé, *et al*, 2008). It is estimated that, on average, they spread and grow at 10% per annum (i.e. doubling in just 7 years). We are thus still in an early phase of the invasion of our land and water – plus facing all the new invasives.

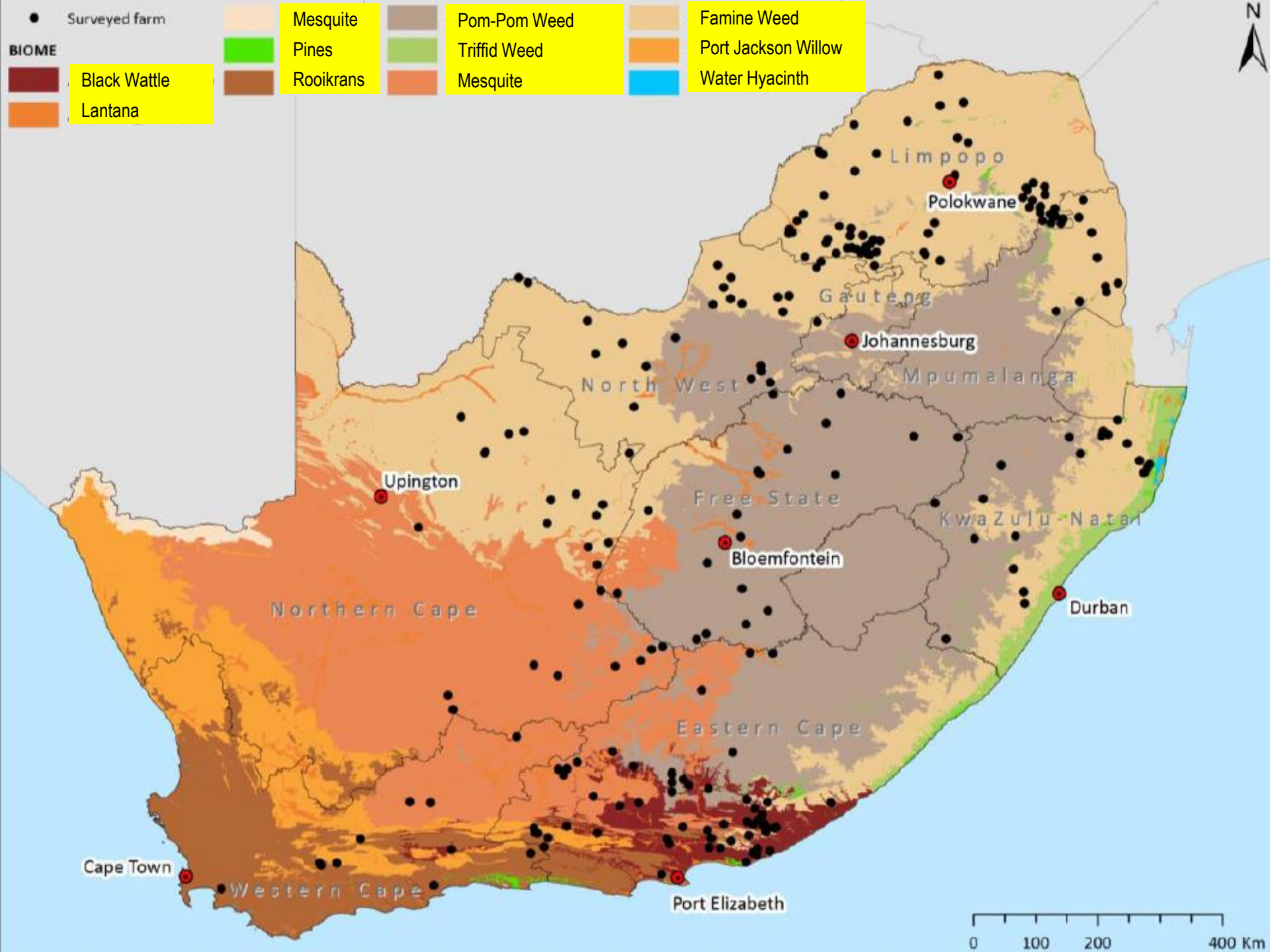


The Impact of the Clearing of Invasive Alien Plants on the Value of Water, Grazing and Biodiversity

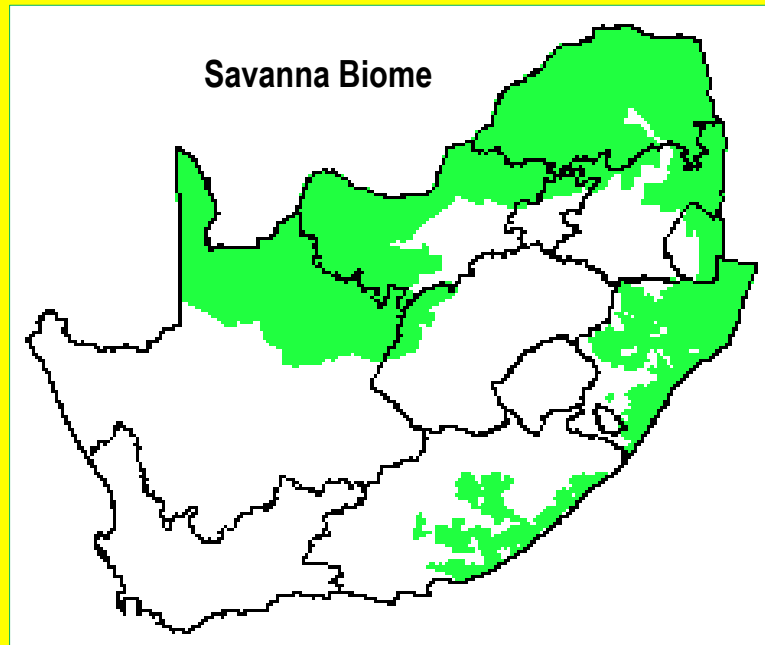
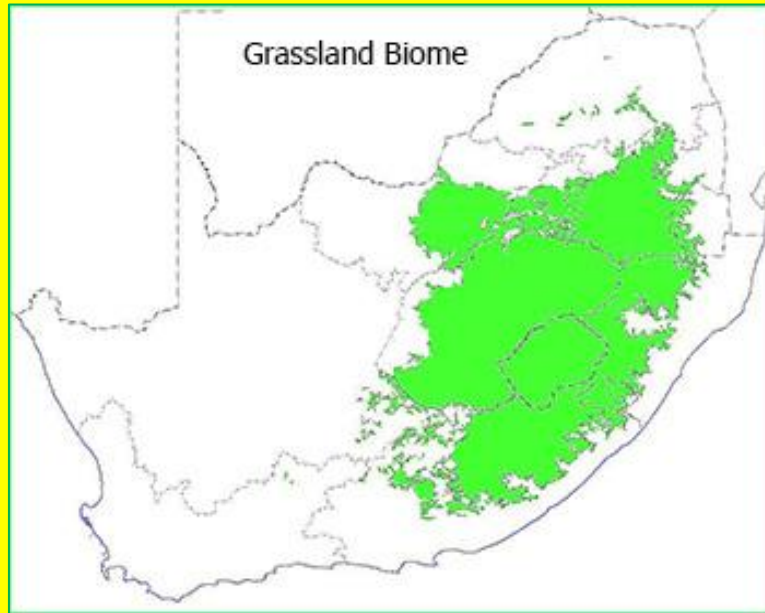
- “Our study showed that reductions in surface water runoff due to current invasions exceeded 3,000 million m³ (about 7% of the national total).”
- “[T]he potential reductions would be more than eight times greater if invasive alien plants are allowed to spread and occupy the full extent of their potential range.”
- “Although an estimated R6.5 billion was lost every year due to invading alien plants, this would have been an estimated additional R41.7 billion had no control been carried out. This indicates a saving of R35.2 billion every year.”
- “The net present value of all control operations up to the end of 2011 would be in the order of R453 billion.” [“About R400 billion of that relates to water quantity.”]

Dr Brian van Wilgen and Dr Willem de Lange (CSIR) ^{1, 2}

1. *The costs and benefits of biological control of invasive alien plants in South Africa* (B.W. van Wilgen & W.J. De Lange). African Entomology (2010).
2. *An economic assessment of the contribution of biological control to the management of invasive alien plants and to the protection of ecosystem services in South Africa* (Willem J. de Lange & Brian W. van Wilgen). Biological Invasions (2010).



Invasions of Grasslands and Savanna Biomes





Invasive rats are estimated to eat one-third ($1/3$) of all grain produced in Africa.



Albatross chick being eaten alive by invasive mice on Tristan Island Photo: Dr Ross Wanless



Dead albatross chick eaten by invasive mice on Tristan Island

Photo: Professor Peter Ryan

Chestnut trees once covered a massive swathe in the USA. Invasive (microbial) diseases represent an added threat (which could be exacerbated by climate change).



Unknown source, from Professor Michael Wingfield

Chestnut blight (which devastated those chestnut trees in the eastern shoreboard of the USA) is just one invasive problem (e.g. Dutch elm disease, Asian long-horned beetle, sudden oak death).



Unknown source, from Professor Michael Wingfield



Zebra Mussels are
choking the Great Lakes
in the USA.

Ulva seaweed is forming a green, marine desert in large parts of the Mediterranean Sea.

Lionfish – Introduced into the Caribbean in the 1990s.



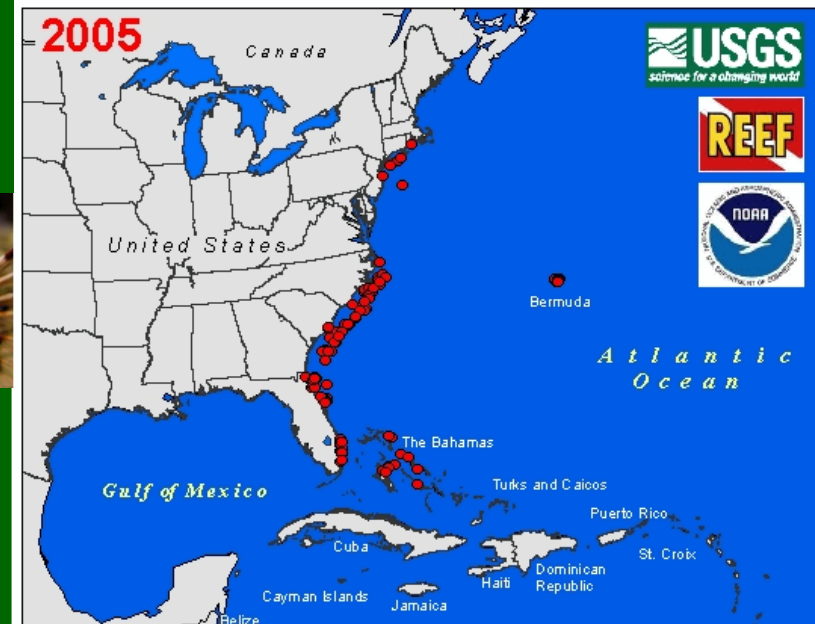
One lionfish can reduce the number of juvenile fish on a patch of reef by 79% in just five weeks.



Lionfish



First
noticed in
1992 in
Florida



Winner
Takes
All



DARWIN'S NIGHTMARE

















































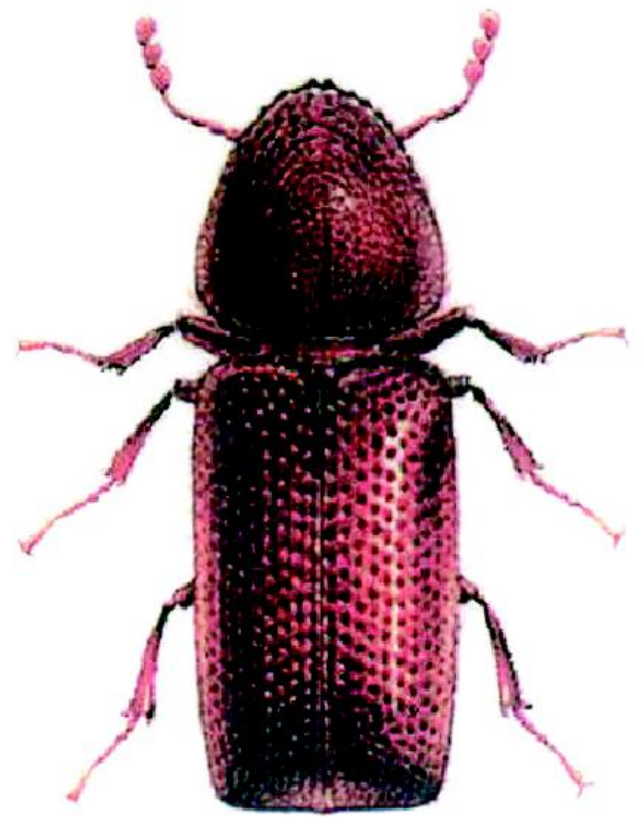




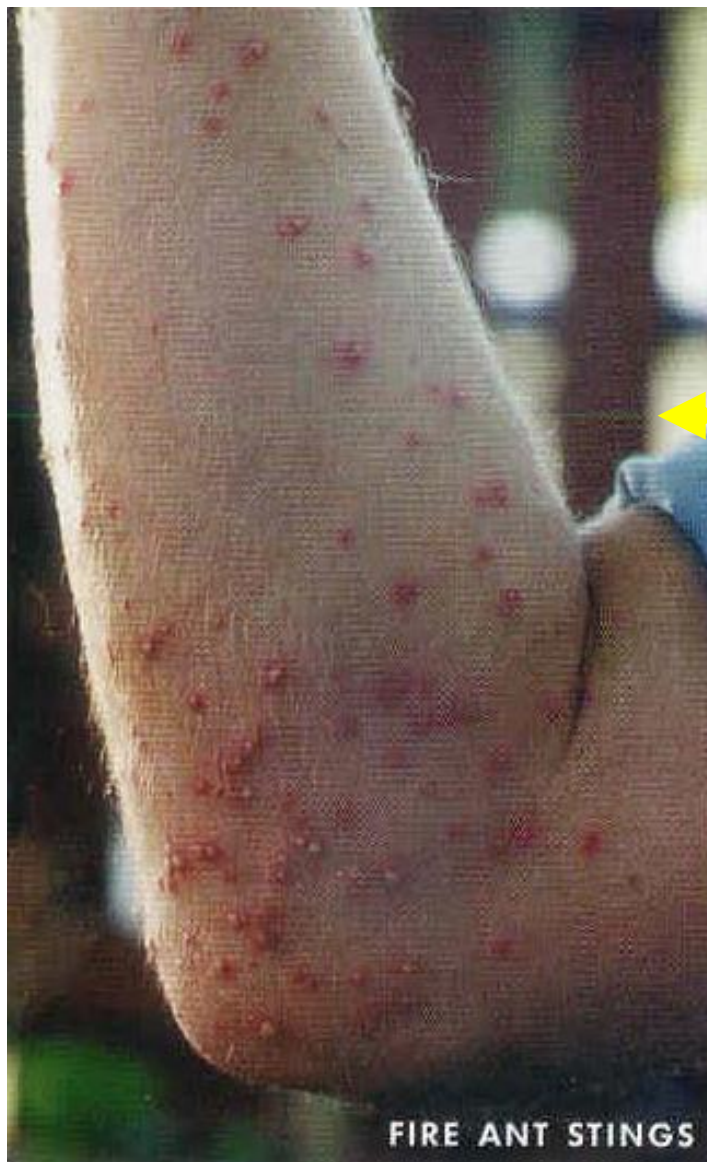

Research at the University of Stellenbosch has shown that over 50% of the endemic species of dragon flies and damselflies are threatened with extinction, owing to invasions by the black wattle (*Acacia mearnsii*).

We had not anticipated such an impact, and doubtless there are others.





Various pest species are impacting on food security. Of particular concern are our pollinators, such as by varroa mites on honey bees



The introduction into South Africa of invasive animals that threaten human life, amongst other impacts – such as the fire ant and various button spiders – appears almost inevitable, given the levels of trade, travel, transport & tourism.

Human Health and Invasions

Bio-security alignment with efforts to combat human health invasions is essential – microbial invasions are among the most threatening of all invasive alien species.



Zoonotic risks



SARS



Small pox

*Prior to human arrival, a new species
successfully colonized Hawaii once
every 25,000 to 50,000 years.*



*Nowadays a foreign species
becomes established in Hawaii
about once every 18 days.*

It's not whether we can afford to do it;
it's whether we can afford not to do it!

“Based on an estimated \$31 trillion in world GNP,
the \$1.4 trillion in losses from invasive species
represents nearly 5% of the world economy.”

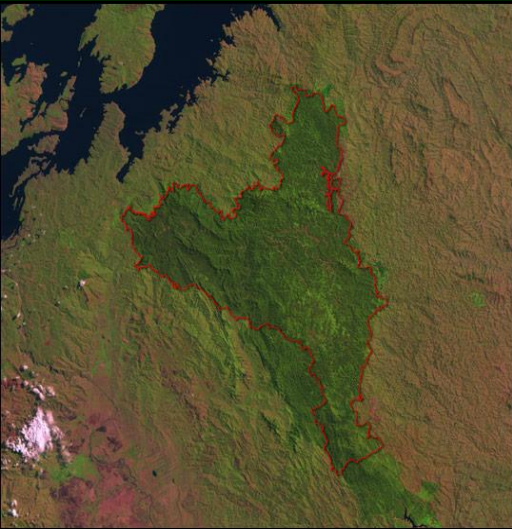
Pimentel, D (Ed). *Biological Invasions: Economic and Environmental Costs of Alien Plant, Animal and Microbe Species*. CRC Press, Boca Raton.

Even if these figures are 50% out, when using simplistic economic measures, they are unaffordable – for invasives are invading, and rapidly. (But the resource-economic externalities – the social costs, opportunity costs, synergistic and cumulative impacts – better suggest the looming catastrophe.)

The “Lethal Cocktail” of Environmental Change



Invasive Alien Species:
invasive grass in China

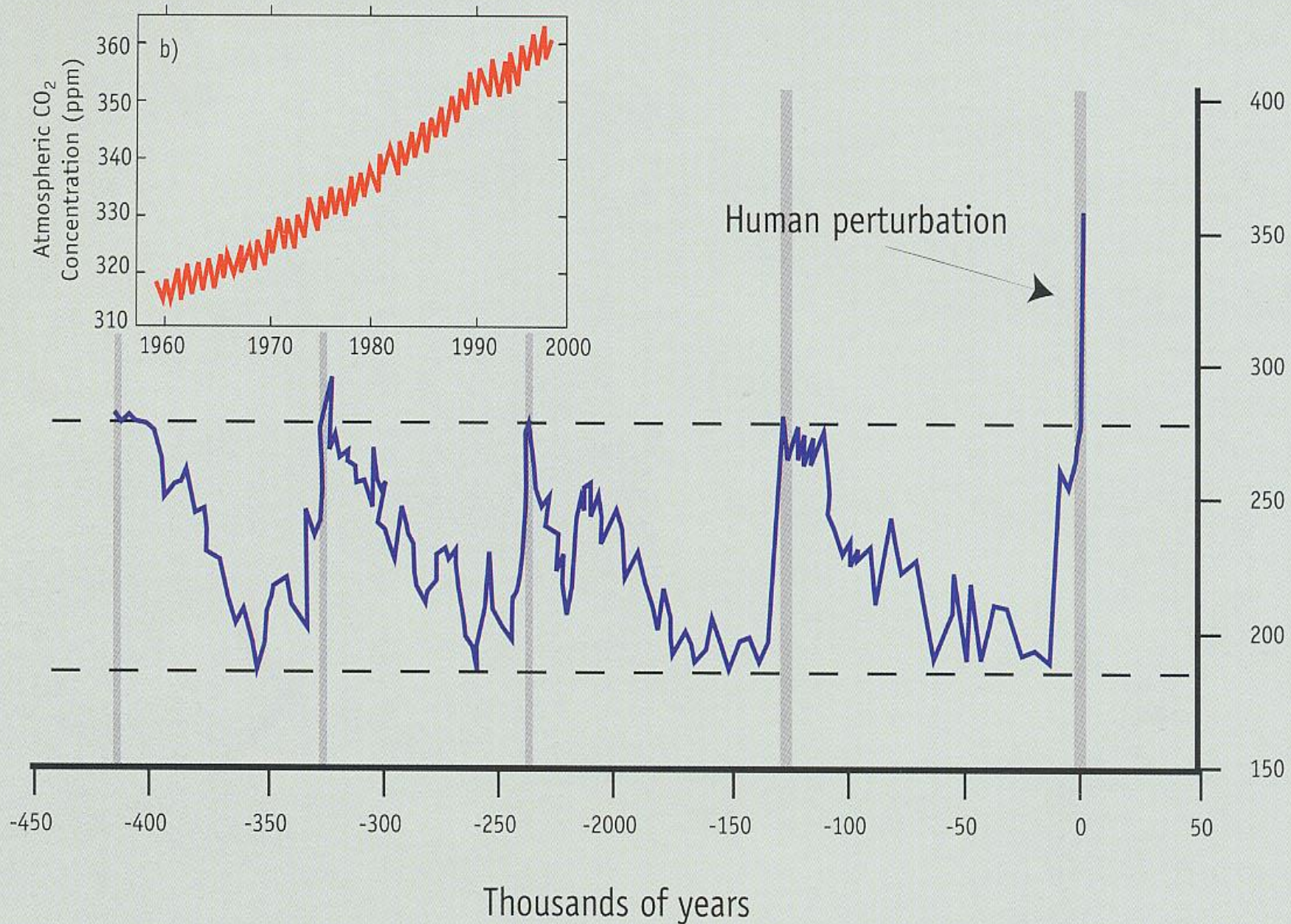


Habitat destruction:
Nyungwe National Park, Rwanda



Climate Change: Melting glaciers:
Torres del Paine National Park, Chile

The recent human influence on the carbon cycle



Research by Dr Barney Kgope, Dr Guy Midgley and a visibly concerned Professor William Bond (below) confirmed a potentially catastrophic link between climate change and habitat modification – and one that will be exacerbated by woody invasive alien plants.



Root and shoot growth of sweet thorn (*Acacia Karroo*) at different parts-per-million of atmospheric carbon dioxide (CO₂).

This will lead to massive impacts on a productive use of land, water security, wild fires, biological diversity, and more.

The already problematic mesquite (*Prosopis* species) in the Northern Cape are well-adapted to take advantage of climate change, with disastrous implications for rivers, keystone ecological species, groundwater and human livelihoods.

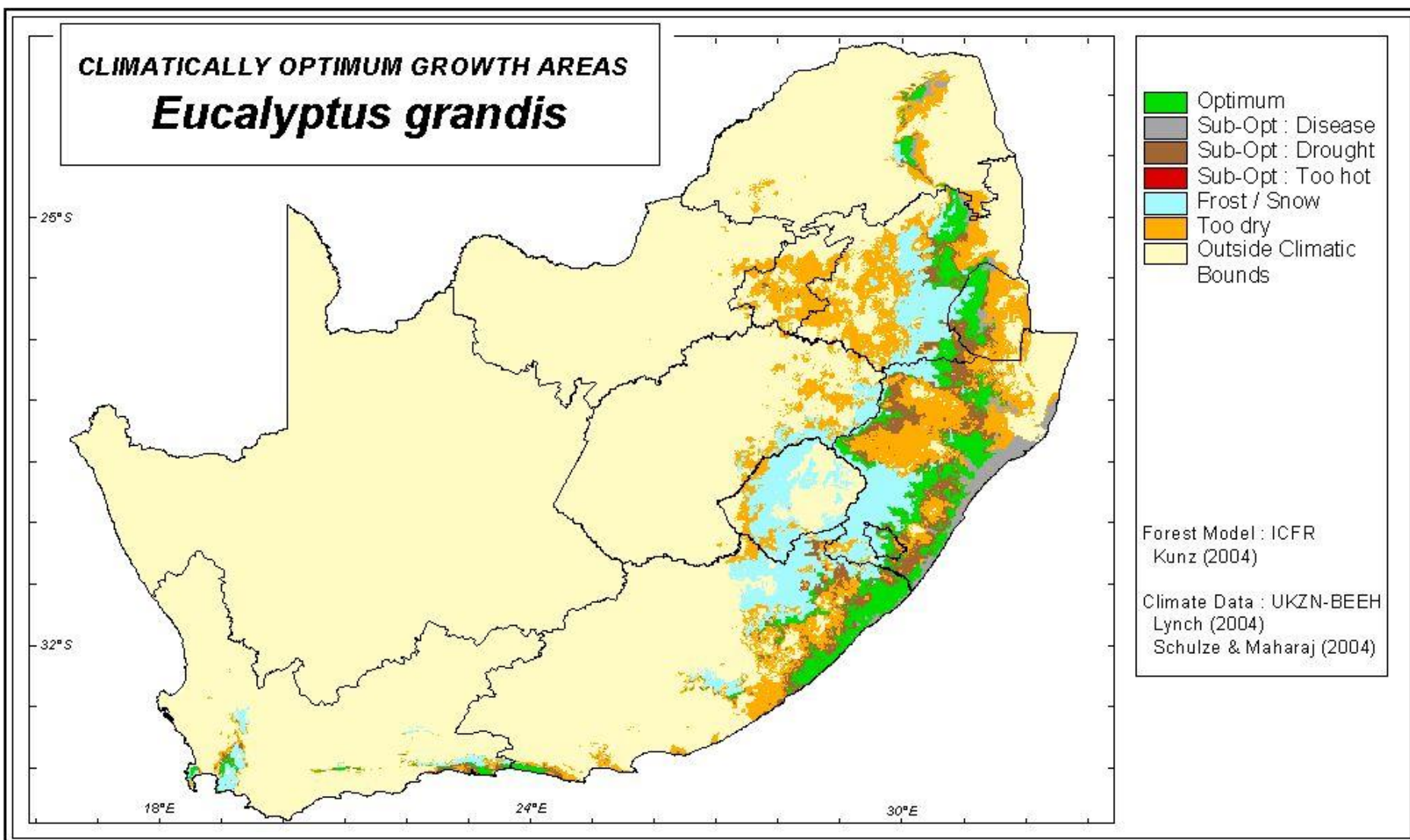




Invasion by Prosopis species



Modeling by Professor Roland Schulze (UKZN) indicates significant climate-change shifts in the areas where water and temperature are optimal for plantations. Below is the model for the saligna gum (*Eucalyptus grandis*), where only a small area of its present range remains optimal for its commercial growth. The economic and ecological impacts for invasives are immense.





Encroachment by sicklebush (*Dichrostachys cinerea*)



Bush encroachment by mopane
(*Colophospermum mopane*)





Bush encroachment by sweet thorn
(*Acacia karroo*)



Environmental Programmes of the Department of Environmental Affairs

Biosecurity



Natural Resource Management Programmes

- Working for Water
- Value-Added Industries
 - Eco-Furniture Programme
- Working for Ecosystems
- Working for Forests
- Working for Wetlands
- Working on Fire

Environmental Protection & Infrastructure Programmes

- Working on Waste
- Working for the Coast
- Working for Land
- Greening & Open-Space Management
- People & Parks
- Wildlife Economy
- Youth Environmental Service

Information Management & Sector Co-ordination

Green Fund Green Infrastructure

A very specific need is to build upon the first iteration of the National Strategy for Biological Invasions in South Africa.

This was put together under difficult circumstances, and it is anticipated that there will need to be considerable further work to structure the Strategy to optimize what is possible within the available resources.

There is also a need to ensure that the Strategy is used as a road map, and not a doorstop. It will require constant updating, like the voice on TomTom keeps recalculating after a wrong turn.



A National Strategy for Dealing with Biological Invasions in South Africa



25 March 2014



A Strategy Against Invasive Alien Species

1. **Research.** (IAS & Environment, Agriculture, Human Health ... Tourism, Transport, ...)
2. **Planning and Prioritization.** (Plants, Animals, Microbes.)
3. **Advocacy, Education and Communication.**
4. **Regulation** (Progressive, Fair and Balanced Laws, Compliance and Enforcement).
5. **Incentives and Disincentives.**
6. **Co-operative Governance and a Public-Private-Community Partnership.**
7. **Prevention** (Bio-security, including Risk Assessment and Management).
8. **Early Detection of and Rapid Response** against Emerging Invasive Alien Species.
9. **Control** (Labour, Chemical, Fire, Mechanical, Bio-Control, Suppression) **& Restoration.**
10. **Monitoring and Evaluation,** for systematic interventions to secure outcomes.

THE ALIEN AND INVASIVE SPECIES REGULATIONS, 2014

in terms of the

**NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004
(ACT NO. 10 OF 2004)**



Lists of invasive species

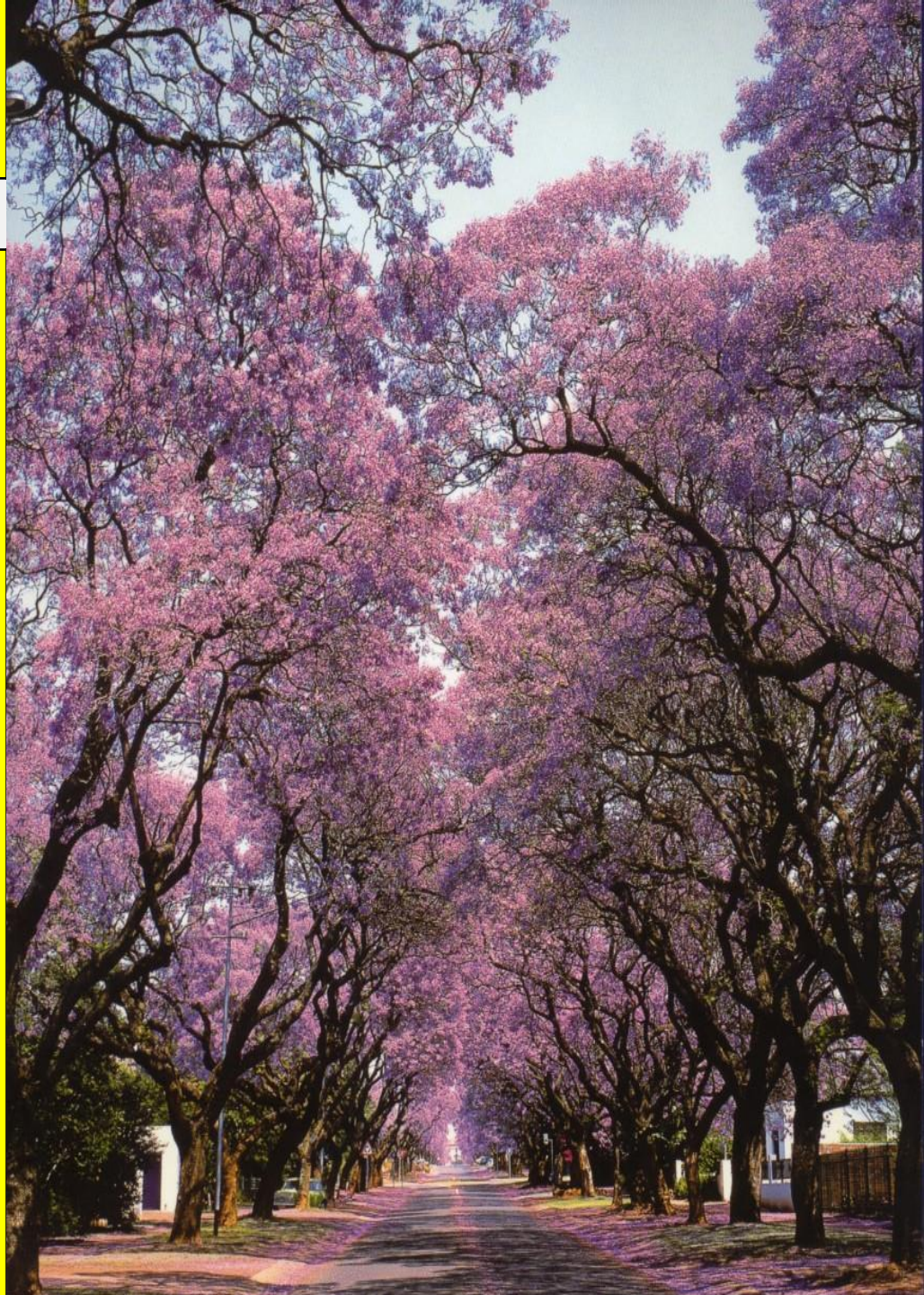
Type of organism	Invasive species	Prohibited species
Terrestrial & fresh-water plants	379	238
Marine plants	4	2
Mammals	41	19
Birds	24	20
Reptiles	35	10
Amphibians	7	9
Fishes	17	111
Invertebrates	47	145
Microbes	7	7
TOTAL:	559	561



CATEGORY / AREA

Jacaranda (*Jacaranda mimosifolia*)

- a. 1b in Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga and North-West.
- b. Not listed for urban areas in Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga and North-West.
- c. Not listed within 50 metres of the main house on a farm in Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga and North-West, for trees with a diameter of more than 400 mm at 1000 mm height at the time of publishing of this Notice, provided such trees are located outside riparian areas.
- d. Not listed elsewhere.





Bio-security

Bio-security – the prevention of the introduction of invasive alien species – has not been given the absolute priority it demands.

It makes little sense to spend billions of Rands on trying to control invasive alien species already in the country, and then to not to invest appropriately in preventing new invasives from entering into the country.

We are finally close to having an integrated assault on preventing invasive alien species from entering into the country – and perhaps from leaving our country as well.

Biosecurity at our Ports of Entry



NEW ZEALAND. IT'S OUR
PLACE TO PROTECT



BIOSECURITY
NEW ZEALAND



- House crows, from India, kill the young of other birds, spread disease and harass people.
- Zanzibar has over 2 million house crows.
- South Africa had invasions in three port cities – Cape Town, Richards Bay and Durban.
- There were 500 birds in Durban in 2005. Left to invade, there would have been more than 250,000 birds in Durban by now. They appear to have been extirpated in Durban and Richards Bay.
- If South Africa fails to eradicate the house crow, we will be a pathway for an invasion up the west coast of Africa, with devastating impacts. We will eradicate them in Cape Town.

Invasive Alien Plants and Run-of-River Abstraction, Low-Flows and the Water Reserve

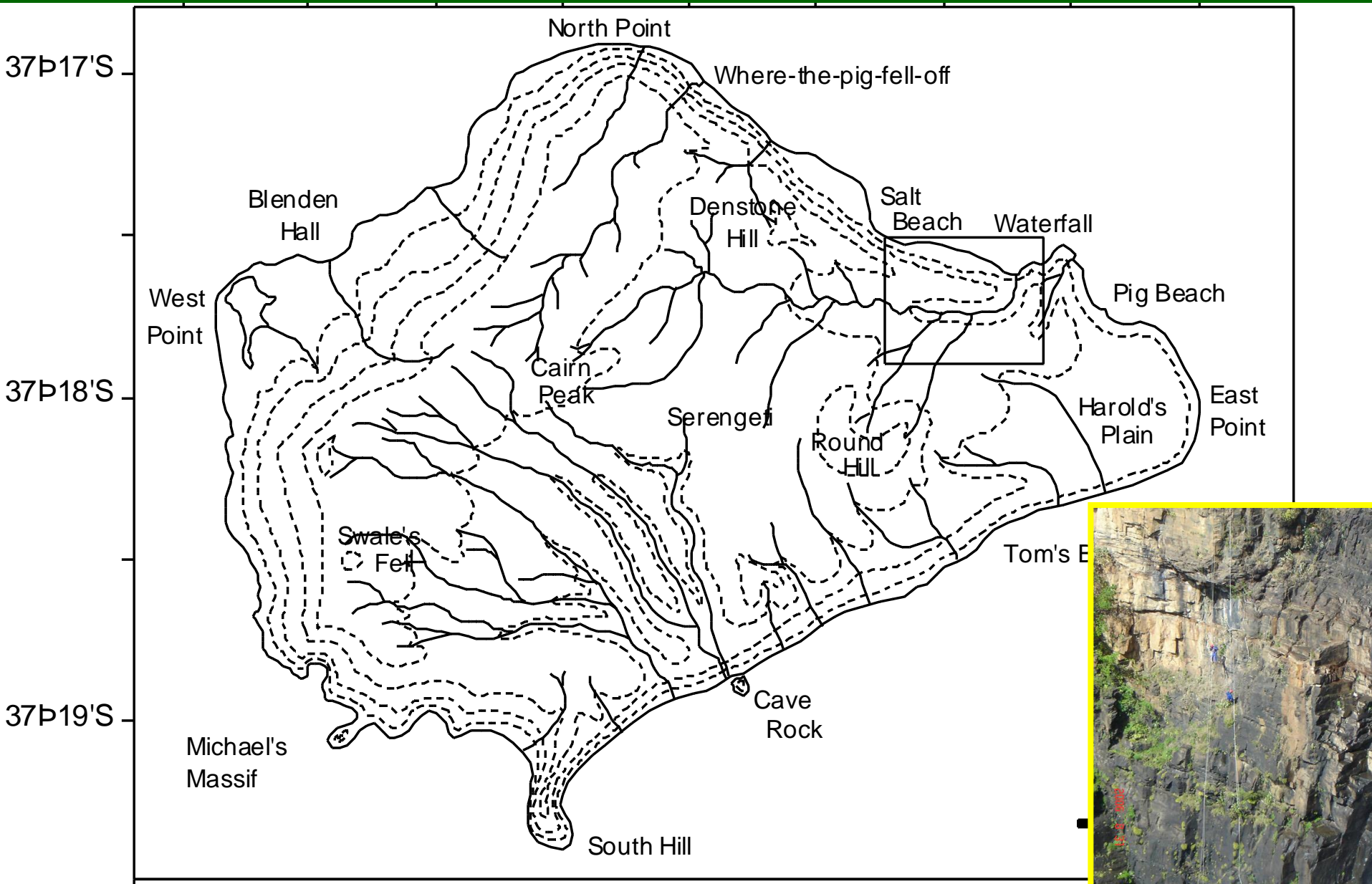


- The pictures to the right show the Jan Dissels River in Clanwilliam in the year 2000 (top) and 2013 (bottom), after clearing of the black wattles by the Working for Water programme..
- Yield from run-of-river abstraction remains central to water security in South Africa, and clearing invasives is essential.
- Without this clearing, releases from dams to meet the environmental water reserve will be considerably higher.



As part of the South African Government's Expanded Public Works Programme, we provide work and training to over 70,000 previously unemployed people.

High-altitude invasives are a priority. Left alone, they will reach thresholds where it is not possible to control them. It took two workers 12 hours to kill eight invasive New Zealand flax plants on Inaccessible Island, as they had to abseil down 1,000 foot cliffs.



Value-Added Industries



Making useful products from invasive species
(and ensuring that cherry-picking does not thwart efforts to control invasives)

Value-Added Industry

Turning a liability
into valuable
products.



Eco-Coffins



Driven by a desire to reduce the cost of bereavement for the poor, the Working for Water programme initiated the “Eco-Coffin Programme”, working in partnership with the KwaZulu-Natal Invasive Alien Species Programme and the Alliance for Religion and Conservation, with funding from the World Bank (after winning the Development Marketplace Award for innovation in 2005).

Basic rope-handled Eco-coffins, made from invasive wood by previously unemployed workers, can be sold for as little as R300. Gold-handled Eco-coffins and Eco-caskets are also made at affordable prices, working through local faith-based organizations to promote dignified funerals that do not further impoverish those left behind.

Professor Kader Asmal, who gave life to the Working for Water programme, and all that has followed, chose to use a basic, rope-handled Eco-Coffin for his funeral.

Eco-Desks



The programme aims to put 500,000 Learners behind a new desk (that will last), within a year.



Eco-Furniture

The Eco-Furniture Programme is making high-quality furniture for Government's office needs, and other furniture, from invasive alien wood. As with the Eco-desks, it is possible to make these products at a substantially lower cost than Government is paying currently, and usually for products that (being solid wood) will last for a long time, enhancing the value of the work.



Value-Added Industries: Crafts, Toys and Games



Value-added products using invasive alien wood are being manufactured for crafts, toys, games and other products. Not only is there scope to expand this (e.g. with supply for Early Learning Centres), but there is also scope to provide crafters with invasive wood, rather than their harvesting valuable indigenous trees.



Eco-Bench – In memory of Professor Kader Asmal



Waste to Bio-Char, Woodwool Blankets



Biomass to Energy (Working for Energy)



**Invasive alien plant biomass
(and bush-encroachment
species) can be used to
generate energy**

Biomass can be used to create energy through firewood, pyrolysis, pelletization, gasification, direct feedstock into coal-fired power stations, and other methods.

It is estimated that 2% of the country's energy needs could be met for over 25 years, and turn the tide against invasive alien plants.

GREEN HOUSING

The “Lighthouse”, made from invasive biomass, is fire-proof, flood-proof, has excellent thermal and acoustic properties, is stronger than brick, is even bullet-resistant, is furnished with invasive material, excels in terms of use of resources (water, energy, waste, sanitation), and is probably the greenest building in the country.



A new bar? A Seven-Star Green Building?



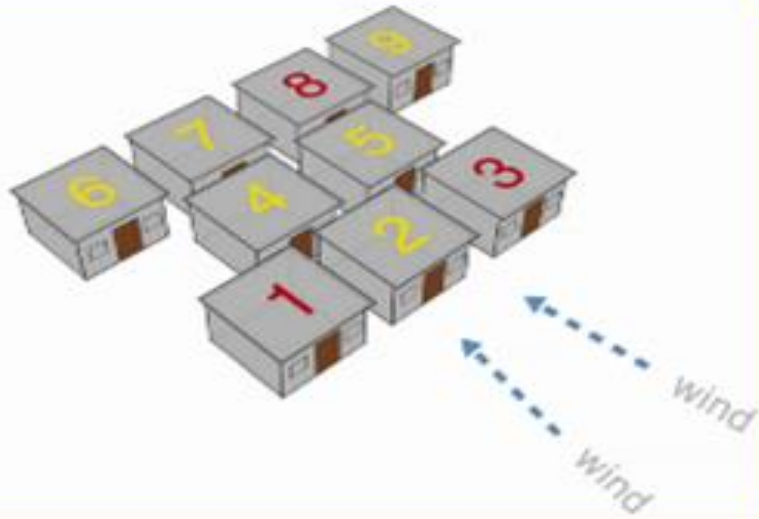
27 m³ of invasive or bush-encroachment biomass is used in a 54 m² Lighthouse.

It is about 70% of the cost-per-m² of an average RDP house, and far superior.

Its use can revolutionize the way in which we manage invasive alien species.



We tried to burn down 9 shacks (6 conventional shacks, and three experimental shacks).
[See video link: <http://youtu.be/s-QaQ9tRVRI>.]



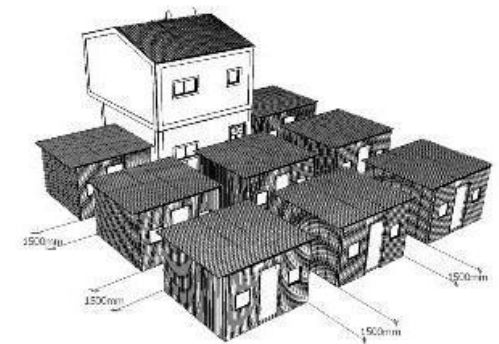
We wanted to see if fire would escape from Unit **1** (lined with imported magna-board) or Unit **3** (lined with wood-wool cement board made from invasive biomass) – the “experimental” units – compared to the “control” of Unit **2** (a typical informal-settlement, fire-vulnerable shack).

We also wanted to see if Unit **8** (with wood-wool cement board from invasive biomass) would survive the spreading fire, compared to Unit **7** (a conventional shack “control”).

Fire prevention in informal settlements is a major focus that must not be lost.



The result was spectacularly successful.



Proving that the Lighthouse will not burn.

The middle front shack was lined with invasive board and had fire-shutters on the windows. The front three shacks were filled with flammable material, doused with petrol, & set alight simultaneously. The test was to prove that the Lighthouse would not burn (and if it did, the front three shacks would burn).

The fire-test was a spectacular success.

The front shack (lined with our board, and with shutters to deprive the fire of oxygen) worked perfectly.

The seven “conventional shacks” were razed to the ground, burning at temperatures of over 1,200°C.

The Lighthouse was left unscathed (two windows were cracked). We measured 998°C on the outside, and 32°C on the inside. We were so confident that we even had people inside the Lighthouse during the fire!



Environmental Monitors

The Department and SANParks have invested in over 1,440 Environmental Monitors, working on conserving rhino, general safety, stakeholder awareness, conservation issues (invasives, fire, erosion, etc).



Mambas ready to strike

They're not even armed but this crack all-female unit has only lost one rhino this year

NTOMBH NKOSI

A CRACK all-female unit has joined the anti-rhino poaching fight.

The Black Mambas are made up of 36 women and operate in Balule Nature Reserve north of Limpopo.

The unit is part of the Department of Environmental Affairs' broader Environmental Monitors Programme, which responds to environmental threats in protected areas, but this unit is the only one in the country made up primarily of women.

The unit was founded by Balule Nature Reserve with the support of the Department of Environmental Affairs Expanded Public Works Programme, environmental monitor programme, South African National Parks (SANParks) and several other funders with a keen interest in preventing poaching.

This year only one rhino has died in Balule, thanks to the hard work being put in by the Black Mambas.

In 2013 a total of 19 rhinos perished, the unit's founder, Craig Spencer said yesterday.

The unit went through a six-week training course, working in shifts during the day and night. "They also undergo polygraph tests every now and then and they pass all the time," Spencer said.

Patrollers have discovered 42 snares, suspected to be left by rhino poachers. They also found smelly clothes and white sneakers covered in blood and pliers used for cutting the fence.

"Poachers use home-made guns, hunting outfits and guns stolen from lodges," Spencer said.

He said poachers usually get paid about R50 000, while the buyers get \$60 000 (R800 000) when they export, mostly to Asian markets.

"By the time poachers kill the rhinos, they already have buyers."

He said not even a single unit mem-



VENOM: A crack all-female unit fighting rhino poaching, the Black Mambas, operates in Balule Nature Reserve.

ber had died since the programme's inception even though they are not armed.

"I have lost guards who were armed before starting this unit. They died after animals attacked them."

"The Black Mambas are well trained to deal with charging animals and poachers" Spencer said.

Nocry Mzimba, 22, said she always wanted to be part of a conservation environment from an early age.

"Two of our biggest challenges are poachers and charging elephants. We have learned we must not show fear or

run," Mzimba, who started with the unit in 2013, said.

"The National Environmental Monitors Programme was established by the Department of Environmental Affairs with the aim of addressing the growing problem of rhino poaching in South Africa."

"The objective of the programme is to reduce poaching while also creating jobs and sustainable livelihoods for communities in and around South Africa's national parks" Pitso Mojelele said.

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Rhino statistics

- 364 – rhino killed this year, no arrests
- 1175 – rhino killed last year
- 20 to 40 years old – average age of poachers
- 42 – number of snares found this week alone
- \$60 000 (R800 000) – value of a rhino horn in Asia
- 36 – number of Black Mambas personnel (unarmed females)

Investing in Sustainable Wildlife Ranching – Biosecurity Threats and Opportunities

1. **Invasive species are the greatest long-term threat to sustainable wildlife ranching.**
Work with us to manage them. Control Plans. Emerging species. Utilization of biomass.
2. **Optimal land-use practice must conserve biodiversity and ecosystem services.**
Carrying capacity. Intensive vs extensive. Predators. Hybrids. Water. Erosion. Fire. Climate.
3. **Optimise contribution to poverty, inequity and unemployment.**
Invest in transformation. Expertise. Breeding stock. Manage disease. Wildlife economy.
4. **Wildlife Ranching needs regulation. Laissez faire = death.**
Genetic threats. Disease. Invasives. Market equity. Self-administration. Promote hunting.
5. **Collaboration works.**
Cumulative and synergistic benefits. Industry sustainability. Investing for children's children.

Thank You



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