



Managing invasive non-native species (INNS)

16th April 2015

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Invasive non-native species – the impacts

- Environmental impacts
 - Native species threatened
 - Habitat modification
- Direct economic threats
 - Infrastructure impacts
 - Risk to operational activities
 - Risks to profile
 - Cost of management/control
- Legal impacts
 - Risk of prosecution/fines
 - Risk of cost recovery

What does the law require?

- EU Invasive Alien Species Regulation (2015)
 - Identifying INNS
 - Preventing arrival – managing pathways
 - Surveillance, eradication, management, restoration
 - Minimising harm
 - Polluter pays.
- Wildlife and Natural Environment (Scotland) Act (2011)
- Infrastructure Act (2015)
 - Species control agreements and orders

What does the law require?

- Water Framework Directive
 - Current guidance places INNS into categories based on anticipated effect on ecology
 - If High Impact species present – High Ecological Status is impossible
- UKTAG Aquatic Alien Species List (February 2015)

How should we prioritise?

UKTAG - Revised classification of aquatic alien species according to their level of impact

- High impact – 35 species (incl. waiting list)
 - 9 submerged/floating plants
 - 3 crayfish
 - 3 amphipods
 - 1 crab
 - 2 bivalve
 - 3 fish

 - 6 riparian plants
 - 1 saltmarsh plant
 - 7 marine invertebrates

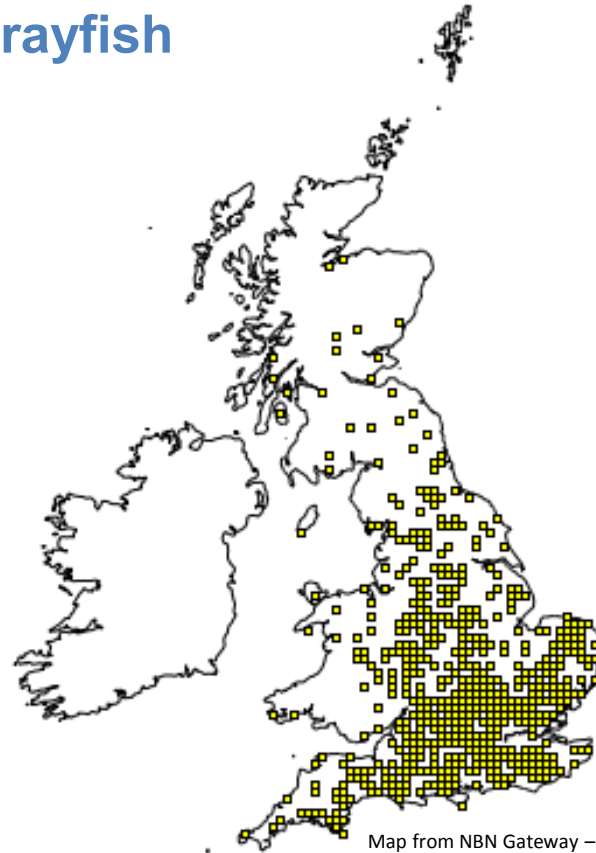
How should we prioritise?

- Moderate impact – 4 freshwater species
 - 2 crayfish
 - 1 snail
 - 1 fish
- Low impact – 16 freshwater species
 - 10 plants
 - 2 crayfish
 - 1 amphipod
 - 3 fish
- Unknown impact – 40+ freshwater species

Current species of concern

Pacifastacus leniusculus Signal crayfish

- Mechanisms of arrival?
- Spread within catchments?



What else should we be concerned about?

Other species to watch

- Invasive shrimps



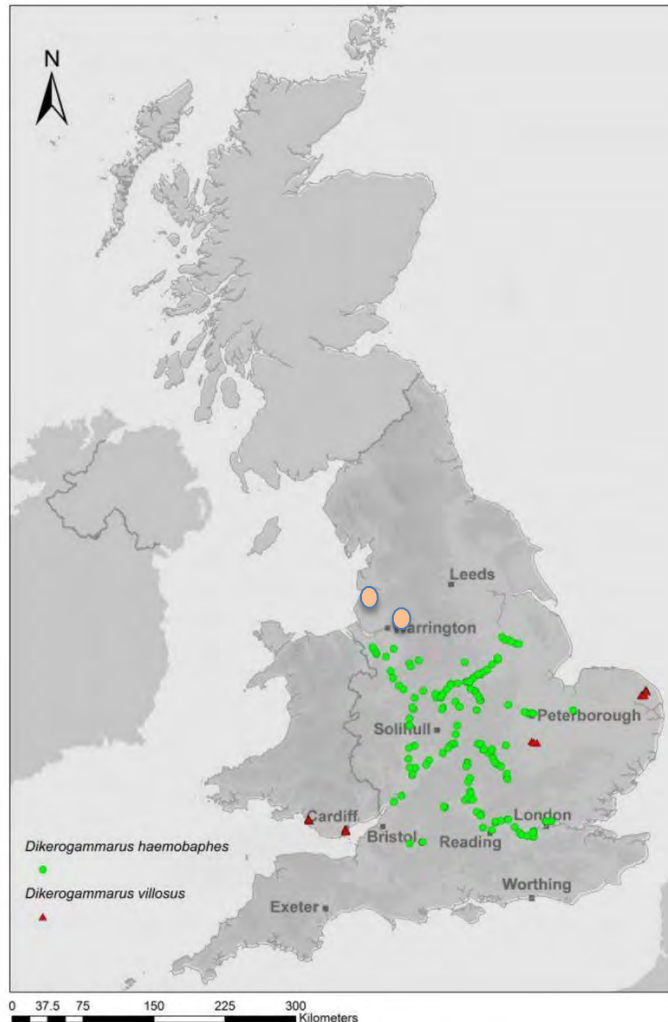
What should we be concerned about?

Dikerogammarus villosus? Killer shrimp



What should we be concerned about?

Dikerogammarus haemobaphes? Demon shrimp



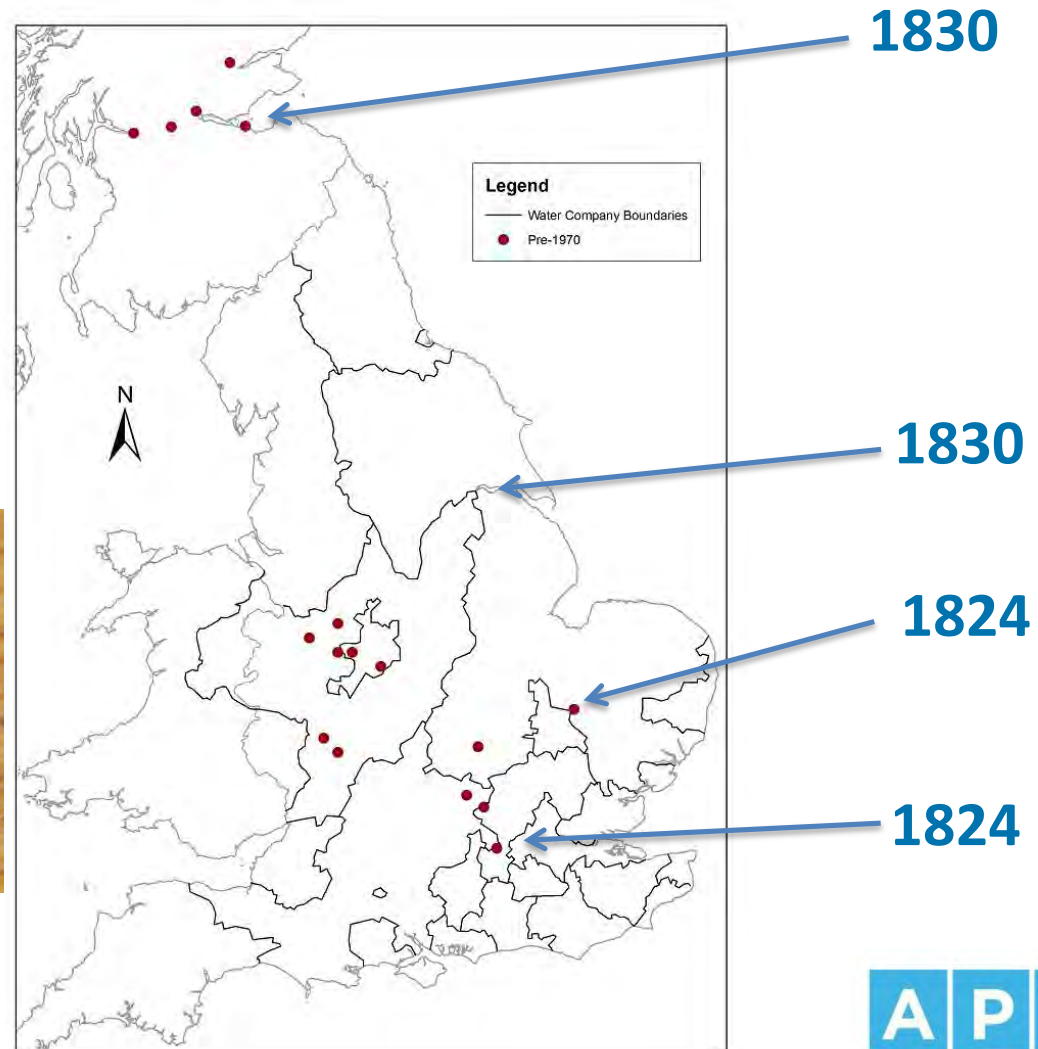
From Green Extabe et al. (2015) PeerJ 3:e757



What should we be concerned about?

Dreissena polymorpha? Zebra mussel

1910



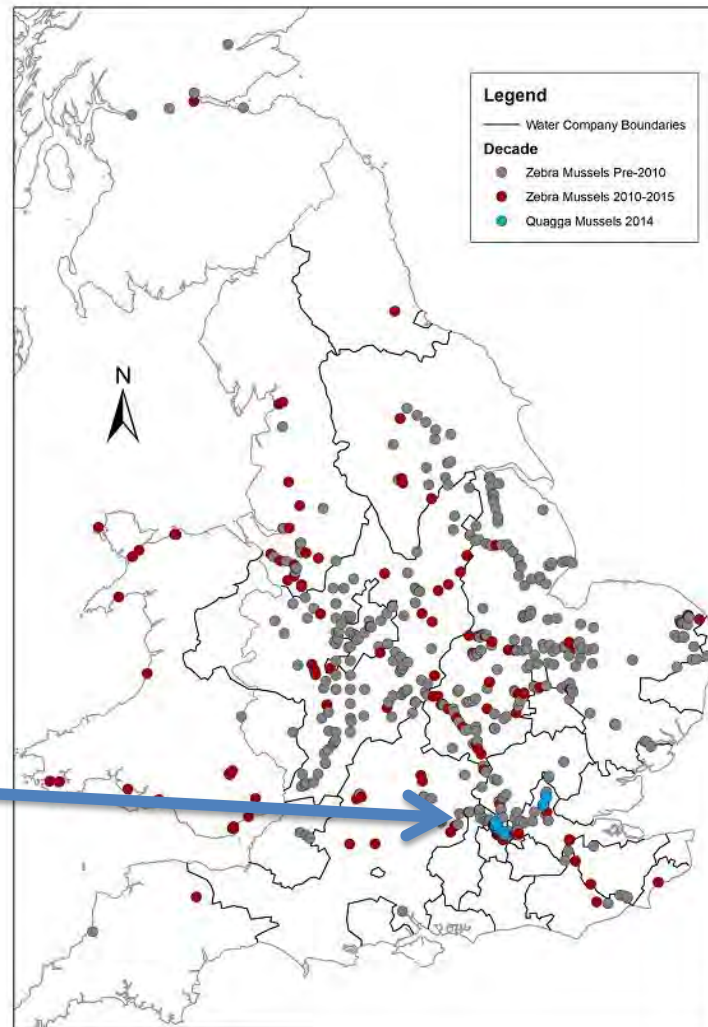
What should we be concerned about?

Dreissena polymorpha? Zebra mussel

2015

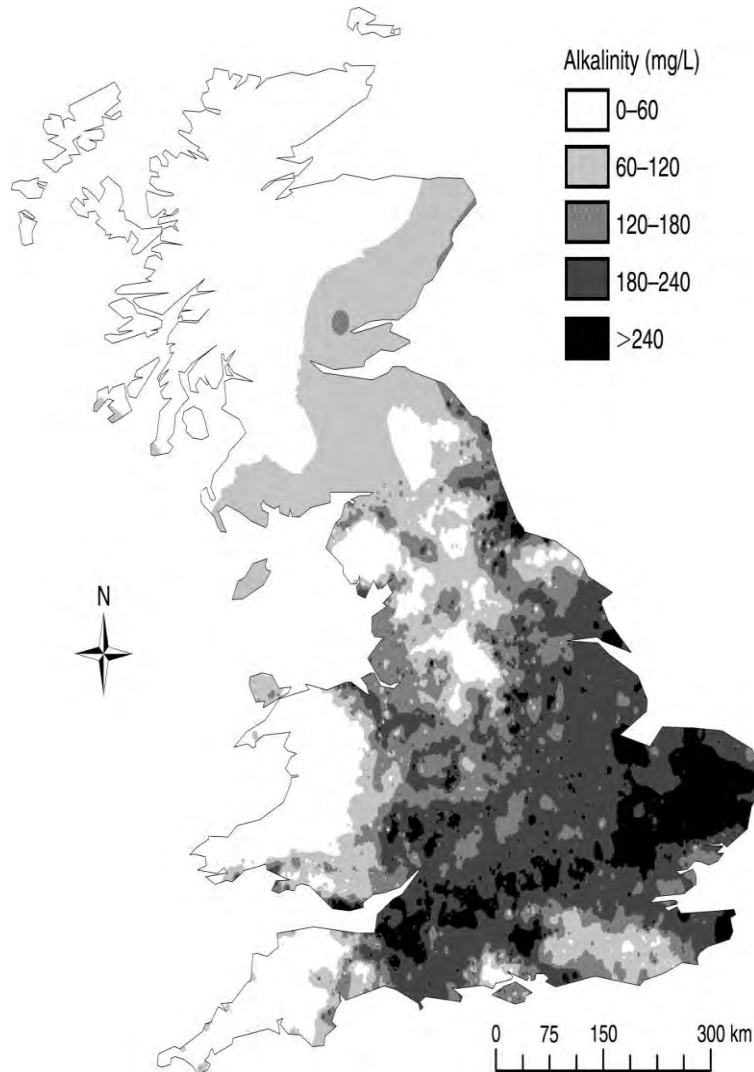


D. bugensis – quagga mussel



What should we be concerned about?

The Ponto-Caspian Region: how relevant to Scotland?



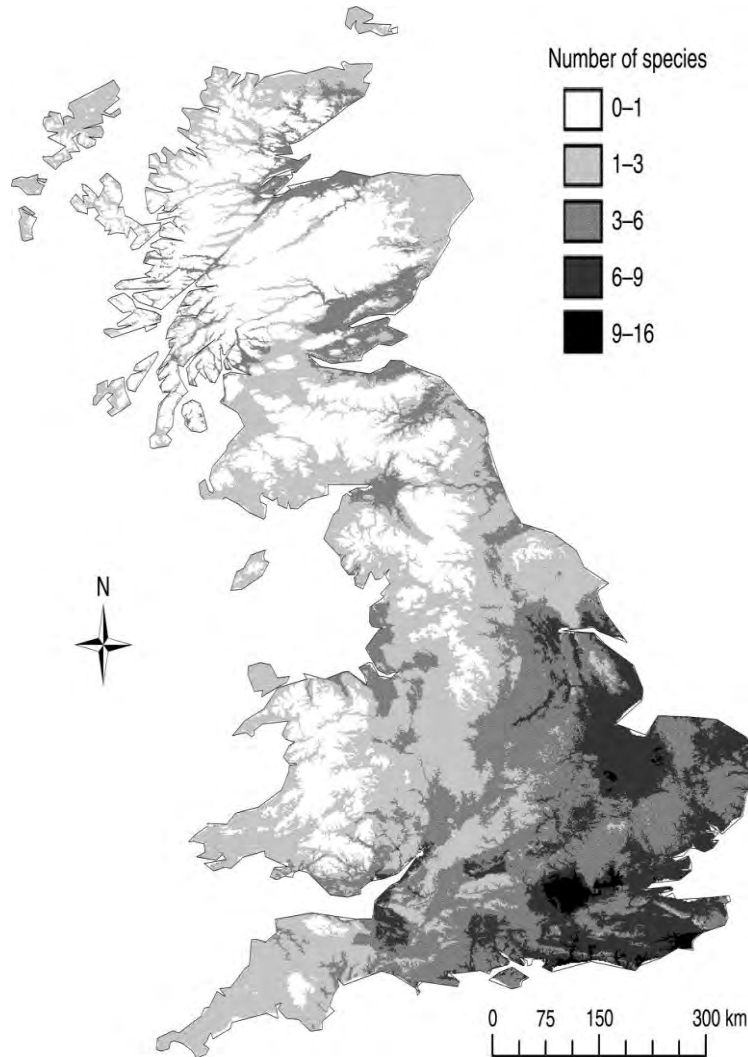
Water bodies with alkalinity < 120 mg/l are unlikely to be invaded by Ponto-Caspian species.

From Gallardo & Aldridge (2013) *Ecol Appl* 23: 352-364



What should we be concerned about?

The Ponto-Caspian Region: how relevant to Scotland?



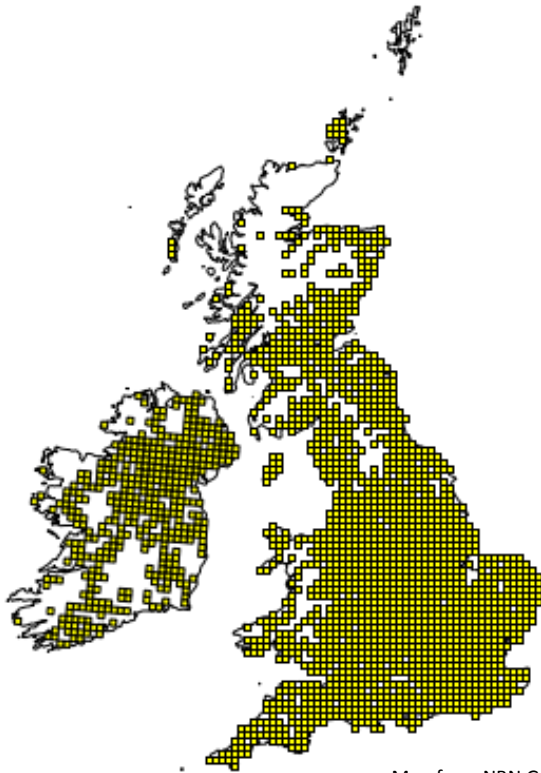
Geology, climate and human dispersal:

Relatively few Ponto-Caspian species will become problematic.

From Gallardo & Aldridge (2013) *Ecol Appl* 23: 352-364

Current species of concern

Pondweeds – *Elodea* species

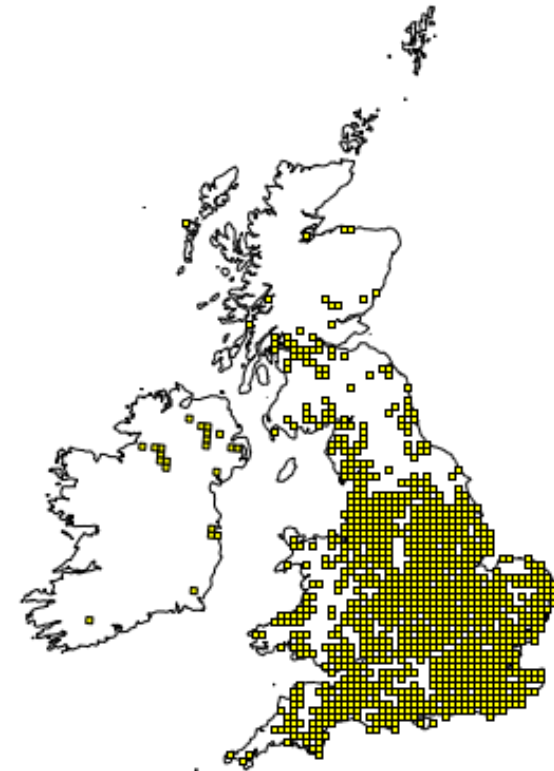


Map from NBN Gateway – April 2015

Elodea canadensis

Has it reached its maximum extent?

Will it be replaced by *E. nuttallii*?



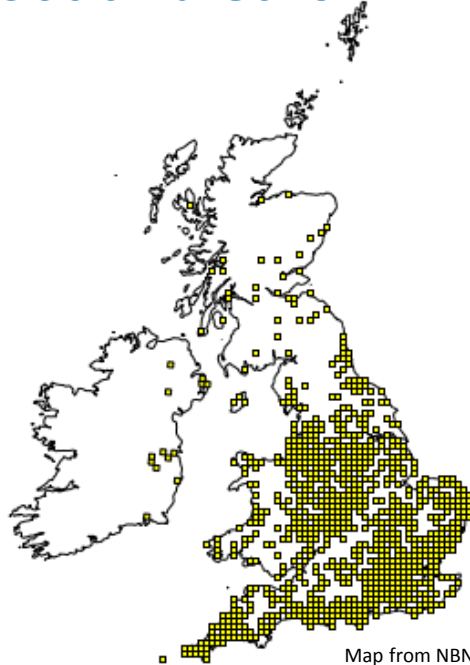
Map from NBN Gateway – April 2015

Elodea nuttallii



What should we be concerned about?

Is Scotland safe?



Map from NBN Gateway – April 2015

Crassula helmsii – New Zealand
Pigmyweed
Widespread in England and Wales.
Spreading north, though rare in Scotland.

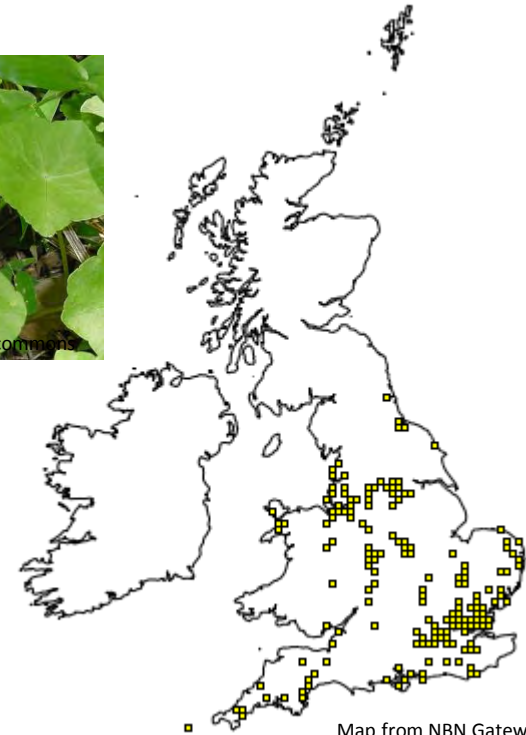
Also:

Myriophyllum aquaticum – parrot's
feather

Lagarosiphon major – curly waterweed



© Marcia Stephani: Wikimedia commons

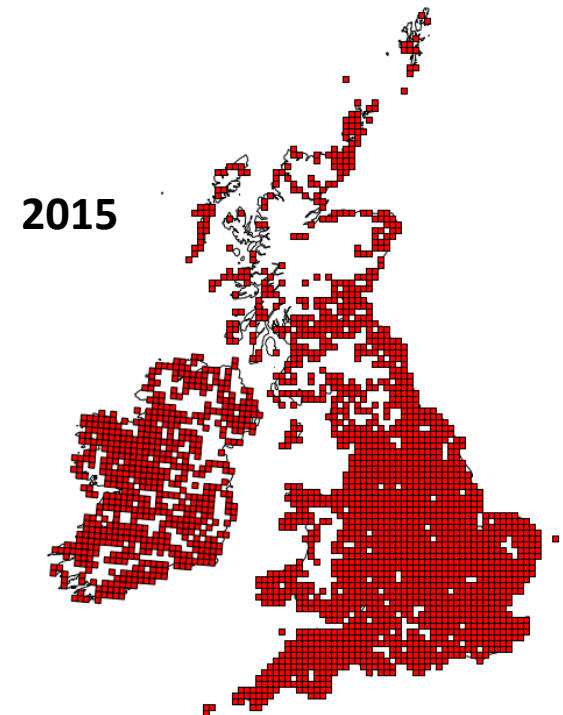
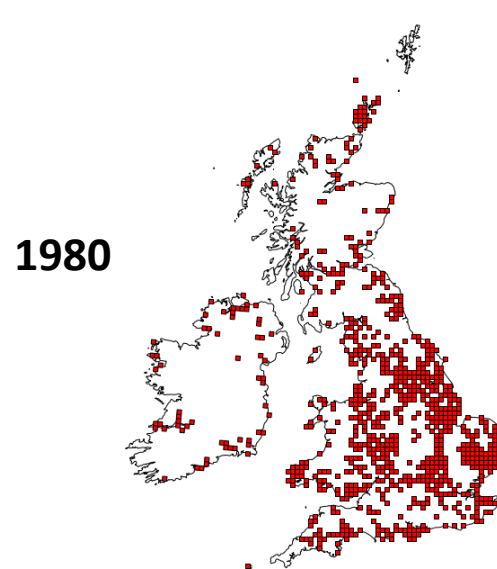
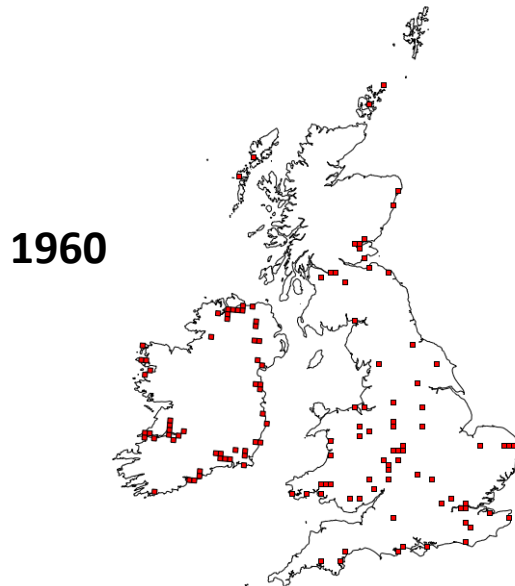


Map from NBN Gateway – April 2015

Hydrocotyle ranunculoides
– Floating pennywort
Common in south and east
England, spreading to other
parts.

What should we be concerned about?

Species from elsewhere: *Potamopyrgus antipodarum*

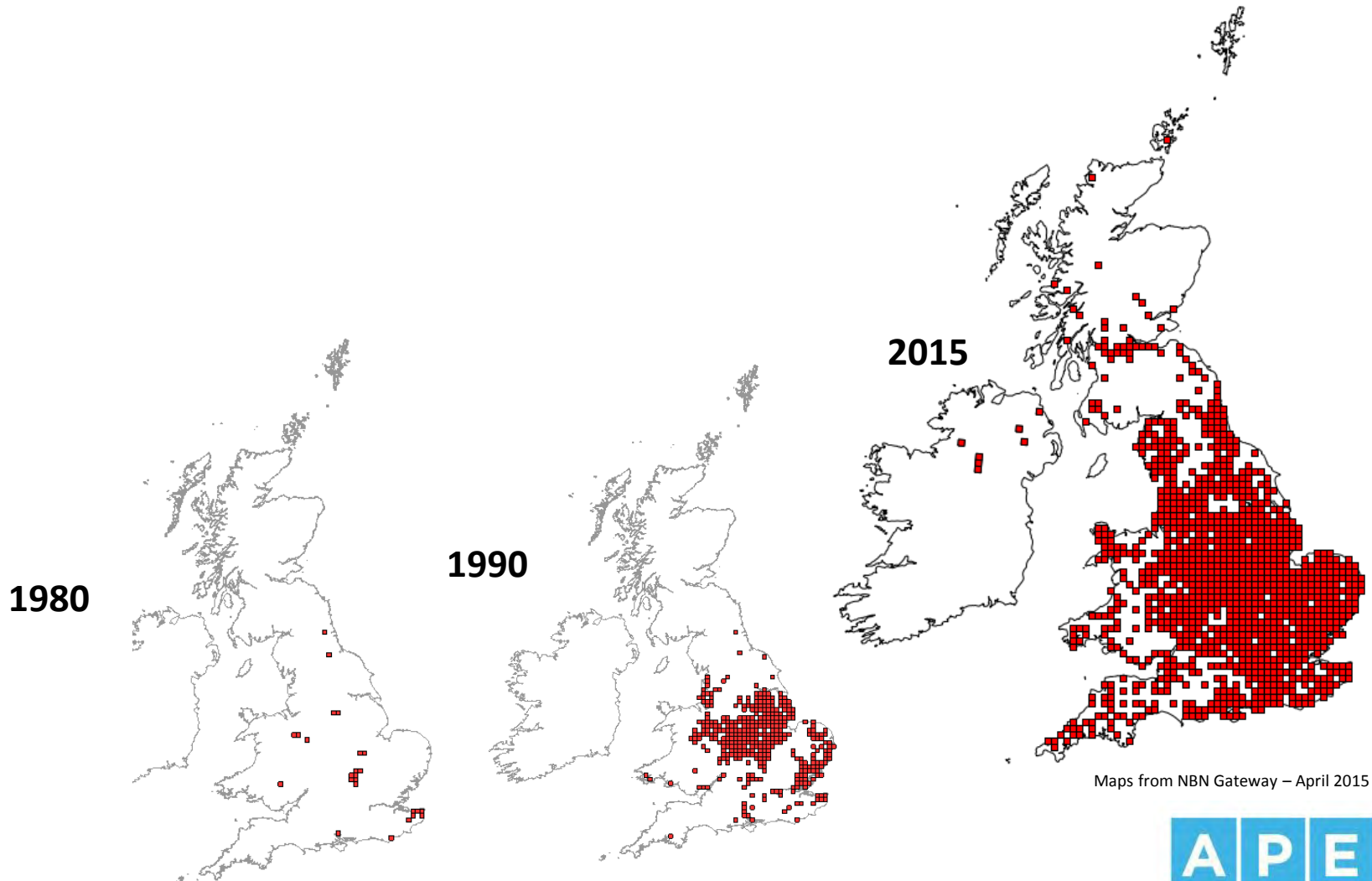


Maps from NBN Gateway – April 2015



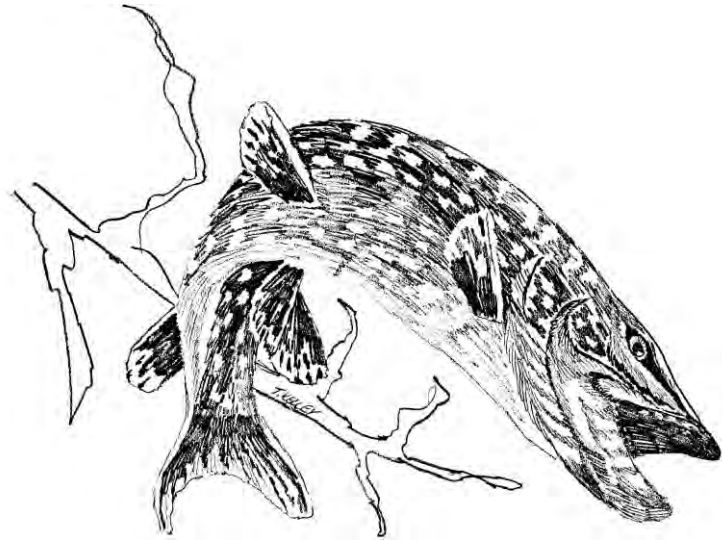
What should we be concerned about?

Species from elsewhere: *Crangonyx pseudogracilis*



What should we be concerned about?

- Chinese mitten crab – *Eriocheir sinensis*
- Fish
 - Bream, crucian carp, goldfish, rainbow trout, etc.
 - But also: perch, pike, bullhead, minnow, stone loach, grayling, etc.



Managing the risks

- Biosecurity
- Education and awareness



STOP THE SPREAD
INVASIVE AQUATIC SPECIES
CHECK-CLEAN-DRY

Are you unknowingly spreading invasive species on your water sports equipment and clothing?

Invasive species can affect fish and other wildlife, restrict navigation, clog up propellers and be costly to manage. You can help protect the water sports you love by following three simple steps when you leave the water.

CHECK Check your equipment and clothing for live organisms - particularly in areas that are damp or hard to inspect.

CLEAN Clean and wash all equipment, footwear and clothing thoroughly.
If you do come across any organisms, leave them at the water body where you found them.

DRY Dry all equipment and clothing - some species can live for many days in moist conditions.
Make sure you don't transfer water elsewhere.

For more information go to www.direct.gov.uk and search for Check Clean Dry



Managing the risks

- **Monitoring**

- What are the key species of concern?
- Appropriate monitoring techniques?
 - Type
 - Frequency



- **Understanding the potential risks**

- Are other parts of the UK good models?
- How are they spreading?



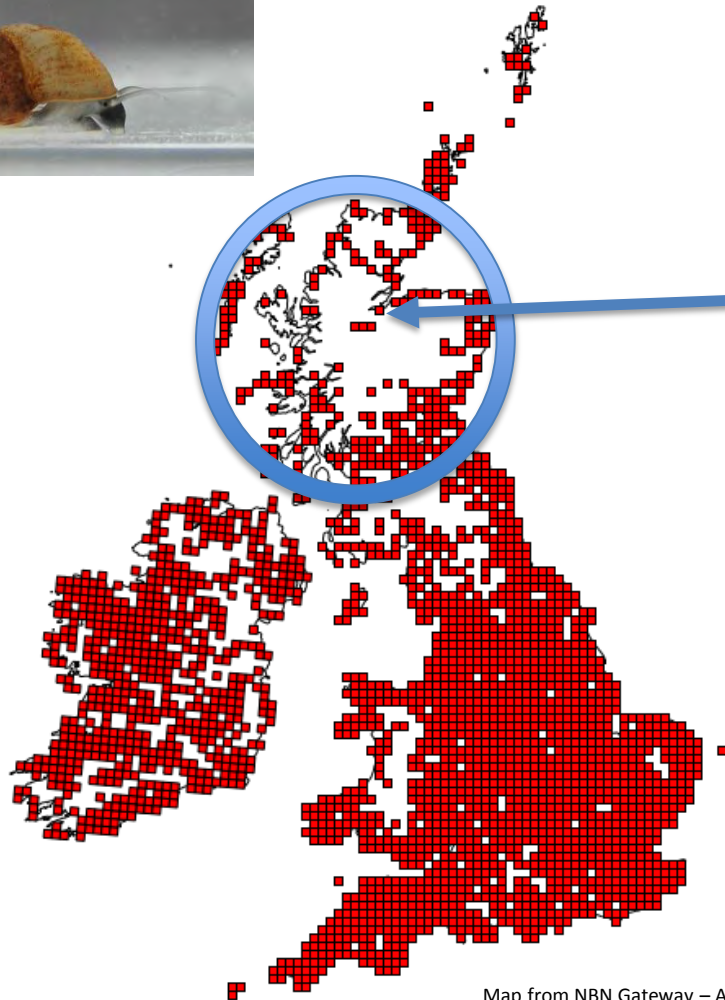
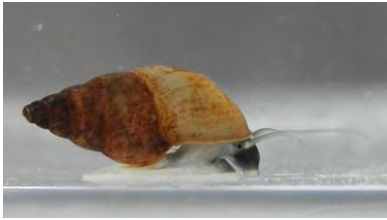
Managing the risks

- Eradication
- Containment
- Control
 - What is feasible?
 - Do Scottish conditions require a specialist approach?



Postscript

- *Potamopyrgus antipodarum*



- *Phagocata woodworthi*

