

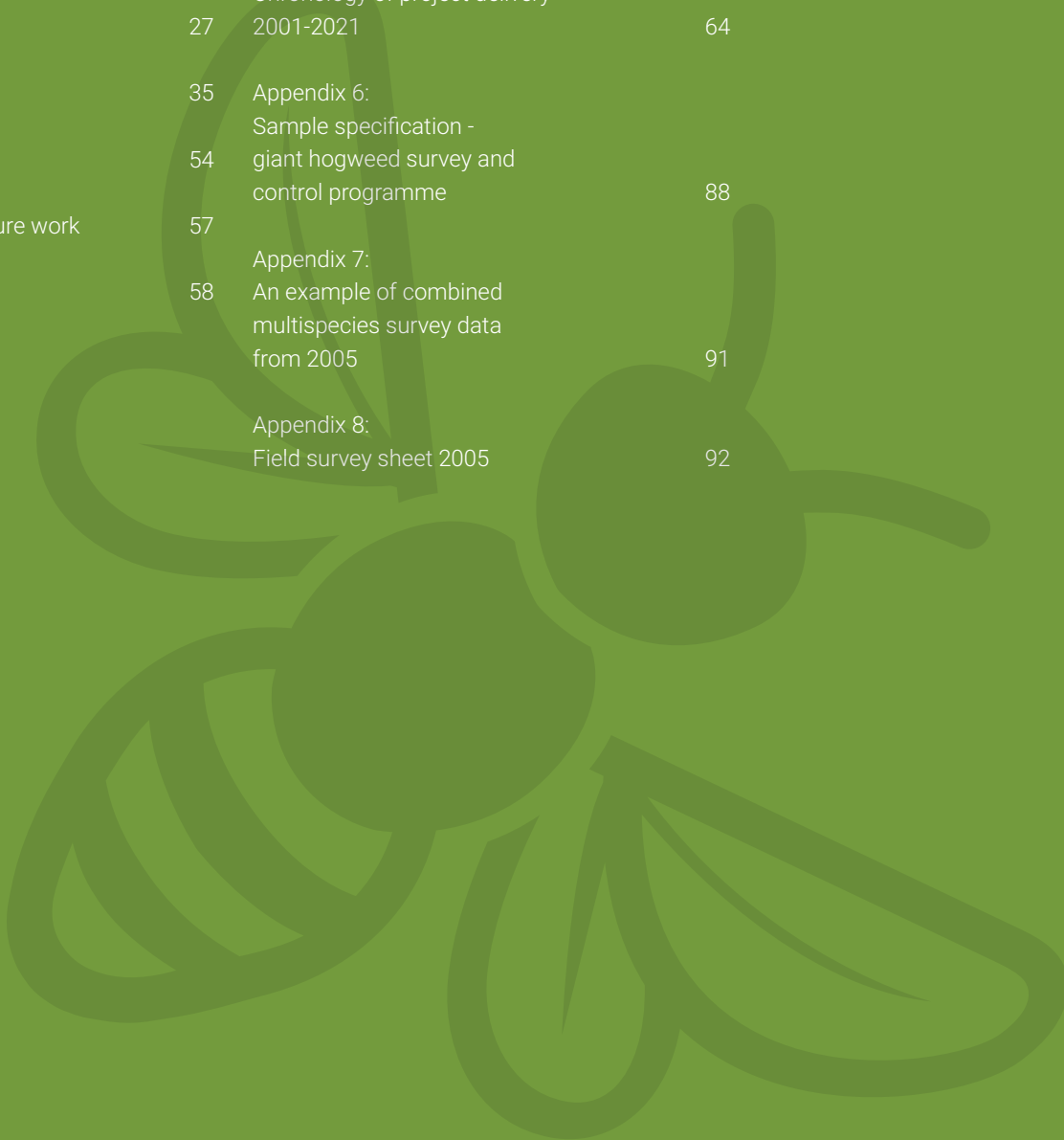
Giant Hogweed Eradication Project Review 2001-21

A report to the
Tamar Valley Invasives Group
By Martin Rule (Natu-Rule Landscapes)

Final Report March 2022

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Our special thanks go to the landowners in the Tamar Valley, without whose support this work could not take place.

The Tamar Valley Invasives Group, March 2022



This report has been produced by Natu-Rule (Martin Rule) on behalf of the Tamar Valley Invasives Group



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Executive Summary

- The Tamar Valley has been the focal habitat within Devon and Cornwall for giant hogweed, a very problematic, invasive, non-native plant, for a number of years;
- In 2001, the Tamar Invasives Plant Project partnership, later renamed the Tamar Valley Invasives Group, was formed with the aim of eradicating the plant from the catchment;
- This report outlines the historical, legislative and geographic context within which the project was designed and developed;
- Ecological issues relating to giant hogweed are outlined, namely its serious human health concerns as well as its capacity to out-compete native flora and to create physical land and river management problems where it occurs;
- The various methodologies used are outlined, namely: herbicide application (foliar and stem injection), uprooting, cutting and the essential use of boats in some locations;
- A chronology is provided, giving more specific details on the various actions taken from 2001 to 2021, including some discussions about changes to project delivery, focus or new challenges arising. Quantitative figures on giant hogweed numbers in each year are provided where these were obtainable, mainly from around 2009 onwards;
- Brief reference is made to efforts to carry out the survey and limited control of Japanese knotweed and Himalayan balsam, but giant hogweed has remained the primary focus over 20 years;
- The findings demonstrate a dramatic reduction in giant hogweed numbers and distribution as the project has progressed (from around 4,000 plants in 2009 to a project low of 174 in 2019 and 336 in 2021);
- The 336 plants in 2021 includes only 17 in the non-tidal river corridor, 287 in the tidal section (including over 200 at one site) and 27 at four off-river sites. It also includes five plants found at a new off-river site, less than 2km outside the project area;
- The discussion concludes that, with only 17 plants found on the non-tidal river corridor in 2021, the project is very close to succeeding with a key aim of eradication in this area, but survey and control efforts need to continue in some form;
- Several aspects that might have improved project efficiency in the early years are also considered. Key among these would have been to have carried out a thorough survey of giant hogweed population and distribution at the outset, to enable clearer funding and logistical decisions to have been made;
- Recommendations are made to assist in taking this project forward into a 'maintenance' phase to ensure the positive outcome is not reversed. Key among these are to continue to develop and expand the communication network with landowners and other river users over this issue and to retain a budget to enable quick action to be taken should any giant hogweed plants be discovered.

Introduction

Giant hogweed (*Heracleum mantegazzianum*), an Invasive Non-Native Species (INNS), has been named 'The UK's most dangerous plant' by the Royal Horticultural Society (Country Living, 2021). After habitat destruction, INNS spread is considered to be the biggest current threat to biodiversity globally (Bellard et al., 2016). It is expected that climate change will facilitate the establishment and spread of many species, beyond their normal geographic range, creating new opportunities for them to become invasive (IUCN, 2020).

From the end of the last century, it was recognised that giant hogweed in Devon and Cornwall was a small problem with the potential to quickly become a serious one. The plant had been known to be present within the Tamar/Tavy river catchment for many years, this seeming to be the centre of its distribution within Devon and Cornwall. It was first recorded in Cornwall in 1956 (French, 2020).

From around the year 2000, ad hoc observations indicated an increase in the population of giant hogweed on the River Tamar and it became apparent that control was needed to prevent the population reaching epidemic proportions, leading to significant detrimental consequences for habitats, biodiversity, human and livestock health and the local economy.

In 2001, a partnership of organisations, now known as the Tamar Valley Invasives Group (TVIG), was established with the ultimate aim of trying to completely remove giant hogweed from the catchment – today called the Giant Hogweed Eradication Project. From the outset, this was expected to be a significant challenge to take on, but a strong partnership of organisations and individuals came together to take this forward.

Since then, the partnership has co-ordinated and managed the annual survey and treatment of giant hogweed in an area which has now extended to include approximately 167ha of riparian habitat. This effort has required a determined commitment from the partnership, not least to secure the funding necessary but also to engage with the wider community and the many private landowners here, crucial to the success of the project.

Over recent years giant hogweed plant numbers have decreased significantly, due to a systematic survey and control regime and it is hoped that the project will soon be entering a monitoring phase rather than being involved in direct control.

This report does not present a detailed scientific study of the giant hogweed population in the Tamar Valley over the last twenty years; the project was not set up with this intention – its focus throughout has been the removal of giant hogweed in the Tamar catchment. The project has evolved over time and methods used for gathering species data over the course of the project have varied, impacting the quality and quantity of information available for a more rigorous population analysis. Neither does the report provide detailed descriptions of giant hogweed ecology, its structure, life cycle, mode of dispersal, etc. Similarly, detailed guidance on management of giant hogweed and other invasive species is not covered. All of these topics are well documented elsewhere.

While this report briefly refers to other invasive non-native species in the Tamar Valley, namely Japanese knotweed (*Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*), the current extent of their distribution and issues caused by their spread are not addressed.



The purpose of this review is to describe the development and delivery of the Giant Hogweed Eradication project between 2001 and 2021, reflecting on lessons learnt while highlighting good practice to inform future invasive non-native species control in the Tamar Valley and elsewhere.

A teenage boy suffered these burns to his legs after coming into contact with giant hogweed. Once exposed to sunlight huge blisters appear

Images © Somerset Live 2017



A young girl, on a fishing trip with her dad, picked a piece of a giant hogweed plant to add to a den she was building.

The potential impact of Giant Hogweed in the Tamar Valley

The key adverse impacts of giant hogweed are described below:

- Authorities advise that humans avoid any physical contact with phytotoxic giant hogweed sap that can cause phytophotodermatitis – a serious skin inflammation. This has implications for public access to areas in the Tamar Valley where giant hogweed may occur – often along riverbanks – and also for operatives carrying out its control or other land and river management activities;
- The plant is not toxic to animals (cows, sheep). However, records of photosensitivity have been recorded (Tiley et al., 1996) and in 2007 a local veterinary diagnosis linked blistering on a horse with giant hogweed contact;
- Giant hogweed grows vigorously in optimal conditions, reaching a height of 5m and a leaf span of up to 3m. Its vigor can easily out-compete other vegetation and ultimately render areas devoid of other plant species, thus having an adverse impact on biodiversity;
- Dying completely back in the winter, areas with abundant giant hogweed plants then result in extensive areas of bare ground, often putting them at high risk of erosion from winter storms. This has serious implications for river, floodplain and flood risk management;
- The plant is prolific: as well as propagating from stem and root sections, more significantly, mature plants produce many thousands of seeds (numbers ranging from 5,000 to 100,000 seeds per plant - CABI, 2019), and these can remain dormant for at least 15 years, thus making the species well-disposed to colonising new areas of land that might become available – for example, from a sudden bank collapse exposing new substrate;
- In common with many non-native species, very little in the way of biological control is exerted on giant hogweed from native UK flora and fauna. Grazing livestock do suppress and can control the plant, but many areas where it occurs – such as within floodplain wetlands and along steep riverbanks which are a feature of the Tamar Valley – are frequently impractical for livestock grazing;
- Observations within the Tamar catchment, as well as elsewhere, are that while giant hogweed seedlings may be suppressed in dense vegetation within some locations, inhibiting their germination and subsequent growth to maturity, there is abundant bare, soft sediment within the floodplain and river corridor where they can actively germinate. Such locations within the project area have unsurprisingly become the hot spot problem areas for giant hogweed over the lifetime of this project;
- As a consequence of the features described above, where present, giant hogweed creates a public health risk, can reduce access for agriculture, leisure and commercial purposes and reduce the amenity value of land. If left uncontrolled, it can cause an increase in riverbank erosion and bank destabilisation, as well as significantly out competing native river and wetland flora, with a direct negative impact on nature recovery in the Tamar Valley.

For the purposes of this report, it is important to highlight the key botanical and ecological features of giant hogweed that are directly relevant to the various problems posed by this non-native species in the Tamar Valley.



Giant Hogweed along a public footpath in the Tamar Valley

Hogweed invading local cottage garden

The economic cost

The cost of giant hogweed to the Tamar Valley, if it was allowed to reach its full potential population capacity along the river corridor, its riverbanks, the wider floodplains and into other adjacent habitats, would be considerable from an ecological, land use, public health and amenity standpoint. However, calculating the actual economic cost of a full infestation of the Tamar catchment is beyond the scope of this project.

Neither detailed cost-benefit analyses (the summation of the potential rewards expected from an action, e.g. controlling giant hogweed, and then subtracting the total costs associated with taking that action) nor counter-factual analyses (comparing the outcomes an action, e.g. treating giant hogweed, with the outcomes that would have been resulted if the action had not been taken, e.g. spread of giant hogweed throughout the catchment) have been carried out in other catchments.

An overview of giant hogweed in the UK, provided by Defra (through the Great British Non-Native Species Secretariat) identifies its environmental, health and social impacts, but lists the economic impacts as 'None known', whereas, in reality, the data required to create a robust economic impact model is just not readily available (GBNNSS, 2019).

An article published in The Guardian (2021) drew attention to research which estimated the combined cost of all invasive species to the UK economy to be at least £5bn since the mid 1970s, averaging £122m/year since 1976. The research, carried out by Cuthbert et al. (2021), makes really interesting reading as they grapple with assessing the monetary costs of biological invasions.

They explain how, in the UK, peer-reviewed data on the financial cost of invasive non-native species exist for only 42 of the 520 invasive species identified in the UK, not including giant hogweed, i.e. only approximately 8% of known invasive species in the UK have documented economic costs. Although the more costly species are also the most studied, the researchers note that the lack of any cost data for the majority of invasive species suggests that knowledge gaps are pervasive and that total costs of invasive species in the UK are underestimated. They conclude that the financial expenditure on managing invasions is a fraction (37%) of the costs incurred through damage from invasive species.

Historical Context

How Giant Hogweed established in the region

Giant hogweed was introduced into Britain from eastern Europe in the 19th century, an obvious prize for the Victorian hunters of new, exotic plants. Seeds were first made commercially available in Britain in the 1840s, with the plant being recommended as ‘very suitable for rough places on the banks of rivers or artificial water, islands or any place where bold foliage may be desired’ (Loudon, 1836).

By the early 1900s, giant hogweed was starting to make its first sporadic breakouts across the country as it escaped from gardens and began to colonise areas of wasteland and riverbanks and it is now widespread throughout the British Isles, particularly along riverbanks.

The south west of England contains many ornamental gardens and hidden botanical sites with a range of habitats and growing conditions, often featuring watercourses. Hence, it is inevitable that giant hogweed should flourish here.

In the early years of the project, the plant was known to have a widespread, if scattered, distribution across the UK, whereas its distribution in Devon and Cornwall was typically patchy, recorded from about 42 out of 141 10km squares (30%) – this compared, for example, with Norfolk and Suffolk, where giant hogweed occurred in 93 out of 113 10km squares (80%) (Booy, 2004).

Following its introduction to an area, invasive species can exhibit a ‘lag phase’ where population expansion is relatively slow, before switching to an exponential growth pattern (Figure 1). In 2001, with giant hogweed distribution in Cornwall centred on the Tamar Valley and still in a lag phase, the opportunity to move rapidly with control to achieve eradication presented itself – an option that has probably been missed for the UK as a whole.

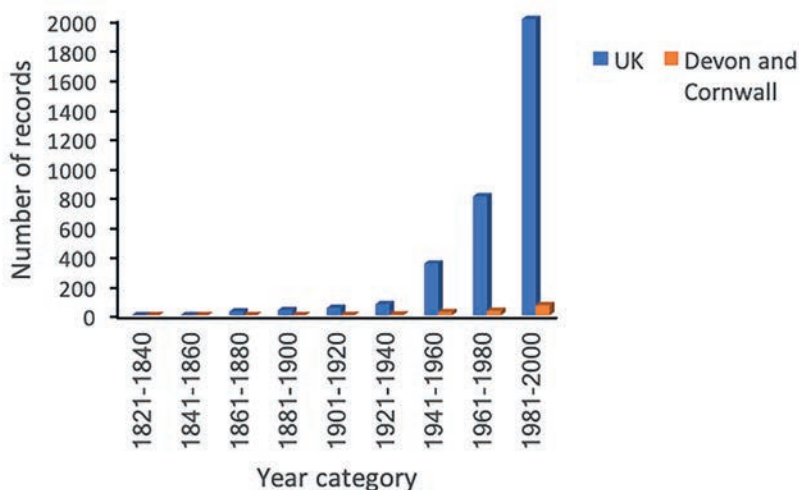


Figure 1: Increase in giant hogweed records for the UK and for Devon and Cornwall between 1821 and 2000 (Booy, 2004. Pers comm.)



River example 1 – Giant hogweed growing on the banks of the Tamar



River example 2

Legislation and Invasive Species

Worldwide, efforts are being made to control this species. In 2017, the EU added giant hogweed to its List of Invasive Alien Species of Union concern as it poses a serious threat to biodiversity, thus placing restrictions on keeping, importing, selling, breeding and growing it and requiring governments to detect and eradicate it throughout the EU (EU, 2019).

Wildlife and Countryside Act

In the UK, both giant hogweed and the more infamous Victorian introduction Japanese knotweed are listed in part 2 of Schedule 9 of the Wildlife and Countryside Act, 1981 (DEFRA, 2011). Under this Act, it is a criminal offence to plant or cause giant hogweed to grow in the wild, breaches of which carry a fine of up to £5,000 and/or two years imprisonment.

Water Framework Directive (WFD)

This EU Directive, which came into force in 2000, commits EU member states to achieve 'good' qualitative and quantitative status of all water bodies (EU, 2000). Although the WFD does not refer explicitly to alien species, it is clear that invasive alien species are considered to exert a negative pressure on WFD water bodies, and can adversely influence their ecological health.



Giant hogweed infesting the Tamar valley

Geographic Context

The Tamar Catchment

The project area lies within the Tamar Valley catchment, forming the ancient border between Cornwall and Devon in the south west of England (Figure 2). The River Tamar rises 6km from the north coast and flows for 98km southwards to reach the English Channel coast at Plymouth. The lower reaches comprise a drowned river valley – a ria – where the tide flows surprisingly far inland, in this case as far upstream as Gunnislake weir. More information on the wider catchment can be found on the Environment Agency's Catchment Data Explorer (EA, 2022).

The project area is also set within a dramatic and scenic landscape of national importance, containing the **Tamar Valley Area of Outstanding Natural Beauty** (Tamar Valley AONB, 2019).

Within the valley a number of nationally important ecological sites occur including wetland habitats. The project area includes parts of the **Tamar-Tavy SSSI** which has other overlapping ecological designations of national and international importance, including **Plymouth Sound and Estuaries Special Area of Conservation**, the **Tamar Estuaries Complex Special Protection Area**, the **Plymouth Sound and Tamar Estuaries Marine Protected Area**, and the **Tamar Estuaries Marine Conservation Zone**.

Significant areas within the valley, including in places the riverbanks themselves, were inscribed in 2006 as a UNESCO World Heritage Site – the **Cornwall and West Devon Mining Landscape**.

The River Tamar itself is an important resource, forming a key part of the region's water supply network, carrying domestic water supplies from upstream reservoirs – most notably Roadford to Plymouth. In the past, the valley hinterland also supplied important resources of timber and food through a thriving market gardening economy.

Today, the valley is quieter and mainly given over to agriculture, along with areas of woodland and commercial forest. Tourism and recreation have developed as significant industries in recent decades, supported by the strategic market towns of Tavistock and Launceston, along with many smaller villages and hamlets, where holiday cottages are increasingly common. Fishing is a popular pastime, with long reaches of bank being leased out to angling clubs, including 'high-end' hotels.

Within this geographic context, the spread of giant hogweed and other invasive non-native species has the potential to have a wide direct and indirect impact on the valley's important ecological sites, land use, flood risk management, water quality, public and commercial access and the local agricultural and tourism economies.

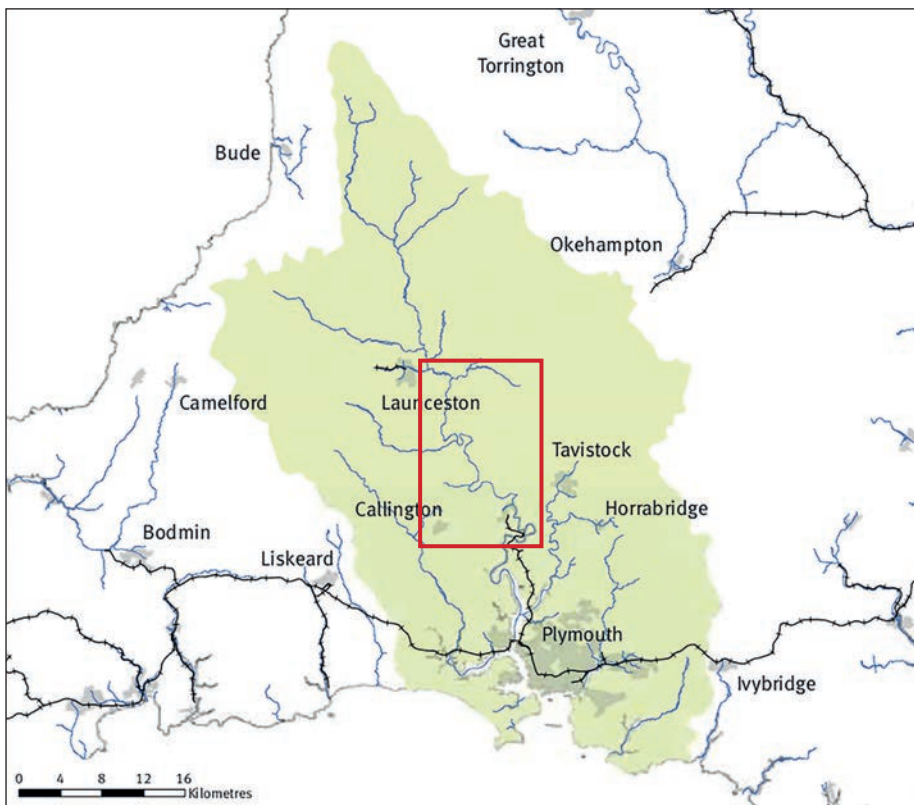


Figure 2:
The Tamar Valley catchment (© Crown Copyright. Environment Agency 100026380.
Map copied from Tamar Catchment Flood Management Plan 2012)

Note:

For the purposes of this report, the approximate position of the Giant Hogweed Eradication Project area is located within the red rectangle. See Figure 3 for more detail.

Project initiation and scope

Although the presence of giant hogweed had been known and was a cause for concern within the Tamar catchment for some years, the full extent of both the population and distribution of the plant was not fully understood when the project was initiated in 2001.

Prior to this, the Environment Agency had been collating information on the plant's occurrence, both from staff and various landowners. In response to growing concerns over its increasing numbers here, and the risk of the scale of the problem growing if no action was taken, the partnership now known as the Tamar Valley Invasives Group was established.

From 2004 until 2016, in addition to giant hogweed, some effort was made to simultaneously survey and/or control Japanese knotweed and Himalayan balsam, before refocusing effort exclusively on giant hogweed. Dealing with such a vigorous invasive species in a piecemeal or half-hearted way would be doomed to failure.

The project area

From the start, the project set out to test the feasibility of eradication of giant hogweed on a catchment scale, but initially, due to limited funding, a small part of the valley comprising the Tamar-Tavy SSSI between Calstock and Gunnislake Newbridge was chosen as a pilot area, including a 9km stretch of tidal river and 62ha of habitat. This river section was recognised as particularly sensitive and of national and international importance, with its existing ecological SSSI designation and, at the time, as a candidate Special Area of Conservation (SAC) and Special Protection Area (SPA). It was known to hold a large giant hogweed population which was having an adverse impact on the SSSI features.



Flowering Giant Hogweed in 2009

Over the following years, as more information was gathered, the survey and control programme expanded, including, in the early years of the project, additional areas that have subsequently been dropped from the survey programme. At one time, it extended along the River Tamar as far north as Higher New Bridge (close to the confluence of the Ottery, north of Launceston), from Calstock to the Tamar-Tavy confluence, upstream on the River Tavy to Lopwell Dam, along the River Plym to Shaugh Prior and on the Chaddlewood Stream at Plympton.

Today, the main survey and control programme covers approximately 167ha, extending along five continuous stretches on the river corridor (Survey Areas A-E), both tidal and non-tidal sections, from Calstock to the River Tamar-River Lyd confluence, and upstream on the River Lyd to Sydenham (near Greenlanes Bridge) (Figure 3 and, for more detail, see Figures 17 to 21).

Four additional off-river sites, adjacent to the main river survey areas, have also been identified as giant hogweed hot spots and surveyed in more recent years, as in the past they are likely to have been the source of seeds which germinated further down the catchment (Figure 3).

In 2021, as part of this project review, Natu-Rule revisited a number of key existing survey sites plus new sites upstream of the project area, to carry out a preliminary search for additional giant hogweed locations. Sites included: Sydenham garden near Greenlanes Bridge; the River Lyd from Lifton to the Tamar confluence; upstream to Polson Bridge and some riverbank sections accessible from public roads; the lower reach of the River Thrushel; from Bradstone village downstream to Bradstone Mill; upstream of Greystone Bridge; Endsleigh Gardens and along the small watercourse in the garden upstream to the old pond; up and downstream of Gunnislake Newbridge; Morwellham Quay, floodplain (very limited access) and car park; Calstock area upstream to Slimeford.



Large Stand of giant hogweed 1



Large Stand 2

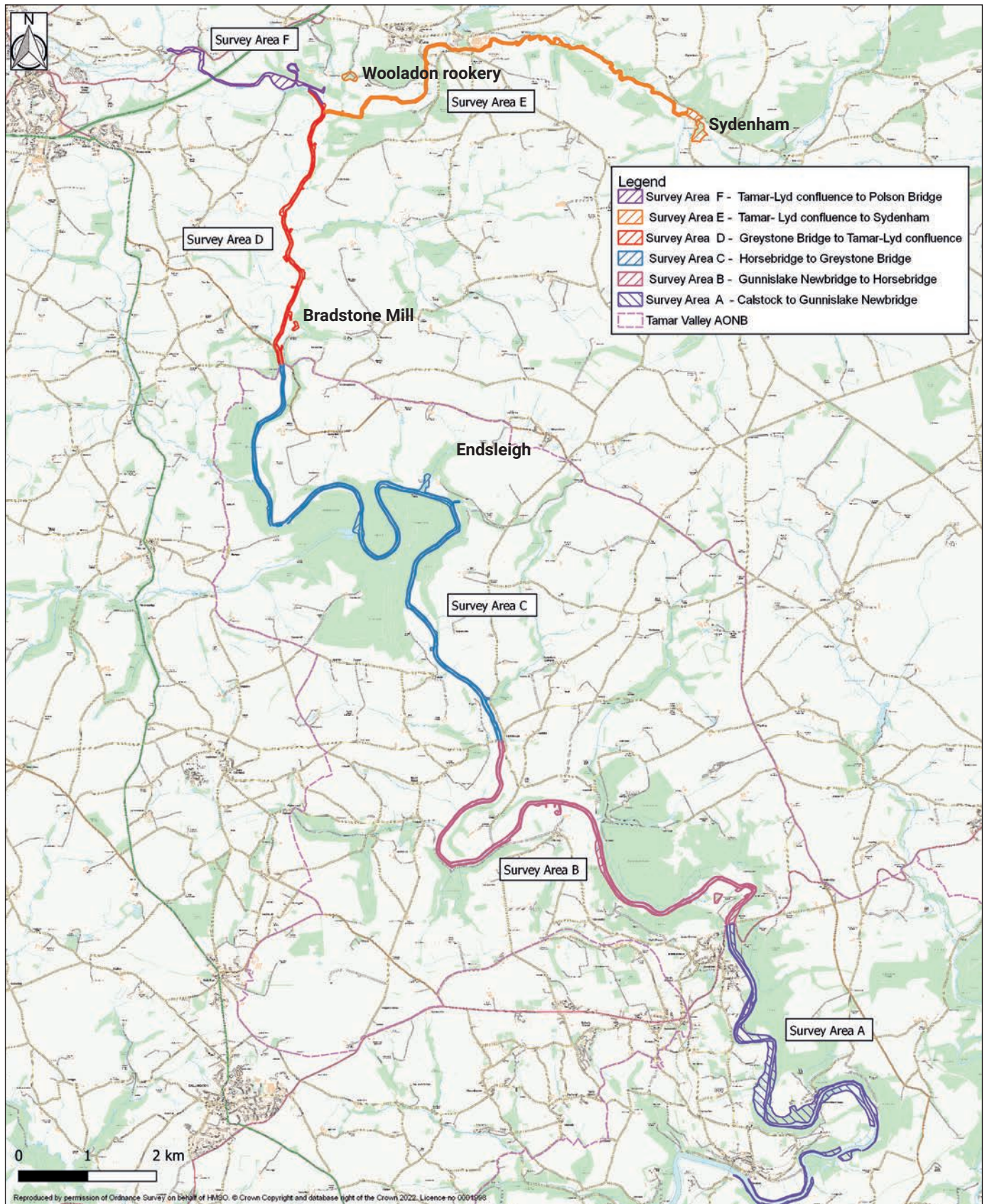


Figure 3:
The current extent of the survey and control area

Notes:

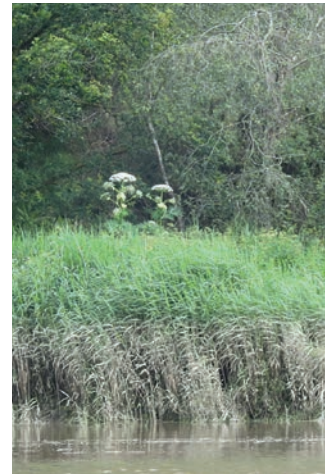
1. Including tidal (Survey Area A) and non-tidal (Survey Areas B-E) river sections.
2. Area F was surveyed between 2006 and 2008 and was revisited during the independent survey of 2021, but it is not part of the current annual survey and control programme.
3. The location of four additional off-river sites annually surveyed in recent years are labelled.

The tidal river section

Survey Area A: Calstock to Gunnislake Newbridge

The tidal landscape features mudflats, fringing reed beds, saltmarsh, creeks and ditches with intermittent areas of pasture on the floodplain (Figure 4). Its large floodplains, soft sediments and inaccessible areas have favoured the giant hogweed's establishment and this section was historically, and still remains, a hot spot for the species in the catchment. Contains some riverside settlements, including Calstock and Gunnislake, with other historic settlement sites including Morwellham Quay. This stretch also features the Tamar Valley Discovery Trail and other riverside public footpaths, part of a County Wildlife Site, parts of the Cornwall and West Devon Mining Landscape and other tourist sites and it is regularly used by canoeists and anglers.

Permission to survey has been given for all but two sites along this stretch of river. The latter includes an organic site on the Harewood peninsula, where the landowner has successfully controlled giant hogweed and other invasive non-native species since 2002.



Tidal Giant Hogweed
© P. Thompson 2021

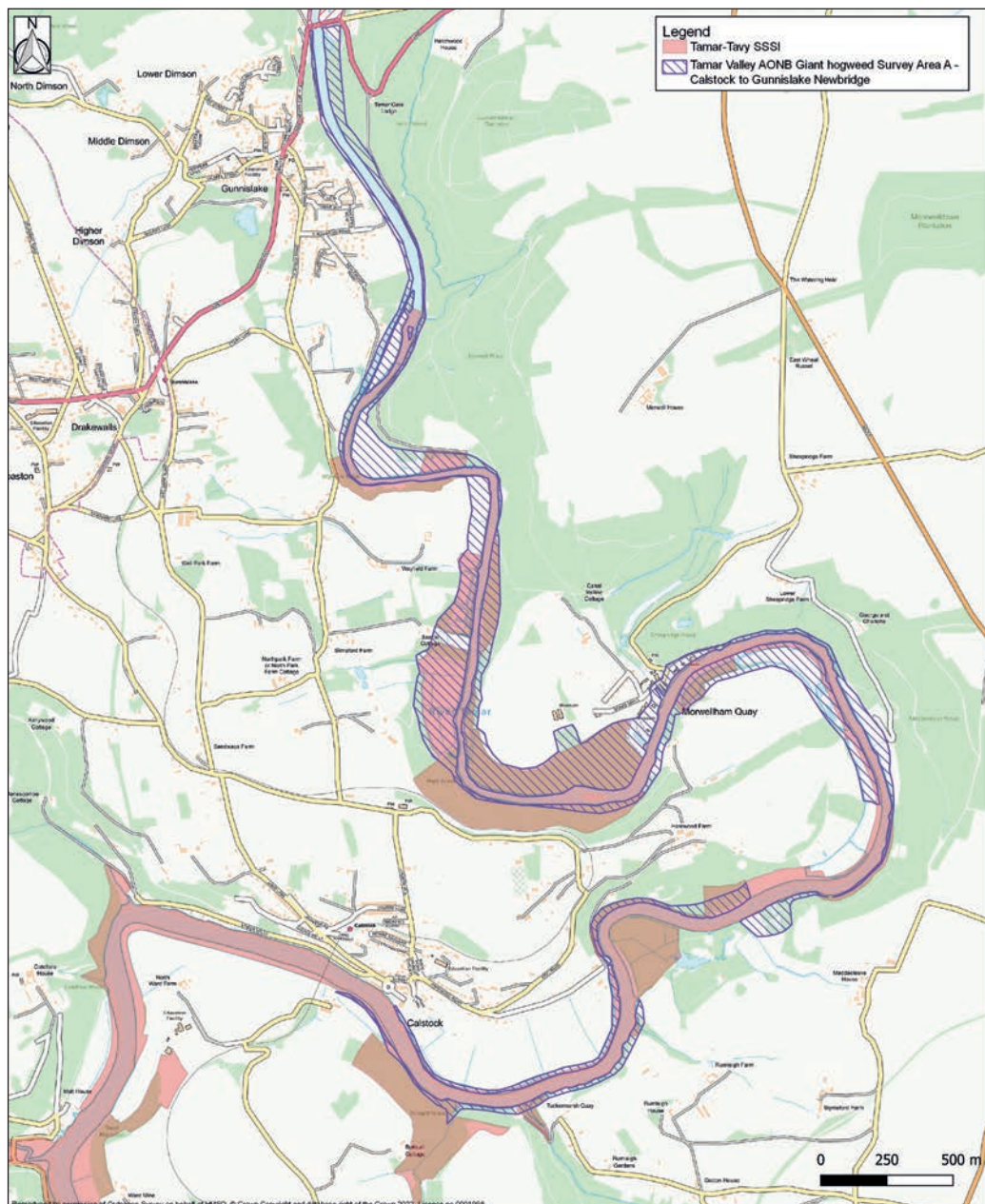


Figure 4:
Survey Area A: Calstock to Gunnislake Newbridge and its overlap with the Tamar-Tavy SSSI

Steep-sided woodland and field invasives



Giant hogweed by Greystone Bridge in 2006

The non-tidal river section

Survey Areas B-E: Gunnislake Newbridge to Sydenham (near Greenlanes Bridge)

In 2004, the survey area began its extension upstream into the non-tidal valleys (please see Figure 3 and, for more detail, go to Figures 18-21). The riparian landscape includes some steep-sided woodland and, further north, the rivers Tamar and Lyd meander across the flatter valley floors, fringed by trees with riverside meadows and some small islets. Freshwater floodplains are pastoral, featuring small incised valleys, wetlands and trees along the river. Access is easier than on the tidal section and some of the river stretches represent what was some of the best fishing in the country. This stretch also features the Tamar Valley Discovery Trail and some public footpaths. Riverside settlements including Horsebridge and the larger village of Lifton.

The project scope developed and the survey area extended upstream, as more information on the extent of the invasive spread was gathered. For a project of this nature, not having robust knowledge of the scale of the population and distribution of the target species at the outset clearly presented a challenge for delivery and in setting the scope of the project.

Despite this, aiming to eradicate giant hogweed from the catchment, albeit over time, was a clear, logical and worthy aim, and has remained the principal objective throughout.

Bringing together and nurturing a strong, committed partnership is a key step towards ensuring the project aim will be met: this is described in the next section.

The Partnership

The ambitious target of giant hogweed eradication was considered feasible for two main reasons – its population growth was still in a lag phase and, importantly, a number of people and organisations were interested in the plant and committed enough to keep a management project going.

Best practice in other countries with considerable experience in managing non-native species, made it very clear that it is essential to act quickly to remove a smaller number of plants rather than to wait for a serious problem to develop before acting. The Tamar Valley Invasives Group (TVIG) partnership was set up in 2001 with this in mind, recognising that acting now should ultimately prove to be far more cost and time effective.

The partnership has included representatives from a number of organisations. The degree of involvement of each organisation has varied over time, but the Tamar Valley AONB, the Environment Agency, Natural England (previously English Nature) and Cornwall Council are currently the core members of the partnership, steering the project work. The Silvanus Trust (now dissolved) was a key partner until 2006 and the Cornwall Knotweed Forum, Tamar Estuaries Consultative Forum and South West Water have been, or are currently, interested parties.

The core partnership roles have included:

- The Environment Agency – programme planning, financial support, technical support, chair meetings;
- Natural England – programme planning, financial support, technical support, Higher Level Stewardship support;
- Tamar Valley AONB – programme planning, financial support, staff support, external funding lead, administration;
- Cornwall Council – procurement, technical support regarding vegetation management.

Scope of project development, associated management and administration can be as narrow or broad as one wants on a catchment-scale project. Between 2001 and 2006, the Silvanus Trust was contracted to provide secretariat facilities for the partnership and over the last 13 years this role has primarily been carried out by the Tamar Valley AONB team, with other partnership members providing support as needed.

Examples of essential project management and administration tasks include;

Project Administration

- Co-ordinate, organise and perform secretarial role for project partnership meetings;
- Be first point of contact for queries from the general public, landowners and contractors;
- Contact landowners regarding upcoming field work, contractor details, etc.;
- Maintain landowner database, ensure it is compliant with data privacy policy and the 2018 General Data Protection Regulation (GDPR);
- Manage and track delivery of contract/s for giant hogweed control, including liaison with landowners, contractors & project partnership;
- Track survey/control progress and reporting.

Procurement

- Draw up survey and control specification with partnership and issue to contractors;
- Issue requests for quotations to at least three potential contractors, assess bids and award contracts;
- Arrange single supplier exemptions where they can be justified;

- Liaise with Cornwall Council departments (Tamar Valley AONB host authority);
- Check all required contractor documents are in place – risk assessments, licenses, insurance including Employers Liability Insurance and Public Liability Insurance;
- Arrange payment of contractors.

Project Publicity

- Co-ordinate publicity with other partners as applicable, for both participating landowners and the general public;
- Devise and send out press releases and deal with queries arising;
- Raise awareness with the general public through a variety of media including website updates, social media and information leaflets;
- Organise landowner and public engagement/demonstration/knowledge events.

Data collection & research

- Collate and disseminate data concerning the effectiveness of the survey and control, including management guidelines;
- Arrange spot check of work done by contractors;
- Map data onto GIS or similar system, and share data with partner organisations;
- Maintain all data in accordance with current data protection legislation;
- Co-ordinate desk-based surveys and literature research.

Finance & fundraising

- Track budget, maintain a summary of finances and report to partnership;
- Identify external funding with partnership and co-ordinate submission of applications;
- Liaise with and report to donors as per agreements.

Reporting

- Report on programme at partner meetings;
- Ensure contractors provide maps and reports as per contract.

An example of a calendar of events from 2003 is presented in Appendix 1.

Finances and resourcing

In 2001, the partnership had hoped to identify a long-term funding commitment for up to 15 years but, in reality, resourcing of the project was never secured for more than two years at a time. From the outset, the programme has been funded mainly through financial contributions from partnership organisations and these tight budget restrictions impacted project development, making longer-term planning difficult. Reassessing and adapting the annual survey and control programme has been necessary year-on-year, due to these financial constraints.

Between 2010 and 2013 efforts were made by the partnership to enter a number of landholdings on the River Tamar into Higher Level Stewardship (HLS) so that, although significant river lengths remained outside of stewardship, most of the well known problem areas for giant hogweed were within HLS control.

In 2018, financial support was secured through the Rural Development Programme for England's Water Environment Grant to fund the full giant hogweed survey and control programme between 2019 and 2020, with a later extension covering 2021. South West Water has also recently made a financial contribution and this, combined with money retained in the project budget, means funding is in place to allow more Invasive Non-Native Species survey and control work in the Tamar Valley until 2023.

Working with landowners

The support of landowners, managers and agents is key to any invasives control project and currently 89 land parcels and 87 landowners are covered by the annual giant hogweed programme, including two properties with land in organic status.

The Tamar Valley AONB office, as main project administrator, holds landowner contact details securely, in line with the 2018 General Data Protection Regulation and the Tamar Valley AONBs Privacy Policy. Each spring, a few weeks prior to the survey season commencing, all landowners or managers/agents are notified of the start of fieldwork, with consent sought from new owners should a holding have changed hands (Appendix 2).

Contractors are provided with landownership information from the previous year. All landowners in a given reach are telephoned by the contractor several days before the initial survey. Occasionally, owners are absent, contact numbers are incorrect or no answer is obtained, in which case a message is left or the contractor will attempt to call at the house during the survey process, although not all landowners live near the survey area; the contractors contact details are left if there is still no response. In some cases, landowners have advised that they do not require annual contact and are happy for work to proceed. The database is reviewed for changes of ownership or consent each year.

With the lack of committed, long-term funding the partnership realised early on that resources available would never be enough to control all invasive species over the whole catchment each year, or to ensure that a control programme would be in place permanently. Ideally, advising and assisting landowners to allow them to make informed decisions in working towards the control of invasives themselves was the preferred longer-term aim, including helping secure Higher Level Stewardship funding for individual holdings. In essence, the partnership hoped to make it as easy as possible for owners to control invasives on their own land.

To this end, face-to-face landowner engagement events were held on a number of occasions. The first, held at Morwellham Quay in 2005, was well attended and served as a promotional event for the partnership and an information gathering event for landowners. It also allowed those involved in catchment management a chance to network and discuss the problem of invasive plants. Similarly, in 2013, an invasives plant drop-in training day was held at another hot spot, with landowners invited to come and find out about how to control giant hogweed, Japanese knotweed and Himalayan balsam. There were opportunities to talk to experts and also to see control of the plants in action during the day.

There has been some interest from landowners and managers to be more actively involved in the effort to control giant hogweed, but unfortunately not enough to replace the annual programme. A number of issues were identified through face-to-face conversations and also through the use of questionnaires, including the barriers which make surveying, let alone control, a challenge for landowners.

The information gathered from questionnaires over the years is really quite consistent. Survey response rate has ranged from 34% to 78%, with the higher response from a separate landowner engagement project carried out between January and April 2013 (the River Landowner Engagement Project) when contact was made in person, by post, email and direct calling. Of the 55 respondents who participated in that project, virtually all were very supportive of the survey and control programme.

A sample questionnaire (2004) and the results of the most recent questionnaire (2021) are presented in Appendices 3 and 4, with examples of issues identified over the years described below;

Barriers to active management of giant hogweed

- Time;
- Age and ill health – “I am elderly. I cannot go tramping along the riverbank to locate any Hogweed. I’d need help with this.”;
- Inaccessible areas – “Due to location of giant hogweed (muddy reed beds), I would rather be monitoring and treatment was left to the experts.”;
- Concerns about reinfestation from upstream – “It will not work unless all landowners manage the hogweed”. Comment regarding Himalayan balsam – “Currently pulled by hand but not entirely successful due to water borne seed from upstream/upriver.”.

Support requested from partnership

- Better information;
- Training;
- Survey and control assistance (including volunteers);
- Maps of giant hogweed treated along a landowner’s stretch of river.

Landowner awareness and identification of giant hogweed on their property

- In the early years, where landowners had been aware of giant hogweed on their property (for up to fifteen years), there was no clear up/downstream pattern for when it was first observed. Assuming the infestation spreads from upstream to downstream, this indicated that the year the plant was first noticed by landowners may not have been the same year it first infested a property;
- Occasionally, landowners have said there is no giant hogweed on their property although extensive stands were present on adjacent properties, indicating possibility of misidentification;
- Misidentification with common hogweed is quite possible, especially with younger plants which have not yet reached the exceptional height of fully mature giant hogweed. There are several native hogweed varieties, much smaller at maturity than giant hogweed, with heights reaching 60-200cm, with broad coarsely divided leaves and white/ greenish yellow flowers;
- Some level of ground truthing is necessary.

Management efforts

- Where landowners have carried out control in the past, it was mostly by cutting and spraying with some grazing, but no method was found to be totally effective;
- Some landowners practice control when the plant is flowering, not before, highlighting the importance of providing good information, including identification of plants before flowers appear and the timing of control;
- Some landowners have mistakenly thought that the Environment Agency or the Tamar Valley AONB are responsible for controlling invasive species;
- Where landowners have said that they would be willing to treat plants if the project supplied herbicides, the partnership agreed that the inherent problems involved with supplying herbicide to third parties, plus lack of control to ensure it is used correctly, unfortunately has made this option not possible.

This question of treatment by landowners is fairly complicated and has been discussed several times in the past. There is a question regarding how fully aware landowners are about these species and the importance of swift action, especially to avoid plants flowering and setting seed. It is likely that many people never, or very rarely, visit their riverbanks or floodplains due to a range of reasons. They may not, therefore, observe the plants or consider their presence in the wider catchment an issue of concern.



I am elderly. I cannot go tramping along the riverbank to locate any Hogweed. I’d need help with this.

Due to location of giant hogweed (muddy reed beds), I would rather be monitoring and treatment was left to the experts.

It will not work unless all landowners manage the hogweed.

Given the fairly large number of landowners involved in the project area, along with the physical, legislative and financial difficulties in carrying out treatment, it was in the end considered unlikely or unfeasible for landowners alone to carry out the survey and control of giant hogweed. On the one hand, it would be attractive to reach this point and reduce the use of public money for this work but, on the other hand, if areas were to go untreated over a few years, all the hard work and commitment of resources to reduce the giant hogweed population to its current level risks been wasted – the time and cost involved in bringing control back on course if it ‘drifts’ might be more than retaining an annual contract ‘in-house’.

However, should landowners take over surveying and treatment in the longer term, a degree of survey work is likely to be required to assess effectiveness and to ensure giant hogweed does not reinfest the valley.

Working with contractors

The importance of retaining good contractors cannot be overstated - they make the difference between project success and failure. Between 2001 and 2008, three contractors were involved in the survey and/or control programmes. Between 2009 and 2012, survey and control work were separated, with an independent survey carried out prior to the control contractor revisiting sites for treatment based on the survey results. This approach was re-evaluated in 2012, based on its value for money and survey accuracy (with a significant change in giant hogweed numbers observed between the early survey and later control treatments, due to ongoing germination). Since 2013 to the present day, an independent prior survey has not been carried out. Instead, the control contractor has been instructed to survey and control simultaneously, with in-field recording of plants followed by immediate treatment. This contractor and his team have made an invaluable contribution to the project over this time due to their;

- Understanding of and interest in the aims of the project, in particular the survey information required;
- Reliability and commitment to the project objectives;
- Good working relationship with landowners;
- Professional, thorough approach;
- In-depth knowledge of the project area and ground conditions, understanding of project logistics including access to hard to reach areas;
- Capacity to operate safely and effectively in, at times, challenging conditions;
- Accumulated knowledge of the growth patterns of giant hogweed in different habitats, previous plant locations, etc.

Landowner familiarity with, and confidence in the work practices of, contractors has been essential in retaining long-term support for the project. Introducing a new contractor, potentially each year, is unlikely to be received well and risks undermining the good work done so far.

Promotion of the project and invasive species work in the Tamar Valley

Various approaches have been taken, on an ad hoc basis from year to year, depending on resources available, including;

- Production and distribution of a giant hogweed guidance and control leaflet (see image below);
- Press releases;
- Articles in local publications;
- Contributions to events;



The importance of retaining good contractors cannot be overstated - they make the difference between project success and failure

- A project case study in the Tamar Valley AONB Management Plan 2019-2024;
- Project information on the Tamar Valley AONB website.

Work is underway to make better use of online promotion, including;

- Creation of a dedicated Invasive Non-Native Species information page on the Tamar Valley AONB website, with useful identification and control information including fact sheets for a number of invasive species, links to partner organisations, information on how to report sightings and links to other useful sites;
- Planning an annual timetable of timely social media posts to raise awareness, for example at the start of the giant hogweed control season, during the annual Invasive Species Week in May and also in response to national invasive species alerts.

The following sections provide a brief summary of project delivery and describe how the project scope has altered in response to new information and knowledge gained through implementation and various evolving challenges – not least practical and financial.

Giant Hogweed
(*Heracleum mantegazzianum*)

Guidance & Control

What is it?
A large member of the carrot family, brought in as an ornamental plant from its native range in south eastern Europe.

Where is it found?
Generally near watercourses and in damp meadows, though it can be found on waste ground.

Why is it an issue?
It is highly invasive and non native. **Each plant can produce up to 50,000 seeds which can survive for up to 15 years.**

Banks of watercourses colonised by the plant are likely to erode more rapidly than those protected by native grasses and other species.



Contact with the cut material in sunlight produces a skin reaction in almost all cases.

Blisters occur 24 to 48 hours after exposure, and dense pigmentation is visible after three to five days. Damaged skin will heal very slowly; leaving residual pigmentation that can develop into phytophotodermatitis - a type of dermatitis that flares up in sunlight and for which there is no straightforward treatment. Cut stems and leaves remain active for several hours.

It is capable of growing to a height of up to 5 metres (15 feet)

Giant Hogweed
(*Heracleum mantegazzianum*)

Guidance & Control

What does it look like?

- A giant cow parsley with deeply divided, light green spiky leaves.
- The plant appears in March as a rosette of leaves.
- As the season progresses, a stout stem, often with purplish blotches, pushes upwards, reaching perhaps 5 metres (15 feet) in July.
- It produces a flat topped flower head up to half a metre across, with several subsidiary flower heads. These flower heads have many individual white florets.
- The plant takes 3-4 years to reach maturity, then flowers and dies.



Seedlings
Each segment = 1cm



Flower umbel
Each segment = 50cm



Leaf
Each segment = 50cm



Stem

Native Hogweed

There is a native hogweed which is similar in appearance, but much smaller, with darker green leaves. It generally does not grow above 2 metres.



Native flower umbel
Each segment = 1cm



Native leaf
Each segment = 1cm

Giant hogweed guidance and control leaflet

Methods

Field survey and control approaches evolved as the project developed, reflecting factors such as new knowledge gained, access practicalities and permissions, changes in giant hogweed numbers and distribution and funding issues (for more detail from individual years, see Appendix 5).

By 2005, it was recognised that the success of previous years' work was difficult to judge. With limited resources, more attention was paid to control rather than surveying. Siting the 'core area' in the upper reaches of the tidal area was a limitation, with the majority of the catchment lying above the core area and, until 2005, little was known about the extent of the invasion in the upper reaches due to a lack of finance to fund an extensive survey.

From 2005, as surveys were further extended to a larger part of the catchment, control work was more targeted and in 2006 a more methodical approach introduced, working from upstream to downstream.

Significant discussion has taken place over the years regarding whether the survey work and actual treatment work should be carried out at the same time or separated. As with most things there are pros and cons but, since 2013, as giant hogweed numbers have declined significantly, it has certainly proved efficient to have one contractor team moving through the catchment, recording and controlling plants at the same time. Key points are described below.

Survey methods

In 2001, with Foot and Mouth Disease preventing any fieldwork, giant hogweed information was gathered through a questionnaire mailed out to landowners. This, along with various in-house data held by the Environment Agency and others, enabled a limited picture of giant hogweed occurrence to be formed.

Such processes are no substitute for targeted, specific field surveys which began in 2002 and have continued ever since, with some limited interruption during the Covid lockdown in 2020. Actually going out and deliberately looking for plants at the optimal time of year and in a systematic manner is bound to reap dividends.

Most commonly, a three-phased approach has been adopted to ensure the most effective survey programme possible – the window for fieldwork is small in the Tamar Valley and may alter when seasonal weather effect plant growth, but is typically as follows;

- Phase 1 – survey in April, when new growth of both newly germinated plants and the regrowth of plants now in their second or third year, is visible. General vegetation density is relatively low at this stage, aiding field access;
- Phase 2 – survey in May;
- Phase 3 – final survey takes place in June, after which the density of vegetation makes location of giant hogweed difficult and prohibits access in some areas.

More details are provided in the sample work specification issued to contractors in Appendix 6.



Surveying in the Tamar Valley 1



Survey 2



Survey 3



Survey 4

The timings of the control programme have varied, depending on whether control of giant hogweed was carried out separate to (and soon after) the survey phases, or on whether both survey and control were carried out simultaneously. Typically, the control treatments have followed the three-phased approach described above.

From the start of the project, the partnership was keen to identify and employ control methods that would be the most;

- Effective in their success rate;
- Practically deliverable;
- Cost-effective;
- Environmentally acceptable.

Based on knowledge from within the partnership, as well as from further afield within the sphere of invasive species control, it was apparent quite early on that, for a landscape-scale project, herbicide use would probably be essential to achieve the desired outcome in most situations.

Control methods

In the Tamar Valley, a number of different contractors have been employed over the years to deliver giant hogweed control treatments. The various methods used can be summarised as follows;

- **Foliar spray with a glyphosate-based herbicide**

Using a knapsack sprayer, sometimes employing a long lance to reach tall or difficult to access plants. This technique, carried out with Use of Herbicide Near Water consent from the Environment Agency, was used on the vast majority of giant hogweed plants within the project area in the earlier years, with thousands of plants needing treatment.

In the first year of control, it was determined that three sprays were needed per site, with 60% effort in spray one, 30% in spray two and 10% in spray three, and with applications about six weeks apart, according to regrowth and new seedlings starting when plants are 50cm tall.

Since 2009, foliar spray at a 4% concentration has been used although, in recent years, as plant numbers have reduced with their size typically small, the vast majority are removed by digging.

The effectiveness of herbicide applications, even when weather conditions are favourable, should not be taken for granted. For example, in 2005 the contractors noted that, where just one or two plants grew, the chemical treatment (glyphosate) had an excellent effect with no trace of giant hogweed found. However, in areas where larger stands were found, chemical spraying was less effective – despite glyphosate having killed a high percentage of these plants, there was still evidence of sprayed plants still growing or of new emergent plants.

- **Direct applications into plant stem**

An alternative approach to spraying mature plants where seed heads were present was the careful removal of the seed heads and the direct application of glyphosate down the gut stem. This resulted in plant death, with no risk of seed heads appearing lower down on the stem as described above. It also minimised the risk of chemical contact with non-target species. Stem injection with glyphosate into larger specimens was introduced in 2007, combined with decapitation of flower or seed heads – this technique was often used for mature plants found later in the season and has occurred much less in more recent years as fewer plants were found in this late growth stage.



Spraying giant hogweed 1



Spray 2



Spray 3

- **Digging up and removing whole plants**

Mainly employed on organic holdings or where the landowner did not support herbicide use, it is also the preferred method in recent years as plant numbers have decreased. It was most suitable for single smaller plants, rather than large stands. It also involves handling plants, which raises a serious health and safety issue for the operatives, so should be undertaken with correct Personal Protective Equipment (PPE).

- **Slashing and/or decapitating plants**

This technique was often employed by private landowners, mainly as herbicide use is more difficult due to the specialised training required, and also because it has an immediate outcome and at least prevents seeding. This technique has rarely been used by contractors in recent years but early on, when so many giant hogweed plants occurred in some locations, slashing was employed at times to reduce the bulk of the material.

In 2006, a demonstration site was established at Morwellham Quay to explore the viability and costs of physical removal of giant hogweed plants, by comparing undercutting of growing plants with direct herbicide foliar treatment. The experiment showed that the undercutting technique needed significant time and costs with results no better than other techniques.

Data recording

A considerable amount of information, including combined multi-species data, has been collected over the course of the project, in addition to observations for specific sites and anecdotal comments on the growth patterns of giant hogweed in the Tamar Valley. The level of information provided was enough to inform the control programme year-on-year. It does mean, given the variance in recording methods, along with changes in the geographic extent of surveys over the years, that direct comparison of data between years is difficult.

For the purposes of invasive management, with giant hogweed numerous and coverage ranging from dense stands of giant hogweed mixed with Japanese knotweed and Himalayan Balsam to sporadic coverage or isolated plants, it was not necessary, practical or cost effective to record exact giant hogweed plant numbers. Separation of the three species was difficult when they occurred together in stands of varying sizes and plant ages, in which case surveyors would record combined coverage of giant hogweed, Japanese knotweed and Himalayan balsam.

For example, part of the data collected from a single property in 2005 (Appendix 7) showed a total coverage, equalling 47,745 m², of multi-species stands including giant hogweed mixed with Japanese knotweed and/or Himalayan balsam (both large and sporadic stands). This amounted to 11.8 acres of coverage. Clearly, extraction of data and mapping of individual species was not viable.

An example of a blank survey sheet from 2005 is shown in Appendix 8. From 2013, the size of giant hogweed plants was no longer noted, as that information would only be relevant to the date it was recorded and size categories could change within a few weeks.

Recording of location information has ranged from simply marking maps in the field to using Geographic Positioning Systems (GPS) and Geographic Information Systems (GIS), or a combination of both. Many recorders have found that the steep, narrow, wooded parts of the valley hamper GPS use significantly. Also, GPS readings were often found to be less accurate than hand annotated maps, occasionally placing a plant in the middle of the river instead of on the edge of the riverbank. Since 2009, large-scale Ordnance Survey field maps have been used to mark giant hogweed locations (Figure 5) and this information is then digitised using ArcMap.



Digging up giant hogweed to remove tap root 1



Dig 2



Dig 3



Dig 4



Mixed invasive species stand 1



Mixed 2

An independent contractor was recruited from 2009 until 2012 to focus solely on surveying, which generated reliable quantitative data. From 2013, with one contractor team carrying out both the survey and control simultaneously, but with plant numbers reducing more or less year-on-year, the gathering of good quality quantitative data has continued. As a result, a consistent timeline of numerical giant hogweed data is available for the current survey area from 2009 to the present and that data only is presented in this report.

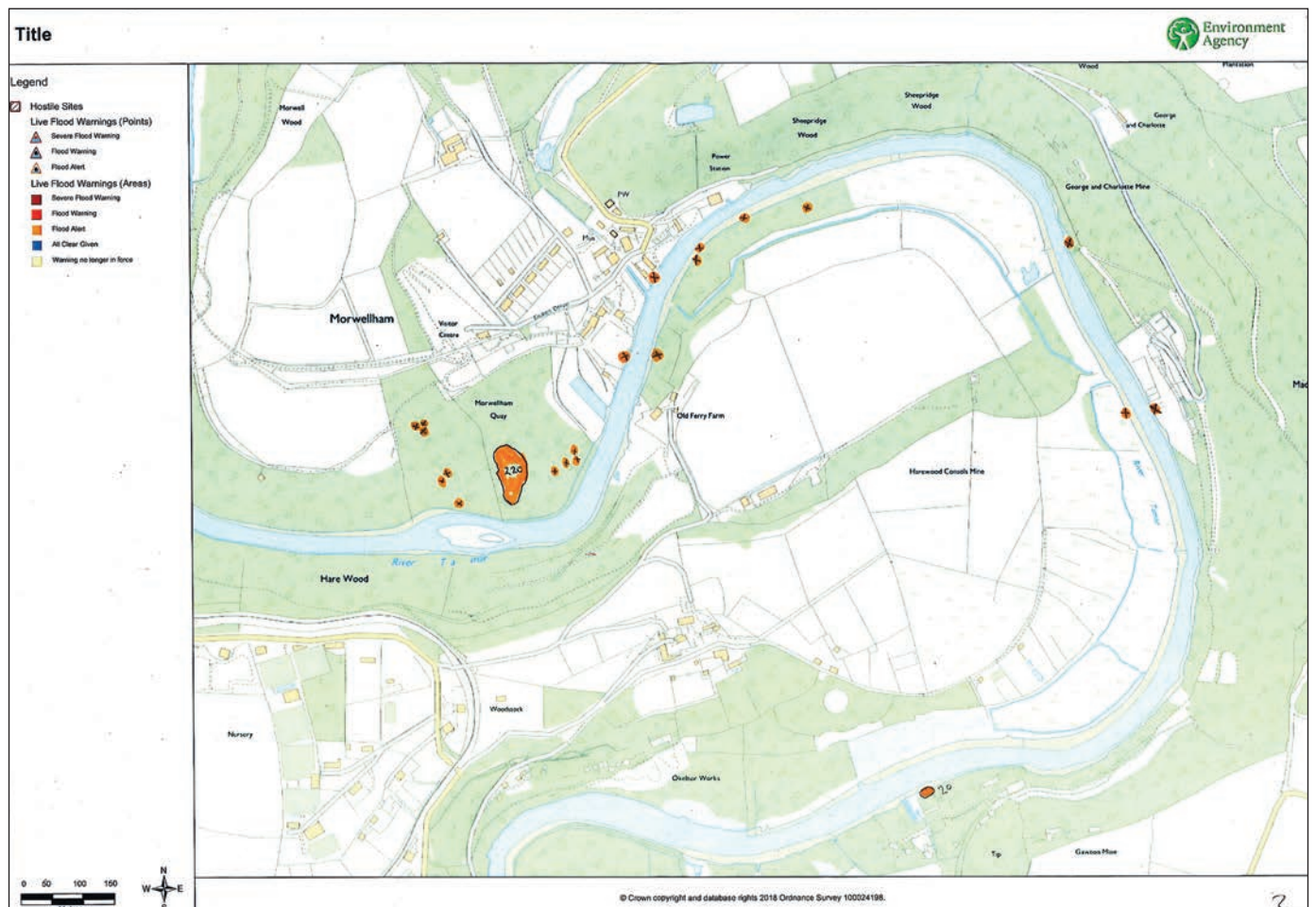


Figure 5: Hand annotated field map showing the location and numbers of giant hogweed in part of tidal section (Survey Area A) in 2018, including single plants (dots) and a large cluster

Organic holdings

The derogation on an organic holding in Survey Area B allowed some herbicide application on that site in addition to hand digging. On the same site, a combination of hand cutting and digging of plants was also undertaken followed by cattle grazing. This approach was very effective over two to three years in eradicating giant hogweed plants from a section of riverbank that was previously heavily infested.

In 2002, the owner of another organic site on the Harewood peninsula in the tidal section (not covered by the project), began a private annual survey and mechanical control programme which continues to this day. In the first year, over 3000 plants were dug up and removed – an incredible effort by the landowner who has achieved remarkable success in controlling invasive species on the property (<https://calstock.org.uk/elf/aliens/>).

Comparison of chemical and non-chemical control

A comparison of this landowner's method with those used by the project control contractor in the Tamar Valley in 2002 offered useful information regarding the effort and associated cost of treating giant hogweed by mechanical or chemical methods with pros and cons for both.

Comparing the spraying figures with the mechanical control work on the organic site resulted in a calculation for the cost of digging at £202/ha, whilst the cost of spraying was £25/ha. Sixty-two full days were required to control giant hogweed by digging over 4ha on the organic site. To physically remove giant hogweed on a catchment scale would require full time field staff and a large rise in costs although this would be partly offset in savings on chemicals.

Comparison of chemical and non-chemical control

Advantages		Disadvantages
Pesticide	Speed	Pesticide drift and missed coverage. Reduced effectiveness if spraying followed by rain
	Lack of direct human contact with plant	Needs to be carried out by qualified persons and requires consent to use herbicide near water from the Environment Agency
		Toxic- danger of contamination of water and hitting non target species
Cutting	Will stop flowering	Close human contact with plant
	Plant specific control	May not kill plant
Digging	Will kill plant	Time consuming and labour intensive
	Non-toxic	Close human contact with plant

The pros and cons of chemical and non-chemical methods are described in more detail elsewhere (e.g. Booy and Wade, 2007). Guidance on the safe use of herbicides to control Invasive Non-Native Species is provided by the UK government (DEFRA, 2014).

Aftercare

In 2005, as the survey and control area increased, the partnership recognised that limited resources did not allow aftercare over such a large area.

While aftercare is recommended, the partnership decided that, as sites could be monitored when revisited each year, this would only be carried out if necessary. The Environment Agency suggested the following species along watercourses; bramble, hawthorn, blackthorn, dog rose, willow and alder or suitable grass seed mix.

Inaccessible areas

Ground conditions can make access to the project area difficult. The terrain can be rugged; riverbanks steep in places, fallen trees, brash and silt making floodplain access increasingly difficult as time has progressed, meaning the risk of plants going unobserved will always remain.

In addition, the rapid growth of vegetation in the spring reduces visibility significantly and makes access very difficult, making it impossible to survey and find plants.

Boat work

From the outset, all contractors, whether carrying out survey or control work, have come across giant hogweed plants or locations that have required access by boat, so from 2003 this option was frequently used, mainly within the tidal reaches and for access onto river islets.

It has been extremely helpful in the past, securing the use of an Environment Agency boat, sometimes one from keepers at Endsleigh, and quite often a private contractor's canoe to carry out this vital work. More recently, the boat work has been subcontracted by the main project contractor.

The practicalities and logistical challenges of boat based work in a tidal area are clearly described in the report for a 2-day boat survey and spray trip in June 2003.

"We were very limited by the tide, so much so that there was only a window of 3 or 4 hours in which to do the work. The tide had to be sufficiently high enough to launch the boat and to get it out of the water. Also, if the water was too low we could not reach the banks to spray from the boat, and there was a risk of getting grounded. To make the most of this time the trip needs to be very carefully planned. The boat needs to be launched as soon as is practical when the tide is rising.

Another limitation is the tide times themselves. The spray could not be done sooner as high tide was too late/early in the day. This also meant that some plants were flowering. As spraying is less effective when the plants have started flowering, we should have taken tools such as a pole saw, to deal with them as well.

This small window of time and insufficient funds meant that the boat spray could not be done as thoroughly as we would have liked. A third boat spray could have been done, but it was decided that another land based spray was more important.



Access on the ground can be challenging 1



Access 2



Access 3

Ditches, wet ground conditions and steep sided mine spoils – just some of the challenges contractors face accessing the project area – highlighting the need for team work.

There were many instances where we had to stop and get out of the boat, firstly because there were plants we were unable to reach from the boat, and secondly to hold the boat so that it did not drift away while the engine was stopped. Stopping to do this took up a lot of time, although the plants which were sprayed were impossible to reach from land, hence it was a worthwhile task.

There were many plants between the high and low tide levels. As the boat spray is done at high tide these cannot be reached. I did not however see any plants in this region over 1m.

Definitely a worthwhile task, but needs more careful planning. If this is done then it could (but not guaranteed) be possible to do it all in 2 days (or alternatively two boats used at one spring tide)".

Sightings reported by the general public

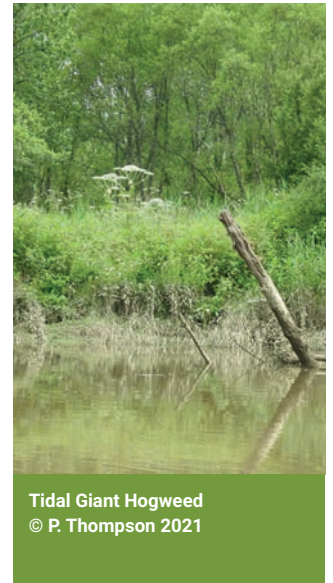
Occasionally, members of the public will notify the contractor or the Tamar Valley AONB office if they see giant hogweed, either outside the survey area or after the main survey has ended, and there is flexibility to allow the contractor to carry out reactive control in these situations.

In 2021, both situations arose, with giant hogweed sightings at two locations being reported by members of the public. Flowering giant hogweed was spotted by a canoeist after the year's fieldwork had ended (its late development thought to be a consequence of a cold snap mid-season) and a landowner previously involved in the project reported giant hogweed at a new site, outside the project area, less than 2km from the river beside a garden wall, amongst hedge shrubs, away from any water courses.

Altering the whole scheduled programme mid-season, in years where plant growth may be delayed by a few weeks due to unexpected changes in weather conditions, is possible but may be problematic as the contractor juggles other work commitments. It is not possible to increase the project area further to cover a larger part of the catchment due to limited funding. The latter touches on a concern raised by the current contractor, i.e. what do we not know regarding colonies away from the river and beyond the project area?

Increasing engagement with the wider community may be part of the solution to these problems. While not a substitute for a systematic survey programme with experienced contractors, the reporting of incidental sightings, as described above, whether from landowners, estate management staff, canoeists, anglers or walkers should be encouraged as the project moves forward from a full survey to a monitoring programme in the coming years.

As we know, to carry out control of 90%+ of giant hogweed plants, but leaving a few to set seed, would render the whole project a failure in its eradication mission. All avenues for gathering information should be explored, especially where funding is limited.



Tidal Giant Hogweed
© P. Thompson 2021

Health and safety

Working in such a remote and rugged environment, it was critical that all contractors worked in a safe and competent manner. There are numerous potential hazards associated with this work; working near water, handling chemicals, challenging conditions and, in the past, there have been incidents of field operators being chased by dogs, cows and bulls.

Contractors were required to provide an approved risk assessment for the tasks they undertook and telephone contact was maintained with colleagues/'buddies' at frequent intervals.

Procedures for the use of herbicides were of course subject to their own rigorous assessment, and only suitably accredited operatives could deliver this element of the work. Specifically, for this element, contractors were required to obtain WQM1 approval from the Environment Agency, if herbicides were used near watercourses, and all herbicide applications were carried out by PA1/6 qualified personnel ensuring they adhered to health and safety requirements and took note of precautions and product label information to ensure the safe handling and use of herbicides.

Similarly, all boat work was subject to rigorous risk assessment.

It is to the credit of all those involved that no health and safety issues or breaches have arisen throughout the lifetime of the project.

Project Delivery 2001-21

Appendix 5 provides a chronology of how the project developed and was delivered between 2001 and 2021, highlighting key outcomes, changes in scope or focus, etc. It is not intended to duplicate all the project information generated over two decades.

Annual results are presented separately for the tidal and non-tidal river sections, as the ecological and practical dynamics of these sections are quite different. In addition to the riverside survey areas, adjacent off-river sites near the non-tidal section have been located and included in recent years as, in the past, they are likely to have been the source of seeds which germinated further down the catchment.

Changes in giant hogweed numbers and distribution in the Tamar Valley

Over the life of the project, the total number of giant hogweed have markedly declined from thousands to 336 in 2021 (Figure 6). An inability to survey one of the tidal hot spots in 2020 was a temporary setback, which may have resulted in 200 clustered plants at that site in 2021. This is described further below and more details are provided in the contractor report available on the Tamar Valley AONB website at <https://www.tamarvalley.org.uk/tamar-invasive-plants-project/>.

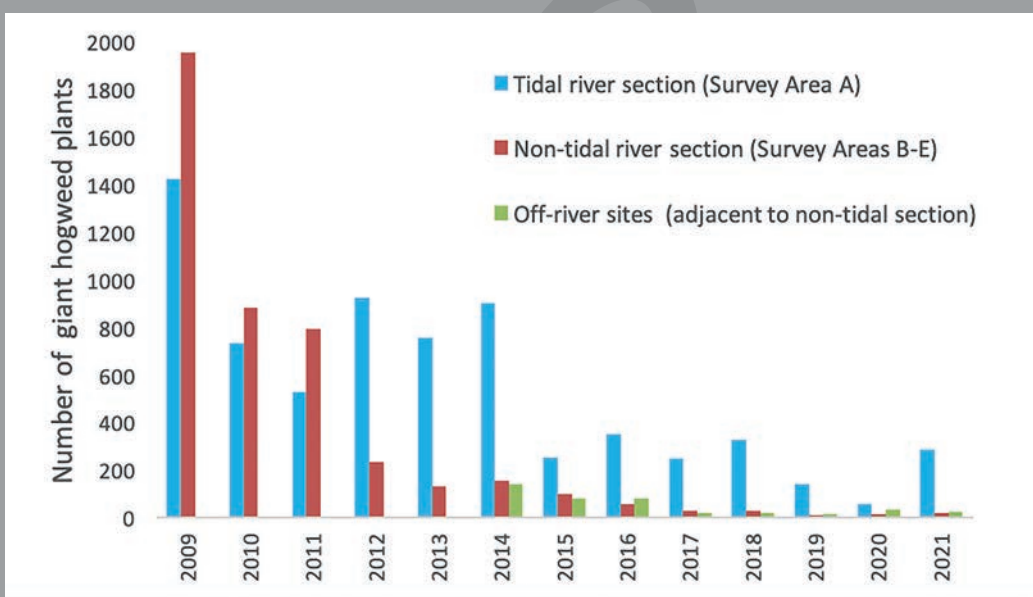


Figure 6:
Change in total number of giant hogweed located and treated in all survey areas, 2009 to 2021

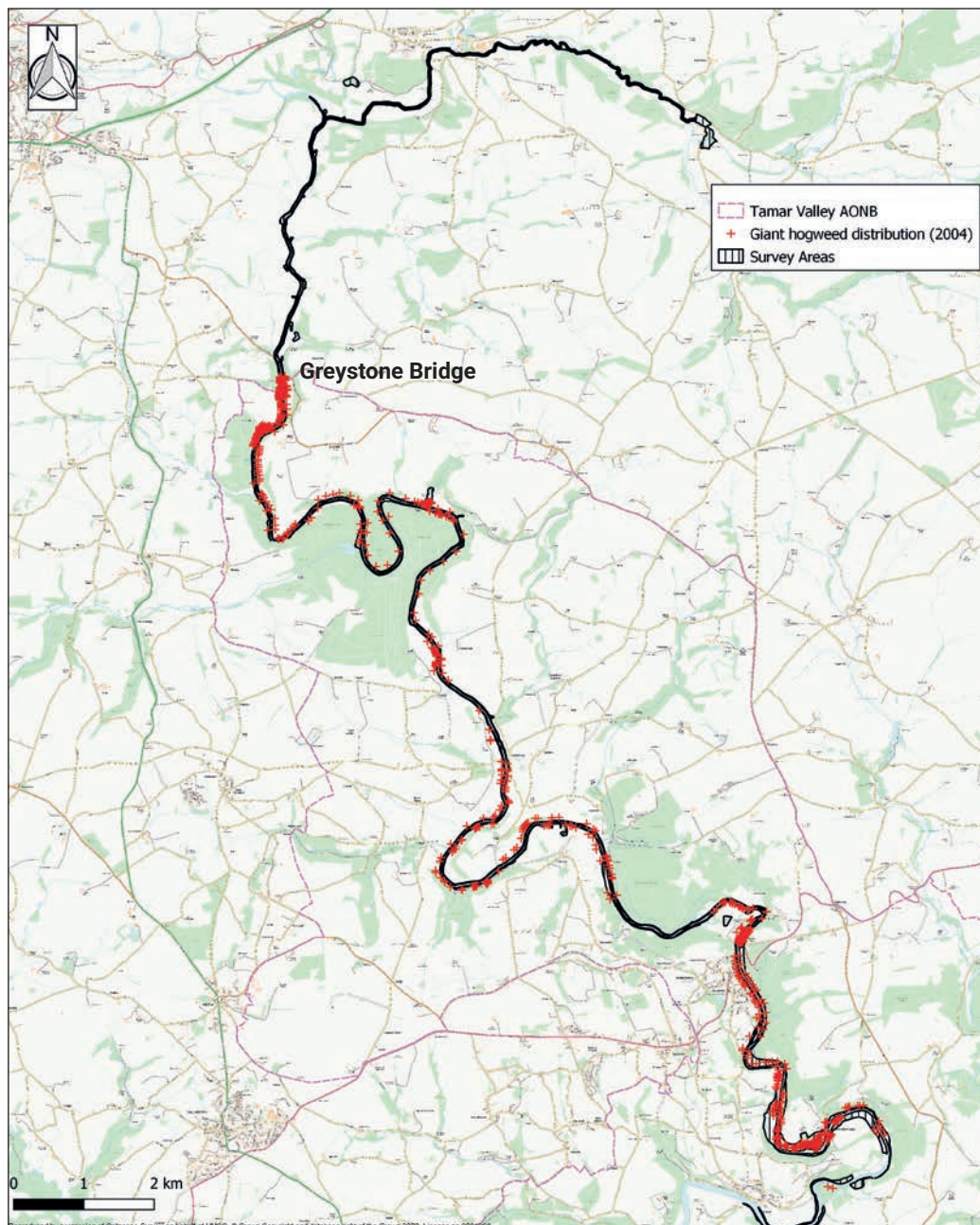
Notes:

1. Off-river sites including a woodland, gardens, a waste tip, ditches, ponds and a yard.
2. In 2020, survey/control was carried out in all properties except for one in the tidal section, where permission was withdrawn during the first Covid pandemic. Permission reinstated and survey/control resumed at the site in 2021.
3. The survey methodology from 2009 allowed the collection of reliable giant hogweed numerical data.

Before and after treatment



Above: A heavily infested site near Gunnislake in 2005, with some regrowth visible in 2009 and finally clear of giant hogweed in 2012



The overall distribution of plants has changed dramatically, from infesting much of the river corridor to now being a restricted population of mostly isolated plants and small clusters, with the non-tidal area almost clear and the tidal area much reduced with some residual localised plant clusters remaining (Figures 7 to 10).

Figure 7:
Distribution of giant hogweed in all Survey Areas (A-C), 2004

Note: The survey area did not extend north of Greystone Bridge until 2006, although reactive site visits were made in response to information from landowners in 2005

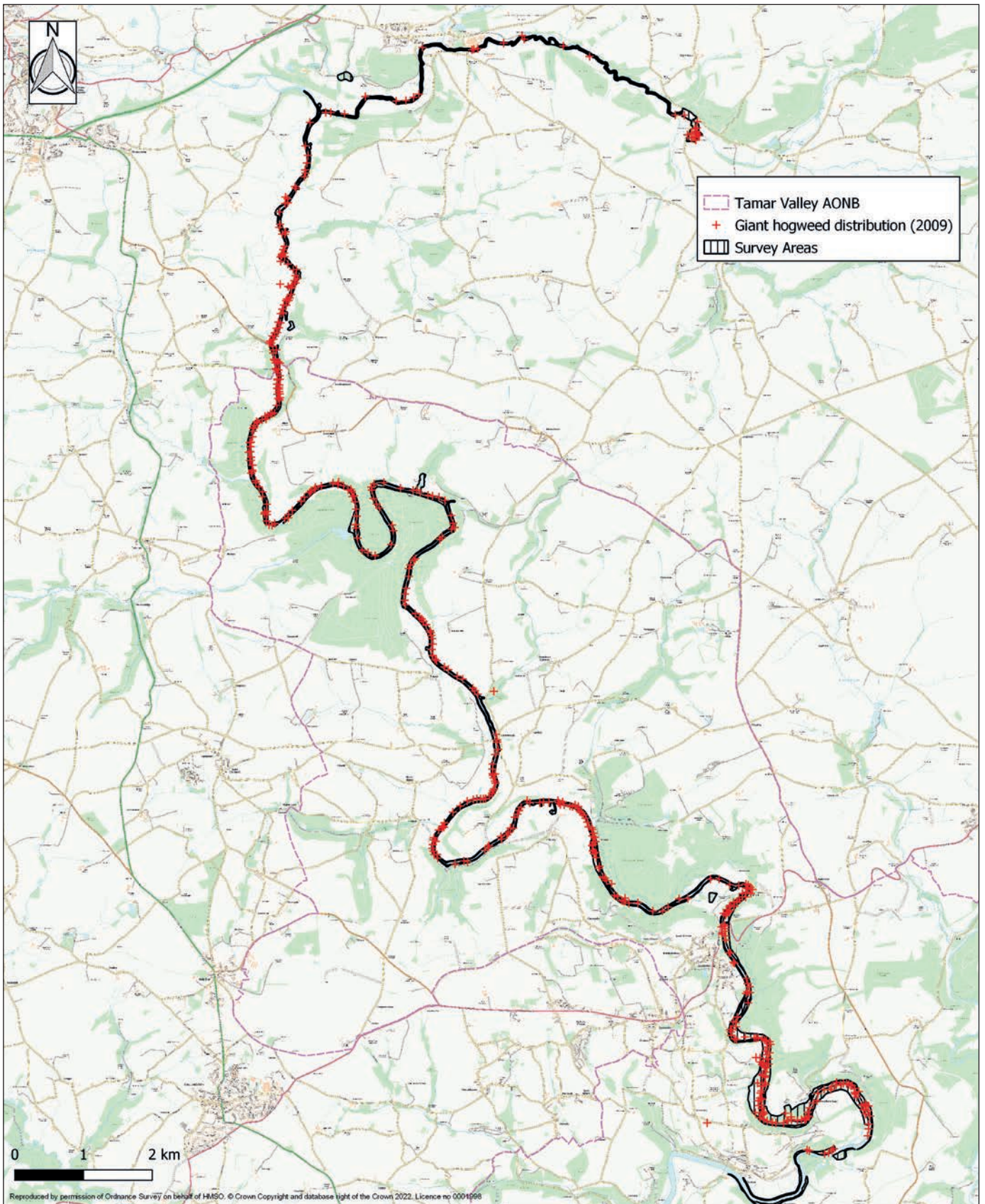


Figure 8:
Distribution of giant hogweed in all Survey Areas (A-E), 2009

Note: From 2009, the main on-river survey area has not changed.

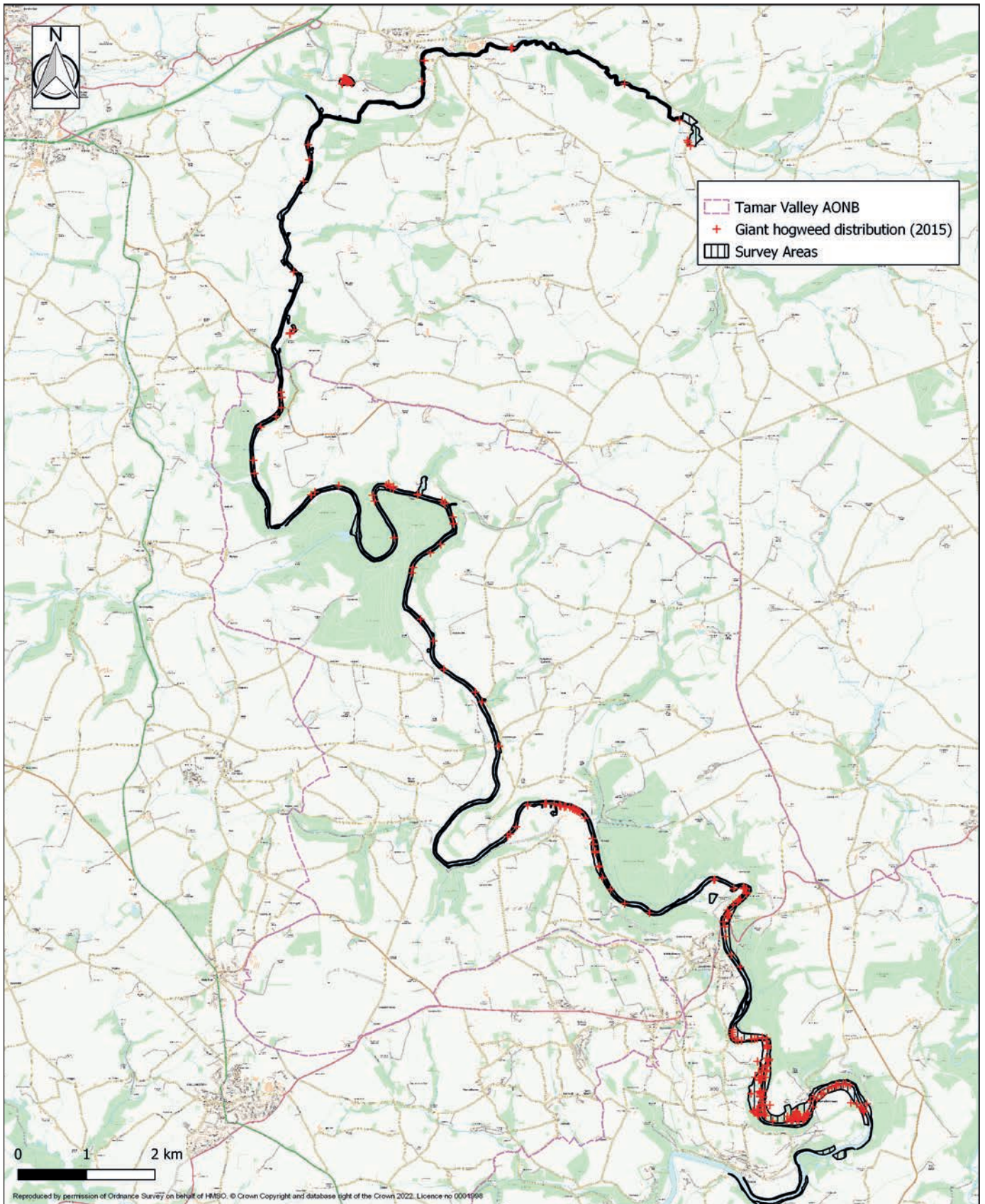


Figure 9:
Distribution of giant hogweed in all Survey Areas (A-E), 2015

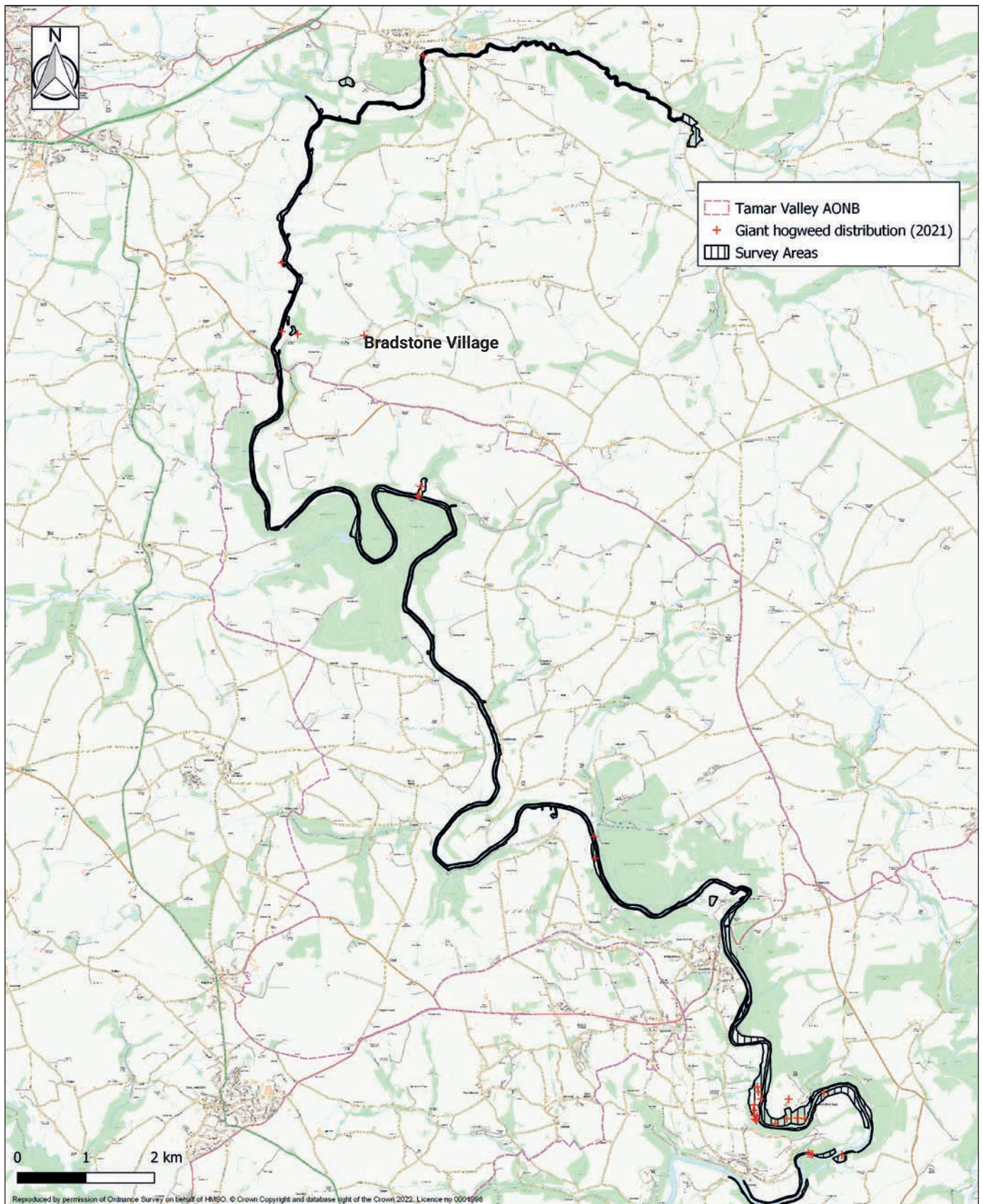


Figure 10:
Distribution of giant hogweed in all Survey Areas (A-E), 2021

Note: Small cluster located at a new site in Bradstone village, less than 2km from the project area.

The tidal river section

The depositional areas in the tidal section between Calstock and Gunnislake Newbridge remain the main stronghold for giant hogweed in the Tamar Valley (Figures 11 to 13). However, the overall decreasing trend in giant hogweed numbers in this section is very positive.

The inability to survey at Morwellham in 2020 was a temporary setback to the project's progress, as contractor access was not permitted due to the landowners understandable concerns during the Covid lockdown. Instead, the landowners carried out a survey, treating 12 plants, although it was considered a likely risk that some plants would be missed on the floodplain, where access and visibility are severely restricted by July.

In 2021, with the landowner's permission, the project contractor did find the remains of flowering plants from the previous year and he removed 200 plants (2 clusters) from the floodplain. The landowner at Morwellham has supported the project for many years and we are confident this localised population can be eradicated in time.

A second site, further downstream on the tidal section near Rumleigh, has not partaken in the project, but the landowner does carry out giant hogweed survey and control at the property. Fortunately, as both of these sites are at the bottom of the catchment, there is minimal risk of these residual populations re-establishing in the wider landscape, but the whole tidal section should remain a key focal point as the project eventually moves from a full survey to a monitoring programme.

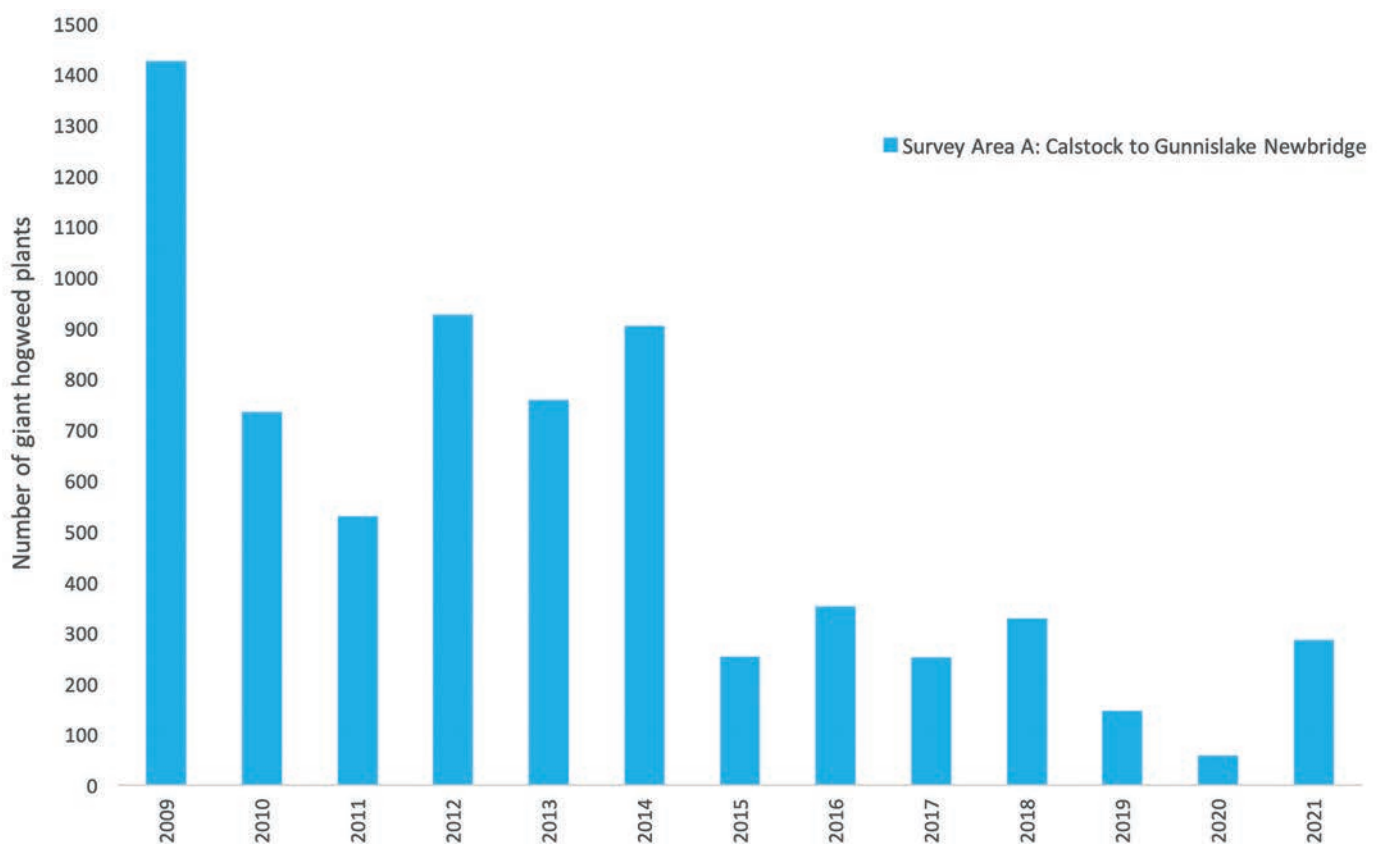


Figure 11:
Change in total number of giant hogweed located and treated in the tidal river section, 2009 to 2021

Notes:

1. 2020 survey and control not carried out at Morwellham during Covid lockdown.
2. 2021 Morwellham revisited - 200 clustered plants found

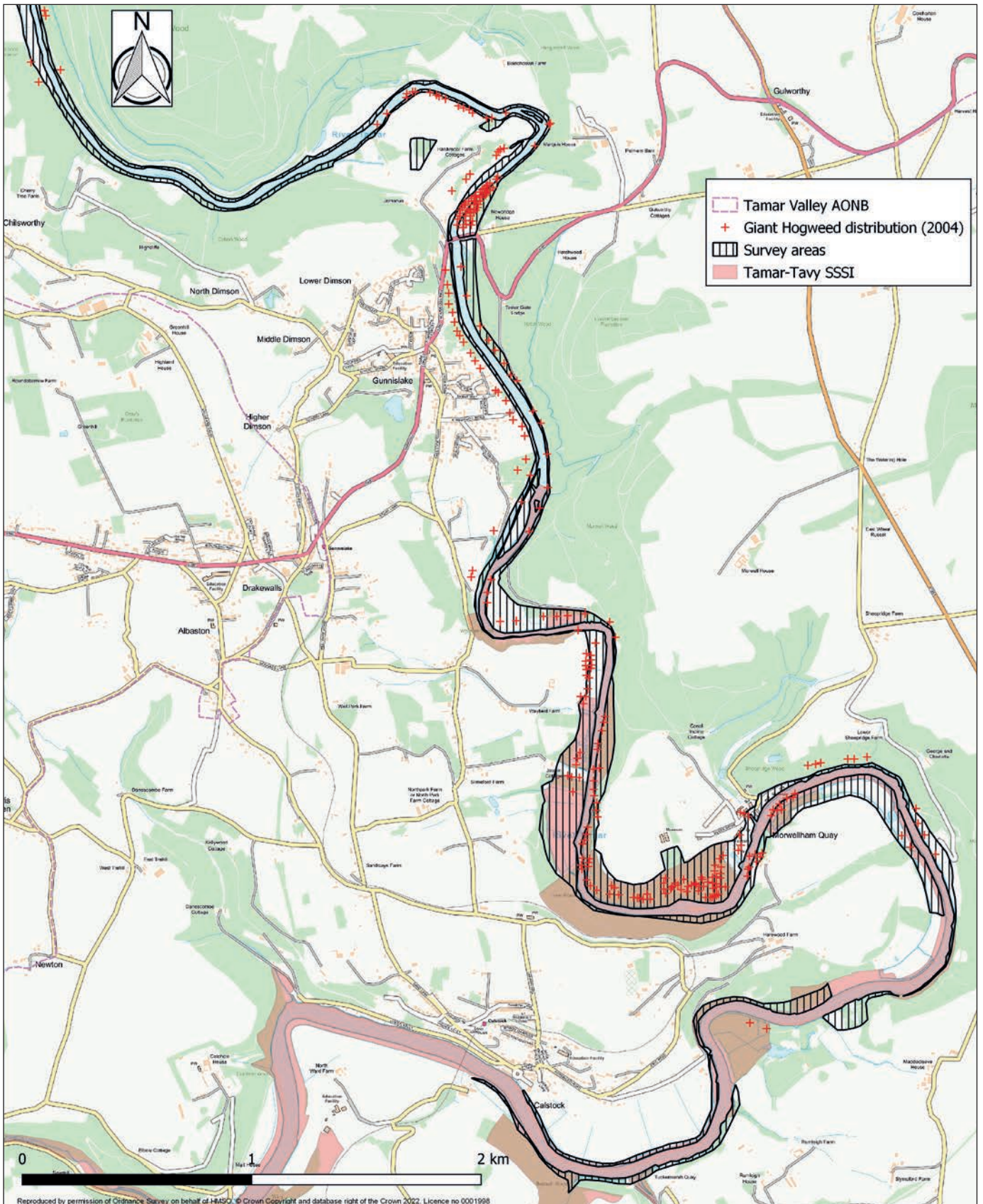


Figure 12: Distribution of giant hogweed in the tidal river section, Survey Area A, 2004

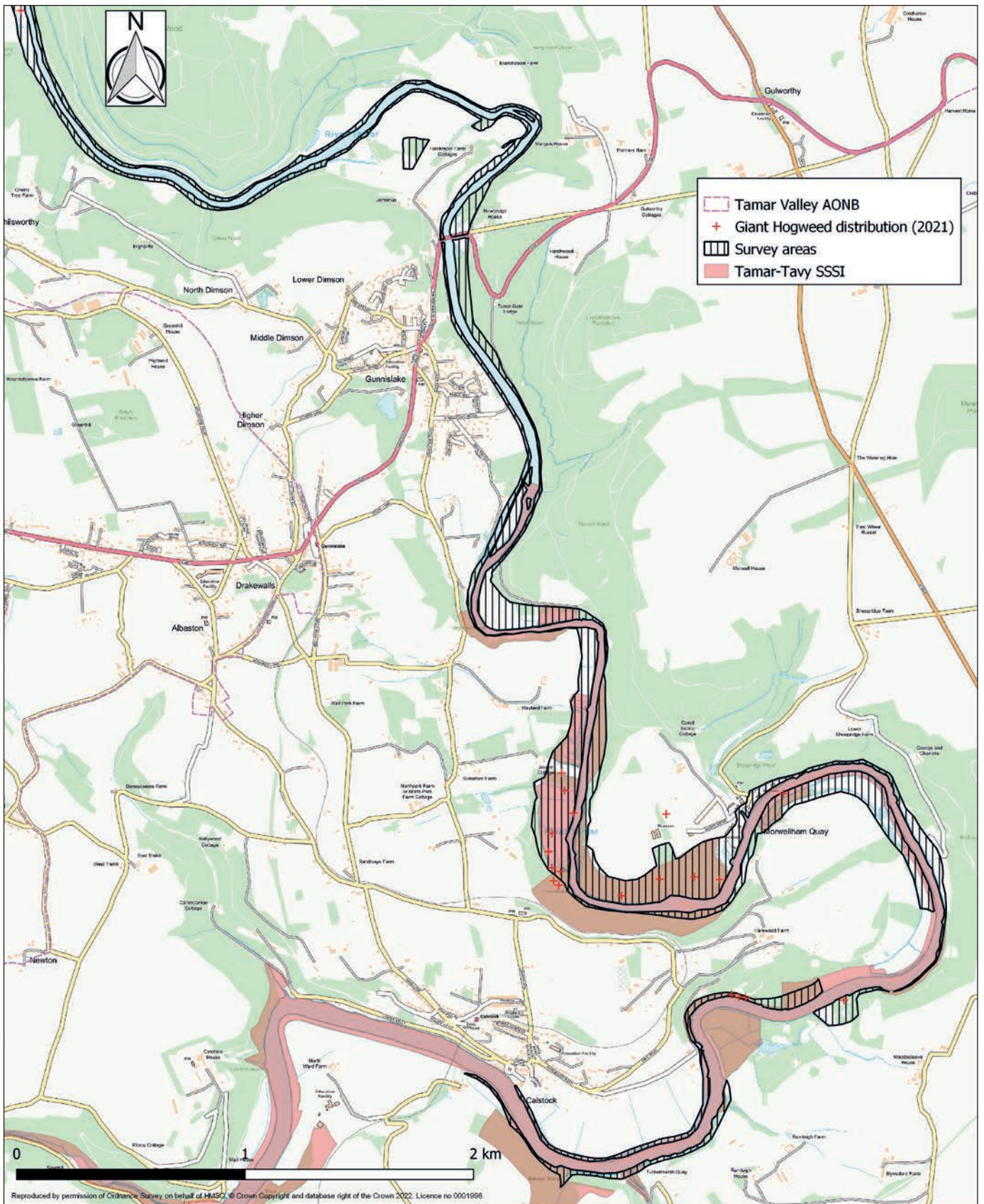


Figure 13:
Distribution of giant hogweed in the tidal river section, Survey Area A, 2021

The non-tidal river section

While surveys at the beginning of the project found more plants in non-tidal freshwater reaches of the River Tamar, in later years the non-tidal river section has typically had lower numbers of giant hogweed compared to the tidal section (please see Figure 6). The large numbers of plants present in the non-tidal section in the past acted as a seed source for the catchment downstream, with the formal gardens at Sydenham and Endsleigh estates likely to have been the original sources.

Therefore, the almost year-on-year decline in the giant hogweed population on the non-tidal river corridors of both the River Tamar and the River Lyd is a significant positive change. With just 17 plants located in 2020 and 2021, the partnership considers that the non-tidal seedbank is near exhaustion and the project is close to succeeding in a key aim of eradication along the main non-tidal river corridor.

With numbers so low, it is tempting to consider giant hogweed as effectively eradicated in the catchment, in comparison to the level of infestation when control first began, but the increase in plants at Morwellham during 2020 is a clear example as to the risk posed to the project if a co-ordinated control programme across the whole project area is not continued, or if areas are removed from the control programme at this point in time.

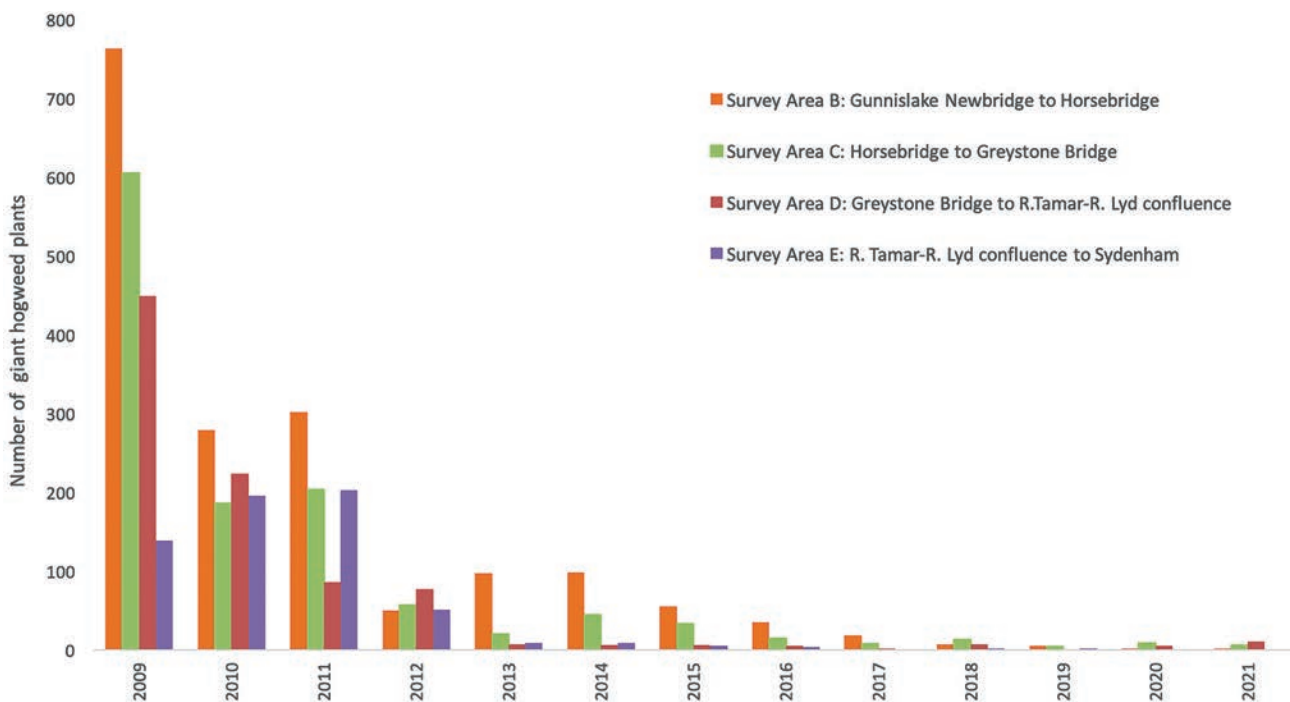
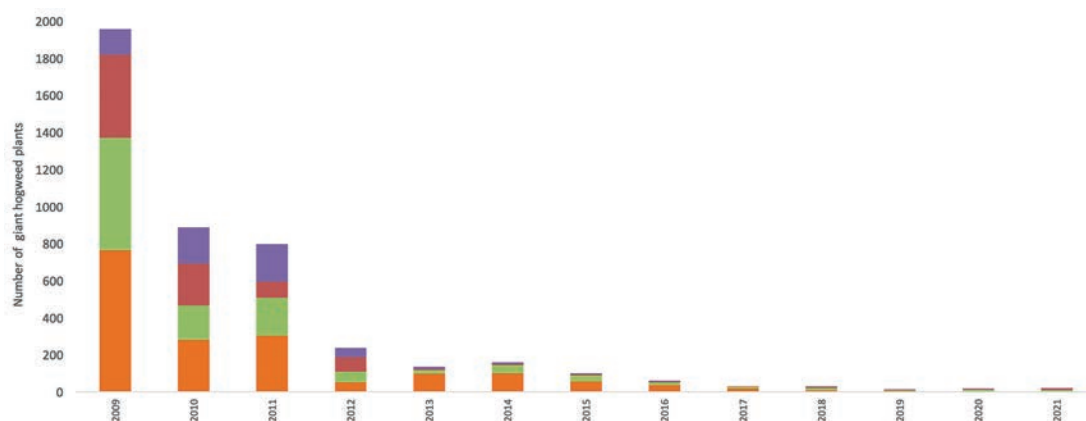


Figure 14 (Fig 14B below):
Change in total number of giant hogweed located and treated in the non-tidal river section (Areas B-E), 2009 to 2021



Off-river sites

The largest threat to this progress identified in recent years has been plants coming from off-river sites, as this area is obviously so large it cannot be monitored. Four off-river hotspots have been identified and surveyed annually for a number of years and the project has worked with the four landowners to get these plants under control (Figures 15 and 16). In 2021, a small cluster of 5 plants was also found by a resident at a new location, Bradstone village, outside the current project area and this site will be revisited in 2022.

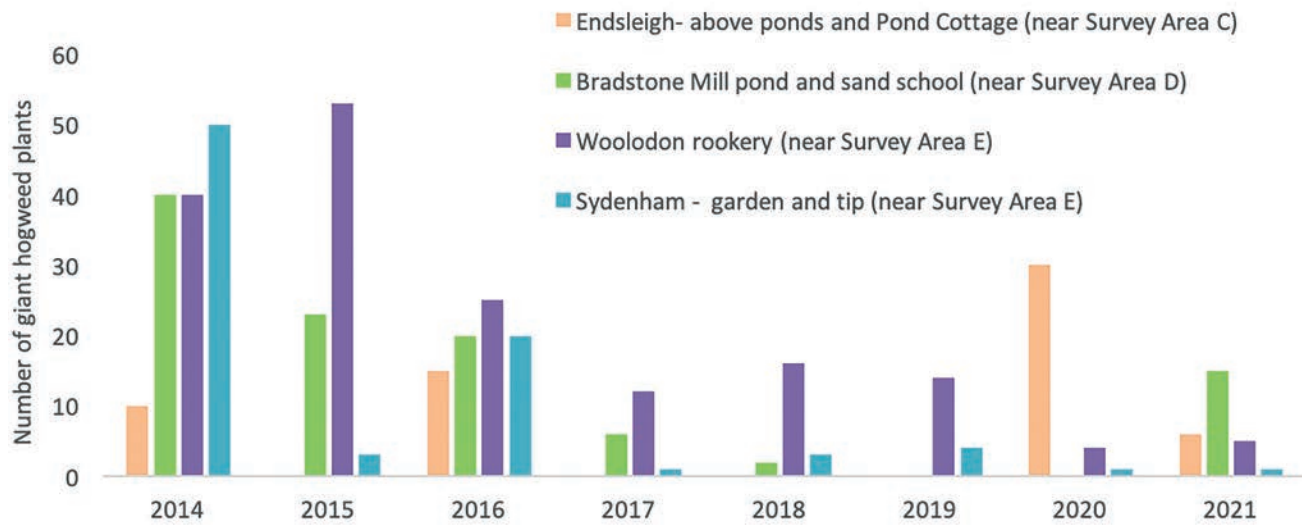


Figure 15:
Number of giant hogweed on off-river sites, 2014-2021

Note: These four sites are known hotspots which required annual surveys (Bradstone village not included)

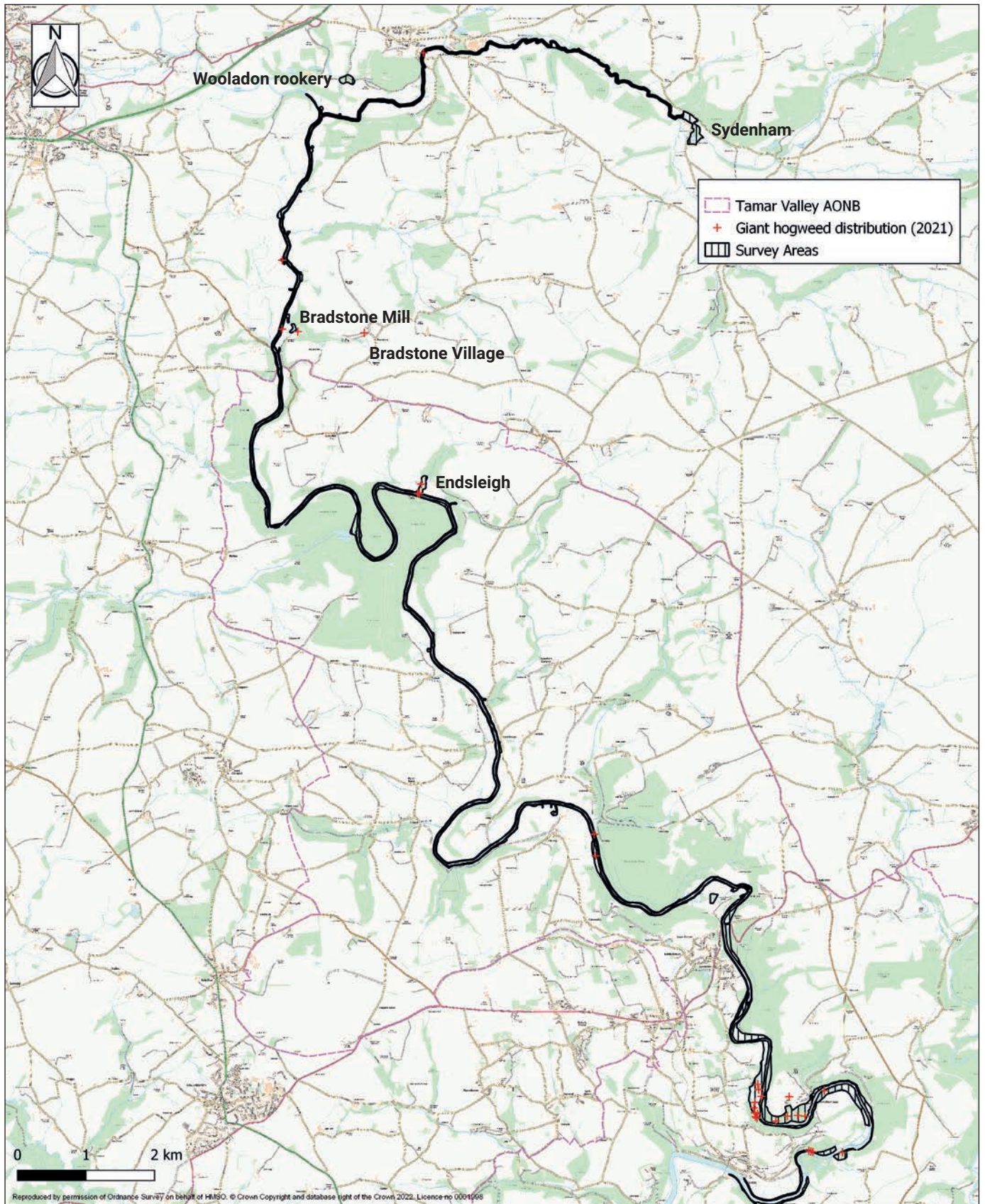


Figure 16:
Off-river giant hogweed sites in 2021

Natu-Rule 2021 walkover survey

The separate walkover survey carried out by Natu-Rule in 2021, included revisiting well known hot spots, plus some additional upstream river stretches and off-river locations. Only four giant hogweed plants were located – two newly-germinated plants behind the Landmark Trust Pond Cottage on the Endsleigh Estate and another two by Morwellham Quay (Figures 17-22). Both sites are known to contain residual populations and should continue to be revisited annually in any future control programme.

Although no giant hogweed plants were found during the Natu-Rule survey, at the sites explored beyond the current main project area, the reporting of giant hogweed at Bradstone village in particular illustrates that it would be impossible to say with absolute certainty that none occur elsewhere within the catchment.

These points directly influence several of the recommendations in the following chapter.

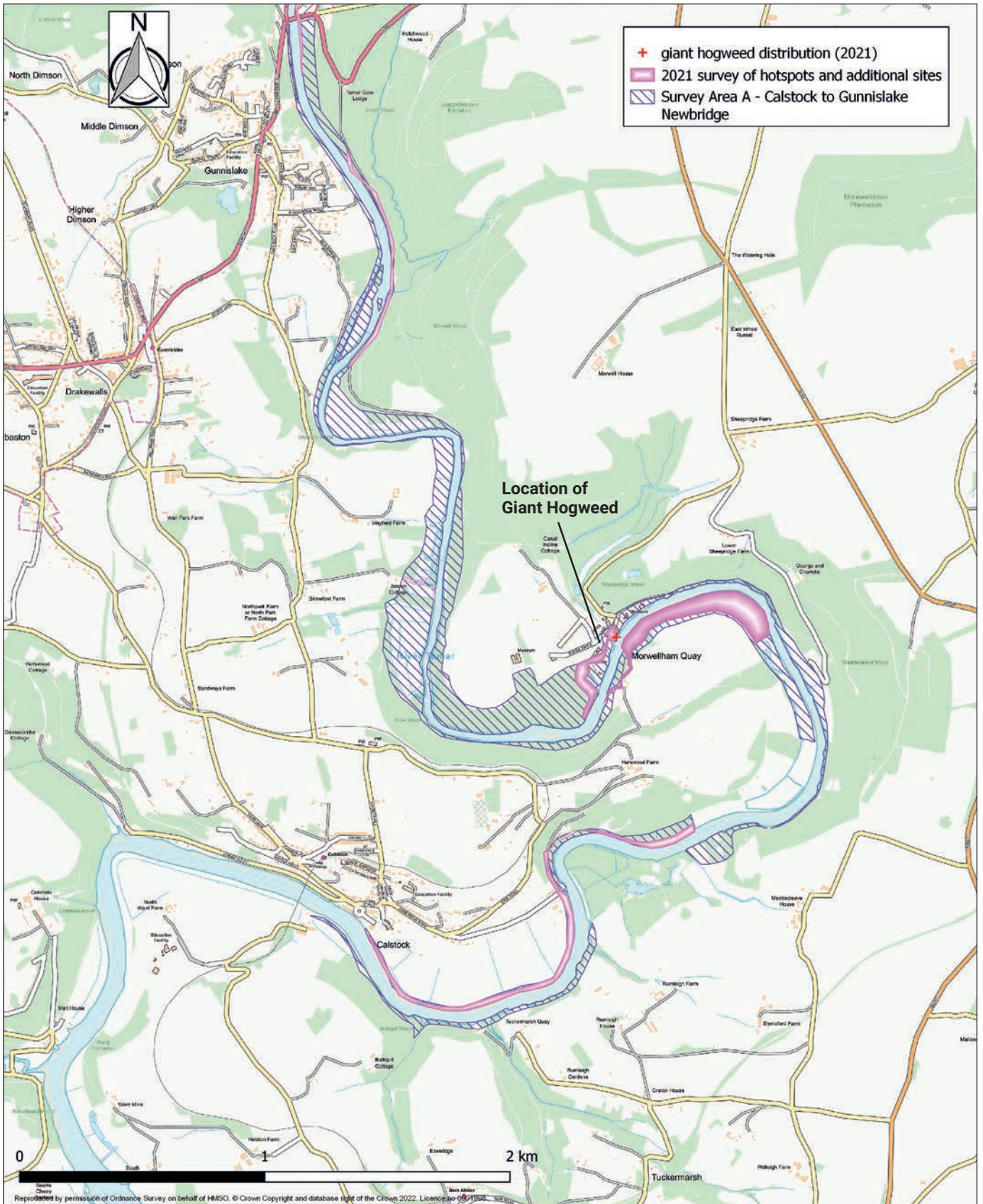


Figure 17: Natu-Rule 2021 survey sites located in Survey Area A: Calstock to Gunnislake Newbridge

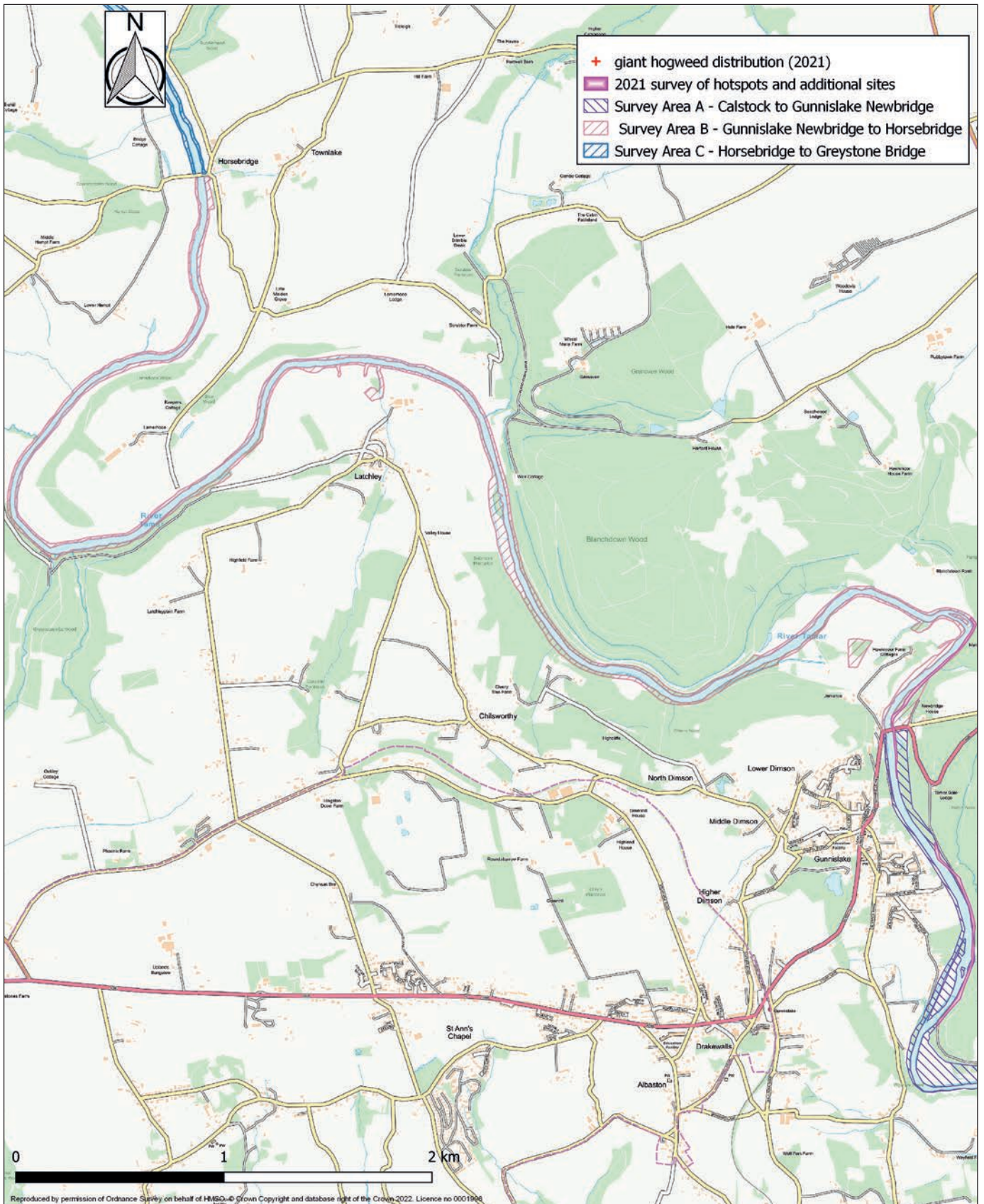


Figure 18:
Natu-Rule 2021 survey sites located in Survey Area B: Gunnislake Newbridge to Horsebridge
(no giant hogweed found)



Figure 19: Natu-Rule 2021 survey sites located in and adjacent to Survey Area C: Horsebridge to Greystone Bridge

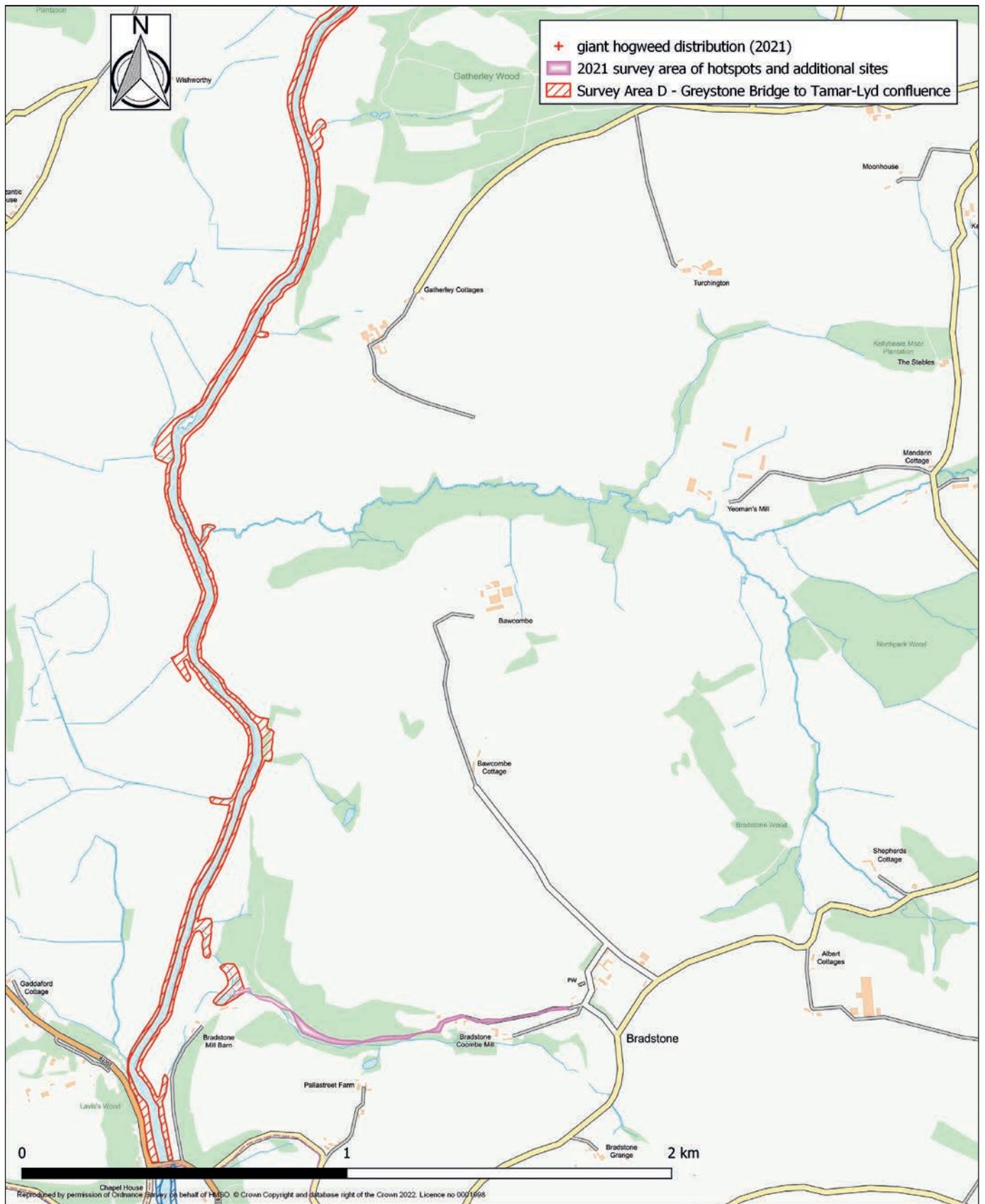


Figure 20:
Natu-Rule 2021 survey sites located in and adjacent to Survey Area D: Greystone Bridge to Tamar-Lyd confluence
 (no giant hogweed found)



Figure 21: Natu-Rule 2021 survey sites located in and adjacent to Survey Area E: Tamar-Lyd confluence to Sydenham (no giant hogweed found)

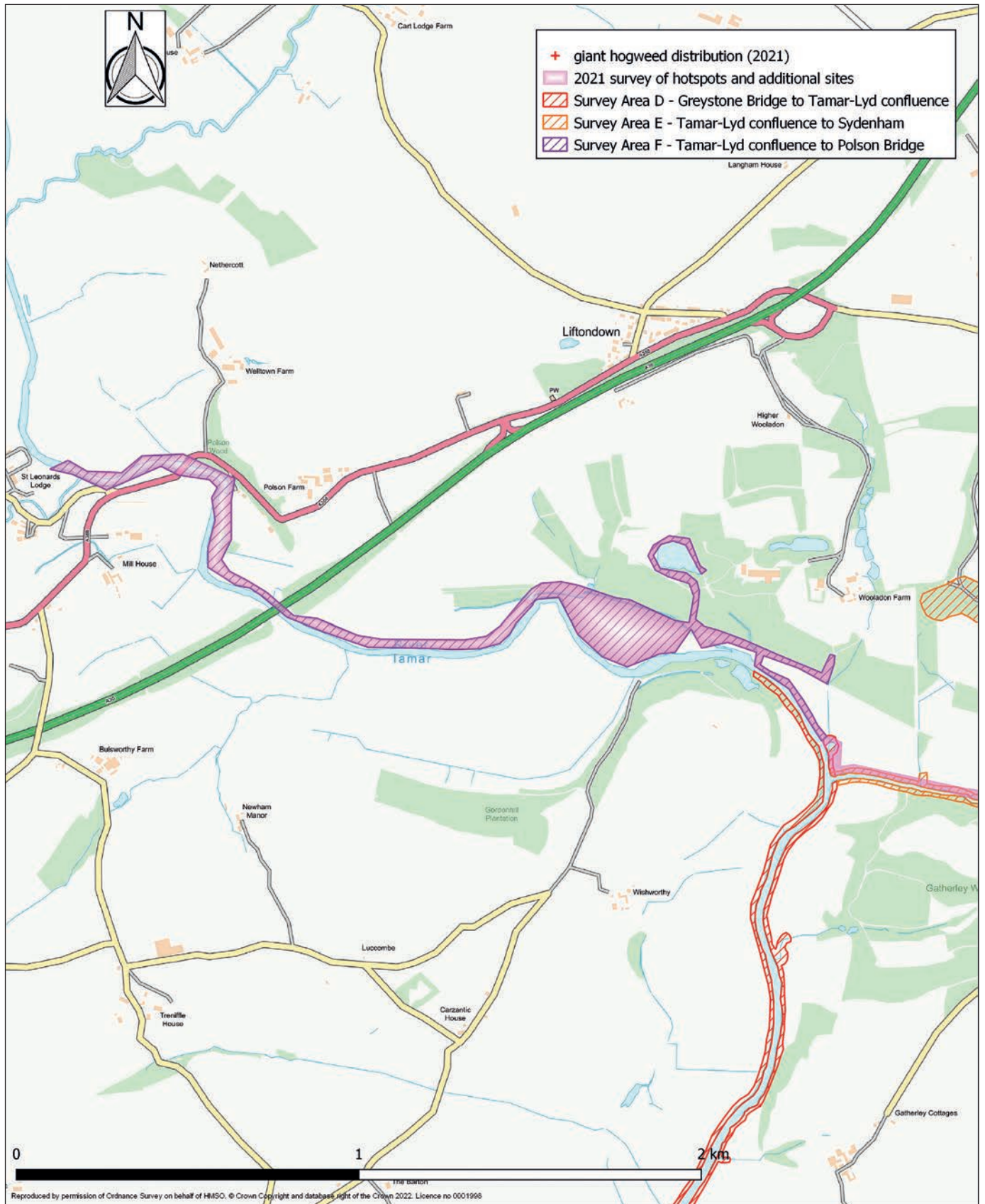


Figure 22;
 Natu-Rule 2021 survey sites located in additional area Survey Area F: Tamar-Lyd confluence to Polson Bridge
 (no giant hogweed found)

Other independent invasive control work in the Tamar Valley

In addition to the work carried out through the Giant Hogweed Eradication Project, other landowners and managers in the area are known to carry out some invasive management work in the valley, including gardening staff at some of the larger estates, fishing club river wardens and landowners on two properties in the tidal section (mentioned earlier in the report, neither of which have partaken in the Giant Hogweed Eradication Project).

Most notable is the annual giant hogweed control work which has been carried out on an organic holding in the tidal river section, with the owner reporting hand removal of thousands of plants initially (averaging 3888 plants a year between 2002 and 2004), with numbers of plants reduced to double figures each year (except one) since 2010. An incredible result. More information on this work is available at the website <https://calstock.org.uk/elf/aliens/>.

Discussion

It is clear that significant progress has been made by the partnership during the last 20 years, towards its main aim of eradicating giant hogweed from the Tamar catchment.

This is extremely positive for the river and wetland habitats in the locality – some parts of which are in a nationally important SSSI – as well as for the human inhabitants of the area. This is critical, as more people are spending time outdoors now, exploring the Tamar Valley Discovery Trail, Morwellham Quay and other parts of this high-value AONB landscape.

This chapter discusses the main outcomes of the project, followed by a discussion of constraints or maybe 'lessons learnt' and also summary notes on good practice.

Project outcomes

Significant reduction in giant hogweed occurrence

Notwithstanding the 'blip' of 2021 survey findings, the main outcome of the project has been a clear population reduction, in both the geographical extent and the numbers of giant hogweed across the Tamar catchment.

The direct and key benefit of this is that many hectares of river and floodplain land within the project area have not been overgrown by giant hogweed, which otherwise would in all likelihood have become dominated by the species. This is a huge benefit to the Tamar Valley riparian habitats and native species which would have deteriorated had the control programme not been undertaken.

The data suggests that the project is now entering the final stage of control in the non-tidal river section, but with residual populations in the tidal and some off-river sites the next phase of the project needs to be agreed.

Significant landowner engagement

This project could only have been delivered through close collaboration with landowners. It would have been impossible to carry out the necessary surveyed, let alone treatment, without accessing all parts of the project area, most of which is private land.

Through a range of mail-outs, telephone conversations and face to face meetings the vast majority of landowners have been very happy for project staff, mainly the contractors, to carry out their work. Currently, the project has a landowner database of 87 contacts.

Naturally, where a landowner raised specific concerns – for example on organic holdings, where herbicide use was not supported – alternative techniques were agreed to, so that control was able to continue and therefore not jeopardise the whole project.

The project has been committed to sharing knowledge with landowners, providing them with confidence to control plants themselves, and will continue to offer such support. Continuing engagement with landowners, particularly on sites with residual giant hogweed populations, will be important as the project moves forward.

Increased public awareness of invasive species in the catchment

Over the past 20 years, the project team has raised the profile of the issues related to non-native species in the catchment, in particular giant hogweed and Japanese knotweed. Awareness-raising events have been held, leaflets produced, etc.

There appears to be a resurgent awareness within many people around the issues of biodiversity loss and climate change. It would be very useful if the project could harness this with regards to seeking records of giant hogweed and other Invasive Non-Native Species within the catchment.

Increased knowledge of locations of other invasive species

Over a number of years, data was collected on other Invasive Non-Native Species, namely Japanese knotweed and Himalayan balsam. Indeed, in some years active control was undertaken to reduce the Japanese knotweed and, to a lesser degree, Himalayan balsam at some locations.

This data may be revisited, if funding allows, as a starting point for another project to address these species

Constraints/lessons learnt

Looking back through 20 years of reports and data, a number of points arise that would be worth considering in order to reflect objectively on the whole project.

Lack of clear knowledge of giant hogweed population and distribution at the outset

While the availability of funds in 2001 limited initial work to the Tamar-Tavy SSSI area, the carrying out of a detailed survey of the extent of giant hogweed across the catchment right at the outset would have been very cost-effective and extremely valuable. This would have set the bounds of the project and indicated its scale, which would have guided the following factors at the start;

- Landownership – the project would have known early on which landowners needed to be contacted, permissions sought, etc.
- Funding – having better knowledge of the scale and extent of the task would obviously have helped set a realistic budget and timeline for the project.

Changes in project focus

While the key project aim was giant hogweed eradication, at times other ideas were brought to the table which might have caused focus to be lost, at least temporarily. For example:

- Altering the project area, mainly through adding-in additional areas or sub-catchments such as the Tavy or areas in the upper or mid-catchment. While these suggestions were usually made for good reason, it did nonetheless divert attention and funding as well as increasing the scale of the task.
- Adding in additional species for survey and control, such as Japanese knotweed and Himalayan balsam. While it is always tempting to do several different tasks on a site 'while you are there', it sometimes stretches the resource too thinly and causes time to be lost, even if done with the best intentions.

Variation in data collection and mapping

The project has always been keen to be able to demonstrate ongoing progress in giant hogweed reduction through graphs, maps etc. However, data has not been collected or mapped in a consistent way across the years, either in paper or digital format, and the maps and reports are not always easily compared. Having said that, there is enough data to demonstrate that giant hogweed has indeed reduced significantly, both in terms of population and distribution.

Lack of a specific landowner group

Considerable engagement with landowners has taken place, described above. However, the question of whether landowners could be encouraged to carry out control themselves arises a number of times in various project reports. The 2013 landowner engagement survey found that a high proportion of landowners would be willing to carry out control themselves, given adequate training and guidance. However, it was evident that, despite this willingness to control giant hogweed, the thoroughness and effectiveness of a landowner led survey was unreliable, especially where plants are tucked away in hard to access niches where nobody passes, and hence the risks of plants being overlooked was too high. It's a difficult balance to get right but as long as the partnership continues to take on the role of

leading the giant hogweed control here, many landowners will tend to 'hang back' from becoming more proactive. Of course, one difficulty is that to be properly effective, all plants need to be eradicated across all the holdings, and as there are a number of barriers limiting people's ability to actively manage giant hogweed themselves, as highlighted earlier in this report, so the partnership taking control does at least maintain this momentum.

The importance of using, and retaining, a reliable contractor

Several different contractors and organisations were used in the earlier years of the project. Given the complexity and scale of the task, the extensive and difficult terrain and the number of different landowners to liaise with, staying with one specific contractor since 2009 seems to have reaped dividends in gradually bringing the giant hogweed numbers down.

Good Practice for catchment or landscape-scale invasives control

Work together

Identify interested organisations, landowners, other key stakeholders and local residents. Everyone has a role to play and can help to some degree. Make the most of the expertise and local knowledge available. Consider how such a partnership can be most effectively managed, including administration and communication needs.

Understand the problem

Survey first to identify the extent of the whole population, to determine the scale of the task in hand (from individual sites to catchment level), what control measures are viable and what is a realistic long-term goal – management or eradication.

Be prepared for long-term commitment from the outset

Ideally, secure adequate medium to long-term funding before beginning a landscape scale control programme

In the shorter term, site specific control (especially on heavily infested or important ecological sites) may be less costly, but the risk of reinfestation from the wider catchment has to be addressed.

Consider what might an exit strategy look like

Research how the move from a control to monitor programme or exit strategy has been done in other similar projects, the level of success achieved and how the risk of reinfestation was managed. It may be appropriate to transition at different times for different parts of the project area or to do it in stages for different areas depending on engagement of specific landowners.

Employ and retain the best contractors available

Identify survey and control contractors (ideally local) who have excellent on-the-ground knowledge of the project area. They must be experienced in INNS control, thorough and conscientious. Offering contracts of more than one year may help secure their service, which aids longer-term planning.

Consider what information you need to inform the programme

Recording information and reporting on annual field work is essential for monitoring progress and for short to long-term planning. Consider the type of information you require and the level of detail needed. What is its purpose? Consider the minimum data required, how it will be gathered, recorded and reported. Liaise with your contractor, taking into account the practicalities involved in carrying out a large-scale control programme while simultaneously recording field data. Your contractor's team may not have experience of working in this way.

Be flexible

It is necessary to continually reassess progress to the inform work plan and ensure the efficient and effective use of resources.

Recommendations for future work

This long-running project has reached an important stage, as the partnership considers how the great progress made is to be maintained.

The underlying principle needs to be agreed that, while total giant hogweed eradication was always the key objective, categorically stating that eradication has occurred, as well as being difficult to prove, would also be dangerous as it might encourage a tendency to completely walk away from the issue.

Instead, the project should begin planning to enter a lower-level control phase and introduce a long-term monitoring phase, rather than an annual maintenance phase – if you like, encourage people to ‘look out for’ rather than ‘actively search for’, giant hogweed plants within the catchment. The timing of this will depend on the survey results over the next year or two.

The following recommendations are suggested to help deliver this;

1. Continue to develop the landowner database, but pay particular attention to sending out reminders about giant hogweed early in the year – send picture reminders, etc.;
2. Develop an additional database of other key river users, most significantly anglers and angling clubs who frequently visit the riverbanks, especially during summer when giant hogweed plants would be most visible. This could be developed in collaboration with Environment Agency Fisheries staff. Boat users, licensed cruise vessels and canoeists could be encouraged to keep a look out on the tidal section, in particular for large flowering plants;
3. Develop a community-based awareness campaign to ask local residents to also keep a look out for giant hogweed plants in their area. Suggest using existing project communication outlets – social media etc. – as well as considering new ones. Circulate reminders, with pictures of giant hogweed, early in the year;
4. Consider how volunteers could be enlisted and trained to survey a specific area each year. Galvanise the support of local residents who have a vested interest in their area, perhaps through parish councils and local newsletters;
5. Consider some specific outreach work to other large ornamental gardens in the catchment, as some of these may be source sites for giant hogweed. Develop mutually supportive relationships to share knowledge and expertise with estate managers, groundsmen and gardeners;
6. In all communications with external parties, members of the public, etc. the project team could request a photo of any suspect giant hogweed plants be sent to them for identification, thus saving time with field visits;
7. Continue survey and control in hard to reach areas. Although landowners and the general public may be able to undertake some survey work, checking more inaccessible areas is going to need dedicated effort for some time;
8. Given the reasonably high chances of giant hogweed plants reappearing in difficult-to-view locations (e.g. tidal floodplain, steep riverbanks), it is recommended that boat-based surveys in the tidal section continue to take place. As well as the tidal reaches, the area upstream of Greystone Bridge should be covered, as the banks there are steep and may harbour plants unseen from the top of the bank. Permission would need to be sought from landowners and angling clubs to allow access/landing/launching of boats;
9. Ensure survey and control work is continued at key sites, including historical hot spots such as Morwellham, where the chance of giant hogweed being present is particularly high;

10. Ensure that contact with privately managed sites, such as Rumleigh, is maintained to encourage reporting of the control work being undertaken and to provide support where possible, should it ever be requested. Similarly, follow the ongoing, successful control work undertaken at the organic property on the Harewood peninsula, and support the landowner's efforts there;
11. It is considered essential that the project team maintains a budget in the long term, to enable a quick response to confirmed sightings of giant hogweed, and take the appropriate action to remove the plant.

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Appendices

Appendix 1: Example calendar of events in 2003 (separate survey and control)

Month completed	Action	Time required (days)	To be completed by
February	Pre-season partnership meeting	0.5	All
February- ongoing	Contact landowners	1	Project administrator
February - Tbc	Press release	0.5	Project administrator
March	Appoint contractor for spraying/surveying	0.5	Project administrator
March - Tbc	On site familiarisation with contractor	0.5	Project manager/contractor
March	Conduct postal survey of landowners upstream of SSSI	2	Project administrator
March - April	Early season survey 1	2	Survey contractor
Mid-April	Spray 1	3	Control contractor
May	Survey 2	1.5	Control contractor
May	Interim report	0.5	Project manager
May	Spray 2	2-3	Control contractor
June	Water-borne survey with contractor	0.5	All
June	Survey 3	1.5	Survey contractor
Mid-June	Partners decide if spray three is to go-ahead	0.5	All
Mid-late Jun	Spray 3 (if needed)	3	Control contractor
October latest	Full report to TVIG	2	Project manager
November	Post-season partnership meeting to review the year and plan next season	0.5	All

Note: Work took place in Survey Area A only in 2003, before extending field programme upstream in 2004

Appendix 2: Sample letter to landowners



To riparian landowners in the Tamar catchment

Date

Dear Landowner

Re: Giant hogweed eradication programme - notification of upcoming survey and control

This letter is to inform you that we will soon be undertaking our annual survey and treatment focussing on the control of giant hogweed on the banks and floodplain of the River Tamar and River Lyd.

As you are probably aware, giant hogweed is a highly invasive plant which can be harmful to people and livestock. It also shades out more sensitive plants, creating bare ground and increasing the potential for bank erosion.

The Tamar Valley Invasive Group have been working together to control this invasive plant in the Tamar catchment area. Giant hogweed seeds can remain viable in the environment for up to 15 years and hence eradicating this plant completely is a considerable challenge, requiring a long-term commitment.

Due to control measures undertaken the giant hogweed population in the catchment has changed from thousands of plants spread along the river corridor to isolated clusters. We couldn't have done this without your continued co-operation and help and would be grateful if you would continue to permit our contractors' access to your land for this purpose.

The first phase of the programme will begin in April when plants will be surveyed and treated with chemical sprays by our licensed contractor, Adam Phillip, and his team. Second and third visits to spray may also be necessary to catch plants that were missed on earlier visits.

Our contractors will contact you to request permission before accessing your property for the survey and treatment of giant hogweed and to update your contact information if you have not returned the enclosed permissions form.

A summary of how we protect your personal data is outlined overleaf. Should you wish to view the Tamar Valley AONB full privacy policy it is available to view online at <http://www.tamarvalley.org.uk/privacy-statement>.

This work is co-ordinated by the Tamar Valley AONB on behalf of the Tamar Valley Invasives Group, a partnership of four organisations: Natural England, the Environment Agency, Cornwall Council and the Tamar Valley AONB.

If requested, a map showing the location of any giant hogweed found on your land last year can be provided by our office.

Should you have any further queries, please do not hesitate to contact me.

Yours sincerely,

(Manager, Tamar Valley Area of Outstanding Natural Beauty)

IMPORTANT INFORMATION

This is one of the most successful invasive species projects in the country, due to its long-term nature and the co-ordinated co-operation of approximately 90 landowners and land managers over many years. **From May 25th 2018 as part of the General Data Protection Regulation (GDPR) all organisations have to review how they manage personal data that they hold.**

In order to co-ordinate the treatment of giant hogweed each year, we hold records of your name, address and some telephone and/or email addresses. We also have limited land parcel information relating to records and locations that have had giant hogweed recorded and treated over the lifetime of the project. We will review our progress each year to assess if our aim of giant hogweed eradication has been achieved and to decide whether we still need to hold all or some of this information. We will not continue to hold your information if it is no longer necessary.

Enclosed with this letter is a permission form and a stamped addressed envelope. In order to comply with GDPR and ensure we are looking after your information with your consent, we will need you to complete and return this form to us.

Appendix 3: Sample mailout questionnaire 2004

Giant Hogweed Questionnaire

1. Name _____

2. Address _____

Please mark the boundary of your landholding on the enclosed map.

3. Do you have giant hogweed on your land?
Yes - please show its location on the map provided.
No - please go to question 5

4. When did you first notice it on your land? _____ years ago.

5. Have you used / do you use any of the following control methods?
Please indicate the number of years that each control method has been used.

Spraying	Y / N
Digging up	Y / N
Cutting	Y / N
Grazing	Y / N
Other	_____

If none, please go to end of questionnaire

6. Which method(s) have you found to be most effective?

7. Do you have any concerns about giant hogweed on your land? If so, please explain

8. Are you liaising with any other organisations about giant hogweed or other invasive plants such as Japanese knotweed? If so, please explain.

Thank you for taking the time to complete this questionnaire and adding your details to the map.

Appendix 4: Summary of 2021 landowner/manager questionnaire responses

Number sent by post and/or email = 90

Number of responses = 35

Note: 2 respondents have sold their properties

	Number (and %) of respondents answering yes	Other notes/ respondents' comments
Respondents know what giant hogweed looks like and aware of the problems it can cause to humans, livestock and the environment.	27 (77%)	"I sometimes get confused with young H. maximum (American cow parsnip)."
Respondents have been aware of giant hogweed on their property and of these 3 have tried themselves (or used contractors) to manage it in the past, with all applying herbicides and 2 also physically removing.	8 (23%)	"As this is a conservation area my understanding is that the environmental agency deal with this." "The Environment Agency have been treating some on the riverbank." "Already successfully managed under current scheme. Aware of historical incidences and presence in neighbouring properties, we spray early in the year and regrowth with Glyphosate and dig plants in flower or too close to watercourses to spray." "We are unable to identify it so have not tried to manage it." "Yes, treated by contractors as soon as we became aware of it. We notified the adjacent landowner of the hogweed too given its invasive nature."
Respondents are concerned about the spread of any other invasive species (native and non-native) on their property, or in the wider area.	26 (74%)	Himalayan balsam 18 (51%) Japanese knotweed 14 (40%) Skunk cabbage 2 (6%) False garlic 1 (3%) Bracken 1 (3%) Ragwort 1 (3%)
It was explained that as giant hogweed numbers continue to decrease, the resources needed to continue the Tamar Valley Invasive groups survey and control programme, at the current level, are unlikely to be available. Respondents confirmed they would consider assisting us in the monitoring of giant hogweed on their property with our support.	27 (77%)	"Happy to monitor although access to area where plants are located is not easy." "Would need a boat." "Yes, if we knew what to look for." "This is difficult given there are a team of 2 of us. We can ask our garden contractor to advise us of hogweed upon his weekly visits provided that he can be given guidance of how to correctly identify it."
Support which respondent said they need	7 (20%)	Survey training (incl. and id small plants)
	8 (23%)	Information (e.g. pictures to help with identification)
	5 (14%)	Assistance with survey (including suggested drone survey). 1 respondent asked for assistance with first survey.
	1 (3%)	Information about its safe removal
	1 (3%)	Website to log findings
	1 (3%)	Map of area showing any giant hogweed
Respondents other comments	2 (6%)	Requested to extend to Himalayan balsam
	1 (3%)	Hogweed was sprayed/ killed on riverbank but plants in wood other side of track were not killed. Note: This area, not currently in but adjacent to survey area, was subsequently revisited by AONB staff. Area had been strimmed and no sign of giant hogweed. Landowner has been asked to notify us when they next have a suspected giant hogweed sighting. Area will be revisited in 2022.
	7 (20%)	Commented on the effectiveness of the project and it being necessary work

Appendix 5: Chronology of project delivery 2001-2021

2001

Project area: Calstock to Gunnislake Newbridge (weir) (9km of river)

Contractors: Silvanus Ltd

Giant hogweed Postal survey only

Giant hogweed reporting: Landowner knowledge on plant location. No plant numbers.

Other invasive species surveyed: No

Plan to have carried out field survey and begin control was postponed due to Foot and Mouth Disease outbreak. Conducted a postal survey of 21 landowners in the SSSI/pilot area to gain knowledge of extent of problem and any previous control work done.

Findings somewhat limited and ambiguous, although all those with giant hogweed had attempted cutting as a control. It was hoped that co-ordinating landowner-based control, along with providing helpful guidance information and possibly a demonstration site might be the way ahead.

Developed good knowledge of the growing season in the Tamar Valley where plants start growing early April, flowering by mid-June and dieback starting in August. Informed planning spring 2002 control measures.

Recognised the need, depending on resources, to eventually extend the survey upstream beyond the SSSI, as giant hogweed washing down from the higher reaches will impact the effectiveness of the project. Unable to extend the postal survey up and downstream of SSSI due to lack of landowner information, so desk top work conducted over winter to collate list of owners and addresses.

Ground truthing postponed due to landowner concerns regarding Foot and Mouth Disease and unnecessary traffic on their land.

Partnership recognised, once control starts, the importance of repeating annually, hence delayed start better than interrupted programme later in the project.

Decision made to proceed with full-scale removal work in spring 2002, both non-chemical and chemical control (three sprays) options.

Chemical control was expected to be necessary for 10 years with eradication achieved after 15 years (although this was revised as project developed in later years).

2002

Project area: As previous year

Contractors: Silvanus Ltd/ Silvanus Services Ltd (sub-contracted)

Giant hogweed: Field survey and control

Giant hogweed reporting: Some coverage and location information but no plant numbers data (although over 3000 plants mechanically independently removed by landowner on one organic holding in the tidal area indicates the scale of the infestation)

Other invasive species surveyed: No

Press release issued to coincide with the commencement of control programme. Several enquiries received, the majority related to Japanese knotweed locations. The few queries relating to giant hogweed were either for sites already identified or general interest enquiries.

Contractors given information pack containing results of 2001 survey, baseline maps and landowner contact details (landowners had already been contacted).

Before commencing treatment, the necessary approvals to use herbicides in or near water were sought from the Environment Agency by the contractor.

Carried out first three herbicide treatments, spraying all giant hogweed encountered, along with survey work. Positions were hand marked on blank field maps during the first spray to act as additional survey information and starting point for the next spray.

Glyphosate spray was used for all three sprays. In the first spray this was used at a 5% concentration. This seemed to be inadequate to kill the plants but would stunt growth or kill individual leaves. In many cases the production of flowers was not inhibited.

Imperative that plants are sprayed and killed before they have a chance to flower as giant hogweed may emerge earlier in the control area across years and earlier than publications suggest.

Several landowners offered to inform project, as soon as the basal rosettes sighted.

Decision to maintain a flexible start date for spraying based on early growth of plants, but aware starting too early merely stunted the plants. Therefore, necessary to wait until first leaves are fully developed, but well before plants start growing spikes.

Fieldwork was characterized by a number of problems, which, in retrospect, seem inevitable:

- Wet weather in early spring meant that spraying took three times longer than planned. The first day of spraying was followed closely by a number of days of rain. Wash off of pesticide could have been a factor in the poor results from spray one. Recognised for 2003 that when sprays are followed by rain overnight, the spray should be repeated and so time given for spraying assumes reasonable weather and should be viewed as a minimum.
- Plants were small, hidden in undergrowth and not easily identifiable by those doing the spraying. Some plants were found in inaccessible locations. Often individual plants had been missed whilst spraying. Recognised for 2003 that each plant has to be targeted individually and care has to be taken to find all the plants in the undergrowth.
- In the field, maps were only loosely filled in by contractors and little valuable information could be extracted. Contractors need to be adequately trained to make sure they identify plants and record information accurately.
- Also, clear field-recording forms needed to collect data, including number of plants sprayed, approximate density of plants, time on site, date, habitat type and presence/location of other alien species – Japanese knotweed, Himalayan balsam.
- An overstretched line of communication developed between contractors. As Silvanus Trust staff ended up liaising with the field contractor/spraying team rather than the contract manager, it was decided, for the latter part of the spraying season, to continue direct contact, rather than going through Silvanus Services Limited, with the potential to reduce administration/management costs.
- Difficulty in contacting landowners (some of whom are holiday home owners or absentee landlords) led to delays in getting to some sites. An early spring also meant plants emerged before all contract details were in place. Recognised need for early contact with all landowners to avoid delays in getting on the site.

Recognised that future spraying programmes need to take full account of these problems.

2002 (cont'd)

Recognised the potential of survey and control from a boat should be investigated further, but would need to consider potential problems such as water contaminations and the practicality of getting small craft near to the plants.

Incidental observations included that giant hogweed did not seem to grow where a large concentration of wild garlic was present, but this was not investigated further.

An end-of-season survey found very few living giant hogweed plants in the control area. Investigate spreading control area upstream, to ensure that no seeds are then washed down into the control area.

Other independent giant hogweed survey & control work - A private programme started on an organic holding in the tidal section within the SSSI, with the landowner controlling giant hogweed by digging and composting plants (this work has continued annually to 2021 with great success). A comparison of this landowner's method with those used by the project control contractor in the Tamar Valley offered useful information regarding the effort and associated cost of treating giant hogweed by mechanical or chemical methods with pros and cons for both. On a larger/catchment scale, spraying was recognised as the most effective method.

2003

Project area: As previous year

Contractors: Silvanus Ltd (survey) & BTCV Contracts (control)

Giant hogweed: Field survey and control, plus initial postal survey of landowners 22km upstream of Gunnislake Newbridge as far as Greystone Bridge

Giant hogweed reporting: General description of location and coverage, plus some plant numbers

Other invasive species surveyed: Japanese knotweed specifically included in postal survey questions

2003 signalled the start of an upstream expansion of the project, due to the risk of waterborne seeds and roots arising from upstream colonising the pilot SSSI area. One of the most visible areas of giant hogweed in the Tamar Valley was found to occur on the north side of Greystone Bridge which would require spraying.

In early July, a postal survey was sent to all landowners whose land borders the River Tamar, between Gunnislake Newbridge and Greystone Bridge. Recipients were asked to fill in a simple questionnaire and mark on a map any areas of giant hogweed on their land. A series of drawings of giant hogweed was also included to aid identification. This produced an 80% response rate from those mailed.

- Almost two-thirds of respondents reported having giant hogweed on their land, though the number of years it had been there (or was observed) varied between one and 15 years.
- The majority of respondents had tried some form of control varying from cutting and putting weed killer down the hollow stems, to one owner letting his horses eat the flower heads.
- Most landowners' concerns were with the restrictions that the plants impose on access to the riverbank and the possible damage to other ground flora.
- Landowners seemed to be happy to let ground surveying and control work take place.
- Almost all landowners mentioned Japanese knotweed or Himalayan balsam, or both as other invasive species on their land.

Boat-based work was included for the first time, as many plants were inaccessible or difficult to reach from land in 2002. The partnership agreed that survey and control from a boat should become integral to the project moving forward. Ideal boats, manned by a boat handler and a survey/control contractor, are small, flat bottomed and easily manoeuvrable by paddle.

The 2003 programme timescale was expected to increase on the previous year. This was largely due to the need to improve surveying and analysis, with four alternating ground surveys and four control sweeps of the area within the Tamar –Tavy SSSI carried out.

Each survey consisted of walking the banks of the river where possible, or viewing from the opposing bank with binoculars when access was impossible, noting location, quantity and vigour of giant hogweed.

A map and field recording sheet was used to record sightings. This year, relevant geographic information was recorded, such as areas inaccessible from land and surrounding vegetation. In all, eleven geographically defined areas of giant hogweed were found and mapped in the SSSI between Calstock and Gunnislake Newbridge.

This information was passed onto contractors to aid the control work. For the first control session, the contractors covered the entire area, whilst in later controls the contractors used a targeted approach based on information provided by the surveyors.

A mixture of glyphosate spray and, once flowering began, the manual slashing of flower heads was employed. The first two controls consisted purely of spot spraying whilst boat work was employed for both spraying and slashing.

In the first control phase, 211 litres of herbicide mix were used. In the second control phase, 69 litres and 12 litres for the boat work. This reduction was due to both the effectiveness of spray one and, to some extent, inaccessibility once undergrowth had started growing.

It was decided, for the third land-based control phase, that there was little point in spraying, due in equal parts to the difficulty of spot spraying in dense undergrowth and the fact that plants had reached their full seasonal growth and would soon be dying off. Instead, efforts were concentrated on slashing flower heads off the plants to prevent seeding.

2003 (cont'd)

Initial giant hogweed control results positive, suggesting a 50% decline from last year and areas that were sprayed in 2003 showing dramatic reduction in plant numbers. On a note of caution, it was possible that more plants had yet to come out and also, as there had been a lower incidence of flooding in 2003, it may be that less seeds had spread and germinated from upstream this year.

The density of giant hogweed in the hard to access poplar fields at Morwellham was noted (this important site in the SSSI would remain a key area for survey and control through the project).

Observed that giant hogweed appears to be light demanding and only two plants were found growing in wooded areas. These were dug up whilst surveying.

The following issues were apparent, and expected to be permanent features of giant hogweed control:

- Giant hogweed emerges over many weeks, posing a problem to timing of spray start. In shaded areas, plants were just showing through, whilst in areas of high light plants up to 20cm in height.
- Observations from the boat work noted that plants that are frequently deluged with river water rarely seem to grow more than one metre, though this did not prevent them flowering. This posed a considerable challenge as, not only are such plants in inaccessible areas, one cannot rely on them being spotted even when flowering.
- Earlier surveys and treatments are relatively easy; as season progresses and bank-side growth develops, access, etc. became increasingly difficult and surveying became progressively harder as other vegetation, especially Himalayan balsam, masked any giant hogweed left.
- No known methodology to differentiate between regrowth of last years' plants and growth from freshly deposited seeds in flood water.
- Continued landowner liaison would help efficiency but landowner-derived data needed to be ground truthed carefully by experienced surveyors.

The importance of keeping landowners fully informed was essential. By being made aware of the ongoing nature of the work at the start of the season, much time can be saved recontacting landowners, although absentee landowners do hinder the ability to communicate.

Following the 2003 season, the partnership recognised the need to;

- Continue with the giant hogweed survey and control and consider including other Invasive Non-Native Species.
- Increase the area surveyed to include upstream to Greystones bridge, from 9km to 30km of river, with a potential 2 to 3-fold increase in project costs.
- Contract out the surveying and control, preferably to an organization or individual capable of undertaking both tasks and with a knowledge of the area. A considerable amount of time could be saved if the surveyor was also able to spray as they went along.

2004

Project area: Calstock to Greystone Bridge (& Lopwell) (30km of river)

Contractors: Silvanus Services Ltd (survey) & BTCV Contracts (control)

Giant hogweed: Field survey and control

Giant hogweed reporting: General description of location and coverage, plus some estimate of plant numbers at individual sites.

Other invasive species surveyed: Japanese Knotweed field survey and control (predominantly Lopwell) and Himalayan balsam field survey

A reduced number of survey and control phases were delivered across the now larger project area. Giant hogweed plants of varying sizes were found at many locations, as was Japanese knotweed and Himalayan balsam.

Population of giant hogweed on one site described as 'horrendous' – 12 hours spent slashing these (organic farm, hence no herbicide permitted).

General descriptions of major infestations of giant hogweed at a number of sites, some in large mixed species stands. Grid references provided to mark extent of giant hogweed at different sites.

The potential use of GPS based surveying was considered for 2005.

The partnership contributed giant hogweed data and samples to research in Devon and Cornwall, investigating a collaborative approach to giant hogweed management (Olaf Booy, Uni. Herefordshire). Draft research proposal identified that in 2004 giant hogweed population in the region was moving out of its lag phase, where growth is relatively slow, into an exponential phase where the challenge of control increases significantly. Recognised that a prudent management policy would aim to reverse this trend and prevent the need for much larger and expensive treatments later.

A further survey extension downstream to Tamar-Tavy confluence and upstream on Tavy to Denham Bridge was considered for 2005, as well as above Greystone Bridge.

2005

Project area: As previous year with additional survey only downstream on River Tamar, on River Tavy (project also invited to survey the River Plym)

Contractors: Mainly Silvanus Services Ltd

Giant hogweed: Field survey and control

Giant hogweed reporting: Mixed species data including location information, coverage of single plants and of stands (m²).

Other invasive species surveyed: Japanese knotweed field survey (and some control) and Himalayan balsam field survey

Comparison with 2004 findings in the main survey area, indicated an overall large reduction in the number and frequency of giant hogweed growing in the areas revisited this year.

However, previous years work highlighted that infestation upstream of the survey area was undoubtedly sending fresh seeds and roots down into the core area and this needed to be addressed, so a more refined survey and control programme was implemented in 2005, with surveys extended to a larger part of the catchment, a more stringent survey methodology used and a more targeted approach to control was taken.

Based on recording sheets developed elsewhere in Cornwall, a simple but effective surveying system, using GPS, had been developed that could be carried out at the same time as control work.

Survey only in 2005, from Calstock to the Tamar-Tavy confluence, the River Tavy upstream to Lopwell and the River Plym to Shaugh Prior. Reactive sites above Greystone Bridge also visited following landowner contact.

No plants found between Calstock and Tamar-Tavy confluence and on the River Tavy and Plym.

A second survey in June concluded that herbicide work is successful, but that many giant hogweed plants, both young and mature, remain, especially in areas of high infestation (known hot spots where large areas of mature plants were found growing very closely together). In these areas, while the glyphosate had killed a high percentage of giant hogweed plants, unfortunately some had still managed to survive to maturity and seed. This resulted in a great deal of new growth with many young plants found, sporadically covering a considerable area. Suggested 'hard-hitting' these areas with extra sprays and stem injection.

Fixed point photography was used this year (and in subsequent years, but unclear how the information resulting helped inform the project).

Promotional event attended by a large number of the landowners held at Morwellham to share information, give advice and visit control sites.

At the end of 2005, a project review was undertaken and drawbacks of work to date identified:

- Since 2001, the limited resources available had led to more focus on control than survey, such that not enough was known about the various invasive species' extent.
- Expanding attention outwards from the original pilot area to include other tidal and upper catchment areas was necessary for effective giant hogweed control in the wider catchment, but had overstretched resources.
- The lack of a long-term funding source was a considerable challenge, limiting planning to year by year.
- Limited resources did not allow aftercare over such a large area.
- Access to the riverbanks are often difficult in the catchment and whilst a database of landowners did exist it was not complete. Over the next five years, the database of landowners would be filled and maintained.

The review also considered the management of contractors;

- Since the start of the project, a variety of contractors had been used to undertake the control work and selection of contractors was initially by competitive tendering. However, it was clear that keeping the same contractor would have obvious continuity advantages (though careful checks should be made on value for money and a retendering process, either halfway through this plan or before the next plan, may be useful). Therefore, current contractor Silvanus Services Limited was kept on a rolling contract, renewed each year once they had calculated costs and these were agreed by the partnership.

- Typically a three-man field team has been used, taking about two weeks for each giant hogweed control phase, dependant on weather. It was the intention that the approach to control – using either small teams over an extended period or a large team for a short period – would be at the discretion of the contractor, so long as the partnership was happy that the work was being carried out adequately.
- Recommended to use the labour-saving techniques of cut and inject for more heavily infested areas in future.

A longer-term plan was proposed to run from 2006, delivering an alternative and more methodical approach to controlling invasives in the catchment;

- Work would start in the upper reaches of the catchment at the highest known location for giant hogweed, in an attempt to clear the catchment of plants from the uppermost point of occurrence and to avoid the spread of seed to areas already controlled. Each area could not be fully controlled in one season and some element of “mopping up” would have to be accounted for.
- Where very large sites were discovered, there was possibly a case to take them out of normal methodology and work on a case-by-case basis.
- Whilst this programme was proactive, reactive control based on specific enquiries could be looked at on a case-by-case basis. Such examples are landowner contacts which, by working with the landowners initially, may lead to subsequent control being taken up by the landowners themselves – wherever in the catchment this may be.

2006

Project area: Calstock upstream to Gunnislake Newbridge (survey & control)

Gunnislake Newbridge up to Higher New Bridge, near Launceston (survey only)

Contractors: Silvanus Trust/Silvanus Services Ltd & Cornwall Council (Morwellham test area)

Giant hogweed: Field survey and control

Giant hogweed reporting: Mixed species data including location information, coverage of single plants and of stands (m2)

Other invasive species surveyed: Japanese knotweed field survey and control and Himalayan balsam field survey

This is the first year that it was possible to directly compare results from the previous year with the introduction of survey recording sheets in 2005.

2006 also introduced a more methodological approach, with work starting in the most upstream area known to have giant hogweed present.

Targeted survey and control area from Calstock Quay to Gunnislake Newbridge with a further survey taking place from Gunnislake Newbridge up to Higher New Bridge, close to the confluence of the River Ottery, north of Launceston.

Two treatment phases were delivered, mainly using herbicide but including slashing of larger plants at the pre-flowering stage.

Overall, a 46% reduction in single plants, 15% reduction in dense coverage and a 77% reduction in sporadic coverage between 2005 and 2006, a very encouraging result on the overall impact of the control measures.

Where there was a mix of giant hogweed and Himalayan balsam, there was a general collective decline in the coverage of these two species.

Reports in June of a large number of flowering giant hogweed at a project site and flowering plants had also been seen at Gunnislake Newbridge. Approach taken by contractors to cover the ground had differed from previous years, with two teams being used, one on each side of the river, leading to communication problems and some areas possibly being missed in the initial spray. Using information from partners and landowners, flowering plants subsequently slashed. A stricter monitoring regime was needed – and should explore possibility of using landowners and those working on the river as partnership ‘eyes’.

Demonstration site was established at Morwellham Quay to explore the viability and costs of physical removal of giant hogweed plants, by comparing undercutting of growing plants with direct herbicide foliar treatment. Undercutting technique needed significant time and costs with results no better than other techniques.

Project was running very low on funds and unlikely to have a clear idea of the 2007 budget until March 2007, just before the field season, making planning extremely difficult.

Considerations for 2007;

- The recording sheets needed to be completed separately for each species in sporadic and dense areas to be able to thoroughly investigate the impact of the control measures on the giant hogweed.
- Following the report of flowering plants late in the season this year, contract with Silvanus Services Ltd, for the “control” of giant hogweed, was thought to be slightly ambiguous. The contract for 2007 be tightened up, and the contract for survey and control reissued for tender.
- For next year, a review of the contract agreement for the control and survey work would be undertaken in line with public policy and public funding agreements. It may be possible to split the control and survey work, for a joint bid to be made by interests working together, or by the partners undertaking some survey work.
- It was noted that it is still very difficult to get a long-term view of the effectiveness of the work. This is neither the fault of the contractors or of the partnership, but the way finances have allowed the work to progress year-on-year and the need to maximise control by minimising surveying. To convince funders of the value of the project, this issue needed to be addressed.
- Because of the potential funding shortage, control in 2007 would be for giant hogweed only.

2007

Project area: As previous year with A30 (Higher New Bridge) as northern cut off point plus River Lyd to Sydenham near Greenlanes Bridge (including the Rookery at Wooladon for first time) and Chaddlewood Stream, Plympton.

Contractors: Cornwall County Council – Commercial/Landscape Services

Giant hogweed: Field survey and control (limited funding)

Giant hogweed reporting: General description for individual properties of location, coverage (m²), density and some plant numbers. Contractor mislaid data spreadsheet.

Other invasive species surveyed: Japanese knotweed field survey and Himalayan balsam field survey

Contractors started at the top of the catchment, the northern most known point for giant hogweed, from there working downstream, ending at the confluence of the Tamar-Tavy. All control work ran from late-April to late-August, by which time many plants had flowers and/or seeds. Plants fairly frequent throughout, and numerous in some areas such as the floodplain areas around Morwellham.

Stem injection employed as new technique for the project, typically carried out late in the season when plants were in seeding stage.

Also undertook survey and treatment on the Lower River Lyd. Very sparse population except a large infestation found away from the river in a rookery near Lifton. All treated by injection and site revisited annually from this year onward.

Moving systematically downstream from higher in the catchment, reduced the reseeding potential across the project area. Work in previous years meant good records of the location and density of giant hogweed within the catchment and therefore contractors reported confidence that the majority of plants downstream to New Quay (Devon) and Old Ferry Farm (Cornwall) had been targeted.

However, wet weather and the amount of giant hogweed affected the programme delivery and so late end to control season. Some sites lower in the estuary were not visited which was a concern as reports suggested giant hogweed was present downstream.

A lot of giant hogweed present at Morwellham including a considerable distance from the riverbank. Site visited three times. Including small, medium-sized and mature, flowering plants found and seed heads removed, under supervision of Environment Agency officers.

Environment Agency requested project to undertake treatment at Chaddlewood Stream, Plympton- some treatment undertaken but as information received late in season giant hogweed had seeded and too late for injection.

Feedback from landowners was positive, although many expressed concerns about the thoroughness of the previous years contracted work, with inadequate contact made and the impression that work was concentrated on the riverbank, with not enough work carried out away from the river.

Database updated to clarify holding boundaries and access route information updated. Liaised with Westcountry Rivers Trust for information on condition of tributaries.

No avenues for external funding identified for 2008. Initiated discussions on how to implement an exit strategy as funding from all sources became harder to secure. Two options; seek external funding or encourage more landowner responsibility.

However, despite the 2007 Awareness Day and other publicity, it was apparent that landowners, for a variety of reasons, would not be able to control giant hogweed.

Invasive Non-Native Species was once again on the Water Framework directive agenda, to ensure water bodies in good ecological condition. Hope that DEFRA may fund future work (not realised).

2008

Project area: As previous year, both banks of the River Tamar extending from the A30 to Calstock and on the River Lyd, from the junction with the River Tamar to the eastern boundary of the Sydenham (near Greenlanes Bridge).

Contractors: Cornwall County Council – Commercial/Landscape Services

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information, general description of coverage, density including distinguishing between small, medium and large plants. Estimated number of plants = 4,275

Other invasive species surveyed: Japanese knotweed field survey and control and Himalayan balsam field survey (and control, undertaken in a separate contract)

Giant hogweed plants widespread across project area with a variety of plant sizes. Count includes 739 plants 'about to flower this year'.

One main treatment phase in excellent weather; second phase not done due to success of first phase and funding issues.

Some giant hogweed was not treated due to inaccessible locations, but contractor provided insufficient information to follow up.

Recorded position of species using GPS, however software problems and GPS distortion /inaccuracy in the field limited its use for mapping.

MSc studentship considered for 2009 survey, but not set up.

Review of 2008 reporting identified following issues;

- Evidence of treatment in sections, but not shown on maps. Therefore, confidence in reporting side of the project not as expected.
- While inaccessible plants always present a challenge, reporting on locations was not sufficient.
- Large sections, where no invasives were reported to be found, although later evidence of invasive plants throughout the catchment.
- Following the 2008 season, need to consider splitting the survey side from the control side, as contractors had trouble surveying and reporting on this, and amend the contract brief accordingly.
- Decision to separate survey and control contracts for 2009, and to reissue for tender.

2009

Project area: Tamar – Calstock upstream to Polson Bridge (near Tamar-Lyd confluence) and on River Lyd to Marystow Bridge (near Sydenham)

Contractors M. Rule (survey/project manager) and A. Phillips (control)

Giant hogweed: field survey and control

Giant hogweed reporting: Location information, coverage, plant numbers and sizes of plants (large, medium and small).

Number of plants = 3,380+

Other invasive species surveyed: Japanese knotweed field survey and control and Himalayan balsam field survey (latter species continued to be abundant on the riverbank in many reaches, but accurate mapping and effective control not possible)

From 2009 a separate surveyor carried out a thorough search for giant hogweed in advance of the control programme, as the surveyor could move rapidly, carrying minimal equipment, and search back-ditches, wet woodlands and other off-river areas quickly. Data was mapped and passed quickly to the main contractor to carry out treatment. This approach adopted between 2009 and 2012.

In addition to walking the main riverbanks, attention was paid to visiting other parts of the floodplain including ditches, wet woodlands and grasslands.

Initial survey of giant hogweed (and Japanese knotweed and Himalayan balsam) undertaken in the survey area. The position and approximate number of plants was recorded on GPS and digitised on GIS. Giant hogweed records, and maps showing location, including inaccessible plants, supplied to the control contractor, to allow timely start to control programme.

Note, when large stands of giant hogweed were found, the numbers were estimated, with the priority of the first survey to locate plants in order to direct the contractor to them quickly – time was pressing, due to the late start of the survey.

Ideally, where no plants found control contractor would not need to visit, saving time and effort. However, even though survey data was given to the control contractor as soon as possible after the survey, normally within 2 days, due to rapid germination and growth rate of giant hogweed, more plants had appeared in some areas by the time treatment commenced. Therefore, giant hogweed numbers provided from 2009-2012 considered a slight underestimate. Borne out by the actual figures recorded by the contractor when spraying took place, which are nearly all in excess of the original recorded figure.

Giant hogweed plants were recorded at 249 locations in Cornwall, 274 in Devon, in excess of 4,000 plants. Many were small, but a significant number were large – even flowering in May – and must have missed treatment in 2008.

No giant hogweed was found on the River Tamar above the River Lyd confluence.

It was noted that several hot spots of giant hogweed infestation remained, generally in the depositional, floodplain areas and plants in these locations seem to grow along the riverbank, berm and soft sediments. Sometimes they occurred in side ditches and under woodland further back from the river; Sydenham on the River Lyd remained the key location in the upper reaches from where giant hogweed continues to spread.

Small numbers of plants occurred well away from main colonies and sometimes in areas of bank seemingly less typical, e.g. fairly stony areas, hedges or on paths. This underlines the need for a thorough survey, to be sure all plants are located.

Giant hogweed rarely seemed to seed into areas with dense vegetation such as among rushes (*Juncus* spp.) and appeared more likely to colonise bare ground, often resulting from flood deposition or erosion events.

Treatment in 2009 appears to have been very successful, with much-reduced occurrence found during the second treatment phase (July-August).

No fixed-point photography was undertaken. It was considered that the whole project team needed to discuss and agree locations, once the objectives for selecting were agreed. In the view of the survey contractor, it seemed a little late to continue with this, for a project that has been running for several years.

2009 (cont'd)

Considerations for 2010 season;

- Allowance should be made for two visits, possibly even three, to the known hot spot floodplain areas as well as to the upstream 'seeding' areas such as Sydenham.
- Further consideration of how to increase landowner involvement in survey and control – in that event, a degree of survey work would still be required to assess effectiveness, as the time and cost involved in bringing giant hogweed control back on course if it 'drifts' might be more than retaining an annual contract 'in-house'.

2010

Project area: Similar to previous year - both banks of the River Tamar were walked from Calstock to Polson Bridge (near the Tamar - Lyd confluence) (Cornish bank) and from New Quay to the River Lyd confluence (Devon bank). The River Lyd was walked as far upstream as Greenlanes Bridge, near Sydenham. The surveyor visited the rookery at Wooladon.

Contractors: M. Rule (survey/project manager) and A. Phillips (control)

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information, coverage, plant numbers and sizes of plants (large, medium and small).

Number of plants = 1,617+

Other invasive species surveyed: Japanese knotweed field survey only and Himalayan balsam field survey only. While, as in 2009, it was decided too problematic to estimate area, more effort was made in 2010 to record discrete Himalayan balsam colonies, as this information might be of use for Higher Level Stewardship agreements.

Due to the earlier start and the less-advanced growth of bankside and, especially, floodplain vegetation, more time was spent exploring back ditches and other floodplain areas than was possible in 2009.

The plant numbers reported were more accurate than in 2009, as they were less numerous and surrounding vegetation less obstructive, therefore it was easier to record more precisely.

For the second year running, no giant hogweed plants were found on the Tamar above the Lyd confluence. Suggested that Lyd to Polson could be dropped from future surveys, thereby reducing time and cost a little. Two new colonies located on the river Lyd.

Initially, it was felt that the overall number of plants had reduced considerably since 2009. However, once the contractor commenced spraying from mid-April, the feedback provided indicated that, in many cases, more plants were present at the recorded locations than when the survey was carried out. This serves to make the point how rapidly giant hogweed seeds can germinate. Also, the control team comprised 4-5 people with more pairs of eyes to spot plants.

Both surveyor and control contractors were of the opinion that giant hogweed seeds may be able to germinate quite late in the year in the Tamar Valley and survive the cold winter. Some of the plants recorded in the early survey in 2010, seemed too large to have recently germinated, especially considering how cold and late the spring was. In the right situation, it is possible for giant hogweed to flower in its second year in the Tamar Valley

The overall pattern of the locations of giant hogweed plants was very similar to 2009. In addition to the well-known, problem floodplain locations, many of the same riverbank reaches held plants in both years. This led to the conclusion that contractors were dealing with the seeds resulting from one or more significant seeding events in a previous year.

Individual plants or small groups occurred right along the system, sometimes separated from their neighbours by several hundred metres. Logistically this is challenging, as both surveyor and contractor still have to travel many time-consuming kilometres to reach plants. It cannot be predicted how long plants will persist at these locations – hopefully the seed bank is being greatly reduced, but only time will tell and it seems necessary that some degree of ongoing survey and control is required for several years yet.

During a resurvey in May, a few plants treated in the first phase were showing signs of re-generation from the base.

The rookery at Wooladon contained an extensive swathe of at least 300 plants, as well as additional plants lower down in the woodland. Many of these plants were medium or large sized. The hedges and ditches linking to the Tamar were also checked, but no plants were recorded

Several lengths of bank upstream of Greystone Bridge could only be seen from the opposite bank. It was suggested to the control contractor that working in two teams in this area might help guide colleagues to plants viewed from the opposite bank.

Higher Level Stewardship - Significant efforts made by the partnership enter a number of River Tamar landholdings into Higher Level Stewardship (HLS). Large holdings, and/or those with the most significant colonies of invasive species were prioritised and twelve applications made. This was a very positive move (and continued until 2013). Making treatment of these species a requirement of any HLS agreement would certainly help in controlling many of the worst infected areas. However, it was recognised as imperative that all plants be treated and future seeding avoided.

2011

Project area: As previous year except short stretch on the River Tamar, upstream of the Lyd confluence to Polson Bridge, now removed

Contractors: M. Rule (survey/project manager) and A. Phillips (control)

Giant hogweed reporting: Location information, coverage, plant numbers and sizes of plants (large, medium and small).

Number of plants = 1,323

Other invasive species surveyed: Japanese knotweed survey and control and Himalayan balsam field survey and control (HLS holdings only)

Ten holdings entered into HLS agreements. This delivered more funding towards giant hogweed control as well as treatment of Japanese knotweed and Himalayan balsam on these holdings.

The surveyor was surprised and concerned at how many medium sized plants were found. Numbers of medium (overwintered) plants estimated at 220+, despite the cold weather in December. Alternatively, these may have actually been stimulated to germinate by the cold weather (vernalisation).

Overall pattern of distribution remained the same as for previous 2 years. The depositional, floodplain areas continue to hold high numbers of plants.

Inaccessible plants – low river flows enabled several islands to be accessed, meaning very few inaccessible plants were recorded.

The familiar pattern of widely scattered plants occurring anywhere along the riverbanks remains. This means that the whole length still needs to be walked to ensure plants are not missed.

2012

Project area: As previous year

Contractors: M. Rule (survey/project manager) and A. Phillips (control)

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information, coverage, plant numbers and sizes of plants (large, medium and small).

Number of plants = 1,159+

Other invasive species surveyed: Japanese knotweed field survey and control. Himalayan balsam field survey

Landowners continued to enter into HLS agreements so that, by 2012, although significant river lengths remained outside stewardship, most of the well-known problem areas for giant hogweed were within HLS control from this year. The adoption of these agreements enabled much closer attention to be paid to invasive species control on those sites, crucially supported by additional longer-term funding. Efforts to bring other landholdings into HLS would continue, although most of the key problem sites were now within the programme.

The overall pattern of distribution remained as for previous years, however, previous hot spots (including the area just below Greystone Bridge and the wide floodplain on the Cornwall side above Greystone Bridge, along with Sydenham) appeared to have much-reduced populations. Elsewhere, the familiar pattern of widely scattered plants occurring anywhere along the riverbanks remained.

On a positive note, it seemed probable that no new seeding had occurred for several years and contractors are dealing with the seed bank from before 2009.

A distinct feature of the 2012 season was the very warm spring, leading to early growth. However, both the surveyor and contractor were able to take advantage of this and make good survey and treatment progress. As the season became wetter, though, this did cause additional growth later in the season – most notably Himalayan balsam.

Considerations for 2013:

- Results for 2013 season may be affected by the significant amount of flooding that has occurred within the Tamar catchment. This may have caused seeds and roots to have been carried to new areas or to become freshly exposed, potentially increasing the likelihood of germination in the spring. It may also have resulted in seed or root bearing areas being covered over by sediment. It seems that no two years are the same, each one presenting a slightly different situation from previous experiences.
- After the 2012 season, the process of an independent survey followed by control work was reassessed based on (1) value for money and (2) the significant change in giant hogweed numbers due to germination in the time between the early survey and later control treatments. The delay between survey and treatment results in a difference between the number of plants treated and the survey results, as it has become apparent that in the right situation giant hogweed will germinate and grow strongly throughout the year, thus limiting the effect of a single survey. The survey contractor provided a snapshot at the beginning of the season, whereas the control contractor data is updated throughout the season and therefore those results show more plants present.

2013

Project area: As previous year

A. Phillips (3-year survey and control contract, 2013-2015)

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information and plant numbers. Size categories not recorded this year as that information would only be relevant to the date it was recorded and would change within a few weeks. Number of plants = 890

Other invasive species surveyed: Japanese knotweed field survey and Himalayan balsam field survey

From 2013 onwards, no prior survey done, instead a single contractor for both survey and control, with in-field recording of plants and immediate treatment.

Single supplier exemption put in place, to ensure retention of current contractor who has carried out excellent work in previous years.

Reduction in the number of holdings (10) that carried out Invasive Non-Native Species control work through HLS agreements and was considered unlikely that any holdings would receive payments for similar control in 2014 (which proved to be the case).

Giant hogweed shows a sizeable decrease in the number of plants in the upper, non-tidal reaches of the Tamar and Lyd. The hope is that the seed bank is beginning to be exhausted.

Many inaccessible plants were known on the tidal section and, due to the unavailability of a suitable boat operator, these plants were not controlled until early-August when seeding was underway. Plants were treated and the remaining seeds bagged. This phase also included works at a property where the landowner normally does not give consent, but where limited access permission had been acquired this year.

Limitations to reporting include change of land management, i.e. grazing, strimming and self-treatment, where no records have been provided by landowners. There appeared to be some giant hogweed self-treatment taking place, including near Greystone, at Endsleigh and Sydenham. More self-treatment would help the overall eradication effort.

Generally, more engagement with the fishing community was desirable and the Endsleigh gillie very proactive, actively working with project contractor to locate giant hogweed on the estate land. In other areas, riverbank management for fishing access included strimming and so giant hogweed plants were occasionally found flowering in a stunted form. This increases the chance of flower heads going undetected if the plants do not reach their normal mature height.

Discussion was held over how to further the landowner engagement as limited success to date.

Similarly, the contractor noted a large degree of variance amongst landowners when contractors visit to carrying out control on their land, from little response, to high interest and encouragement. AONB office carried out a specific landowner-engagement project, and visited landowners in early 2013. Up to 60 landowners participated, virtually all very supportive of the project.

In November 2013, the partnership considered the use of a drone plane to take aerial video / photos three times in the season between Calstock and Newbridge or further up, but idea not pursued (assume due to financial constraints).

2014

Project area: As previous year

Contractor: A. Phillips (3-year survey and control contract, 2013-2015)

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information and plant numbers. Number of plants = 1,060 plus 140 found on 4 additional 'off-river' locations

Other invasive species surveyed: Japanese knotweed field survey field survey and control (at specific riparian sites only)

No HLS payments for the management of Invasive Non-Native Species in 2014 (or subsequent years).

Contractor noted, giant hogweed population much less than 6 years' ago, although new colonies still appear, especially in parts of the floodplain. These areas are becoming increasingly difficult to access physically, due to non-management.

The overall number of giant hogweed plants reported increased since last year by 170.

Riparian land generally had very few giant hogweed plants but, in contrast, some areas away from the river, e.g. Sydenham tip, still pose problems (30 plants in 2014 and spreading into wood).

A significant part of the river between Newbridge and Horsebridge now under single ownership and it is understood the landowner intends to keep this area well managed and maintained.

Low water levels this spring provided additional access to some areas. Control of inaccessible plants was carried out, notably the island above Gunnislake Newbridge and the small island below Gunnislake weir, where access was possible with the use of waders. Additional help was given on the non-tidal section by Endsleigh gillie, who provided a boat and life jackets and supervised the work to remove 2 flowering plants beneath Carthamartha cliffs. Many inaccessible plants were known on the tidal section and controlled as usual from a boat although no control on one site where consent for access not given. In future if canoe access was permitted on some of the upper reaches, this would be greatly beneficial.

The main managed stronghold on the tidal section remained Morwellham where, due to the close proximity of a large number of plants this year, it was suspected that a seeding event has occurred. An additional new colony was also found at the very back of the floodplain with 50+ plants. This site is providing ever increasing difficulty to manage, with treacherous ground conditions and significant summer vegetation. Poplar trees have been felled and left in situ without being cut up at all, thus increasing the already limited access and visibility.

In recent years all floodplain areas have been increasingly difficult with regards to access and visibility, with more fallen trees, root plate hollows, increasing bramble and eroded riverbank faces. To this extent it is much harder to carry out the survey and control with a high degree of confidence. Additionally, water management work at another site is likely to have disturbed the soil, increasing the possibility of seed bank germination, moving seed around the site from where colonies were known to exist, whilst also increasing access problems.

The ability to carry out the works along the riverbank are proving more limited due to decreasing access through fallen trees, erosion, undermining of the riverbank and increasing amounts of overgrown vegetation. There is the belief among some landowners that if an area is kept trimmed, there will be no giant hogweed - this is not the case.

The overall numbers on the non-tidal section were not as low as anticipated. The general riverbank is clear with occasional plants, but most of the giant hogweed found are coming up in areas where there were established populations in the past, including a spit which was a monumental problem but which is now relatively clear with only a few plants each year.

However, in other areas of the non-tidal section the findings were very positive. For example, only two plants were found on a site upstream towards the River Lyd, where there were large numbers of flowering plants five years ago and evidence of seeding. A theory may be that the seed bank was exhausted quickly with good germination conditions. However, the potential that it was washed downstream cannot be discounted.

There is also increasing cases of contract operators being chased by bulls, cows and attacks by dogs.

2015

Project area: As previous year

Contractor: A. Phillips (3-year survey and control contract, 2013-2015)

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information and plant numbers. Number of plants = 351 plus 79 found on 4 additional 'off-river' locations. Note 107 plants reported controlled privately on tidal section site where access by contractors not permitted

Other invasive species surveyed: Japanese knotweed field survey and control (at specific riparian sites only)

Giant hogweed numbers further decreased significantly this year, indicating no fresh seeding events plus depletion of the seed-bank. Outlying 'off-river' sites, e.g. Wooladon rookery, still produced plants and need to be visited – this raised the question of where else giant hogweed might occur.

Consideration given to doing some of the non-tidal stretches by canoe. In theory, this might be possible, providing contractor was covered for health and safety and that landowners and fishing clubs were consulted. The start of the fishing season coincides with the start of the giant hogweed programme. Not clear if canoes have been used.

2016

Project area: As previous year

Contractor: A. Phillips

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information and plant numbers. Number of plants = 408 plus 80 in 4 additional 'off-river' locations

Other invasive species surveyed: No

Contractor reduced reporting to plant numbers and hand annotated maps, to help reduce costs.

In what appeared to be a good flowering year for giant hogweed in the south west region, its reduction along the estuary banks is good news.

Concern was again expressed regarding the problems of accessing tidal areas – physically and regarding having permission – as well as the increasingly difficult nature of the floodplain areas to move through, enabling treatment. Preventing plants from seeding remains key, but plants can germinate at any time of year, sometimes at times when they cannot be reached. In the tidal section, the contractors' essential priority is to control seeding plants, as it is impossible to find every young, small plant when they germinate throughout the year, their emergence and timing of growth is very random and by mid-June most of these areas are largely inaccessible.

In the non-tidal section, an unexpected cluster of giant hogweed found and treated at The Landmark Trust's Pond Cottage on the Endsleigh Estate. The partnership notified the head gardener at Endsleigh (although they do not manage the cottage) who is extremely conscious of the dangers posed by giant hogweed and is working hard to eradicate it (and Japanese knotweed) from the estate.

This again raises the issue of plants we don't know about and the concern that other colonies may exist away from the river, as some of those additional off-river sites identified have been found by chance.

Ideally would survey on a larger scale, but funding not available to do this.

2017

Project area: As previous year

Contractor: A. Phillips

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information and plant numbers. Number of plants = 278 plus 19 found on 4 additional 'off-river' locations

Other invasive species surveyed: No

No plants found on the River Lyd – a project first – and significant reductions across the whole project area including all tidal, non-tidal and off-river sites.

2018

Project area: As previous year

Contractor: A. Phillips (3-year single supplier exemption approved 2018-2020)

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information and plant numbers. Number of plants = 356 plus 21 found on 4 additional 'off-river' locations. Note additional 4 plants found 'off-river' at Hawksmoor

Other invasive species surveyed: No

Three-year single supplier exemption arranged to retain A. Phillips as contractor.

Tidal section plant numbers are slightly increased from last year, due to known seeding events at three sites in 2016 and 2017. Additionally, a small number of plants appeared at a couple of sites at the bottom of the project area, where none had occurred for many years, both due to historic seeding events either on those sites or upstream.

This highlights a concern of the contractor that has been referred to over the last few years – the practical aspect of surveying and management makes guaranteed eradication in the tidal section a hope rather than a probability as, short of landowners carrying out effective control, there may continue to be individual plants evading detection. However, the contractor acknowledges that, without the work of the project in the recent past, the giant hogweed population would be uncontrollable, with millions of seeds in the seed bank. Also, only one plant was found in all the other known tidal hot spot sites combined (where past infestation had been very bad) which shows that, even in some of the lower floodplains areas, success is possible.

In the non-tidal section, overall numbers were very similar to last year from Gunnislake Newbridge to Sydenham. Another positive sign that seed bank has diminished, as it has year on year since 2012. The contractor also again highlighted that the largest threat to eradication in the non-tidal section, is from plants coming from outside the river zone, as this area is obviously so large it cannot be monitored. An example of this is a colony reported at Hawksmoor; only a few plants, but it is unknown where or when the seeding events occurred. Fortunately, Hawksmoor is a downstream section (just above tidal), so not contaminating the whole project area.

There is a clear role for landowners to play – if they can be persuaded, with support, to be proactive and vigilant outside the river zone, then at least this risk could be minimised in the long term.

2019

Project area: As previous year

Contractor: A. Phillips (3-year single supplier exemption approved 2018-2020)

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information and plant numbers. Number of plants = 156 plus 18 found on 4 additional 'off-river' locations.

Other invasive species surveyed: No

Water environment Grant funding secured through the Rural Development Programme for England (RDPE) for two years full survey and treatment, plus landowner event and project review

For the first time 2 of the tidal sites, historically both heavily infected areas, had no plants,

Non-tidal section plants reduced by 50%+, again indicating viable seed-bank depletion.

2020

Project area: As previous year

Contractor: A. Phillips (3-year single supplier exemption approved 2018-2020)

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information, coverage and plant numbers. Number of plants = 73 (not including Morwellham) plus 35 found on 4 additional 'off-river' locations.

Other invasive species surveyed: No

The start of the fieldwork season coincided with the first Covid lockdown. As the work was outdoors, it could be delivered in a Covid-safe way and did not require face-to-face contact. Landowners were notified by letter or email of the planned survey and control programme – consent was maintained for almost all sites.

Permission was temporarily withdrawn for one tidal site, at Morwellham Quay, with the whole site being closed to the public. The landowner agreed to help by surveying for giant hogweed (12 plants found) and the partnership urged him to also carry out control measures, with guidance information provided to support this.

Despite the overall positive results from this year's control work, there is no doubt that the withdrawal of Morwellham from the control programme was a setback, as it is a historical stronghold for giant hogweed in the catchment. But its location at the bottom of the catchment should minimise any greater impact.

Positively, for the remainder of the tidal section, large areas of the river were completely clear. In total, 44 plants, including 30 at one site. It is not possible to know if a plant seeded there a few years ago or if a seed head was washed down to the site from upstream. Otherwise, sporadic distribution of plants (generally in small groups) located at previous tidal hot spots.

The contractor noted, it is worth considering whether seeds might get transported upstream by the incoming tide although, as salt water is heavier than freshwater, it is more likely that any further contamination from a seeding plant would be downstream.

Non-tidal section: 52 plants, up from 30 in 2019. Increase primarily due to a fresh outbreak of 30 plants beside the Landmark Trust site (Pond Cottage) on the Endsleigh estate. Located in an unusual position, on high dry ground to the back of the cottage, away from a watercourse. Partnership contacted the Trust manager who, being very aware of the problems caused by this plant, have instructed their site manager/gardener to increase vigilance and look out for giant hogweed. Pond Cottage will be revisited in 2021 to ensure the local population of giant Hogweed is controlled and eradicated from that site.

With regards the general distribution of giant hogweed, plants in many cases were observed to be grouped, for example the 2 plants between Gunnislake Newbridge and Horsebridge were within 30cm of each other while 4 of the 5 plants between Greystone and the Lyd confluence were within a square metre.

Considerations for future control;

- Why have plants have been observed so close to each other? Perhaps it is either an old seeding site or seeds have been washed down in very close proximity to each other, and then a germination opportunity arises due to winter floods and change in environmental conditions. Understanding the reasons for fluctuating population numbers and clustered distribution would help inform future control efforts.
- As giant hogweed numbers continue to decrease across the control area, it is worth considering the types of sites and conditions most favourable to giant hogweed growth with a view to longer term monitoring and eradication. For example, it is unlikely that giant hogweed would be found in any stable vegetative community such as; wood rush, hemlock water dropwort or bilberry and heath that are found on banks of the Tamar. A disturbed habitat of varied plant species is generally more likely to provide a suitable site. The prevalence of Himalayan balsam combined with winter floods seems to give ample germination opportunity. Medium to high light levels are also needed for germination - in areas of bare damp soil and good light it is thought that plants can flower in 2 years.
- The ideal scenario would be to continue the project for several years after the last plant is found, though obviously funding is an issue. Some cost-effective options are;
 - to cut down contractor time, reassess the full survey approach and have more of a reactive control
 - stop giant hogweed flowering rather than trying to find all the small plants and/or
 - carry out the work every other year although I do think it is possible to flower in the perfect situation in 2 years.
- Extension of treatment area - It is not thought that there are any giant hogweed strongholds or hotspots beyond the project area but, funding allowing, there is potential to survey upstream of the current project area. Some of these areas will be visited in 2021 as part of a review of the project.

2021

Project area: As previous year (main survey and control). Historical hot spots and some upstream sites beyond the project area to be visited by independent surveyor

Contractors: A. Phillips (5-year single supplier exemption approved 2021-2025) and Natu-Rule/M. Rule to carry out an independent survey

Giant hogweed: Field survey and control

Giant hogweed reporting: Location information and plant numbers. Number of plants = 281 (including 202 at Morwellham) plus 27 found on 4 additional 'off-river' locations. Note additional 5 plants found outside project area in Bradstone village, 2km from the riverbank

Other invasive species surveyed: Scoping Japanese knotweed and Himalayan balsam distribution (medium to larger clusters) in the project survey area

Additional Water environment Grant funding secured through the Rural Development Programme for England (RDPE) for this years full survey and treatment.

Five-year single supplier exemption arranged (2021 - 2025) to ensure retention of A. Phillips who has continued to carry out excellent work in previous years, with a considerable decrease in giant hogweed population numbers and spread, due to his teams' efforts. With the current contractors continued involvement in the control programme, partnership can use his exceptional knowledge and experience to provide important insight into the planning of the monitoring phase.

The large number of plants this year at Morwellham is not unexpected, as this site has been the single biggest source of plants within the catchment in the past and so the inability to survey in 2020 did result in a temporary setback in progress. The partnership understood the landowner's concerns regarding movement during the Covid lockdowns and is grateful that work was allowed to resume at the site this year. Morwellham is particularly difficult to survey, even by experienced contractors, especially in the floodplain where access and visibility are very restricted by July. Evidence of one 2020 flowering plants, so Morwellham remains a hotspot in the tidal section.

Giant hogweed is still hanging on in other historical, tidal hot spot sites, though most other areas were plant free in 2021. A canoeist notified the Tamar Valley AONB office of flowering plants at Okeltor and Morwellham in July. The contractor visited the site soon after and controlled the plants, reporting back that flowering appears to have been delayed this year due to a dry and cold April, as plants would usually be in seed by July, whereas they were only just flowering.

Non-tidal area – 17 plants were located mostly in the same areas as last year, indicating they are not the result of a new seeding event on the river, although the single plant on the River Lyd was located on the river, under the council playing field where they have never been before.

In addition, a new and unusual giant hogweed location was found, thanks to a local landowner, previously involved in the project, who reported seeing plants in a hedge at Bradstone village, outside the project area, well away from a watercourse and less than 2km from the River Tamar. The contractor visited soon after and five plants were removed. M Rule and AONB staff subsequently surveyed around Bradstone village (church grounds, village pond) and along a small valley linking the village, past Bradstone Mill, to the main river, but no other plants were found.

This sighting does emphasise, once again, the need to be continually vigilant, with the possibility of unexpected localised germination in new areas of the valley; this will have to be considered as the project moves to a long-term monitoring phase.

A landowner notified the Tamar Valley AONB office in May of suspected giant hogweed growing in woodland near the main riverbank (Horsebridge to Greystone Bridge). AONB staff visited the site to resurvey the following week but the vegetation had been strimmed and no sign of giant hogweed was found. Site to be revisited in 2022.

There were no noticeable inaccessible plants observed by the river at a site on the tidal reach which is not visited the annual survey programme. The AONB office received confirmation that the area was privately surveyed in 2021 and 48 young giant hogweed found. The partnership will continue to engage with the land agent to support the private survey/control of giant hogweed at that site.

Natu-Rule carried out a separate survey in 2021 in May and June, after the main survey had begun, and found only four additional plants, both in the main survey area (two at Pond Cottage and two by the Morwellham Quay). Sites visited: Sydenham Garden; the River Lyd from Lifton to the Tamar confluence; the lower reach of the River Thrushel to confluence with the River Lyd; upstream to Polson Bridge; riverside sections by the A30 near Launceston, accessible from public roads; Bradstone village and downstream to Bradstone Mill; upstream of Greystone Bridge; Endsleigh Gardens and the watercourse in the garden upstream towards Milton Abbot; up and downstream of Gunnislake Newbridge; Morwellham; Calstock area upstream to Slimeford.

Considerations for future work:

- Recommendations for how the project moves forward will be considered in the project review taking place.
- The two giant hogweed sightings in 2021, reported by members of the public, were a valuable contribution to this years' work and should be encouraged in future.
- This is no replacement for a systematic survey by experienced people, but a public awareness campaign could be considered moving forward, especially later in the season when large mature plants are easier to spot.
- Updating the Tamar Valley AONB website with identification sheets and asking for photos of suspected plants to be sent to the Tamar Valley AONB office, would reduce the number of incorrect identifications and the time wasted by contractors or AONB staff visiting sites unnecessarily.
- Members of the public could be asked to send photographs of future suspected giant hogweed to the Tamar Valley AONB office to confirm identification as the contractor has in the past travelled to new sites, which incurs a cost, only to find the plant has been misidentified.

Appendix 6: Sample specification - giant hogweed survey and control programme

SPECIFICATION

1.0 INTRODUCTION TO THE PROJECT

- 1.1 The Tamar Valley Invasives Group (the Group) was set up in 2001 to control invasive plant species within the Tamar Valley Catchment. The core members of the Group are Natural England, the Environment Agency, Tamar Valley Area of Outstanding Natural Beauty and Cornwall Council.
- 1.2 The long-term objective of the Group is to control and, in some cases, eradicate, specific invasive plant species in the Tamar Catchment where they have a potential detrimental effect on the environment, landscape or livelihood of those living in the Valley.
- 1.3 This year's survey and control programme will build on work, carried out annually over a number years, to control and eradicate Giant Hogweed (*Heracleum mantegazzianum*), within the Tamar catchment.
- 1.4 Treatment includes both herbicide spraying and stem injection techniques, however there is also a certain amount of hand digging of Giant Hogweed, in particular on organic holdings.
- 1.5 The project area includes the River Tamar between Calstock and the Tamar-Lyd confluence and a section of the River Lyd.
- 1.6 The survey must be carried out by an appropriately experienced individual who is able to identify and record accurately the location and extent of Giant Hogweed within the project area.
- 1.7 The Contractor must complete relevant health and safety risk assessments which must be approved by the Group before works start.

2.0 WORK PLAN

The area of work will be both banks of the River Tamar extending from Calstock (SX42386804) to the confluence with the River Lyd near Polson Bridge (SX35568491). The River Lyd is also included in the area covered by this brief, extending (both banks) from its confluence with the River Tamar to Sydenham/Greenlanes Bridge (SX4438583236). The survey area will include the river zone extending 50 metres inland from the riverbank, except where the floodplain extends beyond 50 metres, in which case the whole floodplain will be included. Additional local off-river sites will also be included in the area of work (details to be provided in advance).

2.1 Risk Assessments

The Contractor must complete relevant health and safety risk assessments which must be approved by the Group before works start.

2.2 Environment Agency agreement to use herbicides in or near water

Before commencing treatment, the necessary approvals to use herbicides in or near water must be sought from the Environment Agency by the Contractor.

2.3 Survey of the contract area

Survey work will be carried out by the contractor throughout the season to ensure that the data presented to the group is a true representation of the number and distribution of plants within the project area. The position and approximate number of invasive plants will be recorded accurately and digitised on GIS. It may be possible to use Natural England's cartographic services to digitise maps for the draft and final report. However, accurate data will need to be provided in good time to ensure maps can be drawn up for submission of the draft report.

2.4 Landowner contact

There are [add number] landowners or managers in the project area. The Tamar Valley AONB office will contact all landowners prior to the survey work being undertaken. However, all landowners must also be contacted by telephone by the Contractor prior to access onto their land. An explanation to the landowner must be given on the work that is to be carried out. It should be noted that, where a landowner has not been contacted, the area of land covered by this ownership should be excluded from control unless the Contractor is specifically permitted to include this land by the Group. The Contractor must report any changes or discrepancies in any landowner details to the Group.

2.5 Organic Holdings

It should be noted that [add site name] is an organic holding and so no herbicides must be used and access is not permitted on this site. Treatment of the invasive plants is being dealt with by the landowner. However, the surveyor is permitted to survey the land. Where a property is organic but there is a derogation in place to allow some herbicide treatment, the Contractor must liaise closely with the Group and landowner to ensure the conditions of the derogation are not breached.

2.6 **Giant hogweed – Phase 1 Control**

The first phase of the survey and control work will commence in April (there must be enough leaf cover to absorb herbicide). Treatment will include digging out smaller plants, including the compete tap root, or spraying larger plants with herbicide. Locations of giant hogweed plants will be recorded on large-scale OS field maps provided by the Group and if possible (depending on reception) GPS readings can also be provided. There must be no herbicides used on land in organic status (see section 2.5). The derogation on [add site name] allows some herbicide application however there is also a small number of giant hogweed plants that will require hand digging on this site. Inaccessible plants must be noted and recorded to the Group (see section 2.7).

2.7 **Control of inaccessible Giant hogweed plants**

During all phases of control the Contractor must identify to the Group with an 8-figure grid reference the locations and sizes/extent of any invasive plants (giant hogweed) that are difficult to reach, for example, plants on islands or steep riverbanks. The information should be fed back and should include a description and recommendation for control. Two days of boat work should be included within the quote to cover control of inaccessible plants.

2.8 **Giant hogweed – Phase 2 Control**

The second phase of control work will commence after the 1st May. Phase 2 of the control does not need to cover the whole project area again. The areas not to be included in phase 2 are those that have a narrow corridor with grazing up to the river, or areas that are regularly strimmed by the fishing clubs. These areas are: The Lyd, (excluding [add site names]), Tamar Devon side from Newbridge to Greystone Bridge and Tamar Cornwall side to Greystone Bridge (excluding [add site names]). Any new plants not identified from phase 1 must be recorded. Control techniques will include a combination of spraying and stem injection of herbicide, depending on the size and age of the plants. Flowering plants should receive stem injection to limit the overuse of herbicide on surrounding vegetation.

2.9 **Giant hogweed – Phase 3 Control**

It is recommended that a late visit to check any obscure places for flowering plants is carried out in mid to late June. Treatment by stem injection is advised at this stage. Any new plants not treated in earlier phases must be recorded.

2.10 **Limitations**

It is recognised that the above timings will be weather dependant. If the Contractor is unable to commence work at the scheduled times, the Group should be informed at the earliest opportunity when a revised date will be agreed. Herbicide treatment through spraying or stem injection is the preferred method of control. However, where plants are located on land with organic status, then physical removal of plants will be undertaken (see section 2.5 for details).

3.0 **REPORTING**

Ongoing communication between the Group and the Contractor throughout the control period is essential to ensure the success of the aims and objectives of the project.

4.0 **PUBLICITY**

The data provided by the Contractor as part of the plant count will be used to increase public awareness of invasive species through press releases, local workshops and meetings. It will also be used to secure additional funding for the project.

5.0 **FINANCES**

Payment will be made in arrears, following the successful completion of the work as stated in this brief to the satisfaction of the Group. Invoices should be sent to [add address]:

6.0 **SUMMARY TIMETABLE OF CONTRACT**

Phase 1 Control	April
Phase 2 Control (tidal section)	May
Phase 2 Control (non-tidal section)	Mid / late June
Phase 3 Control (tidal section priority)	Mid / late June

7.0 **SUBMISSION OF QUOTES**

The quote should be in the form of a day rate and should include how many hours this includes for each working day and the number of persons in the work team. The quote should include the cost of the spray/treatments.

The quote should include up to a maximum of 30 days with a two-man team.

The quote must be returned to the following email address [add address].

8.0 **QUALITY STANDARDS/CONTROL**

8.1 The Contractor will have responsibility for taking regard for health and safety under the UK Management of Health and safety at Work (MHSW) Regulations 1999, and the Control of Substances Hazardous to Health (COSHH) Regulations 2002. The Tamar Invasives Group will accept no responsibility for any damage or injury which may be caused by or to the Contractor or personnel or property as a result of the work.

8.2 It is the responsibility of the Contractor to ensure that all UK and other (as appropriate) legislation is satisfactorily compiled with at all stages of the project. The law of England shall be the law applicable to the Contract Documents.

9.0 **PRICING DOCUMENT FOR SURVEY AND CONTROL OF GIANT HOGWEED**

Please set out your prices in your quotation as follows. All prices quoted are to be excluding VAT.

Item	Unit
Time based charge for each member of your project team (based on a 7.5 hour working day)	£ per day
How many full day's work you envisage would need to be allocated, to each team member, to satisfactorily fulfil the requirements of all 11 project stages per year	
Additional cost of GPS recording	£
Total inclusive price for delivery of the whole contract (per year)	£

Appendix 7: An example of combined multispecies survey data from 2005

Survey of Invasive Species in the Tamar Valley 2005

1 = Giant Hogweed
2 = Japanese Knotweed
3 = Himalayan Balsam

Accessibility
1 = Inaccessible
2 = Partially Accessible
3 = Partially Accessible
4 = ATV
5 = Mini-pumper
6 = GPS

Evidence of past treatment
1 = Herbicide
2 = cut/cracked
3 = other
4 = no clear evidence

Cornwall / Devon Section 1 The Tamar River	Grid reference (all grid references have SX prefix)	Map Number	Public Access	Date Surveyed	Surveyor	Landowner Name	Survey Details Species	Are plants single aged?	Single plant coverage %	Dense coverage %	Sporadic coverage %	Numbers of plants	Accessibility	Number of visits	Treatment Details	Concentration (ml/l)	Volume used (litres)	Effectiveness	Evidence of past treatment	Photo number	Exposure No.	
																						Map
Devon	3859	4	no	10/05/2005	KB		1,3	No	1000		1000	3	3	1	Spray/Glyphosate	200				1	43-53	
Devon	3860	4	no	10/05/2005	KB		1,3	No	600		600	3	3	1	Spray/Glyphosate	200					1	43-53
Devon	3861	5	Yes	10/05/2005	KB		1,3	No	500		500	3	3	1	Spray/Glyphosate	200						61-62
Devon	3862	5	Yes	10/05/2005	KB		1,2	No	300		300	3	3	1	Spray/Glyphosate	200						67-68
Devon	3863	5	Yes	10/05/2005	KB		1	No	200	150	200	3	3	1	Spray/Glyphosate	200						69
Devon	3864	5	Yes	10/05/2005	KB		2	Yes	300		300	3	3	1	Spray/Glyphosate	200						86
Devon	3865	6	Yes	10/05/2005	KB		1	No	100		100	3	3	1	Spray/Glyphosate	200						87-88
Devon	402	7	no	10/05/2005	KB		1,2,3	No	200		200	3	3	1	Spray/Glyphosate	200						82-84
Devon	415	8	Yes	10/05/2005	KB		1,3	No	400		400	3	3	1	Spray/Glyphosate	200	45		4			116
Devon	432	9	no	16/05/2005	DS		1,3	No	30		30	3	3	1	Spray/Glyphosate	200	20		2			114
Devon	433	9	no	16/05/2005	DS		3	Yes	15		15	3	3	1	Spray/Glyphosate	200	4					120
Devon	433.5	9	no	16/05/2005	DS		1,2,3	No	40		40	3	3	1	Spray/Glyphosate	200	4					121
Devon	437.2	9	Yes	16/05/2005	DS		1	Yes	8		8	3	3	1	Spray/Glyphosate	200	0.5					122
Devon	434.7	9	Yes	16/05/2005	DS		1	Yes	1		1	3	3	1	Spray/Glyphosate	200	0.5					123
Devon	436.4	9	No	16/05/2005	DS		1	Yes	48		48	3	3	1	Spray/Glyphosate	200	4					124
Devon	437.2	9	Yes	16/05/2005	DS		2	Yes	2		2	3	3	1	Spray/Glyphosate	200	4					125
Devon	437.2	9	Yes	16/05/2005	DS		2	Yes	15		15	3	3	1	Spray/Glyphosate	200						127
Devon	437.2	9	Yes	16/05/2005	DS		2,3	Yes	2.5		2.5	3	3	1	Spray/Glyphosate	200						128
Devon	437.6	9	Yes	16/05/2005	DS		1,2,3	No	60		60	3	3	1	Spray/Glyphosate	200	3					129
Devon	439.2	9	Yes	16/05/2005	DS		1,2,3	No	25		25	3	3	1	Spray/Glyphosate	200	6					131
Devon	439.2	9	Yes	16/05/2005	DS		2	No	25		25	3	3	1	Spray/Glyphosate	200	5					132
Devon	439.3	10	Yes	16/05/2005	DS		1,3	No	200		200	3	3	1	Spray/Glyphosate	200	10					133
Devon	439.4	10	No	16/05/2005	DS		1,3	No	30		30	3	3	1	Spray/Glyphosate	200	3					135
Devon	439.4	10	No	16/05/2005	KB		1,2,3	No	2700		2700	3	3	1	Spray/Glyphosate	300	37					136
Devon	439.5	10	Yes	17/05/2005	KB		2	No	20		20	3	3	2	Spray/Glyphosate	200						1
Devon	439.5	10	Yes	17/05/2005	KB		1,2,3	No	20		20	3	3	1	Spray/Glyphosate	200						3
Devon	439.6	10	Yes	17/05/2005	KB		2	No	20		20	3	3	1	Spray/Glyphosate	200						4,5
Devon	439.6	10	Yes	17/05/2005	KB		2	No	20		20	3	3	1	Spray/Glyphosate	200						7
Devon	439.6	10	Yes	17/05/2005	KB		2	No	20		20	3	3	1	Spray/Glyphosate	200						7
Devon	439.6	10	Yes	17/05/2005	KB		1,3	No	12500		12500	3	3	1	Spray/Glyphosate	200	28					8,9
Devon	440.3	10	Yes	17/05/2005	KB		1,3	No	5		5	3	3	1	Spray/Glyphosate	200						11
Devon	440.3	10	Yes	17/05/2005	KB		2	Yes	5		5	3	3	1	Spray/Glyphosate	200						14
Devon	440.3	10	Yes	17/05/2005	KB		2	Yes	5		5	3	3	1	Spray/Glyphosate	200						14
Devon	440.3	10	Yes	17/05/2005	KB		1,3	Yes	2400		2400	3	3	1	Spray/Glyphosate	200						12,13
Devon	440.3	10	Yes	17/05/2005	KB		1,3	Yes	2400		2400	3	3	2	Spray/Glyphosate	200						15-19
Devon	440.3	10	Yes	17/05/2005	KB		1,2,3	No	100		100	10	10	1	Spray/Glyphosate	200						20-22
Devon	440.3	10	Yes	17/05/2005	KB		1,2,3	No	150		150	10	10	1	Spray/Glyphosate	200						24
Devon	440.3	10	Yes	17/05/2005	KB		1,3	Yes	10		10	3	3	1	Spray/Glyphosate	200	25					25
Devon	440.3	10	Yes	17/05/2005	KB		1	Yes	5		5	3	3	1	Spray/Glyphosate	200	2					26
Devon	440.3	10	Yes	17/05/2005	KB		3	Yes	10		10	2	2	1	Spray/Glyphosate	200	27					27
Devon	440.3	10	Yes	17/05/2005	KB		3	Yes	30		30	3	3	1	Spray/Glyphosate	200						28
Devon	447.1	10	Yes	17/05/2005	KB		1	Yes	13		13	3	3	1	Spray/Glyphosate	200						29
Devon	447.1	10	Yes	17/05/2005	KB		1	No	3000		3000	1	1	1	Spray/Glyphosate	300						30
Devon	447.1	10	Yes	17/05/2005	KB		3	Yes	2		2	3	3	1	Spray/Glyphosate	300						4
Devon	447.1	10	Yes	17/05/2005	KB		2	No	2		2	3	3	1	Spray/Glyphosate	300						4
Devon	447.1	10	Yes	17/05/2005	KB		1,3	Yes	2000		2000	1	1	1	Spray/Glyphosate	300						11
Devon	447.1	10	Yes	17/05/2005	KB		1,3	Yes	2		2	3	3	1	Spray/Glyphosate	300						12
Devon	447.1	10	Yes	17/05/2005	KB		1,3	Yes	100		100	3500(HB)	10(GH)	2	1	Spray/Glyphosate	300	0.1				13-14
Devon	447.1	10	Yes	17/05/2005	KB		1,3	Yes	500		500	30-35	3	1	Spray/Glyphosate	300	4					47-49
Devon	447.1	10	Yes	17/05/2005	KB		1,3	No	200		200	3	3	1	Spray/Glyphosate	300	0.5					50
Devon	447.1	10	Yes	17/05/2005	KB		1,3	No	600		600	3	3	1	Spray/Glyphosate	300	1.8					52-54
Devon	447.1	10	Yes	17/05/2005	KB		1,3	No	900		900	3	3	1	Spray/Glyphosate	200	2					55
Devon	447.1	10	Yes	17/05/2005	KB		1,3	No	100		100	3	3	1	Spray/Glyphosate	200	1					56
Devon	447.1	10	Yes	17/05/2005	KB		1,3	No	400		400	3	3	1	Spray/Glyphosate	200	6					57
Devon	447.1	10	Yes	17/05/2005	KB		1,3	No	200		200	3	3	1	Spray/Glyphosate	200	2					58-57
Devon	447.1	10	Yes	17/05/2005	KB		1,3	No	20		20	3	3	1	Spray/Glyphosate	200	1.5					55
Devon	447.1	10	Yes	17/05/2005	KB		1,3	Yes	80		80	3	3	1	Spray/Glyphosate	200	1.3					55
Devon	447.1	10	Yes	17/05/2005	KB		1,3	Yes	120		120	3	3	1	Spray/Glyphosate	200	2					55-56
Devon	447.1	10	Yes	17/05/2005	KB		1	Yes				3	3	1	Spray/Glyphosate	200						55-56

Appendix 8: Field survey sheet 2005

Survey of Invasive Species 2005

Date
Surveyor

Landowner name

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For each site mark on map location/area and a reference number to tie it with this sheet

Site	Grid ref/GPS ref	<input type="text"/>	survey details	GPS	<input type="text"/>
	public access	YES / NO		Measured	<input type="text"/>
	Map reference	<input type="text"/>		Observed	<input type="text"/>
species	Giant Hogweed	1	coverage <i>mark on map</i>	single plant	<input type="text"/>
	Japanese Knotweed	2		dense coverage	m2
	Himalyan Balsam	3		sporadic coverage	m2
	are the plants single aged	YES / NO		number of plants	<input type="text"/>

Accessibility	Inaccessible	1	Evidence of past treatment	Herbicide	1
	Pedestrian difficult	2		cut/excavated	2
	pedestrian with sprayer	3		other	3
	ATV	4	Notes on past treatment	<input type="text"/>	
	Minidigger	5			
	JCB	6			
2005 treatment	number of visits	<input type="text"/>	Notes on 2005	<input type="text"/>	
	type of treatment	<input type="text"/>			
	effectiveness	<input type="text"/> %	treatment type herbicide details concentration volume used	<input type="text"/>	
carried out on this visit	YES / NO	<input type="text"/>			
<input type="text"/>	<input type="text"/>	<input type="text"/>			

Photographs

film number
exposure number

mark point and direction of photographs on map



Photo © A. Phillips 2021

