



**Evolving Forests**

## **Dartmoor Healthy Trees Survey and Planting Report**

**for**

**Harford and Ugborough Moors, South Dartmoor**

<b>Date of report</b>	14 <sup>th</sup> December 2022
<b>Date of surveys</b>	May – August 2022
<b>Author</b>	Bea Davis
<b>Reviewer(s)</b>	Paul Spencer, Kath Giles & Jez Ralph
<b>Client name</b>	Foundation for Common Land
<b>Corylus reference</b>	22026

## **CORYLUS ECOLOGY**

**Devon office: 19 Dart Mills, Old Totnes Road, Buckfastleigh, Devon, TQ11 0NF**  
**Telephone: 01364 653300 E-mail: [info@corylus-ecology.co.uk](mailto:info@corylus-ecology.co.uk)**

*Director: H G Wrigley (née Lucking) BSc. MIEEM, BES*

Corylus Ecology Ltd Registered in England No 5005553  
Registered Office: Henwood House, Henwood, Ashford Kent TN24 8DH  
VAT Reg No. 862 2486 14

## CONTENTS

	Page Number
<b>1.0 Introduction</b>	<b>2</b>
<b>2.0 Methodology</b>	<b>4</b>
<b>3.0 Survey Results and Evaluation</b>	<b>8</b>
<b>4.0 Proposals for Increasing Tree Cover</b>	<b>19</b>
<b>5.0 Conclusions</b>	<b>25</b>

## References

### Maps (embedded in report)

Map 1 – Site Location Plan

Map 2 – All Trees/Groups of Trees Recorded

Map 3 – Locations of All Recorded Saplings

Map 4 – Locations of Healthy Trees/Groups of Trees

Map 5 – Potential Areas for Increasing Tree Cover

### Charts (embedded in report)

Chart 1 – Breakdown of Tree Species Recorded

Chart 2 – Breakdown of Tree Growth Stages

Chart 3 – Sapling Ground Conditions Recorded

Chart 4 – Recorded Altitude (m) of Individual Trees

Chart 5 – Recorded Height (m) of Individual Trees

Chart 6 – Recorded Stem Diameters (cm) of Individual Trees

### Tables (embedded in report)

Table 1 – Percentage of Total Regeneration

## Figures

Figure 1 – Annotated Photographs

## Appendices

Appendix 1 – Survey Form

Appendix 2 – Additional Results

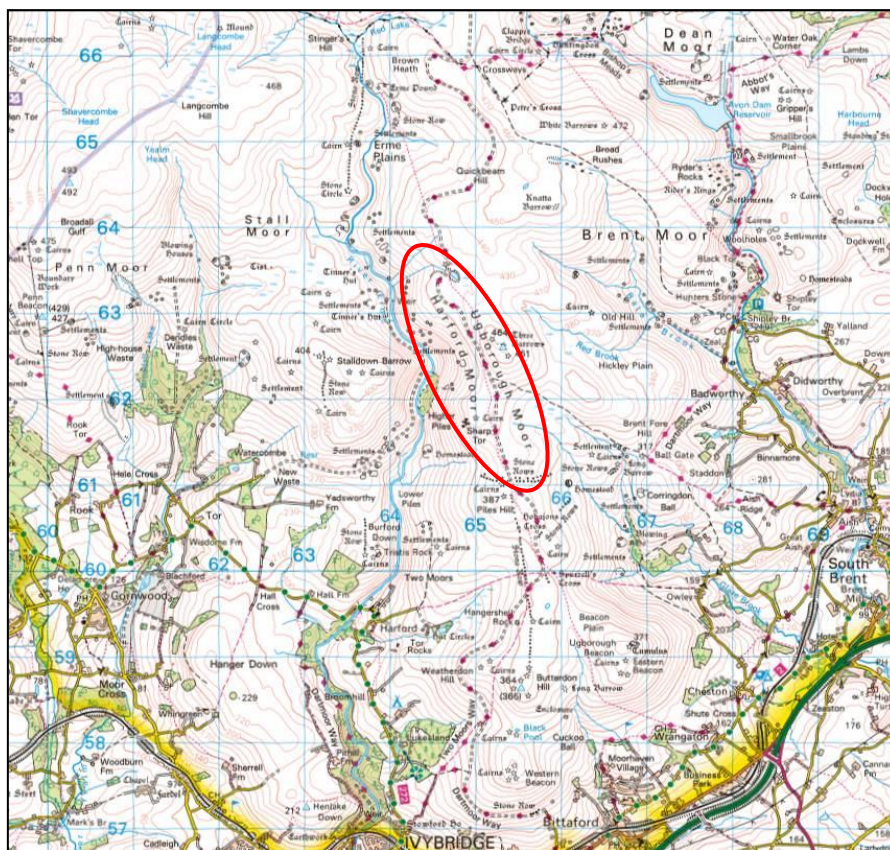
Appendix 3 – Maps of Habitat Types, Enclosures and Other Factors

Appendix 4 – Areas Identified with Increased Numbers of Trees (natural or planted)

## 1.0 INTRODUCTION

1.1 Corylus Ecology and Evolving Forests have worked with the Foundation for Common Land, in consultation with Dartmoor National Park Authority and Harford and Ugborough Commoners' Association, to develop a method for undertaking citizen science surveys of open grown trees on Dartmoor's commons. Surveys were carried out on a series of commons across Dartmoor, including Harford and Ugborough Moors in the south of the national park. The site is located at Ordnance Survey grid reference SX 6574 5954 (see Map 1).

Map 1: Site Location Plan



OS licence number - 100050443

1.2 This work has been carried out in relation to a tree regeneration project for several commons on Dartmoor, which forms part of the Our Upland Commons project through the Our Common Cause Partnership. The objectives are:

- To better understand the number, age, distribution and health of individual trees on commons.
- To use data gathered during the survey to inform two tree planting trial projects on Dartmoor.

1.3 This work aims to move away from the often polarised view of trees on Dartmoor, which tends to focus on a debate over forest versus open ground. The work points to an acknowledgement that naturally woodland would give way to open ground through an extensive area of open grown trees and smaller

wooded patches, based on elevation, ecology and geomorphological changes. The project team's approach to delivering the project aims has been to view this work as the start of a much longer-term evolution of the edges of the Moor: a transition to a more naturalistic relationship between trees and open ground that also engages local communities in a way that instils a wood culture as part of a wider land-use culture.

- 1.4 Our aim is to integrate proposals to increase tree cover on Dartmoor into the purposes of the national park designation, which include conserving and enhancing the special qualities of natural beauty, wildlife and cultural heritage, and promoting opportunities for understanding and enjoyment. The survey has been designed to give as much detailed information as possible but equally to engage people and help to understand the connection of local people to these areas. The project team would like to thank all of the volunteers who have given up so much of their time to help with the delivery of this survey.
- 1.5 The proposals for increasing tree cover take a number of forms, with the aim of testing ways of encouraging open tree growth in these climatically harsh areas, giving clues to the longer-term and more extensive evolution of the moorland edges across the whole Moor.
- 1.6 This work is part of a £3 million project, Our Upland Commons, helping to secure the future of upland commons in England. Ending summer 2024, 12 commons across four parts of the country are involved, including three in Dartmoor National Park. Led by the Foundation for Common Land, Our Upland Commons has been made possible by grants from The National Lottery Heritage Fund, Esmée Fairbairn, Garfield Weston Foundations plus local funders Dartmoor National Park Authority, Devon Wildlife Trust and Dartmoor Preservation Association. This report has been prepared for the exclusive use of the Foundation for Common Land. No part of this report should be considered as legal advice.

## **2.0 METHODOLOGY**

### **2.1 Phase 1: Desk-based Research and Rapid Assessment**

2.1.1 Following a project inception meeting at the Dartmoor National Park Authority (DNPA) headquarters at Parke, and prior to survey work beginning on the ground, early-stage preparatory work was undertaken in order to provide background information for the survey and planting work. This included:

- Building a GIS project based on data provided by the project partners such as DNPA and the South West Partnership for Environmental and Economic Prosperity (SWEEP). This was combined with other information such as Forestry Commission modelling using Ecological Site Classification and climate modelling tools.
- Rapid assessment of the commons to be surveyed to ensure the survey methodology was fit for purpose.

2.1.2 Healthy and safety systems were put in place and agreed with project partners to ensure the safe delivery of the project outputs. For instance, these systems required volunteers to work in at least pairs and to sign on and off site using a project WhatsApp group specifically for health and safety issues. Insurance was arranged to cover the volunteer activities, with volunteer registration forms and risk assessments designed and approved for use as part of the project.

2.1.3 Discussions were held with other organisations, such as Historic England, regarding experience with volunteer led surveying and digital recording of results.

### **2.2 Phase 2: Healthy Trees for Tomorrow Survey**

2.2.1 Delivery of the survey involved developing a robust and repeatable survey methodology, in consultation with stakeholders, which was suitable for use by volunteers and for covering large and diverse areas including:

- Exposed moorland tops with individual scattered trees;
- Open ground with widely dispersed trees where natural regeneration may be occurring;
- More closely spaced trees leading up to the densely wooded fringes where more extensive natural regeneration may be occurring.

2.2.2 The intention was to balance the requirement for the survey methodology to provide sufficient baseline information to guide any proposals for increasing tree cover, whilst also being easy to record as part of a citizen science project taking place in remote areas. The large areas of land the survey needed to cover, in a very small survey window between leaf emergence and full bracken frond cover, guided the design of the survey method. As a result the survey was developed to provide a broad picture of current condition and trends rather than a statistically accurate sample count. It can be seen as a cost-effective way of gathering enough data to see trends and be repeatable in the future no matter what the budget

constraints. The combination of photography and survey will be able to be used for future condition trends on a tree by tree basis.

2.2.3 Following initial field trials, the survey technique was presented to and discussed with Dartmoor commoners and landowners. Their feedback was used to refine the methodology prior to the start of field survey.

2.2.4 A volunteer recruitment drive was undertaken to recruit a group of at least 20 volunteers for the 2022 survey season, to look at Holne and Harford/Ugborough Moors. The project was advertised through relevant local Facebook groups (e.g. Plymouth Tree Partnership, Ashburton and Ivybridge Facebook pages, Dartington Noticeboard Facebook page), DNPA's volunteer network and extensive networks of Corylus Ecology and Evolving Forests. Places at the training events were filled within a week .

2.2.5 Two training sessions were carried out for the volunteer surveyors: one at Harford Moor Gate and one at Venford Reservoir. The survey areas were subdivided to facilitate allocation of each 'patch' to a pair of volunteers; patches were mapped electronically on QGIS, with paper maps also provided to surveyors. Support was provided to all volunteers (primarily by phone, email and WhatsApp) to help them to carry out the survey.



Volunteer training event



Volunteer training event

2.2.6 Survey data gathered by the volunteers and project team were combined with desk-based information to draw up a baseline for open grown trees across the common. The survey area extended from the edge of existing woodlands to open moorland, with identification of recent natural regeneration in these areas. The survey results were recorded and mapped using GIS Cloud in the field (see Appendix 1) and later exported to programmes including MS Excel and QGIS for interrogation. A database was developed containing the full survey results, with attributes recorded including:

- Species;
- Altitude;

- Approximate height and stem diameter;
- Growth stage (e.g. sapling, semi-mature, mature, dying);
- Crown shape (e.g. fan, oval, spreading, cone, windswept);
- Health (including signs of any dieback, leaf discolouration, root exposure etc);
- Signs of browsing; and
- Presence of lichens or fungi.

2.2.7 For trees growing in a group of similar trees of the same species, the number of trees in the stand was also recorded. Additional details were recorded for certain attributes, such as ground conditions where saplings were recorded, details of browsing damage, presence of any dead limbs attached or near to the tree, or whether dead trees were standing or fallen.

2.2.8 Following feedback from surveyors and the project team, areas of bracken were prioritised for early completion; surveying these areas later in the season would have prevented recording of early stage natural regeneration which would be concealed beneath dense stands of bracken.

### **2.3 Phase 3: Increasing Tree Cover**

2.3.1 Following completion of the desk study, it was envisioned that the focus of Phase 3 would likely be on natural regeneration and using natural processes to increase tree cover in areas where trees are likely to successfully establish due to climatic and other conditions. This approach was still considered to be the most appropriate focus for the work following completion of the field survey. The survey results have been cross referenced with information such as the RSPB's Common Cause Vision for Birds (RSPB, 2019) to help guide the selection of suitable locations for increasing tree cover.

2.3.2 Planting could focus on transitional areas which form the soft boundaries between different habitat types, primarily woodland and moorland edges, which will usually tend towards woodland over time if protected from grazing/browsing. Such areas are often of high ecological value and have potential to offer significant opportunities for extending woodland cover in line with current government aims for nature recovery and increasing woodland coverage.

2.3.3 The draft planting plan has been designed by the project team and the survey volunteers, and will be refined with input from stakeholders and the project funders. Issues such as species mixes will be discussed with stakeholders prior to adopting the final planting plan.

2.3.4 Whilst it is envisaged that seed sources and nursery stock will be of local provenance, it is important to note that climatic and soil conditions on the Moor are likely to change over the lifetime of these new trees: for instance the Forest Research Decision Support Tool recommends alder over birch on these



commons (Forest Research, 2022). All planting work will follow the plant biosecurity measures outlined in Section 4, with further detail provided as part of the development process.

- 2.3.5 All areas treated with the different techniques will be monitored over the course of the project, and ideally beyond, to inform future tree planting projects.

### 3.0 SURVEY RESULTS AND EVALUATION

#### 3.1 Phase 1 Results: Desk-based Research and Rapid Assessment

- 3.1.1 It was considered that using mobile phones to record survey data would be the most appropriate option for this survey and following investigations into various apps available for this type of survey, GIS Cloud was considered to be the most suitable (see Appendix 1).
- 3.1.2 24 licenses were granted from GIS Cloud for use of their app, free of charge until August 2022 (representing a saving of £1,700). This enabled an app-based survey form to be developed. The form was designed to be used in the field, taking automatic GPS references for each survey point and recording key pieces of information for each tree, as well as at least one photograph; the form could be used off-line and would store data for automatic uploading once back in signal.
- 3.1.3 The field testing and site assessments also included meeting the landowner of Harford Moor, looking at existing trial plots for tree planting and regeneration, and meeting with the landowner on Walkhampton Common (following a recent project extension to include this area subject to funding), looking at existing tree planting plots near Cadover Bridge.



Regeneration plot on Harford Moor



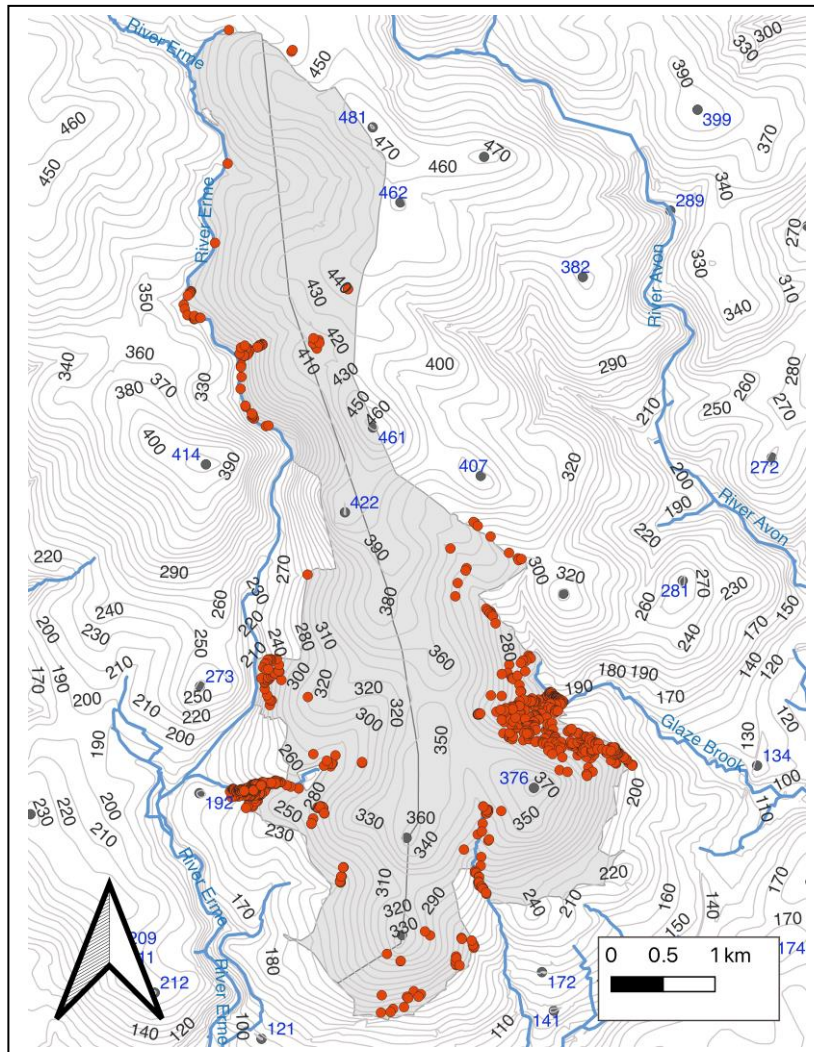
Tree planting plot near Cadover Bridge

#### 3.2 Phase 2 Results: Healthy Trees for Tomorrow Survey

- 3.2.1 Across the project area during 2022, a total of 2,758 trees and groups of trees were surveyed throughout Holne Moor and Harford and Ugborough Moors. This was achieved by 33 volunteers, over an estimated 80 days (640 hours) of survey time.
- 3.2.2 A total of 1,049 of these data points (either individual trees or groups of similar trees) were recorded by 14 volunteers across Harford and Ugborough Moors over 55 days (440 hours) during the period from May to July 2022 (shown as red dots on Map 2). In total this amounts to in excess of 1,398 individual

trees recorded across Harford and Ugborough Moors<sup>1</sup>. The majority of the trees recorded were found at the moorland fringes, close to existing wooded areas and/or watercourses. By comparison, relatively few trees were recorded across the open moorland tops.

**Map 2: All Trees/Groups of Trees Recorded**



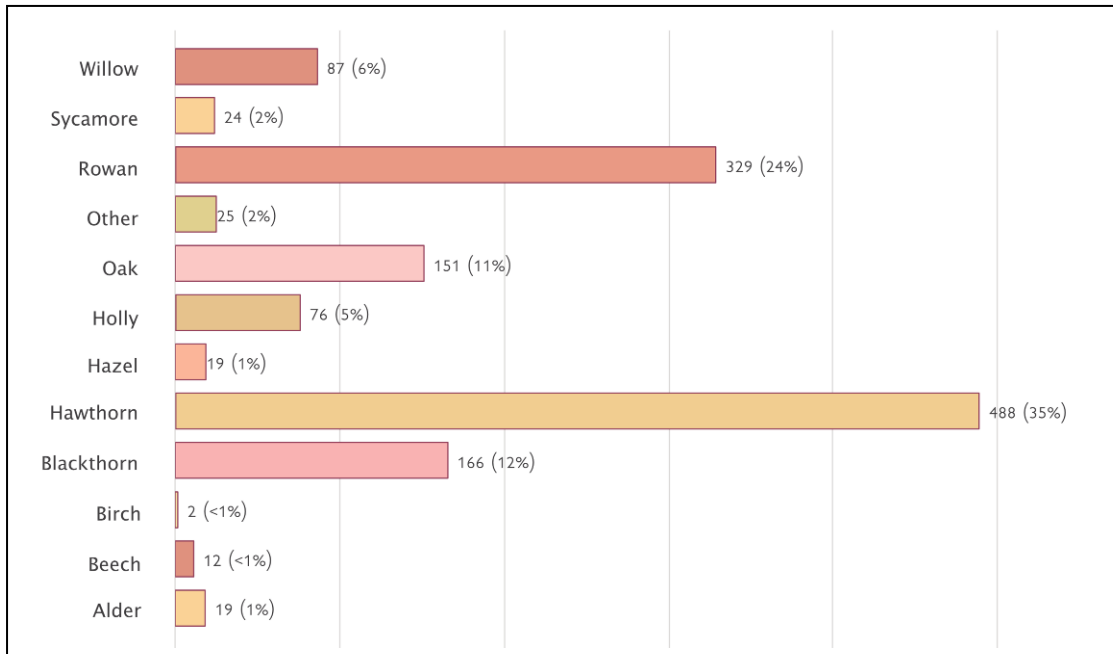
3.2.3 Of the 1,398 individual trees recorded across Harford and Ugborough Moors, the greatest number were hawthorn (488 trees or 35%), followed by rowan (329 trees or 24%), blackthorn (166 trees or 12%) and oak (151 trees or 11%). The remaining species – willow (87 trees), holly (76 trees), other (25 trees), sycamore (24 trees), hazel (19 trees), alder (19 trees), beech (12 trees) and birch (2 trees) – each formed less than 10% of the total (see Chart 1a).

3.2.4 408 trees were found in groups of trees of the same species and with all other attributes being similar within the group. The species most frequently found in groups were blackthorn, rowan and willow,

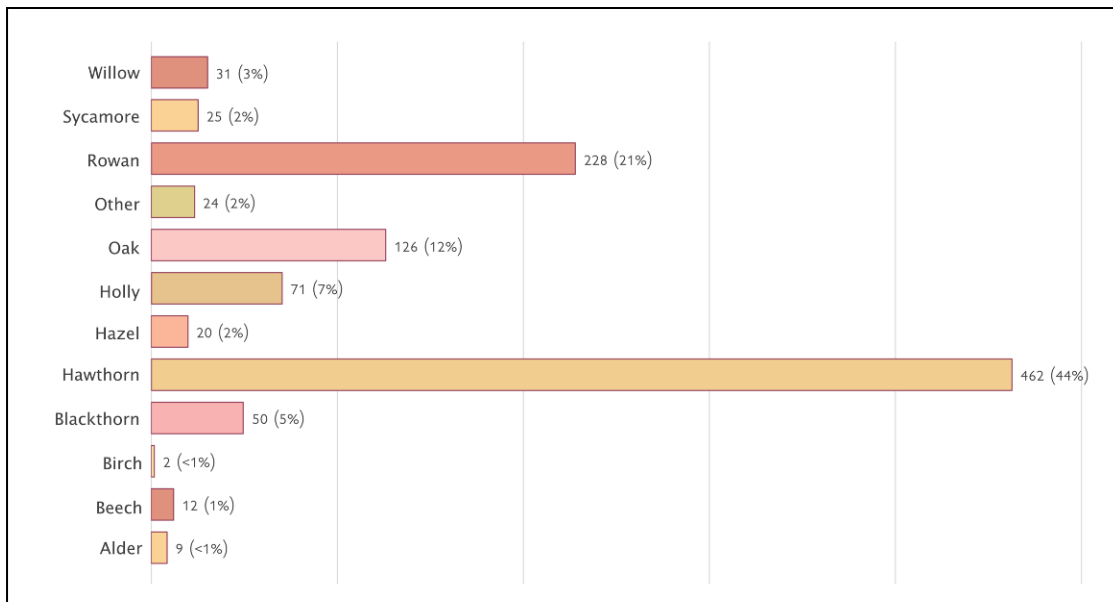
<sup>1</sup> It should be noted that the survey looked only at trees whose canopy was not contiguous with trees in a woodland block.

followed by hawthorn, oak and alder. Holly and sycamore were rarely found in groups and birch, hazel and beech were never found in groups. Considering each tree as a single data point rather than part of a group results in a slightly different breakdown of species (see Chart 1a and 1b).

**Chart 1a: Breakdown of Tree Species Recorded (for individual trees)**



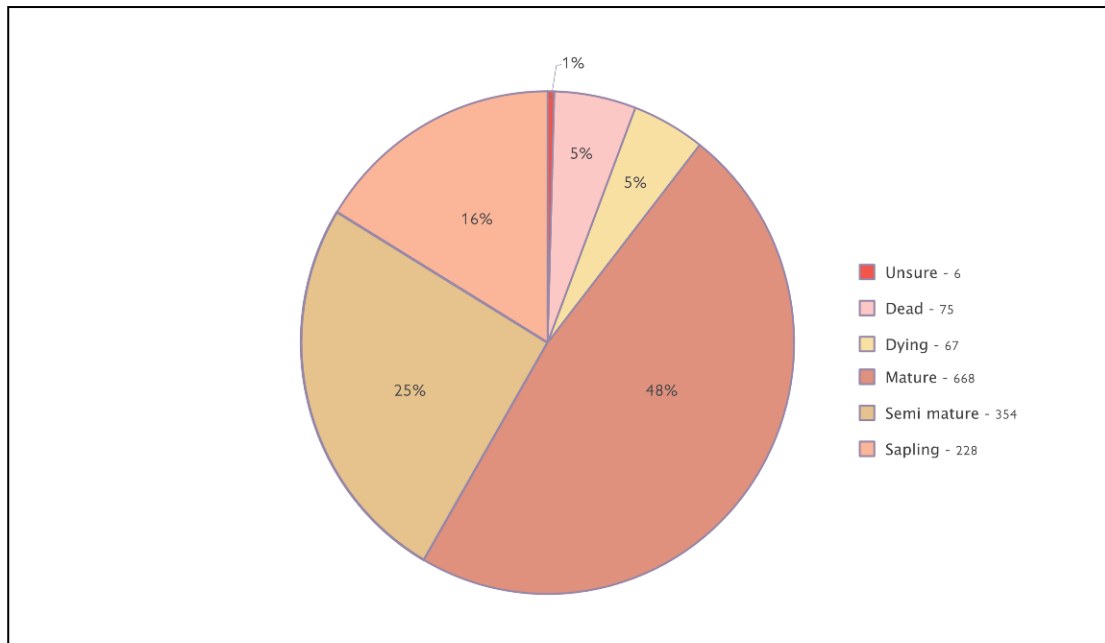
**Chart 1b: Breakdown of Tree Species Recorded (for groups and individual trees)**



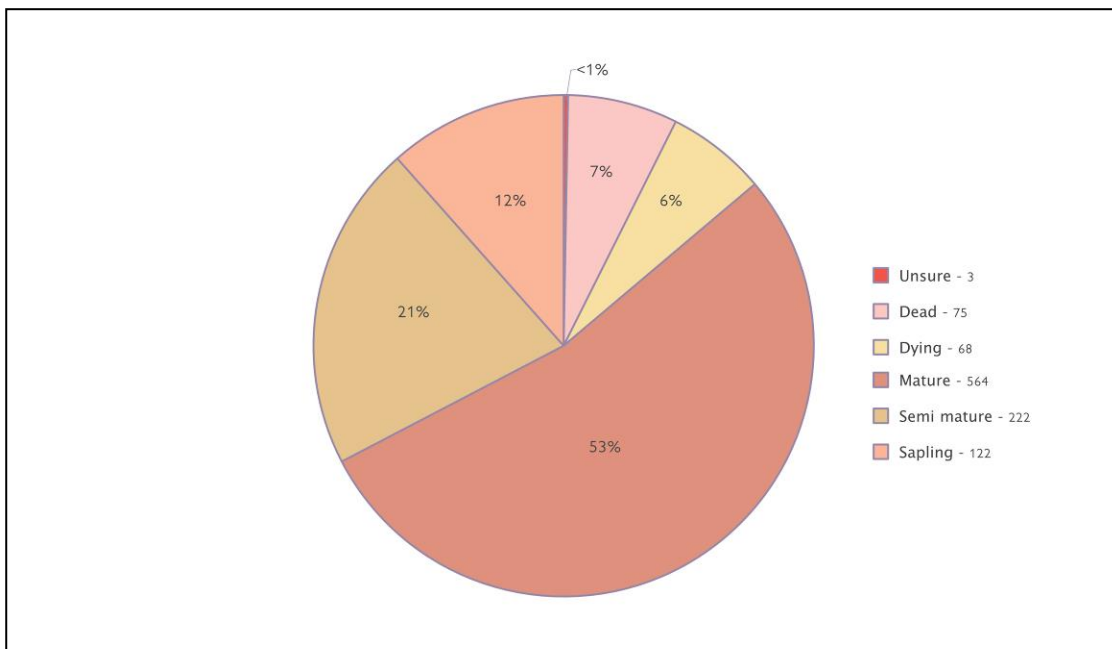
3.2.5 In relation to growth stages, for individual trees (Chart 2a), around half of all trees recorded were mature (668 trees or 48%), one quarter were semi-mature (354 trees or 25%), around one sixth were saplings (228 trees or 16%), and one tenth were dying or dead (67 dying and 75 dead trees, equating to 5% in

each category). The percentage breakdown of results for tree growth stages is broadly similar when considering individual trees or groups of trees (see Charts 2a and 2b for comparison).

**Chart 2a: Breakdown of Tree Growth Stages (for individual trees)**



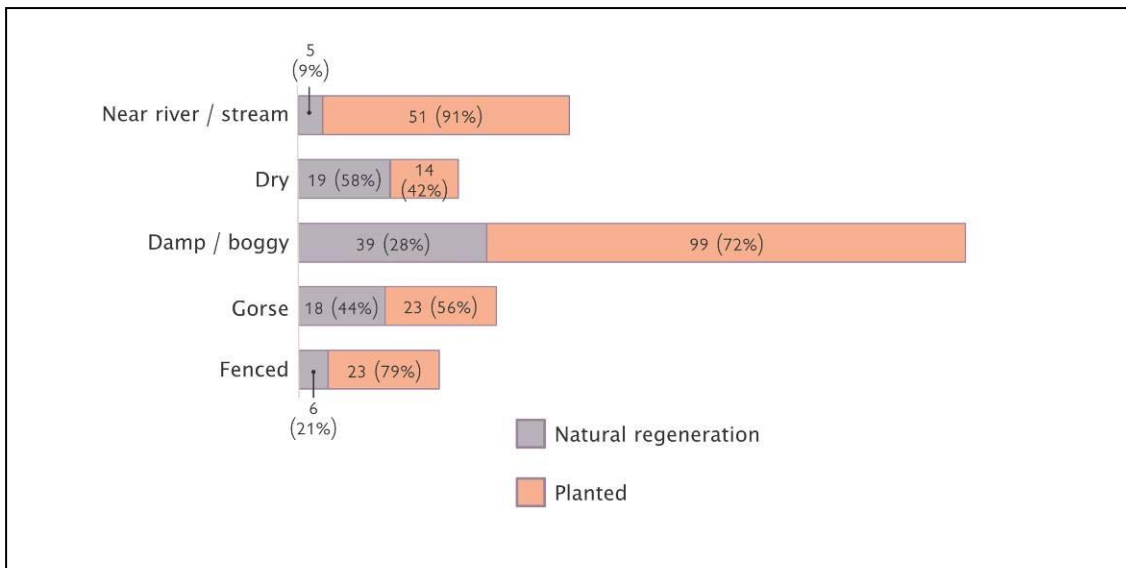
**Chart 2b: Breakdown of Tree Growth Stages (for groups and individual trees)**



3.2.6 Where saplings were recorded (see Map 3), additional details such as whether they were natural regeneration or planted trees, as well as general observations on where they were located., were also noted (see Chart 3). 86 individual saplings were recorded as being natural regeneration (38%),

compared to 142 which were considered to have been planted (62%). 29 of these saplings were within areas protected by fencing, of which 6 were natural regeneration (21%) and 23 were planted (79%). 41 saplings were recorded within areas of protective vegetation, typically gorse, bracken, brambles or other trees, of which 18 were natural regeneration (44%) and 23 were planted (56%). 138 of the recorded saplings were within damp or boggy areas, of which 39 were natural regeneration (28%) and 99 were planted (72%). 56 saplings were recorded near rivers or streams, of which 5 were natural regeneration (9%) and 51 were planted (91%). 33 saplings were recorded as being in dry or free draining areas, of which 19 were natural regeneration (58%) and 14 were planted (42%).

**Chart 3: Sapling Observations Recorded**



3.2.7 31% of the saplings were found in areas protected from grazing/browsing (see Table 1): 13% within fenced areas and 18% within areas of protective vegetation. In each case, 10% of the total comprised planted saplings. 3% of total saplings were naturally occurring and within fenced areas, which more than doubled to 8% for natural regeneration recorded within protective vegetation.

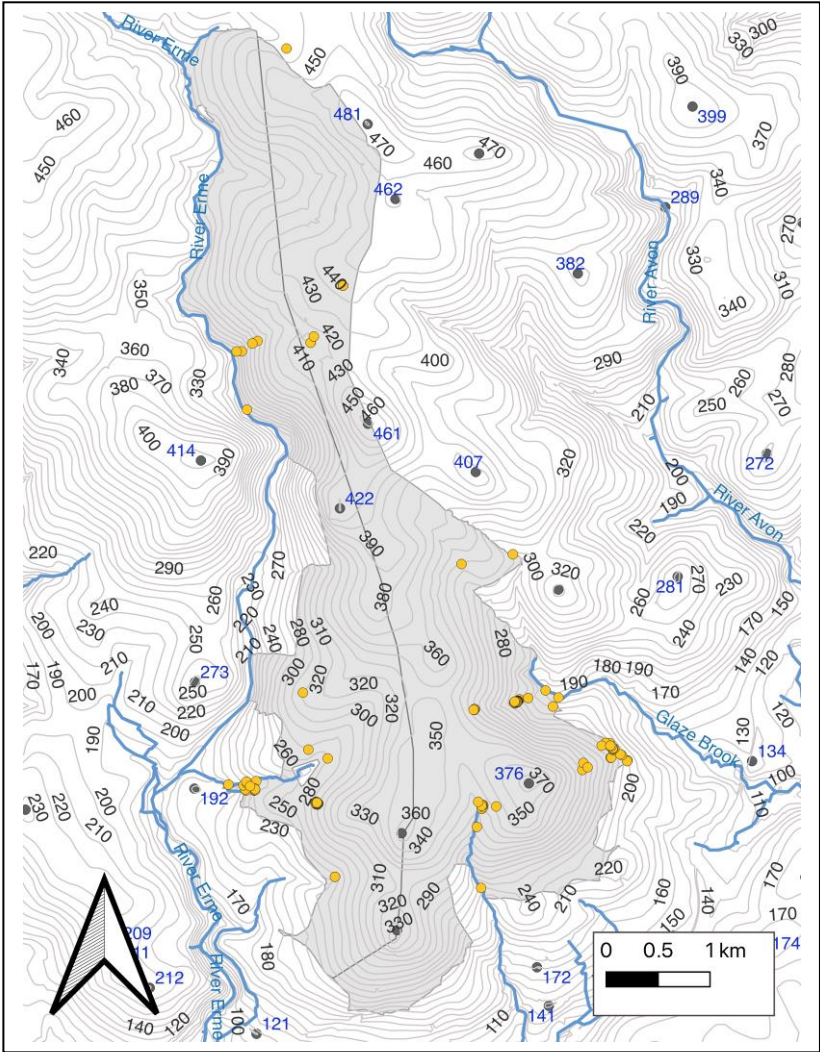
**Table 1: Percentage of Total Regeneration**

	Regeneration	Planted	Total
<b>Total</b>	38	62	100
<b>Fenced</b>	3	10	13
<b>Protective vegetation</b>	8	10	18
<b>Damp/boggy areas</b>	17	43	61
<b>Near river/stream</b>	2	22	25
<b>Dry areas</b>	8	6	14



3.2.8 In terms of broad habitat type, 61% of total saplings were recorded in damp or boggy areas and a further 25% were near a river or stream (see Map 3). Planted saplings were particularly associated with these habitat types, with 43% of total saplings being planted and in damp or boggy areas (compared to 17% for natural regeneration) and 22% were planted and near a river or stream (compared to 2% for natural regeneration). 14% of total saplings were recorded in dry habitats, with 6% being planted specimens and 8% natural regeneration.

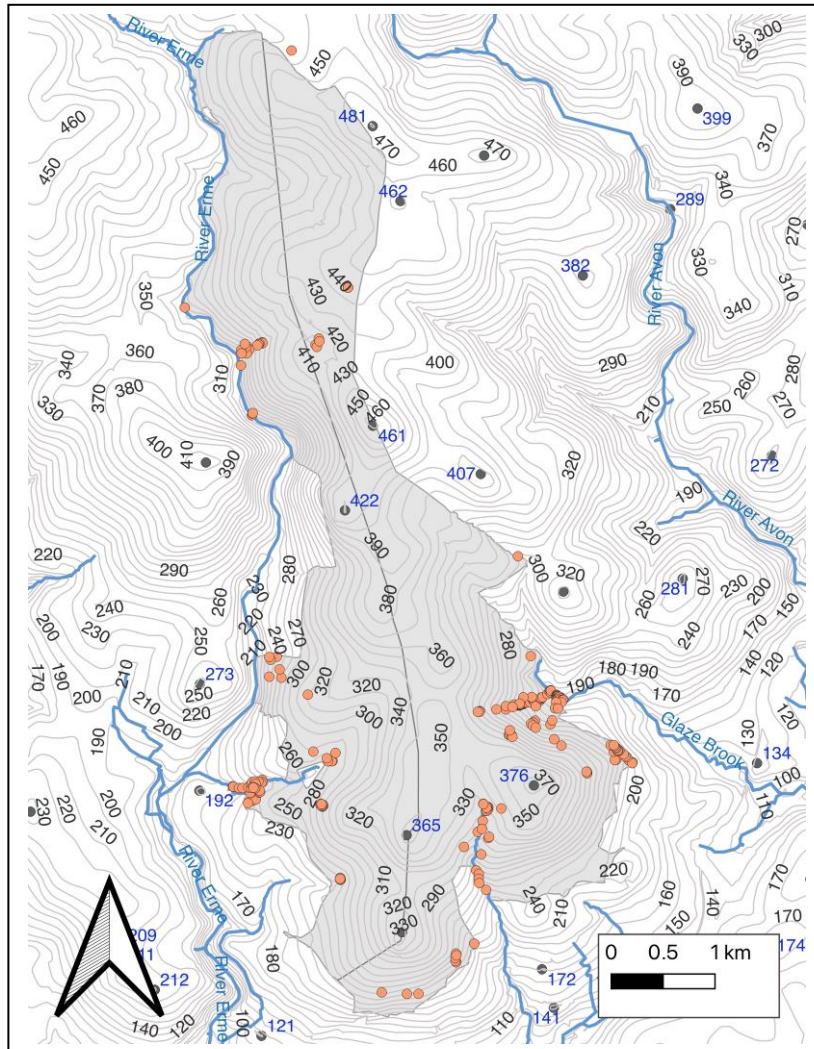
**Map 3: Locations of All Recorded Saplings**



3.2.9 966 individual trees, or 69% of the total, were considered to be healthy (see Map 4) and 432 (31% of the total) were not considered to be healthy. 558 trees (40%) were recorded as having dead limbs attached, 555 trees (40%) were recorded as having dieback present, 250 trees (18%) as having dead limbs on the ground nearby, 194 trees (14%) with root exposure, 132 trees (9%) as having leaf discolouration, and 43 trees (3%) with bare ground under the tree. These categories tended to have a large degree of overlap,

for example the trees with dieback were also likely to have dead limbs attached or nearby, and trees with bare ground under the tree usually also had root exposure.

**Map 4: Locations of Healthy Trees/Groups of Trees**



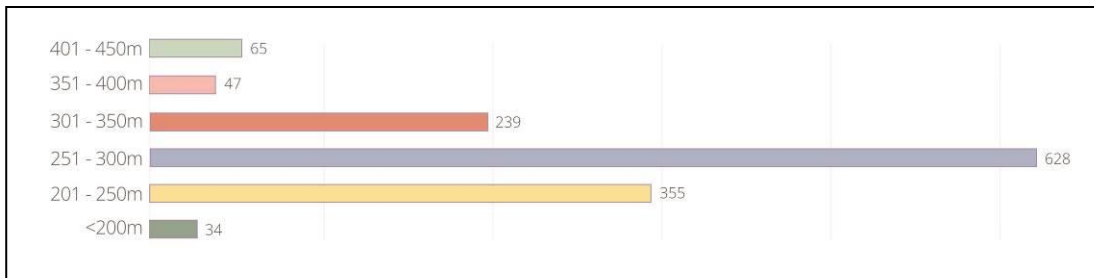
3.2.10 961 trees (69%) showed no signs of browsing, compared to 437 trees (31%) which showed signs of browsing. Where browsing was recorded, additional detail was included in the survey form; this was a descriptive element, with the reports varying from 'historic' or 'minor', 'animal rubbing' and 'bark knawed', to 'some branch ends eaten off' or 'tips of all branches stripped'. Anecdotal evidence reported by the volunteers was that a lot of rowan saplings seemed to have tips that had been browsed.

3.2.11 A number of other attributes were recorded (see Charts 4-6), including altitude, approximate height and stem diameter, crown shape (e.g. fan, oval, spreading, cone, windswept) and the presence of lichens or fungi. The altitude at which trees were recorded ranged from 173m to 436m, with almost half of the trees (46%) being recorded at an altitude of between 250m and 300m. Estimates of tree height ranged from

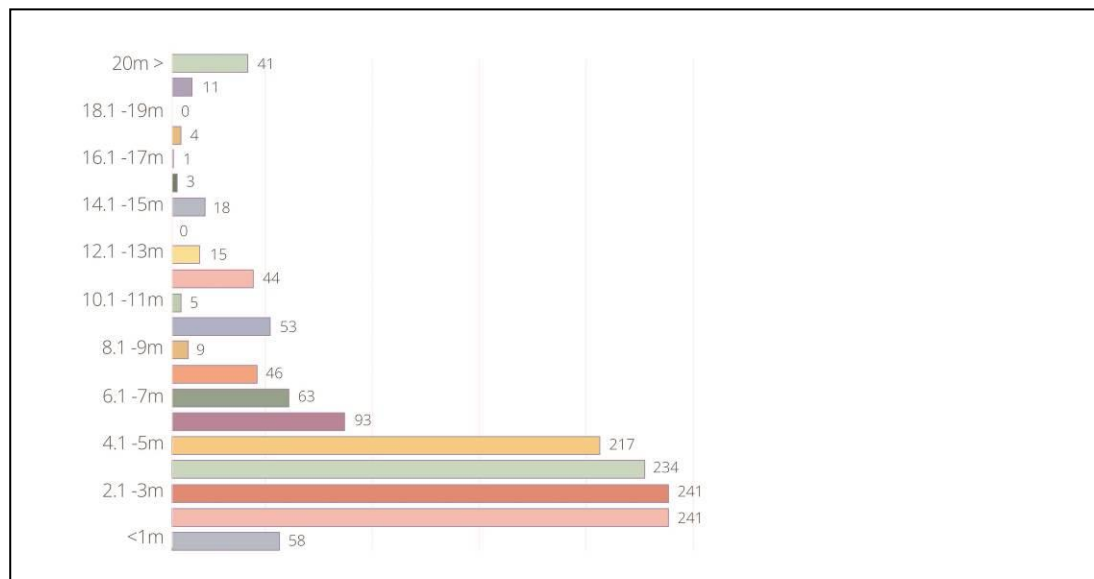


0.05m to greater than 20m, with around two thirds of trees (67%) being between 1m and 5m tall. Stem diameter ranged from less than 5cm to greater than 80cm: the highest proportion are in the smallest category of <5cm (25%); almost half of the trees (46%) are in one of the four categories between 5cm and 25cm; less than one tenth (9%) of trees have a stem diameter of greater than 50cm.

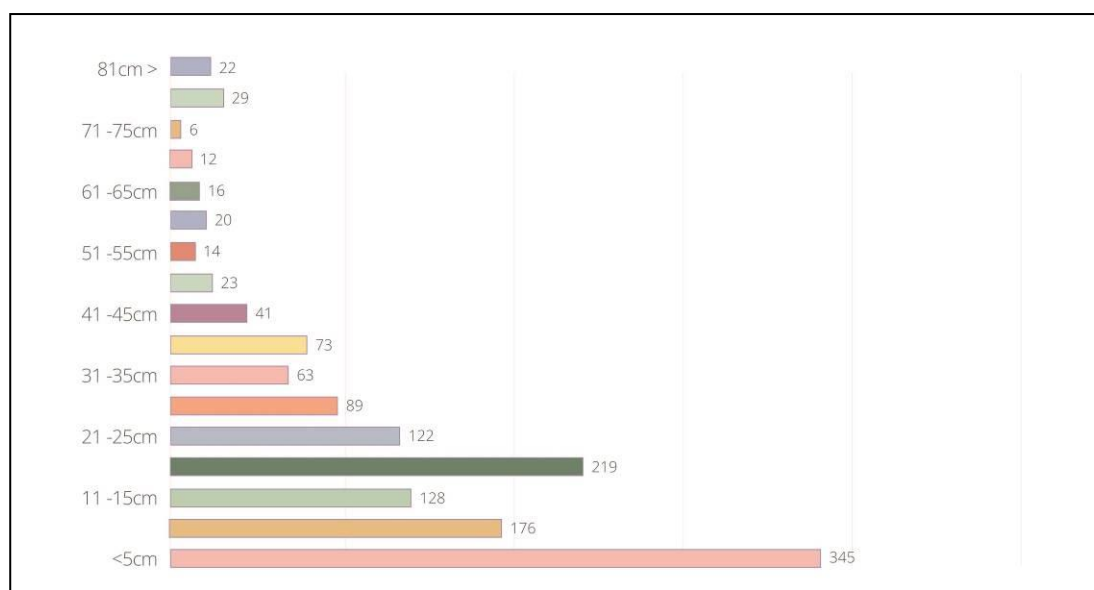
**Chart 4: Recorded Altitude (m) of Individual Trees**



**Chart 5: Recorded Height (m) of Individual Trees**



**Chart 6: Recorded Stem Diameters (cm) of Individual Trees**



- 3.2.12 Regarding crown shape, of the 1,398 individual trees recorded, 597 trees (43%) were recorded as spreading, 295 trees (21%) oval, 231 trees (17%) fan, 118 trees (8%) unclear or not applicable, 94 trees (7%) cone, and 63 trees (4%) windswept (see Appendix 2).
- 3.2.13 Lichens can be broadly grouped into three main types: crustose (encrusting), foliose (leaf-like) and fruticose (branching). 668 trees (48%) had all three types (see Appendix 2). 228 had crustose and foliose lichens, 21 had foliose and fruticose, and 4 had crustose and fruticose. 149 trees had only crustose lichens, 18 only foliose and 4 only fruticose. 306 trees (22%) had no lichens recorded. Of those trees with no lichens, 184 were saplings, 96 were semi-mature, 8 were mature, 7 dead and 1 dying. In addition, the presence of fungi was also recorded: 173 trees (12%) were recorded as having fungus present.

### **3.3 Survey Evaluation**

- 3.3.1 By working with a group of 33 volunteers throughout the summer of 2022, Corylus Ecology and Evolving Forests have delivered a survey of open grown trees on several commons on Dartmoor. The survey results were gathered during an estimated 80 days (640 hours) of survey time across Harford/Ugborough Moors and Holne Moor, of which 55 days (440 hours) were on Harford and Ugborough Moors. This has provided baseline information on the number, age, distribution and health of individual trees on these commons.
- 3.3.2 Given the limitations of this type of survey, it is not intended that the results should be scientifically robust. It is accepted that the survey may not have recorded every individual tree present on these moors and that there will be a margin of error as this was a citizen science project for which much of the data collected were qualitative; however, it is considered that these data provide a useful insight into the tree populations on these moors and provide the information necessary for developing proposals for increasing tree cover in these areas (see Section 4).
- 3.3.3 This work was funded by the National Lottery Heritage Fund and other partners, and has been carried out in relation to a tree regeneration project for several commons on Dartmoor, which forms part of the Our Upland Commons project through the Our Common Cause Partnership. The survey has been delivered thanks to the dedicated group of volunteers who gave up their time and effort to collect the data requested.
- 3.3.4 Around 1,400 trees have been recorded across Harford and Ugborough Moors. As had been expected, the majority of these trees were found at the moorland fringes, close to existing wooded areas and/or watercourses, with relatively few trees recorded across the open moorland tops.

- 3.3.5 At least 11 tree species were recorded across the survey area. Around one third of the trees recorded were hawthorn, one quarter were rowan and one sixth each of blackthorn and oak. The other species recorded - including willow, holly, sycamore, hazel, alder, beech and birch - were found in small numbers. Around one third of the trees were recorded growing in groups of similar trees, particularly blackthorn, rowan and willow.
- 3.3.6 Almost half of all trees recorded were mature, one quarter semi-mature, around one sixth saplings, and one tenth dying or dead. A total of 810 of the trees surveyed were considered to be in the mature, dying or dead categories, which represents 58% of the total, compared to only 16% which were recorded as being saplings. It is acknowledged that some saplings may have been missed by this survey, for instance given the difficulty of finding very small saplings that may have suffered browsing damage. However, the survey results imply that the tree population across Harford and Ugborough Moors is generally advanced and would benefit from rejuvenation.
- 3.3.7 Almost two thirds of the saplings recorded were considered to have been planted, with the remaining one third considered to be naturally occurring. Around one third of saplings were found in areas protected from grazing/browsing, whether within fenced areas or areas of protective vegetation. These results have not been subject to statistical analysis but there appears to be a stronger association with natural regeneration occurring within areas of protective vegetation rather than within fenced areas.
- 3.3.8 Previous planting schemes appear to have favoured damp habitats and areas near rivers and streams, with two thirds of planted saplings being recorded in such habitats. Although less pronounced, there also appears to be a relationship<sup>2</sup> between natural regeneration and these habitat types, with around one fifth of naturally occurring saplings in such areas, compared to less than one tenth recorded in dry or freely draining habitats.
- 3.3.9 Over two thirds of the total trees were considered to be healthy, compared to almost one third of trees which were considered to be unhealthy. A number of features were recorded which could be related to tree health, including signs of dieback, leaf discolouration or the presence of dead limbs; a large degree of overlap was noted for these categories. Two fifths of the trees had dead limbs attached or showed signs of dieback, and almost one fifth had dead limbs on the ground nearby. Around one tenth had root exposure or leaf discolouration.
- 3.3.10 Similarly, over two thirds of trees also showed no signs of browsing, compared to almost one third of trees which showed signs of varying degrees of browsing damage. Anecdotal evidence from one of the volunteers shows that lots of saplings protected by gorse were recorded and plenty of mature trees but

---

<sup>2</sup> It should be noted that these results have not been subject to statistical analysis.

not many in between those stages, with a query raised as to whether saplings were later being browsed off before reaching semi-maturity. This question could be addressed through revisiting areas where saplings were recorded during the next few growing seasons.

- 3.3.11 Various other attributes were recorded, including altitude, approximate height and stem diameter, crown shape and the presence of lichens or fungi. In combination, the data recorded help to build up a picture of the open grown trees present across the commons of Harford and Ugborough Moors. These data will form a useful baseline for assessing change over time and will be used to inform future management decisions. Repeating this survey in future, perhaps at intervals of 10-15 years, would help to build up a picture of change in tree cover across these moorlands over time.

## **4.0 PROPOSALS FOR INCREASING TREE COVER**

### **4.1 Phase 3: Increasing Tree Cover**

4.1.1 Various approaches to increasing tree cover have been considered. These include:

- Natural regeneration, for example leaving fenced areas free of browsing or adjusting the current grazing regime to enable naturally occurring regeneration to become established and to test the efficacy of stored seed already present;
- Conventional planting of 'whips' using tubes and stakes and standard spacing;
- Very dense planting of whips/bare root stock that allows the density of planting to act as the protector;
- No till type planting, using collected local seed spread in fenced areas.

4.1.2 A number of areas on Harford and Ugborough Moors, where increasing tree cover could be considered to be appropriate, have been proposed for discussion with landowners and commoners as well as other stakeholders including DNPA and Natural England. These have been developed using the results of the tree survey and research phase of the project, in combination with available information such as the RSPB's Vision for Birds (RSPB, 2019), with initial input from commoners, landowners and other stakeholders, such as Dartmoor National Park Authority's Ecologist and Dartmoor Headwaters Officers. The intention has been to find areas which would be suitable for increasing tree cover and which would also be complementary in terms of land use and existing features of importance; this will need to be confirmed through wider consultation with relevant stakeholders before any work commences on the ground.

4.1.3 A diversity of species is proposed for each area but this is an important part of the decision-making process which will be refined through consultation with landowners and commoners. It will be important to ensure species are suitable for the area in question and likely to result in a long-term increase in tree cover; and for disease resilience and biosecurity.

4.1.4 Following completion of the survey of open grown trees on Harford and Ugborough Moors, a number of areas have been identified in which it is considered that increasing tree cover could potentially be appropriate. It should be noted that, at this stage, the proposal is to increase tree cover in a small number of trial areas, rather than to carry out large-scale tree planting. However, if it were considered appropriate, and subject to the necessary agreement, consents and funding, this preparatory work could potentially be used to input into a wider tree planting initiative at a later date.

4.1.5 The proposal for increasing tree cover on Harford and Ugborough Moors can be broadly separated into two different approaches: firstly, protection of naturally occurring regeneration and, secondly, new tree

planting. In addition, the use of control area/s is proposed in order to be able to assess whether any changes would occur in the absence of any treatment.

- 4.1.6 Prior to any work beginning on the ground it will clearly be essential to have agreement and all necessary consents in place. This draft planting proposal is therefore issued for consultation with local landowners and Dartmoor commoners, as well as with other key stakeholders including DNPA and Natural England. As part of the stakeholder consultation process it is important that wider issues are considered, such as whether the areas proposed as potentially being appropriate for increasing tree cover are of existing value - for instance ecological, archaeological or agricultural - to which an increase in tree cover would be detrimental. Following consultation, the proposals will be further refined, as necessary.
- 4.1.7 The primary approach for increasing tree cover on Harford/Ugborough Moors focusses on encouraging natural regeneration by reducing grazing/browsing pressure through two contrasting methods, which will be applied in different settings dependant on whether the regeneration is present as scattered or grouped saplings. The proposal to encourage natural regeneration has inherent advantages over other methods (such as planting), including biosecurity benefits and the fact that the trees will be those that are naturally suited to the particular growing conditions in which they are found. In addition, the costs associated with encouraging natural regeneration will be significantly lower compared to planting.
- 4.1.8 **Scattered regeneration:** Initially, it is proposed to use a variety of techniques to protect the scattered regeneration that has been mapped as part of the 2022 volunteer survey. Techniques would include, for instance, the use of tree guards surrounded by gorse brush piles to protect the saplings; this technique has been trialled on Spitchwick Common (see photo below). The aim would be to begin this work on the ground during 2022.
- 4.1.9 **Grouped regeneration:** Once the necessary consents can be secured, fencing would be erected around areas where groups of naturally occurring saplings have been mapped (see example photo below). In addition, this approach would test the efficacy of stored seed already present in these areas. Depending on timings for seeking agreement and consent, it is anticipated that this work could begin on the ground in 2023.
- 4.1.10 **Planting:** The next approach is to carefully select areas to investigate a number of approaches to planting to test what will work best in this part of Dartmoor. It should be noted that planting trees will be very costly compared to other proposed approaches: each tree will require stock-fencing to avoid browsing damage, as well as tube and stake to protect from wind. As with the grouped regeneration plots, depending on timings for seeking agreement and consent, it is anticipated that this work could begin on the ground in 2023.



Protection of individual saplings on Spitchwick Common



Protection of grouped regeneration on Harford Moor

- 4.1.11 **Control:** The establishment of a number of trial plots will be an important element of this work, in order to illustrate what changes, if any, would happen naturally over time. This will involve fencing a small area which does not currently include any natural regeneration; livestock will be excluded from these areas, although no other treatments will occur within the plots. As the erection of fencing will require agreement and all necessary consents to be in place, it is anticipated that this work could begin on the ground in 2023.
- 4.1.12 Working with nature, for instance through encouraging natural regeneration where feasible rather than importing trees, will mean environmental good practice can be followed. By focussing on natural regeneration and direct seed dispersal, biosecurity can be maximised. Where plants need to be bought in, locally grown whips sourced from local nurseries would be used where possible, in order both to reduce costs and to improve biosecurity. Additional biosecurity and environmental good practice measures will be developed as part of the ongoing design process to ensure the highest possible standards are achieved.
- 4.1.13 For each of the above techniques, as mentioned in paragraph 4.1.6, all necessary consents will need to be put in place before work can begin on the ground. In addition to agreement from landowners and commoners, as well as other stakeholders, this will include measures such as registering with the Rural Payments Agency any change to non-agricultural land, and also seeking consent from the Planning Inspectorate on behalf of the Secretary of State for Environment, Food and Rural Affairs to carry out any works that would prevent or impede access to common land, such as fencing. It should be noted that in certain circumstances<sup>3</sup>, where the aim is nature conservation, it is not necessary to seek consent for temporary fencing of moorland areas for up to five years.

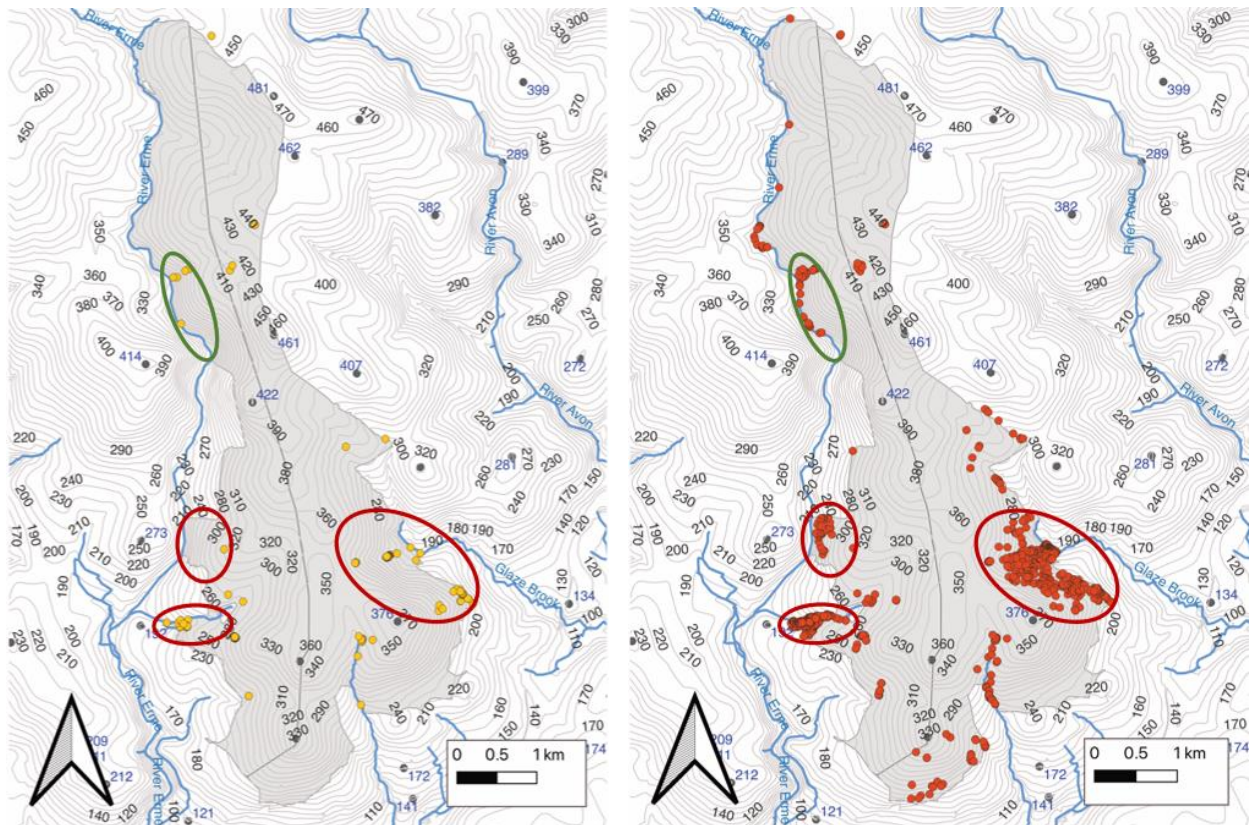
---

<sup>3</sup> The area to be fenced off must be less than 1% of the area of the registered common (in combination with other areas if applicable), the work must be done by or with written consent from the landowner and there must be written agreement with Natural England or the Secretary of State requiring the conservation of nature (Gov.uk, 2022).



4.1.14 Using the results of the tree survey, in combination with other available information (see Appendix 3) such as the RSPB’s Vision for Birds and with input from commoners and landowners, as well as other stakeholders such as DNPA’s Ecologist and Dartmoor Headwaters Officers, a series of areas have been selected as potentially appropriate for increasing tree cover on Harford and Ugborough Moors (see Map 5).

**Map 5: Potential Areas for Increasing Tree Cover (overlaid on a. saplings and b. all trees)**



Note: Area colours relate to RSPB vision map (green = potential woodland/tree expansion; red = bracken/scattered trees)

4.1.15 Map 5a shows the potential planting areas overlaid on the saplings results map, while Map 5b shows the potential planting areas overlaid onto the map of all recorded trees. The colours selected for the potential planting areas shown in Map 5 correspond with the colours from the RSPB vision map (see Appendix 3), which states for the green area in the north “Small areas of woodland and scattered trees on the steep slopes of the Erme, beyond and contiguous with Piles Copse, will extend along the river valley...”, for the red areas to the south-west “Some steeper slopes will have developed a largely un-grazed mosaic of western gorse, bracken and scattered tree scrub and even pockets of closed canopy woodland...” and for the red area to the south-east “As in the Erme Valley, small areas of more varied vegetation structure will occur on the lower slopes, with scattered trees, mature gorse and light bracken...”. The areas shown



on the RSPB's map appear to correspond well with the findings of the survey and also with the areas outlined in the owners' and commoners' visions for the area (see Appendix 3).

- 4.1.16 The aim is that increasing tree cover in such areas would also provide other benefits, for example there are potential benefits for natural flood management by following flowpathways and focussing on riparian areas, which will be further discussed with the Dartmoor Headwaters Officers on site. Opportunities for seeking match funding for the practical element and ongoing monitoring of this project will also be investigated.
- 4.1.17 It should be noted that this report focusses on looking for areas where increasing tree cover could be feasible, based on the survey results, and does not look for reasons why particular areas should not be considered. Clearly there may be constraints which mean increasing tree cover may not be a viable option for certain areas; for instance, it is known that the northern area shown on Map 5 lies within an area of nature conservation importance, which is reflected in its inclusion within both a Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). Therefore stakeholder consultation will be carried out, prior to practical work beginning on the ground, to identify constraints which may impact on the proposals for increasing tree cover.

## **4.2 Future Management and Monitoring**

- 4.2.1 The management objectives and opportunities of any increased tree cover will need to be considered beyond the small-scale trial planting which forms part of the current project. Management approaches will need to have overarching objectives which could include:
- Ensuring the continued widespread and dispersed tree cover on the Moor of primarily hawthorn.
  - Connecting existing areas of trees along rivers. One area we feel tree planting could make a significant difference is in creating connectivity between established woodlands. On Harford the most obvious example is connecting the highest trees on the Erme south of Erme's Plains with Piles Copse and Piles Copse with Burford Down to create one ribbon of unfragmented woodland. This would create an ecological corridor that will contribute to soil health and, in the long-term, allow for natural genetic diversity to be increased in the tree cover.
  - Creating an environment of montane scrub that could include widely dispersed trees leading down in altitude to scrub and further down into river valleys of ribbons of willow/alder and oak woodlands.
  - Investigating how tree cover can work with and enhance grazing potential on the Moor.
- 4.2.2 With planting plans should come economic models that would cover:
- Potential costs. These will be monitored within this project to act as a model for any future work.

- Potential grant income for planting and management. This should include monitoring new agri-environment schemes for agroforestry type incentives.
- Potential private income, for instance from carbon accounting or biodiversity net-gain payments/initiatives. It is unlikely carbon accounting will provide much in the planting of widely dispersed slow-growing hawthorn but in less marginal areas this could be a significant source of income.

4.2.3 At the point where planting plans are confirmed, a long-term monitoring plan needs to be put in place. The current project is funded to spring 2024 by which time even the oldest plots will only have seen one summer of growth. Monitoring beyond this time needs to consider:

- Continued monitoring of all saplings in the first five years, ensuring any tree tubes, protective brush piles, or growing vegetation such as gorse and bramble, and/or fencing remain in situ and in functional condition and are fulfilling their roles of protecting tree growth. Carrying out practical works on the ground to address any issues that are identified through this monitoring programme.
- Monitoring all saplings for at least five years to ensure any planted saplings that are lost are replaced and, for any natural regeneration that is lost, additional saplings should be identified and protected to ensure no net loss of naturally regenerating saplings.
- Monitoring of tree growth over a ten year period to inform future planting plans.
- Promoted regeneration and new planting needs to be noted and surveyed regularly against each other to assess the viability of different management regimes.
- At five years an assessment needs to be made of any fencing and tree tubes to allow them to be removed at the earliest point at which the trees are thought to be established enough to withstand environmental threats and grazing.

## 5.0 CONCLUSIONS

- 5.1 A citizen science survey of open grown trees on several Dartmoor commons, including Harford Moor and Ugborough Moor, has been carried out by a group of 33 volunteers, led by Corylus Ecology and Evolving Forests, working with the Foundation for Common Land. The survey methodology was designed in consultation with Dartmoor National Park Authority and refined following consultation with Harford and Ugborough Commoners' Association.
- 5.2 This work has been carried out in relation to a tree regeneration project for several commons on Dartmoor, which forms part of the Our Common Cause ~ Our Upland Commons project. The work was funded by the National Lottery Heritage Fund and other partners, as part of the Our Upland Commons project led by the Foundation for Common Land.
- 5.3 The aim of this work is to address the core objectives of the project, which are to better understand the number, age, distribution and health of individual trees on commons and to inform two tree planting trial projects on Dartmoor. There are a number of limitations of this type of survey but it is considered that the core objectives have been met. The findings of the survey have been used to develop draft tree planting proposals for Harford and Ugborough Moors, which are now available for further consultation with stakeholders.
- 5.4 The survey recorded approximately 1,400 trees across Harford and Ugborough Moors during 440 hours (55 days) of survey time. At least 11 tree species were recorded across the survey area, with the majority of trees recorded being hawthorn, rowan, blackthorn or oak. The other species recorded include willow, holly, sycamore, hazel, alder, beech and birch. Around one third of the trees were recorded growing in groups of similar trees, particularly blackthorn, rowan and willow.
- 5.5 Over half of the recorded trees were in the mature, dying or dead categories, compared to around one sixth of the recorded trees being saplings. Around one third of the saplings recorded were found in areas protected from grazing/browsing.
- 5.6 Over two thirds of the total trees were considered to be healthy. Similarly, over two thirds of trees showed no signs of browsing, compared to almost one third of trees which showed signs of varying degrees of browsing damage. Various other attributes were recorded, including altitude, approximate height and stem diameter, crown shape and the presence of lichens or fungi.
- 5.7 There is much additional analysis and interpretation that could be made from the data which have been collected, therefore the raw data will be made available to the Harford and Ugborough Commoners'

Association and other stakeholders, although it is important that the limitations of this survey should always be borne in mind.

- 5.8 At this stage, the draft planting proposals are twofold: 1) encouraging natural regeneration in areas of either scattered or grouped saplings which are naturally occurring on the commons, using different techniques in the different settings; and 2) planting locally sourced whips in fenced enclosures. In addition, the use of control plots has been proposed and is considered to be an important element of this work. The proposals will be refined, if necessary, following consultation.
- 5.9 The citizen science survey undertaken on Harford and Ugborough Moors during 2022 has provided a unique insight into the southern edge of the Moor. The majority of the survey at Holne Moor is also near completion and is revealing that this area is very different in character; this will be discussed in a separate survey and planting report following completion of the survey there in 2023. It is hoped that in 2023 Walkhampton Common will also be surveyed; this will again provide a different landscape, being extensively quarried but also facing directly onto the prevailing weather. We would recommend that, if possible, areas on the east and north of the Moor be considered for future surveying as both offer differing habitats and environmental conditions. This would give a fuller picture of the state of trees on the Moor and allow a more complete analysis of future potential.

## REFERENCES

Forest Research. (2022) *Decision Support Tool*. Available from: <http://www.forestdss.org.uk/geoforestdss/>.

[Accessed to October 2022].

Gov.uk. (2022) *Guidance: Carrying out works on common land*. Available from: <https://www.gov.uk/guidance/carrying-out-works-on-common-land>. [Accessed to October 2022].

Harford and Ugborough Commoners' Association. (2019) *Harford and Ugborough Combined Management Map*. Created in June 2019 to combine the owners' and commoners' visions following separate exercises under the pilot phase of the Our Common Cause project; draft for later discussion pending agreement.

Harford and Ugborough Commoners' Association. (2016) *Harford and Ugborough Enclosure Locations Map*. Created in January 2016 by John Howell to show where he had placed the enclosures on behalf of HUG.

Natural England. (2021) *Multi-Agency Geographic Information for the Countryside (MAGIC) website*. Available from: <http://magic.defra.gov.uk/>. [Accessed to October 2022].

Royal Society for the Protection of Birds (RSPB). (2019) *Harford and Ugborough Moors Common Cause Vision for Birds*.

## FIGURES

Figure 1 - Annotated Photographs



Hawthorn group



Willow group



Dieback



Dieback



Leaf discoloration



Root exposure, bare ground





Hawthorn



Rowan



Oak sapling



Rowan sapling



Fungus



Lichen



**APPENDICES**

## Appendix 1 – Survey Form

13:40

GIS Healthy Trees survey

GPS  Pinpoint  Accuracy: 11m

Volunteer username

Date

Common name  
 Ugborough  
 Harford  
 Holne

Number of trees  
 Single stem  
 Multi stem/ Coppice  
 Group

Photo of tree  
 Place your meter stick against the trunk. Standing back a few paces take a photo that allows full view of the tree - base to canopy

13:40

GIS Healthy Trees survey

Species

Alder  
 Beech  
 Birch  
 Blackthorn  
 Hawthorn  
 Hazel  
 Holly  
 Oak  
 Rowan  
 Sycamore  
 Willow  
 Other

Crown shape  
 Please refer to your Survey Guide for images

Spreading  
 Oval  
 Fan  
 Cone

13:40

GIS Healthy Trees survey

Height estimate (m)

Stem diameter estimate (cm)

Health  
 Please tick all that apply

Healthy  
 Fungus present  
 Dieback present  
 Leaf discolouration  
 Root exposure  
 Bare ground under tree  
 Dead branch(es)/ limb(s) - attached  
 Broken/ fallen/ dead limbs nearby  
 Dead - on the ground  
 Dead - standing

Presence of lichens  
 Crustose

## Appendix 2 – Additional Results Tables

### Table of Crown Shape

	Number	Percentage
<b>Cone</b>	94	7
<b>Fan</b>	231	17
<b>Oval</b>	295	21
<b>Spreading</b>	597	43
<b>Unclear / N/A</b>	118	8
<b>Windswept</b>	63	4

### Table of Lichens/Fungi

	Type	No. of types of lichen	No. of trees	Percentage	Notes
<b>Lichens</b>	Crustose, foliose & fruticose	3	668	48	
	Crustose & foliose	2	228	16	
	Foliose & fruticose	2	21	1.5	
	Fruticose & Crustose	2	4	0.3	
	Crustose	1	149	11	
	Foliose	1	18	1.3	
	Fruticose	1	4	0.3	
	No lichens	0	306	22	184 saplings, 96 semi-mature, 8 mature, 7 dead and 1 dying
<b>Fungi</b>			173	12	

## Appendix 3 – Maps of habitat types, enclosures and other factors affecting planting

### Harford and Ugborough Moors Common Cause Vision for Birds

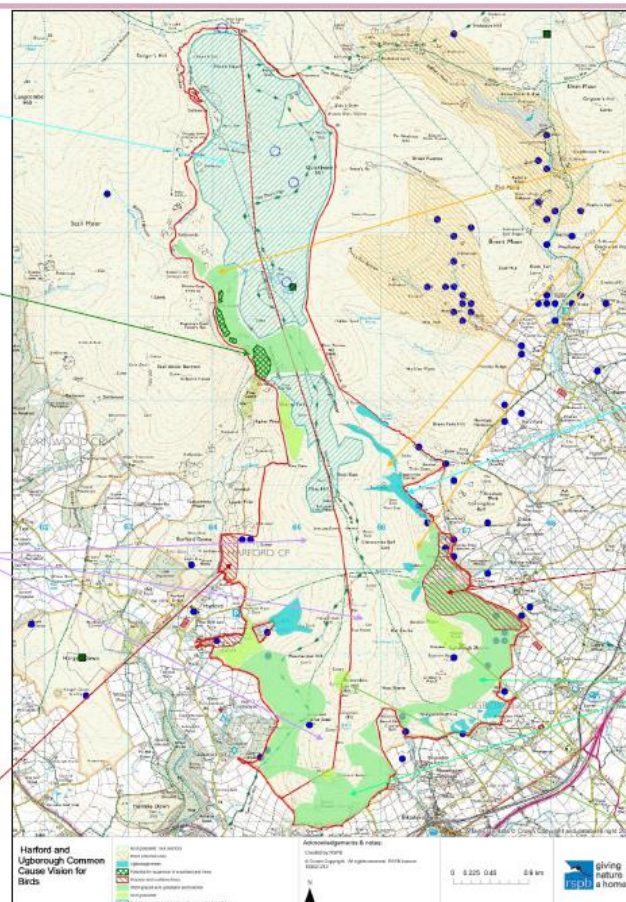
From the restored deep peat of the blanket bog and wet heath north of Three Barrows, where snipe will regularly breed, to the sheltered damp combs and slopes of the Erme and Glaze Brook valleys where diverse habitat will support the Red Listed whinchat and cuckoo, Harford and Ugborough Moors will support a thriving community of moorland birds. Extensive western gorse heathland on the higher ground will be managed on rotation and will offer abundant and structurally varied habitat, which will be alive with stonechat, linnet and meadow pipit. Dartford warbler will colonise the more sheltered heathland slopes. Where important archaeological features occur such as cairns, crosses, ancient enclosures and the impressive stone rows, the landscape will be more open with stepping stones of heathland, providing connectivity and nesting habitat for these species. Wheatear will be numerous in these more open areas with scattered rock, and on the short-grazed acid grasslands around the tors and barrows, with golden plover becoming a numerous winter visitor. Small pockets of both oak and willow dominated woodland, scattered trees and stands of mature Common gorse will offer excellent woodland and moorland edge habitat for tree pipit, redstart, cuckoo, willow warbler and yellowhammer. In the clean waters of the Erme both grey wagtail and dipper will become frequent and kestrel and hobby will be regularly seen hunting across the Commons.

Areas of deeper peat will be wet throughout the year, with small pools, varied mire communities, reduced dominance of *Molinia* and light grazing throughout the spring and summer. Breeding snipe will be frequent, and the damp, rushy gullies will support reed bunting. Both skylark and meadow pipit will be numerous across the blanket bog.

Small areas of woodland and scattered trees on the steep slopes of the Erme, beyond and contiguous with Piles Copse, will extend along the river valley adding to variety of structure and offering further habitat for priority species such as redstart, cuckoo, and willow warbler. Tree pipit will be frequent in the bracken fringe using scattered trees as song posts.

The extensive heathland habitat will become a patchwork of different ages of dwarf shrub, including stands of mature, bushy western gorse and old-age heathland, with occasional scattered trees and small stands of mature Common gorse. Where large-scale archaeological systems occur in the landscape, these areas will incorporate stepping stones of heathland to ensure connectivity and provision of nesting habitat for species such as stonechat and linnet across the Common. The predominant heathland community will be western gorse dominated, but where more diverse stands with a greater proportion of heathers occur these will be managed carefully, benefiting invertebrates and birdlife.

Some steeper slopes will have developed a largely un-grazed mosaic of western gorse, bracken and scattered tree scrub and even pockets of closed canopy woodland, where a range of both moorland and woodland species will become present; linnet, cuckoo, stonechat and tree pipit. Stands of mature European gorse to the fringes of the moor will support yellowhammer with lesser redpoll becoming a regular breeder.



Whinchat will be numerous along the damp, bracken covered lower slopes of the Commons, as on neighbouring Brent Moor. They are associated with sheltered topography; small stream gullies, and combs close to flushes, mires or streams. The habitat will provide a varied vegetation structure including lightly grazed, open heathland with grassy areas, a light bracken canopy and occasional scattered trees. The golf course with its flushes, mixed mire habitat and bracken will also support several pairs of whinchat and in the ranker, damp, western gorse habitat breeding grasshopper warbler and red bunting will be present.

Mire habitats on the Commons will be varied in structure with both short-grazed and rank, taller habitat, which will provide nesting and feeding opportunities for snipe, and where willow scrub develops to the moorland edge, reed bunting. Where mires occur close to well dog-walked areas (e.g. above the reservoir) buffers of western gorse habitat will be retained around parts of the mire, to deter dogs from roaming into potential snipe breeding habitat.

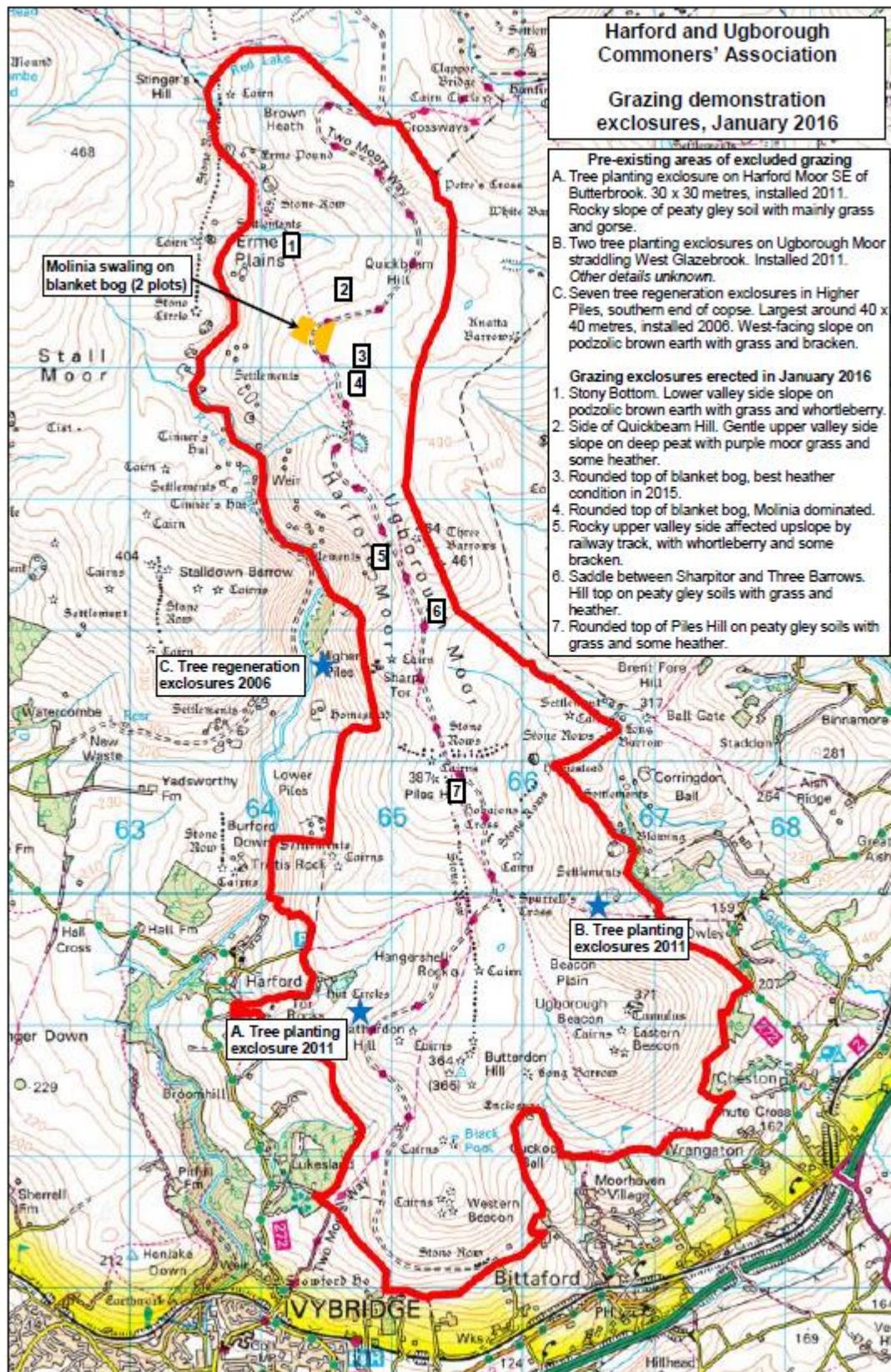
As in the Erme Valley, small areas of more varied vegetation structure will occur on the lower slopes, with scattered trees, mature gorse and light bracken combining to support tree pipit, yellowhammer and linnet. The scattered trees will also attract cuckoo, scanning from tree perches for their host's nests.

The southern slopes of Harford and Ugborough will provide a mosaic of bracken stands, open grassland (both short-grazed and longer), networks of small patches of western gorse and common gorse, particularly to the moorland edge, which will support abundant meadow pipit, skylark, stonechat and linnet.

Wheatear, skylark and meadow pipit will be frequent around the open tors and beacons and along the open stretches of the ridge between Western Beacon and Sharp Tor.

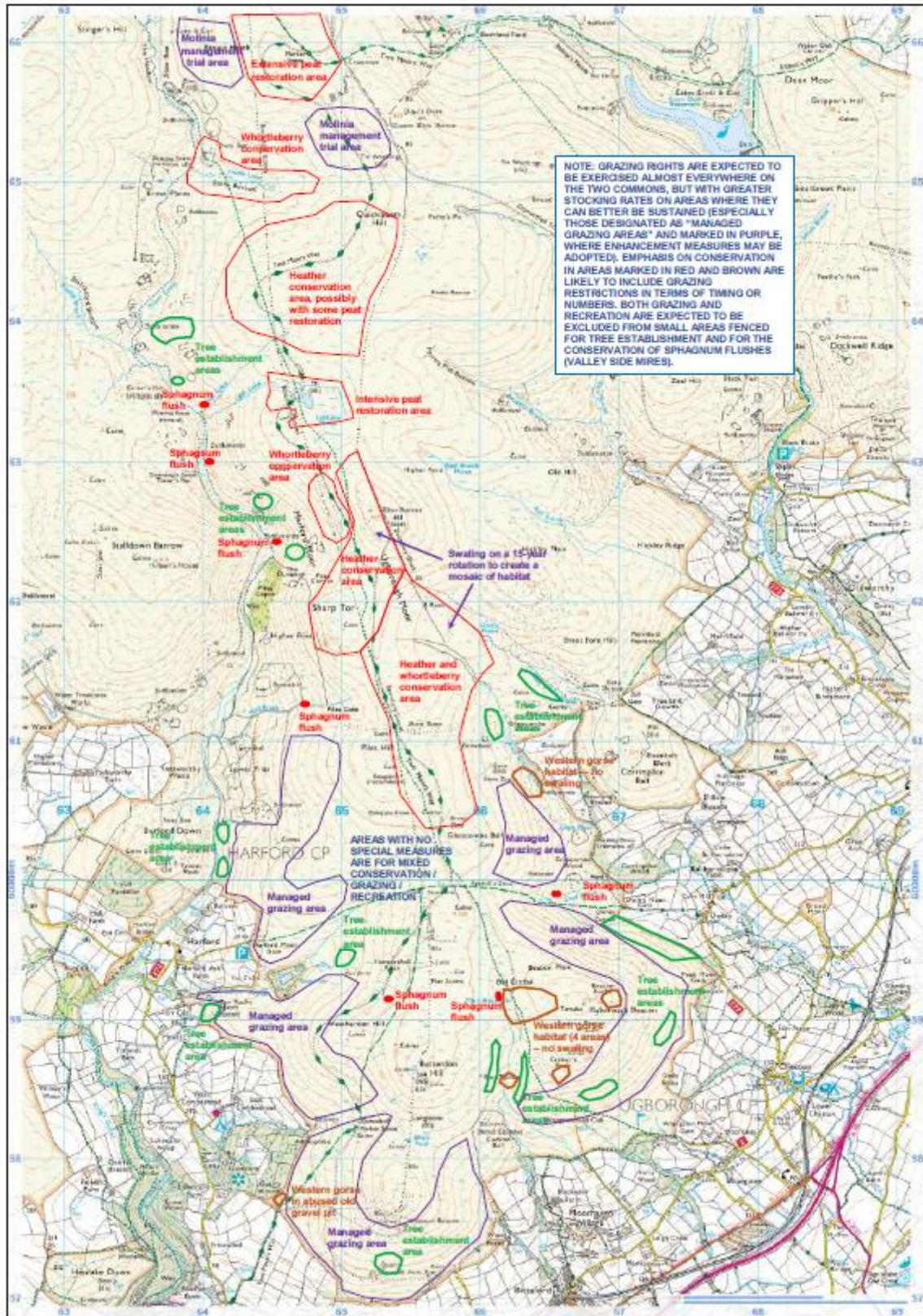


Created in January 2016 by John Howell to show where he had placed the exclosures on behalf of Harford and Ugborough Commoners' Association.





Created in June 2019 to combine the owners' and commoners' visions following separate exercises under the pilot phase of the Our Common Cause project; draft for later discussion pending agreement.





**Appendix 4 – Areas of interest seen on Dartmoor to date with increased natural or planted trees that may provide evidence or examples for future planting plans**

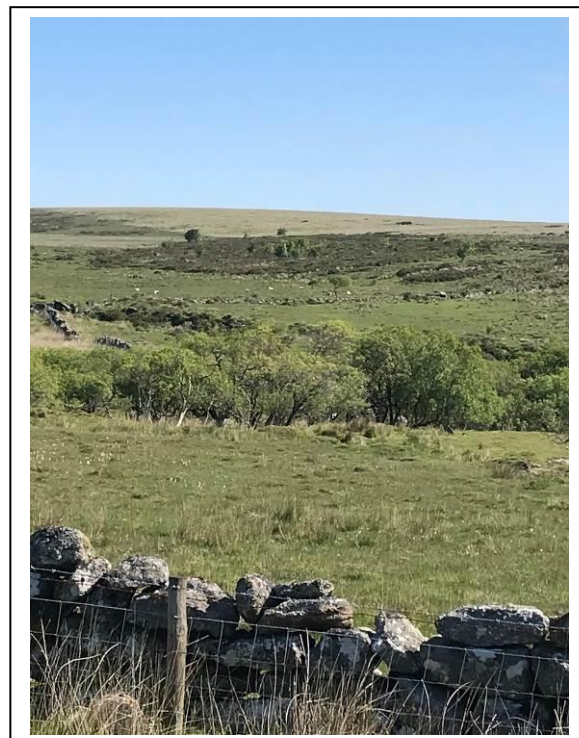
**1. Chinaclay works, Cadover Bridge**

Multiple areas of extensive new planting in fenced enclosures of roughly 1-3 ha each. Mixed broadleaves. Too extensive an area for this project but the size and density of planting may give some environmental protection and enhance early-stage growth.



**2. Powdermills, area above old works**

Naturally regenerated (or possibly planted for the works) dense woodland in hollow progressing through lighter scrub to open moor. A possible small-scale model of a natural woodland thinning with altitude.



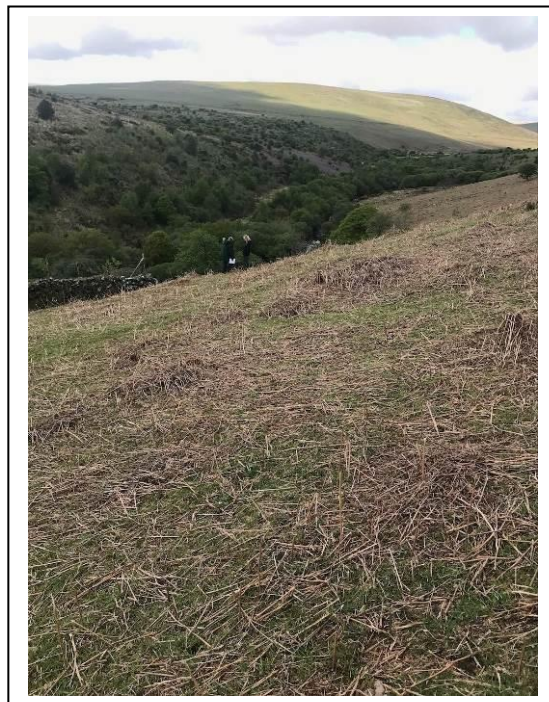
### 3. Bench Tor

In the survey area of Holne Moor. Dense woodland in steep stream bed giving way to montane scrub and open moor.



### 4. Burford Down, Erme Valley

Natural regeneration in large excluded area showing the likely natural progression of scrub and woodland, all be it on an east facing valley side.





## 5. Sherberton Common

New planting in tubes, no fencing, some dead hedging with gorse. Planted without fencing, would be a good area for monitoring success as a model of cost-effective planting within a grazed area.



## 6. Piles Copse

Very successful new planting as individual trees in “cactus” guards and excluded fenced areas. Some trees grown from seed originating in Piles Copse, others bought in from Moor Trees.



## 7. Small fenced exclosures, Harford

Experimental exclosures now c. 5-10 years old. Very little growth. The lack of growth in these areas could be exposure, soils or planting stock.

