

The Lowland Agricultural Peat Task Force: Paludiculture sub-group

# Roadmap to making wide-scale adoption of paludiculture a commercial reality in England: Independent report to the UK government



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## Introduction

We want to see paludiculture take its place in our matrix of opportunities to farm more sustainably on lowland peat. For this to be true, we need a targeted programme of investigation, development, and reform. Rather than wait for paludiculture options to develop organically, we need to develop all elements of the architecture of paludiculture simultaneously and expeditiously, as well as underpinning paludicultural crops and products.

In Recommendation 14 of our Task Force report, we recommend the adoption of a roadmap to commercially viable paludiculture: the roadmap is contained in this document. The roadmap sets out our plan to make the widescale adoption of paludiculture a commercial reality over a 10-year timescale, starting from 2023. We are under no illusion that paludiculture will be widely practiced by 2033, but by then, we would hope to have unlocked paludiculture as a new opportunity for some farmers, particularly those farming on marginal or low-lying land. We must be clear that the roadmap is a series of additional changes required to make paludiculture available as a mainstream option for farmers and growers in England. It should not be viewed in isolation from the other 13 Task Force Recommendations: its success will depend on the delivery of recommendations involving water and water management and of delivery of our wider Task Force report.

Paludiculture, or farming on rewetted peat, is a system of agriculture for the profitable production of wetland crops under conditions that support the competitive advantage of these crops. In the context of lowland peat soils it is most usually achieved through raising the water table to achieve wetland conditions.

As the Task Force report makes clear, we firmly believe that no peat farmer should be left financially worse-off for better managing our carbon stores. This is true of all the interventions being considered, not least in relation to paludiculture, which shows the most promise to preserve our peat. Therefore, the fundamental building block to the wide-scale adoption of paludiculture is the business case. Developing the business cases for different crop and product combinations is thus a key component of this roadmap. Unless we can prove that farmers will not be left financially worse-off, or indeed, as we heard from workshop attendees, that we can prove that farmers will be in a better position financially compared to their current enterprise, then we cannot expect farmers to be willing to adopt paludiculture.

The majority of paludicultural crops and farming systems so far explored are not food producing. The greatest potential for paludiculture is currently in the areas of fibre and biomass crops. Given the current contribution made by lowland peat farming to the UK's supply of certain food crops, the displacement of food production by paludiculture is seen by some as a key choke point. However, there are food opportunities to be explored (see the section [Example paludicultural crops and potential products and markets](#)) and the investigation of these opportunities and mitigation strategies for food displacement are included in the roadmap (see [Table 19](#)). Nevertheless, we stress the need to see paludiculture as the most effective way to still farm but reduce the current deterioration of

drained lowland peat soils. If we do not do more to preserve our peat, then the faster we will lose our most productive soils and the food crops they currently grow.

Paludiculture offers an exciting opportunity to address challenges already being faced by farmers while also offering solutions to a number of other societal issues. It, therefore, also offers a range of new social, economic and environmental challenges for us to work through and address.

## Summary of roadmap years 1 and 2

A large proportion of the actions across years 1 and 2 of the roadmap are about securing funding and developing specifications to grow other components of the roadmap in the longer-term. These activities carry forward to years 3 to 5, reflecting the need to secure further investment in other activities captured by the roadmap as it develops.

From year 2, large-scale field trials feature across the roadmap in several pathways (see for example [Table 3](#) 'Carbon budgets and carbon finance timeline' and [Table 8](#) 'Case for change to paludiculture timeline'). Trials will be more efficient if they can be set-up to address the range of questions we set out across our different pathways, rather than singular issues. However, we recognise this may not always be possible. Collectively, field trials will be a crucial source of data for other elements of the roadmap and will also provide opportunities to test arising findings and solutions.

Apart from securing funding and developing specifications, the remaining year 1 actions can be grouped into 6 themes:

1. Agricultural policy: actions including, for example, determining where legal definitions of agriculture would exclude paludiculture and the food displacement risk of conversion to paludiculture.
2. Identifying stakeholders and starting to educate funders: actions including, for example, undertaking stakeholder mapping.
3. Benefits of paludiculture: actions including, for example, identifying where paludiculture is a solution to challenges being faced by society.
4. Markets: actions including, for example, identifying what markets paludiculture has the potential to supply.
5. Machinery: planning out whole chain machinery requirements and reviewing potential machinery solutions from other industries and countries.
6. Learning from existing paludicultural projects: establishing a directory of paludiculture projects and review learning from them.

Year 2 will see the commencement of nine projects for which funding is to be secured and specifications developed in year 1. There may be opportunities to bring some of these projects together. These projects are:

- Agricultural Land Classification for paludiculture (see [Table 7](#))
- Urgency, impact and cost of inaction (see [Table 8](#))
- Optimal landscape scale for benefit delivery (see [Table 22](#))
- Spatial opportunity map (see [Table 22](#))

- Construct water budgets (see [Table 20](#))
- Impact of raising water table on surrounding land (see [Table 20](#))
- Pros and cons of dropping water table for farming operations (see [Table 12](#))
- Risks to linear and buried infrastructure (see [Table 22](#))
- Market research (see [Table 8](#))

The remaining year 2 actions can also be grouped into 6 themes:

1. Benefits and risks: actions including, for example, collating and reviewing existing field measurements of greenhouse gas emissions for paludiculture, determining the source and type of pests and weeds that thrive under paludicultural conditions, and undertaking a risk assessment of paludicultural crops on native species.
2. Funding and support: actions including, for example, developing new bespoke funding schemes for innovation and trialling and working with Local Enterprise Partnerships to develop a strategy to establish and support paludicultural businesses.
3. Stakeholders and networks: actions including, for example, educating policy makers about paludiculture and establishing an agency to match manufacturers and growers.
4. Product development: actions including, for example, manufacturers determining the criteria for farmed sphagnum to input into growing media.
5. Machinery: undertaking a machinery gap analysis.
6. Agricultural policy: identifying where and how definitions of agriculture need to be amended to include paludiculture.

## How to read this report

[Part 1](#) of this report sets out the wrap-around architecture that we think needs to be developed to make paludiculture a reality.

[Part 2](#) of this report explores the roadmap pathways in detail. These pathways should be viewed as dynamic rather than fixed and will be subject to amendment as knowledge is gained through delivery of earlier actions in the pathway.

Using figures, we have demonstrated the relationship between actions on our different pathway: these actions should be read from left to right. Using tables, we have brought together these same actions into a timeline. Year 1 is 2023 for all pathways. Many actions from year 2 onwards are dependent on previous actions being completed and thus cannot commence until the previous actions have been completed. Most pathways begin with the need to secure funding.

There is no implied priority in the order by which the pathways are set out within this document. All pathways are important and must be delivered to achieve our objective of making the wide-scale adoption of paludiculture a commercial reality.

## **Livestock paludiculture**

Livestock may be farmed under paludicultural conditions to produce meat and cheese. We are aware that these products already have established routes to market, and as such, we have developed our roadmap on the assumption that these existing routes will support the sale of these same products produced under paludicultural conditions. Market development for paludicultural livestock products has not been a priority for us.

However, viable livestock paludicultural options apart from the growing of fodder crops remain to be identified.

## **Part 1: Paludiculture Architecture**

This part of the report sets out the wrap-around architecture which must be developed for paludiculture to succeed and shows the relationship between different roadmap pathways which are explored in detail in [Part 2](#) of this report. Three model business case pathways are included in the roadmap. These are indicative of what will be required for each different crop and product combination and are not an exhaustive list of the pathways required. Further examples of crop and product combinations are set out in the section [Example paludicultural crops and potential products and markets](#).

### **Paludiculture finance**

The architecture for paludiculture finance is made up of many elements which are interrelated to and dependent on each other but can be broadly assigned to 3 groups: direct funding, land value and economic model or business case. The pathways under each heading are set out here.

#### **Direct funding for paludiculture**

This group of pathways cover the revenue streams for paludiculture. They are:

- [Funding for paludiculture](#)
- [Returns from the sale of paludicultural crops](#)
- [Carbon Finance](#)
- [Finance from other ecosystem services](#)

#### **Land valuation**

This group of pathways cover the impact of paludiculture on perceived land value and the impact of land value on availability of funds to support the uptake of paludiculture. The pathways under the '[Economic model or business case](#)' heading are also a key driver of land value, which is based upon the returns on investment that can be achieved on the land. The additional land valuation pathways are:

- [Tenancy agreements, mortgages, rent](#)
- [Legal recognition of paludiculture as a form of agriculture](#)
- [Inclusion of paludiculture in definition of good condition land](#)

## Economic model or business case

This group of pathways brings the economics of paludiculture together to develop the economic model or business case necessary to support the development and uptake of paludiculture. Inputs into the model or case also include those set out under the heading of [Direct funding for paludiculture](#) as well as the paludiculture farming system inputs set out in the Farmer architecture section (that is, [Machinery](#), [Agronomy](#), [Seedstock](#) and [Labour](#)).

The additional pathways that have been developed are:

- [Case for change to paludiculture](#)
- [Farmer training](#)
- [Advocacy and facilitation](#)
- [Farmed Sphagnum Growing Media model](#)
- [Anaerobic Digestion for energy model](#)
- [Typha Insulation Fibreboard model](#)

The last 3 pathways are model business case pathways and are indicative of what will be required for each different crop and product combination. This is not an exhaustive list of the pathways required. Further examples of potential pathways are shown in the section [Example paludicultural crops and potential products and markets](#).

## Farmer architecture

Most of the elements included under the [Paludiculture finance](#) heading are also key to the wrap-around architecture for farmers. Additional pathways have been developed on:

- [Machinery](#)
- [Agronomy](#)
- [Seedstock](#)
- [Labour](#)
- [Farmer training](#)
- [Advocacy and facilitation](#)

## Product developer architecture

Many of the elements included under the [Paludiculture finance](#) heading are also key to the product developer and manufacturer wrap-around architecture. Additional pathways have been developed on:

- [Business and Innovation support](#)
- [Advocacy and facilitation](#)

### Example paludicultural crops and potential products and markets

The UK Paludiculture Live list contains 88 Native species with promising potential for paludiculture in the UK. Therefore, the examples given here of paludicultural crops and potential products and markets are still illustrative of the wider potential.



**Food:** bilberry, celery, cheese, cranberry, meat, nettle, sedge grains, sweet grass grains, watercress and water pepper

**Herbal remedies, medicines and biomedical:** bilberry, bog myrtle, cranberry, comfrey, hemp agrimony, lady's smock, meadowsweet, round leaved sundew and Sphagnum moss

**Flavourings:** bilberry, bog myrtle, meadowsweet, round leaved sundew, water mint and wild celery

**Construction materials:** fibreboards – bulrush and reed, light weight aggregates – bulrush, and roofing (thatching) – reed

**Furniture and decorative homewares:** alder, rush and willow

**Bioenergy:** bulrush, reed and willow

**Growing media:** Sphagnum moss

**Fabrics:** bulrush (down replacement) and nettle

**Industrial chemicals:** reed (silica) and Sphagnum moss

## Policy landscape

The policy landscape has both the potential to be a driver of paludiculture development and uptake and to be a key source of barriers to uptake. Therefore, actions within the policy landscape are a significant part of developing the wrap-around architecture for paludiculture. The pathways that have been developed are for the following areas of policy:

- [Agricultural policy and farming support](#)
- [Carbon Budgets and Net Zero](#)
- [Water management](#)
- [Water quality](#)
- [Planning](#)
- [Legal recognition of paludiculture as a form of agriculture](#)
- [Nature designations](#)

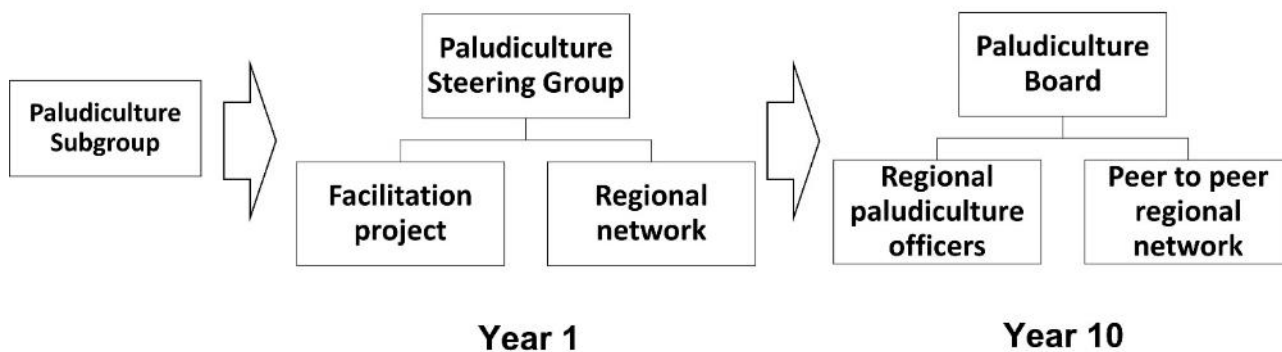
## Governance

This roadmap has been developed by the Paludiculture Subgroup to the national Lowland Agricultural Peat Task Force (see [Annex 1 Paludiculture Sub-group](#)). Now that the Task Force has come to an end, we need to asset-up a new governance structure to see the roadmap delivered.

In year 1, the Paludiculture Subgroup should transform into the Paludiculture Steering Group (see [Figure 1](#)). The Steering Group should build on the membership of the Subgroup but be expanded to include representatives of the different communities that will need to be involved in delivering the roadmap. The Steering Group should be supported by a facilitation project which builds a community of interest as well as by a set of regional

networks consisting of interested stakeholders. This network could link into the proposed National Forum for lowland peat (Task Force Recommendation 7).

**Figure 1: Transitioning governance structures for roadmap delivery**



The roadmap will itself generate new governance bodies and arrangements, which will be best placed to take over the reins of governing roadmap delivery.

By year 10 of the roadmap, governance should be the responsibility of the proposed [Paludiculture Board](#), supported by the structures proposed and developed in the Advocacy and facilitation pathway – that is, regional paludiculture officers and peer-to-peer regional networks ([Table 17](#)).

Some of the elements in the year 10 governance structure are developed earlier in the roadmap than year 10, and the Paludiculture Board itself is timetabled for establishment in years 6 to 10. Therefore, we should expect the governance structure to transition from its year 1 configuration to its year 10 configuration as different elements of the roadmap are completed and new governance elements are established.

## Part 2: Paludiculture Roadmap Pathways

The following roadmap pathways set out the actions that need to be undertaken to deliver these different strands of the paludiculture roadmap. These pathways should be viewed as dynamic rather than fixed and will be subject to amendment as knowledge is gained through delivery of earlier actions in the pathway.

As we have said upfront, there is no implied priority in the order of our pathways. All pathways are important and must be delivered to achieve our objective of unlocking paludiculture.

### Funding for paludiculture

Recommendation 1 of the Lowland Agricultural Peat Task Force calls for significant investment in new water-level management infrastructure. Delivery of this is a prerequisite for the adoption of paludiculture: it is thus not explored further here.

The three further key elements of funding for paludiculture set out in [Figure 2](#) (with the same information presented in a different format in [Table 1](#)) are:

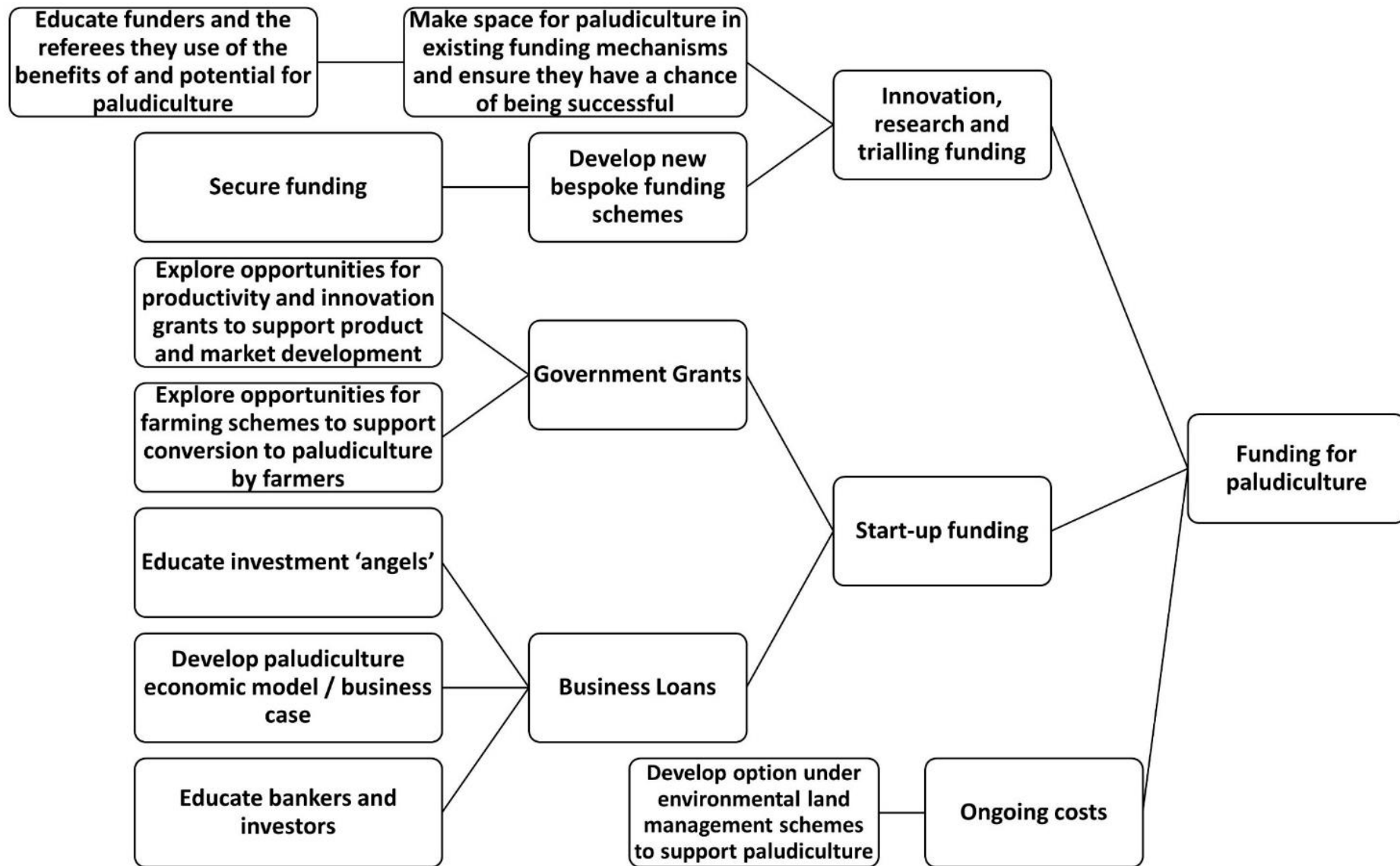
1. Funding for innovation, research, and trialling,
2. Funding for start-up of paludicultural enterprises and
3. Funding for ongoing costs.

The third element is separate from the funding from the [Returns from the sale of paludicultural crops](#) or [Carbon Finance](#) and [Finance from other ecosystem services](#). The actions for the three elements are brought together into a single timeline in [Table 1](#).

Dependencies:

- [Economic model or business case](#)
- [Agricultural policy and farming support](#) – ensuring that paludiculture is in-scope of objective for new farming support schemes

Figure 2: Funding for paludiculture pathway



**Table 1: Funding for paludiculture timeline**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"> <li>• Secure funding for innovation, research, and trials</li> <li>• Educate funders and the referees they use about the benefits of, and potential for, paludiculture</li> <li>• Educate investment ‘angels’</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Make space for paludiculture in existing funding mechanisms and ensure they have a chance of being successful in securing funding</li> <li>• Develop a new bespoke funding scheme for innovation, research, and trials</li> <li>• Develop option under environmental land management schemes to support paludiculture</li> <li>• Explore opportunities for productivity and innovation grants to support product and market development</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Explore opportunities for farming schemes to support conversion to paludiculture by farmers, including options for on-farm water storage</li> <li>• Develop paludiculture economic model/business case</li> </ul>
Years 6 to10	<ul style="list-style-type: none"> <li>• Educate bankers and investors</li> </ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

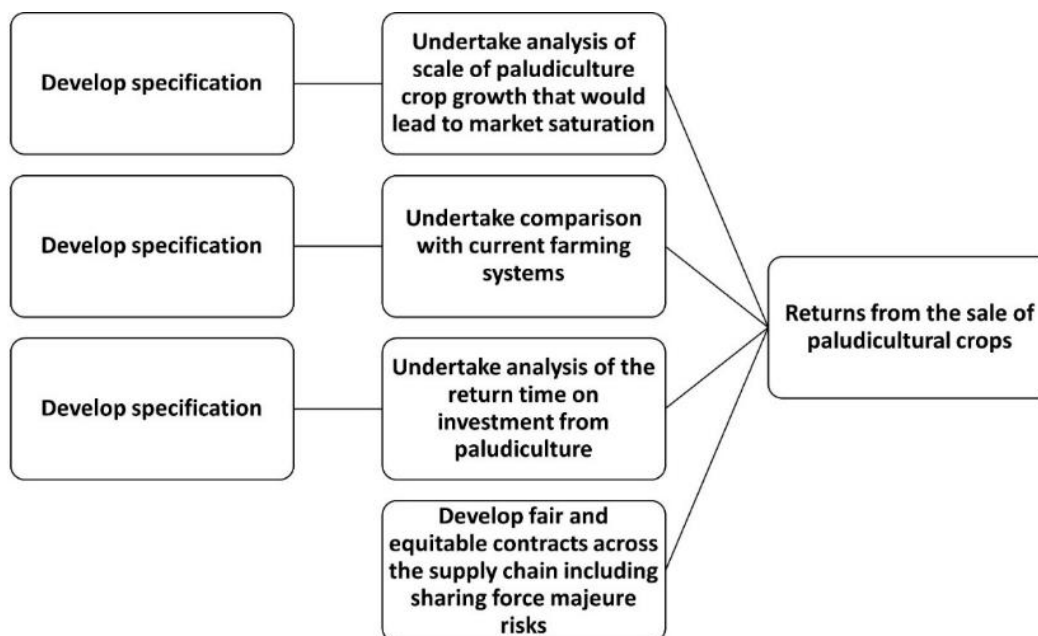
### **Returns from the sale of paludicultural crops**

In future, for some crops, the returns from the sale of paludicultural crops have the potential to be the main funding source for paludiculture. The actions required to understand this potential as well as the work required to achieve fair and equitable returns across the supply chain are set out in [Figure 3](#) and [Table 2](#). The figure and table set out the same actions in different formats. The section [Analysis of the scale of crop growth that would lead to market saturation](#) explores that particular action further.

Dependencies:

- [Economic model or business case](#), for example:
  - [Farmed Sphagnum Growing Media model](#)
  - [Anaerobic Digestion for energy model](#)
  - [Typha Insulation Fibreboard model](#)
- [Case for change to paludiculture](#) – identify markets for paludicultural crops

**Figure 3: Returns from the sale of paludicultural crops pathway**



**Table 2: Returns from the sale of paludicultural crops timeline**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"> <li>• No actions</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Develop specification and undertake analysis of the scale of growth that would lead to market saturation</li> <li>• Develop specification for comparative analysis of the returns from paludiculture and current farming systems</li> <li>• Develop specification for an analysis of the return time on investment for paludiculture</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Develop fair and equitable contracts across the supply chain including sharing force majeure risks</li> </ul> <p>For near market-ready crops, for example farmed Sphagnum</p> <ul style="list-style-type: none"> <li>• Undertake comparative analysis of returns</li> <li>• Undertake analysis of return time on investment for paludiculture</li> </ul>
Years 6 to10	<p>For 'other' crops</p> <ul style="list-style-type: none"> <li>• Undertake comparative analysis of returns</li> <li>• Undertake analysis of return time on investment for paludiculture</li> </ul>

Note: Actions for years 6 to 10 are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

### **Analysis of the scale of crop growth that would lead to market saturation**

This analysis would determine the hectares of each crop that would need to be grown in the UK to satisfy a range of projected domestic and international demand for products from paludiculture.

Market saturation is considered to be the point at which an additional hectare of crop growth would drop the market price for that crop. However, there are likely to be opportunities to grow and expand markets beyond the categories identified at this early stage of development for paludiculture.

### **Carbon Budgets and Carbon Finance**

There are two different pathways presented here that have significant overlap. The first, [Figure 4](#), is the pathway for securing the inclusion of paludiculture in the UK Greenhouse Gas Inventories (Land use, land use change and forestry sector (LULUCF)), such that paludiculture can count towards achieving Carbon Budget and Net Zero targets. The second, [Figure 5](#), is the pathway or developing routes to securing carbon finance for paludiculture. [Table 3](#) combines the actions from the two pathways into a single timeline. Reference is made in [Figure 5](#) and [Table 3](#) to a new Peatland Soil Code; further explanation of the proposed Code is set out in the section on the [Peatland Soil Code](#).

These pathways dock into Recommendation 5 of the Task Force report for viable opportunities for private finance, as well as Recommendation 12 which calls for more large-scale peat preservation field trials. Indeed the methodology proposed here to develop a new Peatland Soil Code provides a model that can be extended to embrace other management interventions on lowland agricultural peatlands.

Dependencies:

- [Funding for paludiculture](#)

Figure 4: Carbon Budgets and Net Zero pathway

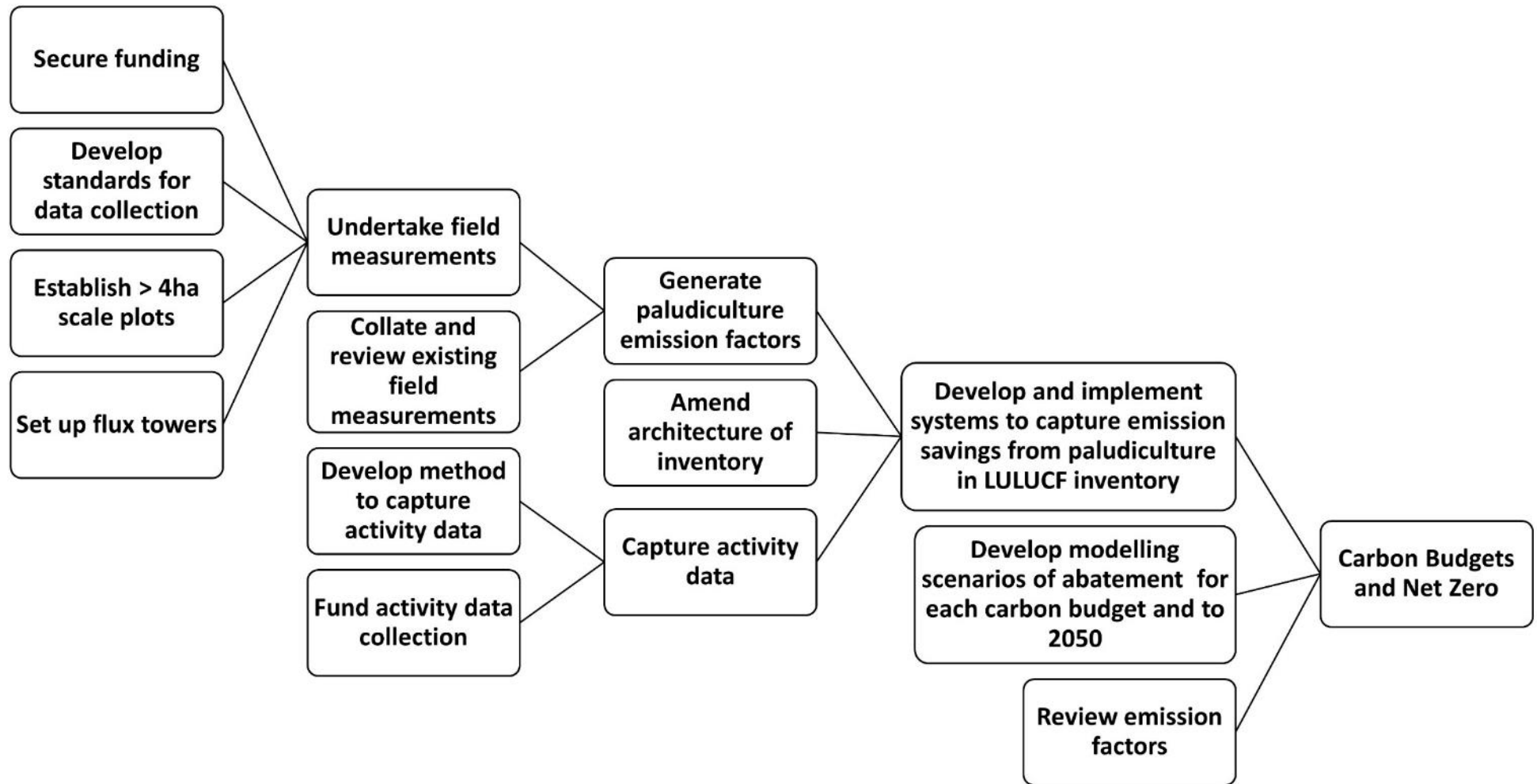
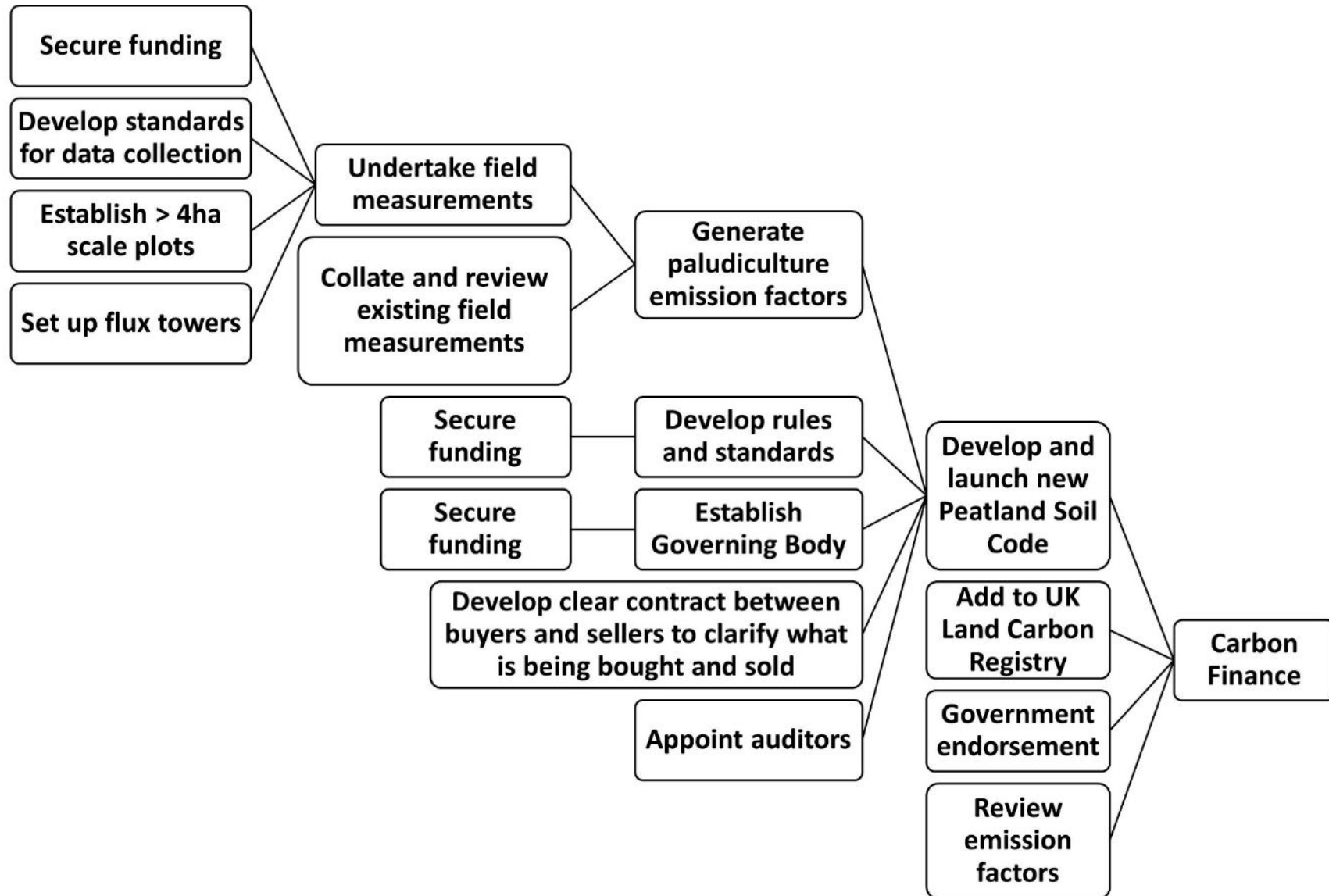




Figure 5: Carbon finance pathway



**Table 3: Carbon budgets and carbon finance timeline**

Year	Actions
Year 1	<ul style="list-style-type: none"> <li>• Secure funding for field measurements of emissions (sites, flux towers, staff)</li> <li>• Develop standards for data collection of greenhouse gas emissions</li> <li>• Secure funding to develop Peatland Soil Code rules and standards</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Establish &gt;4ha paludiculture plots for measurement of greenhouse gas emissions</li> <li>• Set up flux towers</li> <li>• Collate and review existing field measurements of greenhouse gas emissions</li> <li>• Develop rules and standards for a new Peatland Soil Code</li> <li>• Amend architecture of UK Greenhouse Gas Inventory to include paludiculture</li> <li>• Develop method to capture activity data (area under paludiculture)</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Undertake field measurements of greenhouse gas emissions</li> <li>• Generate paludiculture emission factors from field measurements</li> <li>• Secure funding for Peatland Soil Code governing body</li> <li>• Establish Peatland Soil Code governing body</li> <li>• Develop modelling scenarios of abatement from paludiculture for each carbon budget and to 2050</li> </ul>
Years 6 to 10	<ul style="list-style-type: none"> <li>• Launch new Peatland Soil Code</li> <li>• Appoint auditors for Peatland Soil Code</li> <li>• Add Peatland Soil Code to UK Land Carbon Registry</li> <li>• Develop clear contract between buyers and sellers to clarify what is being bought and sold and treatment of force majeure risks</li> <li>• Government endorsement of new Peatland Soil Code</li> <li>• Fund the collection of activity data</li> <li>• Collect activity data</li> <li>• Implement systems to capture emission savings from paludiculture in the UK Greenhouse Gas Inventory (LULUCF sector)</li> <li>• Review emission factors (periodic reviews)</li> </ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

### **Peatland Soil Code**

Current soil carbon trading schemes are not suitable for use on peat soils and the existing Peatland Code is designed for restoration projects only. Therefore, there is the need for a code to facilitate the trade of the carbon benefits arising from paludiculture. The actions set out here are those required to put a new code in place, starting with the generation of the underlying data to quantify the benefits of paludiculture in terms of greenhouse gas emissions.

Whether this is indeed a standalone code or a module of an existing or developing code is an open question. There would be benefits and efficiencies from joining forces with another code. However, this will depend on the willingness of the owners of different codes to extend their code to cover paludiculture, influenced in part by the compatibility of any paludiculture module with the existing scheme rules.

### **Finance from other ecosystem services**

Markets for ecosystem services other than carbon are developing, for example, for nutrient mitigation and biodiversity. Paludiculture has the potential to offer benefits for a range of marketable ecosystem services.

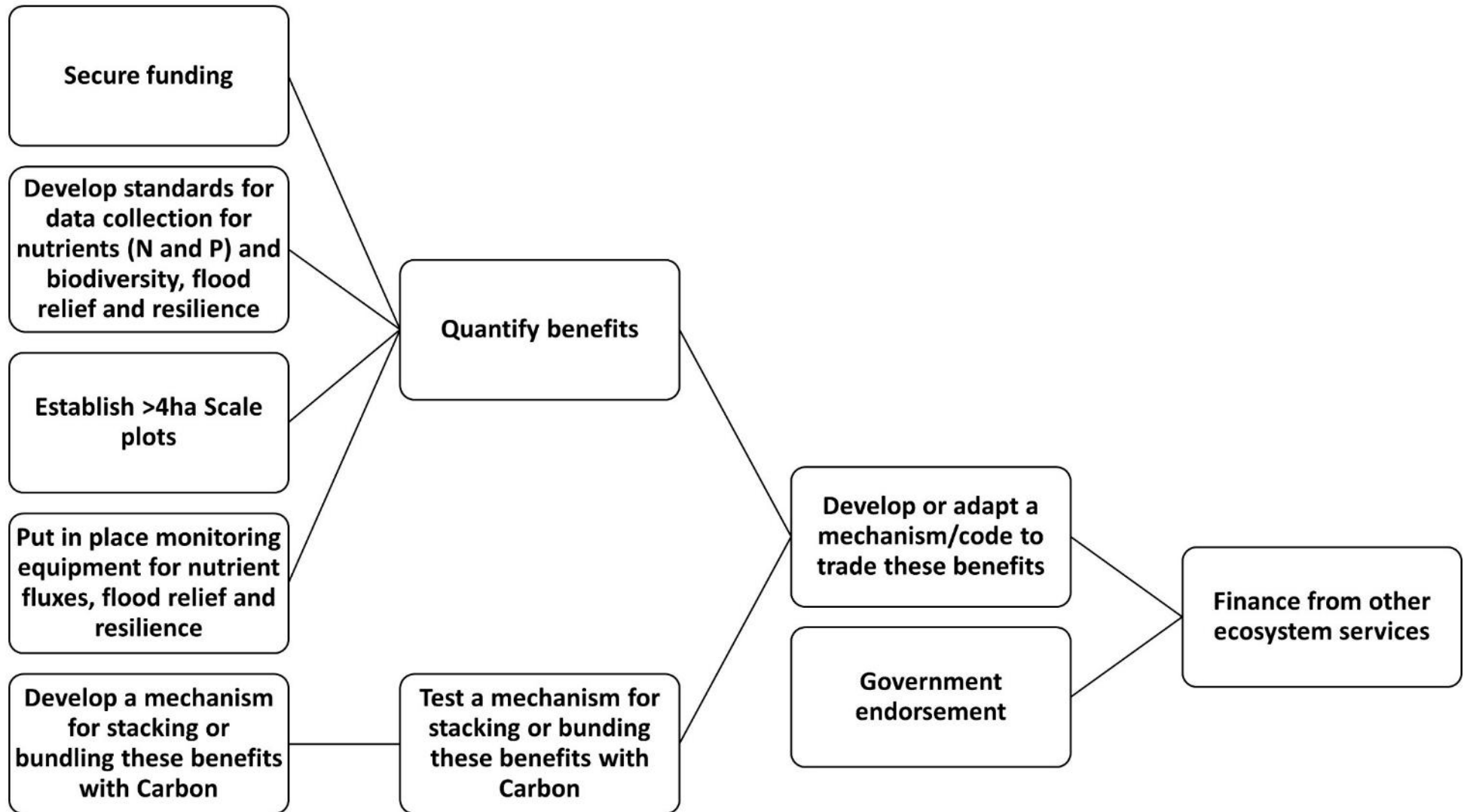
[Figure 6](#) sets out the action pathway to quantify and trade these benefits (whether in combination with, or separate from, the carbon benefits). There are similar actions set out in the carbon finance pathway; the large-scale field plots identified in both pathways can be used for both actions with the correct monitoring equipment installed. [Table 4](#) sets out the timeline for the actions within this pathway. The method for trading benefits needs to consider how these benefits could change under different climate change projections.

This pathway docks into Recommendation 5 of the Task Force report for viable opportunities for private finance, as well as Recommendation 12 which calls for more large-scale peat preservation field trials.

Dependencies:

- [Funding for paludiculture](#)
- [Carbon Budgets and Carbon Finance](#)

Figure 6: Finance from other ecosystem services pathway



**Table 4: Finance from other ecosystem services timeline**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"><li>• Secure funding for field measurements of other ecosystem services (sites, monitoring equipment, staff)</li><li>• Develop standards for data collection of other priority ecosystem services (nutrients, biodiversity, flood resilience)</li></ul>
Year 2	<ul style="list-style-type: none"><li>• Establish more than 4 hectares of paludiculture plots for measurement of greenhouse gas emissions and other ecosystem services</li><li>• Put in place monitoring equipment</li></ul>
Years 3 to 5	<ul style="list-style-type: none"><li>• Quantify the benefits of paludiculture on other ecosystem services</li><li>• Develop and test a mechanism for stacking or bundling these benefits with carbon</li></ul>
Years 6 to 10	<ul style="list-style-type: none"><li>• Develop or adapt a mechanism or code to trade these benefits</li><li>• Government endorsement of new or adapted trading mechanism</li></ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

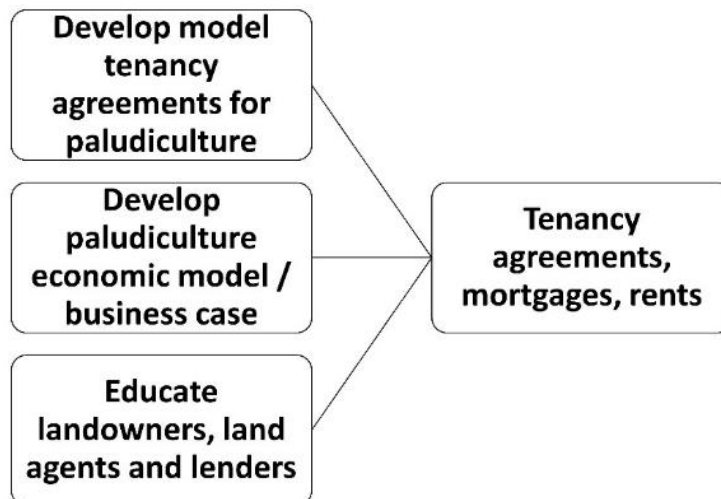
### **Tenancy agreements, mortgages, rent**

Figure 7 and Table 5 set out the pathway and timeline for actions on tenancy agreements, mortgages and rent, with the same actions presented in a different format in each. These actions do not commence until years 3 to 5 due to their dependence on other parts of the roadmap, in particular the development of economic models/business cases.

Dependencies:

- [Economic model or business case](#)
- [Inclusion of paludiculture in definition of good condition land](#)
- [Case for change to paludiculture](#)
- [Advocacy and facilitation – communication plan](#)

**Figure 7: Tenancy agreements, mortgages, rents pathway**



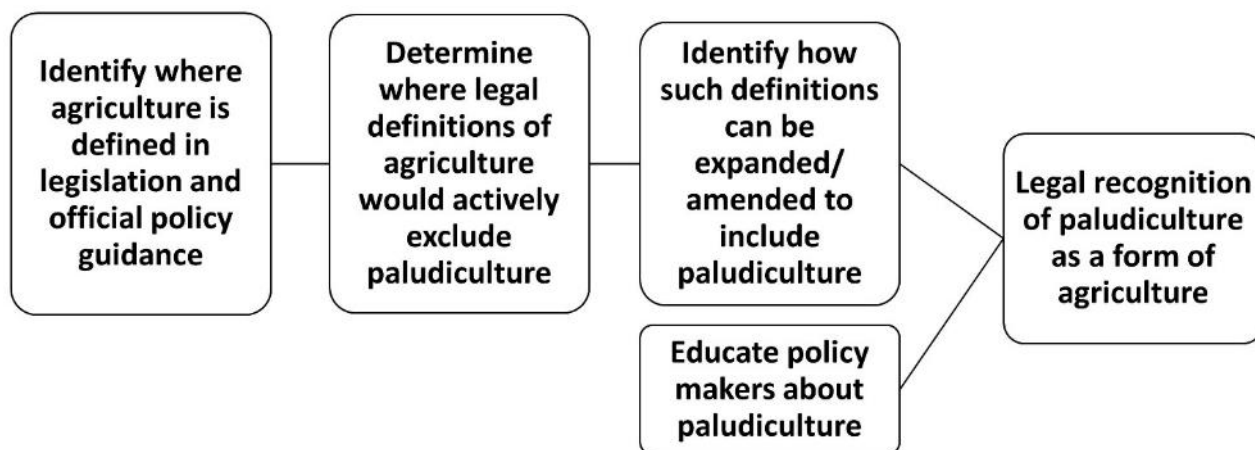
**Table 5: Tenancy agreements, Mortgages, Rent**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"> <li>• No actions</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• No actions</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Develop model tenancy agreements for paludiculture</li> </ul>
Years 6 to 10	<ul style="list-style-type: none"> <li>• Develop paludiculture economic model / business case</li> <li>• Educate landowners, land agents and lenders</li> </ul>

**Legal recognition of paludiculture as a form of agriculture**

Figure 8 and Table 6 set out the pathway and timeline for actions on legal recognition of paludiculture as a form of agriculture, showing the same actions in different formats. The time gap between the step of identifying where the legal definition of paludiculture needs amending and that of achieving full legal recognition for paludiculture is an acknowledgement of the length of the process to make legislative amendments. Therefore, the pathway does not attempt to capture the actions that individual policy teams would need to take to achieve this.

**Figure 8: Legal recognition of paludiculture as a form of agriculture**



**Table 6: Legal recognition of paludiculture as a form of agriculture**

Year	Actions
Year 1	<ul style="list-style-type: none"> <li>Identify where agriculture is defined in legislation and official policy guidance</li> <li>Determine where this legal definition would actively exclude paludiculture</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>Identify how such definitions can be expanded/amended to include paludiculture</li> <li>Educate policy makers about paludiculture</li> </ul>
Years 3 to 5	-
Years 6 to 10	<ul style="list-style-type: none"> <li>Legal recognition of paludiculture as a form of agriculture</li> </ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

### **Inclusion of paludiculture in definition of good condition land**

The value of land is in part determined by its agricultural grade. However, the method used to determine this (the Agricultural Land Classification) is not suited to paludiculture (see the section [New Agricultural Land Classification for Paludiculture](#)). This reinforces the current perception of agricultural land valuation that “dry land is good” and “wet land is bad”. [Figure 9](#) sets out the pathway to address this and the timeline for these actions are set out in [Table 7](#). The section [New Agricultural Land Classification for Paludiculture](#) sets out the proposal for a new approach.

Dependencies:

- [Funding for paludiculture](#)
- [Advocacy and facilitation](#) – communication plan

### **New Agricultural Land Classification for Paludiculture**

The Agricultural Land Classification (ALC) provides a method for assessing the quality of farmland to enable informed choices to be made about its future use within the planning system. Grades 1, 2 and 3a represent the best and most versatile land (that is, land which is most flexible, productive, and efficient in response to inputs).

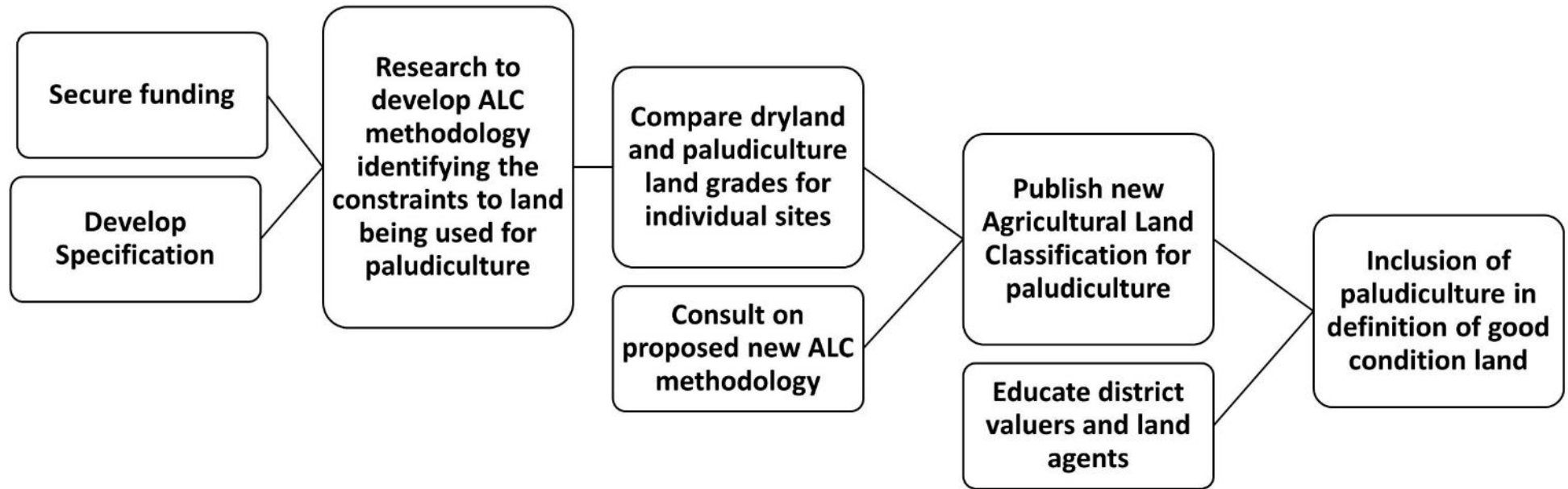
The ALC assesses the long-term physical limitations for agricultural use of a site for winter wheat and main crop potatoes using prevailing climate, site, and soil characteristics. These are dryland agricultural crops, and the land is valued for continuing to produce these particular crops most efficiently.

Paludiculture requires very different conditions and land needs to be recognised as being of high quality if it can successfully deliver other, paludiculture, crops. This requires a new method to be developed, adopted, and recognised.

The specification for this research will need to be developed with farmers and other stakeholders.



Figure 9: Inclusion of paludiculture in definition of good condition land



**Table 7: Inclusion of paludiculture in definition of good land condition**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"> <li>• Secure funding and develop specification for research project</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Undertake research to develop Agricultural Land Classification methodology identifying the constraints to land being used for paludiculture</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Compare dryland and paludiculture land grades for individual sites</li> <li>• Consult on proposed ALC methodology</li> </ul>
Years 6 to 10	<ul style="list-style-type: none"> <li>• Publish new ALC for paludiculture</li> <li>• Educate district valuers and land agents</li> <li>• Paludiculture included in the definition of good land</li> </ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

### **Case for change to paludiculture**

Figure 10 and Table 8 set out the pathway for additional actions to make the case for change to paludiculture, showing the same actions in different formats. The section titled [Market research](#) explores the required market research and the section titled [Farmer-led trials](#) explores the requirements for the farmer-led trials. This pathway also docks into Task Force Recommendation 12 for more large-scale peat preservation field trials.

Dependencies:

- [Funding for paludiculture](#)
- [Returns from the sale of paludicultural crops](#) – analysis of market saturation

#### **Market research**

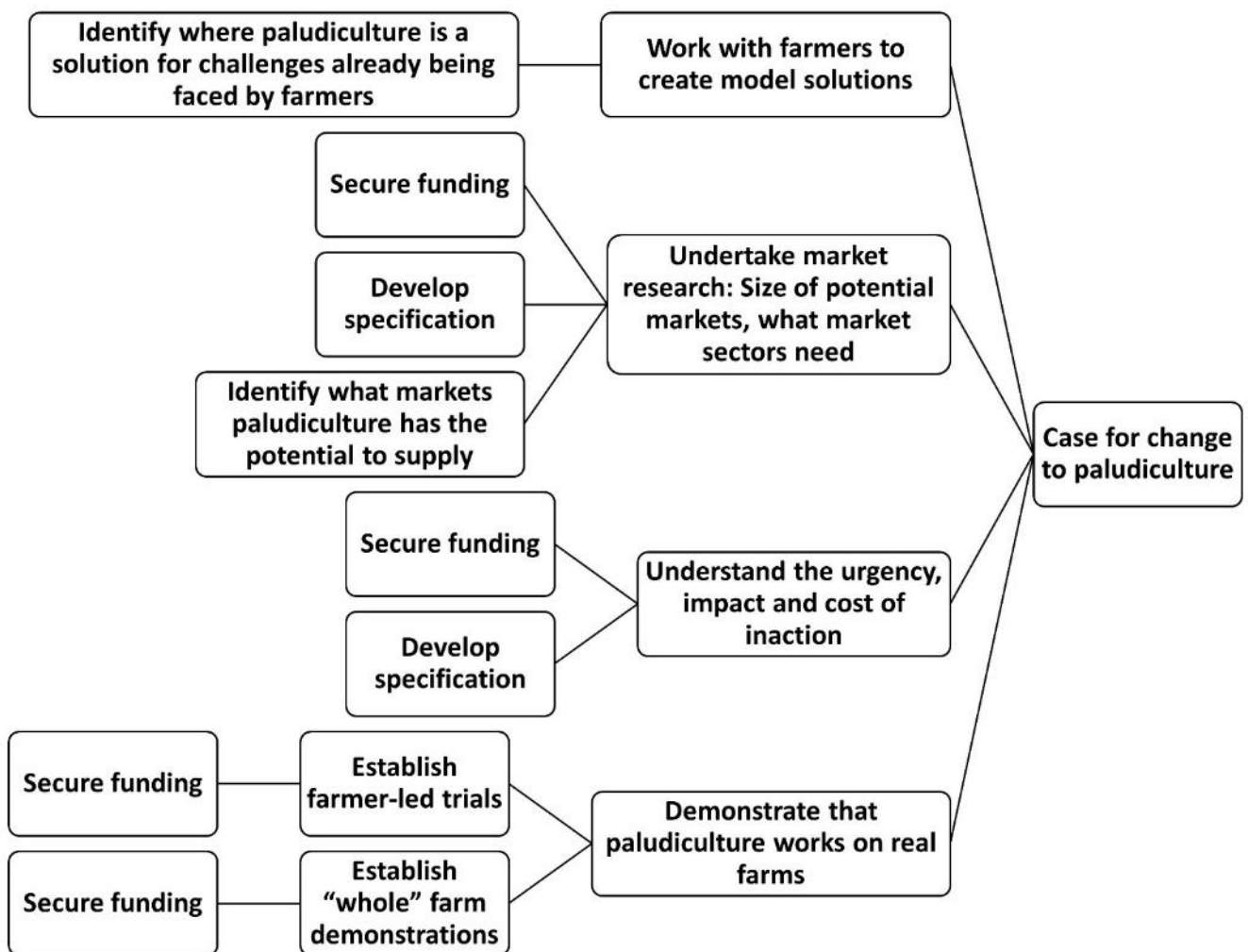
Whilst some potential products and markets for paludicultural crops have been highlighted in the section [Example paludicultural crops and potential products and markets](#) the global Database of Potential Paludiculture Plants (DPPP) contains 1,128 species, of which, 300

species have good or promising potential. The UK Paludiculture Live list filters this list further for a UK context and contains 88 Native species with promising potential. Across both lists many species are perennial plants and span several opportunity categories including, energy, food, fodder, medicinal use, and raw material provision.

This research will focus on the properties of paludicultural crops that may be of interest to different sectors of the economy, identify existing products that can be replaced by paludicultural crops, or processes where paludicultural crops could displace current feedstock and identify the scale of opportunity which may exist for paludiculture in these markets.

We also need to understand the potential for UK paludiculture crop production to be displaced by imports once markets are established for these crops.

**Figure 10: Case for change to paludiculture pathway**

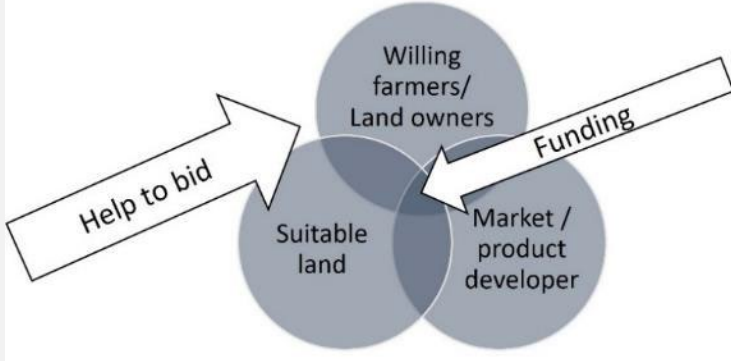


**Table 8: Case for change to paludiculture timeline**

Year	Actions
Year 1	<ul style="list-style-type: none"> <li>• Secure funding for projects and farmer-led trials</li> <li>• Identify what markets paludiculture has the potential to supply</li> <li>• Develop specifications for market research and project examining the costs of inaction</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Identify where paludiculture is a solution for challenges already being faced by farmers</li> <li>• Understand the urgency, impact, and cost of inaction on agricultural land on peat</li> <li>• Undertake market research on size of potential markets and what the market sectors need</li> <li>• Establish farmer-led trials</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Work with farmers to create model solutions for existing challenges</li> <li>• Demonstrate that paludiculture works on real farms</li> <li>• Secure funding for and establish “whole farm” paludicultural demonstrators</li> </ul>
Years 6 to 10	-

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

**Farmer-led trials**



- Need to be large enough scale (20 hectares) and able to accelerate at no risk
- Representative of dynamics of real land
- Regional demonstration suited to local conditions
- Farmer is lead partner and can use funds to bring in experts (for example, agronomists and engineers)
- Government pump-priming funding followed by private investment
- Simple process for farmers to secure funding
- Product partner involved from the outset to provide the product specification

## Farmed Sphagnum growing media model

This is the first of three model pathways to develop crop and product-specific economic models or business cases. It considers farmed Sphagnum used as a growing media. Other uses of farmed Sphagnum will require their own pathway, although there may be some overlap. [Figure 11 sets out the farmed Sphagnum growing media model pathway and Table 9 sets out the timeline for actions to be completed.](#)

This pathway also docks into Task Force Recommendation 12 for more large-scale peat preservation field trials.

Dependencies:

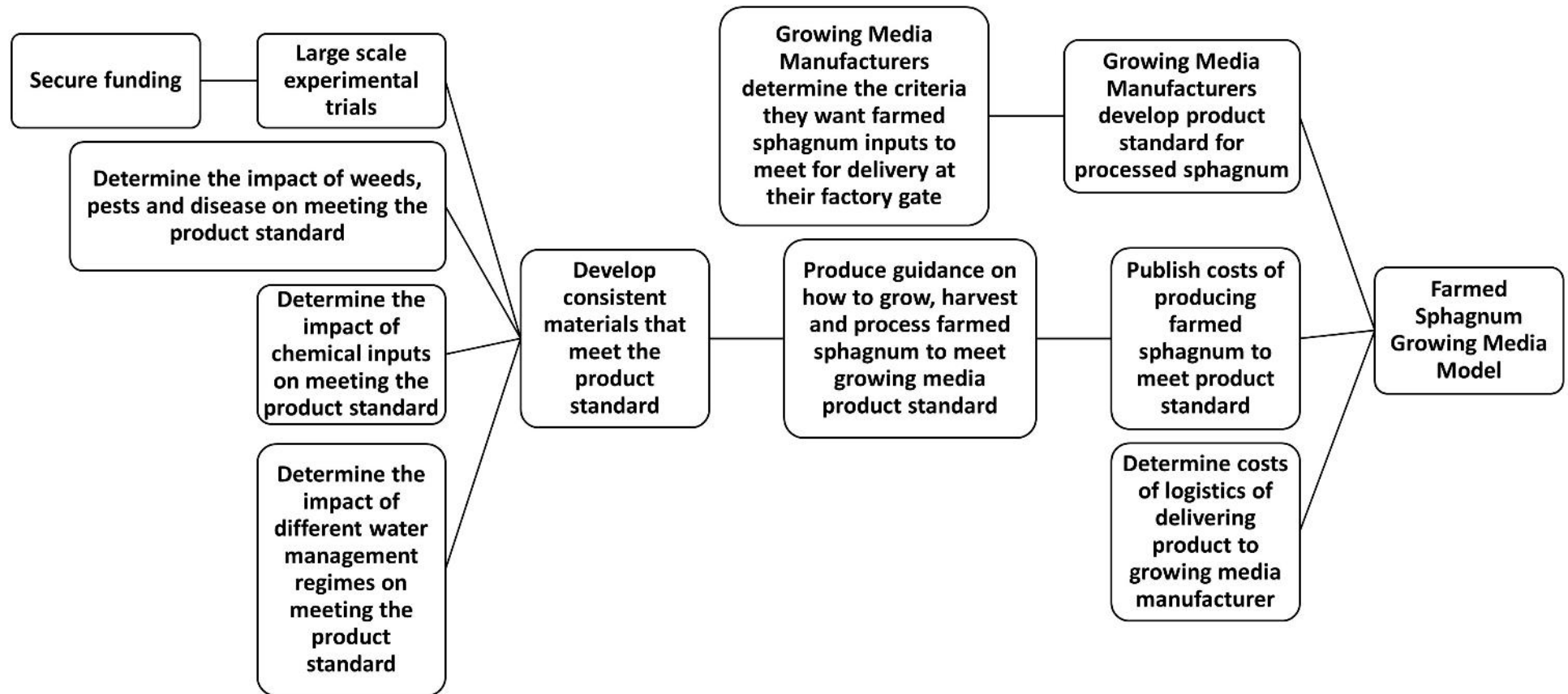
- [Funding for paludiculture](#)
- [Machinery](#)
- [Agronomy](#)
- [Seedstock](#)
- [Labour](#)

**Table 9: Farmed Sphagnum growing media model timeline**

Year	Actions
Year 1	<ul style="list-style-type: none"><li>• Secure funding for large scale experimental trials</li></ul>
Year 2	<ul style="list-style-type: none"><li>• Establish large scale experimental trials</li><li>• Growing Media Manufacturers determine the criteria they want farmed Sphagnum inputs to meet for delivery at their factory gate</li></ul>
Years 3 to 5	<ul style="list-style-type: none"><li>• Growing Media Manufacturers develop the product standard for farmed Sphagnum</li><li>• Determine the impact of weeds, pests and disease on meeting the product standard</li><li>• Determine the impact of chemical inputs on meeting the product standard</li><li>• Determine the impact of different water management regimes on meeting the product standard</li><li>• Develop consistent materials that meet the product standard</li><li>• Determine costs of logistics of delivering product to Growing Media Manufacturers</li></ul>
Years 6 to 10	<ul style="list-style-type: none"><li>• Produce guidance on how to grow, harvest and process farmed Sphagnum to meet growing media product standard</li><li>• Publish costs of producing farmed Sphagnum to meet product standard</li></ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

Figure 11: Farmed Sphagnum growing media model pathway



## Anaerobic digestion for energy model

This is the second model pathway, which considers paludicultural feedstock converted via anaerobic digestion to energy. [Figure 12](#) and [Table 10](#) set out the pathway and timeline for actions to be completed.

Dependencies:

- [Funding for paludiculture](#)
- [Machinery](#)
- [Agronomy](#)
- [Seedstock](#)
- [Labour](#)

**Table 10: Anaerobic digestion for energy model timeline**

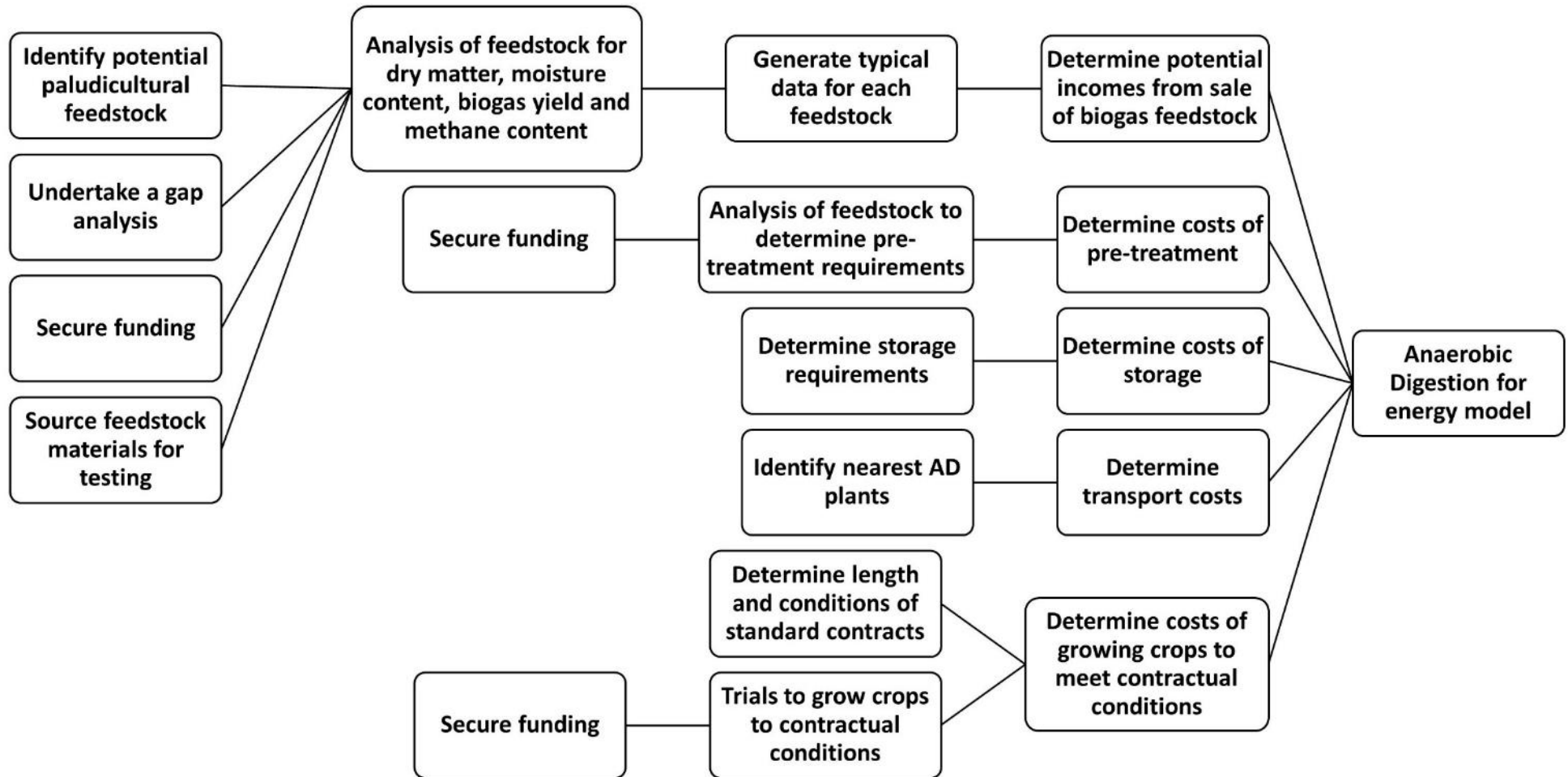
Year	Actions
Year 1	<ul style="list-style-type: none"><li>• Identify potential paludicultural feedstock</li><li>• Undertake a gap analysis of existing information concerning these feedstocks for biogas yield, etc.</li></ul>
Year 2	<ul style="list-style-type: none"><li>• Secure funding for analysis of feedstock and pre-treatment requirements</li><li>• Source feedstock for testing</li><li>• Determine on-farm storage requirements for feedstock</li></ul>
Years 3 to 5	<ul style="list-style-type: none"><li>• Analysis of feedstock for dry matter, moisture content, biogas yield and methane content</li><li>• Analysis of pre-treatment requirements</li><li>• Generate typical data for each feedstock</li><li>• Determine potential income from the sale of biogas feedstock</li><li>• Determine costs of pre-treatment</li><li>• Determine costs of storage</li><li>• Determine length and conditions of standard contracts</li><li>• Secure funding for and undertake trials to grow crops to contractual conditions</li></ul>
Years 6 to 10	<ul style="list-style-type: none"><li>• Determine costs of growing feedstock crops to meet contractual conditions</li></ul>

Note: Identifying the nearest anaerobic digestion plant and determining transport costs will need to be carried out by individual paludiculture operators. Therefore, these actions have not been timetabled as a collective roadmap action. Generic data based on assumptions may be developed.

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.



Figure 12: Anaerobic Digestion for energy model pathway



## Typha Insulation Fibreboard model

The third model pathway considers insulation fibreboard made from Typha (reedmace, or 'bulrush'). [Figure 13](#) and [Table 11](#) set out the pathway and timeline for actions to be completed. This pathway also docks into Task Force Recommendation 12 for more large-scale peat preservation field trials.

Dependencies:

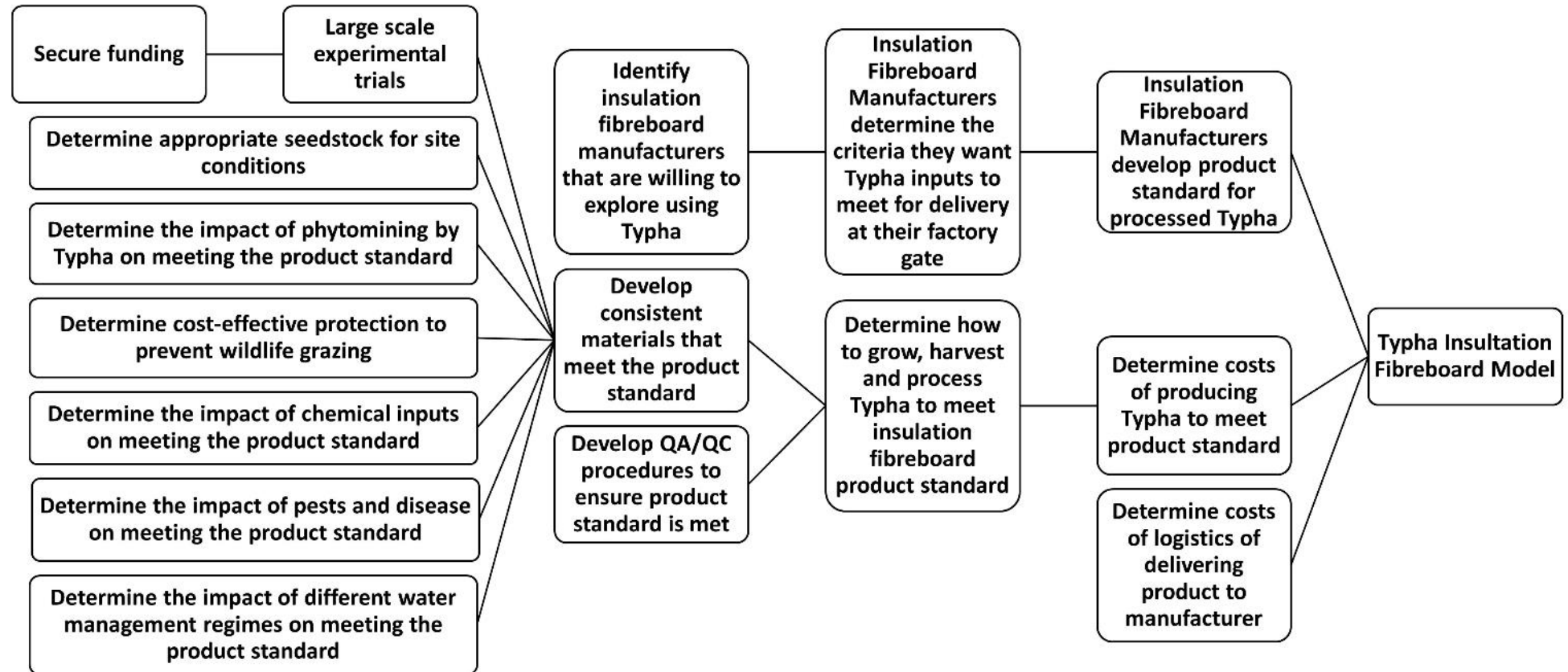
- [Funding for paludiculture](#)
- [Machinery](#)
- [Agronomy](#)
- [Seedstock](#)
- [Labour](#)

**Table 11: Typha insulation fibreboard model timeline**

Year	Actions
Year 1	<ul style="list-style-type: none"> <li>• Secure funding for large scale experimental trials</li> <li>• Identify insulation fibreboard manufacturers that are willing to explore using Typha</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Establish large scale experimental trials</li> <li>• Insulation Fibreboard Manufacturers determine the criteria they want Typha inputs to meet for delivery at their factory gate</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Insulation Fibreboard Manufacturers develop product standard for processed Typha</li> <li>• Determine appropriate seedstock for site conditions</li> <li>• Determine the impact of phytomining by Typha on meeting the product standard</li> <li>• Determine cost-effective protection to prevent wildlife grazing (where this is an issue)</li> <li>• Determine the impact of chemical inputs, weeds, pests and disease on meeting the product standard</li> <li>• Determine the impact of different water management regimes on meeting the product standard</li> <li>• Develop consistent materials that meet the product standard</li> <li>• Develop QA/QC procedures to ensure product standard is met</li> </ul>
Years 6 to 10	<ul style="list-style-type: none"> <li>• Determine how to grow, harvest and process Typha to meet insulation fibreboard product standard</li> <li>• Determine costs of logistics of delivering product to manufacturer</li> <li>• Determine costs of producing Typha to meet product standard</li> </ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

Figure 13: Typha insulation fibreboard model pathway



## Machinery

Figure 14 shows the initial machinery pathway. After the initial actions, a machinery pathway decision-point is reached and there are two alternative pathways from that point depending on whether it is possible to drop the water table for key farming operations:

1. Figure 15 Adapt existing machinery
2. Figure 16 Develop bespoke machinery

However, it is possible that both pathways will be required, either in different regions (depending on hydrological conditions) or for different crops. The actions from Figure 14, Figure 15 and Figure 16 are combined into a timeline in Table 12. The key action required to determine the outcome of the machinery pathway decision point is explored in the section [Analysis of the pros and cons of dropping the water table for farming operations](#).

These pathways dock into Task Force Recommendation 13 on advancing new technologies.

Dependencies:

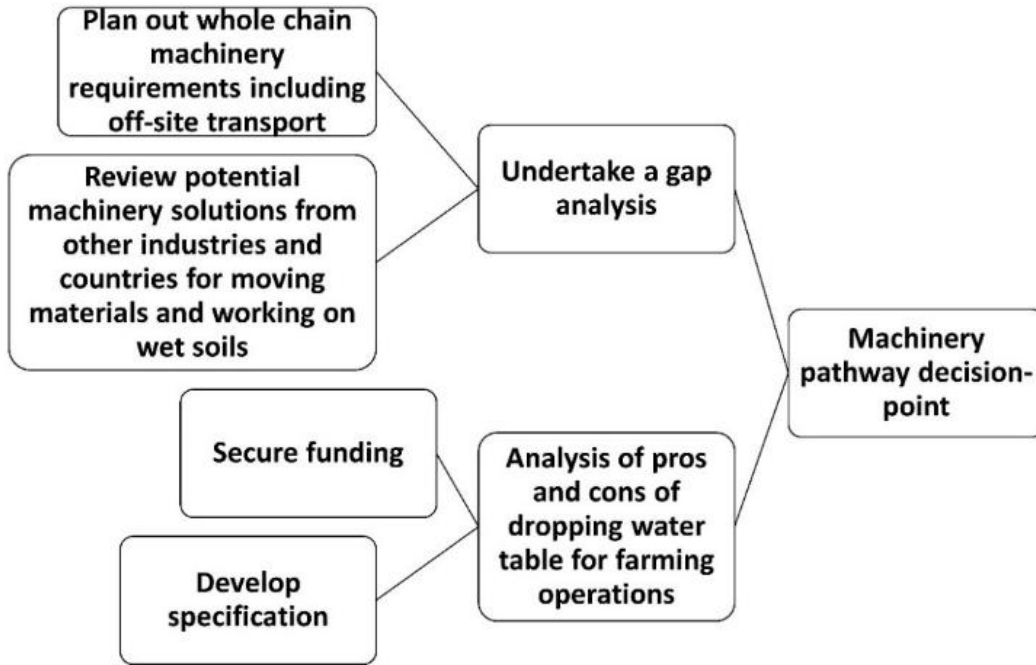
- [Funding for paludiculture](#)
- [Economic model or business case](#)
- [Case for change to paludiculture](#) – market research

### **Analysis of the pros and cons of dropping the water table for farming operations**

It is clear from discussions that the ability to use or adapt existing machinery would provide a faster solution for adoption of paludiculture. However, this seems predicated on the ability to drop the water table for farming operations to allow conventional machinery onto the land, coupled with the availability of water to raise the water table after operations are completed. Therefore, an experimental analysis of this approach is required as an early action to determine the way forward for the machinery pathways and the level of effort required for different components.

It will also be important to understand the implications of cycling the water table on various consequential aspects, such as greenhouse gas emissions and nutrient losses as well as the capital required to manage the water table in this way.

**Figure 14: Machinery pathway: Initial**



**Figure 15: Machinery pathway: Adapt**

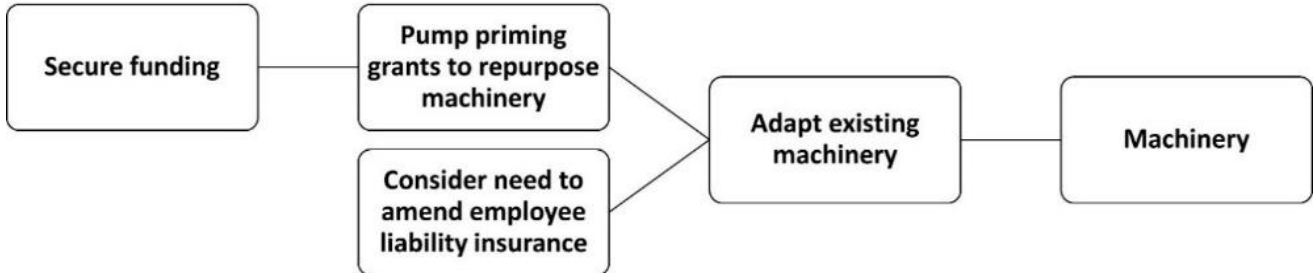
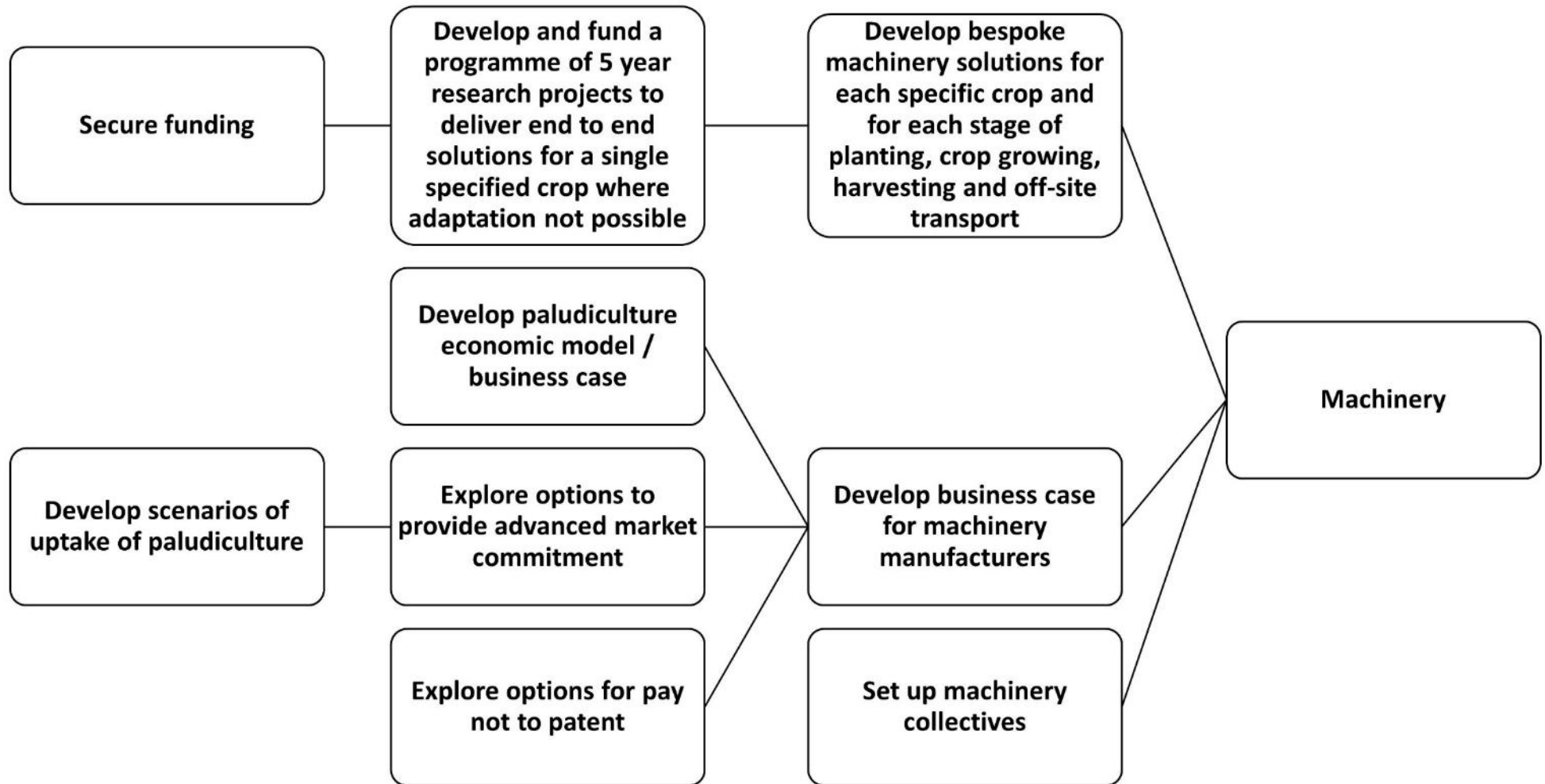


Figure 16: Machinery pathway: Bespoke



**Table 12: Machinery timeline**

Year	Actions
Year 1	<ul style="list-style-type: none"> <li>• Plan out whole-chain machinery requirements for priority crops, including off-site transport</li> <li>• Review potential machinery solutions from other industries and countries for moving materials and working on wet soils</li> <li>• Secure funding and develop specification for an analysis of the pros and cons of dropping the water table for key farming operations</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Undertake gap analysis of the whole chain machinery requirements</li> <li>• Analysis of the pros and cons of dropping the water table for key farming operations</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Machinery pathway decision point</li> </ul> <p>Adapt:</p> <ul style="list-style-type: none"> <li>• Secure funding for and provide pump priming grants to repurpose existing farm machinery</li> <li>• Consider the need to amend employee liability insurance for the use of adapted machinery</li> <li>• Adapt existing machinery</li> </ul> <p>Bespoke:</p> <ul style="list-style-type: none"> <li>• Secure funding and develop and fund a programme of 5-year research projects to deliver end to end solutions for a single specified crops where adaptation is not possible</li> <li>• Develop scenarios of uptake of paludiculture</li> </ul>
Years 6 to 10	<p>Bespoke</p> <ul style="list-style-type: none"> <li>• Develop bespoke machinery solutions for each specific crop and for each stage of planting, crop growing, harvesting and off-site transport</li> <li>• Develop paludiculture economic model / business case</li> <li>• Explore options to provide advanced market commitment</li> <li>• Explore options for 'pay not to patent'</li> <li>• Develop business case for machinery manufacturers</li> <li>• Set up machinery collectives for new paludiculture machinery</li> </ul>

Note: Actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

## **Agronomy**

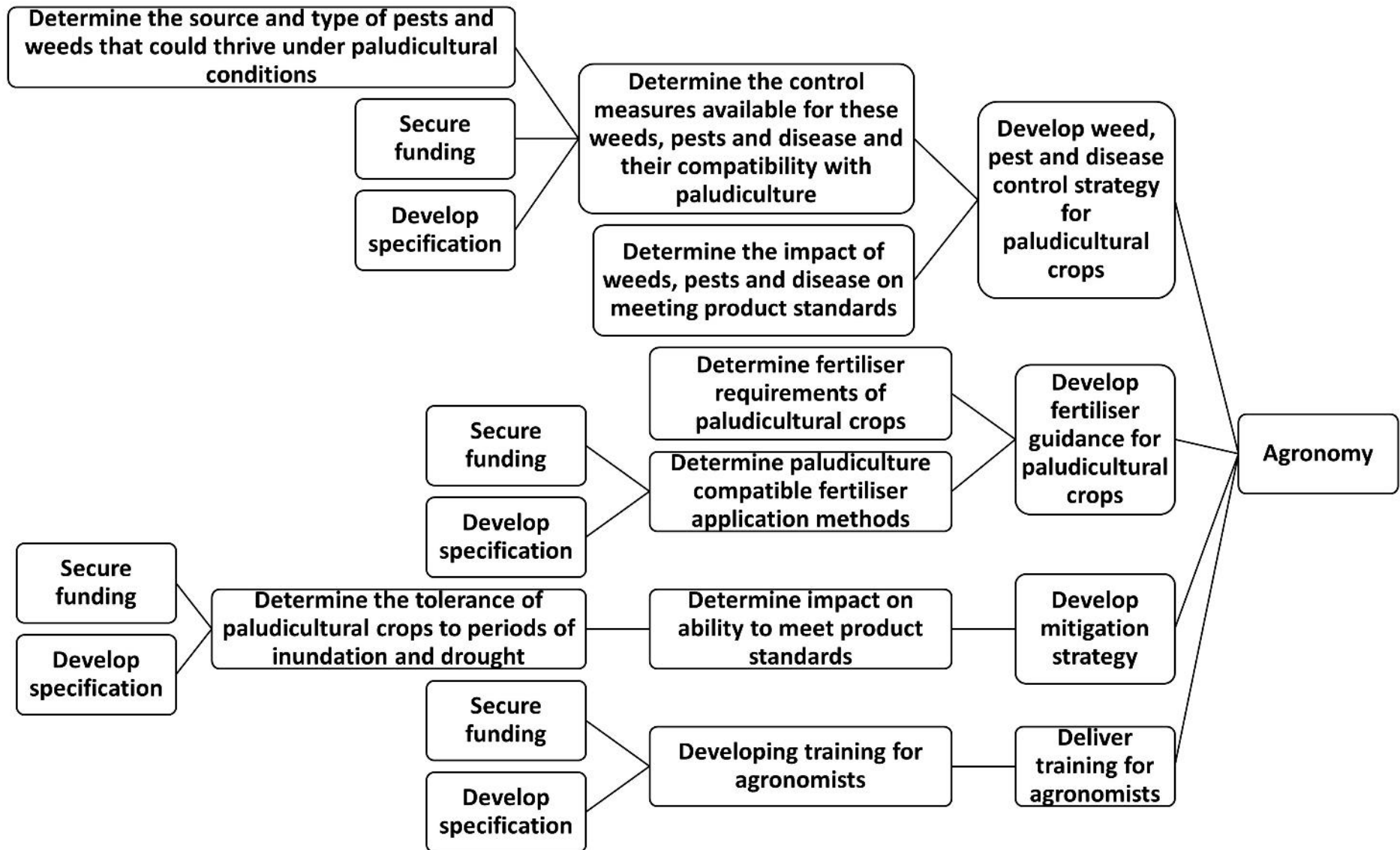
Figure 17 and Table 13 set out the pathway and timeline for actions on fertiliser application, weed, pest and disease control and extremes of water availability.

Dependencies:

- Funding for paludiculture
- Case for change to paludiculture – farmer-led trials
- Farmed Sphagnum Growing Media model
- Anaerobic Digestion for energy model
- Typha Insulation Fibreboard model
- Machinery
- Labour
- Water management
- Water quality



Figure 17: Agronomy pathway



**Table 13: Agronomy timeline**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"> <li>• No actions</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Determine the source and type of weeds, pests and disease that could thrive under paludicultural conditions</li> <li>• Secure funding and develop specification to determine paludiculture-compatible weed, pest and disease control and fertiliser application methods</li> <li>• Secure funding and develop specification to determine the tolerance of paludicultural crops to periods of inundation and drought</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Determine the control measures available for these weeds, pests and disease and their compatibility with paludiculture</li> <li>• Determine the impact of weeds, pests and disease on meeting product standards</li> <li>• Determine fertiliser requirements of paludicultural crops</li> <li>• Determine paludiculture compatible fertiliser application methods, to minimise the mobilisation of nutrients to water bodies</li> <li>• Determine the tolerance of paludicultural crops to periods of inundation and drought</li> <li>• Secure funding for agronomist training</li> </ul>
Years 6 to 10	<ul style="list-style-type: none"> <li>• Develop weed, pest and disease control strategy for paludicultural crops</li> <li>• Develop fertiliser guidance for paludicultural crops</li> <li>• Determine the impact of periods of inundation and drought on ability of crops to meet product standards</li> <li>• Develop mitigation strategy for the impacts of periods of inundation and drought on ability to meet product standards</li> <li>• Develop and deliver training for agronomists</li> </ul>

Note: Many actions from years 3 to 5 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

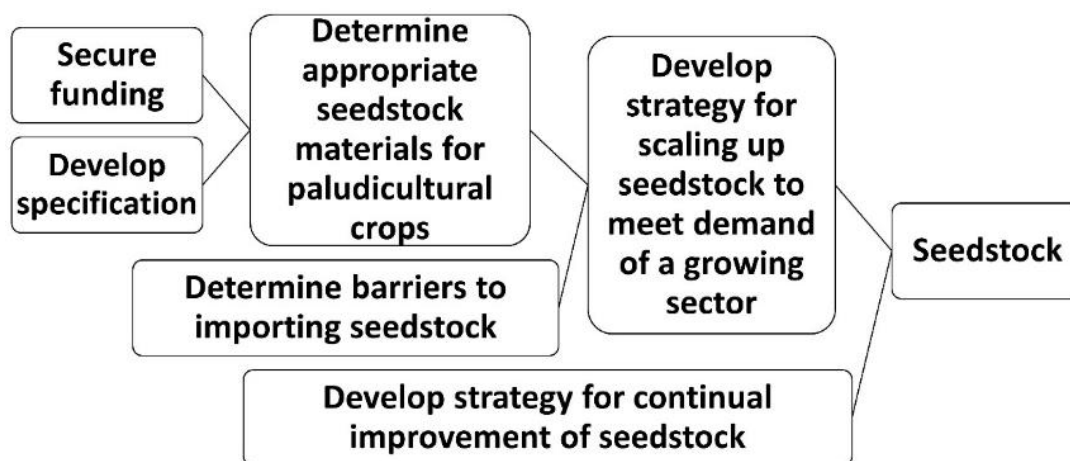
### **Seedstock**

Figure 18 and Table 14 set out a pathway and timeline for actions to develop a strategy for scaling up seedstock. Once that strategy has been developed the pathway will need to be updated to include actions to deliver the strategy.

Dependencies:

- [Funding for paludiculture](#)
- [Case for change to paludiculture](#) – market research
- [Farmed Sphagnum Growing Media model](#)
- [Anaerobic Digestion for energy model](#)
- [Typha Insulation Fibreboard model](#)
- [Agronomy](#) – impact of weeds

**Figure 18: Seedstock pathway**



**Table 14: Seedstock timeline**

Year	Actions
Year 1	<ul style="list-style-type: none"> <li>• No actions</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Secure funding and develop specification to determine appropriate seedstock</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Determine appropriate seedstock materials for paludicultural crops</li> <li>• Determine barriers to importing seedstock</li> <li>• Develop a strategy for scaling up seedstock supply to meet the demand of a growing sector</li> </ul>
Years 6 to 10	<ul style="list-style-type: none"> <li>• Develop strategy for continual improvement of seedstock</li> </ul>

Note: Actions in years 3 to 5 are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

## Labour

Figure 19 and Table 15 sets out a pathway and timeline for actions to develop a series of labour-related strategies. Once these strategies have been developed the pathway will need to be updated to include actions to deliver these strategies.

Dependencies:

- Case for change to paludiculture – farmer-led trials
- Farmed Sphagnum Growing Media model
- Anaerobic Digestion for energy model
- Typha Insulation Fibreboard model
- Machinery
- Agronomy

**Figure 19: Labour pathway**



**Table 15: Labour timeline**

Year	Actions
Year 1	<ul style="list-style-type: none"> <li>• No actions</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• No actions</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Develop annual calendar of labour requirements for each crop</li> <li>• Determine the requirements for seasonal labour</li> <li>• Determine the skillset requirements to deliver different paludiculture operations</li> <li>• Determine the risks to workers working in a wetter environment</li> </ul>

Year	Actions
Years 6 to 10	<ul style="list-style-type: none"> <li>• Develop a strategy to ensure access to the required seasonal labour, with consideration of the impact of seasonal work on workers</li> <li>• Develop a strategy to upskill workers</li> <li>• Develop a mitigation strategy to address the risk to workers working in a wetter environment</li> </ul>

Note: Actions in years 6 to 10 are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

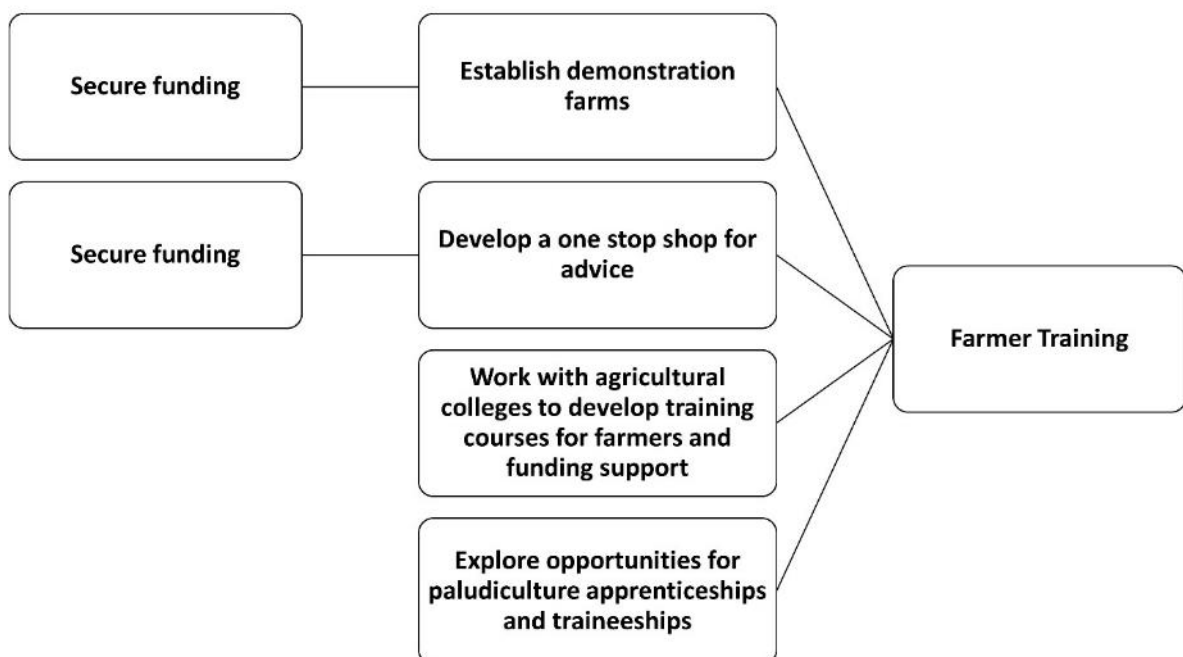
## Farmer training

Figure 20 and Table 16 set out the pathway and timeline for actions to deliver different forms of farmer training, with the same actions shown in each in different formats.

Dependencies:

- [Funding for paludiculture](#)
- [Case for change to paludiculture](#) – farmer-led trials
- [Economic model or business case](#)
- [Machinery](#)
- [Agronomy](#)
- [Labour](#)

Figure 20: Farmer training pathway



**Table 16: Farming training timeline**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"><li>• No actions</li></ul>
Year 2	<ul style="list-style-type: none"><li>• No actions</li></ul>
Years 3 to 5	<ul style="list-style-type: none"><li>• Secure funding for, and establish, paludicultural demonstration farms (see Case for change to paludiculture)</li><li>• Secure funding and develop a one-stop-shop for advice to farmers</li></ul>
Years 6 to 10	<ul style="list-style-type: none"><li>• Work with agricultural colleges to develop training courses for farmers and funding support (this action is dependent on completion of actions across other pathways, for example Case for change to paludiculture, Farmed Sphagnum Growing Media model, Agronomy, Machinery and Labour)</li><li>• Explore opportunities for paludiculture apprenticeships and traineeships</li></ul>

Note: Actions for years 6 to 10 are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

### **Advocacy and facilitation**

The advocacy and facilitation pathway (Figure 21) sets out the actions to create partnerships and a paludiculture community as well as a wider awareness of paludiculture. It culminates in the creation of a Paludiculture Board. Table 17 places these actions into a timeline.

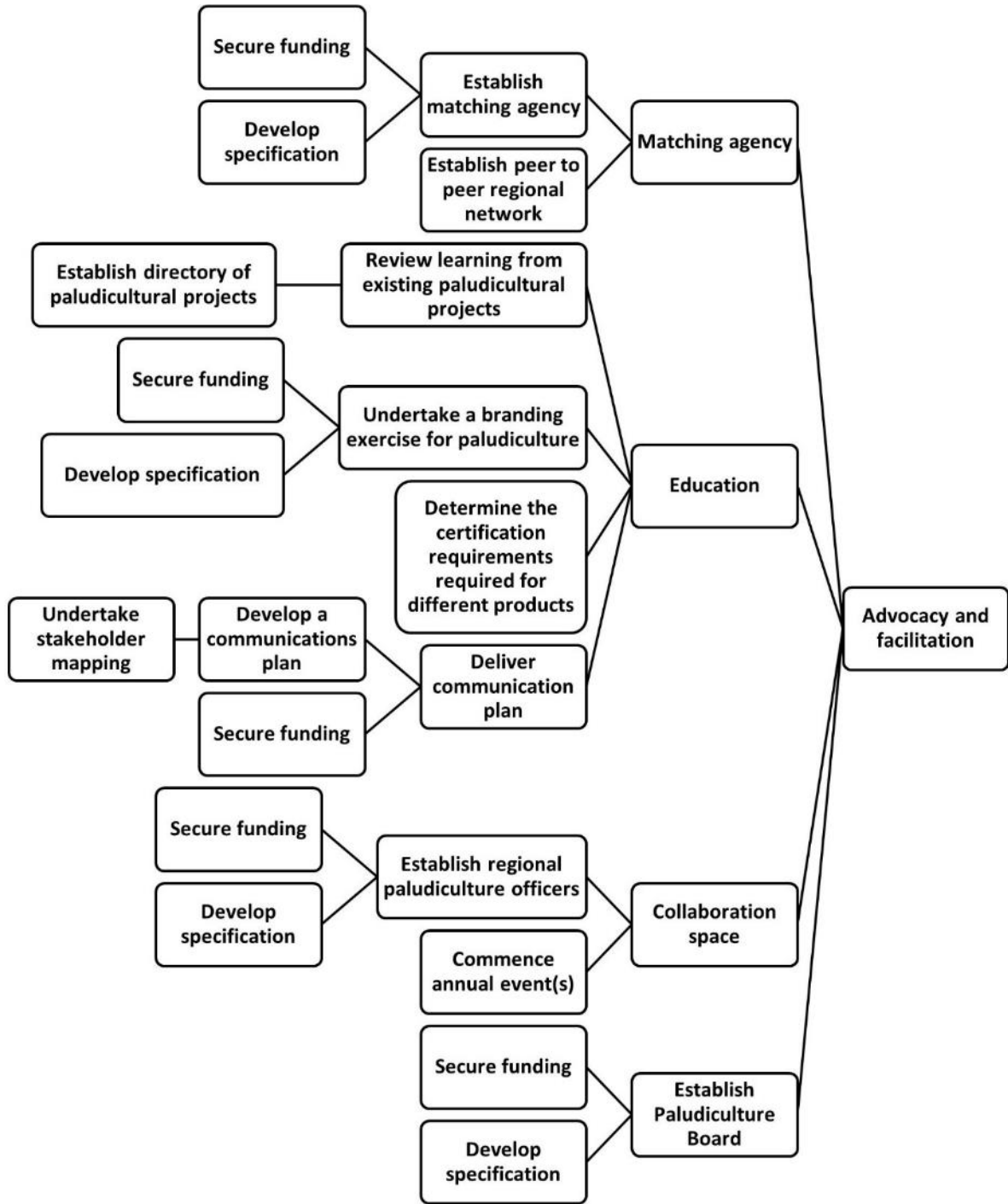
The proposal for Paludiculture Officers could be seen as additional top the Peat Sensitive Farming Advisors (PSFAs) proposed in Task Force Recommendation 6, or as part of the PSFA role. This pathway also docks into Recommendation 9 on raising the profile of peat soils.

#### **Paludiculture Board**

The need has been identified for a body to take on the role of advocacy and facilitation for paludiculture, a so called 'Paludiculture Board'. It is proposed that this Board is set up later in the roadmap and becomes the home for other elements developed throughout the roadmap, for example the matching agency (Figure 21). The Board should eventually be funded via member subscription, but this can only happen once there is a large enough industry to generate sufficient subscriptions to cover operating costs.

The details of the role and makeup of the Board will develop organically as governance of the roadmap transitions from the current model as set out in Figure 1 and as other elements of the roadmap are delivered.

Figure 21: Advocacy and facilitation pathway



**Table 17: Advocacy and facilitation timeline**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"><li>• Secure funding and develop specification for matching agency</li><li>• Secure funding and develop specification for branding exercise</li><li>• Establish directory of paludicultural projects</li><li>• Review learning from existing paludicultural projects</li><li>• Undertake stakeholder mapping for communications and education plan</li></ul>
Year 2	<ul style="list-style-type: none"><li>• Establish matching agency</li><li>• Undertake branding exercise for paludiculture</li><li>• Determine the certification requirements for different products</li><li>• Develop a communications plan and secure funding to deliver it</li><li>• Develop specification for regional paludiculture officers</li></ul>
Years 3 to 5	<ul style="list-style-type: none"><li>• Establish peer to peer regional networks</li><li>• Deliver communications plan</li><li>• Secure funding and establish regional paludiculture officers</li><li>• Commence annual collaborative events</li></ul>
Years 6 to 10	<ul style="list-style-type: none"><li>• Develop specification and secure funding for a Paludiculture Board</li><li>• Establish Paludiculture Board</li></ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

### **Business and Innovation support (product developer and manufacturer)**

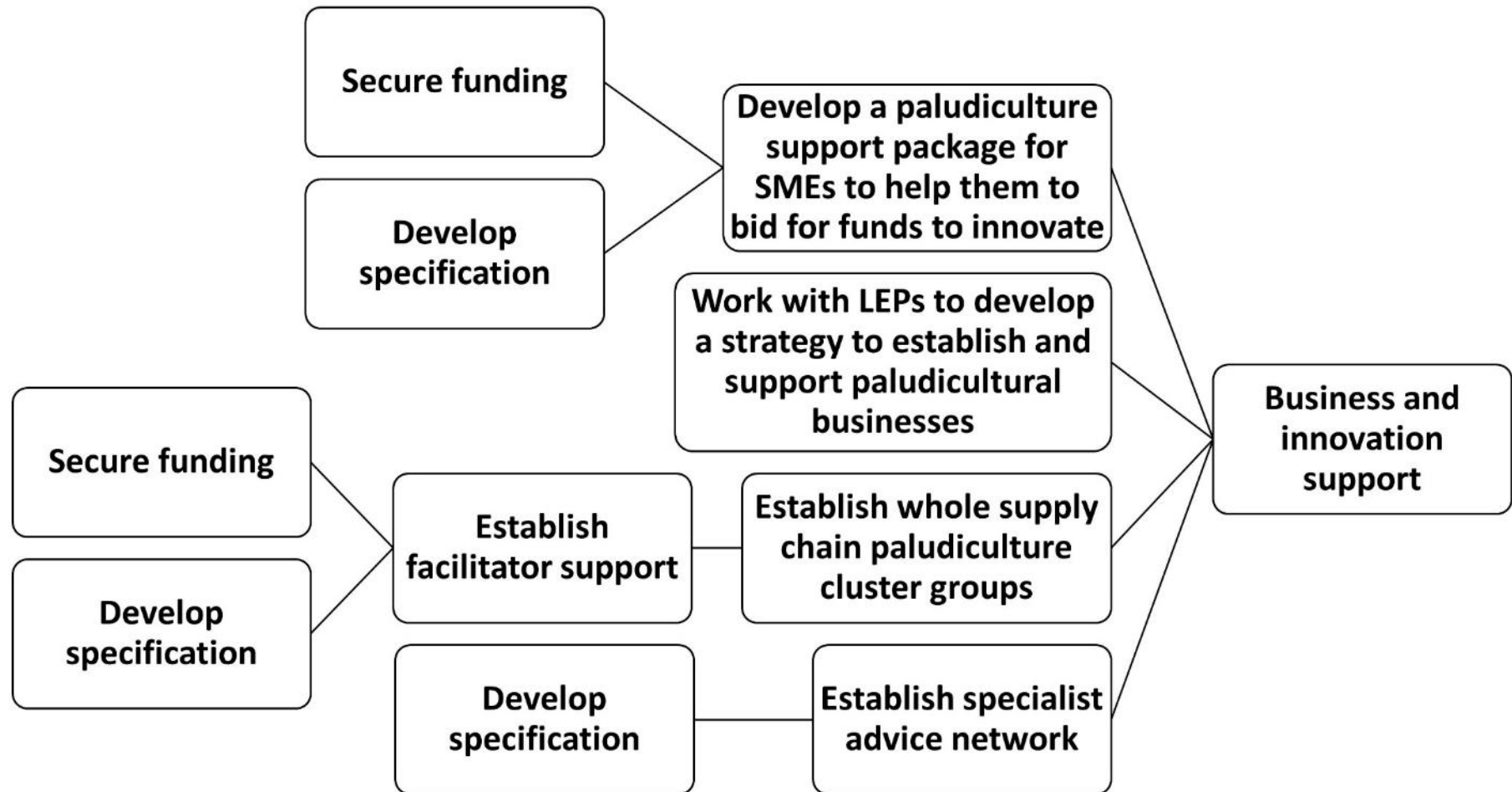
Figure 22 and Table 18 set out the pathway and timeline for actions to provide business and innovation support to product developers and manufacturers, showing the same actions in different formats.

Dependencies:

- [Funding for paludiculture](#)
- [Advocacy and facilitation](#)



Figure 22: Business and Innovation support pathway



**Table 18: Business and Innovation support timeline**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"><li>• Secure funding and develop specification for a support package to assist small to medium-sized enterprises (SMEs) to bid for funds to innovate</li><li>• Secure funding and develop specification for facilitator support for whole supply chain cluster groups</li></ul>
Year 2	<ul style="list-style-type: none"><li>• Work with Local Enterprise Partnerships in regions with potential opportunity for paludiculture to develop a strategy to establish and support paludicultural businesses</li><li>• Develop a paludiculture support package for SMEs to help them to bid for funds</li><li>• Establish facilitator support for cluster groups</li><li>• Develop specification for specialist advice network</li></ul>
Years 3 to 5	<ul style="list-style-type: none"><li>• Establish whole supply chain paludiculture cluster groups</li><li>• Establish specialist advice network</li></ul>
Years 6 to 10	<ul style="list-style-type: none"><li>• No actions</li></ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

### **Agricultural policy and farming support**

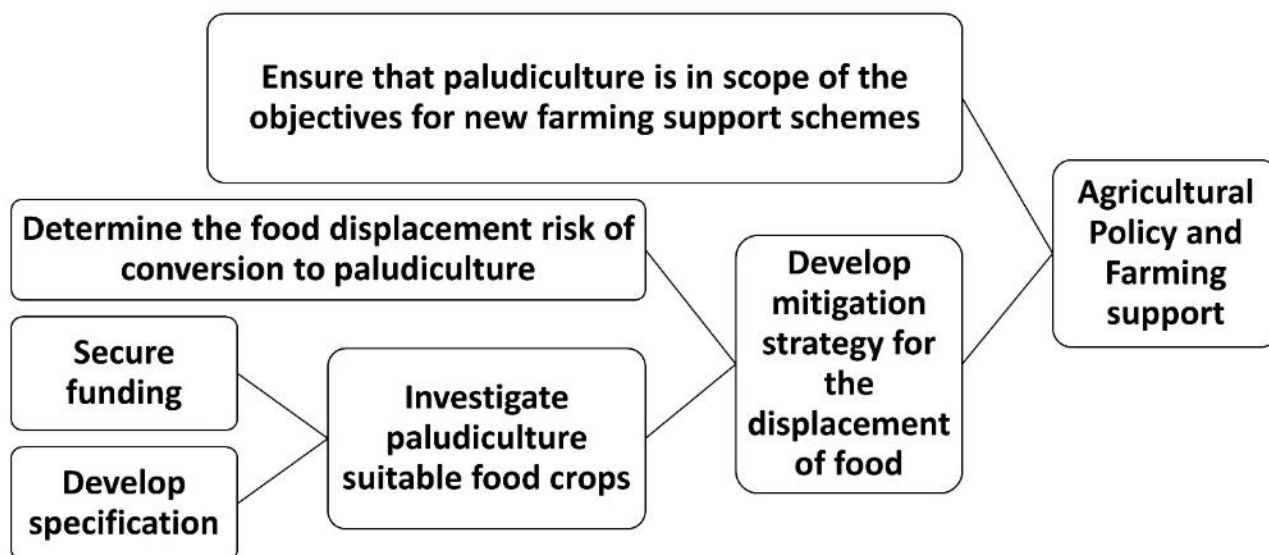
[Figure 23](#) sets out the pathway for additional agricultural policy and farming support actions that are not already covered in other pathways (for example, the ‘funding for paludiculture’ and ‘legal recognition of paludiculture as a form of agriculture’ pathways). [Table 19](#) sets out the timeline for these additional actions.

Task Force Recommendation 13 makes it clear that we need to manage any adverse impacts on our domestic food supply in bringing forward new technologies. The Task Force has also stated that wetter modes of farming must not drive our food production overseas. Therefore, addressing the concern that paludiculture may displace domestic food production and developing plans for any required mitigation is a key part of this pathway.

Dependencies:

- [Funding for paludiculture](#)

**Figure 23: Agricultural policy and farming support pathway**



**Table 19: Agricultural policy and farming support timeline**

Year	Actions
Year 1	<ul style="list-style-type: none"> <li>• Ensure that paludiculture is in scope of the objectives for new farming support schemes</li> <li>• Determine the food displacement risk of conversion to paludiculture</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Secure funding and develop specification to investigate paludiculture suitable food crops</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Investigate paludiculture suitable food crops</li> </ul>
Years 6 to 10	<ul style="list-style-type: none"> <li>• Develop mitigation strategy for the displacement of food from conversion to paludiculture, including plans to develop promising paludiculture suitable food crops</li> </ul>

Note: Actions from years 3 to 5 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

### **Water management**

Figure 24 and Table 20 set out the pathway and timeline for the water management actions, showing the same actions in different formats. These actions need to be considered in the context of changing water availability due to climate change.

This pathway docks into Task Force Recommendation 3 on a new place for peat in strategic decisions on water and Recommendation 8 on ensuring policy and legislation supports regulators.

Dependencies:

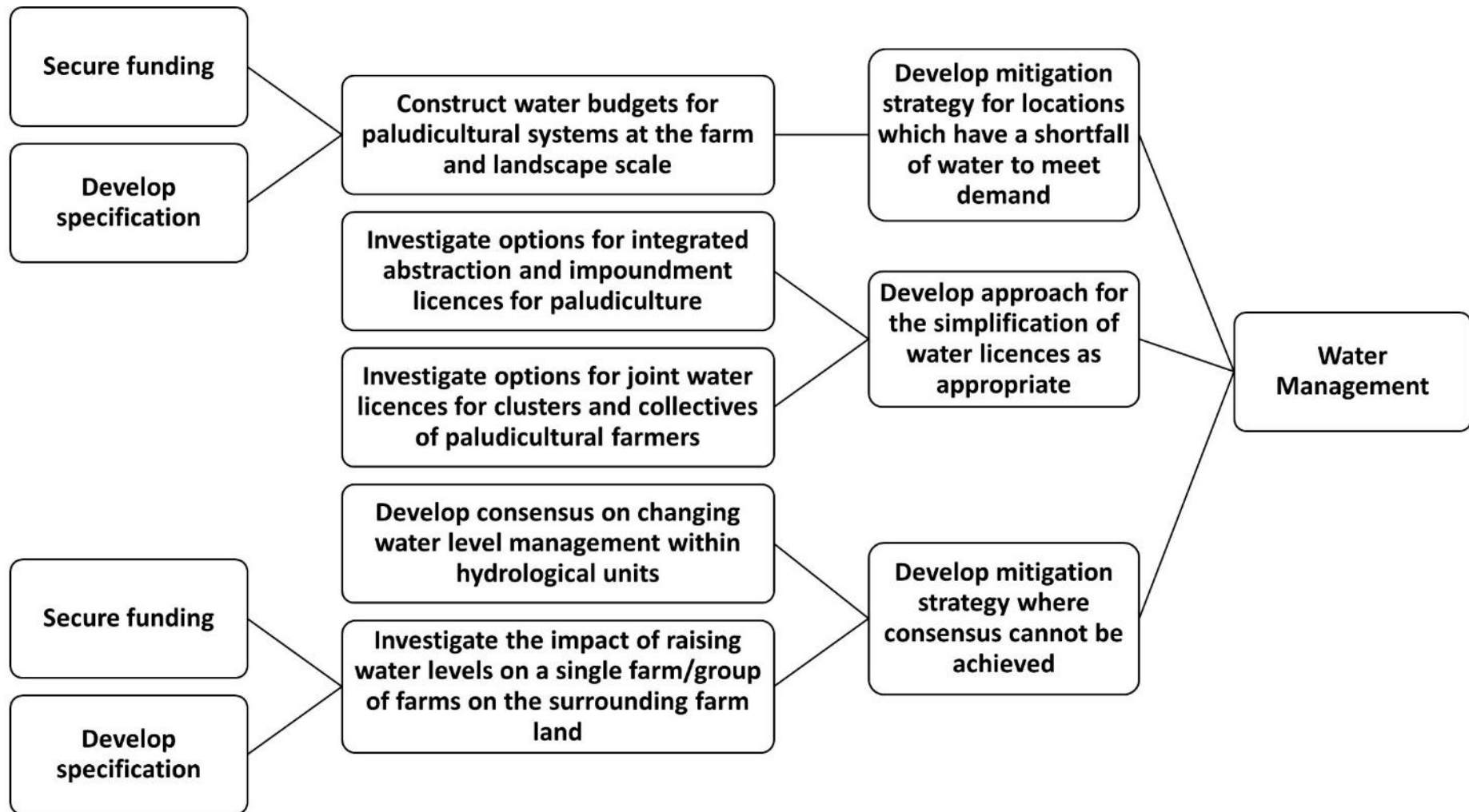
- [Funding for paludiculture](#)
- [Planning](#)

**Table 20: Water management timeline**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"> <li>• Secure funding and develop specification to construct water budgets</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Construct water budgets for paludicultural systems at the farm and landscape scale (and feed into national and regional water resource plans)</li> <li>• Secure funding and develop specification to investigate the impact of raising water levels on a single farm/group of farms on the surrounding farmland</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Develop mitigation strategy for locations which have a shortfall of water to meet demand</li> <li>• Investigate options for integrated abstraction and impoundment licences for paludiculture</li> <li>• Investigate options for joint water licences for clusters and collectives of paludicultural farmers</li> <li>• Develop approach for the simplification of water licences as appropriate</li> <li>• Investigate the impact of raising water levels on a single farm/group of farms on the surrounding farmland</li> </ul>
Years 6 to 10	<ul style="list-style-type: none"> <li>• Develop consensus on changing water level management within hydrological units (that is, at the landscape scale)</li> <li>• Develop mitigation strategy where consensus cannot be achieved</li> </ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

Figure 24: Water management pathway



## Water quality

Figure 25 and Table 21 set out the pathway and timeline for water quality actions, showing the same actions in different formats.

This pathway docks into Task Force Recommendation 13 on more large-scale peat preservation field-trials, addressing the question of the impact of raising water levels on water quality and the water environment.

Dependencies:

- [Funding for paludiculture](#)
- [Finance from other ecosystem services](#)
- [Machinery](#)
- [Agronomy](#)

Figure 25: Water quality pathway

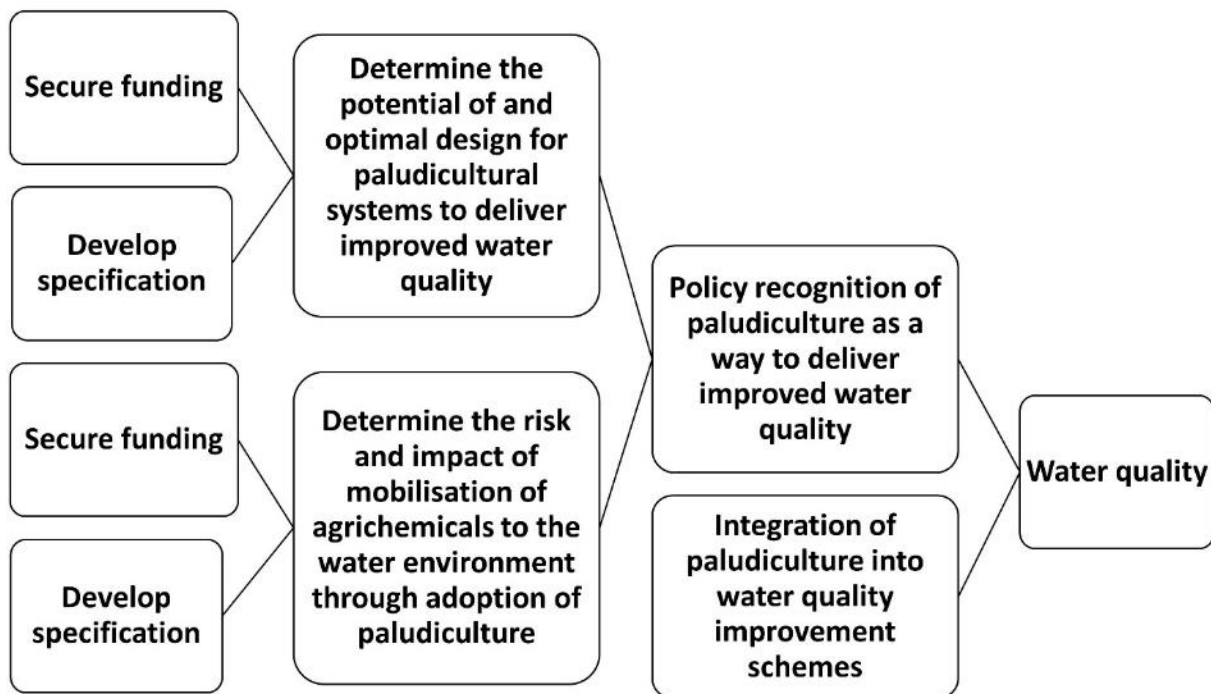


Table 21: Water quality timeline

Year	Actions
Year 1	<ul style="list-style-type: none"> <li>• No actions</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Secure funding and develop specification to determine the water quality benefits and potential negative impacts of paludiculture</li> </ul>

Year	Actions
Years 3 to 5	<ul style="list-style-type: none"> <li>• Determine the potential of and optimal design for paludicultural systems to deliver improved water quality</li> <li>• Determine the risk and impact of mobilisation of agrichemicals to the water environment through adoption of paludiculture</li> </ul>
Years 6 to 10	<ul style="list-style-type: none"> <li>• Policy recognition of paludiculture as a way to deliver improved water quality</li> <li>• Integration of paludiculture into water quality improvement schemes</li> </ul>

Note: Actions from years 3 to 5 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

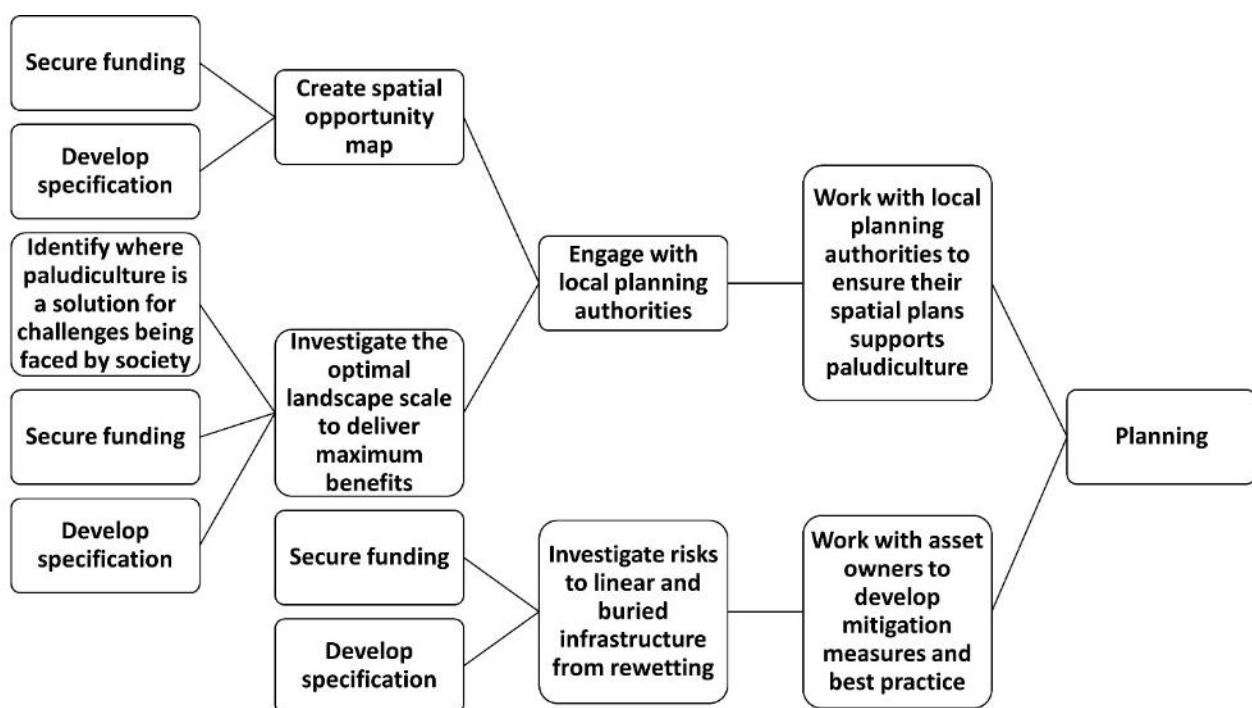
## Planning

The planning pathway (Figure 26) sets out actions related to spatial planning and the planning system. Table 22 sets out the timeline for these actions.

Dependencies:

- [Funding for paludiculture](#)
- [Water management](#) – water budgets
- [Nature designations](#)

Figure 26: Planning pathway



**Table 22: Planning timeline**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"> <li>• Secure funding and develop specifications for paludiculture spatial opportunity map, investigation of optimal landscape scale to deliver maximum benefits to society and investigation of the risks to linear and buried infrastructure from rewetting</li> <li>• Identify where paludiculture is a solution for challenges being faced by society</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Create spatial opportunity map</li> <li>• Investigate the optimal landscape scale to deliver maximum benefits to society</li> <li>• Investigate risks to linear and buried infrastructure</li> </ul>
Years 3 to 5	<ul style="list-style-type: none"> <li>• Engage with local planning authorities to ensure their spatial plans support paludiculture, including being sympathetic to processing requirements</li> <li>• Work with the asset owners of linear and buried infrastructure to develop mitigation measures and best practice</li> </ul>
Years 6 to 10	<ul style="list-style-type: none"> <li>• Work with local planning authorities to ensure their spatial plans support paludiculture</li> </ul>

Note: Actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

### **Nature designations**

The nature designations pathway ([Figure 27](#)) covers two main issues:

1. Combability of paludiculture with existing nature designations, and
2. The potential likelihood and impact of future nature designations on paludicultural farming operations and how to minimise the impact.

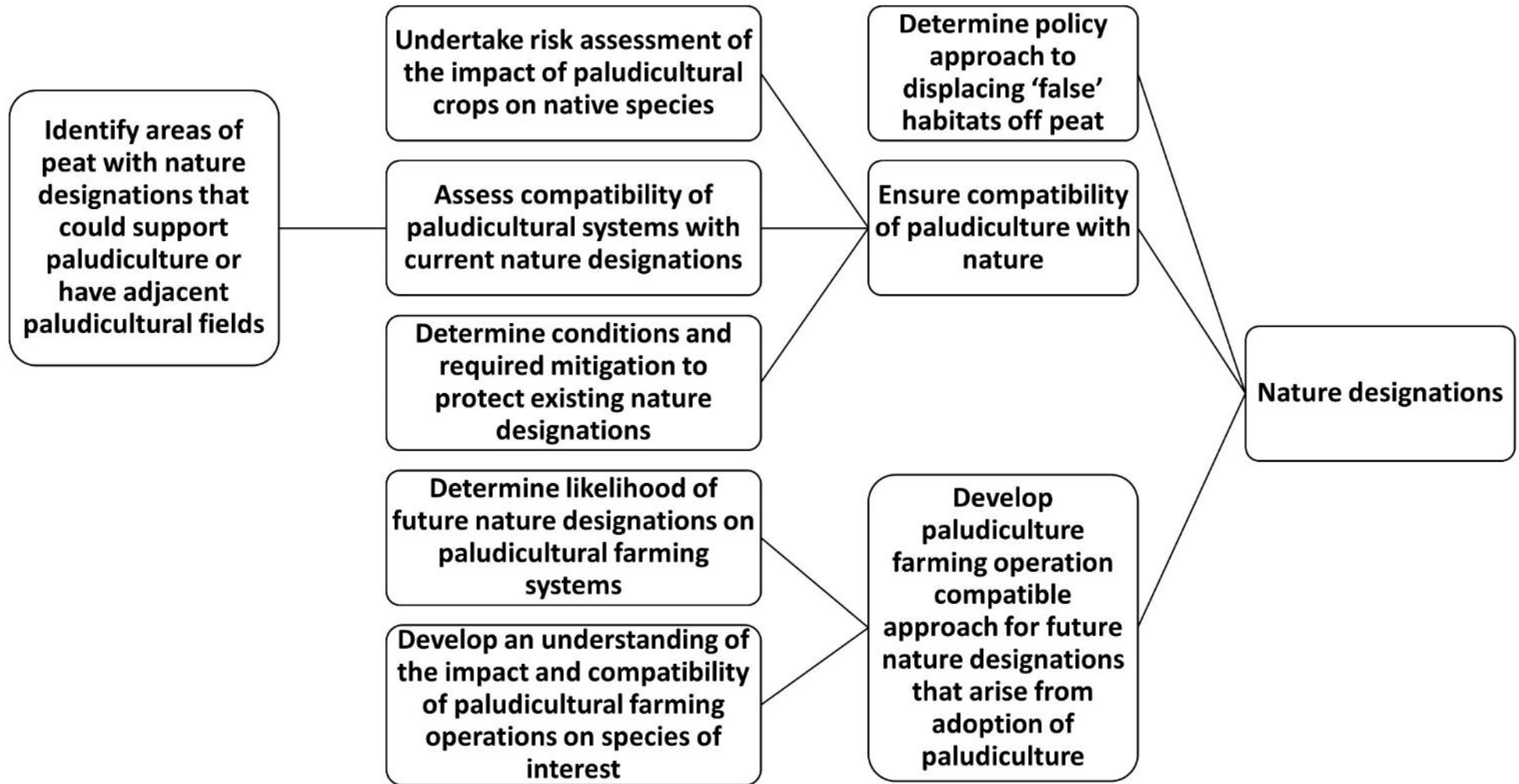
[Table 23](#) sets out the timeline for actions on these issues.

Dependencies:

- [Farmed Sphagnum Growing Media model](#)
- [Anaerobic Digestion for energy model](#)
- [Typha Insulation Fibreboard model](#)
- [Machinery](#)
- [Agronomy](#)
- [Seedstock](#)
- [Water quality](#)



Figure 27: Nature designations pathway



**Table 23: Nature designations timeline**

<b>Year</b>	<b>Actions</b>
Year 1	<ul style="list-style-type: none"><li>• Identify areas of peat with nature designations that could support paludiculture or have adjacent paludicultural fields</li></ul>
Year 2	<ul style="list-style-type: none"><li>• Determine policy approach to displacing ‘false’ habitats off peat, – that is, non-peat habitats that are currently on peat soils.</li><li>• Undertake risk assessment of the impacts of paludicultural crops on native species and habitats</li><li>• Assess compatibility of paludicultural systems with current nature designations</li></ul>
Years 3 to 5	<ul style="list-style-type: none"><li>• Determine conditions and required mitigation to protect existing nature designations</li><li>• Ensure compatibility of paludiculture with nature</li><li>• Determine likelihood of future nature designations on paludicultural farming systems</li><li>• Develop an understanding of the impact and compatibility of paludicultural farming operations on species of interest</li></ul>
Years 6 to 10	<ul style="list-style-type: none"><li>• Develop paludiculture farming operation compatible approach for future nature designations that arise from adoption of paludiculture</li></ul>

Note: Many actions from year 2 onwards are dependent on previous actions being completed and cannot commence until the previous actions have been completed.

# Annex 1 Paludiculture Sub-group

## Membership

- Judith Stuart, Defra – Chair
- Katharine Birdsall, Environment Agency
- Kate Carver, Great Fen Project
- Jack Clough, University of East London
- Andrea Kelly, Broads Authority (also sits on the Lowland Agricultural Peat Task Force)
- Deborah Land, Natural England (also sits on the Lowland Agricultural Peat Task Force)
- Richard Lindsay, University of East London (also sits on the Lowland Agricultural Peat Task Force)
- Neal Wright, BeadaMoss, Micropropagation Services (EM) Ltd

## Terms of Reference

- Set out and communicate all of the steps needed to make wide scale adoption of paludiculture a commercial reality and provide an indicative timetable for their delivery.
- Set out the ways in which the current policy landscape creates barriers to adoption and where policy could be used to stimulate progress.
- Identification of key choke points.
- Highlight the areas requiring innovation to draw in and harness potential innovators and associated funding streams.
- Join up activity already being undertaken on paludiculture in England and allow shared learning.

## Ways of working

This report is the output of 18 months of work led by the Paludiculture Subgroup and is based on the input of many experts and stakeholders. This input was provided by means of a series of 10 topic meetings held between March and November 2021 and at four regional workshops held in March 2022.