

**European Community Directive
on the Conservation of Natural Habitats
and of Wild Fauna and Flora
(92/43/EEC)**

Supporting documentation for the Third Report by the United Kingdom under
Article 17

on the implementation of the Directive
from January 2007 to December 2012
Conservation status assessment for

Habitat:

H91D0 - Bog woodland

IMPORTANT NOTE – PLEASE READ

- The country-level reporting information contained in this document is a contribution to the Article 17 UK report for the habitat/species concerned.
- It has been provided by **Scottish Natural Heritage** and refers only to the state of the habitat/species in **Scotland** - it does not constitute an assessment for the whole of the UK.
- The Article 17 UK Approach document provides details on how this information has been used and, combined with information supplied by other Statutory Nature Conservation Bodies
- The format of the document is closely aligned to that set out by the European Commission for Member State reporting – as a result, some of the fields are not applicable at a country-level and have deliberately been left blank – in addition, the content of most fields is constrained by the EC reporting categories.

Reporting format on the 'main results of the surveillance under Article 11' for Annex I Habitats Types

0.2 Habitat code	H91D0
-------------------------	--------------

1.1 Maps

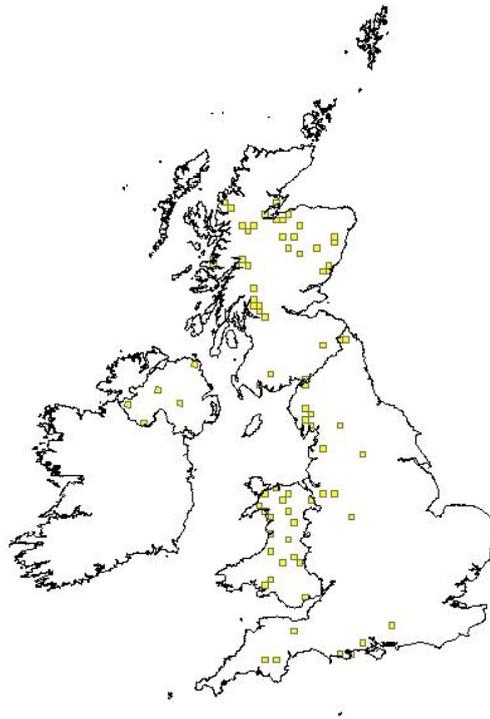
1.1.1 Distribution map

Map 1.1.1 is based on records in the JNCC Woodland NVC Community database. All SACs for H91D0 are included, as well as all recorded stands and transitions of NVC type W4c.

The maps are likely to be a very incomplete representation of the actual range of H91D0. W4c is a good proxy for birch bog woodland, although Scots pine is more usually the dominant tree species. Pine bog woodland does not conform readily to any NVC type and so data on its distribution cannot be easily obtained. Appendix 2 of MacKenzie and Worrell (1995) shows the distribution of wooded bogs in Scotland as recorded by the Land Cover of Scotland 1988, but a good many of the sites may represent tree invasion onto degraded bog. In addition, bog woodland has generally not been identified in previous woodland surveys, the assumption tending to be that trees on bogs are a sign of degradation of the bog through drainage.

Data sources from the previous reporting round are:
H10 = JNCC International Designations Database 2007 (Central point locations of candidate SACs reported to Europe that host feature locations)

H13 = NVC Woodland Community Access Database. 2007. Joint Nature Conservation Committee. Data collated by Ed Mountford for the JNCC Woodland Lead Coordination Network, April 2007



1.1.2 Method used - map	Estimate based on partial data with some extrapolation and/or modelling
1.1.3 Year or period	1978-1999
1.1.4 Additional distribution map	False
1.1.5 Range map	Please refer to the UK report for this habitat.

2.1 Biogeographical region or marine regions	ATL
2.2 Published sources	"Map Data Sources"

	JNCC International Designations Database. Joint Nature Conservation Committee. NVC Woodland Community Access Database. Joint Nature Conservation Committee."

2.3 Range	
2.3.1 Surface area Range	
2.3.2 Method used Range	Estimate based on partial data with some extrapolation and/or modelling
2.3.3 Short-term trend Period	2001-2012
2.3.4 Short-term trend Trend direction	stable
	The range of this habitat is limited by hydrology in ways that are not fully understood. Distinguishing between new bog woodland and tree encroachment onto degraded bog, or as a result of surface drying resulting from a changing climate, is complex. Our present knowledge is not sufficient to suggest how the range may be changing.
2.3.5 Short-term trend Magnitude	a) Minimum
	b) Maximum
2.3.6 Long-term trend Period	
2.3.7 Long-term trend Trend direction	
2.3.8 Long-term trend Magnitude	a) Minimum

Optional		
	b) Maximum	
2.3.9 Favourable reference range	a) Value in km²	
	No change from 2007	
	b) Operator	
	c) FRR is unknown	False
	d) Method used to set FRR	No change from 2007
<p>The current range of H91D0 bog woodland appears to be sufficiently large and (for the most part) compact not to raise any major concerns about the viability of the habitat on these accounts, i.e. it can be taken to be approximately equal to the favourable reference range. Even with incomplete data on the distribution of H91D0, the range envelope shown in Map 2.1.1. covers around 31,000 km². If records for Scots pine bog woodland were included then the range would probably be increased across the Highlands, though wooded pine bogs do not appear to occur in any of the western pinewoods with the exception of the Loch Maree Islands (MacKenzie and Worrell 1995, p.32). Records for birch/ willow dominated bog woodland are also probably lacking.</p> <p>The current range appears to include a substantial part of its former/potential natural range (MacKenzie and Worrell 1995). This was impacted on by the rapid spread of blanket peat from about 4,000 years ago, which was driven by natural climatic change (resulting in increased paludification) and possibly by the clearance of trees by people. As a result, the widespread occurrence of bog woodland in upland areas supporting peaty soils seems to have been increasingly limited. Significant areas of the habitat were lost in Scotland within the historic and recent past, but this is likely to have affected area more than range.</p>		
2.3.10 Reason for change Is the difference between the reported value in 2.3.1 and the previous reporting round mainly due to:	a) Genuine change?	False
	b) Improved knowledge/more accurate data?	False

	c) Use of different method (e.g. "Range tool")	False

2.4 Area covered by habitat		
2.4.1 Surface area	Value in km²	10
2.4.2 Year or period	2007-	
2.4.3 Method used Area covered by habitat	Estimate based on expert opinion with no or minimal sampling	
	This figure is a crude approximation based on expert opinion, as there is no data available on habitat extent.	
2.4.4 Short-term trend Period	2005-2012	
2.4.5 Short-term trend Trend direction	stable	
2.4.6 Short-term trend Magnitude	a) Minimum	
	b) Maximum	
	c) Confidence interval	
2.4.7 Short-term trend Method used	Estimate based on expert opinion with no or minimal sampling	
	Based on expert opinion, as there is no comprehensive data available on loss or expansion No data is available to analyse trends in the area of H91D0 bog woodland. The habitat appears to have suffered a similar fate to other types of native woodland during recent decades, i.e. various forms of exploitation (especially drainage, afforestation, over-grazing and burning) have lead to a severe reduction in their extent and alterations to their composition	

	<p>(MacKenzie and Worrell 1995). Such losses have largely been stemmed in recent years and various actions have been taken to restore damaged sites, for example at Monadh Mor SAC (see http://www.wetwoods.org/sites/Monadhmor.htm). Restoration of this habitat is, nevertheless, a gradual process and typically takes many years before the full characteristics of the former habitat can be regained (Legg et al. 2003). Without further and more precise information on changes in the area of the habitat, it is assumed that the overall extent has probably remained more-or-less stable since 1994.</p>	
2.4.8 Long-term trend Period		
2.4.9 Long-term trend - Trend direction		
2.4.10 Long-term trend Magnitude Optional	a) Minimum	
	b) Maximum	
	c) Confidence interval	
2.4.11 Long-term trend Method used		
2.4.12 Favourable reference area	a) Value in km²	10
	<p>H91D0 bog woodland is a scarce resource in Scotland (The current area estimate is only 1,000 ha and this is spread very thinly across its range). Even where it does occur, it often comprises small, fragmentary stands. Opportunities for interaction between sites seem very limited and the long-term stability of hydrological conditions at small sites is not secure. Accordingly, there seems to be a general consensus amongst woodland conservationists that this habitat is too fragmented and isolated to be sure that all of the component species and individuals site can perpetuate themselves.</p> <p>Concern about the limited extent and patchy occurrence of the habitat is heightened by the scale of loss of bog woodland, compared to its natural status and given that its area is at an historical low (see MacKenzie and Worrell 1995). Bog woodland undoubtedly did once cover a much greater area than at present and little of this now survives. Its former extent was substantially reduced by the rapid spread of blanket peat, driven by natural climatic change (which increased paludification) and possibly in combination with woodland clearance. In the uplands it probably became increasingly marginalised. Further losses have occurred more recently through drainage,</p>	

	<p>planting, burning, grazing and other factors. Wooded bogs were targeted as indicative of potentially plantable areas in the earlier days of plantation forestry. Further, even where bog woodland sites themselves were not directly drained and planted, planting up to and around the margins affected their hydrology and many subsequently dried out and lost characteristic features. These losses have not been quantified, but are thought to have been severe. Such loss has now been stemmed, but they further increased fragmentation and isolation which were already profound.</p> <p>It would have been particularly important in upland areas supporting peaty soils, with forested mires once fairly widespread in a matrix of drier forest, with areas in the north most likely to have carried more extensive areas of bog woodland. Small patches also probably occurred on and around peat bogs throughout lowland areas.</p> <p>Over the last half century there has been some compensatory expansion due to increased drainage on or around formerly treeless bogs and reductions in grazing pressure. Such woodland will however rarely develop the necessary characteristics to qualify as H91D0 bog woodland (even though it has sometimes been included in areas estimates for wooded bogs, e.g. Land Cover of Scotland 1988). Some works have also been taken to restore damaged sites, e.g. removing planted trees and blocking drains, but regaining the characteristics of former habitat will take time and is not certain.</p> <p>The bulk of the resource typically merges into either semi-natural bog or woodland, which provides some degree of connectivity between bog woodland sites. Fragmentation and isolation are anyway most likely to lead to impoverishment rather than complete habitat loss, so the view taken is that an increase of no more than 10% above the current area of H91D0 is necessary to remedy this issue, i.e. the favourable reference area is judged to be no more than 10% above the current area of c.1,000 ha.</p>		
	<table border="1"> <tr> <td data-bbox="576 1229 876 1279">b) Operator</td> <td data-bbox="876 1229 1522 1279"></td> </tr> </table>	b) Operator	
b) Operator			
	<table border="1"> <tr> <td data-bbox="576 1279 876 1375">c) FRA is unknown</td> <td data-bbox="876 1279 1522 1375">False</td> </tr> </table>	c) FRA is unknown	False
c) FRA is unknown	False		
	<table border="1"> <tr> <td data-bbox="576 1375 876 2002">d) Method used to set FRA value</td> <td data-bbox="876 1375 1522 2002"> <p>10km2</p> <p>H91D0 bog woodland is a scarce resource in Scotland The current area estimate is only 1,000 ha and this is spread very thinly across its range). Even where it does occur, it often comprises small, fragmentary stands. Opportunities for interaction between sites seem very limited and the long-term stability of hydrological conditions at small sites is not secure. Accordingly, there seems to be a general consensus amongst woodland conservationists that this habitat is too fragmented and isolated to be sure that all of the component species and individuals site can perpetuate themselves.</p> <p>Concern about the limited extent and patchy</p> </td> </tr> </table>	d) Method used to set FRA value	<p>10km2</p> <p>H91D0 bog woodland is a scarce resource in Scotland The current area estimate is only 1,000 ha and this is spread very thinly across its range). Even where it does occur, it often comprises small, fragmentary stands. Opportunities for interaction between sites seem very limited and the long-term stability of hydrological conditions at small sites is not secure. Accordingly, there seems to be a general consensus amongst woodland conservationists that this habitat is too fragmented and isolated to be sure that all of the component species and individuals site can perpetuate themselves.</p> <p>Concern about the limited extent and patchy</p>
d) Method used to set FRA value	<p>10km2</p> <p>H91D0 bog woodland is a scarce resource in Scotland The current area estimate is only 1,000 ha and this is spread very thinly across its range). Even where it does occur, it often comprises small, fragmentary stands. Opportunities for interaction between sites seem very limited and the long-term stability of hydrological conditions at small sites is not secure. Accordingly, there seems to be a general consensus amongst woodland conservationists that this habitat is too fragmented and isolated to be sure that all of the component species and individuals site can perpetuate themselves.</p> <p>Concern about the limited extent and patchy</p>		

		<p>occurrence of the habitat is heightened by the scale of loss of bog woodland, compared to its natural status and given that its area is at an historical low (see MacKenzie and Worrell 1995). Bog woodland undoubtedly did once cover a much greater area than at present and little of this now survives. Its former extent was substantially reduced by the rapid spread of blanket peat, driven by natural climatic change (which increased paludification) and possibly in combination with woodland clearance. In the uplands it probably became increasingly marginalised. Further losses have occurred more recently through drainage, planting, burning, grazing and other factors. Wooded bogs were targeted as indicative of potentially plantable areas in the earlier days of plantation forestry. Further, even where bog woodland sites themselves were not directly drained and planted, planting up to and around the margins affected their hydrology and many subsequently dried out and lost characteristic features. These losses have not been quantified, but are thought to have been severe. Such loss has now been stemmed, but they further increased fragmentation and isolation which were already profound.</p> <p>It would have been particularly important in upland areas supporting peaty soils, with forested mires once fairly widespread in a matrix of drier forest, with areas in the north most likely to have carried more extensive areas of bog woodland. Small patches also probably occurred on and around peat bogs throughout lowland areas.</p> <p>Over the last half century there has been some compensatory expansion due to increased drainage on or around formerly treeless bogs and reductions in grazing pressure. Such woodland will however rarely develop the necessary characteristics to qualify as H91D0 bog woodland (even though it has sometimes been included in areas estimates for wooded bogs, e.g. Land Cover of Scotland 1988). Some works have also been taken to restore damaged sites, e.g. removing planted trees and blocking drains, but regaining the characteristics of former habitat will take time and is not certain.</p> <p>The bulk of the resource typically merges</p>
--	--	--

		into either semi-natural bog or woodland, which provides some degree of connectivity between bog woodland sites. Fragmentation and isolation are anyway most likely to lead to impoverishment rather than complete habitat loss, so the view taken is that an increase of no more than 10% above the current area of H91D0 is necessary to remedy this issue, i.e. the favourable reference area is judged to be no more than 10% above the current area of c.1,000 ha.
2.4.13 Reason for change Is the difference between the reported value in 2.4.1 and the previous reporting round mainly due to:	a) Genuine change?	False
	b) Improved knowledge/ more accurate data?	False
	c) Use of different method (e.g. "Range tool")	False

2.5 Main pressures		
a) Pressure	b) Ranking H = high importance M = medium importance L = low importance	c) Pollution qualifier
K04: Interspecific floral relations	H	
B06: grazing in forests/ woodland	M	
B07: Forestry activities not referred to above	M	
I01: invasive non-native species	M	
I02: problematic native species	M	

The main pressures affecting H91D0 are listed below. These are derived mainly from The related EC codes are shown in brackets.

High importance

? K04.03 introduction of disease (microbial pathogens)

Dothistroma needle blight has been found in planted and semi-natural pine forests across Scotland. Scots pine was initially thought likely to be more resistant than other commercial pine species, but has been widely infected. The long-term prognosis is unknown but likely to be serious – anything from reduced vigour of regeneration, through commercial failure as a crop species to complete loss of the resource may be possible.

Medium importance

<p>? B06 grazing in forests/ woodland Excessive browsing, principally by deer, is a problem on some H91D0, leading to poor natural regeneration and reduced diversity of the ground vegetation. This is not only a pressure at present, but has affected some woods for many decades.</p> <p>? I01 invasive non-native species Rhododendron is spreading on one SAC, and is likely to invade the bog woodland unless controlled.</p> <p>? I02 problematic native species Birch is expanding on one SAC, and may indicate drying out.</p> <p>? B07 Forestry activities not referred to above, B02.01.02 forest replanting (non-native trees) Past drainage to prepare ground for forestry has damaged several areas of bog woodland. Work to remedy this has been carried out in some areas, where non-native trees have been felled and drains blocked.</p>	<p>mainly based on expert judgement and other data</p> <p>Derived from the pressures listed in SNH’s Remedies database, the UK BAP Habitat Action Plan for wet woodland (making allowance for those likely to be relevant to Bog Woodland) and from MacKenzie and Worrell (1995).</p>
2.5.1 Method used – pressures	

2.6. Main threats		
a) Threats	b) Ranking H = high importance M = medium importance L = low importance	c) Pollution qualifier
K04: Interspecific floral relations	H	
B02: Forest and Plantation management & use	M	
B06: grazing in forests/ woodland	M	
B07: Forestry activities not referred to above	M	
I01: invasive non-native species	M	
I02: problematic native species	M	

<p>High importance</p> <p>? K04.03 introduction of disease (microbial pathogens) Dothistroma needle blight has been found in planted and semi-natural pine forests across Scotland. Scots pine was initially thought likely to be more resistant than other commercial pine species, but has been widely infected. The long-term prognosis is unknown but likely to be serious – anything from reduced vigour of regeneration, through commercial failure as a crop species to complete loss of the resource may be possible.</p>

Medium importance
 ? B06 grazing in forests/ woodland
 Excessive browsing, principally by deer, is a problem on some H91D0, leading to poor natural regeneration and reduced diversity of the ground vegetation. This is not only a pressure at present, but has affected some woods for many decades.

? I01 invasive non-native species
 Rhododendron is spreading on one SAC, and is likely to invade the bog woodland unless controlled.

? I02 problematic native species
 Birch is expanding on one SAC, and may indicate drying out.

? B07 Forestry activities not referred to above, B02.01.02 forest replanting (non-native trees)
 Past drainage to prepare ground for forestry has damaged several areas of bog woodland. Work to remedy this has been carried out in some areas, where non-native trees have been felled and drains blocked.

2.6.1 Method used –threats	modelling
	Derived from the pressures listed in SNH’s Remedies database, the UK BAP Habitat Action Plan for wet woodland (making allowance for those likely to be relevant to Bog Woodland) and from MacKenzie and Worrell (1995).

2.7 Complementary information	
2.7.1 Typical species (as used in the assessment of Structure and function)	
2.7.2 Typical species – method used	
2.7.3 Justification of % thresholds for trends	
2.7.4 Structure and functions - Methods used	Estimate based on partial data with some extrapolation and/or modelling
	Information taken from SNH’s Remedies database
2.7.5 Other relevant information	The main pressures are inappropriate grazing levels, drainage, scrub encroachment leading to further drying, afforestation. Condition assessments for show that 75% (three out of four) of assessed SACs are judged Favourable. However, there is very little information on extent outside of SACs, and no information at all on condition. A newly identified pressure since the last reporting round is

	<p>Dothistroma needle blight. This has been found in planted and semi-natural pine forests across Scotland. Scots pine was initially thought likely to be more resistant than other commercial pine species, but has been widely infected. Since most Scottish bog woodland is dominated by pine, this is a serious threat to the future of the habitat.</p> <p>The main pressures are inappropriate grazing levels, drainage, scrub encroachment leading to further drying, afforestation. Condition assessments for show that 75% (three out of four) of assessed SACs are judged Favourable. However, there is very little information on extent outside of SACs, and no information at all on condition.</p> <p>A newly identified pressure since the last reporting round is Dothistroma needle blight. This has been found in planted and semi-natural pine forests across Scotland. Scots pine was initially thought likely to be more resistant than other commercial pine species, but has been widely infected. Since most Scottish bog woodland is dominated by pine, this is a serious threat to the future of the habitat.</p> <p>Under certain combinations of physical circumstances in the UK, scattered trees can occur across the surface of a bog in a relatively stable ecological relationship as open woodland, without the loss of bog species. This true Bog woodland is a much rarer condition than the progressive invasion of bogs by trees, through natural colonisation or afforestation following changes in the drainage pattern which leads eventually to the loss of the bog community. The habitat type has not previously been well described in the UK, and consequently knowledge of its ecological characteristics is limited.</p> <p>A few examples of this unusual habitat type are found in areas of Scotland where summer drying may permit the establishment and growth of tree roots in the upper peat layers. The structure and function of this habitat type is finely balanced between tree growth and bog development. Tree growth, however, is always slow (or the trees would take over the bog); the trees are likely to be widely-spaced (because much of the surface area is too wet for them to establish), and dead trees may be common even among the fairly small individuals (because their weight depresses the peat locally leading to waterlogging and death). Although stunted in form these trees may be of considerable age, with the oldest individuals in bog woodland in Scotland estimated at 350 years old.</p> <p>The principal tree species in this form of Bog woodland is Scots pine <i>Pinus sylvestris</i>. Pine bog woodland types are likely to be intermediate in character between NVC type W18 <i>Pinus sylvestris</i> – <i>Hylocomium splendens</i> woodland and more open mire types such as M18 <i>Erica tetralix</i> – <i>Sphagnum papillosum</i> mire or M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire.</p>
--	--

	<p>A birch <i>Betula</i> spp.-dominated variant of Bog woodland occurs where birch <i>Betula</i> spp. or willow <i>Salix</i> spp. occur in long-term stable combinations with bog vegetation. These birch/alder/willow types may be close to NVC type W4c <i>Betula pubescens</i> – <i>Molinia caerulea</i> woodland, <i>Sphagnum</i> sub-community or other wet woodland types, such as W2 <i>Salix cinerea</i> – <i>Betula pubescens</i> – <i>Phragmites australis</i> woodland or W3 <i>Salix cinerea</i> – <i>Galium palustre</i> woodland. Very small fragments occur on New Forest valley bogs and on the fringes of some peat bogs and mere sites in hollows within oakwoods, and other examples in Scotland have developed on M17 <i>Scirpus cespitosus</i> – <i>Eriophorum vaginatum</i> blanket mire vegetation.</p> <p>Secondary birch woodland on degraded bogs, and woodland encroachment resulting from falling water tables, are excluded from the Annex I definition, but may in some circumstances be referable to 7120 Degraded raised bogs still capable of natural regeneration.</p>
--	--

2.8 Conclusions
(assessment of conservation status at end of reporting period)

Please refer to the United Kingdom assessment for this habitat.

3. Natura 2000 coverage & conservation measures - Annex I habitat types

3.1 Area covered by habitat

3.1.1 Surface area Estimation of habitat type surface area included <u>in the SAC network</u> .	a) Minimum	
	b) Maximum	
3.1.2 Method used	Estimate based on expert opinion with no or minimal sampling	
3.1.3 Trend of surface area within the network	stable	

--	--

3.2 Conservation measures															
Conservation measures taken (i.e. already being implemented) within the reporting period and provided information about their importance, location and evaluation.															
3.2.1 Measure	3.2.2 Type					3.2.3 Ranking H = high importance M = medium importance L = low importance	3.2.4 Location where the measure is PRIMARILY applied			3.2.5 Broad evaluation of the measure					
	a) Legal/statutory	b) Administrative	c) Contractual	d) Recurrent	e) One-off		a) Inside	b) Outside	c) Both inside & outside	a) Maintain	b) Enhance	c) Long term	d) No effect	e) Unknown	f) Not evaluated
3.1: Restoring/improving forest habitats	Y		Y			M			Y	Y	Y	Y			
4.2: Restoring/improving the hydrological regime	Y		Y			H			Y	Y	Y	Y			

Considerable work has recently gone into improving the condition and restoring degraded areas of H91D0 bog woodland. The habitat forms a part of the UK BAP wet woodland habitat action plan (available via <http://www.ukbap.org.uk/>), which has targets to: (i) maintain the current habitat extent and distribution; (ii) improve its condition; (iii) expand its area by planting or natural regeneration; and (iv) restore former areas that have been converted to non-native plantations. Although new and restored areas of habitat will take time to mature, it is expected that they will make an increasing contribution to the resource over the coming decades.

Bog Woodland is protected on 7 SACs for H91D0 in response to the EC Habitats Directive (see <http://www.jncc.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=H91D0>). National forestry policy includes a presumption against clearance of native woodland for conversion to other land uses, and in particular seeks to maintain the special interest of ancient semi-natural woodland. Various other measures and initiatives have been put in place to help conserve bog woodland: for example, The Wet Woods Restoration Project that aimed to restore areas of bog woodland at five sites in Scotland (see <http://www.wetwoods.org>).

The distribution of this type of woodland more widely is completely unknown, and it is thus practically unprotected. We have a limited understanding of the major threats – although they include heavy grazing pressure and Dothistroma needle blight, as for Caledonian pine forest – and

thus a limited ability to respond to them. Planned work includes improving our understanding of the distribution and area of H91D0.