Provision of Nesting Sites and Nest Boxes for the European Kingfisher (*Alcedo atthis*) and the Irish White-Throated Dipper (*Cinclus cinclus hibernicus*) along the River Allow

Prepared by Kieran Murphy (April/May 2011)

For

I.R.D. Duhallow Ltd.

And

LIFE+ Programme

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Introduction:

The European Kingfisher (*Alcedo atthis*) and the Irish White-Throated Dipper (*Cinclus cinclus hibernicus*) (hereafter referred to as kingfisher and dipper respectively) are two bird species that are associated with running water environments and can both be susceptible to changes in a river's ecosystem and habitat, whether natural or manmade (Crowe *et al*, 2008; Flegg, 1975). In recent years the morphology and hydrology of the River Allow has rapidly changed. This is primarily due to intensification in both agricultural and forestry practises (Igoe, pers comm., 2011). Both species are affected by these changes that occur along the Allow. Bank erosion is having a devastating effect on the survival of the kingfisher as it requires steep river banks to built nests in which to brood and raise their young (Birds of Kerala, 2010; Crowe *et al*, 2008). The erosion can also lead to siltation of the river. Along with interfering with the life cycles of the Freshwater Pearl Mussel (*Margaritifera margaritifera*) (Ross, 1992) and the Atlantic Salmon (*Salmo salar*) (Hendry and Cragg-Hine, 2003), excessive siltation may also reduce the numbers and diversity of aquatic invertebrates (NS2, 2010) upon which the dipper feeds (Sorace *et al*, 2002). So in turn, excess erosion of river banks may lead to the decline of dippers also.

Actions C8 and C9 for the IRD Duhallow LIFE project are to provide 12 kingfisher nesting areas and 10 dipper nesting areas, respectively, to the Allow river.

Aims:

1. Identify the locations of both species in the catchment.
2. Map positive nesting sites.
3. Identify potential areas that could benefit from the provision of artificial nesting sites.
4. Recommend nest-box design and placement strategy.

Kingfisher (*A. atthis*):

A key project action (C8) of the I.R.D. Duhallow LIFE Project requires that suitable sites be identified for the installation of 12 nest boxes for the kingfisher. Before this can be done, the following prerequisites should be met if kingfishers are to re-establish themselves along the river: the stream in which it feeds needs to be relatively slow moving and free from riffles; the banks that the bird nests are usually steep, even vertical, and have the soft, sandy material for ease of excavating (see Picture 1), large amounts of rock in the bank may deter the kingfisher and even in the middle of digging will abandon the tunnel if it hits rock (du Feu, 1993); and a suitable perching site must be present. It is from these perches that the kingfisher watches for prey beneath the surface of the water. If the bank is of suitable quality and the water meets the criteria, the habitat can even be improved if a perch is inserted into the bank, in the form of cut off branches or sticks (du Feu, 1993).

Picture 1 Photo by Ruth Gaj McKeever

Survey Work for Suitable Sites:

As one walks the banks of the Allow one will see many banks that would seem to be suitable for the installation of kingfisher nest boxes. Many of these banks are under constant pressure from erosive action and even if they were suitable to house kingfishers they may not last very long. Also, because of this pressure, work to protect the banks, by I.R.D. Duhallow LIFE Project, has commenced (as from the beginning of April 2011).
The work involved includes coppicing and planting slips of willow (*Salix spp*) along the

banks. If these measures prove to be successful, then the vegetative coverage that the trees will give will be unsuitable for kingfishers, as the bird normally requires bare banks to nest in.

A survey of the river banks and its riparian zone was conducted, on various dates in April and May of 2011, to establish the sites that are to be protected and restored from river erosion and what sites will be kept for possible nest box installation. Many of the banks that would be deemed suitable for installing nest boxes are also the banks that are under the greatest threat from erosion and will have to be planted with willow slips or have some kind of bank revetment. These banks may become unsuitable for kingfishers as they will in time become vegetated. Other banks will require more extensive work performed on them to stop further erosion.

This report highlights possible sites where nest-boxes may be installed and guidelines on the installation of these nest-boxes.

The territory of a kingfisher can vary from 1.5 to 4km. This was kept in mind when mapping and designating potential sites for nest boxes. The following is an initial proposal of where potential territories might be set up:

Note:

The town of Kanturk is not fully designated in any territory. This is because no banks were deemed suitable for kingfishers and it also puts a small gap between two likely kingfisher areas (Fig. 1).

Proposed Kingfisher Territories:

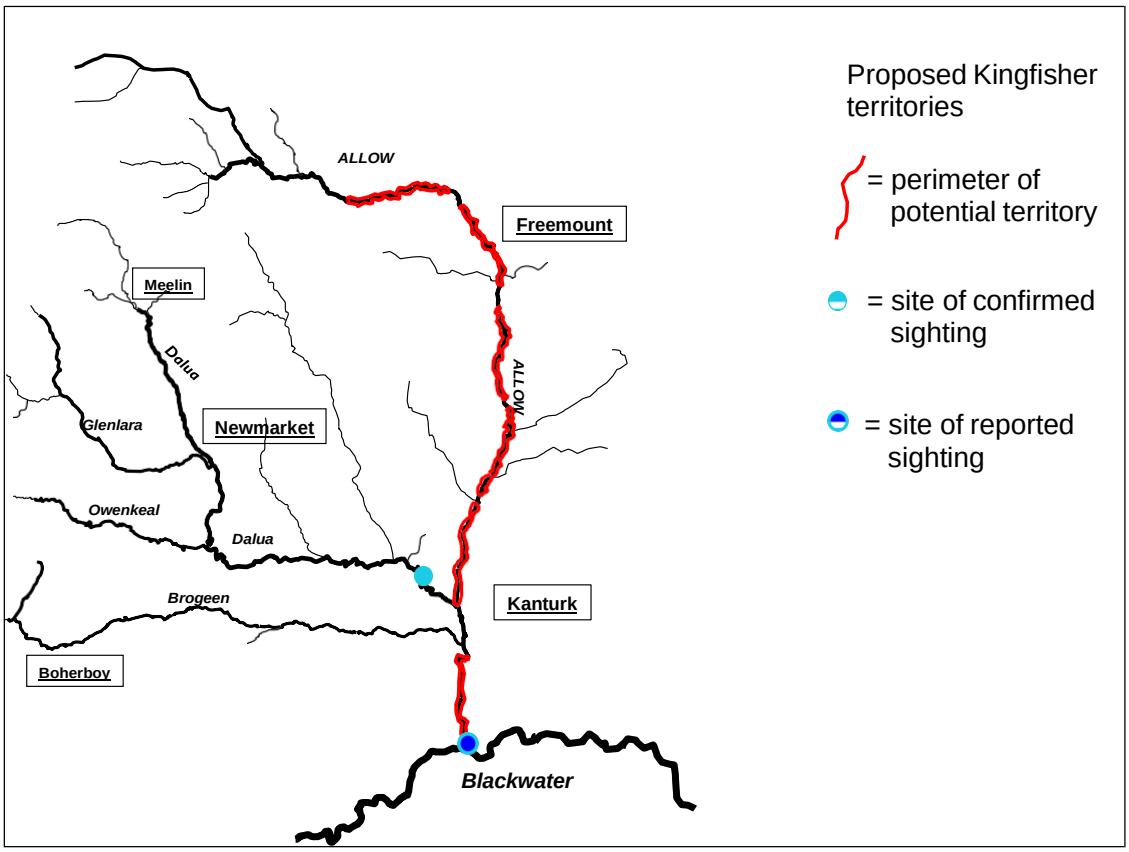
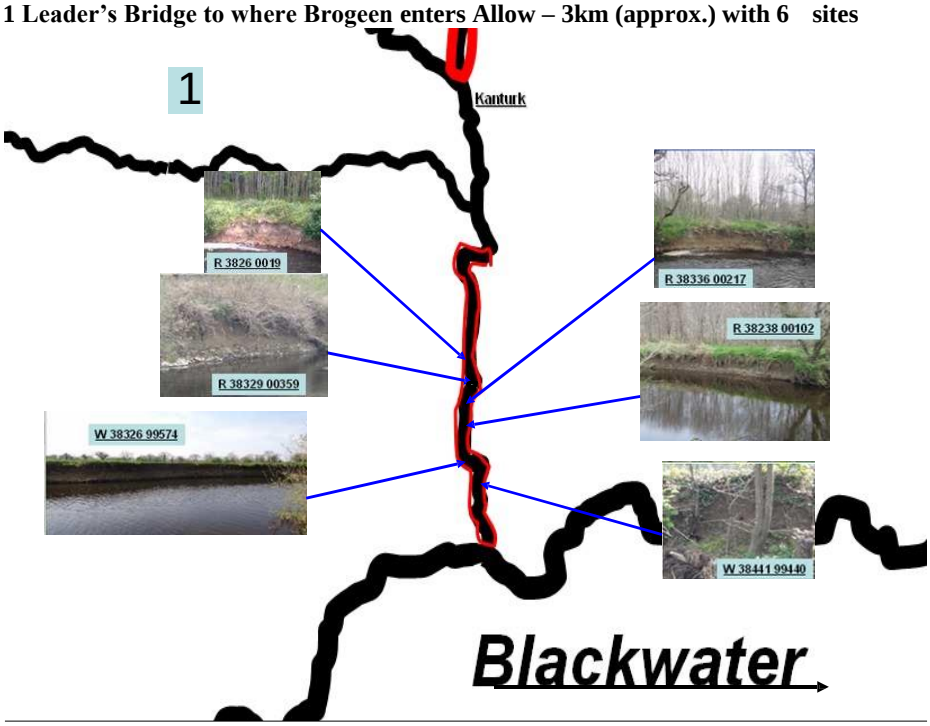
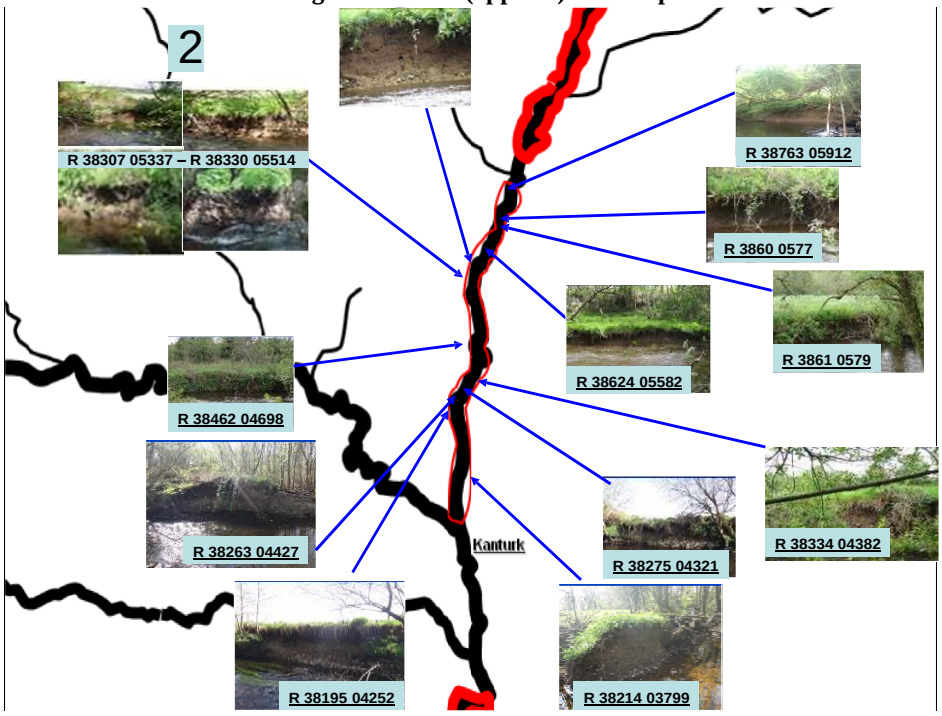

Proposed Kingfisher territories
= perimeter of potential territory
= site of confirmed sighting
= site of reported sighting
ALLOW
Freemount
Meelin
Dalua
Glenlara
Newmarket
ALLOW
Owenkeal
Dalua
Brogeen
Kanturk
Boherboy
Blackwater

Figure 1

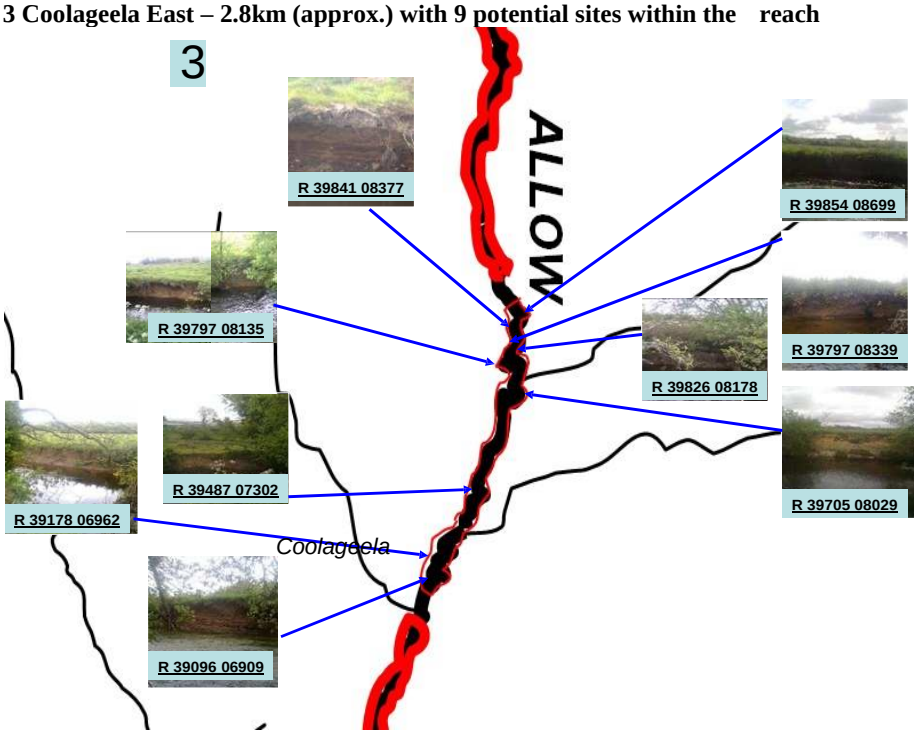
1 Leader's Bridge to where Brogeen enters Allow – 3km (approx.) with 6 sites



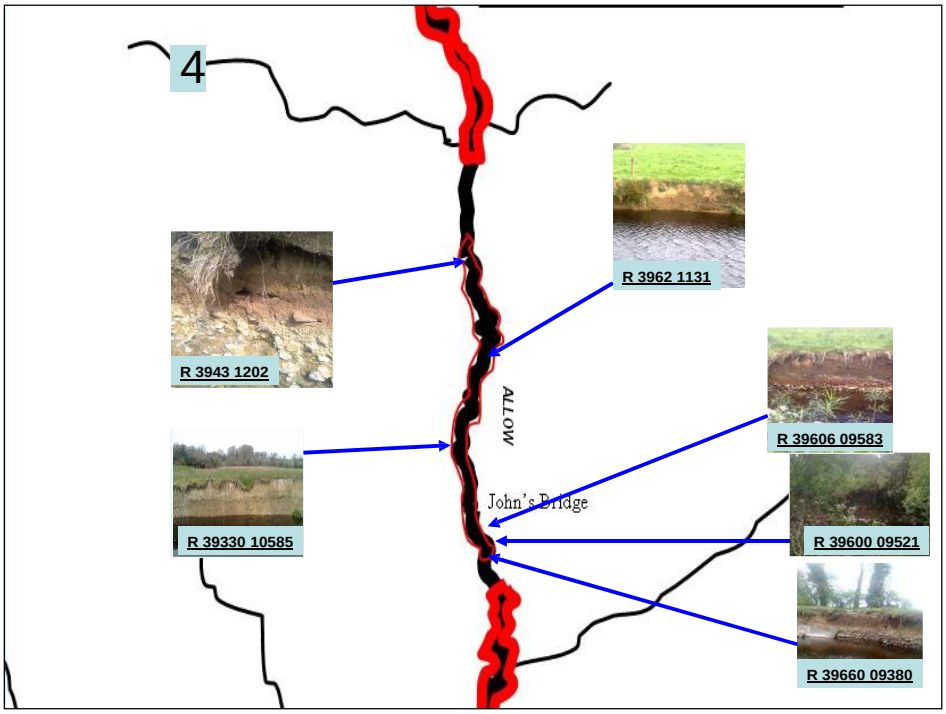
2 North of Kanturk to Coolageela – 3.5km (approx.) with 15 potential sites



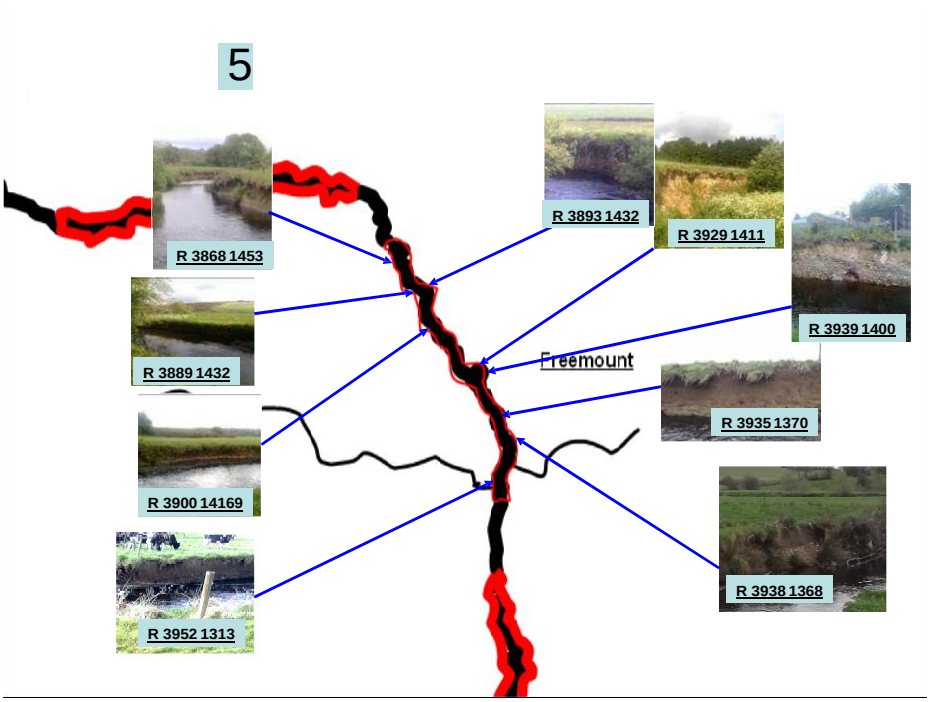
3 Coolageela East – 2.8km (approx.) with 9 potential sites within the reach



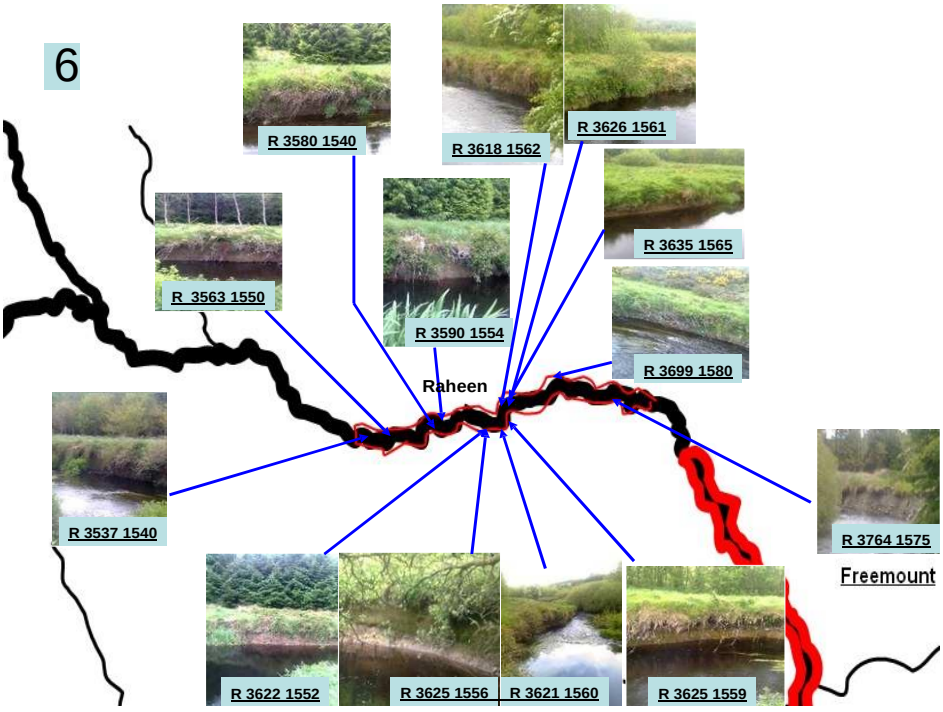
4 John's Bridge to north of 'Metal Bridge' – 3.3km (approx.) with 6 potential sites



5 Kilberrihert to Knockaneglass West – 3.7km (approx.) with 9 within reach



6 Raheen to Ballynaguilla – 4.8km (approx) with 13 potential sites



Designation of territory:

Where areas of high concentration of possible banks for nest box installation occur, these sites are to be deemed the centres of each kingfisher territory. From this centre, a stretch of between 1.5km and 2km will be designated up and down stream. Deviations can be made as seen fit.

Types of nest boxes:

Many sources (NHBS, 2011; Alana Ecology, 2011; Jayne, 2008; Hopkins, 2001) suggest the same design for nest tunnels and chambers for kingfishers. They entail the construction of a tunnel that can be between 550-700mm in length, approximately 150mm high and 125-150mm wide. The base of the tunnel and chamber should be suitably drained, so a wire mesh or something sturdier is required (NHBS, 2011).The materials used to make to structures vary depending on what literature is read. The German company Schwegler (2010) suggest that the best material is a mixture of sawdust and concrete, which is then moulded to shape. This is meant to have the best longevity (NHBS, 2011). Du Feu (1993) states that fibreglass works better for kingfishers than for other bird species. All do consent that breathable material is to be used as overheating or condensation can occur. Plywood may be a good, cheaper substitute.

Nesting tunnel and chamber (NHBS, 2011)

Installation methodology:

Once the sites where nest-boxes and tunnels can be installed have been identified, a standard methodology for installation can be implemented. The best time to install the nest boxes is well before the breeding season starts, which is in the middle of February. It

is recommended that two nest-boxes are to be installed as kingfishers raise two broods in a season and can use two different holes/tunnels for each brood (Morgen and Glue, 1977).

A small trench should be dug so that the roof of the tunnel and nest chamber is at least 300mm (1 foot deep) below the top of the bank and it should be 1 metre long and at least 300mm wide. Before the chamber and tunnel are covered again, bank material (sand, clay, etc.) should be lightly packed into them, all the way up to the entrance. This is to ensure that the kingfisher will have something to excavate. Also, the chamber end of the object should be slightly higher than the entrance so that the entire nest box is angled to at least 15^{o}. The entrance of the tunnel should be in about 100mm from the face of the bank. This makes sure that the artificial material does not becoming obvious in the event of bank material falling away (De Feu, 1993) (See Picture 2, 3 and 4).

With all this in mind there are other conditions to be considered before one inserts a nesting tunnel and chamber in to the bank; anything that a mammalian predator can utilise to gain entry into the kingfisher's nest must be looked out for (De Feu, 1993).

<u>Sites to avoid</u>:

- overhangs;
- large exposed root systems;
- cracks in the bank
- any other structure within one metre of the hole

At the end of each breeding season, once the last young kingfisher has fully fledged and has begun seeking new territories, the artificial nesting chambers can be cleaned, and set up again for the following season.

Picture 2 (RSPB Community – LVRP, 2011)

Picture 3 (Elana Ecology, 2011)

Picture 4 (Elana Ecology, 2011)

Dipper (*C. cinclus hibernicus*):

With regards to the dipper, the most suitable habitat is one which has very clean, well oxygenated, fast flowing water (Alberto Sorace *et al*, 2002). If these are conditions are available, and if the waters are not overly acidified, the biggest criteria for the presence of the dipper are aquatic macro invertebrates. If there is a low supply of these larval stages of mostly terrestrial invertebrates then the dipper will in all likelihood be absent. Consequently, the dipper is one of the most sensitive birds to change in river ecology (Alberto Sorace *et al*, 2002). One is most likely to find dippers inhabiting rivers and streams that contain riffles and have rock appearing above the surface on which it will stalk its prey.

The nesting requirements of this bird are basic, relative to those of the kingfisher. Dippers will nest in crevices of large rocks, disused drainage pipes, ledges and underneath bridges (see Picture 5 and 6). It is the latter that is a cause of some concern at present. With the restoration of many old bridges, for safety and infrastructural reasons, many points underneath these bridges, where the dipper previously nested at are being lost. Older bridges often contained irregular brickwork that would have provided ledges and crevices, and support beams higher up, all of which gave plenty of nesting sites (Tyler & Ormerod, 1994, cited by Copland, 2007). The improvement in infrastructure and building methods have now made these features a thing of the past (Copland, 2007). To address this issue the I.R.D. Duhallow LIFE Project has set out a plan (Action C9) to set up special nesting sites to be established beneath 10 bridges that occur along the Allow (Fig.2 for locations of bridges).

Picture 5 – Dipper nest Ballynaguilla Br. (K. Murphy)

Picture 6 – Dipper nest 'Metal' Br. (Dr. F. Igoe)

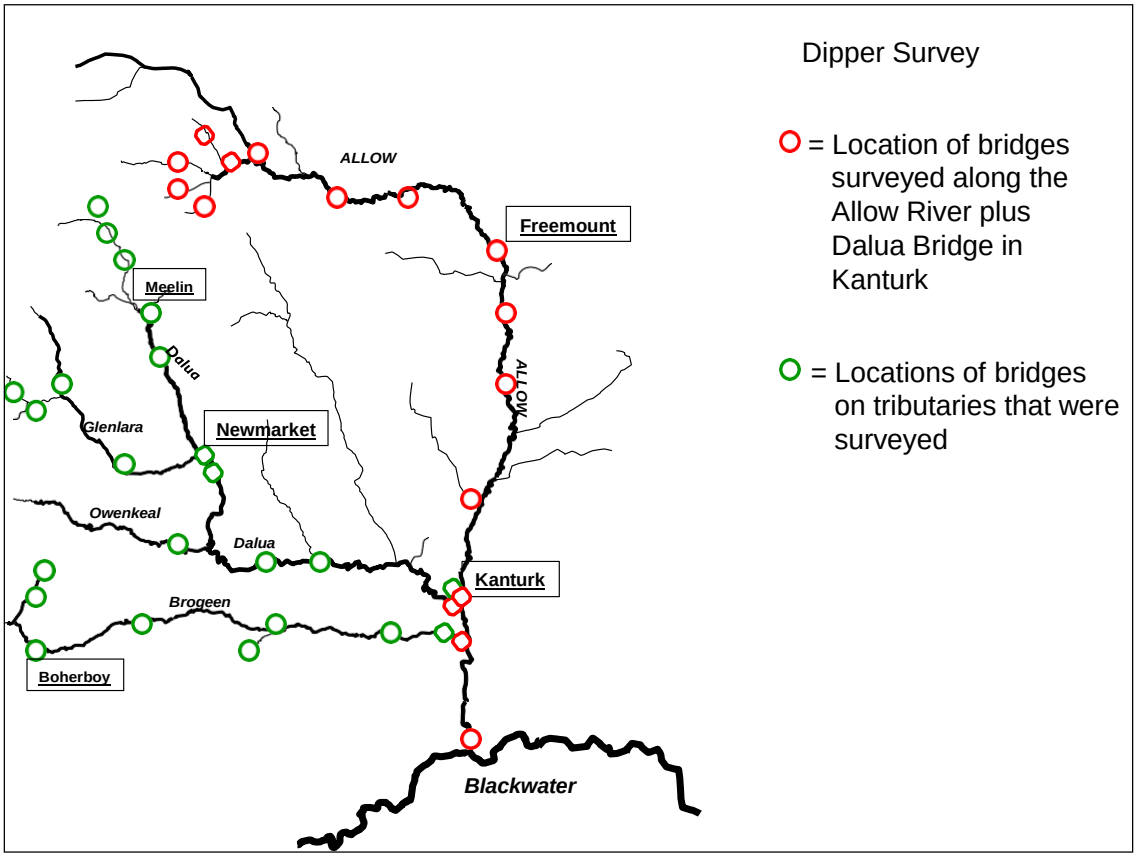


Figure 2 – Locations of bridges in the Allow catchment

Bridges Surveyed:

Many bridges that cross the River Allow have the potential to be suitable sites for nesting dippers. These bridges were surveyed on 12th and 18th of April 2011. (Grid references obtained from Ordnance Survey of Ireland (OS*i*): Discovery Series maps 72 and 79)

Leader's Bridge: Dromcummer Beg; W 3849 8867

A missing brick in between the two arches on the downstream face of the bridge has the potential of nesting many species of bird (See Photo 1). If it was already occupied the chances were that a bird other than a dipper had nested there. Dippers prefer to nest from where they can easily 'fall' into the water if feeling threatened so this hole must have been unsuitable. Also, no suitable holes were found under the archways for neither dipper nor grey wagtail (*Motacilla cinerea*)

Photo 1

Greenane Bridge: Kanturk; R 3822 0316

Under each archway there were many outcrops of brick that could be considered suitable nesting sites for the dipper (See Photo 2). Each ledge, however, was absent of any bird activity. This may be because they were at chest height and easily accessible for human interference. The river itself at this site is actually very accessible for people and it is possible that the dippers in the area know this and stay away.

Photo 2

Kanturk Bridge: Kanturk; R 3814 0316

There were no such outcrops under the bridge that spans this part of the Allow, upstream from where it is joined by the Dalua, in the town centre. On the western side, under the bridge there was a small room that may house any species of animal but it was deemed unsuitable for dippers.

A good reason why no dipper nests were found under either bridge could be because there were plenty of potential sites along the river as the banks were walled and may have holes, crevices and ledges that are big enough to hold nests (Photo 3).

Photo 3

Coolageela Bridge: Coolageela East; R 3850 0645

The underside of this single span bridge is too close to the very shallow water for be used as a site for nesting dippers (See Photo 4). Also, the underside of bridge is not suitable for natural nesting.

Photo 4

John's Bridge: Ballybahallagh; R 3947 0978

The underside two spans of the bridge showed no evidence of potential sites for natural dipper nests. Ivy overgrowth of the downstream (southerly) facing façade may hold suitable cover for the dipper (Photo 5). High activity of a blue tit (*Parus caeruleus*) on the day of surveying (08-04-11) suggested that the tit was defending a nest from the surveyors and it is likely, therefore, that no other passerine nest was in the ivy. Upstream of the bridge had quite suitable hunting grounds.

Photo 5

Unnamed Bridge ('Metal' Bridge): Kilberrihert; R 3950 1118

This double concrete and metal span bridge had three indents with protruding ledges on the left-hand wall of the bridge (as one looks downstream). The third one

viewed had dipper nest. Habitat was suitable. On Thursday April 14th a dipper was twice seen from upstream of the bridge, flying toward the nest.

Allow Bridge: Freemount; R 3930 1376

Deep waters underneath the double masonry span bridge are preceded by shallow riffles (Photo 6). This may make suitable habitat for the dipper. The masonry on the underside looked to be improved leaving no suitable nesting sites. No nests were observed.

Photo 6

Raheen Bridge: Raheen; R 3652 1559

The stream over which the double masonry span bridge is built looked to be ideal dipper habitat. Possible dipper nest present but most likely grey wagtail. Size and shape of nest could not be seen as it was within a cavity. It did not seem to have the typical entry hole of a dipper nest (Photo 7). Bird droppings were observed. Dipper was seen flying overhead which may indicate that the area is inhabited by dippers. Sedimentation under one of the spans may lead to less suitable feeding grounds for both dipper and wagtail in the future (Photo 8).

Photo 7 **Photo 8**

Ballynaguilla Bridge: Ballynaguilla; R 3443 1557

The single masonry span bridge did show signs of past maintenance. However, some crevices and holes were spotted. In one such hole was a dipper nest (Photo 9). The other cracks and crevices seemed too close to the dipper nest to make it comfortable with other species nesting there.

Photo 9

Unnamed Bridge: Rowls Langford North; R 3215 1680

This single masonry span bridge showed no 'natural' nesting site for dippers or grey wagtails as the brick work seemed to be well maintained (Photo 10). There were signs of bird activity underneath the archway in the form of droppings.

Photo 10

Unnamed Bridge: Rowls Aldworth; R 3126 1647

The single masonry span bridge showed nowhere for a dipper to build a nest. The habitat seemed to be very suitable. The downstream facing side of the bridge was covered in vegetation and quite possibly contained the nest of a great tit (*Parus major*).

Unnamed Bridge: Rowls Shaddock; R 3050 1533

The single span masonry arched bridge had a stone loose near the apex of the arch (Photo 11). Inside was a dipper nest (Photo 12). At this youthful stage in the river the water would be fast moving and well oxygenated, again making for a good habitat for the dipper.

Photo 11

Photo 12

Unnamed Bridge: Rowls Shaddock; R 2987 1559

Double span concrete bridge proved unsuitable for dipper nesting (Photo 13). Water under the bridge looked to be too shallow and the arches too narrow to place a viable nesting box/ledge for the dipper (Photo 14). Also, current human activity around the bridge might also deter any nesting bird.

Photo 13

Photo 14

Unnamed Bridge: Rowls Langford South; R 2984 1655

The habitat around this single concrete span bridge looked to be ideal for foraging dippers. The bridge itself had no place for dippers to nest but this proved to be unnecessary as there was a nest in the fork of an over hanging branch (Photo 15). A dipper was also sighted in the vicinity of the nest.

Photo 15

Unnamed Bridge: Rowls Langford North/South; R 3049 1749

There was nowhere suitable for natural nests under this single span concrete bridge. Bridge seemed quite low also (Photo 16). Habitat looked to be very suitable though.

Photo 16

Survey Results:

Of the 15 bridges surveyed, only 3 had dipper nests under them plus a further one being observed in the vicinity (Rowls Langford South – photo 15) (table 1). This accounts for just over one quarter (26.6%). During separate, unrelated field and survey work at other bridges, some dipper activity was observed and noted (see fig. 3).

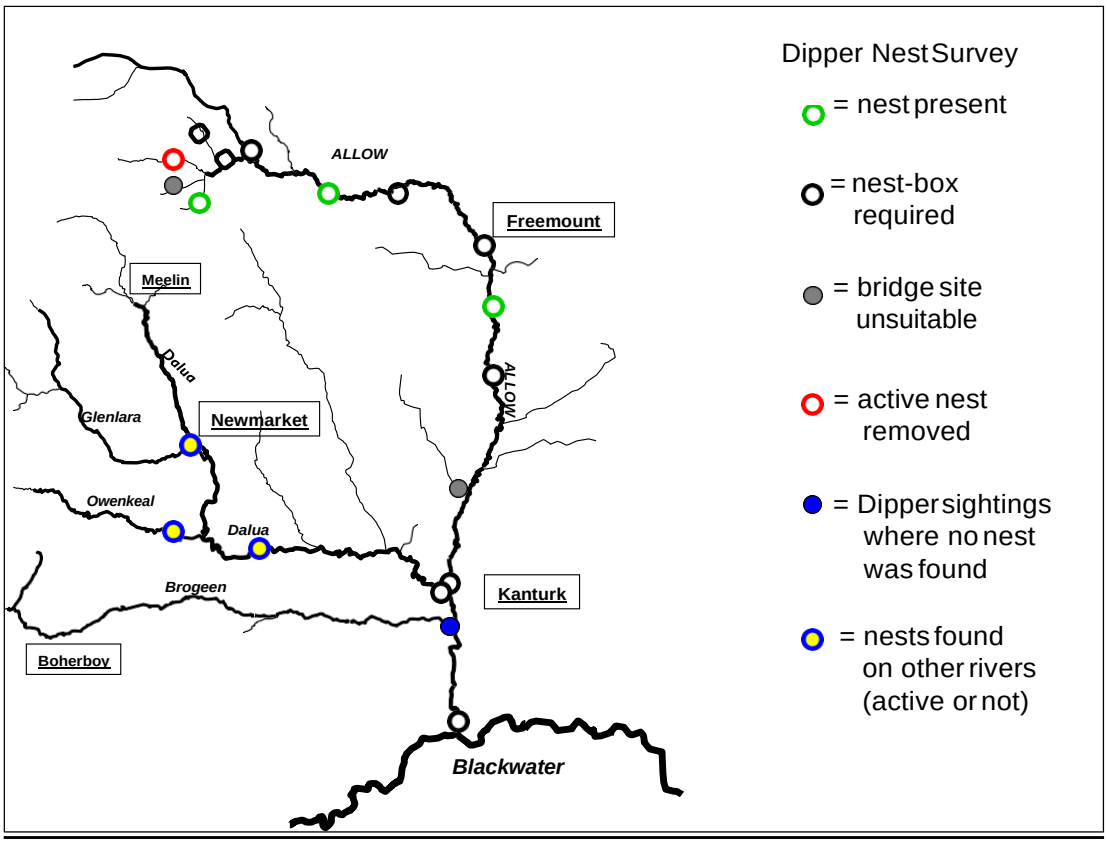


Figure 3 Locations of surveyed bridges plus other location where either dipper or nest was observed

Table1. Nest-boxes and locations required:

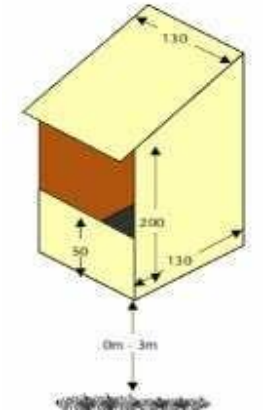
Bridge	Grid Reference	Nest Box required	Nest already present
Leader's Br.	W 3849 8867	✓	
Greenane Br.	R 3822 0316	✓	
Town Centre Br.	R 3814 0316	✓	
Coolageela Br.*	R 3850 0645	2	
John's Br.	R 3947 0978	✓	
Metal' Br	R 3950 1118		✓
Allow Br.	R 3930 1376	✓	
Raheen	R 3652 1559	✓	
Ballynaguilla	R 3443 1557		✓
Rowls Langford N	R 3215 1680	✓	
Rowls Aldworth	R 3126 1647	✓	
Rowls Shaddock (a)	R 3050 1533		✓
Rowls Shaddock (b)*	R 2987 1559	2	
Rowls Langford S**	R 2984 1655	✓	✓2
Rowls Langford N/S	R 3049 1749	✓	

*Bridge not suitable for dipper nesting, natural or otherwise.

**Since this survey was done and the dipper nest identified, the branch upon which the nest was situated was" illegally" cut down was discarded. On inspection the remains of a young bird was found within what was left of the nest. See photos 17-21 (inclusive) in Appendix.

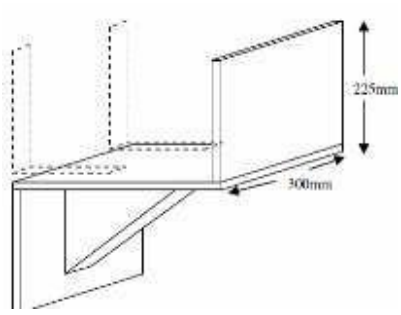
Types of nesting units:

In the case of nest-boxes, almost anything will suffice. There are many designs of dipper nest box. These can range from full nest boxes (Du Feu, 1993; NHBS, 2011) to mere platforms (Copland, 2007) or even piping (Hobson, 2010). In general, dippers just need a sufficiently large platform or hole to build upon. The following images are examples of the types of nesting units that can be used:



Dipper Nest Box (Du Feu, 2005)

Nest Box (NHBS, 2011)



Ledge (Copland, 2005)

Piping (Hobson, 2010)

Installation of Nesting Units:

When installing the ledges or the piping, common sense must prevail. Placing ledges in plain sight and in opportune sites for human and predator interference could have a negative effect in attracting the dipper to nest under that specific bridge. Camouflaging the nesting ledge or using the pipe alternative (easier to hide and camouflage) may be a better way forward. The nest-sites can be installed at any time of the year, but the non-breeding period is recommended to avoid any interference (Copland, 2007). Construction of the nesting unit is fairly straightforward. Fixing the box to the bridge, however, may require more time depending upon the structure of the bridge and its accessibility. It is recommended that two people are involved in fixing a nesting unit, since ladders may be required to reach appropriate sites above running water (Copland, 2007).

Potential Study:

It has been decided that the two best types of artificial nesting sites (for cost and simplicity) are the ledge (Copland, 2005) and the piping (Hobson, 2010). However, because it is unknown what one will be favoured by dippers, a study with the use of both will be conducted.

Initially, this study will concentrate on the Allow and its results will then help decide what type to use for the rest of the catchment, namely the Brogeen and Dalua rivers. It is also a good idea to have two nest units installed, as grey wagtails or even wrens (*Troglodytes troglogdytes*) might decide to take up residency in one. Hence, with two choices, the dipper still has a chance of nesting in one.

Because only four sites were identified as positive for having dipper nests during the preliminary survey, any substantial statistical analysis for a bridge variable to dipper occupancy will not be performed until after the nesting and breeding season of 2012. The height, width, elevation and other such specifications of each bridge have already been recorded, and these figures will be included as variables when analysing the final results of the project (Table 2).

Table2. Bridge locations, types and other variables

Bridge	Grid Reference	Bridge type	Underside type	Veg. Growth on side of Bridge (%)	Elevation (m)	River Width (m)	River Depth (m)	Bridge Width (m)	Arch Height (m)
Leader's Br.	W 3849 8867	1	2	0	78	35	0.8	7	6
Greenane Br.	R 3822 0316	1	2	0	87	22	0.15	6	6
Town Centre Br.	R 3814 0316	1	2	0	87	17	0.3	2	3
Coolageela Br.	R 3850 0645	1	1	76 - 100	95	1	0.25	8	1.5
John's Br.	R 3947 0978	1	1	51 - 75	118	9.5	0.85	7	5
Metal' Br*	R 3950 1118	2	2	0	121	6	0.65	4.5	2.2
Allow Br.	R 3930 1376	1	1	1 - 25	138	10	0.7	6	5.5
Raheen	R 3652 1559	1	2	0	157	8	0.25	6	3.5
Ballynaguilla*	R 3443 1557	1	2	0	172	8	0.2	4	4.5
Rowls Langford N	R 3215 1680	1	1	0	189	6.5	0.4	5	4
Rowls Aldworth	R 3126 1647	1	3	76 - 100	203	6.5	0.4	5	4
Rowls Shaddock (a)*	R 3050 1533	1	3	26 - 50	223	2.5	0.5	5	3.5
Rowls Shaddock (b)	R 2987 1559	2	1	0	218	2	0.1	4.5	1
Rowls Langford S*	R 2984 1655	2	1	0	217	4	0.3	4	2.5
Rowls Langford N/S	R 3049 1749	1	1	0	238	1.3	0.2	3.5	0.8

Bridge Type: 1 = Masonry; 2 = Concrete. **Underside Type:** 1 = No holes or ledges; 2 = Few holes or ledges; 3 = Disrepair with crevices.
* Bridges with nests

Recommendations for Installation of Dipper Nest Units:

Study Design:

The following is the procedure of installation of artificial dipper nesting units along the dipper:

- Bridge locations have already been designated

Table3. Bridge Locations where units are to be installed:

Bridge	Grid Reference
Leader's Br.	W 3849 8867
Greenane Br.	R 3822 0316
Town Centre Br.	R 3814 0316
John's Br.	R 3947 0978
Allow Br.	R 3930 1376
Raheen	R 3652 1559
Rowls Langford N	R 3215 1680
Rowls Aldworth	R 3126 1647
Rowls Langford S	R 2984 1655
Rowls Langford N/S	R 3049 1749

- Permission to do work on the bridges must be gained from the relevant authorities (e.g. local authorities, NPWS and OPW)
- Designated installation sites will be pre-marked out with spray paint: Circle (O) for pipe and a straight line (–) for ledge. If possible, the units should be as inconspicuous as possible.
- Installation should be done from early to mid September.
- Because of the dangers associated with working on rivers, teams of at least two people will be mandatory when installing units and the use of full safety gear will also be required.
- Monitoring of these sites can be conducted from mid October but must be done during hours of darkness so as to properly get information of winter roosts (Cross *et al*, 2008). The number of dippers roosting at each bridge is to be recorded
- Further monitoring of the bridges will be done in the following spring when breeding pairs have nests built.
- Once active nests are identified (being used by at least one bird), these will be monitored for success in breeding and further success of fledgling birds.
- Correlations of type of nest unit used and bridge type will be made from these results and from there, further recommendations of nest units installations for the other rivers in the catchment (e.g. Dalua and Brogeen).

Acknowledgements:

Thanks go to IRD Duhallow Ltd. for providing the opportunity to undertake the aforementioned surveys, especially to Mr. Pat Fitzpatrick, LIFE project coordinator, for contacting all the respective landowners for permission to cross their land. Also, thank you to Mr. Fitzpatrick for giving me the opportunity and trust to perform such surveys. Thanks to Dr. Fran Igoe, LIFE Project head scientist for providing guidance and advice and accompanying me on some of the surveys. I am also grateful to Padraig Moynahan and John Fitzgerald for accompanying me for the remainder of the surveys.

Reference:

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APPENDIX

Threats to Dipper Nesting:

When surveying bridges (18th of April) on the River Allow for potential sites to install artificial nesting units for the dipper, a nest was located in the fork of a tree that overhung the river less than a metre downstream of the bridge (Photo 17). At a later date (30th of May) this nest was found to have been discarded and the branch upon which the nest was sitting was cut down (Photos 18-21 incl.). It is because of this disregard that the installation of nest units is important to give dippers a chance to fledge and mature.

Photo 17

Photo 18

Photo 19

Photo 20

Photo 21