

## A Novel, Effective and Safe Newt Trap

David Dewsbury (GB – Coleford, Royal Forest of Dean)

### Summary

Described here is a novel design of newt trap which is highly effective and completely safe for newts. The newts are captured on the base of the water body but can swim to the surface to breathe at all times. They are not confined to the surface layer and hence not at risk from the heat of the sun. The trap can be deployed and retrieved quickly and easily without the need (of the operator) to enter the water. Because of the higher catch rate a relatively small number of traps can be used to 'sample' the newt population of a large number of ponds quite quickly. There is no need to visit the traps during darkness and so the safety of the operator is much enhanced. These traps have been used for 3 years. They have captured over 3000 newts with zero casualties and no signs of any animal stress.

### Zusammenfassung

#### **Eine neue, effektive und sichere Molchfalle**

Ein neuer, sehr effektiver und sicherer Typ einer Molchfalle wird beschrieben. Die Molche werden am Boden des Gewässers gefangen, können aber jederzeit an die Gewässeroberfläche zum Atmen schwimmen. Sie sind nicht auf die obere Wasserschicht beschränkt und deshalb dort nicht dem Risiko einer Überhitzung durch die Sonne ausgesetzt. Die Falle kann schnell und einfach ausgelegt und wieder eingeholt werden, ohne das Gewässer zu betreten. Aufgrund der guten Fängigkeit wird nur eine relativ kleine Anzahl von Fallen gebraucht, um die Molchpopulationen einer größeren Anzahl von Gewässern schnell zu erfassen. Es besteht keine Notwendigkeit, die Fallen in der Dunkelheit aufzusuchen, was die Sicherheit des Bearbeiters erhöht. Dieser Fallentyp wird seit drei Jahren eingesetzt. Dabei wurden mehr als 3000 Molche ohne Zwischenfälle oder Anzeichen von Stress gefangen.

### Introduction

It is widely acknowledged that one of the best ways to survey for reptiles and amphibians is by using refuges, either natural or man-made. Newts are no exception and they can often be found hiding under tiles and pieces of wood either on land or on the bottom of a pond. Traditionally bottle traps have been used for catching newts in water especially in the UK; either set at the surface or

anchored to the bottom. Because these have a narrow opening they do not catch many newts and they have to be checked every few hours during warm weather to avoid the risk of suffocation. Even when set at the surface with ventilation holes, bottle traps can become submerged after heavy rainfall and then pose a large risk to newts and other creatures such as water shrews.

In order to be most effective a trap should sit on the substrate of the water body. (See More Detailed Design Points below.) A newt trap should also present a wider opening to passing newts to increase the chances of entry and be reliable at retaining the animals which enter. For safety it must allow newts to breathe at all times.

The new trap design was tested as a prototype in spring, 2010. I carried out a limited comparison trial with bottle traps and found the new trap to be significantly more effective. It has been further developed and found to be particularly useful for conducting large-scale surveys in a short time scale. It would probably be a useful tool for carrying out scientific investigations and also for mitigation and trans-location projects although I have no knowledge of any such projects to date.

The principle focus for this project was to find an easier, more effective and safer method than bottle traps for surveying for the Great Crested Newt (*Triturus cristatus*) which is particularly protected in the United Kingdom (fig. 1).



Figure 1: Great crested newt (*Triturus cristatus*) male (Photo: D. Dewsbury).  
Abb. 1: Männchen des Kammmolches (*Triturus cristatus*).

## Summary of Benefits

The following potential benefits over bottle traps are apparent:

- Completely safe for newts
- Newts can breathe air at all times
- Newts not confined to shallow water or exposed to the sun
- Much more effective at catching newts than bottle traps
- Much safer and more convenient for surveyors
- Newts can be left for longer periods (current agreement with 'Natural England' is a maximum of 24 hours)
- No need to enter ponds
- Minimal disturbance to pond life
- No night visits necessary
- Quick to deploy so large-scale surveys possible
- Greater scope for carrying out scientific studies on newt distribution, behaviour, disease, etc.
- May offer a useful method for newt capture in mitigation situations

## Design Description – Overview

My first prototype was hastily put together after we sold our house. I had to remove the newts from the garden pond because the new owner was going to destroy it. This early device consisted of a biscuit box with a slot in one side, some netting to retain the newts and a plastic bag over the top to hold some air. This proved to be highly effective at removing the newts until there were no more to be found. However, there would have been a number of difficulties using this prototype in the field.

After carrying out a trial in 2010 using various designs with varying dimensions, I have settled on the design shown in the diagram (fig. 2).

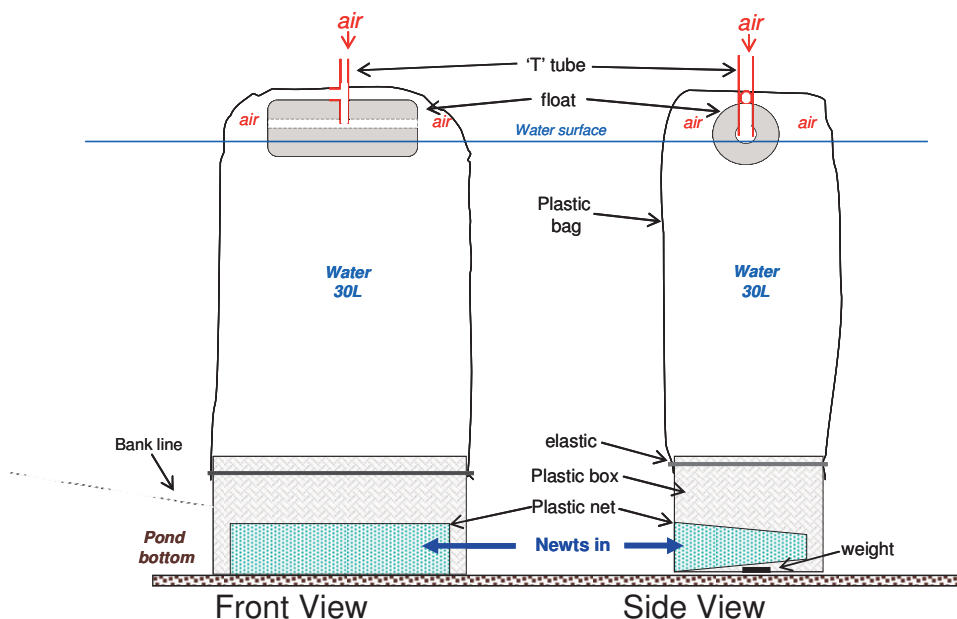


Figure 2: Diagrammatic Illustration of Newt Trap, Front view and side view.

Abb. 2: Schema der Molchfalle, Vorder- und Seitenansicht.

A readily available plastic box and tall bin liner which fit well together were selected as the basic shell. This results in a total volume of water available to the newts of up to 34 litres and a normal operating depth of up to 80 cm. Thus the newts have access to the full depth of the pond and can escape from the heat of the sun.

The plastic bag is held at the pond surface by a float made from water pipe insulation material which is very buoyant and cannot become waterlogged. A plastic 'T' piece tube supplies sufficient fresh air from above the pond down into the centre of the float. The side-arm of the 'T' also provides a vent above the float, immediately inside the bag so an air pocket is assured. The air at the top of the bag allows the newts (and any other animal) to breathe at all times. Newts do not require a large supply of air and this tube is quite adequate.

A weight attached securely to the bottom of the box ensures that the box will sink to the bottom and remain stationary (in stagnant water).

The trap can be easily sterilised using the normal chemical agents although I normally discard the bag after use. (Whilst this may seem wasteful it is difficult to be certain that the bag has not been damaged during an earlier use and any risk of contamination is also avoided. I do reuse the bag for redeployment in the same pond if I am confident that no damage has been caused. The cost of the bag is approximately £0.10.)

## More Detailed Design Points

Details of some of the components are illustrated in the operating instructions described below.

The newt entrance is a rectangular slot measuring 18x4 cm from which the attached plastic netting forms a square funnel tapering to approximately 20x0.8 cm towards the rear of the box. The entrance is situated right at the pond bottom so that newts traversing the pond floor will encounter it and enter inside. We have found that where the box is not sitting on the bottom the catch rate is much reduced. This is also supported by other studies (eg KRÖPFLI et al. 2010) where catch rates have been found to be greater at the bottom of the water body. Other studies (DOLMEN 1983) have shown that *T. cristatus* tends to be more active just above the ground and I have observed this in my own garden pond. Further comparisons of this trap and other funnel traps are required to support this hypothesis.

The prototypes used in my early trial had entrance slots of different heights and widths for comparison but this did not appear to affect the capture rate very much.

The weight is made from a strip of lead which is not ideal from an environmental point of view but I guess that its effect on the lead concentration of the water is negligible and it cannot be ingested by swans and other water birds. However it would be advisable to find an alternative material. The weight must be securely attached to avoid damaging the newts or their creeping underneath it.

A few holes in the base of the box facilitate the initial sinking until the water is able to enter via the main entrance slot and also allow complete drainage on retrieval from the water.

The float and breathing tube construction detail is important for the welfare of the air-breathing inhabitants. The float is made from a 20 cm length of water pipe insulation which is intended for 15 mm diameter water pipe and is pre-cut along one side. The size of the float must be large enough to render the whole trap buoyant in the event of a sudden rise in the level of the pond. I.e. the float must be large enough to support the whole weight of the trap (including the lead weight) at the surface of the water. Thus the trap will float up from the pond bottom if necessary, the breathing tube will remain in contact with the air and any captive creatures will still be able to breathe freely.

The breathing tube is a plastic 'T' piece designed for aquarium air line construction and is approximately 0.4 cm in diameter. This is held securely inside the centre of the float using a short length of neoprene tube and a special clip which is supplied with the trap. A similar clip is used to secure the bag to the 'T' piece outside the bag.

The float holds the bag at the surface of the pond with the tube protruding into the outside air. Thus there will always be a passage for air from the atmosphere above the pond to the inside of the bag above the water level. The size of the vent is relatively small but quite sufficient to maintain the level of oxygen in the air pocket inside the bag.

It is important that the tube communicates directly between the outside air and the air inside the bag at all times.

The plastic bag is securely attached to the box using strong elastic.

## Newt Trap Operation

### Assembly

It is preferable to assemble each trap at home before proceeding to the target pond. This takes about five minutes. Attempting to assemble the components at the pond side will pose a significant risk of damaging the plastic bag on brambles or other vegetation near the pond.

The plastic box assembly, float, breathing tube, plastic clips and plastic winder, string and elastic should all have been properly sterilised.

Assemble as follows:

Place one clip around the neoprene tube close to the end (fig. 3a). Prise open the float and insert the clip end of the tube and 'T' piece assembly about half way along (fig 3b.) The clip will keep the tube securely inside the float.

Select a new bag and check that there are no holes or faults in the seams. Insert the float assembly up into the bag so that the breathing tube is positioned at the far end of the bag. Pierce the bag with a sharp point and push the end of the 'T' piece right through.

Clamp the bag around the 'T' piece using another clip (fig. 3c.)

Replacement bags can be purchased from most large supermarkets. Use 30 litre, 'tall bin liners' with an 880-900 mm rim size (width 450 mm) and length 760 mm.



Figure 3a and b: Breathing tube assembled and inserted into the float (Photos: D. Dewsbury).

Abb. 3a und b: Zusammengesetztes und in den Schwimmer eingesetztes Atmungsrohr.



Figure 3c: Breathing tube and float inserted into bag and secured by clip.

Abb. 3c: Atmungsrohr und Schwimmer sind in den Beutel eingesetzt und mit einem Clip befestigt.

Attach the loop of elastic around the box assembly approximately half way down. Place the open end of the bag over the box and secure it with the elastic ensuring that it is securely fastened all the way round. Push the elastic firmly up against the box rim to ensure that the bag will not become detached during deployment. An excessive amount of the bag should not be allowed to obstruct the trap opening (fig 3d.)

Loosely collapse the bag inside the box and place the winder and string on top.



Figure 3d: Newt trap assembled. (Photos D. Dewsbury).  
Abb. 3d: Zusammengebaute Molchfalle.

## Deployment

Select a suitable location in the pond to position the trap. Ideally this should be an area of clear water with no over-hanging branches and where the sinking will not be impeded by weed or debris. The depth of the water must not exceed the total length of the trap assembly (approximately 75 cm.) The trap can be positioned near the bank if the pond is deep. (A better result can often be obtained closer to the bank).



NB. If the trap is deployed in dense blanket weed or forced down through other vegetation then the trap entrance will be obstructed and the catch greatly reduced. If necessary use a rake or a length of foraged timber to clear an area of weed before deploying the trap. Beware of sunken tree branches which can obstruct the trap recovery.

Proceed as follows:

1. The cord must be loosely coiled in one hand ready for launching. One way to do this is to let the winder and string fall to the ground whilst holding the trap in the left hand (LH). Push the trap away from the body, grasping the cord with the right hand (RH). Collect the loop of cord into the LH and hold the cord loop in the LH under the box. Repeat the loops with the RH until all the cord is looped under the trap in the LH.

2. Secure the winder on the bank with one foot.

Transfer the trap to the RH but with the coiled cord still in the LH (fig. 4a.)



Figure 4a: Newt trap ready to launch (Photo D. Dewsbury).

Abb. 4a: Zur Auslage fertige Molchfalle.

3. Toss the trap assembly out to the desired spot, trying to make it land upright. (Not essential) Allow for 'wind drift' during sinking if necessary. Wait for the box to sink fully (fig. 4b), wind in all slack line and secure the winder in the bank-side vegetation. Submerge the line as much as possible to keep human attention to a minimum. Check as far as possible that the box is not floating off the bottom.



Figure 4b: Newt trap deployed (Photo D. Dewsbury).

Abb. 4b: Ausgelegte Molchfalle.

## Retrieval

Pull the trap to the bank side fairly gently, trying not to let the bag become snagged. If it is kept moving the box will glide across the surface quite well (fig. 5a).

Grasp the float assembly through the bag (litter picker tongues are usually necessary) (fig. 5b) and lift it whilst the box remains submerged. Wait until most of the water has flowed out of the box before pulling it from the water (fig. 5c) otherwise the bag may become detached by the weight of the water and the captive newts will avoid being counted!



Figure 5a and b: Retrieval of the Newt trap (Photos: D. Dewsbury).  
 Abb. 5a und b: Einholen der Molchfalle.





Figure 5c: Newt trap retrieved with newts inside (Photo: D. Dewsbury).  
Abb. 5c: Eingeholte Molchfalle mit gefangenen Molchen.

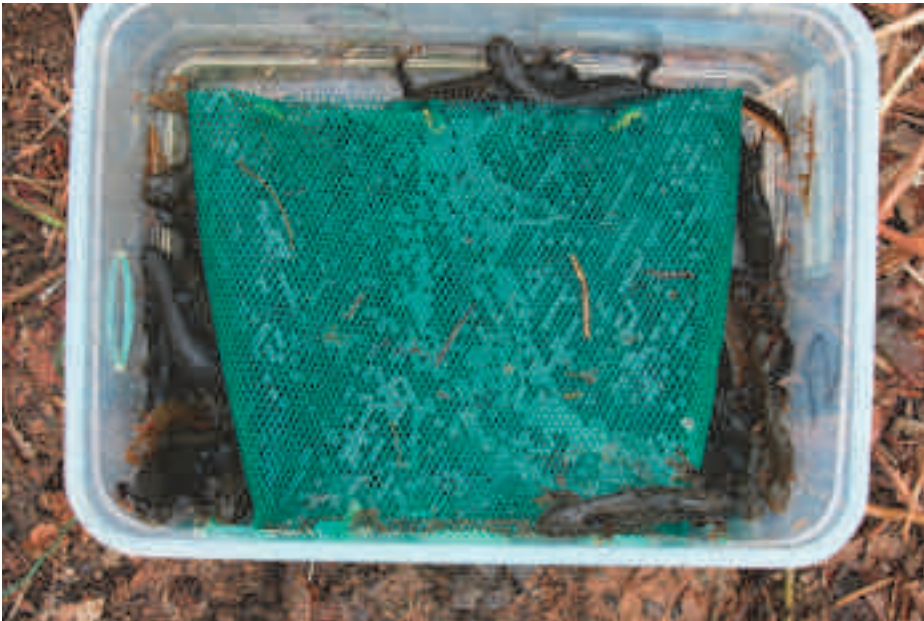


Figure 5d: Trap after removal of the bag. Newts to be identified and counted (Photo: D. Dewsbury).  
Abb. 5d: Falle nach der Entfernung des Beutels mit Molchen, die bestimmt und gezählt werden.

Before lifting the elastic from around the bag, check for any newts that may be around the top of the box inside the bag. Normally all newts will have moved down into the box (fig. 5d) as the water flows out during the recovery operation. Carefully lift the elastic away from the bag to release it. The bag can be placed on one side. Identify, count and return the newts to the pond as soon as possible. An assistant recorder is a very useful asset especially if there is a large number of newts. Perhaps the easiest way is to gently lift each one from the box (preferably wearing disposable vinyl gloves,) identify it to your recorder and then return it gently to the water. This minimises the handling time whilst ensuring an accurate count and identification.

Ensure that there are no newts retained inside the trap, the bag or the float.

Place the used traps and bags, etc into a large bin liner for transportation back home.

## Sterilisation

There is potential for cross-contamination between ponds e.g. of alien pond weeds and chytrid fungus so thorough sterilisation is essential.

1. Discard the plastic bag (If it is to be re-used then it must also be sterilised.).
2. Thoroughly rinse the box assembly, the plastic netting and winder, string and breathing tube with a fine jet from a hosepipe to ensure that no particles of debris or plant material remain.
3. Immerse all components for 15 minutes in a 10% solution of bleach (or other sterilising agent).
4. I do this most conveniently using a 9 litre plastic box which will just accommodate the newt trap and sufficient liquid for complete immersion (fig. 6a). A 75 ml bottle of bleach topped up to 7.5 litres with tap water is just right. Several traps can be sterilised using one bottle of bleach. (Please do not use hot water!) I sterilise the box assemblies first and then immerse all the floats and breathing tubes. I leave all the sterilised components to drain and to become dry if possible (fig. 6b).
5. Subsequently rinse all components with tap water and allow to dry.



a)



b)

Figure 6a and b: Newt trap being sterilised (a) and traps laid out to dry (b) (Photos: D. Dewsbury).

Abb. 6a und b: Eine Falle während der Desinfektion (a) und zum Trocknen (b) ausgelegte Molchfallen.

## Comparison trial (Summary)

A very small comparison trial was conducted in 2010 to make a direct comparison between the prototypes of the new trap and conventional bottle traps (fig 7.)



Figure 7: Conventional bottle trap (Photo: D. Dewsbury).  
Abb. 7: Übliche Flaschenfalle.

Each trial involved placing four conventional bottle traps at roughly 2 m intervals against the pond margin and at the same time deploying two ‘Dewsbury Box’ traps a few metres out from the same stretch of bank. The bottle traps were set with the base protruding slightly above the surface and with ventilation holes to ensure an air supply. (Some operators set bottle traps at the pond bottom but I considered this to be too risky.)

All the traps were left overnight and the newts counted the following morning.

Comparison trials were conducted at two different ponds, each with a good population of *Triturus cristatus*.

The results from the three trials were as follows (tab. 1):

Table 1: Comparison Trial Catch Data. (NB. Catch numbers are for all three UK species.)  
Tab. 1: Fangdaten aus den Vergleichsuntersuchungen (die Fangzahlen beinhalten alle drei in Großbritannien vorkommenden Arten).

Trial Number	Number of Bottle Traps	Number of ‘Dewsbury’ Box Traps	Average Catch per Bottle Trap	Average Catch per Dewsbury Box
1	4	2	2.5	23
2	4	2	2.5	20
3	4	2	1.75	8

The 'Dewsbury' box traps appear to catch many more newts than conventional bottle traps.

This was an extremely limited experiment and I have not deployed any more bottle traps since then.

## Summary of Operational Experience in the Field

The trap has been used in its current form to carry out surveys during the spring seasons of 2010, 2011 and 2012. During this time more than 3000 newts have been captured and released with no casualties or any signs of stress.

Surveys are normally carried out on up to ten water bodies at a time using my stock of twenty traps. The traps are deployed during one day (usually in the afternoon,) left in place over night and retrieved the following day. The average number of traps per water body is obviously two but this varies with only one being deployed in small or 'poor' ponds but more in larger or 'better' ponds. This is obviously subjective and also depends on the total number of ponds to be surveyed.

The traps are conveniently carried in a plastic shopping bag, five per bag and so are much easier to handle than bottle traps which can be quite difficult to transport.

Surveys have been carried out for Forestry Commission England, The National Trust, The Royal Society for the Protection of birds, The Duchy Estate and some private landowners.

An example of a typical project is the Wyre Forest (Worcestershire) where ten ponds were surveyed over one night on Forestry Commission land and the adjacent National Nature Reserve. The presence of *T. cristatus* was confirmed in one location and three additional locations were identified.

Similarly in ten ponds in Mortimer Forest (Shropshire) one *T. cristatus* location was confirmed and three new ones identified. The first ever *Lissotriton vulgaris* record for the forest was also found.

The Forest of Dean (Gloucestershire) and surrounding area where I live has been surveyed extensively over the three years and a distribution map for three species of newt is taking shape. So far 70 water bodies have been examined some of them more than once. *Triturus cristatus* has been found in 23 water bodies at 14 different locations, most of which were previously unknown. This information will enable more ponds to be created in strategic areas to form links between the separate *T. cristatus* populations across the whole forest area.



Table 2: Summary of Catch Data 2010 to 2012, all locations.

Tab. 2: Zusammenfassung der Fangdaten 2010 bis 2012 von allen Orten.

Year	All Species	<i>Triturus cristatus</i>	<i>Lissotriton vulgaris</i>	<i>Lissotriton helveticus</i>
2010	801	148	134	519
2011	981	98	154	729
2012	1415	94	139	1182
Total	3197	340	427	2430

- Number of trap deployments (in ponds with newts) = 443
- Average total catch of newts = 7.2\*
- Maximum total catch in one trap of all species = 56
- Maximum catch in one trap of *T. cristatus* = 19
- Percentage of males caught all species = 75% (+/- 5%)
- Number of newt casualties or deaths = 0

\*The average catch includes many water bodies which have a very low newt population. The normal catch is significantly greater and often more than 20.

The traps also catch other creatures including tadpoles of toad (*Bufo bufo*) and frog (*Rana temporaria*), dragonfly larvae, sticklebacks (*Gasterosteus aculeatus*) water beetles, freshwater shrimp (*Gammarus*) caddis larvae (*Trichoptera*) and snails. Where sticklebacks are captured there is a low expectation for newt capture (fig. 8). This is found to be the case and there are no instances of *T. cristatus* being caught with sticklebacks. However, *T. cristatus* have been caught in ponds where alien carp species have been introduced by visitors to the forest.

Other interesting facts have emerged such as the sex ratio of captured newts which was found to be approximately 75% male and 25% female for all species.



Figure 8: By-catch, in this case sticklebacks (*Gasterosteus aculeatus*), Photo: D. Dewsbury.

Abb. 8: Beifänge in der Falle, hier Dreistachlige Stichlinge (*Gasterosteus aculeatus*).

## Problems and Difficulties

The traps were sometimes not sitting on the bottom of the pond, resulting in a zero or much-reduced catch. It is advisable to check the depth using a plumb line where there is any doubt. (The traps are designed to float in the event of a sudden increase in pond depth to protect captured newts from drowning.)

Water temperatures below about 10 degrees will result in lower catches and at very low water temperatures, very few newts will enter the traps.

In ponds with a very dense growth of vegetation, it was found that a space had to be cleared to allow the box to reach the pond bottom. If a layer of compressed vegetation unavoidably remains underneath the trap it may still be effective in catching newts. Care must be taken not move the trap so that the entrance becomes significantly obstructed by vegetation. Best results are obtained in water bodies with less vegetation.

A strong breeze can cause the trap to drift a short distance before it sinks.

Over-hanging trees can hamper the retrieval. The trap must be thrown out below any branches.

Emptying a box of newts can result in considerable interest from people passing by but this is not usually much of a problem.

## Deeper Water Operation

Traps have been successfully deployed in an old swimming pool at a depth of more than 120 cm. This was achieved by cutting off the top of the bag and attaching a second bag using adhesive tape. The assembly remained sound over night and was successful in catching newts.

There has been one report of newts laying eggs on the plastic bag. I suspect that this happened when the water was very shallow and much of the plastic bag was lying horizontally on the surface. Such a situation may enable newts to make a fold in the bag to lay eggs. Most deployments are made in deeper water which keeps the bag relatively taut and egg-laying does not happen. Please be aware of this possibility and return any such eggs to the pond, along with a small portion of the bag if necessary.

I believe that water shrews (*Neomys fodiens*) would have sufficient air and food (captured invertebrates) inside the trap and could utilise the float as a refuge. However, none has been captured so far. Alternatively they may chew their way out through the bag.

## Additional Possible Trials and Uses

### Comparison with Other Traps

More extensive trials to compare this trap with other more conventional traps would be very useful. It may be possible to stop using bottle traps if the new trap can eventually be used to 'confirm' an absence of newts. Such confidence can only come from greater usage by experienced operators.

### Mitigation and Trans-location Projects

It would be interesting to see if these devices could be used to move large numbers of newts to an alternative pond. This may be a more effective and safer method than using landfall traps or funnel traps.

### Other Aquatic Air-breathing Animals

It may be possible to modify the trap dimensions to capture other creatures. For example it would be interesting to see how effective it may be for capturing aquatic frogs or their tadpoles. Eg. in comparison with funnel traps.

## Availability and Feedback

The trap is now available to purchase from an on-line supplier and I would recommend that people who wish to use it should buy at least one before attempting to make their own. Much thought has gone into developing a sturdy and safe design and some of the parts can only be bought in large quantities. Whilst it is possible to make something that will work, it will take quite a lot of time to acquire suitable components and assemble them.

Any feedback of cost saving design ideas would be gratefully received. Also please report any problems, suggestions or interesting observations.

More than 100 of these traps have been supplied to other people and I hope you will be persuaded to try it out for yourself.

## Update for 2014

I have continued to use my trap for newt surveys during 2013 and 2014 and many other people are also using it in the United Kingdom and some on the European mainland.

The highest number of newts caught with a single deployment is now 88 and the highest number of great crested newts (*Triturus cristatus*) is 25.

## Comparison Trial with Bottle Traps in April, 2014

In April, 2014 I carried out a comparison trial in conjunction with an environmental consultancy. The comparison was a single event for one night only. The Consultancy deployed bottle traps on one of their routine surveys and I

deployed my box traps at the same time. The results are shown as written up by the Consultancy and are as follows:

	Bottle Trap			Dewsbury Trap			Average no. of GCN caught per bottle	Average no. of GCN caught per Dewsbury
Pond ref.	Number of Traps	GCN count	Smooth count	Number of Traps	GCN count	Smooth count		
New North	30	13	1	5	26	6	0.43	5.2
New South	30	12	7	5	28	1	0.4	5.6
I	30		5	2	4	7	0	2
L	50	5	14	1	3		0.1	3
R	15		6	2	7	2	0	3.5
O	50	4	7	4	5	8	0.08	1.25
P	25	2	15	2	8	1	0.08	4
K	8			1	11	2	0	11
<b>Total</b>	<b>238</b>	<b>36</b>	<b>55</b>	<b>22</b>	<b>92</b>	<b>27</b>	<b>0.15</b>	<b>4.18</b>

Only great crested newt (GCN) (*Triturus cristatus*) and smooth newt (*Lissotriton vulgaris*) were found to be present in the ponds. Many of the ponds were very shallow and the box traps had to be deployed right in the centre at an approximate depth of less than 30cm. These were not ideal conditions for these traps but they still performed very well compared with the bottle traps. In three of the ponds no GCN were found with bottle traps but were shown to be present by the box traps.

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Trap Supplier: [www.nhbs.com](http://www.nhbs.com)

### Contact Details:

David Dewsbury Bsc.  
Heathville, Wood Edge Road, Lower Milkwall  
Coleford, Gloucestershire, GL16 7LF  
Great Britain (GB)

E-mail: [david.dewsbury@btinternet.com](mailto:david.dewsbury@btinternet.com)

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