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A sustainable future for Chinese giant salamanders

Chinese giant salamander field survey manual

Chinese Giant Salamander International

中国大鲵保护国际

Benjamin Tapley, Shu Chen, Samuel T. Turvey, Jay Redbond, Sumio Okada, & Andrew A. Cunningham

Chinese giant Salamander (CGS) Field Manual

A number of methods are utilised to survey Cryptobranchid salamanders and these methods vary greatly in their efficacy and invasiveness. The Chinese giant salamander (*Andrias davidianus*) is the world's largest amphibian. Historically, this species was found over much of southern and central China in the Pearl, Yellow and Yangtze River drainage basins. Despite its large size and wide distribution relatively little is known about this species and range wide surveys have not been undertaken. In order to understand the distribution and population status of Chinese giant salamanders it is pivotal that the data collected during field surveys is comparable between sites, the use of standardised methods is therefore of the upmost importance. This field manual has been produced to facilitate the adoption of standardised Chinese giant salamander surveys in China that are minimally invasive, logistically feasible and robust. It is our hope that these methods will be used by all researchers working to collect data on the species.

Equipment and reagent list for each survey team

Equipment/Reagent	Use
1 x 2m^2 tarpaulin	This is for placing equipment at the 0.5km swabbing point on the transect.
2 pairs of waders with felt on the sole to prevent slipping on rocks during field survey	
3 pairs of Wellington boots with felt bottom	To wear with the wetsuits when conducting underwater surveys.
3 x INON LE350 torches and 9 spare batteries	These are waterproof torches and can be used during daytime when looking in underwater crevices and cave searches as well as nocturnal spotlight surveys.
3 x hope head torches	Used during nocturnal spotlight surveys.
2 x log peaveys	To be used during day time rock turning surveys
3 x 5mm wetsuits	To be worn during all surveys.
3 x head covers for wetsuits	To be worn when doing underwater crevice and cave searches
3 x masks and snorkels	To be used while doing underwater crevice and cave searches.
1 pair of fins	To aid when diving in deep parts to check crevices and caves.
3 x dry bags	To use for carrying equipment so it doesn't get wet.
3 x flat bottom nets with 5mm or smaller mesh weave	
Washing up bowl	To be used as a holding tank for the salamanders whilst taking morphometric measurements, swabs and weighing the animals in. Also for disinfecting equipment and feet at the end of the survey.
1 set of 3 different sized capped clear plastic tubes with a cm measure fixed to the sides and bottom	For taking morphometric measurements of larvae and juveniles as well as aiding the taking of swabs from the CGS.
1 large drain pipe 30cm wide 1.5m long with a cm measure fixed to the side	For taking morphometric measurements of large adults (the pipe is useful for restraint).

Towels	
1 electric digital scale 0.1g to 30 kg	For weighing the CGS.
1 small length of plastic pipe	For opening the mouth when taking buccal swabs.
1 scrubbing brush	For scrubbing off organic matter before disinfecting with Virkon after surveying.
1 spray bottle filled with Virkon	For disinfection after surveying.
1 Palintest micro 600 handheld pH meter www.palintest.com	To test water.
1 Palintest Micro 800 www.palintest.com	To take GPS, dissolved oxygen, altitude, salinity and water temperature.
1 Towel	For cleaning probe.
1 Salifert nitrate water test kit http://salifert.com/	Water parameters.
1 Salifert nitrite water test kit http://salifert.com/	Water parameters.
1 Salifert Ammonia water test kit http://salifert.com/	Water parameters.
1 Salifert kdh and alkalinity water test kit http://salifert.com/	Water parameters.
120m tape measure	For measuring river width and depth.
1 flow meter	For measuring the flow rate of the water.
30 pairs of cotton handling gloves to be worn over nitrile gloves	For extra grip when handling salamanders and to minimise impact of salamander bites
6 boxes powder free nitrile of gloves	For swabbing and handling.
200 PIT tags and a pit tag reader	For marking the CGS.
2 vials of vet bond glue	For sealing the PIT tag incision.
120 swabs	For buccal, chytrid and cloacal swabs.
120 eppendorf tubes	For storing swabs.
1 vial of 90% ethanol	For storing genetic swabs and other swabs if needed.
1 litre of distilled water	For washing the probes and water test kits.
1 secchi disk	For measuring the water turbidity.
1 water proof pen and pad	For writing up data in the field.
20 Large crab traps	For trapping salamanders
Field survey sheets	

Survey Protocol

a) Survey Protocol

For health and safety purposes the surveys should be conducted by a minimum of two people, both surveyors should be able to swim. A large amount of equipment needs to be carried and ideally there will be an additional person based on the river bank during surveys who will be in the position to assist in case of emergency. Teams should check the weather forecast and avoid undertaking surveys during periods of heavy rainfall so as to avoid the risk of flash flooding.

On the day that the team reach each of the sites, contact shall be made with the relevant local authorities and potential survey sites shall be investigated for the field surveys. The field surveys shall begin the following day. Each transect will consist of a cumulative 1km stretch of accessible river, with day time and night time surveys conducted on the same day. 20 crab traps per km should be set over two

days and two nights with the bait being replaced with fresh chicken liver and sardines when the traps are checked the morning after being first set. The number of hours that the traps are immersed must be recorded on the survey. All surveys should be carried out during periods of low precipitation so that the water level is low and the water flow is slow, to maximise the chances of finding Chinese giant salamander (CGS) during the surveys; these conditions reduce the water within the river system, so therefore reducing the number of crevices CGS can hide in. Surveying at this time should also keep the risk aspect to a minimum as it will be safer to work in the river system. Traps should be hidden from view and firmly anchored and their positions recorded. Traps should be evenly spaced along he transect wherever possible; if there are a limited number of appropriate trapping sites along a transect, several traps may need to be placed adjacent to one another. In addition, surveyors should use all of the techniques outlined below at each site, and work in a downstream-to-upstream direction, as this will limit the chances of CGS individuals escaping downstream unobserved. At the start of each survey, set up a swabbing and measurement station at the 0.5km point, equipment can then be most easily accessed when processing salamanders. The equipment that will be used and carried during the river search (masks, gloves etc.) should be placed in a 60 litre dry bag to prevent it getting lost and / or damaged.

At the start of the transect fill in the general site survey sheet.

Each time a CGS is caught, fill in the individual record sheet for each salamander that is captured / observed.

After the survey is complete write up the data and save it electronically.

Do not capture animals that are guarding nest sites as we do not want to disturb breeding activity.

b) Survey Techniques

A combination of all following field survey techniques shall be used at each of the sites.

- **Snorkeling**

This method should be used during day time surveys and night time spot light surveys to check crevices, under rocks and in caves where CGS could be resting. This involves diving to check crevices and caves if there are deep parts of the river. Use a wetsuit with hood, mask and snorkel, dive torch and a net. In shallow water, masks and snorkels should be used to check under stones to aid visibility and when stones are being held by log peaveys.

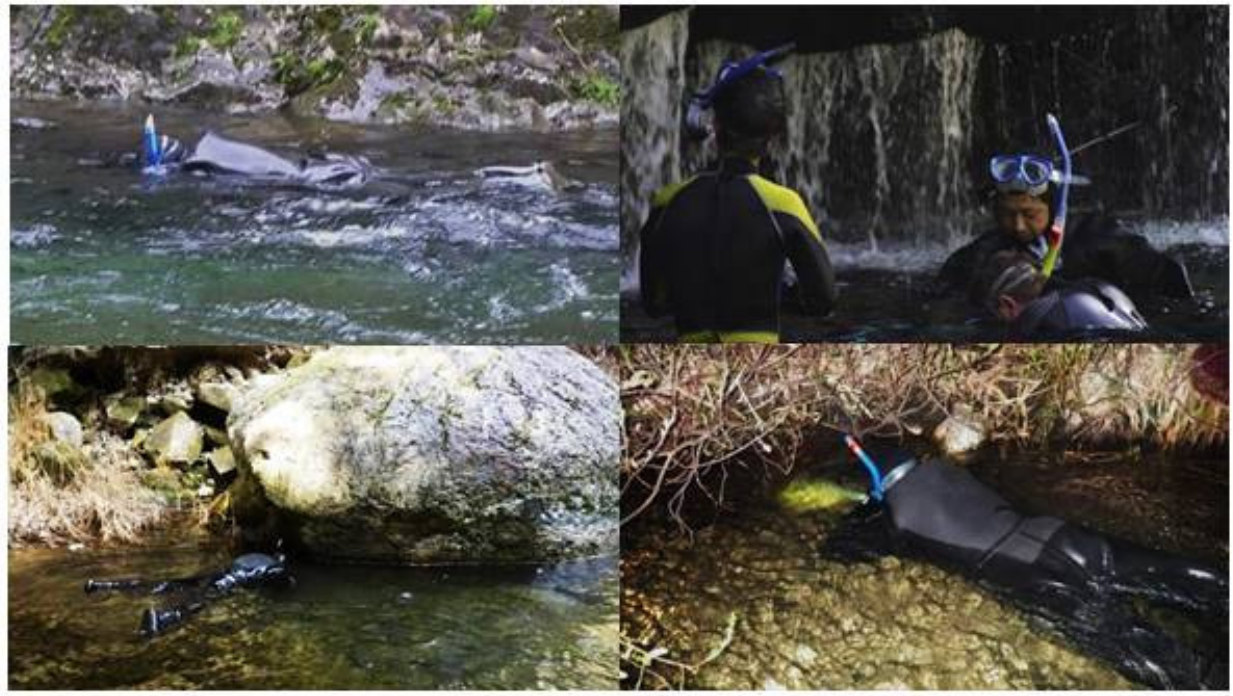

Figure 1. Snorkeling can be used during daytime and nocturnal surveys and can help to find individuals as well as locate suitable trapping sites.

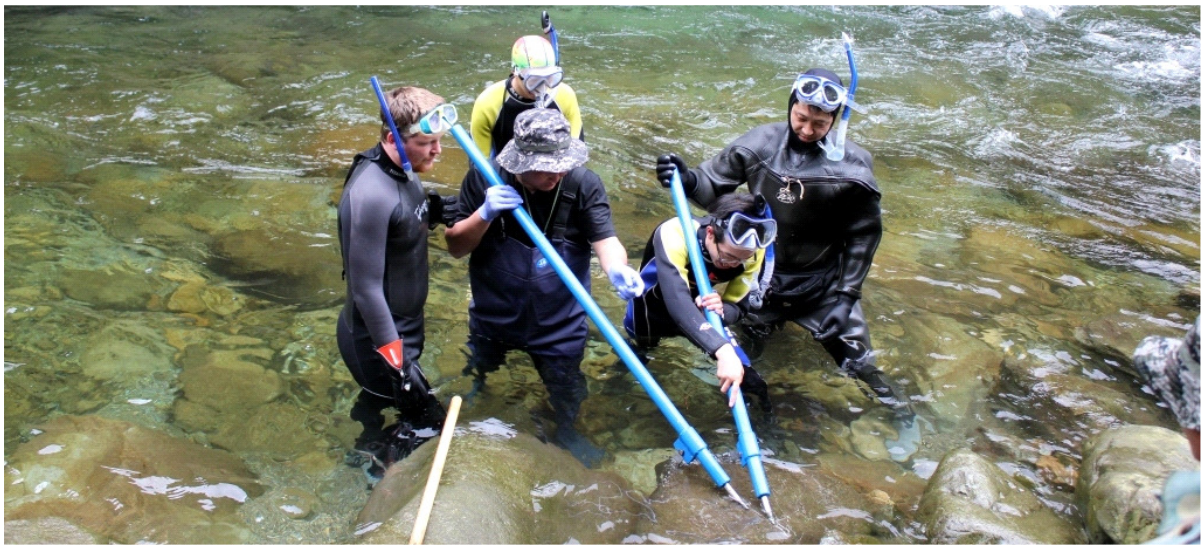

Figure 2. Turning heavy rocks using log peaveys combined with snorkeling during day time surveys will maximise your chance of finding CGS.

- **Rock turning**

Suitable rocks are those that measure 40cm in width or length. These rocks should be turned during the day and night surveys. The rocks should be checked for suitable gaps by using your hand and feeling for gaps and crevices. Handling gloves should be used for safety, e.g. to protect against possible CGS bites and to improve the handlers grip on the salamander. While turning rocks, another team member wearing

a mask and snorkel should check under the water while the rock is turned for better visibility. The person with the mask should also have a net ready, using the water flow to help catch CGS should it try to escape downstream. Log peaveys can be used for turning larger rocks that are unmanageable due to weight and position; two log peavey operators can lift the larger rocks. This piece of equipment should only be used during the day for health and safety reasons.

- **Nocturnal spot lighting**

During night surveys, follow the transect up stream, as lights may startle the CGS and give them an easier route of escape downstream without being detected. The equipment that should be used are nets, waders, wetsuits, snorkel and mask, head torches and dive torches. Walk / wade / swim slowly and scan the river system and look for the CGS, focusing on suitable refuge sites.

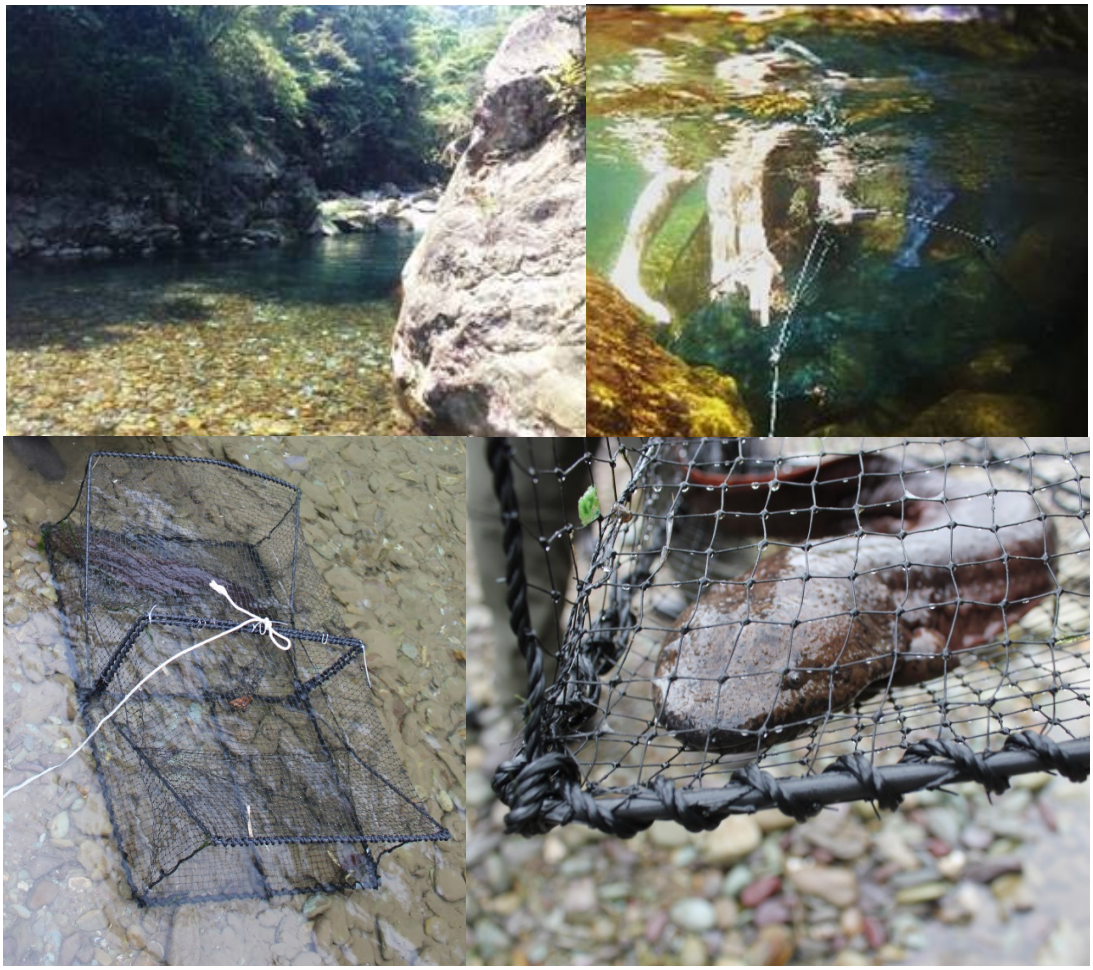

Figure 3. Crab trapping is an effective way of catching salamanders and will help when surveying in low population density.

- **Crab traps**

20 crab traps should be used along the 1km transect in areas of suitable habitat. Traps should be evenly spaced along he transect wherever possible; if there are a limited number of appropriate trapping sites along a transect, several traps may need to be placed adjacent to one another. Traps are enclosed framework of wire with two openings.; these openings are constructed so that when the salamanders enter to eat the bait, they cannot escape and become immediately trapped (Fig. 3). Traps should be set

during the day and checked first thing in the morning after the night time survey. The bait for the traps should be a large piece of chicken liver and sardines. These traps should be used over two days and two nights with the bait being replaced with fresh Chicken liver and Sardines when the traps are checked the morning after the first night. The trapping hours must be recorded on the survey sheet. It is also important that the traps are in locations where they are not easily accessed by locals as there is the potential chance that they could either steal the traps or what's in them. Deep pools with rocks, caves and crevices are the best places to set traps as they represent ideal CGS habitat and are more likely to be undetected from the river bank.

CGS swabbing protocol (metamorphosed salamanders)

a) Swabbing amphibians

- Amphibians are sensitive – so minimise handling time.
- Do not force limbs or tails into unnatural positions.
- Swabbing requires at least two people (potentially more in the case of very large salamanders): one person to handle, the other to take the swab.
- The person taking the swabs should not touch the amphibian at any time and should also wear gloves.

b) Genetic samples

- Buccal swabbing (inside the mouth for DNA samples).
- Person swabbing to wear nitrile or latex powder free gloves, handler to wear nitrile gloves and safety gloves.
- Don't touch swab or stem of swab.
- Open mouth by putting your hand in front of the face of the salamander, but far enough away to avoid being bitten. It will open its mouth. Insert plastic pipe into mouth to keep it open.
- Swab by taking ten sweeps of the swab against the mucosal surface inside the mouth whilst rotating the swab.
- Cut the tip of swab off directly into an eppendorf tube half filled with 90% ethanol. Do not allow the swab to touch your hands or to contact any other surface at any time.
- Change gloves between individuals.
- Label swab clearly with date, location, species, animal I/D, type of swab (e.g. buccal) and any other relevant information.

c) Cloacal swabs

- For pathogen screening.

- If the skin of the amphibian is dirty or has substrate on it, wash it in the stream before taking the swab, as organic material may interfere with the analysis of the swab.
- Wear nitrile or latex powder free gloves, and change gloves between individuals.
- Don't touch swab or stem of swab.
- Gently insert swab into cloaca and rotate 360^{o} five times.
- Do not expose swab or its sleeve to direct sun and/or heat.
- Refrigerate within 24 hours if possible.
- If refrigeration is not possible, store in cut tip of swab off directly into an eppendorf tube half filled with 90% ethanol. Do not allow the swab to touch your hands or to contact any other surface at any time.
- Label swab clearly with date, location, species, animal I/D, type of swab (e.g. cloacal) and any other relevant information.

d) Skin (chytrid) swabbing

- Wear nitrile or latex powder free gloves, and change gloves between individuals.
- If the skin of the amphibian is dirty or has substrate on it, wash it in the stream before taking the swab, as organic material may interfere with the analysis of the swab.
- Don't touch swab or stem of swab.
- Swab the hind feet and underside of the hind limbs (one stroke of the swab between each of the digits and five sweeps on the underside of the limb, rotate the swab constantly).
- Using another swab, swab the underside of the tail ten times.
- Do not expose swab or its sleeve to direct sun and/or heat.
- Refrigerate within 24 hours if possible.
- If refrigeration is not possible, store in half filled eppendorf tube half filled with 90% ethanol and cut tip of swab off and place in the ethanol. Do not allow the swab to touch your hands or to contact any other surface at any time.
- Label swab clearly with date, location, species, animal I/D, type of swab (e.g. buccal) and any other relevant information.

e) Collection of dead amphibians

- If one or more dead animals are found, take photographs of the carcase(s) and surrounding area before touching or moving the dead animal(s).
- Wear nitrile or latex powder free gloves, and change gloves between individuals.
- Swab the skin for chytrid fungi following the protocol outlined above.
- Store each carcase in a separate, sealed polythene bag which is then held in a second, sealed

polythene bag.

- Label each carcase clearly with date, location, species, animal I/D and any other relevant information.
- Refrigerate (e.g. store on ice) until the animal can be examined post mortem by a suitably qualified person. If this cannot happen within 48 hrs, then keep refrigerated until the carcase can be stored frozen.
- Collect non target species too – i.e. please collect and process any amphibians found dead during field work and not only CGS.
- Comment on possible cause of death.

- **Labelling**
- Species
- Animal I/D (if there is one; e.g. microchip number)
- Date
- Location (GPS)
- Type of swab (cloacal, skin etc.)
- Researcher name
- Write in clear water proof pen.

f) Disposal of waste

- Remove gloves by pinching around the wrist opening, and inverting as you remove the glove.
- You now have both contaminated gloves in one hand.
- With your clean un-gloved hand pinch the ring around the opening of the glove remaining on your hand, and remove glove by inverting it as you remove it.
- Use alcohol to sanitize gear such as scissors. Use alcohol sanitizer for hands and sensitive equipment (e.g. scales and calipers).
- Dispose in municipal waste or, if available, clinical waste (can depend on local regulations).

CGS field disinfection protocol

- Although there is no evidence of the spread of chytrid fungi by vehicles, it is good practice to park on hard ground (rather than vegetated areas) and walk to the river / stream.
- Dead/sick amphibians should be regarded as a high infection risk.
- Disinfect boots and equipment which may have come into contact with amphibians or water (including wet suits and water test probes).

- You will need a scrubbing brush, disinfectant, gloves (to wear while disinfecting), and bin bags for waste.
- Note that organic matter reduces disinfectant effectiveness.
- Use a brush to scrub off organic material.
- Rinse with water.
- Disinfect using Virkon (10 mg/ml) by spraying all surfaces liberally with this Virkon solution.
- Leave equipment to disinfect for a minimum of 10 minutes before rinsing with clean water.
- Allow equipment to dry for before next use.
- Keep field equipment inside plastic bags during transit and storage to reduce the chance of transmitting infectious disease.
- Used disinfectant solutions should be poured directly into a sink/drain and flushed with clean water. In the field, pour onto an area of ground well away from water source. Used gloves can be disposed as domestic rubbish. (Virkon is biodegradable. Do not dispose of other disinfectants directly onto the ground.)

CGS environmental parameter survey protocol

Water samples must be fresh, and should be processed within 15 minutes of sample collection. Remember that reagents are toxic – do not dispose of used reagents or samples in or near water bodies.

a) pH

- Using the pH probe, take the pH of the water body in the middle of the stream at the start of the 1km transect.
- Record additional readings at each point where a salamander is observed. Lower the pH and temperature probe to the exact location where the salamander was found.
- Ensure that you test the water with the pH probe and the temperature probe in the same location and within a short time period as pH is temperature dependent.
- Record your reading when the pH symbol on the digital display stops flashing.
- Rinse probe with bottled water and store in probe storage solution.
- Disinfect the probe between different river / stream systems.
- The unit is not waterproof. Be careful when you use it.

b) Ammonia, nitrite and nitrate.

- To measure these parameters, we use chemical test kits manufactured by Salifert.
- Test the water body in the middle of the stream at the start of the 1km transect. Additional readings are not required at the site of each salamander sighting for the purposes of standardisation as deep water may preclude the collection of specific water parameters at the microhabitat level..

- Follow the manufacturer's guidelines.
- As these kits are fiddly, it is best to process the samples and take the readings on the river bank.
- Disinfect the syringes and receptacles between different river / stream systems.

c) Water temperature, Dissolved oxygen, Salinity, GPS, Altitude.

- Use this probe to record the GPS location at the start and end of each transect.
- Use the multi parameter Palintest probe and test the water body in the middle of the stream at the start of the 1km transect. The probe must be fully immersed in order for it to work.
- Take results when the readings have stabilised (there will always be some fluctuation as the water is moving).
- Take readings at the location and depth of every salamander encountered along the transect.
- Clean the probe with bottled water and allow it to dry.
- Disinfect the probe between different river / stream systems.

d) Additional readings

- Record how deep in the water the Chinese giant salamander is as well as the the width of the stream / river at this point.
- Record the turbidity (by lowering the secchi disk until it disappears) and flow rate at the start of each transect in the middle of the stream and at the location of each salamander sighting.
- Note any evidence of hunting/poaching activity (bow hooks, poison, electro fishing).

Chinese giant salamander site survey sheet

Date:	Site name: Survey site time: Survey end time:
Names of surveyors:	Survey technique (Tick box) Day time snorkeling Initials of participants Night time snorkeling Initials of participants Rock turning Initials of participants Trapping Initials of participants Night time spotlighting Initials of participants

GPS point at start of survey N E GPS point at end of survey N E	Altitude: m asl.
Weather (tick box) No cloud Partial cloud Over cast Light rain	Start time: End time:
Water temperature: ^{o}C	DO %
DO mg/l	Salinity
pH	Ammonia ppm
Nitrite ppm	Nitrate ppm
Alkalinity	Dkh
Turbidity cm	Flow rate

Evidence of hunting (Tick box)

Bow hooks

Poison

Traps

Electrofishing

Chinese giant salamander individual record sheet

Date:	Site name: Time encountered:
Surveyors:	Encountered when (Tick box) Day time snorkeling Night time snorkeling Rock turning Trapping Night time spotlighting

GPS N E	Altitude: m asl.
Water temperature: °C	DO %
DO mg/l	Salinity
pH	Turbidity cm
Flow rate	
Depth of salamander cm Distance from nearest bank cm Size of rock L x W at widest point (If salamander found under rock)	Width of stream at salamander sighting cm
New capture Yes No	Microchip number
SVL cm Total length cm	Weight G
Sex Male Female Unknown	Active Hiding Nest guarding
Buccal swab Cloacal swab Chytrid swab x 2	
Notes on health	
Photo numbers (photograph from the side and from above).	

Identifying the Chinese giant salamander

Chinese giant salamander larvae measure 2-3cm in total length upon hatching, and they leave the nest at around 4-5cm total length. They have smooth skin with external gills and remain in this form until they metamorphose and lose their external gills at around 20-25cm total length.

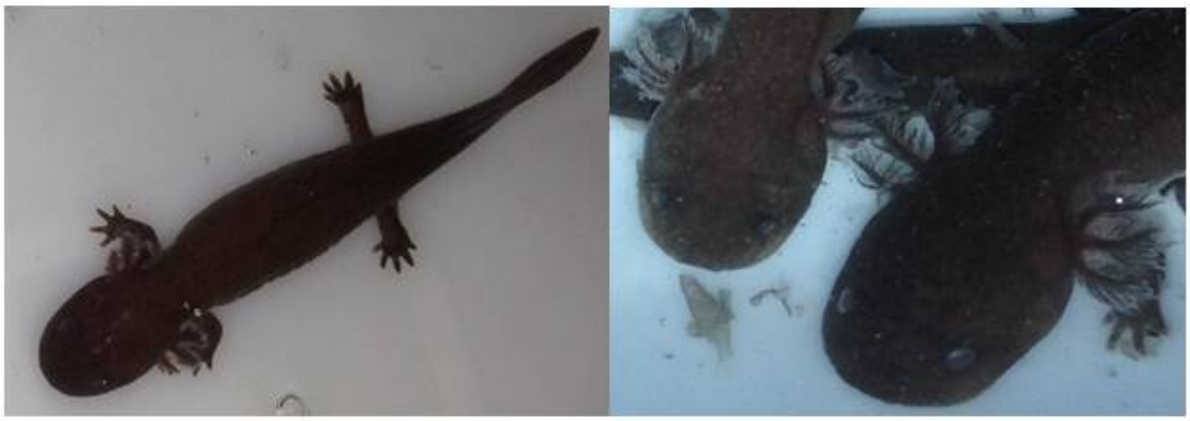

Figure 4. Young Chinese giant salamander larvae with external gills.

Chinese giant salamander adults: These grow up to 1.8m in length and can be distinguished from other salamander species by the folds of skin along their flanks which facilitate percutaneous absorption of oxygen. The skin is smooth and mucus is excreted when they are held. Colour is variable and ranges from light brown to dark brown; some have marbled markings of black and brown. They have a large, blunt and flat head with small nostrils and small eyes which lack eyelids.

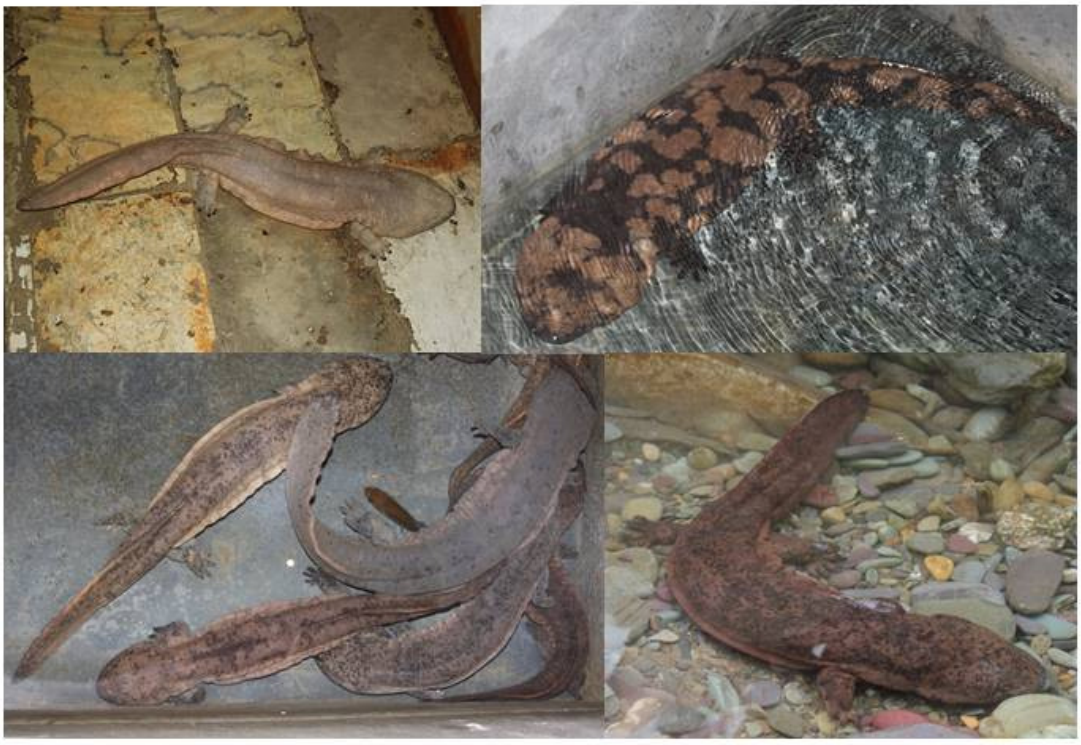

Figure 5. These pictures demonstrate the variation in colour across individuals of Chinese giant salamanders.

- **Species you could mistake for CGS**

Warty newts (*Paramesotriton* species), can grow up to 20cm total length. They have a rougher skin than the CGS and their skin is not slimy. Colour varies from species to species but they have black markings on the underbelly and sometimes the belly is orange to red. The larvae can grow to 4cm and are black with a characteristic yellow/white ring around each eye and yellow/white tips to the external gills.

Figure 6. The Warty newt can be found sharing Chinese giant salamander habitat. The picture on the far right is the larvae of this species and should not be mistaken for CGS larvae. Image of larvae © Henry Janssen

Farm survey protocols

- Choose a farm closest to the field transect in the same county and collect swab samples from 30 CGS individuals (ideally 15adults and 15 sub-adults). If there are less than 30 CGS individuals in the farm, please try to swab all the animals. If there are no farms in this county, please record “no farm”.
- Conduct farm questionnaire interviews first as this will enable a better understanding of CGS stocks and thus facilitate a more representative sampling.
- Wear nitrile or latex powder free gloves, and change gloves between each individual held/sampled.
- Restrain the salamander in an appropriately sized drain pipe with measure (Fig. 7), placing the salamander in the pipe will facilitate the collection of morphometric data.

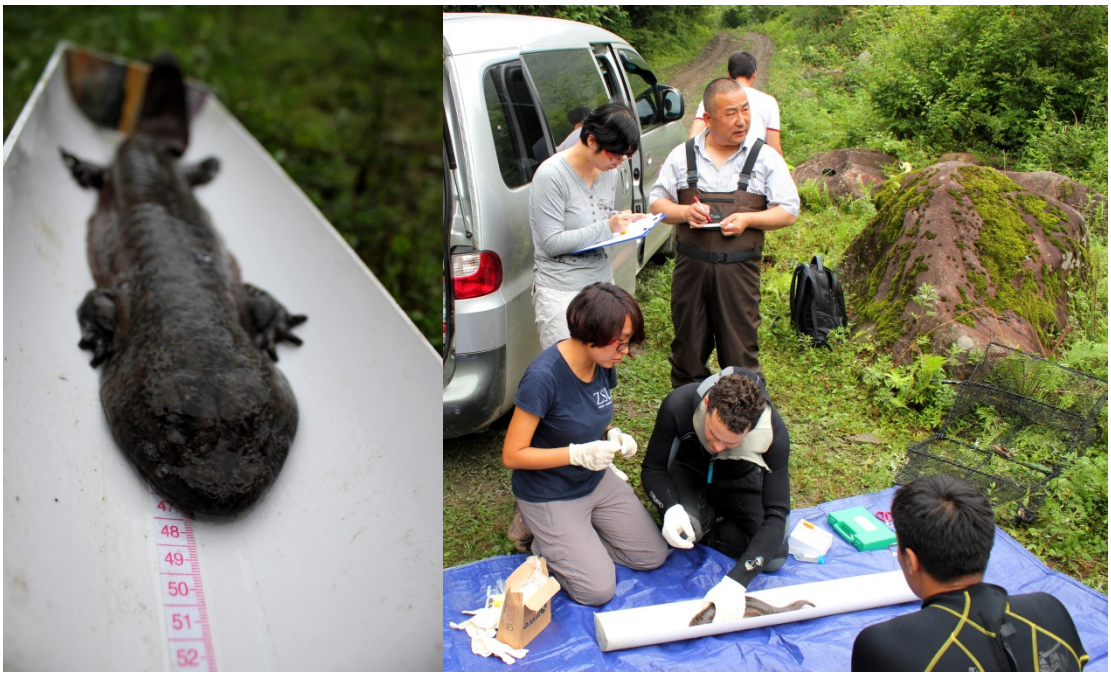

Figure 7. The use of a drain pipe with measure facilitate the collection of morphometric data.

- Fill in the form below to record further information for each individual and save electronically

Catalogue Number	Name of the farm	Body length (cm)	Wild caught Captive bred /unknown	If captive bred, generation (F1, F2, unknown)	No. of farm tank	Animal's origin	Tissue	Number for Farm questionnaire	Collection time	Collector	Photo	Other, such as Phenotype

- Try to collect samples covering as much of the diversity as possible (e.g. random sampling, swab one CGS from every odd-numbered tank and sample as few animals as possible from the same tank).

- Collect both genetic and pathogen samples from the same individual and label clearly (i.e.##1a for the mouth swab,##1b for the skin swab and ##1c for the cloacal swab).
- Disinfect the PVC pipe after sampling every individual (virkon 1g:100ml) and let the disinfectant stay in contact with the equipment for 5 mins before rinsing it with clean water to sample the next animal. Change gloves between animals.
- Disinfect your shoes and equipment when you leave the farm.
- Store each swab in a new Eppendorf tube half filled with 90% ethanol. Label clearly, seal the tube (e.g. using plastic paraffin film) and send to KIZ (mouth swabs) and SNNU (skin and cloacal swabs) for lab analysis as soon as possible.

Villager Questionnaire Survey Manual

Interview framework

- 30 village interviews are required for each county.
- All interviews need to be conducted very close to the same river section in which the ecological field surveys are being carried out, so that data from both of these separate survey methods are directly comparable.
- Aim to conduct 10 separate interviews in 3 different villages within each survey region. [If there are fewer than 3 villages within the survey region, then collect either 15 interviews each from 2 villages, or 30 interviews from a single village; however, having fewer than 3 villages in the survey region is unlikely.]

Village selection

- Once a specific river section for ecological surveys has been identified within the county, identify the locations of all villages within 1km in either direction of this river section (e.g. using a high-resolution map, and/or by asking local officials).
- Number each of these villages, and select three villages at random for interviews using the randomization function in Excel (or alternative randomization method).
- Upon arrival in each village, record its name and location using a GPS.

Selection of informants

- After arriving in the village, walk a transect through the village (e.g. along the main street, starting at one end of the village). Try to find informants who are in each household that you encounter along this transect, until you have obtained all of the necessary interviews required for the village. Informant encounters along the transect will be opportunistic, as people may or may not be at home as you pass their household. [Whereas techniques such as household randomization would provide a statistically slightly more robust framework for subsequent data analysis, these techniques are largely precluded by the need for rapid surveys and a lack of prior available data on household occupation and distribution within villages. Given the generally small size of villages in the study regions, meaning that a transect walk to obtain 10 interviews in households where people are at home may well traverse the entire community, our pilot study at Fanjingshan NNR has shown that this is the most simple, practical and standardised method to be used.]
- Do not try to interview informants from hotels, medical centres, schools, or specialist shops; only select informants from households, small farms, or general stores.
- Only interview adult informants. Do not try to preferentially speak to old informants, who you think may know more about local ecological conditions, as they are also less likely to have gone into the surrounding ecosystem recently; random encounters with informants of a range of ages is the approach that should be followed.

- If 10 villagers cannot be found within the target village, continue interviewing in the nearest neighboring village until a total of 10 interviews has been reached.

Interview protocols

- Do not wear clothing with CGS images or project logos on it while interviewing informants, as these may make the informant less willing to answer sensitive questions about CGS exploitation or other activities.

- Do not explicitly state that you are involved with a project on CGS; instead, describe the project in more general terms as a study on the local environment and natural history, again to avoid biasing the informant's answers to questions about CGS exploitation.

- Ask the informant the questions exactly as they are written in the questionnaire, and in the order that they are written – they have been worded and ordered in this way for a reason! If different research teams ask questions in different ways, then interview data between different regions will not be comparable and will be far less useful. In particular, many of the questions have been worded specifically to avoid "leading" the informant to think he/she should answer a question in a certain way to satisfy the interviewer, rather than answering truthfully. The question order ensures that questions about sensitive subjects are presented towards the end of the questionnaire, to avoid making the informant potentially suspicious of answering questions early on during the interview process. CGS questions are deliberately combined with other types of questions, to try to prevent the informant from worrying why there is so much attention on CGS in the questionnaire and therefore possibly becoming unwilling to discuss the species.

- Offer the informant cigarettes during the interview if he/she wants them.

- At the end of the interview (NOT at the beginning), offer the informant a specially made bag with the project logo and CGS image on it. Explain that if he/she sees a CGS in the future, or hears about CGS poaching events or other relevant information, he/she can phone the number on the bag. If the bag is given to the informant at the start of the interview, they will become aware of the project's particular focus on CGS conservation, and so may be more unwilling to answer questions on CGS exploitation.

- In the evening after each series of interviews, make sure that all interview data are entered into the Excel spreadsheet while the information is still fresh in your mind. This will also prevent having to enter data from large numbers of questionnaires at once at the end of the fieldwork. Please enter the data in English if possible; hopefully this should not be too difficult, as most of the answers should be single words or numbers.

Chinese giant salamander survey questionnaires

CGS Villager questionnaire

Interview number:
Location of interview:
Date:
Name of interviewer:

Opening statement: "We are local scientists from XXXX, studying ecology/environmental research. We are conducting a study on the animals and aquatic resources found in this region, and would like to ask you some questions for our studies, because you know a lot more about the environment here than we do. We have a questionnaire that takes about 20 minutes to complete. All information that you tell us will be completely confidential, we will not write down your name, and you will not be identified – we just want to try to learn more about the local environment from you."

A. BACKGROUND QUESTIONS

1. Are you prepared to participate in this survey and answer the following questions? Y/N

2. Male/Female

3. Age:

4. Ethnicity:

5. How many years have you lived in this local region?

6. Occupation:

B. CGS QUESTIONS

7. Do you know what a CGS is? Y/N

   If Y: ask informant to describe the species (emphasizing its size)
   If N: prompt the informant with a CGS photograph

   (show series of photographs of aquatic species, and ask informant to identify CGS accurately)

8. Are there any local names for the CGS?

9. Are there any stories, legends, myths, traditions or customs about CGS?

10. Have you ever seen a *wild* CGS around here? Y/N/don't know

    If Y:
    - Describe the last time you saw a *wild* CGS (specific location, year, time of year if known)
    - How many times have you seen a *wild* CGS? Describe all previous sightings (year and location)

    *** Try to mark each locality on a high-resolution map as accurately as possible (try to record approximate co-ordinates, distance from community, and name of river drainage/watershed)*

    *** When recording sighting dates, specifically report whether informants stated a calendar year (e.g. 1993), or whether they said "XX years/decades ago" or "in the 1980s/1990s etc". Try to encourage*

the informant to give a direct calendar year if possible.

If N:
- Do you know anyone else in this community who has seen a ***wild*** CGS? If Y, where/when?

11. Do people ever eat ***wild*** CGS in this community?

    - Yes (today)
    - Yes (but only in the past)
    - Never
    - Don't know

12. Have you ever eaten ***wild*** CGS? Y/N/don't know

    If Y:
    - When was the last time you ate ***wild*** CGS?
    - How many times per year do you eat ***wild*** CGS?
    - Where did you eat ***wild*** CGS?
    - Are they eaten more/only at special occasions? If Y, what kind of occasions?

13. Are CGS ever used in Traditional Chinese Medicine? Y/N/don't know

    If Y:
    - What is their main medicinal use?
    - Have you ever used CGS-based medicine? If Y, when?

14. Do people in this community have any other uses for ***wild*** CGS? Y/N/don't know

    If Y, describe these uses:

15. Has anybody (e.g. local people, reserve staff, farm staff, local authorities) ever released any CGS into any rivers in this region? Y/N/don't know

    If Y:
    - How often does this happen?
    - How many animals have been released?
    - When was the most recent CGS release?
    - Who releases the CGS?
    - Where do these CGS come from?
    - Where have they been released? (try to provide exact location(s))
    - Why do they get released here?

16. Do you farm CGS? Y/N

    If Y:
    - Where do you obtain them from?
    - How many do you have at the moment?
    - What is the maximum number of CGS that you have ever kept?
    - How long have you kept CGS for?
    - Who do you sell these CGS to?
    - Have you ever released CGS into the wild? Where and when?

17. Does anybody else in this community farm CGS? Y/N/don't know

If Y:
- How many people (i.e. households)?
- How many CGS in total are farmed in this community? (approximate guess)
- Where do they obtain them from?
- Who are they sold to?
- How long have CGS been farmed in this community?
- Have they ever been released into the wild? Where and when?

C. FRESHWATER RESOURCE USE QUESTIONS

18. Do you go fishing? Y/N

    If Y:
    - How regularly do you go fishing? (how many times a week, month, or year)
    - When do you go fishing? (day or night)
    - Where do you go fishing? (give locations AND approx. distance from community – mark all locations on map if possible)
    - Do you go fishing more at certain times of year? If so, which times of year?
    - Which fish species do you try to catch? (list names)
    - What fishing methods do you use? (list all methods) Which is your main fishing method?
    - Do you use electro-fishing? If YES, how often do you use this method?
    - Do you use poison? If YES, how often do you use this method?
    - Do you use explosives? If YES, how often do you use this method?

    If N:
    - Did you use to go fishing? If YES, where did you use to go fishing, and when did you stop going fishing?

19. Have you ever tried to catch CGS from the wild? Y/N

    If Y:
    - How regularly do you try to catch CGS? (how many times a week, month, or year)
    - When do you try to catch CGS? (day or night)
    - Where do you try to catch CGS? (give locations AND approx. distance from community – mark all locations on map if possible)
    - Do you try to catch CGS more at certain times of year? If so, which times of year?
    - What methods do you use to catch CGS? (list all methods)
    - Why do you catch CGS? If it is sold, who is it sold for, and for what price?
    - How many CGS have you caught in the past year? Give dates and locations for each individual.
    - How many CGS have you caught in the past five years? Give dates and locations for each individual if possible.
    - Have you always tried to catch CGS? If N, when did you start trying to catch them, and why?
    - Do you still try to catch CGS today? If N, when did you stop trying to catch them, and why?

20. Approximately what proportion of people in this community try to catch CGS?
    - All
    - Over 50%
    - Less than 50%
    - Very few
    - None
    - [Record exact number if given, as well as proportion]

21. What methods do people in this community use to try to catch CGS?

22. Has the level of CGS collecting carried out by local people changed over the past ten years? Y/N/don't know

    If Y:
    - Has it increased or decreased over this time period, and by how much?
    - Why has it changed?

23. What are the main localities where people try to catch CGS?

24. Do you collect other aquatic species (e.g. frogs, crabs, crayfish, shrimp, mussels) from the wild? Y/N

    If Y:
    - How regularly do you do this activity? (how many times a week, month, or year)
    - When do you do this activity? (day or night)
    - Where do you do this activity? (give locations AND approx. distance from community – mark all locations on map if possible)
    - Do you do this activity more at certain times of year? If so, which times of year?
    - Which species/kinds of animals do you try to catch? (list names)
    - What methods do you use to collect these species? (list all methods)
    - Why do you collect these species?

    If N:
    - Did you use to do this? If YES, where did you use to do this, and when did you stop?

25. Approximately what proportion of people in this community go fishing in nearby rivers?
    - All
    - Over 50%
    - Less than 50%
    - Very few
    - None

26. What are the main areas around here where people go fishing?

27. Approximately what proportion of people in this community collect frogs or other aquatic species from nearby rivers?
    - All
    - Over 50%
    - Less than 50%
    - Very few
    - None

28. What are the main areas around here where people collect other aquatic species?

29. Approximately what proportion of people in this community use electro-fishing?
    - All
    - Over 50%
    - Less than 50%
    - Very few
    - None
    - [Record exact number if given, as well as proportion]

30. Approximately what proportion of people in this community use poison fishing?
    - All
    - Over 50%

- Less than 50%
- Very few
- None
- [Record exact number if given, as well as proportion]

31. Approximately what proportion of people in this community use explosives for fishing?
    - All
    - Over 50%
    - Less than 50%
    - Very few
    - None
    - [Record exact number if given, as well as proportion]

32. Do people from other places ever visit the region near this community to collect CGS? Y/N/don't know

    If Y:
    - How often does this happen?
    - Does this tend to happen at a particular time of year? If Y, when?
    - Do they try to collect adults, young or eggs?
    - Where do these people come from?
    - How many CGS have they caught over the past 12 months? (approx.)
    - Why do they come here to collect CGS?

D. CONSERVATION ATTITUDES QUESTIONS

33. Do you think that any species in this region (aquatic and/or terrestrial) have declined over the past ten years? Y/N/don't know

    If Y, list all species the informant thinks has declined; describe the level of decline over the past ten years (approximate); describe what the informant thinks is responsible for this decline.

34. Have any species disappeared completely from this region during your lifetime? Y/N/don't know

    If Y, list all species, and the approximate date that these species disappeared from the local region.

    Also ask specifically about any known tiger sightings, and record all details (date, location) – this question can act as a control.

35. Has the CGS population in this region stayed the same or changed at all (do NOT specifically ask if declined) during your lifetime? Same/changed/don't know

    If Y, describe the amount of change during this period (approximate); when it started to change; and describe what the informant thinks is responsible for this change.

36. What do you think the main threats are to the CGS population in this region? Please rank in order of importance, with 1=high importance. (*Read out the categories*)
    - Overharvesting by local people
    - Overharvesting by other people not from this community
    - Water pollution
    - Lack of food
    - Water development projects (e.g. weirs, dams)
    - Other (describe)
    - No threats

37. What are your attitudes about whether CGS should be protected? (*Read out the categories*)
    - They should be protected everywhere
    - They should only be protected in nature reserves
    - No need to protect them
    - Other (describe)
    - No opinion

38. Do you think that you or your community would get any benefit if CGS was protected? Y/N/don't know

    If YES, why would there be a benefit?

39. Are any particular aquatic species in this region specifically protected by law? Y/N/don't know

    If Y, list all species, and try to describe what this legislation is (i.e. whether they can/can't hunt it, etc)

40. Is wild CGS specifically protected by law? Y/N/don't know

    If Y, try to describe what this legislation is (i.e. whether they can/can't hunt it, etc)

41. Are any fishing methods banned in this region? Y/N/don't know

    If Y, ask the informant to name these methods.

42. Are any areas where fishing cannot be carried out? Y/N/don't know

    If Y, ask the informant to name these localities/rivers.

43. Have the nearby rivers changed at all during the past ten years? Y/N/don't know

    If Y, how have they changed in quality? (*NB: differentiate between water pollution and rubbish in the water if they say "pollution".*) What has caused this change (e.g. water structures such as weirs or dams)?

44. Has anyone ever been prosecuted for illegal fishing around here? Y/N/don't know

    If Y, how often has this happened? Which village/town where they from? What charge/fine/sentence was there?

45. Has anyone ever been prosecuted for catching CGS around here? Y/N/don't know

    If Y, how often has this happened? Which village/town where they from? What charge/fine/sentence was there?

46. Has anyone ever been prosecuted for poaching/collecting any other animal or plant species around here? Y/N/don't know

    If Y, how often has this happened? Which village/town where they from? What charge/fine/sentence was there?

    Space for further comments if necessary:

Chinese giant salamander county-level governmental official survey questionnaire

County, Autonomous County and Nature Reserve interview format
The purpose of this questionnaire is to understand the distribution and status of the Chinese giant salamander populations in your county/Nature Reserve. We sincerely appreciate your support for the conservation research of this species.

Questions:

1. Date

2. Name of department

3. Name of person, job title/official position and contact telephone number

4. Name of Province

5. Name of City

6. Name of County

7. Do you know what a Chinese giant salamander is?

8. Do you have any reports of giant salamanders *in the wild* from your county?

(a) within the past 12 months?

(b) within the past 5 years?

(c) older than 5 years ago?

9. If YES, describe the following:

a) Name all localities from which giant salamanders *in the wild* have been reported within your county

b) How recently (which year) have giant salamanders *in the wild* been reported from each of these localities?

c) What kind of environmental conditions/habitat are the giant salamanders in the *wild* reported from in each locality? (*"Don't know" is an acceptable answer.*)

d) How were these reports obtained? [*i.e. who reported the presence of CGS?;* also *try to find out what kind of evidence is available to support the proposed occurrence of giant salamanders in each named locality*]

e) Have any of these reports been verified by local officials? (*e.g. by visiting the locality and seeing the CGS with their own eyes*).

10. Have there ever been any reports of dead or sick wild CGS being found in your county? If YES, please

give as many details as possible (*e.g. year, location, number of animals affected, description of any illness*).

11. Do you think CGS was present in your county in the past but has since disappeared?

- What makes you think they have disappeared?

- What do you think made them disappear?

(c) When do you think they disappeared from your county?

12. Does your department protect the CGS? If so, when did this protection start and how is this protection carried out?

13. What threats does the CGS face in your county?

14. Have you ever had any reports of wild giant salamanders being collected or traded?

If YES:

a) Collect all details associated with these reports: date(s), locations(s), number(s) of animals

b) Were the *wild* giant salamanders being caught for sale to restaurants or farms or for another reason (*please state all reasons*)?

c) Have people ever been prosecuted for collecting or trading wild CGS in your county? If YES, how many people, when did the prosecutions take place, and what were the penalties?

15. Have any permits been facilitated to be issued for the collection of CGS from the wild in your county?

16. Are there any giant salamander farms in the region under your office's jurisdiction?

If YES:

a) How many farms?

b) How many farms of each farm type?
- Smallholder (_____)
- Company (_____)
- Collaborative (_____)

c) How many farms in your county are licensed to farm CGS

d) How many farms in your county are not licensed to farm CGS

e) How many farms in your county have licenses to sell giant salamanders?

17. Are farmed giant salamanders ever released into the wild in this county?

If YES:

a) How many releases have occurred in the last 12 months?

b) How many releases have occurred in the last 5 years?

c) When was the last year CGS were released and how many were released during that year? (Name the year and the number of animals released.)

d) Where were these individuals released (names of locations/rivers)?

e) Where do these individuals come from? (e.g. which farm(s))

f) How were the specific release site(s) chosen? (What were the reasons for choosing these release sites?)

18. What do you think is the future of the CGS farming industry over the next 5-10 years?

    a) Stay the same
    b) Increase
    c) Decrease

    (give space for any further comments, e.g. reasons why they think this)

19. Have there been any recent changes in market demand (i.e. demand from restaurants)? Y/N
    a) If YES, have these had any impact on the local industry? If YES, please describe

20. What do you think that the farms would do if the farming industry collapses? (tick more than one if necessary)
    a) Abandon the farm
    b) Transfer the business
    c) Release the captive CGS
    d) Don't know/never considered this
    e) Other

What do you think that the government response would be if the farming industry collapses? (leave as open question)

Chinese giant salamander farm survey questionnaire

Chinese Giant Salamander Farm Questionnaire, April 2014

1. Date:

2. Name of person being interviewed:

   Telephone contact number:

3. Position of person being interviewed (i.e. their job within the farm):

4. Name of farm:

5. Address of farm _____

GPS: ____ N _____E

6. What is the business model used by the farm?

1) Smallholder (i.e. in a family house) 2) Company 3) Cooperative 4) Other _____

7. Over how many sites is the farm located _____and how many staff are employed (1) at this site_____, and (2) over all sites_____.

8. Does this farm have households involved or not? **Y/N**

9. When was this CGS farm established?

10. Estimated total number of CGS (adults plus stock juveniles):

    (If possible, record exact number: _____)

    A) <100

    B) 100 < 1000

    C) 1000 < 5000

    D) 5000 < 10000

    E) > =10000

11. Estimated number of breeding adults:

    (If possible, record exact number: _____)

    A) <20

    B) 20 < 50

    C) 50 <100

    D) 100 < 500

    E) >=500

12. How many CGS larvae do you estimate your farm produces annually? (If possible, record exact number: _____)

    A) None

    B) <100

    C) 100 < 1000

    D) 1000 < 5000

    E) 5000 < 10000

    F) 10000 < 50000

    G) >=50000

13. How many generations of CGS have you bred on your farm?

14. Has your farm ever experienced any disease in the captive CGS population? **Y/N**

    If YES, give details (e.g. which diseases, which year, proportion of stock lost?)

15. Pictures – can you ID the signs of disease on these pictures? (Describe the informant's responses/comments)

16. Have any of the neighbouring farms experienced disease? If YES, please give as much detail as possible (e.g. number/percentage of neighbouring farms with disease, when the disease occurred, or is it still on-going? what kinds of disease has occurred on these farms?)

17. Can you describe 3-5 most important production problems you have come across?

18. Describe the source(s) of your CGS:

Origin		Approximate number of breeding adults	Approximate number of juveniles/sub-adults	Approximate number of larvae	Further details of location
Locally wild-caught					
Wild-caught from other regions					
Other farms in this county					
Other counties in this city					
Other cities in this province					
Other province (describe which province):	Name of the province				
	(i) Shaanxi				
	(ii) Hubei				
	(iii) Hunan				
	(iv) Anhui				
	(v) Guizhou				
	(vi)				
	(vii)				
	(viii)				

19. Does your farm sell CGS?

Destination	Approximate number of wild-caught CGS	Approximate number of breeding farmed adult CGS	Approximate number of juveniles/subadult farmed CGS	Approximate number of farmed larvae	Further details of location
Restaurants (describe where)					
Other farms within this county					
Other counties in this city					
Other cities in this province					
Other province:					
(ix) Shaanxi					
(x) Hubei					
(xi) Hunan					
(xii) Anhui					
(xiii) Guangdong					
(xiv) Other (describe which province)					

20. If you sell CGS to other farms, what is their purpose for buying them?

□ For breeding

□ For rearing

□ Other (describe)

21. Do you rear animals separately based on their origins？ Y/N

(If YES, describe the informant's responses/comments on why, and on how they do the separation)

22. Have you microchipped your CGS? **Y/N**

If YES, in which part of the animal do you do the microchipping?

23. Do you know of any wild populations of CGS in your area? **Y/N**

If YES, describe all known wild population(s) – geographic location, estimated numbers of wild animals, etc.

24. In your opinion, is there a preference for farms to stocking with farm-bred or with wild CGS? **Y/N**
If Yes, please describe which is preferred and why.

25. Are CGS from your farm ever released into the wild? **Y/N**

If YES:
-How often/regularly does this occur?
-How many animals are involved in each release?
-Where are they released?
-Why are they released in this location?

26. What do you think is the future of the CGS farming industry over the next 5-10 years?

a) Stay the same
b) Increase
c) Decrease

(give space for any further comments, e.g. reasons why they think this)

27. Have there been any recent changes in market demand (i.e. demand from restaurants)? Y/N
    a) If YES, have these had any impact on your industry? If YES, please describe

28. What would you do if the farming industry collapses? (tick more than one if necessary)
    a) Abandon the farm
    b) Transfer the business
    c) Release the captive CGS
    d) Don't know/never considered this
    e) Other