GGI Field Expedition Training Module for Collection of Genomic Quality Tissues.

Best Practices in Sampling Genomic Materials for Vertebrates

Scenario 1. Genomic sample from voucher specimen.

Best case scenario, genetic tissue material is taken from a voucher specimen, prior to, or during preservation of the specimen.

1. Anesthetize animal according to ACUC approved protocols.

2. Specimen is given a unique Field ID number.

3. As soon as specimen is dead, remove samples of muscle, heart, liver, kidney for genetic sample, place in cryo-vial with EDTA/DMSO (and SDS for birds and mammals) buffer. Label tube with specimen Field ID and Biorepository number (if available). Each sample of a different type of genetic material (muscle, heart, liver, etc.), or multiple samples from the same individual too large for one vial, should be placed in separate vials, with the same Field ID for the voucher specimen, but different Biorepository number for each vial. Record the sample type (i.e. VerbatimSamType: heart, liver, muscle, etc.) for each vial. Either scratch ID numbers on tube and/or wrap in aluminum foil and flash freeze in liquid nitrogen (if available).

4. Sterilize utensils between sampling each specimen. Rinse free of sanitizing agent and continue to the next specimen.

5. Preserve specimen according to Department/Division standard protocols, alcohol prep, skin, skeleton, etc. See references below.

6. Record data, specimen taxonomy, field ID, locality, date, collectors, etc., and tissue type, in FIMS spreadsheet (or field notebook, later to be transferred to FIMS spreadsheet if computer not available in field).

Scenario 2. Genomic sample from a series of voucher specimens.

When specimens are very small, as with tadpoles, or larval fish, a series may be collected and assigned a single Field ID, if one is confident that all individuals represent the same species (from the exact same locality) based on field identification. In this case, one whole specimen, or a subset of specimens may be placed in the cryo-vial as the genomic sample with appropriate buffers.

Ex. 10 tadpoles of the same species and locality in a series.

1. Assign Field ID to the series.

2. Anesthetize animals according to ACUC approved protocols.

3. Place one individual in a cryo-vial as a genomic sample, label this with Field ID and unique Biorepository number.

4. Take tail-clips (avoid tip, or other distinguishing features) from other individuals in the series, place clip in cryo-vial as a genetic sample with appropriate buffers. Each clip gets the same Field ID the series, but a unique biorepository number.

5. Sterilize utensils between sampling each specimen. Rinse free of sanitizing agent and continue to the next specimen.

6. Preserve series according to Department/Division standards.

Scenario 3. eVoucher: Genomic sample from a photographic voucher or in other cases where the specimen was not collected.

Sometimes whole specimens may not be collected, especially with protect or otherwise endangered species, or where bag-limits have been met, but more specimens are encountered. In these cases, one should obtain high quality photographic images of the specimens, including dorsal, lateral, ventral, and photographs of distinguishing features supporting the identification of the specimen.

1. Assign a Field ID to the specimen.

2. Obtain high quality photographic images of the specimen, including distinguishing features supporting the identification of the species. Record a unique number for each photograph and associate the series with the Field ID (e.g. "Image4502–5 = USNM-FS 38600a–d").

3. Sample blood, toe-tips, tail-tips, fin-clips, feathers, hair, or other appropriate genetic material for the specimen, minimizing harm to the individual.

4. Place genomic sample in a cryo-vial, label outside of tube with Field ID and unique Biorepository number.

5. Sterilize utensils between sampling each specimen. Rinse free of sanitizing agent and continue to the next specimen.

6. Release individual(s) at point of capture or otherwise nearby safe environment (i.e. out of direct sunlight if extreme heat, and/or in secure hiding away from predators).

References and Further Reading

Amphibians and Reptiles:

McDiarmid, R.W. 1994. Appendix 4: Preparing amphibians as scientific specimens. pp. 289–297 In: *Measuring and Monitoring Biological Diversity: Standard methods for amphibians. eds.* Heyer, W. R., M. A. Donnelly, R. W. McDiarmid, L. C. Hayek, and M. S. Foster. Smithsonian Institution Press, Washington, DC, USA.

Jacobs, J. F. and W. R. Heyer. 1994. Appendix 5: Collecting tissues for biochemical analysis. pp. 299–301 In: *Measuring and Monitoring Biological Diversity: Standard methods for amphibians. eds.* Heyer, W. R., M. A. Donnelly, R. W. McDiarmid, L. C. Hayek, and M. S. Foster. Smithsonian Institution Press, Washington, DC, USA.

Foster, M. S. 2012. Preparing reptiles as voucher specimens. pp. 95–125 In: *Reptile biodiversity: Standard methods for inventory and monitoring. eds.* McDiarmid, R. W., M. S. Foster, C. Guyer, J. W. Gibbons, and N. Chernoff. University of California Press, Berkeley, California, USA.

Fishes:

Weigt, L. A., A. C. Driskell, C. C. Baldwin, and A. Ormos. 2012. DNA Barcoding Fishes, In: DNA Barcodes: Methods and Protocols. eds., Kress, W. J. and D. L. Erickson. Springer Protocol Series: Methods in Molecular Biology, Vol. 858.