

## **Collaborative Amphibian Reporting and Publications 2000 to current:**

### **Monitoring Program Design and Implementation:**

Bennetts R, Corn PS, Daley R, Gould WR, Jean C, Patla DA, Peterson CR, Ray A. 2013. Cooperative amphibian monitoring protocol for the Greater Yellowstone Network: Narrative, version 1.0. Natural Resource Report NPS/GRYN/NRR—2013/654. National Park Service, Fort Collins, Colorado.

Gould, W.R. 2008. Evaluation of sampling designs and analysis of data collected by the Greater Yellowstone Network Vital Signs monitoring program. Final Project Report submitted to Cathie Jean, Program Manager, Greater Yellowstone Network, National Park Service, Bozeman, MT.

Ray, A., D. Patla, and C. Peterson. 2019. Taking the pulse of wetlands: what are we learning from the amphibian vital sign? **Yellowstone Science** 27:52-54.

Ray, A., C. Peterson, D. Patla, B. Thesing, D. Schneider, and J. Treanor. 2020. Spea bombifrons (Plains Spadefoot) leucism. **Herpetological Review** 51:306-307.

Ray, A.M., A.J. Sepulveda, B. Hossack, D. Patla and K. Legg. 2014. Using monitoring data to map amphibian hotspots and describe wetland vulnerability in Yellowstone and Grand Teton national parks. **Park Science** 31:112-117, 119.

Ray, A.M., A.J. Sepulveda, B. Hossack, D. Patla and K. Legg. 2014. Environmental DNA: Can it improve our understanding of biodiversity on NPS lands? **Park Science** 31:118.

Ray, A.M., A.J. Sepulveda, B. Hossack, D. Patla, D. Thoma, R. Al-Chokhachy, and A. Litt. 2015. Monitoring Greater Yellowstone Ecosystem wetlands: can long-term monitoring help us understand their future? **Yellowstone Science** 22:44-52.

Sepulveda, A. J., A. M. Ray, and A. M. McKee. 2017. Adding value to monitoring efforts with environmental DNA. **The Wildlife Society Wetlands Working Group Newsletter**, December 2017. <http://wildlife.org/wwg/newsletters/>

### **Status and Trends:**

Corn, P.S., B.R. Hossack, E. Muths, D.A. Patla, C.R. Peterson, and A.L. Gallant. 2005. Status of amphibians on the Continental Divide: surveys on a transect from Montana to Colorado, USA. **Alytes** 22:85-94.

Gould, W.R. 2010. Multi-scale analysis of breeding amphibian occupancy within the Greater Yellowstone Ecosystem. Final project report submitted to Cathie Jean, Assistant Program Manager, Greater Yellowstone Network, National Park Service, Bozeman, MT.

Gould, W.R. 2016. Multistate occupancy modeling of breeding amphibians within the Greater Yellowstone Network across a decade (2006-2015). New Mexico State University, Las Cruces, NM. Report submitted to Greater Yellowstone Network on 6 November 2016.

Gould, W.R. In prep. Multistate modeling of salamander occupancy in the Greater Yellowstone Area (2006 – 2018). New Mexico State University, Las Cruces, NM. DRAFT Report submitted to Greater Yellowstone Network on 10 December 2019.

Gould W.R., D A Patla, R. Daley, P.S. Corn, B.R. Hossack, R. Bennetts, and C.R. Peterson. 2012. Estimating occupancy in large landscapes: evaluation of amphibian monitoring in the Greater Yellowstone Ecosystem. **Wetlands** 32:379-389.

Gould, W., A. Ray, L. Bailey, D. Thoma, R. Daley, and K. Legg. 2019. Multistate occupancy modeling improves understanding of amphibian breeding dynamics in the Greater Yellowstone Area. **Ecological Applications** 29(1):e01825.

Hossack, B.R., W.R. Gould, D.A. Patla, E. Muths, R. Daley, K. Legg, P.S. Corn. 2015. Trends in Rocky Mountain amphibians and the role of beaver as a keystone species. **Biological Conservation** 187:260-269.

Patla, D.A. and C.R. Peterson. 1999. Are amphibians declining in Yellowstone National Park. **Yellowstone Science** 7:2-11.NE 10(12): e0145060.

Patla, D. A., and W. R. Gould. 2009. Amphibian monitoring in the Greater Yellowstone Network - project report 2007. Yellowstone and Grand Teton National Parks. Natural Resource Technical Report NPS/GRYN/NRTR—2009/151. National Park Service, Fort Collins, Colorado.

Patla, D. A., and C. Jean. 2010. Amphibian monitoring in the Greater Yellowstone Network—Project report 2008 and 2009: Yellowstone and Grand Teton National Parks. Natural Resource Data Series NPS/GRYN/NRDS—2010/072. National Park Service, Fort Collins, Colorado.

Patla, D. and K. Legg. 2012. Greater Yellowstone Network amphibian monitoring: 2010-2011 annual status report. Natural Resource Data Series NPS/GRYN/NRDS—2012/332. National Park Service, Fort Collins, Colorado.

Patla, D. A. and C. R. Peterson. 2004. Amphibian and reptile inventory and monitoring Grand Teton and Yellowstone National Parks, 2000-2003 Final Report. Herpetology Lab, Department of Biological Sciences, Idaho State University. 18 pp plus appendices.

Patla, D.A., C.R. Peterson, and R.E. Bennetts. 2007. Amphibian Monitoring in the Greater Yellowstone Network: 2006 Annual Report. National Park Service, Greater Yellowstone Network. Bozeman, Montana, USA.

Patla, D., and A. Ray. 2018. Greater Yellowstone Network amphibian and wetland monitoring: Status report for 2014, 2015, and 2016. Natural Resource Report NPS/GRYN/NRR—2018/1638. National Park Service, Fort Collins, Colorado.

Patla, D., and A. Ray. 2020. Greater Yellowstone Network amphibian and wetland monitoring: Status report for 2017 and 2018. Natural Resource Report NPS/GRYN/NRR—2020/2111. National Park Service, Fort Collins, Colorado.

Ray, A.M., W. Gould, B. Hossack, A. Sepulveda, D. Thoma , D. Patla, R. Daley, and R. Al-Chokachy. 2016. Influence of climate drivers on extinction and colonization rates of wetland-dependent species. **Ecosphere** 7(7): e01409.

Ray, A., and D. Patla. 2016. Greater Yellowstone Network amphibian monitoring: 2012-2013 biennial status report. Natural Resource Report Series NPS/GRYN/NRR—2016/1140. National Park Service, Fort Collins, Colorado.

### **Analytical Approaches:**

Gould, W.R. 2009. Amphibian occupancy modeling within the Greater Yellowstone Network Vital Signs Monitoring Program, 2006 – 2008. New Mexico State University, Experimental Statistics Program, Las Cruces, NM. Report submitted to Greater Yellowstone Network on 6 February 2009.

Gould, W., A. Ray, L. Bailey, D. Thoma, R. Daley, and K. Legg. 2019. Multistate occupancy modeling improves understanding of amphibian breeding dynamics in the Greater Yellowstone Area. **Ecological Applications** 29(1):e01825.

### **Habitat and Beaver Associations:**

Bartelt, P.E., A.L. Gallant, R.W. Klaver, C.K. Wright, D.A. Patla, and C.R. Peterson. 2011. Predicting breeding habitat for amphibians: a spatiotemporal analysis across Yellowstone National Park. **Ecological Applications** 21:2530-2547.

Hossack, B.R., W.R. Gould, D.A. Patla, E. Muths, R. Daley, K. Legg, P.S. Corn. 2015. Trends in Rocky Mountain amphibians and the role of beaver as a keystone species. **Biological Conservation** 187:260-269.

Klaver, R.W., C.R. Peterson, and D.A. Patla. 2013. Influence of water conductivity on amphibian occupancy in the Greater Yellowstone Ecosystem. **Western North American Naturalist** 73:184-197.

### **Climate:**

Patla DA, Peterson CR, Corn PS. 2009. Amphibian decline in Yellowstone National Park. **Proceedings of the National Academy of Sciences** 106: E22. (Letter)

Ray, A.M., W. Gould, B. Hossack, A. Sepulveda, D. Thoma, D. Patla, R. Daley, and R. Al-Chokachy. 2016. Influence of climate drivers on extinction and colonization rates of wetland-dependent species. **Ecosphere** 7(7): e01409.

Ray, A.M., A.J. Sepulveda, B. Hossack, D. Patla and K. Legg. 2014. Using monitoring data to map amphibian hotspots and describe wetland vulnerability in Yellowstone and Grand Teton national parks. **Park Science** 31:112-117, 119.

Sepulveda, A.J., M.T. Tercek, R. Al-Chokhachy, A.M. Ray, D.P. Thoma, B.R. Hossack, G.T. Perderson, A.W. Rodman, and T. Olliff. 2015. The shifting climate portfolio of the Greater Yellowstone Area. **PLOS ONE** 10(12): e0145060.

### **Disease:**

Patla, D., S. St-Hilaire, A. Ray, B.R. Hossack, and C.R. Peterson. 2016. Amphibian mortality events and ranavirus outbreaks in the Greater Yellowstone Ecosystem. **Herpetological Review** 47:50-54.

### **Wetland Dynamics:**

Ray, A.M., A.J. Sepulveda, B. Hossack, D. Patla, D. Thoma, R. Al-Chokhachy, and A. Litt. 2015. Monitoring Greater Yellowstone Ecosystem wetlands: can long-term monitoring help us understand their future? **Yellowstone Science** 22:44-52.

Ray, A.M., A. Sepulveda, K. Irvine, S. Wilmoth, D. Thoma, and D. Patla. 2019. Wetland drying linked to variations in snowmelt runoff across Grand Teton and Yellowstone national parks. **Science of the Total Environment** 666:1188-1197.

### **Invasives:**

Flynn, L.M., T.M. Kreofsky, and A.J. Sepulveda. Introduced American Bullfrog Distribution and Diets in Grand Teton National Park. *Northwest Science* 91:244-256.

Kamath, P.L., A.J. Sepulveda, and M. Layhee. 2016. Genetic reconstruction of a bullfrog invasion to elucidate vectors of introduction and secondary spread. *Ecology & Evolution* 6(15).

### **Other Influential Work from Grand Teton and Yellowstone National Parks**

Bartelt, P.E., R.W. Klaver, and W.P. Porter. 2010. Modeling amphibian energetics, habitat suitability, and movements of western toads, *Anaxyrus (=Bufo) boreas*, across present and future landscapes. *Ecological Modelling* 221:2675–2686

McMenamin, S.K., E.A. Hadly, and C. K. Wright. 2008. Climatic change and wetland desiccation cause amphibian decline in Yellowstone National Park. *Proceeding from the National Academy of Sciences* 105:16988–16993.

McMenamin SK, Hadly EA. 2012 Ancient DNA Assessment of Tiger Salamander Population in Yellowstone National Park. *PLoS ONE* 7(3): e32763.

Murphy, M. A., J. S. Evans, and A. Storfer. 2010. Quantifying *Bufo boreas* connectivity in Yellowstone National Park with landscape genetics. *Ecology* 91:252-261.

Schook, D.M. and D.J. Cooper. 2014. Climatic and hydrologic processes leading to wetland losses in Yellowstone National Park, USA. *Journal of Hydrology* 510:340–352.

Schneider, D., J.J. Treanor, J. Richards, J. Wood, E. Lee, and A. Waag. 2015. Plains Spadefoot, *Spea bombifrons*, Confirmed in Yellowstone National Park. *Northwestern Naturalist* 96:227-229.

Spear, S. F., C. R. Peterson, M. Matacq, and A. Storfer. 2005. Landscape genetics of the blotched tiger salamander (*Ambystoma tigrinum melanostictum*). *Molecular Ecology* 14: 2553-2564.

Spear, S., C. R. Peterson, M. Matacq, and A. Storfer. 2006. Molecular evidence for historical and recent population size reductions of tiger salamanders (*Ambystoma tigrinum*) in Yellowstone National Park. *Conservation Genetics* 7:605-611.