



# Inventory and Monitoring (I&M) Initiative Happenings

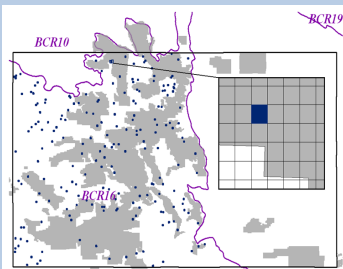
*Spatially Balanced Sampling - Generalized Random Tessellation Stratification (GRTS)*

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## I&M initiative (I&M)

The inventory and monitoring of biological resources, ecological processes, and abiotic components are critical to meeting the National Wildlife Refuge System's legislated mission and mandates. The collection and assessment of these data may occur at various geographic scales, ranging from a single management unit to the entire Refuge System. Each requires different sampling strategies and monitoring designs.

I&M recommends that sampling frameworks designed to address large-scale spatial coverage consider using a spatially balanced sampling design known as Generalized Random Tessellation Stratification (GRTS). This method combines the advantages of probability sampling with most of the spatial balance of systematic sampling, and has the added advantage that subsets of the samples are also approximately spatially balanced. When survey data on Refuges is collected using this sampling framework, it provides valid data for developing accurate estimates for species populations at both local and range-wide scales. The beauty of GRTS is that a local-scale monitoring plan may be incorporated into an existing regional-scale sampling design. Please contact I&M for additional information.



*Colorado with sampling grids selected using GRTS across public and private lands in Bird Conservation Region 16*

## Region 1

### Acoustic Bat Inventory Jenny Barnett

Because many Refuges in Region 1 lacked basic information about bats, the I&M initiative conducted an acoustic inventory project on the Refuges east of the Cascade Range. Using acoustic bat detectors, 17 refuges were inventoried in 2012 and 2013 to develop species lists and gather baseline data on bat distribution and activity rates. Working with partner agencies, USFWS adopted the "Bat Grid" as the frame for sampling. Through this project, 14 species of bat were documented and over 119,000 bat call files were collected.



The Bat Grid was developed by the USFS for an interagency bat monitoring program in the Pacific Northwest. It has since been expanded to cover the entire US, Mexico and Canada. The Bat Grid is now being used as the sampling frame for a new multi-national, multi-agency effort to standardize monitoring of multiple bat taxa across North America, the North American Bat Monitoring Program (NABat). NABat uses the GRTS design to allocate survey sites. Sampling sites in Region 1 were laid out based on this grid, allowing baseline data to be added to the NABat database and contribute to large scale monitoring efforts.

## Region 6

### Bird Surveys Randy Machett

Comprehensive inventory and monitoring surveys for birds were initiated on the Charles M. Russell National Wildlife Refuge (CMR) during 2014 using funding provided by the Inventory and Monitoring initiative. Working with several partners, fifty 1-square kilometer grids were selected using GRTS.

The GRTS sampling approach provided the ability to remove survey locations that were inaccessible for a variety of reasons and to add replacements while maintaining representative samples and spatial balance. This was a huge advantage given the formidable challenges involved hiking to survey locations on CMR's 1.1 million acres. Additionally, the GRTS sampling approach, combined with adoption of protocols established for Integrated Monitoring of Bird Conservation Regions (IMBCR), allowed data collected specifically for CMR to be used in larger contexts, and vice-versa. The addition of birds detected during sampling efforts on CMR improved previous statewide IMBCR estimates and significantly increased sagebrush and grassland associated bird detections. Because the CMR effort followed the IMBCR protocol (including the use of GRTS), detection data collected there now contributes to regional IMBCR data, strengthening not only distribution information, but also occupancy and density estimates for these species across Montana.

