MEASURING EFFECTIVENESS
A Comprehensive Approach to Bat Management in Wisconsin

Scenario ➢ A Comprehensive Approach to Bat Management in Wisconsin

Background ➢ All state wildlife action plans must propose plans for monitoring SGCNs and their habitats, for monitoring the effectiveness of conservation actions, and for adapting these conservation actions to respond appropriately to new information or changing conditions.

The following is excerpted from Section 6 of the Wisconsin Wildlife Action Plan. It illustrates the practical application of concepts and models for measuring the effectiveness of conservation actions to benefit rare cave bat species in Wisconsin.

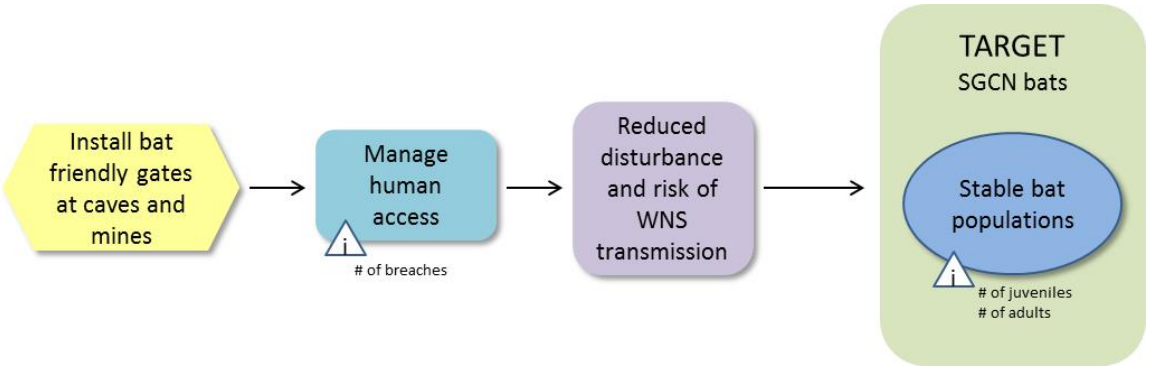
Establishing a system of effectiveness monitoring is critical to successful implementation of the Wisconsin Wildlife Action Plan.

Bats are a vital part of many Wisconsin ecosystems, including being voracious consumers of mosquitoes and crop pests. Unfortunately, bats are at risk due to their low reproductive rate and the limited number of breeding and hibernation sites available. Added to these factors is the risk of white-nose syndrome (WNS), a devastating disease of hibernating bats that has caused the most precipitous decline of North American wildlife in recorded history. White-nose syndrome is caused by the fungus *Psuedogymnoascus destructans*. Since it was first discovered in New York in 2006, WNS has affected eleven species of cave-hibernating bats, including four endangered species and subspecies of insect-eating bats in the eastern and southern U.S., causing declines approaching 100 percent in some populations. Recent estimates suggest 5.7-6.7 million bats have died over the past seven years. In Wisconsin, white-nose syndrome was found in a single mine in Grant County in April 2014 and has since been documented in seven additional counties. The population of bats at the initial mine in Grant County has decreased by 70% since the discovery of white nose there. The disease poses a severe threat to all four of Wisconsin's cave bat species.

White-nose syndrome has significant environmental, economic and public health implications. Insectivorous bats consume large numbers of agricultural and forest pests, the control of which cost farmers and foresters billions of dollars yearly. Bats play an important role in sustaining many unique and fragile cave ecosystems. For example, bats are the primary source of nutrients in many cave systems, and many cave-obligate species depend on such input for survival. Thus, the loss or significant reduction of bat

populations from caves could have cascading affects that impact the status of many other cave species.

Wisconsin's Bat Management Plan is a comprehensive and proactive effort aimed at conserving and managing the state's bat populations. It serves as a framework for coordinating projects to increase knowledge of bats through roost monitoring, acoustic monitoring, and training citizens to collect long-term bat data. This cost-effective approach to gathering information set the stage for the development and implementation of critical surveillance and monitoring of the deadly white-nose syndrome in bat hibernacula throughout the state. The following is an example of how a results chain might be used to illustrate the connections among conservation action, intermediate outcomes, and the ultimate desired result (stable bat populations).



For this example, the results chain illustrates the connections between the conservation action (install bat gates), the objective (reduce human access), the threat (human disturbance), and the conservation target (SGCN bats). Walking through the logic, you would expect that if bat gates are installed at caves and mines then there will be reduced human access to those caves and mines. If there is reduced human access there will be reduced disturbance by humans. If there is reduced disturbance, the SGCN bat species will increase their populations. The specific elements in the results chain are:

Action: Install bat friendly gates at caves and mines in Wisconsin.

Objective: Reduce risk of human-spread WNS and disturbance to hibernating bats.

Threat: Human access at caves and mines could result in the white-nose syndrome casing fungus to be spread to other caves and mines, thereby facilitating the spread of the disease. Repeated arousal of hibernating bats by both humans and WNS can lead to depletion of energy reserves and starvation before winter ends.

Target: SGCN bats.

For the objectives and threats, an "indicator" is developed that will be used to measure results for that particular element. In Wisconsin's Wildlife Action Plan, the action to "install bat gates" is an example of "Direct Management of Natural Resources," one of the broad categories of conservation actions. For this broad action category, sample indicators include:

- Percent management actions implemented as planned;
- Evidence that direct management action is reducing key threats;
- Degree to which target SGCNs respond as expected from direct management actions;
- Degree to which target habitats/processes respond as expected from direct management actions;
- Species measures (e.g. population size, reproductive success); and
- Habitat measures (e.g. size, condition).

For the action to install bat gates, the indicator "number of bat gates installed" could be measured by counting the number of gates installed at caves and mines each year. This would be an intermediate "output" measure – one that provides a useful metric to track progress, but does not in itself reveal whether the conservation action has or will achieve the desired result (increasing bat populations).

For the threat "reduce human access" the indicator "number of breaches" could be measured. Again, this is an intermediate indicator that does not measure whether the ultimate goal of increased bat populations has been achieved.

Finally, the ultimate goal of increased SGCN bat populations can be measured by species measures of reproductive success (# of juvenile bats of each species) and population size (# adult bats of each species).

The bat example is meant to serve as a model for how monitoring and effectiveness measures will be implemented for specific conservation actions in Wisconsin's Wildlife Action Plan. As we develop the monitoring and effectiveness measures framework, we will link specific indicators and metrics with the relevant conservation actions in the WWAP database. We will also link information from existing monitoring programs that may have data relevant to a given conservation action. The database can then be used to help generate reports for specific SWG-funded projects, for individual conservation actions, and for larger classes of conservation actions (e.g. all "Direct Management" actions).

Over time the department will be able to better show how the conservation actions taken to implement the WWAP are resulting in real benefits to SGCN populations and their habitats.