North American Waterfowl Management Plan Science Support Team
Technical Report No. 2009-1

Final Report of the Alternative Performance Metrics Workshop

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ABSTRACT
The NAWMP Science Support Team's (NSST) Alternative Performance Metrics Subcommittee hosted a 2-day workshop on 5-6 August 2008 at Patuxent National Wildlife Research Center - Laurel, MD to explore alternative metrics for measuring progress in achieving NAWMP goals by linking habitat actions to vital rates regionally. This workshop resulted from a recommendation introduced in the NSST's Technical Report No. 2008-1 entitled "Continental Progress Assessment Report Recommendation A.1 – NSST Scoping Document: A Report to the Plan Committee from the NSST." The workshop goal was to measure our collective influence on waterfowl across spatial scales. The objectives of the workshop were to: I. Understand the biological and administrative need for new alternative metrics that apply across Joint Ventures; II. Identify candidate metrics; III. Develop an objective process to evaluate and select preferred metrics; and IV. Achieve consensus around a limited number (1–3) of preferred alternative metrics for implementation under the NAWMP.

A small group of invited Joint Venture Science Coordinators and representatives from the Flyway Councils and Federal Agencies were selected to participate and provide broad representation, skills, and backgrounds from the waterfowl community. Results and recommendations from the workshop are submitted in this report.

Workshop participants reached consensus on a general monitoring framework. In the short-term, workshop participants agreed to the following:

i. JVs should frame their accomplishments in terms of changes in demographic parameters (i.e., season specific vital rates).
ii. All JVs should adopt the annual life cycle model (Fig. 1) as the basis of their monitoring program. This framework explicitly links ecologically similar JVs (i.e., breeding JVs or wintering JVs), thus facilitating decisions about appropriate levels of resource redundancy required to meet the life cycle needs of waterfowl among JV's, and links JVs temporally throughout the year.
iii. Individual JVs should develop conceptual or empirical models to explicitly describe how habitat management actions influence vital rate(s) and JVs should develop monitoring programs to track the direct influence of their management actions on the quality and quantity of refuge areas and food resources. Resulting estimates then provide information on local impacts of JV actions and can be rolled up across JVs to estimate cumulative impacts on waterfowl population dynamics and carrying capacity at the continental scale.
iv. At the JV scale this framework should be used to complement traditional metrics including number of acres protected, enhanced, or restored, dollars spent, and dollars leveraged.
v. At the continental scale, this framework will complement the current metric of comparing continental population size to the population goal.
vi. In the long-term, JVs should incorporate the influence of both their management actions and population size (Fig. 3) on vital rates. This next step will allow managers and researchers to understand the impact of density-dependence on management actions and vital rates.

Final Report of the
Alternative Performance Metrics Workshop

Hosted by the North American Waterfowl Plan Science Support Team's
Alternative Performance Metrics Subcommittee
5–6 August 2008
Patuxent National Wildlife Research Center
Laurel, MD

One of the recommendations of the Continental Assessment was that "… *partners must … strive to develop better performance metrics that reflect the impacts of partner actions on waterfowl populations.*" To this end, the North American Waterfowl Management Plan Science Support Team (NSST) organized the "Alternative Performance Metrics" subcommittee (Table 1) to identify a limited number of alternative performance metrics to be adopted and implemented by the North American Waterfowl Plan Committee and Joint Ventures (JVs). These alternative metrics are intended to either complement or replace current reporting criteria (i.e., number of acres protected, enhanced, or restored, dollars spent, etc.).

The Subcommittee (hereafter we) elected to elicit input from experts and stakeholders throughout the waterfowl management community. The first step in the process was to host a workshop consisting of experts representing the JVs, Flyway Councils, Federal agencies, and academia. The goal of the workshop was to "identify alternative metrics to measure progress by Joint Ventures in achieving the biological goals of the North American Waterfowl Management Plan." To fulfill this goal, we established four objectives:

I. Understand the biological and administrative need for new alternative metrics that apply across Joint Venture boundaries;
II. Identify candidate metrics;
III. Develop a process to evaluate and select preferred metrics; and
IV. Achieve consensus around a limited number (1–3) of preferred metrics for implementation by the JVs.

The results and recommendations from this workshop are reported in this report for the consideration, amendment, and approval or rejection by the NSST. The NSST will submit its recommendation for adoption or rejection of our recommendations to the North American Waterfowl Management Plan Committee for final consideration and determination for endorsement.

The Alternative Performance Workshop (Workshop) was held at Patuxent National Wildlife Refuge on 5–6 August 2008. To facilitate discussion and progress we elected to keep the number of participants low, while ensuring adequate representation from across the waterfowl community. The initial participant list included representatives from the JVs, Flyway NAWMP Science Support Team Technical Sections, Federal Agencies, and academia. However, the actual number of participants was less than anticipated due to last minute travel restrictions and scheduling conflicts (Table 1).

During the course of the 2-day workshop participants discussed a variety of topics including the biological (as identified in the Continental Assessment and Joint Task Group Report) and

bureaucratic needs (U.S. Congressional funding requirements) for alternative metrics; strengths and weakness of methods currently employed by JVs; need to assess progress across multiple temporal and spatial scales; and finally potential alternatives.

After two days of discussion, presentations, and questioning, workshop participants reached consensus on a general monitoring framework. In the short-term, workshop participants agreed to the following:

i. JVs should frame their accomplishments in terms of changes in demographic parameters (i.e., season specific vital rates). The vital rates discussed for the breeding period were nesting success, duckling survival, adult female survival, and nesting/renesting probabilities. Survival and cross-seasonal effects on breeding parameters related to nutritional status were discussed for the non-breeding period (i.e., migration and winter). These vital rates were reviewed both in the context of population sustainability and how individual JVs contribute to continental carrying capacity. Framing accomplishments in terms of a life cycle model (see below) and season specific vital rates creates a common currency across all JVs and enables roll up from the regional to the continental scale.

ii. All JVs should adopt the annual life cycle model (Fig. 1) as the basis of their monitoring program. This framework explicitly links ecologically similar JVs (i.e., breeding JVs or wintering JVs), thus facilitating decisions about appropriate levels of resource redundancy required to meet the life cycle needs of waterfowl among JV's, and links JVs temporally throughout the year.

iii. Individual JVs should develop conceptual models or, where data exist, empirical models to explicitly describe how habitat management actions influence vital rate(s). These models and contrasting hypotheses will inform the "what" and "how" of the monitoring program. For example, during the winter, JVs may be able to impact survival directly through the provision of refuge areas. They also may be able to affect survival (directly; Fig. 2) or productivity (indirectly through a "cross seasonal effect") by increasing the quality and quantity of food resources. Thus, JVs should develop monitoring programs to track the direct influence of their management actions on the quality and quantity of refuge areas and food resources. The resulting monitoring data would serve as model input to estimate 1) impact of management on food abundance, and 2) winter survival. The resulting estimates then provide information on local impacts of JV actions and can be rolled up across JVs to estimate cumulative impacts on waterfowl population dynamics and carrying capacity at the continental scale.

iv. At the JV scale this framework should be used to complement traditional metrics including number of acres protected, enhanced, or restored, dollars spent, and dollars leveraged.

v. At the continental scale, this framework will complement the current metric of comparing continental population size to the population goal.

vi. In the long-term, JVs should incorporate the influence of both their management actions and population size (Fig. 3) on vital rates. This next step will allow managers and researchers to understand the impact of density-dependence on management actions and vital rates.

Several efforts are currently underway to develop annual life-cycle models that include the effects of both harvest and habitat management activities. The Pintail Action Group is developing a model that integrates vital rate estimation and management activities at 2 primary breeding area (Alaska and the PPR), 2 separate wintering areas (California and the Gulf Coast) and 2 spring staging areas (Platte

River Basin and the SONEC region). This model incorporates several hypotheses about the cause of the decline of pintails and provides a foundation for monitoring JV progress in recovery efforts. For example, one hypotheses states pintail nest success in the Canadian prairie pothole region is positively correlated with the amount of summer fallow fields (Fig. 4). Based on this hypothesis, the Prairie Habitat JV (and perhaps Prairie Pothole JV) should monitor the amount of summer fallow fields and how effective their programs are at promoting summer fallow fields. Similarly, The Black Duck Joint Venture is developing an integrated population and habitat model. This model will contrast competing hypotheses linking black duck seasonal vital rates to habitat features. For example, it is believed black duck winter survival is related to food availability. If this hypothesis is supported, the implication for the ACJV will be to develop a monitoring program to evaluate annual food availability and how their management actions influence food availability.

The advantages of this framework are many: it links JVs ecologically, temporally, and spatially; it creates a common currency (i.e., finite population growth [λ]) to allow roll up from regional to continental scale; it further focuses attention on how JVs can increase the capacity of the land to support waterfowl; and it serves as both a planning and assessment tool. Although we recommend all JVs use vital rates as a common currency for assessing progress, this does not necessarily mean JVs will need to monitor vital rates specifically targeted by their management actions on a continuing (i.e., annual) basis. Instead, models that related JV habitat management actions on a vital rate will have to be validated periodically using field monitoring data. We acknowledge that this framework will take varying amounts of time for JVs to implement due to current differences in resources, use of models, and logistical constraints in data acquisition. However, this framework is theoretically sound and robust to changes in population goals and is a critical component of adaptive management. Finally, the NSST will continue to devote time and effort to improve our collective ability to monitor progress toward NAWMP goals and can provide support to individual JVs in the development of models for monitoring.

Submitted by:

The NSST Alternative Performance Metrics Subcommittee.

Table 1. Subcommittee members and participants of the "Alternative Performance Metrics Workshop" held August 5–6, 2008 at Patuxent National Wildlife Research Center, Laurel, MD.

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[a]Subcommittee Chair
[b]Subcommittee member

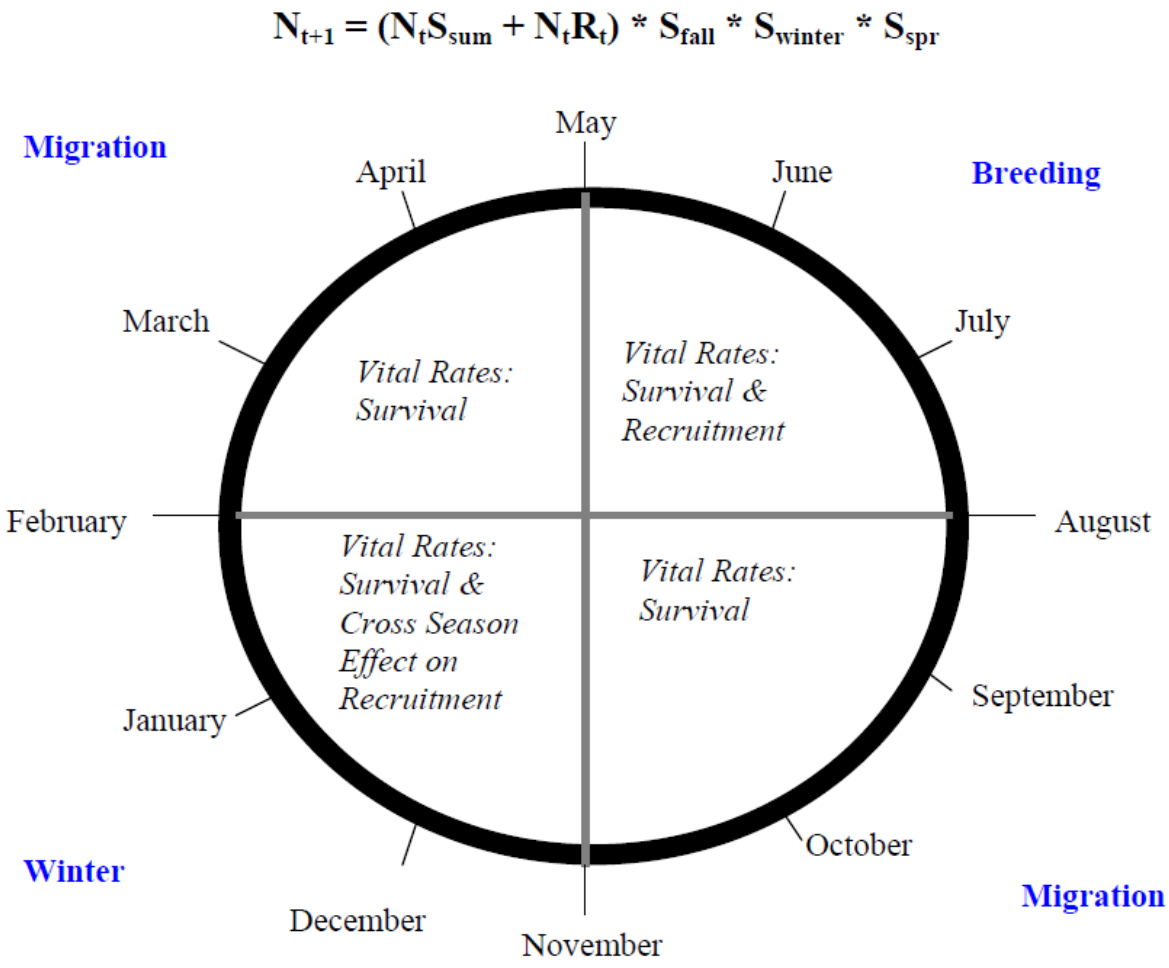

Figure 1. The annual life-cycle model describes important vital rates that influence waterfowl population dynamics during a 1-year period.

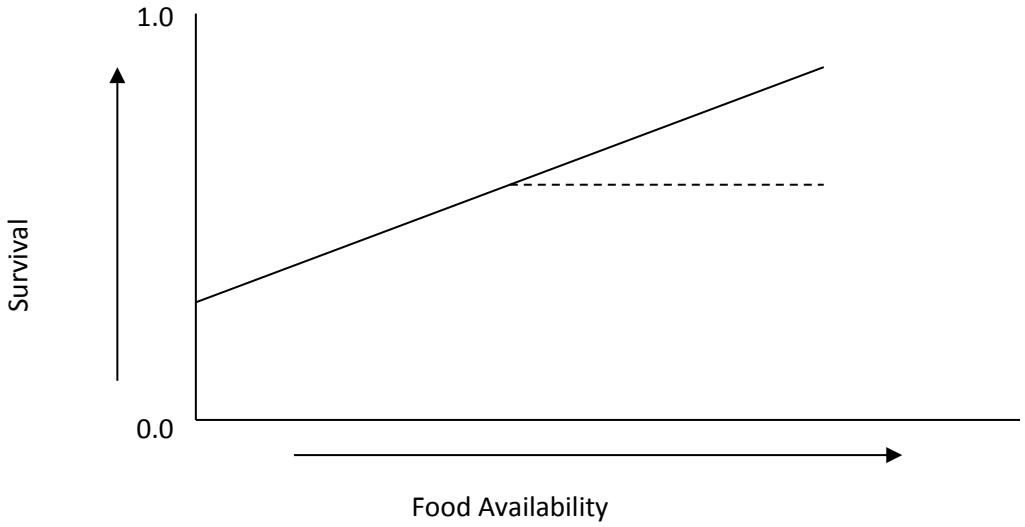

Figure 2. Theoretical example of the relationships between food availability and winter survival.

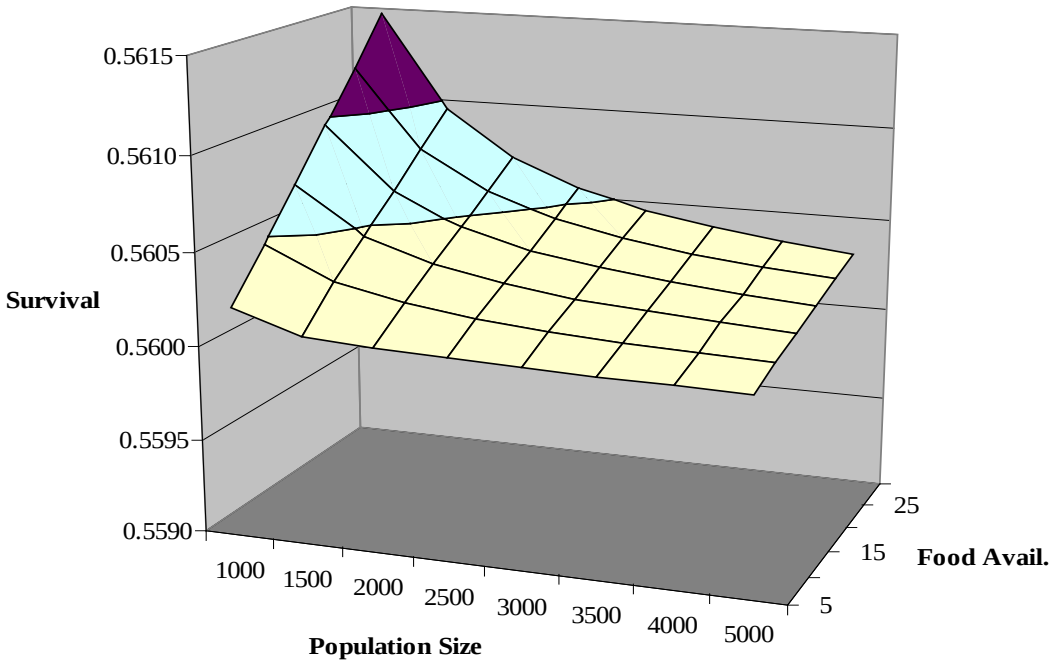

Figure 3. Theoretical relationship between survival and food availability as a function of population size.

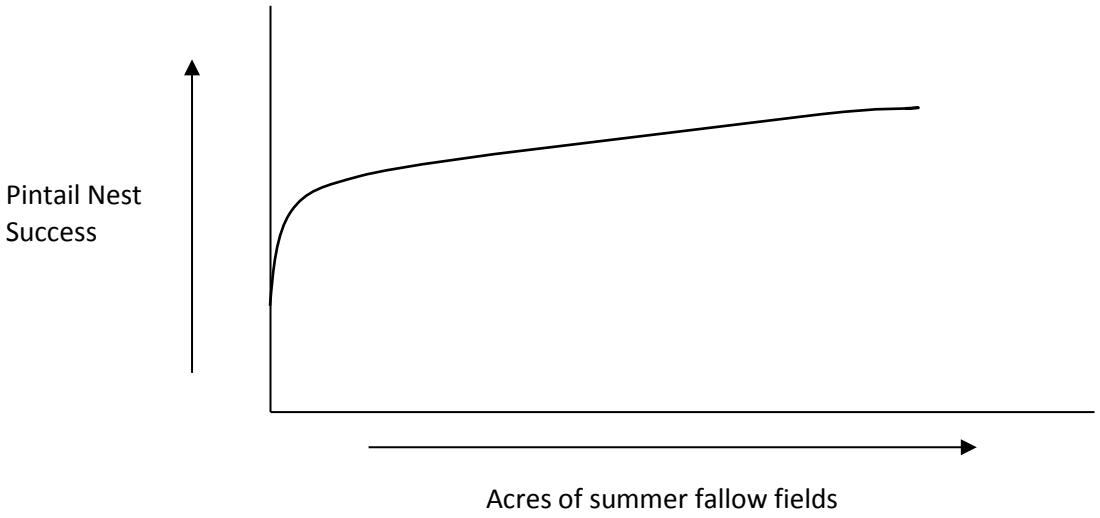

Figure 4. Theoretical relationship between northern pintail nest success and the amount (acres) summer fallow fields in the Canadian Prairie Pothole Region.