



PHJV ASSESSMENT STUDY UPDATE

NAWMP Prairie Habitat Joint Venture Evaluation Program

November 1999

1999 Field Season Summary

The 1999 field season included the evaluation of four more Assessment sites; three with high (H) levels of treatment (PHJV Habitat Program) and one with medium (M) treatment. The lone Saskatchewan site, **Allan Hills East (H)**, was located about 100 km southeast of Saskatoon, SK. Approximately 25% of the site was treatment, dominated by planted nesting cover. The site also included a good amount of undisturbed parkland habitat because steeply rolling topography limits the area suitable for cultivation. The area had average to slightly below average water levels.

The other three sites were in Alberta. **Kinsella (H)**, located about 15 km southeast of Viking, AB, had about 12% treatment. Planted nesting cover and idled parkland were the two most common treatments at this site. A relatively large proportion of this site was used by livestock and the site had extensive tracts of scrubland and woodland. The site's water levels were below average. **Red Willow (H)** was located just north of Stettler, AB and treatment made up approximately 24% of the area. About half of the treated area was enrolled in grazing systems, while planted nesting cover, idled parkland and delayed hay made up most of the remainder. The site also had 70 nesting tunnels. Water levels also were low at this site. The medium treated site, **Hay Lakes (M)**, had 6% treatment and was about 24 km northwest of Camrose, AB. Idled parkland was the most common treatment type, but the site also included planted nesting cover, idled pasture, grazing system and delayed hay. This site had good-to-excellent water levels.

All sites were up and running by mid-March. By mid-April, crews had once again "raised-the-mark" by decoy-trapping their 135 hens in 5-6 days! Hens started nesting by April 22 on all sites. By the end of the summer radio-marked hens had initiated 222 nests at Allan Hills East, 123 nests at Kinsella, 186 nests at Red Willow and 206 nests at Hay Lakes. As in past years, a high proportion of these nests were in woodland and shrubland habitat. Grassland and wetland habitat also were a preferred habitat at most sites. Twenty-five to 34% of these nests were in PHJV programs at the three high treatment sites (Allan Hills East,

Kinsella and Red Willow), whereas 7% of the nests initiated by radio-marked hens were in PHJV program at Hay Lakes.

Approximately 17% of the 222 radio-



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ADAPTING PHJV CONSERVATION PROGRAMS

The primary purpose of conducting rigorous scientific evaluations of conservation programs is to help inform subsequent management decisions. Sometimes such decisions merely involve fine-tuning of productive programs. Other changes can be more dramatic if programs prove unproductive, or if pilot testing identifies promising new initiatives. In this issue of the Assessment Update, we review some of the ways in which feedback from the Assessment and related studies has helped to guide systematic improvement of PHJV programs.

From the outset, the Assessment Study and other elements of the PHJV evaluation plan were designed to: a) determine the biological effectiveness of NAWMP habitat programs; b) search for ways to improve these programs in the future; and c) test the major assumptions and parameters in the computer planning tools used to plan prairie conservation programs. Annual feedback on these questions has been provided to PHJV managers, but recently, as the number of completed study sites has grown, researchers have been able to provide such advice with greater confidence. Before addressing these objectives, however, we should step back and ask two fundamental questions:

Are PHJV Programs Focussed on the Most Important Problems?



Two new lines of evidence indicate that conservation work on the breeding grounds is the most important conservation investment that NAWMP partners can make. The unprecedented sample of radio-marked Mallard hens from the Assessment Study has provided the opportunity to examine the impact of nutrient reserves upon arrival on the breeding grounds on subsequent reproductive effort and success of breeding birds. Results from 8 Assessment sites indicated that older females had significantly higher breeding effort and reproductive success. Pre-breeding weight significantly affected reproductive effort, however, greater weight did not result in higher reproductive success. The analysis is being repeated incorporating data from 19 sites, but the implication is that under present circumstances in mid-continent North America, reproductive success is dominantly determined by factors operating on the breeding grounds, not on migration or wintering areas.

Researchers at the University of Montana recently conducted a sensitivity analysis of the mid-continent Mallard population, drawing heavily on results from the Assessment. They used simulations incorporating

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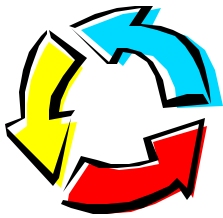
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natural levels of variation to identify demographic factors that are most limiting to population growth. Nearly half of the variation in population growth was explained by variation in nest success, and variation in summer hen and duckling survival together accounted for an additional one third of variation in population growth. These results strengthen our confidence that PHJV programs are focused on improving the demographic factors controlling population growth.

Are the PHJV Partners Working in the Right Places?



PHJV program planners used DU's wetland inventory database to identify target areas for program delivery. A new more sophisticated statistical model relating pair populations to wetland features has largely re-affirmed the appropriateness of the original landscape targets. Some changes are in order, however. The new analysis has identified several desirable boundary changes for existing delivery areas, pinpointed a previously neglected region in west-central Saskatchewan, and has contributed to a growing belief in the importance of increasing conservation efforts in the Missouri Coteau. Soon this model will be coupled with a digital upland cover map, providing a powerful tool for targeting conservation actions.




What Feedback Has Already Helped Alter Prairie Care?

SOME INDIVIDUAL TREATMENT RESULTS

- Early-nesting Mallards made little use of delayed hay projects, although late-nesting Blue-winged Teal and Gadwall did to a greater degree. Also, normal hay cutting on Assessment sites regularly occurred after July 15th.
 - *Prairie Care guidelines were changed to emphasize cropland conversion rather than simply paying to delay cuts on existing hayland.*
- Mallards made little use of conservation fallow treatments (chemical fallow, underseeded legumes, etc.)
 - *These treatments have been eliminated as incentive programs except in important Northern Pintail areas where that species uses such habitats.*
- Fenced dense nesting cover was not cost-effective as delivered in the Canadian parklands.
 - *The program, expected to be a major element of treatment in Manitoba and parts of Saskatchewan, was eliminated.*
- Agricultural use (e.g., grazing) of cover can compromise duck production.
 - *Guidelines were tightened to reduce the frequency of agricultural use for cover management purposes.*
- Idled Parkland is more valuable than previously thought.
 - *More active permanent protection of natural parkland habitats is underway.*

- *This discovery substantially affected the philosophy and direction of new conservation planning in Ducks Unlimited Canada.*
- Hen and duckling survival, as well as nest success, have large effects on productivity.
 - *Targeting of landscapes for PHJV program delivery now emphasizes areas with high-density complexes of potholes to a greater degree than ever before.*
- Duck production from PHJV-modified grazing systems was improved only marginally.
 - *Grazing incentives were restructured to focus on conversion of cropland to perennial cover.*
 - *New grazing projects developed to maximize duck production are being established for further testing.*
- Fall-seeded cereal crops are more attractive to nesting ducks and result in higher nesting success than expected.
 - *After further experimental testing, Ducks Unlimited has greatly expanded its incentive program for new growers of winter cereals, especially in the Missouri Coteau, an area so important to breeding Northern Pintails.*

SOME BROADER PATTERNS

CHOICE OF NESTING COVER – On 15 Assessment sites analyzed to date, nesting Mallards have chosen shrubland and woodland as nesting sites over all other cover types. Idle hayland and idle pasture were next, followed by planted nesting cover, wetland edges and grassland. Delayed hay fields and especially spring-seeded cropland were avoided. 

NESTING SUCCESS – On all 11 treated sites, the point estimates for nest success were greater from PHJV treatment habitats than all other habitats combined. For 7 sites these differences were statistically significant. Generally, nest success has been highest in planted nesting cover. The differences, however, between treated and untreated areas have not been as great as predicted at the outset by PHJV planners.

HATCHED NESTS/HECTARE BY HABITAT TYPE – For Mallards we have been able to combine estimates of cover preference and nest success to calculate a productivity index (hatched nests / hectare) for each cover type. Hatching rates for idled parkland and planted nesting cover are substantially higher than for any other cover types. Hayland, cropland, and conservation farming lands are least productive.

DUCK PRODUCTION AND TREATMENT INDICES – We have compared various duck production estimates to an index of predicted PHJV impact on each Assessment site. The treatment index combines the acreage of various treatments (planted cover, grazing systems etc.), weighted by the expected “productivity” of each program type as ranked by PHJV planners. As expected, based on 19 sites to date, Mallard hen success is higher at sites with higher treatment, hen mortality is lower, but duckling survival is unaffected. There is more variation among sites than anticipated, however.

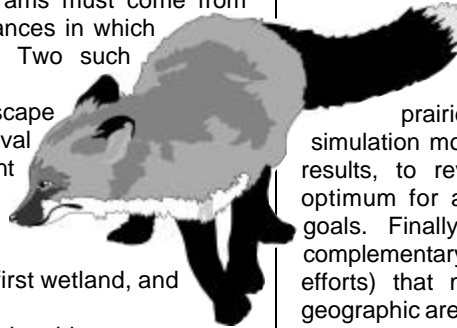
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SPATIAL MODELS OF NESTING SUCCESS AND DUCKLING SURVIVAL

Feedback on individual techniques is useful for managers, but ideas for improving future programs must come from identifying those ecological circumstances in which birds are usually most successful. Two such efforts are in progress.

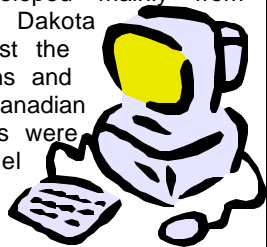
A preliminary analysis of landscape factors related to duckling/brood survival has been completed for 8 Assessment sites at 3 different spatial scales. Important predictors of survival include earlier hatching date, closer distance from the nest to the brood's first wetland, and higher wetland density.



 Landscape factors affecting hatching rates are being examined both within sites (10) and among sites (16). Within sites, habitat type, duck species, later initiation date, larger patch size, patch shape (area corrected for perimeter), and greater distance from a wetland all were important predictors of the likelihood of a nest hatching. The best model predicting hatching rates among sites included the density of habitat patches, mean patch size, and a shape parameter. Larger patches with minimal edge had greater hatching rates. Such results, when updated with the remainder of the Assessment data, will provide strong guidance for future landscape plans.

PRAIRIE CARE PLANNING MODELS

Because the Mallard Productivity Model used to plan Prairie Care programs was developed mainly from information collected in North Dakota grasslands, it was important to test the applicability of its major assumptions and parameter estimates in the Canadian parklands. Several major differences were discovered. The planning model underestimated Mallard preferences for several natural types of cover (shrubland, woodland, idle native parkland and wetland edge) and overestimated use of planted nesting cover. Generally, the model overestimated nesting success in several types of cover, and underestimated duckling survival. Importantly, the model also did not account for variation in duckling survival. Ducks Unlimited staff are working with researchers from the USGS on a new version of the Mallard model as part of a new decision support system.



PRELIMINARY CONCLUSIONS



PHJV programs can enhance duck reproductive success. Nest success usually was higher in PHJV cover than in adjacent habitats, and hatching rates tend to be higher at treated sites. However, the impact of PHJV programs generally has been less than expected, and more concentrated projects may be needed than first thought. Planted cover, a major PHJV treatment, has been less attractive and nest success, though better

than on nearby lands, has been lower than anticipated. Also, high variation in production exists among sites and years.

So although the PHJV has been doing many of the right things in mostly the right places to preserve or restore the productive capability of the Parklands for waterfowl, further adaptive adjustments are warranted. We also need to better understand annual variation in production with attendant implications for cost/benefit projections in both prairie and parklands. We need additional simulation modeling work, informed by the latest research results, to review how much treatment, and where, is optimum for achieving the PHJV's long-term conservation goals. Finally, we need to re-double the search for complementary actions (e.g., extension and public policy efforts) that may yield conservation benefits over large geographic areas.

NEXT PRIORITIES FOR ANALYSIS

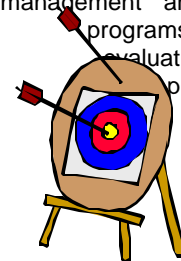
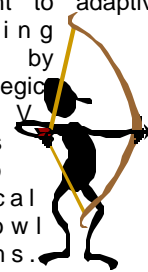
In addition to completing the on-going analyses described above, high priority topics for examination include: a) extending the comparisons of hatched nests / hectare by cover type to other species of ducks; and b) determining the landscape circumstances in which idle parkland habitat is most productive (e.g., contrasting production of natural cover patches within and outside of a matrix of planted cover).



Other important uncertainties that limit our ability to plan for the future include the temporal dynamics of wetland conditions and duck production all across the prairie pothole region. A cover management study initiated by IWWR in 1998 will help address this question, but additional GIS and simulation-modeling work also is needed.

CONTINUING IMPROVEMENTS IN MANAGEMENT PERFORMANCE

As analysis of Assessment results accelerates over the next two years, the flow of information to support the PHJV's review of conservation programs also will increase. The integration of IWWR's researchers in committees and task forces charged with program reviews will ensure the rapid application of research results. Ducks Unlimited, the main delivery agency for the PHJV, has embraced a corporate commitment to adaptive management and has been modifying programs continually as warranted by evaluation results. In recent strategic planning, the PHJV partnership committed to enhancing the foundations of waterfowl conservation programs. These important management commitments, coupled with a growing body of scientific evidence, will help ensure steady improvement in the effectiveness and efficiency of prairie conservation actions.



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Table 1. Results from 1999 Assessment sites.

	Allan Hills East, SK (H)	Kinsella, AB (H)	Red Willow, AB (H)	Hay Lakes, AB (M)
Mallard Pairs/Mi. ²	42	24	30	20
Percent Mayfield Nest Success				
Treatment	10	13	19	17
Non-Treatment	6	7	16	8
Hen Success (%)	19.2	14.6	31.3	20.5
Hen Mortality (%)	25.8	34.2	27.8	26.1
60 Day Duckling Survival (%)				
	28.7	25.4	40.3	31.3
Fledging Rate ^a	0.20	0.15	0.50	0.24

^a females fledged per female in the spring population

marked nests found at Allan Hills East were in planted cover. This figure was less than 3% at the other three sites.

Preliminary analysis suggest Mayfield nest success estimates for all species combined was higher in PHJV habitat than adjacent non-treated habitat at all four 1999 sites (Table 1). However, as usual, predators had a major influence on the duck's nesting effort. As compared to the average from previous Assessment sites (1993-1998), hen success was low at Kinsella, average for Allan Hills East and Hay Lakes, and relatively good at Red Willow (Table 1). Hen mortality was comparable to results from previous sites. The 1999 site had unusually low duckling survival. In fact, 60-day duckling survival estimates for Allan Hills East, Kinsella and Hay Lakes comprised 3 of the 4 lowest estimates to date. Only Punnichy (1993) had lower duckling survival. Duckling survival at Red Willow was better, but slightly below average. While most predators that negatively affect waterfowl were present at each site, an initial look at predator indices do not reveal unusually high numbers of any particular predator. The unusually cold weather and heavy rainfalls (e.g., 2 in. in 1 hour, 5 in. in 24 hrs.) experienced at the sites in July may have been an additive stress, that when combined with predation, resulted in the below average duckling survival.

Average hen success and duckling survival estimates for Red Willow combined to produce a fledging rate comparable to the average from previous Assessment sites. However, low-to-average hen success and poor duckling survival estimates for Allan Hills East, Kinsella and Hay Lakes produced some of the lowest fledging rates for sites studied to date.

These results are disappointing, especially given the amount of PHJV program at Allan Hills East and Kinsella. However, these findings further support the growing realization that there are a tremendous number of factors pulling in many different directions that affect waterfowl production. Understanding these factors and their relationships will continue to be an ongoing battle. (For a synopsis of Assessment findings to date as they relate to the PHJV Conservation Program, see the accompanying article on Page 1 - EDITOR)

Assessment Y2K

At the conclusion of the 1999 field season, the Assessment Study had examined 23 sites in Alberta, Saskatchewan and Manitoba. Of these 23, 8 have been low treatment sites, 8 medium treatment and 7 high treatment. Four more sites are planned for 2000: a low treatment site near Leask, Saskatchewan; a medium treatment site in the Allan Hills; and high treatment sites south of Prince Albert, Saskatchewan and near Holmfield, Manitoba. Staff will visit these sites shortly to meet with landowners and secure housing. Work will start in mid-March and be in full swing by mid-April.

Although 3 final sites are scheduled for 2001, presently we anticipate completing fieldwork on the project in 2000 in order to focus more resources on analysis and planning for follow-up studies. A final determination will be made next fall...



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