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The Healthy Farm Index – Including Bird Observations in a Multifactor Assessment

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What is farm health? Like our own health, farm health is difficult to define or measure because farms differ in many ways. Many describe a healthy farm as one that is economically viable and ecologically responsible, with clean water and air, green fields, abundant fish and wildlife populations, and with safe places for family recreation and enjoyment. Others might describe a healthy farm as one that is managed in a way to increase the benefits of nature to the farm and local communities. Here, we use "healthy" in a general sense, and ask farmers to define their specific vision of what is healthy for their farm.

Why the Healthy Farm Index (HFI)? As an agricultural state, 93 percent of Nebraska's land use – 45.5 million acres – is devoted to working farms and ranches that provide food and fiber products and play a vital role in soil and water conservation and management, fish and wildlife populations, and natural beauty. Measuring and tracking annual production of food and fiber is common, but few options are available to keep track of other benefits that farms provide. Farm assessment tools that emphasize annual economics or inputs such as fertilizers, pesticides, or irrigation water may not apply to farms that focus on both conservation and long-term profitability for coming generations. There is need for a research-based assessment tool that farmers can use to evaluate how various management styles affect resiliency of both profit and conservation and the broad array of potential benefits to farms and people. And there is need for a tool that appeals to farmers as workable and effective for self-assessment of their unique farming systems.

Together with farmers and others, scientists at the University of Nebraska–Lincoln developed the *Healthy Farm Index* as part of research conducted under a USDA organic farming grant. The goal was to develop a tool to help farmers monitor and improve the long-term health of their farm. Here, the HFI is framed around four major categories of **production** (farm production), **protection** (protection of soil and water), **biodiversity** (variety of crops, livestock, wild birds, and natural habitats), and **family** (satisfaction related to farm, family, community). Birds are included as a measure because their associations with various habitats and insect foods reflect farm health in a variety of ways. They also are colorful, visible, and fairly easy to monitor by observing and listening for them in the various habitats on a farm.

This publication provides an overview of the *Healthy Farm Index* and how farmers can use it to move toward goals they see as important for their farm. It starts with a brief overview of why nature is important to farms and rural communities, and includes a section on how to survey farm birds. Although developed on organic farms, the concepts apply to most farms and could be adapted to ranches or other lands.

Why include nature on your farm?

Benefits from nature, often called "ecosystem services," are valued globally in excess of $125 trillion per year but are provided free of charge and often taken for granted. These immense benefits include suppression of insect and rodent pests; crop pollination; purification of air and water; production of

high quality soil; water retention and flood control; carbon sequestration; shade, wind, and climate control; breakdown of waste into nutrients; and beauty, awe, and wonder.

Cultivating the benefits of nature can help bring stability to agricultural ecosystems and rural communities. Nature's benefits stem from the variety of plant and animal life and their interactive processes, often together called "biological diversity" or "biodiversity." On farms, a diversity of crops and natural habitats improves stability, protection, and production. Good soil, clean water, wildlife, and beauty are essential to an enduring agriculture. Working farms and rural communities are the center of know-how and caring for each field and parcel. Those farm skills are needed in building farm health, which contributes more broadly to local families and rural communities.

Pollination, Production, and Pest Suppression — Beneficial wild, unmanaged insects, not including honey bees, provide a value of at least $57 billion in the United States each year in pollination services, dung burial, control of insect pests, and as critical food resources that support wildlife important to hunting, fishing, and wildlife watching. In addition, pollination by a diversity (variety) of wild bees improves fruit quality, shelf life, and commercial value (e.g., strawberries) and increases pollen deposition, fruit set (e.g., tomatoes, blueberries, almonds, sunflowers), and crop yield (e.g., blueberries).

Cultivating the benefits of nature can help bring stability to agricultural ecosystems and rural communities. (Photo by R. J. Johnson)

In crop fields, beneficial insects, birds, and bats suppress crop pests. Research in the Midwestern US found that farms with natural habitats, such as along field margins or in patches, had lower pest insect pressure and more insect-eating birds. In Nebraska and surrounding states, for example, birds such as blackbirds, meadowlarks, quail, American Robins, Blue Jays, and Wild Turkeys are primary predators of army cutworm caterpillars that infest winter wheat and alfalfa fields in early spring. The presence of robin and blackbird flocks, in particular, in crop fields is often an early indication to the farmer that army cutworms are present. One study found that a single Brewer's Blackbird consumed on average 10 army cutworm caterpillars per feeding bout. In addition, Downy and Hairy Woodpeckers and Common Flickers consume European corn borer larvae in winter, plus cutworms, weevils, and aphids. Nebraska bat species consume a variety of crop pests, including scarab beetles, stinkbugs, leafhoppers, and cucumber beetles (adult of the corn rootworm). Recent field experiments in Illinois found that bats suppressed corn earworm larvae and corn damage, an estimated global value of $1 billion, and, indirectly, suppressed pest-associated fungal growth and mycotoxin in corn.

Additional evidence comes from studies in other locations. Predatory falcons in New Zealand vineyards reduced pest bird depredation by 95 percent (grape removal) and by 55 percent (number of grapes pecked), a savings of $95 to $132/acre. Field studies in Jamaica indicate that tree-using birds reduce coffee pest borer infestation rates by 60 percent. And a detailed study in Costa Rica found that the presence of habitat on farms increased the numbers of pest-eating birds, which decreased pest borers by half. That translates into a $30 to $126 savings per acre each year, a savings per farm similar to the annual income of a Costa Rican citizen.

Biodiversity, Stability, and Health — Crop diversity contributes resilience to withstand variability in market and weather conditions, disease or pest outbreaks, and natural disturbances. Incorporating cover crops protects and builds healthy soil. Mixed farms of crops and livestock offer opportunities to incorporate forage and manure cycles.

Natural habitats along field margins, streams (including vegetated canals), ponds, and similar areas support beneficial wildlife and insects, and planned vegetation plantings also help. For example, sheltering tree rows and grassy strips protect soil and water from erosion, reduce wind abrasion to crops, and increase moisture conservation. And in recent studies, even natural microbes found in soil are being used to increase crop yields and nutrient uptake, defend against pathogens, and shield crops against droughts and other climate uncertainties.

Recent studies have found that biological diversity slows the spread of pathogens and diseases. For example, in biologically diverse areas, people have a lower risk of West Nile Virus, Lyme disease, and Hantavirus. Diversity has

a similar effect with plant diseases. For example, biological diversity lowers transmission of rust fungi that infect plants such as perennial ryegrass. How biological diversity provides these benefits in reduced disease risk is still being studied but some facts are known. A variety of species brings competition, interactions, behaviors, and differences that interfere with the spread of pathogens and disease. One example of this is a "dilution" effect, in that diversity includes some species that are resistant to particular diseases or pathogens. The diversity mix of resistant species "dilutes" the number of susceptible individuals and slows the disease spread. In another example, a recent study found that children living in areas surrounded by greater diversity of native plants had lower rates of allergic reactions such as asthma, related in part to increased beneficial bacteria on their skin. Biodiversity in nature protects against diseases and stresses to both ecosystems and people.

The HFI Difference — We continue to learn more and more about how the variety of life and ecosystems on Earth form the basis of shared human wealth, health, and well-being. Farms are important in sustaining biodiversity just as they are in producing food. There is concern about a continuing slow decline of many beneficial insects and birds and an estimated $4-20 trillion/year loss of benefits as natural habitats decline or disappear. A pollinator shortage, as one example, was documented in areas of China and Nepal, resulting in time-intensive and expensive hand-pollination efforts by people.

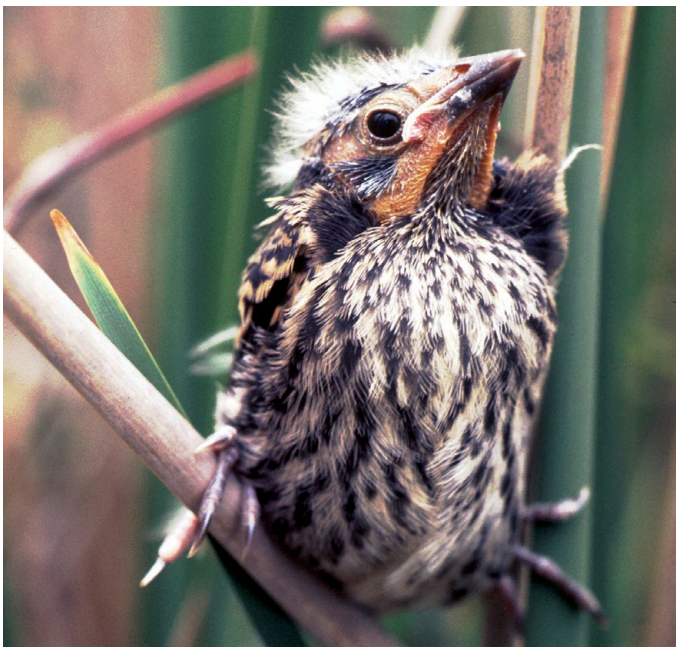
Healthy diverse farms make a valuable difference. Harnessing the power of nature for benefits to farms, families, and communities stems from maintaining and enhancing natural habitats, often made possible through long-term farm bill conservation programs. Gradually moving toward a farm where the benefits of nature are included in planning builds a lasting legacy that benefits future generations and communities.

How to Use the HFI on the Farm

The HFI is a tool to visualize and monitor the farm as a whole over time to better understand how management decisions affect farm health. It allows you to set goals for the variety of farm functions and, if desired, to communicate your success to others. *To illustrate the HFI, we created "John Doe's" farm in eastern Nebraska, based on real farms we surveyed.*

Thinking about farm health is perhaps thinking like a land "doctor," who makes "farm calls" and monitors farm health indicators, much like a medical doctor monitors temperature and heart rate. The HFI is framed here around four major categories: *production, protection, biodiversity,* and *family,* each with two or three research-based indicators that link them with characteristics of a healthy farm (*Table 1*). For example, the category "*production*" might use bu/acre of corn as an indicator and 170 bu/acre as the target (goal). The objective is not to maximize categories but rather to think about your situation and choose reasonable goals or targets for each category that work for you and your farm.

Because each farm and situation is unique, you also choose weights (relative importance as a percentage) for each category and for indicators within each category. Weights across the four categories total 100 percent (*Table 1*) and weights across indicators within each category also total 100 percent. As an example, *for his first HFI year, John Doe wanted to maintain his corn and soybean production at current yield levels (target). He also wanted to assess other HFI indicators, especially vegetation*



We continue to learn more and more about how the variety of life and ecosystems on Earth form the basis of shared human wealth, health, and well-being. (Photo by R. J. Johnson)

Table I. Overview example of the *Healthy Farm Index.*

Categories	*Example of Category Weights**	*Indicators*	*Targets (goals)*	*Indicator Weights*
Production	0.25 (25%)	Each Category has 2-3 Indicators – example: bu/acre for production	Choose targets for each indicator – example: yield average for production	Within each Category, Indicator weights total 1.0 (100%), as do the weights across Categories.
Protection	0.25 (25%)			
Biodiversity	0.25 (25%)			
Family	0.25 (25%)			
Totals	1.0 (100%)			

* In this example, each of the four categories is assigned the same weight so each has 0.25 (25%), for a total across categories of 1.0 (100%).

buffers along the stream that runs through his farm (indicator: percent of waterways protected) because his long-term goal was to pass the farm to the next generation with many conservation practices in place. For John, the first year would provide a baseline to work from so he divided the weights evenly across the four categories and across indicators within each category.

A. Production Indicators

› Yield averages for primary crops, livestock, or other products — Typically, your primary crop or product for a particular year provides a suitable yield indicator. Alternatively, you can enter all crops grown and just divide indicator weights (total 1.0) among them.

- Target — Consider your own long-term yield average or yield averages for similar crops and farms in your area. *John Doe typically grows corn and soybeans and, in some years, milo and alfalfa. This year, he decided to plant corn (target 170 bu/acre) and soybeans (target 50 bu/acre) and to include both in his HFI. Drought lowered current-year yields but they were well above average dryland yields under drought conditions (Table 2A).*

› Alternative market opportunities — Alternative income products or services such as agri-tourism or eco-tourism, including wildlife watching, canoeing, and nature photography; horse boarding; specialty livestock such as a few chickens or steers; specialty crops such as flowers, woody stems, honey, or farmer-market vegetables; and hunting are increasing in some areas and may provide opportunities for your farm. These might provide supplemental income and a hedge against years when primary crop production is down, and often may be side efforts by family members, or 4-H projects. For simplicity, these are measured by the number of options, rather than by production yield or profit. If these become primary enterprises on your farm, however, they could move to a yield measure such as the corn or soybeans example above.

- Target — Consider whether such opportunities are of interest to you and the potential in your location. *John Doe's family grows a few grass-fed steers and hosts outdoor recreational activities such as wildlife watching and nature photography on their farm, two alternative market opportunities (Table 2A).*

B. Protection Indicators

› Percent of waterways buffered/sheltered.

› Percent of farm fields protected from wind and water erosion.

› Percent of continuous living cover — percent of the farm that is always covered with protective vegetation. This would include natural habitat areas; grasslands; pastures; perennial crops; and crop fields that incorporate cover crops, no-till prac-tices, or comparable protection between harvest and planting.

- Targets for protection of water and soil should be high because soil and water are key elements for farm production and health over the long term. *John Doe's farm has a narrow buffer along the creek (75 percent buffered), three windbreaks (90 percent of farm fields protected), and grass cover (30-acre CRP field and a small pasture: 25 percent of farm in continuous living cover) (Table 2B).*

C. Biodiversity Indicators

› Domestic diversity — Number of different crops, cover crops, and types of livestock

- Target — Many sustainable or organic farms have multi-year, multi-crop rotations with four to six different crops or cover crops. For your target, consider what rotations or livestock options are best for your situation and farm. *For this initial year, John Doe's farm will have corn and soybeans, which he rotates each year, pasture, and a CRP field (four crops/cover crops, Table 2C, row 1); and a few steers (one livestock species, Table 2C, row 2). Although livestock is an alternative income opportunity in this case, it is included as domestic diversity because the steers introduce diversity through pasture for grazing and manure for nutrients.*

› Wild diversity — Number of different bird species (types) that your farm supports. An approach to build your bird list is outlined on page 7 in the section, *Surveying Birds on Farms.*

- Target — As an initial target, use expected numbers from *Surveying Birds on Farms* to estimate how many bird species might occur in the different habitats on your farm. *John Doe surveyed birds during the May and June bird nesting season as part of a family activity during times when field conditions limited field work. John or other family members observed birds while walking across the CRP field and along two of the three windbreaks (line transects, Figure 1, page 9). He will use his initial survey results of five woodland and two grassland bird species as a baseline to build upon (Table 2C).*

› Habitat Diversity — Number of different habitat and field types (e.g., woody habitat, grassland, pasture, wetland, stream, pond, corn, soybeans, alfalfa)

- Target — Consider the current variety and whether increasing the variety of habitat and field types is workable, or perhaps a goal could be to improve the quality of habitats and fields already present. *John Doe has windbreaks, CRP grassland, pasture, a creek, corn, and soybeans for a total of six different habitat types (Table 2C).*

Table 2. Example: John Doe's initial *Healthy Farm Index* table with target values and weights.

Category	*Category weights*	*Indicator*		*Farm data*	*Target values*	*Raw score*[1]	*Indicator weights*	*HFI*[2]
A. Production	0.25	Corn (bu/acre)		146	170	85.9	0.50	10.7
		Soybeans (bu/acre)		44	50	88	0.45	9.9
		Alternative Market opportunities		2	2	100	0.05	1.3
		Subtotal					1.00	21.9
B. Protection	0.25	% Waterways buffered/sheltered		75	100	75	0.34	6.4
		% Farm fields protected		90	100	90	0.33	7.4
		% Farm in continuous living cover		25	50	50	0.33	4.1
		Subtotal					1.00	17.9
C. Biodiversity	0.25	**Domestic Diversity**	# Crops and cover crops	4	5	80	0.17	3.4
			# Livestock species	1	1	100	0.16	4.0
		Wild Diversity	# Woodland bird species	5	10	50	0.17	2.1
			# Grassland bird species	2	3	67	0.16	2.7
		Habitat Diversity	# different habitat types (natural & domestic)	6	7	86	0.11	2.4
			% of farm in non-crop habitats	11	15	73	0.11	2.0
			% of farm in unique habitat types	3	5	60	0.12	1.8
		Subtotal					1.00	18.4
D. Family	0.25	Satisfaction [scale 1 (Low) to 6 (High)]		5	6	83	0.50	10.4
		% of farmed land that you own		90	90	100	0.50	12.5
		Subtotal					1.00	22.9

Total	1.00

Subtotals (lower right box) of A+B+C+D = HFI TOTAL (100 max):	81.1

[1]To calculate the Raw Score, divide Farm Data by Target Value in each row and multiply by 100 (example using first row: (146/170) x 100 = 85.9).
[2]To calculate the HFI column values, multiply the Raw Score by the Category weight and by the Indicator weight for each row (example using first row: 85.9 x 0.25 x 0.5 = 10.7).

› Percent of the farm in non-crop habitat (e.g., windbreaks, woodlots, buffers, stream edges, wetlands, grassland, or pasture).

- Target — About 10-15 percent in non-crop habitats can provide a place for beneficial birds, pollinators, and other wildlife. Arrangement is also important to consider in relation to wildlife habitat location and goals such as pollination or pest suppression. For your target, choose a percentage that fits your farm situation and interests over the short- and long-term. *John Doe used an aerial view of his farm, available on Google Maps on the Internet, and estimated approximately 11 percent of his farm was currently in non-crop habitats (Table 2C).*

› Percent of the farm in unique habitat types (e.g., wetland, stream and stream bank vegetation, pond and pond edge vegetation, native prairie, or wildlife "hotspots" where you regularly see a wealth of wildlife). Unique habitats merit attention because they often benefit water and soil protection, biological diversity, and sometimes production and recreational benefits.

- Target — If your farm has unique habitats, you have unique and important ground. Consider protecting these unique areas and perhaps managing to increase their benefits and value. *John Doe's farm has a creek, which, along with the current edge vegetation, covers about 3 percent of his farm (Table 2C).*

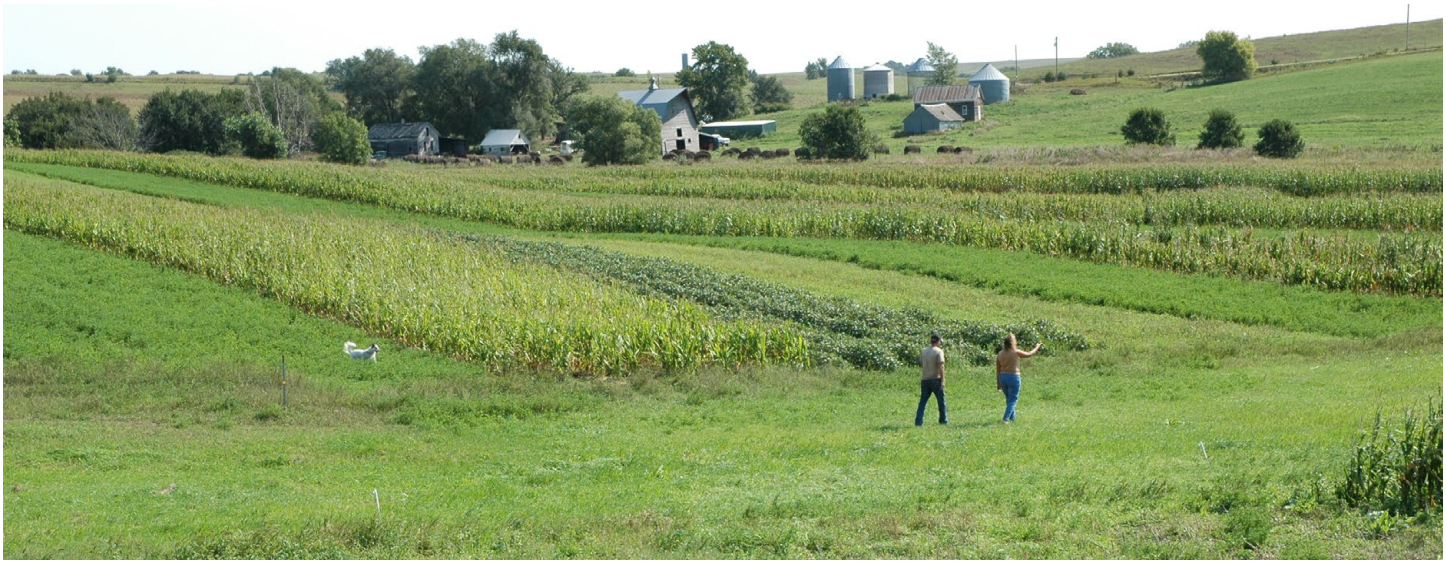
D. Family

› Satisfaction — This is your assessment of how satisfied you are with your farm profit and management system in relation to your goals for your farm, family, and community. It is ranked as 1) very dissatisfied, 2) dissatisfied, 3) somewhat dissatisfied, 4) somewhat satisfied, 5) satisfied, or 6) very satisfied.

- Target — Ideally, your farming situation provides satisfaction and some enjoyable times along the way, even considering that farming is difficult, especially with uncertainties of weather, markets, regulations, and other challenges. Consider what provides satisfaction with your farm system or community and set a goal or target toward maintaining or increasing your level of satisfaction. Satisfaction comes in part from reasonable income and farm production. It also may stem in part from outdoor activities such as walking, fishing, hunting, birding, or just observing the natural beauty that can create feelings of awe and wonder while living in a rural home. *John Doe is generally satisfied but wants to monitor and improve the overall farm benefits so he ranks his current situation as satisfied (5) (Table 2D).*

› Percent of farmed land that you own

- Target — The target here is the amount of land that you need to feel comfortable for you and your family's future. Many farmers lease additional ground to farm. Leasing may extend production options without the capital investment or tax liability of ownership, but it entails finding a satisfactory working arrangement with the landlord. Studies indicate that farmers who own the land they farm, also called land tenure, tend to increase care for the land, so keep in mind good stewardship practices on land that is leased or owned. *John Doe leases about 10 percent of the land he farms so he currently owns 90 percent, and that is his current target (Table 2D). John's long-range plan is to continue leasing as long as he can effectively manage the extra ground with his current situation and equipment.*



While between-farm comparisons are possible, the Healthy Farm Index is not designed to suggest that one farm is better than another; but rather, to show change over time and demonstrate success at conserving, maintaining, and benefiting from monitoring the general health of your farm as a whole. (Photo by R. J. Johnson)

Category and Indicator Weights

Weights allow you to choose the relative importance of the four categories (category weights) and of indicators within categories (indicator weights) for your farm. The weights are your choice. After choosing weights, note that you can change them at any time but, to make valid comparisons between years, the years must have the same weights. *For the initial year, John Doe decided to spread the HFI Category weights equally across the four categories (0.25 or 25 percent each) and generally to allocate indicator weights equally across indicators within categories (Table 2).*

Reviewing and Setting Future Targets

Reviewing the overall HFI score and scores for each individual indicator is a valuable way to identify areas of strength and areas that need attention. While between-farm comparisons are possible, the *Healthy Farm Index* is not designed to suggest that one farm is better than another; but rather, to show change over time and demonstrate success at conserving, maintaining, and benefiting from monitoring the general health of your farm as a whole.

John Doe reviewed his initial year results and, for the second year, decided to extend and widen the narrow buffer along his stream. He and his family decided to initiate planning toward their long-range vision. The buffer change increased the percentage of waterways buffered (increased from 75 to 90 percent; the percentage of the farm in continuous living cover (from 25 to 28 percent) (Table 3B, rows 1 and 3); the percentage of the farm in non-crop habitats (from 11 to 14 percent); and unique habitat types (from 3 to 4 percent) (Table 3C, last 2 rows). Moreover, the second year was a good production year so the target for corn and soybeans (John's long-term average) was exceeded (Table 3A). In future years, John is planning to add cover crops to his rotation and to gradually increase protection and diversity values. He plans to monitor his HFI goals each year as a tool to move toward his farm, family, and community goals.

In thinking about plans for your farm and community each year, the HFI can be used as a guide so that multiple goals are considered and valued in relation to conditions and what you see as important. In addition, in visiting with neighbors, there may be interest in community goals that each farm might consider for the good of all; planning complementary crop rotations or wildlife habitats, protecting pollinating insects, connecting wildlife habitats between farms, or planning educational farm events are some examples.

Surveying Birds on Farms

A bird survey is conducted by observing and listening for different birds in the various habitats on your farm. Observations can be made anytime including during day-to-day activities but a focused survey will provide a more complete record. The only tools you need are a good pair of binoculars to observe bird colors and field marks and a field guide to birds. A checklist of birds that we observed on Nebraska farms, titled Bird Checklist for Nebraska Farms, is available on the Nebraska Birding Trails website at *http://nebraskabirdingtrails.com/birding-checklists/* .

Who — Observing birds for a species survey requires little experience or time and can grow as an extension of day-to-day farm observations. And watching birds can be a fun outdoor pastime or family activity. Local bird enthusiasts or birding groups such as Nebraska chapters of the National Audubon Society (*http://www.audubon.org/audubon-near-you?state=NE*) might offer help if desired. In addition, bird observation may spark interest in school or 4-H youth projects in science, art, or other areas.

Where — Windbreaks, tree rows, wooded stream banks, CRP grasslands, grassy strips, pastures, non-crop field edges, and plantings or gardens near the farmstead are good areas to consider. Uncropped field corners where center-pivot irrigation is used often provide habitat for birds. And some birds nest or forage for insects in crop fields, especially near edges and in no-till fields with plant cover.

When — Often, surveys are done during the *nesting or breeding season* (about May through June in Nebraska) because warm-weather migrants are present, and nesting birds sing and remain stable on territories, making them easier to locate and observe. Birds are typically most active in early mornings until about four hours after sunrise, and also during evening hours before sundown, so those are good times to observe.

Observations during other seasons will add additional species to your farm list. During *spring and fall*, migrants (e.g., hawks, songbirds) use farm habitats as "stopover" sites to rest and forage. And during *colder months*, some bird species that nest farther north shift south into Nebraska and can be observed from about October to April.

How — Often, birds are observed while slowly walking along a habitat edge (windbreaks, wooded stream edges, grassy strips) or across fields (CRP fields, pastures). This "line transect" approach is often useful on farms (*Figure 1*).

Table 3. Example: John Doe's second year *Healthy Farm Index* table.

Category	*Category weights*	*Indicator*		*Farm data*	*Target values*	*Raw score*[1]	*Indicator weights*	*HFI*[2]
A. Production	0.25	Corn (bu/acre)		178	170	100[3]	0.50	12.5
		Soybeans (bu/acre)		52	50	100[3]	0.45	11.3
		Alternative Market opportunities		2	2	100	0.05	1.2
		Subtotal					1.00	25.0
B. Protection	0.25	% Waterways buffered/sheltered		90	100	90	0.34	7.7
		% Farm fields protected		90	100	90	0.33	7.4
		% Farm in continuous living cover		28	50	56	0.33	4.6
		Subtotal					1.00	19.7
C. Biodiversity	0.25	**Domestic Diversity**	# Crops and cover crops	4	5	80	0.17	3.4
			# Livestock species	1	1	100	0.16	4.0
		Wild Diversity	# Woodland bird species	5	10	50	0.17	2.1
			# Grassland bird species	2	3	67	0.16	2.7
		Habitat Diversity	# different habitat types (natural & domestic)	6	7	86	0.11	2.4
			% of farm in non-crop habitats	14	15	93	0.11	2.6
			% of farm in unique habitat types	4	5	80	0.12	2.4
		Subtotal					1.00	19.6
D. Family	0.25	Satisfaction [scale 1 (Low) to 6 (High)]		5	6	83	0.50	10.4
		% of farmed land that you own		90	90	100	0.50	12.5
		Subtotal					1.00	22.9

Total	1.00

Subtotals (lower right box) of A+B+C+D = HFI TOTAL (100 max):	87.2

[1]To calculate the Raw Score, divide Farm Data by Target Value in each row and multiply by 100 (example using first row: (178/170) x 100 = 105; target exceeded, so enter 100%).
[2]To calculate the HFI column values, multiply the Raw Score by the Category weight and by the Indicator weight for each row(example using first row: 100 x 0.25 x 0.5 = 12.5).
[3]Although farm data exceeded the target for this year, enter 100% to indicate the target was met.

The Total for Category weights and each Subtotal for Indicator weights must equal 1.0.

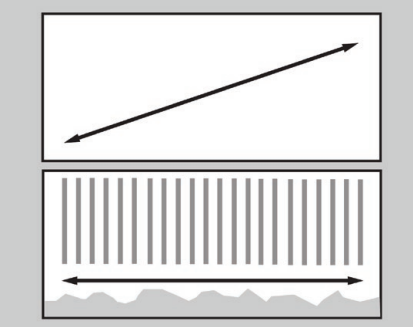


Figure 1. Line transect across a field or habitat area (top diagram), and along a habitat edge (bottom), approaches often useful on farms.

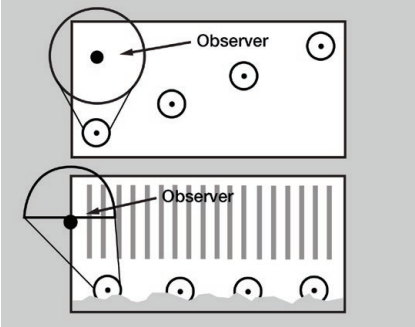


Figure 2. Point counts showing observations in a circle area, as in a field, or in a half circle as at a field or habitat edge.

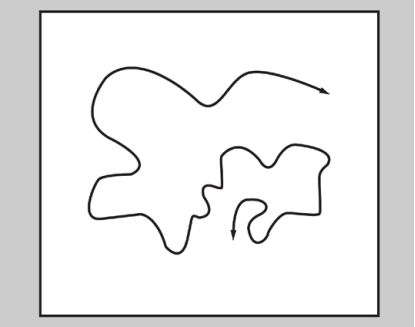


Figure 3. An area search involves observing for birds while walking quietly through an area.

A second approach is to stand quietly and count birds in a circle or semicircle area around you for about five minutes, which is called a "point count" approach (*Figure 2*). Usually, a series of several "points" are selected in a habitat, such as several along a windbreak or stream edge or several across the open area of a CRP field. A third approach is to observe while walking quietly around in an area, an "area search" approach (*Figure 3*).

With all methods, be aware that some birds are more difficult to see or hear than others, but you can detect most birds out to 25-50 yards from where you stand or walk. If you don't know a species, just call it an unknown but make note of characteristics so that you might identify it later.

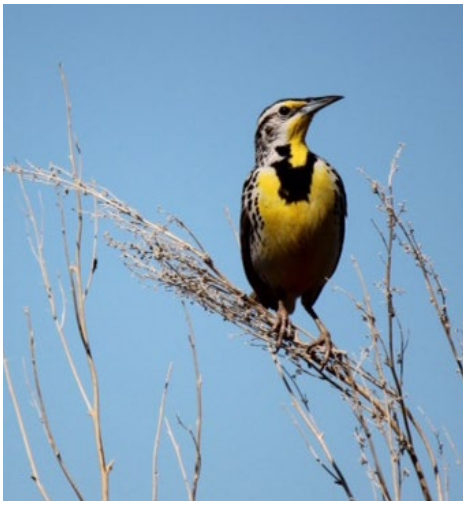
Key points to remember — Be sure to record the place (habitat) and date when you observe a bird species. This helps link the birds observed with a habitat your farm offers and the seasons when birds are present in that habitat. A list of the different bird species that use your farm through the year can create a sense of pride and accomplishment because it demonstrates many other values that your farm is providing. The diversity of birds is a good indicator of overall farm health because it stems from the diversity of habitats that also are occupied by other wildlife and plants.

One key reason for surveying birds is to learn how they may be changing over time, from year to year. Many birds on your list will be present every year but some may arrive only some years. As a total list is developed, you can monitor change over time by checking the total list against the species observed during a specific year.

Think about unique bird species for your area that, when present, indicate good habitat for many other species. Often, these are species in need of conservation help because they are sensitive to habitat loss or environmental change. Consider these habitat-species examples:

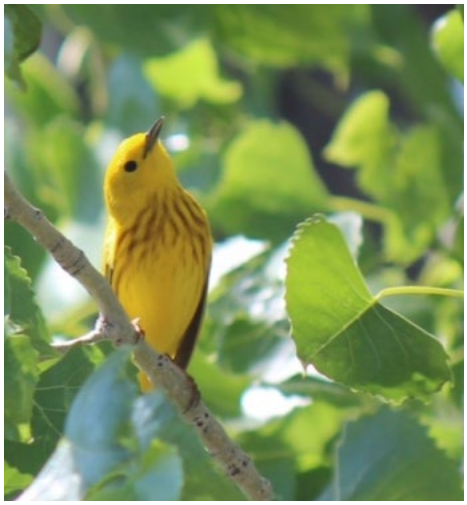
Grasslands or pastures — Meadowlarks, Grasshopper Spar-row, Bobolink, Greater Prairie-Chicken, and Upland Sandpiper

Woodlands or shrubby, brushy areas — Great-crested Flycatcher, Eastern Wood-Pewee, Bell's Vireo, Field Sparrow, Brown Thrasher, towhees, woodpeckers, orioles and Eastern Kingbird



Western Meadowlark
(Photo courtesy of Amy I. Oden)

White-breasted Nuthatch
(Photo courtesy of Amy I. Oden)



Yellow Warbler
(Photo courtesy of Amy I. Oden)

How Many to Expect — The number of bird species observed depends on the amount and variety of habitats available, as well as the surveying intensity. Within a habitat, bird numbers are limited by space, resources available, and other factors, and species may change somewhat each year. Usually, one brief survey will find only a small portion of the bird species that could nest in the habitat over time (*Table 4*).

Table 4. Approximate numbers of bird species associated with various habitats in Nebraska and the numbers that might be seen at one time along one specific transect (one transect, one year) or along more than one transect or more than one year (more transects, more years). Numbers are based on field surveys on central and eastern Nebraska farms.

Habitat	*Number of Bird Species*		
	Total possible	**One transect, one year**	**More transects, years**
Woody corridors	80	10 to 20	30 to 40
Grassy or weedy strips with scattered shrubs	30	6 to 12	7 to 15
Grassland (e.g., CRP)	15	3 to 5	10 to 12

Helpful Resources

A bird's-eye view of your farm is available for free using Internet programs such as Google Earth (*https://www.google.com/earth/*). Such aerial views help visualize the amount and placement of different crops and habitats on your farm and can stimulate thinking about what you'd like to see.

In Nebraska, several agencies or organizations offer assistance or cost share programs to help with stewardship or habitat efforts on farms. Farm Bill Wildlife Biologists are available to help landowners enroll in conservation programs; these positions are through a unique partnership of Pheasants Forever, the Nebraska Game & Parks Commission, and the Natural Resources Conservation Service (*http://nebraskapf.com/habitat-programs/help-me-with-habitat/*). Additional help is available through University of Nebraska–Lincoln Extension (*http://www.extension.unl.edu/home*), Nebraska Forest Service (*http://nfs.unl.edu/*), and others.

The locally based Nebraska Birding Trails website (*http://www.nebraskabirdingtrails.com/*) and the Nebraska Bird Library (*http://www.nebraskabirdlibrary.org/*) have a wealth of information on birds and bird observation in Nebraska, and the Trails website has a printable checklist of birds that we found on Nebraska farms.

The Cornell Lab of Ornithology All About Birds website (*http://www.allaboutbirds.org*) maintains descriptions, life history information, and facts about birds. In addition to websites and various bird guide books, there are also apps for smart phones and tablets.

Field guides for bird identification are available in book or digital app formats. A free app from the Cornell Lab of Ornithology, called *Merlin*, includes photos, descriptions, sounds, and range maps and can use your location and season to suggest bird ID based on features observed. The *Merlin* app is available for free at: *http://merlin.allaboutbirds.org/*. Other commercial apps, including *iBird, Peterson, Sibley, National Geographic,* and *Audubon Birds*, have bird artwork and photos (birds, nests), recorded sounds, range maps, life history information, and help with bird identification. Most have a free trial version with a limited subset of species, and more complete versions for a moderate cost.

Summary

The *Healthy Farm Index* is a multifactor farm assessment tool that provides a straightforward way for farmers to monitor and harness the power and benefits of nature for their farms, families, and communities. It focuses on living components that reflect farm "health" or long-term sustainability and includes birds because they are good indicators, colorful, and easier to observe than many other organisms.

The HFI is framed around the four major categories of **production** (farm production), **protection** (protection of soil and water), **biodiversity** (variety of crops, livestock, wild birds, and natural habitats), and **family** (satisfaction related to farm, family, community). Categories and category indicators have farmer-selected weights that reflect relative importance. With the help of farmers and others, UNL scientists developed the interactive HFI assessment tool to help farmers incorporate the benefits of nature for the farm and family in concert with a profitable farm operation (*Table 5*).

Why Use the HFI?

Farmers care about making the world a better place. Use the HFI to join 600 million family farmers committed to conserving biodiversity. In 2010, the International Federation of Agricultural Producers, representing 600 million family farmers in 120 national organizations across 80 countries, committed to conserving biological diversity on farms as part of a shared responsibility with others – a gift to the people of the world and to the long-term health of farms; a legacy for children, grandchildren, and generations to come.

Table 5. Interactive Healthy Farm Index table for your farm use.

Category	*Category weights*	*Indicator (add crop and unit)*		*Farm data*	*Target values*	*Raw score*[1]	*Indicator weights*	*HFI*[2]
A. Production	0.25	Corn yields (bu/ac)		178	170	100.0	0.50	12.5
		Soybean yields (bu/ac)		52	50	100.0	0.45	11.3
		Wheat yields (bu/ac)					0	
		Alfalfa yields (tons/ac)					0	
							0	
		Alternative market opportunities		2	2	100.0	0.05	1.3
		Subtotal					1.0	25.1
B. Protection	0.25	% Waterways buffered/sheltered		90	100	90.0	0.34	7.7
		% Farm fields protected		90	100	90.0	0.33	7.4
		% Farm in continuous living cover		28	50	56.0	0.33	4.6
		Subtotal					1.0	19.7
C. Biodiversity	0.25	**Domestic Diversity**	# Crops and cover crops	4	5	80.0	0.17	3.4
			# Livestock species	1	1	100.0	0.16	4.0
		Wild Diversity	# Woodland bird species	5	10	50.0	0.17	2.1
			# Grassland bird species	2	3	66.7	0.16	2.7
		Habitat Diversity	# different habitat types (natural & domestic)	6	7	85.7	0.11	2.4
			% of farm in non-crop habitats	14	15	93.3	0.11	2.6
			% of farm in unique habitat types	4	5	80.0	0.12	2.4
		Subtotal					1.00	19.6
D. Family	0.25	Satisfaction [scale 1 (Low) to 6 (High)]		5	6	83.3	0.50	10.4
		% of farmed land that you own		90	90	100.0	0.50	12.5
		Subtotal					1.0	22.9

Total	1.00

Subtotals (lower right box) of A+B+C+D = HFI TOTAL (100 max):	87.3

The Total for Category weights and each Subtotal for Indicator weights must equal 1.0. A red color shows when the "Total" of Category weights or "Subtotals" for Indicator weights exceed 1.0. Note that Category weights must fall between 0.05 (5%) and 0.50 (50%), so that each category, A-D, has at least five percent but no more than fifty percent.

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