

# **Appendix Q: Waterfowl Hunting Closed Areas, History, Description, Background and Rationale for Alternative E**



# Waterfowl Hunting Closed Areas, History, Description, Background and Rationale for Alternative E

(With descriptions of the Wisconsin River Delta Special Hunt Area (Pool 10) and the Lower Pool 11 No Open Water Hunting Area)

This appendix provides background information and rationale for modifications of the Refuge closed area system presented in Alternative E of the Environmental Impact Statement and Comprehensive Conservation Plan. Descriptions, backgrounds, and rationales for each closed area are included. Also included are descriptions of the Wisconsin River Delta Special Hunt Area (Pool 10) and the Lower Pool 11 No Open Water Hunting Area. Additional information on closed areas is provided in Chapter 3 (section 3.2.7.1) of the EIS/CCP, with specific locations, objectives, and rationale provided in Objective 4.2 Waterfowl Hunting Closed Areas in Alternative E of the EIS/CCP. Location maps are presented in Appendix P. Attachment 1 of this appendix provides discussion on waterfowl disturbance thresholds and other waterfowl hunting closed area issues raised during the comment period for Alternative E, Supplement to the Draft EIS/CCP.

## Background

National wildlife refuges play a crucial role in providing breeding, migrational, and wintering ground habitat for waterfowl. Over the past 75 years, the U.S. Fish and Wildlife Service has strategically established many of its refuges to help meet widely held waterfowl conservation goals.

A feature common to refuges is the inclusion of closed areas, which provide waterfowl the opportunity to feed and rest without disturbance during migration and at wintering locations. Without disturbance, waterfowl are provided opportunity for molting, preening, pair bonding and fat storage, all of which help build healthier populations. Closed areas also help keep regional populations in and around refuges, providing hunting opportunity on adjacent public and private lands. The value of closed areas to waterfowl declines if they are frequently altered or rotated. The purpose of the Upper Mississippi River National Wildlife and Fish Refuge closed area system is to provide migrating waterfowl a network of relatively secure feeding and resting areas, and to disperse waterfowl hunting opportunities on the Refuge. Existing closed areas are defined as follows:

“Closed to all migratory bird hunting; other hunting and trapping is only allowed beginning the day after the close of the state duck hunting season, until season closure or March 15, whichever comes first, except turkey hunting is allowed during state seasons.”

Refuge closed areas are generally open for other uses, including recreational boating and sport and commercial fishing. The only exceptions are the Spring Lake closed area (Pool 13) which is a sanctuary and closed to all public entry October 1 to the end of the state duck hunting season, and the Goose Island No Hunting Zone (Pool 8) which is closed to hunting at all times. In addition, a portion of the Lake Onalaska (Pool 7) closed area has been designated a Voluntary Waterfowl Avoidance Area since 1986 where the public is asked to remain out of the area October 15 to mid-November to minimize disturbance of feeding and resting waterfowl.

## Closed Area Milestones

- # 1924 – Refuge established by Congress
  - N Entire Refuge closed to waterfowl hunting until the early 1930s
- # 1930s to 1956 – system of 20 closed areas, totaling 34,150 acres
  - N Some closed areas established out of convenience of Refuge ownership rather than on areas with best food sources (carrying capacity) or reduced disturbance; established only on Fish and Wildlife Service-acquired fee title lands
  - N Disturbance by boaters a problem;
  - N Maintenance of boundaries difficult, required constant brushing;
  - N “Firing lines” developed
- # 1957-58 – system of 14 closed areas, totaling 41,600 acres
  - N After 10 years in development, this is the core of the current system which now has 15 units, covering 44,544 acres. Two units do not have standard closed area regulations:
    - 3) Spring Lake in Pool 13 is a sanctuary from October 1 to the end of the duck hunting season.
    - 4) Goose Island in Pool 8 is closed to all hunting year-round. Trempealeau National Wildlife Refuge, next to Pool 6, functions as a closed area with special regulations but is not included in this analysis. When first established, this system generally met goals of providing secure feeding and resting areas and dispersing hunting opportunities. Closed areas are located on Refuge-acquired and Corps of Engineers-acquired fee title lands.
- # 1978 and 1985 – Wildlife Technical Section of the Upper Mississippi River Conservation Committee
  - N Section recognized that some closed areas were not functioning as intended and proposed changes to the closed area system but none were implemented.
- # 1986 – establishment of the Lake Onalaska Voluntary Waterfowl Avoidance Area (Pool 7).
  - N Other than at Spring Lake and Goose Island (see above), this is the only tool currently being used by the Refuge to address human-caused disturbance during fall migration. This program, developed in cooperation with state agencies and local sportsman and conservation groups, asks the public (mostly boaters) to avoid entry into this area. It has been operational each year, from October 15 through mid-November, since 1986. Studies conducted in 1986-88, 1993, 1997, and 2004 revealed that the voluntary avoidance area was effective in maintaining constant levels of boater intrusions and disturbance of birds despite increased levels of boating activity throughout the Pool.
- # 1987 – Refuge’s Master Plan
  - N During development of the Plan, changes to the closed area system were considered but none were included in the final, pending further study on human disturbance and effectiveness of the voluntary avoidance area.
- # 2005 – release Draft EIS/ CCP in May
  - N Initial preferred alternative (D) proposes a closed area system of 21 units, covering 43,704 acres. Areas would retain the standard closed area definition and add proposed regulations of no fishing and the use of no motors during the state duck hunting season.
- # 2005 – release Supplement to the Draft EIS/CCP in December
  - N New preferred alternative (E) proposes a system of 22 units, covering 45,755 acres. Areas retain standard closed area definition with proposed regulations of voluntary

avoidance on all large closed areas October 15 to the end of the state duck hunting season and use of no motors and voluntary avoidance on small closed areas (~1000 acres or less) October 15 to the end of the state duck hunting season. A threshold for disturbance is also established under Alternative E.

- # 2006 – release of EIS/CCP with final preferred Alternative E that includes a closed area system comprised of 23 units covering 43,764 acres. Same entry regulations and threshold as Supplement (see above).

## Definitions

### *Waterfowl Hunting Closed Area, current definition:*

“Closed to all migratory bird hunting; other hunting and trapping is only allowed beginning the day after the close of the state duck hunting season, until season closure or March 15, whichever comes first, except turkey hunting is allowed during state seasons.”

### *“Large” and “Small” Closed Areas: Alternative E*

Waterfowl hunting closed areas under Alternative E will continue to be defined with the current definition, see above.

In addition, closed areas will be classified (with exceptions) as either “Large” or “Small,” as described below:

Under Alternative E, the public will be asked to practice Voluntary Avoidance (limiting entry) on all closed areas (“Large” and “Small”) October 15 to the end of the respective state duck hunting season and in addition there will be a “no motor” restriction on “Small” closed areas October 15 to the end of the regular state duck hunting season. “Large” closed areas are greater than 1,000 acres and “Small” closed areas are ~1,000 acres or less. “No motors” means the use of motors on watercraft is not allowed, although possession of a motor is allowed in these areas.

### *Disturbance Threshold: Alternative E*

One major disturbance per day based on a season-long average. This is based on results of human disturbance monitoring and research on Pools 7 and 8, 1980 – 2004. A major disturbance is defined as a human intrusion which displaces 1,000 waterfowl or 50 percent of the waterfowl present, whichever is less. The disturbance threshold would not include commercial fishing (handled through permitting process) or government entities engaged in monitoring, research, or law enforcement.

### *Sanctuary: all alternatives*

A waterfowl sanctuary is defined as follows: “No entry October 1 to the end of the regular state duck hunting season.”

### *Voluntary Waterfowl Avoidance Area or Voluntary Avoidance Area*

Under Alternative E, closed areas will be posted to encourage boaters to practice Voluntary Avoidance (limited entry) October 15 to the end of the state duck hunting season to reduce disturbance of waterfowl. Moving the effective date from October 1 in Alternative D to October 15 in Alternative E for these entry regulations reflects public concern about the loss of fall fishing and survey data which shows that the major influx of migrating waterfowl occurs after October 15 each year. The existing Voluntary Waterfowl Avoidance Area on Lake Onalaska in Pool 7 will continue as implemented, with effective dates of October 15 to mid-November.

### *Closed Area System Goals*

After nearly 50 years, changes from within and outside the closed area system have altered how waterfowl utilize the Refuge during migration. Changes include the amount and quality of habitat available, the number and species of waterfowl using the system, and the size and number of closed areas available. Refuge-wide, fewer islands and acres of vegetation are generally available to provide shelter, food, and cover. More diving ducks, Tundra Swans, and Canada Geese are now present, but fewer puddle ducks.

As a result of these changes, not all closed areas in the system are providing waterfowl with the habitat components required to meet their biological needs. Waterfowl are now concentrated in a few functioning closed areas rather than being dispersed throughout the system.

The overall Refuge closed area system goals and some strategies to achieve them are as follows:

- 1) Provide migrating waterfowl a more balanced and effective network of feeding and resting areas.
  - N Add closed areas in gaps between stepping stones of habitat.
  - N Align closed areas over existing preferred food sources.
  - N Construct islands to restore habitat, protect vegetation beds from currents, wind and wave action, and sedimentation, and provide thermal and visual barriers for waterfowl.
  - N Promote growth of aquatic vegetation using water level drawdowns.
- 2) Minimize disturbance to feeding and resting waterfowl in closed areas.
  - N Establish Voluntary Waterfowl Avoidance Areas.
  - N Restrict use of motors.
  - N Restrict fishing.
  - N Establish waterfowl sanctuaries (no entry).
- 3) Provide waterfowl hunters with more equitable hunting opportunities over the length of the Refuge.
  - N Add new closed areas to hold birds in new areas.
  - N Eliminate or reduce the size of existing closed areas to provide more area open to hunting.
  - N Establish hunter spacing limits (Illinois only).
  - N Eliminate use of permanent blinds.
- 4) Reduce hunter competition and waterfowl crippling loss along some closed area boundaries.
  - N Consider managed hunts (include hunting public in the development of these hunts).
  - N Adjust the closed area boundary
  - N Modify hunting regulations.
- 5) Stabilize boundaries where island and/or shoreline loss or gain creates a fluctuating boundary.

Background and rationale for each of the 20 closed areas and 3 sanctuaries included in Alternative E for the Refuge closed area system address one or more facets of these goals. A description of each closed area by Refuge District, Pools 4 through 14, is presented in the following pages.

## Closed Area Descriptions

### Winona District

#### **Pool 4, Big Lake, Wisconsin, 2,461 acres**

##### *General Description*

The Big Lake closed area encompasses 2,461 acres of Big Lake in a line roughly bordering the main channel to the west, shoreline to the east, Indian Slough to the north and Grand Encampment dredge material placement site to the south. This closed area is classified as “large” and will be designated a voluntary avoidance area October 15 to the end of the state duck hunting season. A travel corridor is included on the northeast corner to facilitate boat traffic from a resort and private docks to and from the main channel with minimal disturbance to migrating waterfowl. The closed area will not take effect before the start of the 2009 waterfowl hunting season. This delay will allow waterfowl hunters the opportunity to locate new hunting locations and allow the refuge to further study the availability of vegetation and other food sources in Big Lake and Nelson-Trevino and evaluate waterfowl use on Lake Pepin (Pool 4) and within Nelson-Trevino.

The Big Lake closed area is located in the general area of an historic (1930s to mid 1950s) closed area that was dropped in 1957. The area will be closed to waterfowl hunting because of the availability of abundant waterfowl foods and open water habitat. Big Lake represents the only location this type of habitat is available for an approximate 50-mile stretch of river upstream of Lock and Dam 6 (Winona District). The only exception is the habitat found on Trempealeau NWR in Pool 6. The lack of protected high-quality waterfowl habitat has led to a skewed distribution of migrating birds over the length of the Refuge.

The closed area alignment within Pool 4, beginning no sooner than the opening of the waterfowl season in 2009, includes; Big Lake, Wisconsin (2,461 acres), Rieck’s Lake/Buffalo River, Wisconsin (608 acres), and Peterson Lake, Minnesota (677 acres) for a pool-wide total of 3,746 acres. Since 1957, the closed area acreage in Pool 4 has been 6,884 acres, the new alignment provides a net gain of 3,138 acres open to hunting within the pool.

##### *Background*

Big Lake was a closed area from the mid-1930s through 1954 (named the Beef Slough closed area) totaling 1,319 acres. Evaluation of the area in 1954 determined that due to land ownership at the time, the eastern boundary was difficult to maintain as it traversed through deep, open water. The north and south boundaries were through marsh which resulted in the creation of firing lines and it was determined that elevated levels of boat traffic through the closed area were causing disturbance of the birds. Based on this evaluation, the closed area configuration was changed in 1957 which included Nelson-Trevino, Wisconsin (3,773 acres) and Peterson Lake (including Rieck’s Lake and Buffalo River), Minnesota/Wisconsin (3,111 acres). In the following year, 1958, reports indicate that waterfowlers requested the Big Lake closed area be re-established as they witnessed a decline in waterfowl hunting success in Robinson Lake, Minnesota. However, no changes to the alignment were made.

The Big Lake area has seen a decline in aquatic vegetation and a loss of depth diversity caused by sedimentation from the Chippewa River. The bed-load from the Chippewa, primarily sand, not only influences backwater features and water quality, but also the main channel where it affects channel maintenance activities extending through Pool 7. In an attempt to reduce sand loading to Big Lake, two major inflows, Indian Slough and Catfish Slough, were modified. The Indian Slough closure incorporates features to improve fisheries habitat via tree drops and riffle-pool complexes. The

Indian Slough structure was not engineered to be a sand-trap but is instead a closure to reduce the flow of water, thus reducing the amount of sand entering Big Lake.

Future habitat improvement activities proposed for Big Lake include island construction, maintaining/increasing water depths in approximately three percent of the aquatic area for fishery habitat, re-vegetation of historic dredged material placement sites to increase the area and diversity of forests and increasing emergent vegetation by approximately 14 percent. Other features will be considered to stabilize shorelines and reduce island dissection..

### *Rationale*

The Big Lake closed area will substantially increase the amount of food available to migrating waterfowl in a relatively secure environment. Big Lake, one of the last, and the best, puddle duck and diving duck habitat areas on the Winona District (Pools 4-6), will play a vital role in achieving a more even distribution of waterfowl, primarily puddle ducks, but some divers as well, on the entire Refuge. Energetic studies (Slivinski, 2004) indicate an expected 104 percent increase in gross energy available to migrating and staging waterfowl by developing Big Lake as a closed area.

In conjunction with the closing of Big Lake, Nelson–Trevino, Wisconsin (3,773 acres), Buffalo (Beef) Slough, Wisconsin (788 acres), and portions of Peterson Lake closed area will be opened to hunting providing new opportunities for duck hunters as well as deer and small game hunters. These changes will not occur before the 2009 waterfowl hunting season.

### Winona District

#### **Pool 4, Rieck's Lake/Buffalo River, Wisconsin, 608 acres**

##### *General Description*

The Rieck's Lake/Buffalo River closed area includes the existing boundary around Rieck's Lake and a small section of water west of Hwy. 35 to the east bank of the railroad tracks and south to the main cut below the Rieck's Lakeside Park. A travel corridor is included to allow access from the Buffalo River Landing to the main channel. At 608 acres, this area is classified as a "small" closed area (less than 1000 acres) and is closed to the use of motors and is a Voluntary Avoidance area from October 15 to the end of the state duck hunting season. Under this designation, the use of motors will not be allowed and the public will be asked to voluntarily avoid entering the area during the stated time period to minimize disturbance to waterfowl. This new configuration will not take effect before the start of the 2009 waterfowl hunting season to coincide with implementation of the Big Lake closed area (see above).

##### *Background*

Rieck's Lake is most widely known as the location for the Alma Tundra Swan Watch. This closed area is located north of Alma, Wisconsin and was traditionally renowned as a site that held concentrations of up-to 6,000 migrating tundra swans within close proximity of the road. An observation deck was built through the cooperation of the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers and City of Alma, and is staffed by volunteers during the fall migration period. The notoriety of Rieck's Lake has grown with over 20,000 people from around the world annually visiting the observation deck for close-up views of swans.

The greatest threat to Rieck's Lake is sedimentation from surrounding lands and the heavy growth of bur-reed which has overgrown the marsh eliminating open water. Waterfowl counts from 2004 showed a peak of only 300 Tundra Swans and counts from 2005 showed only 65 swans utilizing the

closed area. The Swan Watch organization, working with Buffalo County and a grant from the Federal Scenic Byways Program, contracted to have 35,000 cubic yards of sediment dredged during the early-fall of 2005. The material was removed in a mosaic pattern to create large open-water “fingers” that will provide attractive resting and feeding areas for swans and other waterfowl. First year results are inconclusive because a combination of late-arriving swans and a relatively early freeze-up of Rieck’s Lake pushed swans to larger, open water areas. It is anticipated that until changes can be made within the watershed of Rieck’s Lake, sedimentation will continue to pose a threat to the area.

### *Rationale*

Rieck’s Lake is separated from Pool 4 by Highway 35 making it an easy boundary to maintain. It provides moderate waterfowl food resources for migrating waterfowl and offers educational benefits to the public by providing one of the few opportunities to see waterfowl close-up. It also provides economic benefit to the surrounding towns through the increased tourism brought by the Swan Watch.

### Winona District

#### **Pool 4, Peterson Lake, Minnesota, 677 acres**

### *General Description*

The Peterson Lake closed area includes a boundary change which reduces the size of the closed area from 3,111 acres in both Minnesota and Wisconsin to 677 acres in Minnesota only. It is classified as a “small” closed area (less than 1,000 acres) and is closed to the use of motors and is a Voluntary Avoidance area from October 15 to the end of the state duck hunting season. Under this designation, the use of motors will not be allowed and the public will be asked to voluntarily avoid entering the area during the stated time period to minimize disturbance to waterfowl. A travel corridor will be established from the Peterson Lake Landing to the main channel to facilitate motorboats during the hunting season. This new configuration will not take effect before the start of the 2009 waterfowl hunting season to coincide with implementation of the Big Lake closed area (see above).

### *Background*

The existing configuration of the Peterson Lake closed area includes Peterson Lake, Minnesota, Buffalo (Beef) Slough, Wisconsin, Rieck’s Lake, Wisconsin and the main channel for a total of 3,111 acres. This closed area configuration was developed in 1958 in response to the opening of Beef Slough (Big Lake) closed area to hunting.

Over the years, Peterson Lake has suffered from significant erosion of the islands that bordered its eastern side resulting in a decrease in aquatic and terrestrial habitat diversity which has negatively affected the waterfowl use of the lake. In 1992, three culverts were placed through the Lock and Dam 4 embankment to move water to the Finger Lakes area of Pool 5. The culverts were installed in an effort to improve the fisheries of the Finger Lakes. In 1995, as part of the Peterson Lake Habitat Rehabilitation and Enhancement Project (HREP), many of the remaining islands were protected by rip-rap. At the same time, some of the islands were “replaced” using rock structures to reduce sedimentation and velocities in Peterson Lake.

Proposed habitat improvement projects for Peterson Lake include island formation through both construction and sedimentation (seed islands). A 500 percent increase in emergent vegetation is proposed based on the cumulative effects of the proposed island construction. The U.S. Army Corps of Engineers is proposing the addition of two islands in Peterson Lake along the Lock and Dam 4

embankment to protect the embankment from erosion through means other than rip-rap. These islands are tentatively scheduled to be completed during the summer of 2007.

### *Rationale*

The Peterson Lake closed area had been proposed for removal in the initial release of Alternative E. However, comments received in writing and made at public meetings by waterfowl hunters suggested that Peterson Lake remain a closed area. In response to these comments, a smaller closed area that encompasses Peterson Lake was developed and will take effect in conjunction with the other closed area changes in Pool 4 (establishment no earlier than the waterfowl hunting season 2009). It is anticipated that the potential for improved waterfowl habitat exists in Peterson Lake over the next 15 years if funds become available to implement the recommended island construction and enhancement projects.

### Winona District

#### **Pool 5, Weaver Bottoms/Lost Island, Minnesota/Wisconsin, 3,508 acres**

### *General Description*

Weaver Bottoms (Minnesota)/Lost Island (Wisconsin) is an existing closed area that has minor boundary adjustments under the final Alternative E. The size has been increased by 369 acres to include the main channel travel corridor and a slight adjustment to the east boundary near river mile 743 to include the area which is proposed for future channel maintenance island construction. The Draft Alternative E had included the channel maintenance islands constructed during 2005-2006 within the closed area, however, public comment received indicated that this would pose a navigation burden to the people of Buffalo City, Wisconsin due to sedimentation dictating where they could access the main channel. The intention is to have any future channel maintenance islands constructed as part of this cluster be located within the closed area boundary. This closed area is classified as "large" (greater than 1000 acres) and has voluntary avoidance area designation from October 15 to the end of the state duck hunting season. The main channel is the only travel corridor located in the closed area.

### *Background*

Weaver Bottoms (Minnesota) was historically significant for migrating waterfowl and wintering fish. This was due to extensive beds of emergent and submersed vegetation and a series of main channel border islands that protected the area from inflows from the main channel. Weaver Bottoms has been negatively impacted by inflows from the main channel and the Whitewater River which delivers large amounts of sediment, impacting water quality. Since the late-1960s, the area had degraded to a large, windswept lake with minimal vegetation. However, 58 – 96 percent of annual waterfowl use on Pool 5 still occurs within Weaver Bottoms, most likely because of reduced disturbance inherent in closed areas.

Extensive studies concluded that to improve conditions in Weaver, a two-tiered approach was needed. First, side-channels needed modifications to restrict sediment and reduce velocities. Second, islands should be constructed to reduce wind fetch and the re-suspension of bottom sediments. Phase I was completed in 1987 when partial or complete closures were constructed across most of the secondary channels leading into Weaver Bottoms and two islands were constructed. Phase II, construction of additional islands and/or other measures, was not implemented pending results of monitoring the effects of Phase I. To date, monitoring has not shown significant improvements in aquatic vegetation from Phase I projects.

Pool 5 was the site of a pool-wide water-level drawdown in 2005. Preliminary monitoring found over 1,000 acres of exposed sediment with good to excellent annual and perennial plant growth. Planning is under way to conduct a second drawdown during the summer of 2006 which would enhance the growth of perennial plants that were established during the 2005 drawdown. Aquatic vegetation in Weaver Bottoms has the potential to improve over the next several years due to the effects of the drawdowns.

The Lost Island (Wisconsin) portion of the closed area contains several forested islands and shallow backwater lakes. This section has a minor boundary adjustment along the east side near river mile 743 to facilitate the inclusion of any future channel maintenance islands which are constructed. If funding becomes available, there is the potential for more channel maintenance islands to be constructed as part of this "island cluster."

### *Rationale*

The Weaver Bottoms/Lost Island closed area is remaining intact due to the historic waterfowl use of the area and the potential for improved habitat (including both submersed and emergent plants) and increased waterfowl use in the future. Planned habitat improvement projects include island construction and additional water-level management through drawdowns. With improved habitat for both puddle ducks and diving ducks, Weaver Bottoms/ Lost Island will play a crucial role in achieving a more even distribution of waterfowl on the upper reaches of the Refuge.

### Winona District

#### **Pool 5, Spring Lake, Wisconsin, 243 acres**

### *General Description*

Spring Lake is a new closed area encompassing 243 acres is classified as "small" (less than 1,000 acres) and is closed to the use of motors and is a Voluntary Avoidance area from October 15 to the end of the state duck hunting season. Under this designation, the use of motors will not be allowed and the public will be asked to voluntarily avoid entering the area during the stated time period to minimize disturbance to waterfowl. Because there is no public access directly affected by the closed area, a travel corridor is not included. The area contains a portion of the islands built through the Environmental Management Program (EMP) in 2004-2006. The southeastern boundary of the closed area terminates at the downstream toe of the Lock & Dam 5 dike.

### *Background*

The Spring Lake area was once a diverse complex of islands and deepwater areas which contained abundant vegetation providing excellent fish and wildlife habitat. Today, the habitat has declined due to losses in bathymetric and topographic diversity from sedimentation and island loss. Spring Lake was the site of a 1995 EMP project designed to reduce flow and sedimentation by placing a rock sill on the north end of the lake.

A second EMP project which will be completed in late-May 2006, includes an extensive island complex designed to stabilize habitat conditions and improve sediment transport and distribution. The islands will also provide environmental conditions for establishment and continued growth of aquatic vegetation. These improvements are anticipated to increase the coverage of emergent vegetation by over 200 percent and maintain the coverage of submersed vegetation. While the fall 2005 waterfowl surveys were inconclusive, waterfowl hunters and spring birdwatchers commented on the noticeable increase of birds using the area.

### *Rationale*

The Spring Lake closed area, though relatively small, has the potential to provide significant food resources for migrating waterfowl in future years. EMP projects and water level drawdowns should have a significant impact on the food resources available in the area. With improved habitat, mainly for puddle ducks, the Spring Lake closed area will play an important role in achieving a more even distribution of waterfowl on the entire Refuge. Energetic studies (Slivinski 2004) indicate that the Spring Lake closed area will increase the food availability to waterfowl by 69 million Kcals. This amount should be even higher with the habitat improvements brought on by water level drawdowns.

As a secondary benefit, the proximity of this closed area to a land source (Lock & Dam 5 dike) will provide a wildlife observation opportunity often difficult to provide on a large river system.

Pool 5 was the site of a pool-wide water-level drawdown in 2005. Preliminary monitoring found over 1,000 acres of exposed sediment with good to excellent annual and perennial plant growth. Planning is under way to conduct a second drawdown during the summer of 2006 which would enhance the growth of perennial plants that were established during the 2005 drawdown. Spring Lake vegetation has the potential to improve considerably over the next several years following the construction of islands and the water-level drawdowns.

### Winona District

#### **Pool 5A, Fountain City Bay, Wisconsin, 24 acres**

#### *General Description*

The Fountain City Bay closed area is a 24 acre parcel located at the southern-most tip of the Wisconsin Department of Natural Resources' Merrick State Park. The closed area is classified as "small" (less than 1,000 acres) and will be closed to motor use and be a voluntary avoidance area from October 15 to the end of the regular state duck hunting season.

#### *Background*

The Fountain City Bay closed area was requested by Merrick State Park as a means to avoid confusion to waterfowl hunters who use the Fountain City Bay area. The State Park is closed to all waterfowl hunting, but due to the proximity and open water between the State Park and the Refuge property, it was confusing to users and difficult to maintain signage to clearly define the areas.

Both agencies, Fish and Wildlife Service and Wisconsin Department of Natural Resources, will work together over the coming years to complete a land transfer that would give the State Park the 24-acre parcel in exchange for a parcel of equal value elsewhere on the river, thus eliminating the closed area from the Refuge.

#### *Rationale*

The Fountain City Bay closed area is being instituted to alleviate hunter confusion caused by the proximity of Fish and Wildlife Service land to Merrick State Park. Open water and differing agency signs and regulations have created confusion for waterfowl hunters in this area. The creation of a closed area will provide consistency of regulation within the entire bay.

## Winona District

### **Pool 5A, Polander Lake, Minnesota/Wisconsin, 1,907 acres**

#### *General Description*

Polander Lake is an existing closed area which includes Polander Lake (Minnesota) and Betsy Slough (Wisconsin). A boundary change on the northwest edge increases the closed area 318 acres. This acreage includes Pap Slough (Minnesota) on the southern boundary and extends to the downstream bank of Honeymoon Slough (Minnesota) as the western boundary, the main channel forms the eastern boundary of the addition. Polander closed area, at 1,907 acres is classified as “large” and is a voluntary avoidance area from October 15 to the end of the state duck hunting season. Two travel corridors are included in the closed area, the main channel and a corridor which will connect boat traffic from the Minnesota City Boat Club to the main channel (just upstream of the Polander HREP project islands) with minimal disturbance to migrating waterfowl.

#### *Background*

Habitat diversity and quality have been degraded within Pool 5A from island loss and sedimentation, especially in the lower portions of the pool. Island dissection and erosion continue to occur and contribute to declines in aquatic vegetation and floodplain forests. Sedimentation has most impacted the Betsy Slough backwaters which have also experienced island erosion and island dissection. The majority of sediment in the pool is transported from the Zumbro River in Pool 5 and the Chippewa River in Pool 4.

Polander Lake has been impacted by erosion which has eliminated many of the islands. This has caused the loss of terrestrial habitat and played a role in the loss of submersed and emergent aquatic vegetation. The Polander Lake HREP (completed in 2002) protected the remaining islands, closed an island breach in Pap Slough, re-vegetated a historic disposal site, and constructed three islands. The desired future condition for Polander Lake includes a 40 percent increase in emergent vegetation and a 10 percent increase in submersed vegetation from 1989 conditions.

#### *Rationale*

The full potential of the Polander Lake project has yet to be realized although the area is showing good response by submersed aquatic vegetation. Slivinski’s report (2004) indicates that the inclusion of the additional 318 acres north of Polander Lake will increase available waterfowl food resources within the closed area by 44 percent (161 million Kcal), a substantial gain through a relatively small addition. With improved habitat, mainly for puddle ducks, and a few divers, the Polander Lake closed area should play an important role in achieving a more even distribution of waterfowl on the upper reaches of the Refuge.

## La Crosse District

### **Pool 7, Lake Onalaska Closed Area, Wisconsin, 7,369 acres**

#### *General Description*

No change is being made in entry regulations for this existing closed area. The existing Lake Onalaska Voluntary Waterfowl Avoidance Area remains in effect. Boundary adjustments are being made in three locations:

Adjust the line in Gibbs Chute where the boundary “splits” a small island vegetated predominately with reed canarygrass. The new boundary will be along the south shoreline of Gibbs Chute resulting in an estimated closed area reduction of 1.6-acres beginning in 2007.

Continue to make adjustments in the closed area boundary near Proudfoot Slough. When established in 1957, the closed area boundary in this location was defined as the east or left descending bank of the Mississippi River. Sand accretion, followed by rapid colonization by woody plants, continues to add to the barrier island complex in this area. This is the only site along the main channel portion of the closed area where this is occurring. Previous boundary adjustments occurred in 1999 (+5.7 acres added to the closed area) and 2001(+2.0 acres). Closed area addition in 2007 of about 14 acres.

Stabilize a section of the closed area boundary along the “old channel.” As island erosion has occurred, sign placement through an area dotted with small, scattered islands and emergent plant beds, has resulted in an uneven boundary. This uneven boundary allows hunters to setup “ahead” of other hunters. According to Refuge staff, a straight-line boundary was the norm in this area until the early 1980’s when the current practice was instituted. Boundary adjustment in 2007 will add less than 10 acres to the closed area.

In 1986, the 3,356-acre Lake Onalaska Voluntary Waterfowl Avoidance Area (VWAA) was established within part of the Lake Onalaska Closed Area to reduce boating disturbance to migratory waterfowl. Monitoring boater compliance with the VWAA will continue.

### *Background*

This closed area was established as a conventional closed area in 1957. Prior to 1957, the one closed area in Pool 7 was located near Hammond Chute and was known as the Hammond Chute Closed Area (1,660 acres). Known initially as the “La Crosse Closed Area,” a number of adjustments have been made to the boundary of the Lake Onalaska Closed Area since establishment, particularly along the northern boundary near Gibbs Lake and the Brice Prairie Barrier Islands.

With the exception of the southeast corner, much of Lake Onalaska is part of the Lake Onalaska Closed Area. This major backwater includes open water, interior islands, barrier island complexes with associated marsh, and flowing channels that convey water from the main channel into the lake. The arrangement of habitat types supports large concentrations representing each of the four main groups of waterfowl: diving and puddle ducks, swans, and geese, along with a variety of other marsh, waterbirds, and raptors. Peak waterbird counts in recent years include 140,000 ducks, geese, swans, coots, and White Pelicans on October 23, 2002 and 145,000 on October 27, 2003. No other closed area within the Refuge’s existing Closed Area System likely provides as much habitat for all groups of waterfowl. Wildcelery is the dominant submersed aquatic plant in the lake and provides habitat for aquatic invertebrates and panfish, and food for migrating waterfowl. Lake Onalaska also supports one of the premier panfish fisheries on the Upper Mississippi River.

Three crescent-shaped islands were constructed within the closed area in 1989-90 as part of the Lake Onalaska EMP project. Follow-up stabilization maintenance on these islands occurred in 1993 and 1998. Habitat protection projects have also been completed within the closed area. In 1986, a section of shoreline near the midpoint of the lower Brice Prairie Barrier Island was stabilized with riprap. Additional work occurred in 1992 on the southeast tip of the lower barrier island when a rock mound, rock wedge, and terminal groin were constructed. Construction work on the latest project to protect sections of the lower Brice Prairie Barrier Island and the tip of the upper barrier island was initiated in 2005 and completed in 2006. In 1988, riprap was placed along the shorelines of four small islands in the lake near Red Oak Ridge Island. “Old Cormorant” Island received shoreline protection in 1993 after a tiny remnant of the island remained. Both ends of Red Oak Ridge Island, the second largest island in the lake, were stabilized with riprap in 1995. Because of the importance

of barrier islands in protecting vegetation beds, nearly 1,400' of eroding shoreline on two barrier islands located next to the main channel in the southwest corner of the lake was stabilized in 1998. Other habitat protection projects have also been completed just outside the closed area boundary. Among the tools being considered for use in future habitat projects within or next to the closed area includes island construction and stabilization, backwater dredging, and water level management.

Commercial and sport anglers, hunters, sailors, and pleasure boaters are among the user groups recreating on Lake Onalaska in the fall. Boating disrupts feeding activities of diving ducks and other waterfowl on the lake and could reduce the quality of the closed area as a staging site (Korschgen et al. 1985). In response, the Lake Onalaska Voluntary Waterfowl Avoidance Area (VWAA) was established. When established, the VWAA included most of the high-quality wildcelery beds in the lake at the time. VWAA boundaries permit boating along principal corridors and allow access to all areas of the lake and the main channel of the river. Boaters are encouraged to avoid entering the VWAA, which is marked with buoys, from October 15 through mid-November. Boater compliance with the program was monitored in 1986-88, 1993, 1997, and 2004. In 2004, even with increased boater activity on Lake Onalaska, the proportion of lakeside boating events that resulted in disturbance to waterfowl was lower than in previous years. Many boaters also made an obvious effort to comply with the VWAA by boating around concentrations of waterfowl. During the 31 days the VWAA was monitored, 29 intrusions were noted that resulted in major disturbances (more than 1,000 birds disturbed).

The La Crosse Municipal Airport is located adjacent to the closed area on French Island. Many waterbirds using the closed area are concentrated on the south end of the lake, or under the approach to Runway 13/31. An extension to Runway 13/31 is identified as a future need in the airport master plan, which would place aircraft directly over thousands of migratory birds each spring and fall.

One of the management problems with the former Hammond Chute Closed Area were firing lines. Firing lines can be crowded, resulting in competition and confrontations between hunters, and skybusting, which often leads to an increase in the number of crippled waterfowl. In 1954, boundaries for the new Lake Onalaska Closed Area, and other Refuge closed areas, were set with the goal of eliminating firing lines. In the 1954 report recommending the current Closed Area System, Refuge Biologist "Doc" Green, justifying the boundary of the Lake Onalaska Closed Area, cautioned, "...The only possible firing line will be along the slough which forms the north boundary, and since this does go through marsh, there should not be a well developed firing line even there."

Unfortunately, a firing line did develop along a section of Gibbs Chute, which forms the northern boundary, and remains today. Preferred hunting sites along this firing line have colorful local names, e.g., Barrel Blinds, Golden Chair, Minnesota Point, and others. Within the Comprehensive Conservation Plan, addressing this issue is found in Objective 4.4 Firing Line – Pool 7, Lake Onalaska.

### *Rationale*

Under Alternative E, no change was made in entry regulations for the Lake Onalaska Closed Area to provide a benchmark for measuring long-term voluntary avoidance effectiveness and compliance as presented in the existing Lake Onalaska VWAA. This exception also recognizes the unique location of this closed area amidst heavy residential shoreline development, numerous boat launching facilities, proximity to nearby population centers, and a sailing club. This access translates into considerable boating traffic on Lake Onalaska during fall migration. Three adjustments are being made. Specific rationales include:

- # Sign maintenance and public recognition will be simplified by moving the boundary to the south side of Gibbs Chute and eliminating the “split” boundary through the small island. This change will also increase hunting opportunity.
- # Near Proudfoot Slough, the closed area boundary will continue to be the east or left descending bank of the Mississippi River. Recognizing the public desire for continued waterfowl hunting opportunity in this area, future boundary adjustments will be made with the goal of keeping the small embayment open to hunting. Any future adjustments are dependant on the rate of fill deposition and subsequent colonization by woody vegetation. Maintaining the closed area boundary near the developing shoreline is consistent with boundary management elsewhere along the main channel, reduces maintenance needs associated with establishing and maintaining a clear line through dense vegetation, and lessens safety concerns by eliminating a hunting/no hunting line in a limited visibility situation.
- # The section of boundary bordering the “old channel,” is subject to annual change from erosion and/or change in aquatic vegetation beds. In effect, the boundary over time has been moving into what was always intended as closed area. This fluctuation in perceived left descending bank also leads to continual difficulty in annual posting, confusion and concern with hunters on where the boundary is from year to year, and ambiguity for Refuge and state enforcement personnel. This situation will be corrected by adjusting the line to provide a better defined boundary visible to waterfowl hunters and law enforcement personnel alike. Alternative E seeks to strike a balance between these various needs and the desires of waterfowlers. This adjustment will result in an enlargement of the closed area of less than 10 acres.

A fourth adjustment identified in Alternative D, moving the closed area boundary to include an entire island near the former Red Sails Resort on the east side of the lake, was removed from further consideration in response to public concerns about limiting available hunting areas. It was originally proposed due to the proximity of the area to residences and potential conflicts with anglers and other water users.

## La Crosse District

### **Pool 8, Goose Island No Hunting Zone, Wisconsin, 986 acres**

#### *General Description*

The Goose Island No Hunting Zone is an existing small closed area that will be expanded by about 110 acres along the south boundary (total area of 986 acres after expansion). Although designated a no hunting zone due to proximity to Goose Island County Park, this area is part of the Refuge’s Closed Area System. The Goose Island No Hunting Zone is a small closed area (~1,000 acres or less). As a result, beginning in fall 2007, the use of motors on watercraft will not be allowed from October 15 to the end of the state duck hunting season to reduce human-caused disturbance to migratory birds. To further reduce disturbance, the public is also being asked to voluntarily refrain from entering the area from October 15 to the end of the state duck hunting season. Habitat consists of a backwater complex complete with a flowing slough, shallow lakes, a mix of submersed and emergent plants, and mini-deltas formed where breakouts occurred in the natural levee along Running Slough.

An additional expansion of 235 acres to the north, proposed in Alternative D, was dropped in Alternative E in favor of a special hunt area. Due to public concern and comment, the special hunt area has been dropped.

## *Background*

The following background material concerning the origins of the current Goose Island No Hunting Zone was obtained from annual La Crosse District narrative reports, the 1954 Closed Area Recommendations Report, and the follow-up 1957 Closed Area System Evaluation. Although details are sketchy, the Goose Island No Hunting Zone evidently began in response to a need to buffer hunters from “live decoys” present because of a Mallard propagation project. In the early 1950s, the Badger State Sportsmen’s Club (BSSC) was permitted by the U.S. Fish and Wildlife Service to propagate and release Mallards at their facility on Goose Island. In 1955, the sanctuary around the “duck project” was expanded to legally described locations and posted accordingly. This increased the size of the sanctuary from 100 to about 650-700 acres. Due to the presence of Mallards serving as live decoys, the entire area was closed to hunting. As a result, the “duck project” served as a de facto closed area, but was not recognized as such in the pre-1954 Refuge Closed Area System. When the Refuge’s Closed Area System was being revised beginning in 1954, the BSSC began moving their Mallard breeding stock off the island due to enforcement problems. Views varied on how the “duck project” fit in to the revised Closed Area System. BSSC members wanted to continue releasing mallards, and began raising and releasing wood ducks, so their preferred option was to maintain the hunting ban. Refuge personnel thought the hunting prohibition could be abandoned provided the BSSC continue to remove their breeding stock of ducks, thus eliminating the live decoy problem. Otherwise, a sizeable area would have to be posted to prohibit hunting. In the end, the area remained closed to hunting and became part of the revised Refuge Closed Area System. In addition to Mallards and Wood Ducks, Canada Geese were later propagated and released at the site. The BSSC facilities were removed from Goose Island in 1983 ending more than 30 years of waterfowl propagation at the site.

In 1972, the size of the Goose Island Closed Area expanded and hunting on the island was prohibited. This action resulted in the new designation as the Goose Island No Hunting Zone. Expansion occurred when the area south of the entrance road was added to the no hunting zone. At the same time, a 82-acre parcel west of Hunters Point Road in Vernon County was also closed to hunting. Although closed to hunting, this area is not part of the Goose Island No Hunting Zone because it offers minimal waterfowl habitat and is separated by Hunters Point Road. When open to hunting, both areas were “trouble spots” because of their proximity to the adjacent Goose Island County Park and the BSSC’s propagation project. Rifles aimed carelessly were a source of danger to park visitors, park and Refuge signs were vandalized, and geese were destroyed at the propagation project.

In recent years, the Goose Island No Hunting Zone has been one of the most heavily used puddle duck concentration areas on a per acre basis in the Refuge’s Closed Area System. The peak count of 14,820 puddle ducks occurred on November 19, 2001 and included 12,820 mallards. Canada Geese and Tundra Swans also use the area. The “mini-deltas” (particularly the upper delta) and areas protected by emergent plants or woody vegetation provide thermal cover and are important habitat features. As the hunting season progresses and food in the no hunting zone becomes limiting, the birds generally use the area for protection during daylight hours and fly out at night to feed in areas subject to too much disturbance to be used by day. When this pattern is broken, usually by inclement weather, waterfowlers in Pool 8 benefit.

The Shady Maple/BeiERS Lake area, which is part of the no hunting zone, at one time supported overwintering habitat for panfish. Use of this site for overwintering fish has been diminished as a result of flow changes and sedimentation. The public has expressed an interest in restoring panfish habitat. Balancing habitat requirements for puddle ducks, geese, and swans, with those of panfish will require careful consideration. Increased human disturbance is also a concern.

## *Rationale*

The Goose Island No Hunting Zone is being expanded by 110 acres along the south boundary. This adjustment is being made to accomplish the following:

- # Add additional puddle duck habitat to the no hunting zone. Tundra Swans and Canada Geese will also benefit.
- # Eliminate the established firing line along the current south boundary. Hunting currently takes place from several islands located along this boundary. Moving the south boundary to the edge of the Running/Wigwam Slough channel reduces the opportunities to stand along the boundary and shoot.
- # Eliminating the firing line should increase the effective size of the no hunting zone. Currently, the disturbance created by hunting pressure along the south boundary further reduces the area available to waterfowl to feed and rest.
- # An expanded no hunting zone will also increase wildlife observation viewing opportunities available to the public from pullouts along Highway 35.

To reduce disturbance to waterfowl in this small no hunting zone (<1,000 acres), a no motor regulation will be in effect from October 15 to the end of the duck hunting season. The public is also being asked to voluntarily refrain from entering the no hunting zone during this same timeframe. Hikers using the Goose Island Interpretative Trail, located within the no hunting zone, will not be affected. A section of the Goose Island Canoe Trail is also located within the no hunting zone. A “voluntary closed period,” from October 1 to November 15, has been in effect since the canoe trail was established. The dates of this “voluntary closed period” will be adjusted to match the no motor and voluntary avoidance area dates. The trail brochure will also be rewritten to reflect the changes. Periodic monitoring will be conducted to determine how well voluntary avoidance is working.

The proposed 235-acre expansion of the no hunting zone to the north, proposed in Alternative D, was dropped in Alternative E due to public comment and concern about the loss of hunting opportunity, especially for youth, and the possible impacts of no hunting in an area with an already high deer population. In Alternative E, the Goose Island Special Hunt Area was proposed for the 235-acre area. The focus of the special hunt area was to provide young waterfowl hunters, age 16 or younger, with a dedicated site close to La Crosse. Deer hunting was also allowed during the state seasons. The public showed little support for the special hunt area and it has been dropped.

## La Crosse District

### **Pool 8, Wisconsin Islands Closed Area, Wisconsin and Minnesota, 6,510 acres**

#### *General Description*

Wisconsin Islands Closed Area is an existing closed area located in the lower part of the pool. As islands in lower Pool 8 have disappeared, open water has become a more dominant feature in the closed area. Remnant and restored islands in the upper part of the closed area protect beds of submersed and emergent aquatic plants. In the recent past, submersed plants such as wildcelery have recolonized areas within the lower part of the area. Under this plan, the closed area boundaries will remain the same. The public is being asked to voluntarily avoid entering the Wisconsin Islands Closed Area beginning October 15 each year to the end of the state duck hunting season. Within the closed area and voluntary avoidance area, a travel corridor is being implemented in a section of Raft Channel, from the upper closed area boundary to the five boathouses. To minimize disturbance to waterbirds adjacent to the travel corridor, the Raft Channel Slow No Wake Zone will be in effect each fall from October 15 to the end of the state duck hunting season.

## *Background*

The Wisconsin Islands Closed Area was implemented in 1957 after lengthy study. When established, this closed area offered excellent habitat for both puddle and diving ducks. The lower end was widely used by diving ducks. Puddle ducks generally used the upper reach of the area, where the water was fairly shallow and filled with aquatic plants. Islands present at the time also provided thermal cover for the birds during stormy weather. In the 1950s, the dominant submersed aquatic plants were sago pondweed, American pondweed, and flatstem pondweed. Wildcelery, another important submersed plant, was common to locally abundant, especially at the mouths of cuts leading off the main channel. During the 1957 fall migration, the peak population of ducks recorded in this closed area was 44,620 on a November 20 aerial survey. Nearly 1.85 million duck use days (1 duck per day = 1 use day) were recorded in the closed area from late September through early December 1957. Although no species breakdown was provided for either the peak population or use days in the closed area, for the La Crosse District (Pools 7 and 8) as a whole in 1957, mallards ranked first in number of use days followed in order by wigeon, scaup, Ring-necked Ducks, Pintails, and Blue-winged Teal.

Since the 1950s, there has been an observed decline in fish and wildlife habitat conditions in lower Pool 8 and the Wisconsin Islands Closed Area due to the loss of islands and the shelter they provide plants, a decline in aquatic plants, and a decline in depth diversity. The loss of aquatic plant beds and aquatic invertebrates resulted in fewer ducks using the closed area. In 1997, for example, fewer than 100,000 duck use days were recorded during fall migration!

Beginning with the completion of Phase I/Pool 8 Islands EMP Project in 1992, habitat restoration efforts in the lower part of the pool and closed area are producing positive results. In 1995, the shorelines of several islands, both in and out of the closed area, were protected with riprap. Two “seed islands” were also constructed in the closed area. Phase II/Pool 8 Islands EMP Project, or the Stoddard Bay Project, was completed in 1999. As part of the project, an additional six “seed islands” were constructed within the closed area. Moreover, a drawdown of water levels in lower Pool 8 in 2001 and 2002 was conducted to promote the growth and establishment of aquatic plants, particularly emergent plants such as arrowhead. Planning for the next large restoration project (Phase III/Pool 8 Islands EMP Project) is under way and when completed will have restored more than 100 acres of islands in the upper part of the closed area. One of the project goals is to restore puddle duck habitat in an area along Raft Channel. Additional habitat projects are also being considered.

In response to improved habitat conditions, duck use in the Wisconsin Islands Closed Area increased dramatically beginning in fall 1998. Peak counts from aerial surveys included 112,300 Canvasbacks on November 23 and 22,025 scaup, 7,175 Common Goldeneyes, and 4,500 Buffleheads on December 2. Nearly 4.5 million diving duck use days were recorded. Puddle duck numbers also rebounded in 1998, but lagged far behind diving ducks. Large numbers of ducks, primarily diving ducks, continue to concentrate in the closed area. In fall 2005, the peak count of 109,785 occurred on November 8. Diving ducks (primarily Canvasbacks, scaup, and Ring-necked Ducks) accounted for 101,115 of the total observed while 5,730 puddle ducks were counted, mostly Mallards and Gadwall.

When the Wisconsin Islands Closed Area was established, the focus was on providing migration habitat and protection for ducks. Few geese and Tundra Swans used the Upper Mississippi River in the 1950s and those that stopped remained only a short time. For example, the peak combined population of Canada Geese and Snow/Blue Geese observed on Pools 7 and 8 was about 300 in 1957. That year the peak tundra swan count in the Wisconsin Islands Closed Area was 13. Today, peak Canada Goose counts are about 2,500 in the closed area, while Tundra Swans typically exceed 10,000. Snow/Blue Geese are rarely observed.

In the 1950s, human use in the Wisconsin Islands Closed Area was a concern, just as it is today. One of the reasons for proposing this location as a closed area in the 1950s was to minimize human

disturbance to waterfowl. This area was of sufficient size to afford sanctuary to the birds. Further, in the 1950s, few small boats were expected to travel into the area except in calm weather. Now, larger boats and changing propulsion technology and availability (e.g., airboat, go-devil, beavertail, hovercraft, etc.) result in access in all kinds of weather. Monitoring human entry into the closed area was conducted in fall 2001. Ninety-one of 468 (19 percent) boating events documented during 132 hours of observation intruded into the closed area.

*Rationale:*

No change was made in the size of the Wisconsin Islands Closed Area. In recent years the cumulative impact of habitat projects has resulted in an increase in the density and distribution of aquatic plants and invertebrates. Waterfowl are responding. Future habitat projects, beginning with Phase III/Pool 8 Islands EMP Project, are expected to restore additional acres of waterfowl habitat.

The public is being encouraged to voluntarily avoid entering this closed area from October 15 each year to the end of the state duck hunting season to reduce disturbance to staging waterfowl. Periodic monitoring will be conducted to determine how well the voluntary avoidance is working. A travel corridor is being established in the upper end of the closed area in a section of Raft Channel to provide access to a commercial business and five boathouses that are located adjacent to or within this reach of the closed area. To minimize disturbance adjacent to the travel corridor, the Raft Channel Slow No Wake Zone is being established within the travel corridor and will be in effect each fall from October 15 to the end of the state duck hunting season. Buoys will be placed in Raft Channel to mark the boundaries.

The proposed 32-acre expansion of the closed area along Raft Channel in the upper corner of the closed area, identified in Alternative D, was dropped in response to public concerns about limiting available hunting areas.

Mc Gregor District

**Pool 9, Pool Slough, Minnesota-Iowa, 1,112 acres**

*General Description*

Pool Slough closed area was established as a conventional closed area in September 2003. Proposed actions under Alternatives D and E change that designation to a sanctuary, no entry October 1 to the end of the state duck hunting season. The area includes the majority of the Winnebago Creek delta and portions of the former backwater channel of the Upper Iowa River known as Pool Slough and its associated delta. The area lies adjacent to the Pool Slough EMP project scheduled for completion in 2007 on land owned and managed by the State of Iowa.

*Background*

Pool Slough is a flowing former backwater channel of the Upper Iowa River. The proposed Pool Slough sanctuary includes portions of this former channel and the deltas associated with this slough and the Winnebago Creek.

*Rationale*

This closed area is needed to provide a balanced and effective network of feeding and resting areas for waterfowl, particularly puddle ducks, the length of the Refuge. Energetic studies (Slivinski, 2004) indicate that this closed area will secure an additional 429 million Kcals of estimated gross energy for waterfowl in the area.

The change to “Sanctuary” classification will help optimize the effectiveness of the new moist soil units to be constructed on the adjacent Iowa DNR lands and coincide with their management. The original closed area was established in support of the Pool Slough EMP project. When completed this EMP project and associated sanctuary will help shorten the large gap (25.3 miles) between the Wisconsin Islands Closed Area and Harpers Slough Closed Areas.

Closure to all public use during the proposed period coincides with the sanctuary status on adjacent lands managed by the State of Iowa to minimize disturbance during the duck season and support and optimize water bird use of the marsh management units. Reduced human caused disturbance within Pool Slough closed area would also enhance wildlife viewing opportunities along the Army Road east of New Albin, and perhaps from the overlook platform adjacent to Highway 26, north of New Albin.

### Mc Gregor District

#### **Pool 9, Harpers Slough, Iowa-Wisconsin, 5,209 acres**

##### *General Description*

Harpers Slough is a large open water area in the lower part of the pool interspersed with emergent and submergent aquatic vegetation and small wooded islands. This existing closed area would be classified under Alternative E as a “large” closed area (greater than 1,000 acres) with a voluntary avoidance area designation from October 15 to the end of the state duck hunting season. Under this proposal the public will be asked to voluntarily avoid entering the area during the stated time period to minimize disturbance of waterfowl.

##### *Background*

The existing Harpers Slough Closed Area was established in 1957 and 1959. At that time it was predicted to hold high numbers of waterfowl and it has ever since. The abundance of aquatic vegetation and wooded islands that provide birds protection from strong winds has remained somewhat intact or is being restored through EMP projects.

##### *Rationale*

Harpers Slough is a critical feeding and resting area for waterfowl during the fall migration, often having more use than any closed area on the Refuge. It plays a critical role in minimizing disturbance to waterfowl utilizing both the closed area and the open water area in front of Sugar Creek. This area is one of the most important migratory rest stops on the Refuge for canvasback ducks and tundra swans. During peak migration periods up to one quarter of the world’s Canvasback population has been observed resting and feeding in this area. Large concentrations of puddle ducks and additional diving duck species are commonly recorded as well during both fall and spring migration periods. The current closed area boundaries have undergone only slight modification since 1958. Pool 9 is the most productive (Kcal) pool on the Refuge (Slivinski, 2004).

Harpers Slough Closed area protects 14 percent of the pool’s estimated 16,810 million Kcal production for use by migrating waterfowl. The Harpers Slough EMP project is in the planning stages. This project will protect and enhance island habitat and aquatic plant communities, and improve fisheries habitat within the closed area.

## Mc Gregor District

### **Pool 10, Sturgeon Slough, Wisconsin, 340 acres**

#### *General Description*

Sturgeon Slough closed area encompasses 340 acres of backwater sloughs, channels, and forested islands in an area north of the Highway 18 bridge. Most waterfowl use is by wood ducks and mallards. Sturgeon Slough is classified as a “small” closed area (less than 1000 acres) and is closed to the use of motors and is a Voluntary Avoidance area from October 15 to the end of the state duck hunting season. Under this designation, the use of motors will not be allowed and the public will be asked to voluntarily avoid entering the area during the stated time period to minimize disturbance to waterfowl.

There is a hiking trail within the closed area that starts just north of the Highway 18 bridge. It then extends to the old road causeway and loops back. The trail is surrounded by a 66-acre no hunting zone established under Alternative E (first proposed in Alternative D) to prevent conflicts between hikers and hunters. This no hunting zone remains active throughout the entire hunting season under Alternative E.

#### *Background*

Prior to 1957, Pool 10 had two closed areas, one at McGregor Lake and one at Sny Magill. Both areas were designated on the basis of Refuge ownership alone and were not very desirable for waterfowl. These closed areas were dropped because of lack of aquatic vegetation and lack of waterfowl use. The Bagley Bottoms area, south of the Wisconsin River delta, was recommended as a new closed area but was never so designated. Since 1957, Pool 10 has had only one closed area (12-Mile Island, 540 acres) in the lower part of the pool. It is contiguous with the 12-Mile Island closed area in Pool 11. However, it is 33 miles south of the Harper’s slough closed area in Pool 9. This distance creates a large gap in the network of stepping stones of habitat that provide resting and feeding areas for migrating waterfowl.

The first draft of Alternative E proposed to establish the McGregor Lake closed area (852 acres), located north and south of the Highway 18 bridge. This area was to be closed to waterfowl hunting from the beginning of the state duck season through October 31 and then open to hunting from November 1 through the remainder of the state duck season. McGregor Lake closed area was paired with the Wisconsin River Delta closed area, which was to open early season and close November 1 (see below), as a dual function area to provide a continually active closed area throughout the season within this portion of the pool.

Citizen concerns received during the public comment period indicated confusion with the “dual function” concept presented by the McGregor Lake/Wisconsin River Delta “flip-flop” proposal. In response, the final Alternative E establishes a standard “small” closed area north of the Highway 18 bridge. This new area is called the Sturgeon Slough closed area. The portion of the McGregor Lake area south of the Highway 18 bridge is now dropped from any closed area designation, due to marginal waterfowl habitat and its importance to sport fishing, and remains open to public use under Alternative E.

Sturgeon Slough closed area is primarily used by wood ducks. Although not heavily used by waterfowl at this time, it will provide the birds a relatively secure resting area during the duck hunting season .

The Wisconsin River Delta closed area proposed under the draft Alternative E is now a special hunt area (see below).

### *Rationale*

Sturgeon Slough closed area and the Wisconsin River Delta Special Hunt area are established in response to public concerns over the confusion of “dual function” closed areas and the retention of early season hunting in this section of Pool 10. This action will provide continuous closed area conditions during the duck hunting season within this portion of Pool 10 and shortens the long distance, 31 miles, between Harper’s Slough and 12-Mile Island closed areas. Sturgeon Slough is 11.4 miles south of Harper’s Slough closed area. The Sturgeon Slough closed area will primarily serve for local birds, particularly wood ducks, and early migrants.

### Mc Gregor District

#### **Pool 10, Wisconsin River Delta Special Hunt Area, Wisconsin, 1376 acres**

### *General Description*

The Wisconsin River Delta special hunt area contains excellent waterfowl habitat that includes small backwater wetlands and areas of open water interspersed with sloughs and wooded islands. One larger lake, Gerndt Lake, contains the best waterfowl habitat and receives the most hunting activity. Both submersed and emergent vegetation are present.

The Wisconsin River Delta Special Hunt Area is closed to all hunting and trapping November 1 to the end of the State duck hunting season. It is designated a voluntary avoidance area during those same dates when the public is asked to voluntarily avoid entering the area minimize disturbance of waterfowl. This designation allows for early season hunting. The size of the Wisconsin River Delta closed area is reduced 169 acres from earlier proposals to keep boat access channels outside the closed area.

### *Background*

In the draft Alternative E, the Refuge proposed to create a new “large” closed area (greater than 1,000 acres) just north of the confluence of the Wisconsin and Mississippi Rivers called the Wisconsin River Delta. This would have been a dual function closed area with the McGregor Lake closed area to the north. Comments received during the public comment period indicated some confusion with the “dual function” concept presented by the McGregor Lake/Wisconsin River Delta “flip-flop” proposal, therefore, the Wisconsin River Delta closed area has been modified as a special hunt area. See above for additional background presented for Sturgeon Slough.

The Wisconsin River Delta closed area was proposed in Alternative D to satisfy two critical waterfowl management needs of this portion of the Refuge:

- 1) It would establish a mid-pool closed area in Pool 10, halving the existing distance (31 miles) between closed areas and
- 2) It would provide good dabbling duck habitat in a closed area. Both purposes contribute to management goals of achieving a more optimal distribution of waterfowl throughout the Refuge.

### *Rationale*

Under Alternative E, the closed area configuration is changed to a special hunt area. As such, it continues to address management goals, but to a lesser degree. Changes were made in response to public input that acknowledged the need for closed areas but wanted continued early season hunting opportunities in the proposed Wisconsin River Delta area. There were several suggestions to establish a closed area in the McGregor Lake area rather than the delta. Thus, the establishment of the Sturgeon Slough closed area and the Wisconsin River Delta special hunt areas meet management objectives and public concerns. This configuration allows hunters to take advantage of opening weekend and early migrants while still filling a gap for relatively secure resting and feeding areas for the bulk of dabbling duck migrants later in the season. Allowing early hunting opportunity also alleviates any economic impacts from this new closed area. The Sturgeon Slough area serves as closed area for local birds, especially wood ducks, and other migrants.

Wisconsin River Delta and Sturgeon Slough provide the best combination of spacing, food, and habitat in order to fill the 31-mile gap between stepping stones of secure migration habitat at Harpers Slough in Pool 9 and 12-Mile Island in lower Pool 10. The Delta also provides greater potential gross energy (plant foods) than other potential closed areas in Pool 10 (Slivinski, 2004). See further discussion of the topic in Chapter 2, Alternative E, Objective 4.2.

### Mc Gregor District

#### **Pool 10. 12-Mile Island, Iowa, 540 acres**

### *General Description*

Under Alternative E, this existing closed area is classified as a “small” closed area (less than 1,000 acres) and therefore, is closed to the use of motors and designated a Voluntary Avoidance Area October 15 to the end of the regular state duck hunting season. Under this proposal the use of motors would not be allowed and the public will be asked to voluntarily avoid entering the area during the stated time period to minimize disturbance of waterfowl.

The area is bounded by the main channel on the west and another channel on the east. The area consists of forested narrow island chains that support and protect an extensive marsh complex with both emergent and submergent plant communities. Water depths throughout the area are shallow.

### *Background*

This closed area was established as part of a larger (12 Mile Island, Pool 11) closed area in 1957. Fall waterfowl (diving ducks, puddle ducks, swans, and Canada Geese) use within the closed area is greater than any place within Pool 10. The area is bordered to the east by Ferry Slough which is the site of the most concentrated hunting pressure in Pool 10. Because of the open nature of the area, and the arrow head configuration of the landmasses, disturbances from boaters or other intrusions result in birds leaving the area. There is intense hunting pressure surrounding the area. In recent years thousands of mallards have used the closed area to stage each evening before feeding in the surrounding agricultural fields. Given the shallow nature of the area little fishing occurs within it.

### *Rationale*

This existing closed area is needed to provide waterfowl a more balanced and effective network of feeding and resting areas. The “small” classification designation that includes voluntary avoidance and no motors designation after October 15, will prevent unnecessary disturbances to waterfowl in

this small and narrow closed area. This closed area, like the Pool 11 component to the south will also provide an undisturbed loafing and staging location for birds utilizing the adjacent moist soil units.

### Mc Gregor District

#### **Pool 11, 12-Mile Island, Iowa, 1145 acres**

##### *General Description*

Under Alternative E, this existing closed area is classified as a “large” closed area (greater than 1,000 acres) and includes travel corridors (Skimmer Horn Slough and Ackerman’s Cut). The 12-Mile Island closed area is designated a voluntary avoidance area October 15 to the end of the state duck hunting season. Under this proposal the public is asked to voluntarily avoid entering the area during the stated time period to minimize disturbance of waterfowl. Habitat within 12-Mile Island is characterized by timber-lined back water sloughs and lakes, with some small emergent and submersed vegetation marshes.

##### *Background*

This closed area was established as part of a larger conventional closed area in 1957. The area receives its greatest waterfowl use late in the migration season and usually as a response to surrounding hunting pressure. The closed area also holds migrants on a daily basis that utilize the Guttenberg Ponds moist soil units bordering it to the north. Guttenberg Ponds is designated as a sanctuary within this closed area under Alternative E (see below). Little fishing occurs within the area except along the two proposed travel corridors.

##### *Rationale*

This existing closed area remains a closed area. It is needed to provide waterfowl a balanced and effective network of feeding and resting areas, and to continue to provide an undisturbed loafing and staging location for birds utilizing the adjacent moist soil units.

### Mc Gregor District

#### **Pool 11, Bertom McCartney, Wisconsin, 2,384 acres**

##### *General Description*

Under Alternative E, the Bertom McCartney closed area retains its existing conventional closed area regulations with no changes. The current area includes islands and water from river mile 599 on the south, to river mile 603.5 on the north. The area’s best waterfowl habitat with both emergent and submersed aquatic vegetation is located in the northern portion (Hay Meadow Lake) of the closed area. The remaining area contains pockets of emergent vegetation, open water areas, and timber lined sloughs.

##### *Background*

This closed area was established as a conventional closed area in 1957. For the last 20 years the most southerly boundary of this closed area has moved south each season following any new sediment deposition on the island that forms its southerly boundary. The Refuge’s newly renovated Bertom McCartney Boat Landing is within the closed area. The closed area was also the site of the District’s

first EMP project, constructed in 1994, to rehabilitate backwater sloughs primarily for the benefit of winter fish. The area has traditionally had an excellent fishery and continues as a result of the EMP project.

### *Rationale*

This existing closed area remains a conventional closed area. It is needed to provide migrating waterfowl a balanced and effective network of feeding and resting areas. Originally under Alternative D the southern portion of the closed area was proposed to be removed. This proposal, however, is now dropped in lieu of the food resources report (Slivinski, 2004) that indicated there would be a significant net loss in available food within the Pool with this action, (despite adding the John Deere Marsh Closed Area). Waterfowl use remains highest within the northern part of the closed area; however, the smaller pocket marshes in the remainder of the closed area receive considerable waterfowl use later in the fall. Diving ducks also utilize the open water portions of the area, especially during days when strong Northwest winds drive the birds from the open water stretches elsewhere in the Pool. The continued use of existing closed area regulations in this area is important to maintain because of the fisheries resources within its boundary and the presence of a Refuge boat landing within the area. Given the size and inaccessibility of the northern portion of the area, fishing pressure should not disturb birds. In addition, most of the waterfowl use occurring within the southern portion of the closed area occurs after the traditional bass fishing season has ended.

### Mc Gregor District

#### **Pool 11, Guttenberg Ponds, Iowa, 252 acres**

### *General Description*

Under Alternative E, Guttenberg Ponds is designated a waterfowl sanctuary (no entry October 1 to the end of the state duck hunting season). It is located within the existing 12-Mile Island closed area. The specific area includes the Guttenberg Ponds moist soil units and Big Pond located to the south and adjacent to the moist soil units. Water levels in the 50-acre moist soil units are managed seasonally for migrating water birds, primarily waterfowl in the fall. Typically thousands of waterfowl utilize the area each fall feeding on moist soil plants within the flooded units.

### *Background:*

The entire proposed area was originally part of the Guttenberg National Fish Hatchery which was abandoned and turned over to the Refuge. The proposed sanctuary area is within a conventional closed area established in 1957. The moist soil units were constructed in 1994 during the Bussey Lake EMP project. Big Pond currently has water control structures on it; however, they have not been functional since the 1960s. Big Pond is well known for pan fishing but is not accessible except during periods of high water in the spring. Prior to this proposal the Refuge sought and received concurrence from Iowa DNR to establish a “No Entry Area” at this location.

### *Rationale*

The proposed sanctuary is needed to minimize disturbance to feeding and resting waterfowl. The current berm structures surrounding the two ~25 acre moist soil units are insufficient to buffer waterfowl from individuals walking on the berms or in the area. Birds are flushed with each disturbance and forced to relocate in areas open to hunting or leave the area. The Big Pond area functions with the moist soil units to allow open water loafing and a staging area for migrants prior to their arrival within the units each day.

## Mc Gregor District

### **Pool 11, John Deere Marsh, Iowa, 405 acres**

#### *General Description*

Under Alternative E, John Deere Marsh closed area is established at the confluence of the Little Maquoketa and Mississippi Rivers. The south portion of the area contains a developing emergent plant community extending into the open water expanses of lower Pool 11. The northern portion of the closed area consists of a well established emergent community forming a rich wetland band along the shore line. Both areas contain significant submersed vegetation communities in some years, depending on river conditions. It is classified as a “small” closed area (less than 1,000 acres) and therefore, is closed to the use of motors and designated a Voluntary Avoidance Area October 15 to the end of the regular state duck hunting season. Under this proposal the use of motors would not be allowed and the public will be asked to voluntarily avoid entering the area during the stated time period to minimize disturbance of waterfowl.

“Walk-in” hunting will be encouraged in an area between the two sections of this closed area.

#### *Background*

The south portion of this closed area has expanded from a few small spoil placement sites into an ever-expanding emergent marsh over the last 25 years. The forces driving this development are a result of sediment within the Little Maquoketa River watershed and are expected to continue. The northern wetland component within this closed area has remained fairly stable over the same time period. The deflective berms associated with the Mud Lake EMP project (completed 2006) just upriver from this location should provide additional benefits to this marsh as time passes. Because the area is close to Dubuque, Iowa it receives considerable hunting pressure, especially during opening weekend. However, the birds that utilize the area soon leave due to the fact that there are no protected areas to harbor them. The John Deere Marsh area is one of three wetland complexes (Sunfish Lake, Wisconsin. Mud Lake, Iowa.) within the open water area of lower Pool 11. Hunting is permitted in both of these other two locations.

#### *Rationale*

This new closed area is needed to shorten the 29.7-mile gap between Bertom McCartney Lake closed area to the north and the proposed Kehough Slough closed area to the south. In addition the other more heavily hunted locations in the lower portion of Pool 11 will benefit because birds will remain in the area, having a relatively secure location for waterfowl to feed, rest and meet other life requirements. This should provide hunters in the area a more quality hunt over the course of the season. The closed area proposed in Alternative D included all lands within the Refuge at John Deere Marsh. After receiving public comments about the lack of walk-in hunting areas in proximity to Dubuque, the proposal was altered. The new configuration allows hunting in the area bordered to the south by the John Deere intake channel, and to the north by the Little Maquoketa River on all lands within the Refuge east of the railroad. This adjustment allows the hunting public to use one of the few walk-in areas in lower Pool 11, and not jeopardize the functionality of the remaining closed area.

## Mc Gregor District

### **Pool 11, Lower Pool 11 No Open Water Hunting Area, Wisconsin, 4000 acres**

#### *General Description*

The Lower Pool 11 No Open Water Hunting Area is located as follows (see map, Appendix P): All waters within the state of Wisconsin on the Mississippi River from river mile 586.3 to river mile 592.1 as described: **North** boundary (RM 592.1) is formed by a line between Specht's Ferry located on the Iowa shoreline NE across the main channel to the Potosi Point jetty on the Wisconsin shoreline. **East** boundary is the Wisconsin shoreline. **South** boundary (RM 586.3) is formed by a line from the John Deere deflection dike on the Iowa shoreline east across the main channel to Fenley Bluff on the Wisconsin shoreline. **West** boundary formed by State boundary between Wisconsin and Iowa.

Under Alternative E, open-water waterfowl hunting is prohibited in the described area in accordance with general Wisconsin open-water hunting regulations/definitions summarized as follows:

No person may hunt waterfowl in open water from, or with the aid of, any blind including any boat, canoe, raft, contrivance, or similar device. Open water is defined as any water beyond a natural growth of vegetation rooted to the bottom and extending above the water surface of such height as to offer whole or partial concealment to the hunter. Dead stumps and dead trees in the water do not constitute a natural growth of vegetation. Hunting is permitted in any open water area provided the hunter is standing on the bottom without the aid of a blind. Blinds include, but are not limited to, any boat, canoe, raft, or similar device that provides any concealment for the hunter.

#### *Background*

Until the 1980s the area was an important staging and feeding area for diving ducks, primarily Scaup, which fed on fingernail clams and aquatic insects. During the 1980s, the fingernail clam population crashed, and waterfowl use of the area virtually ceased. In recent years, submersed vegetation, such as wild celery, has become established in portions of the area and once again Canvasback, scaup, and Ring Necks are using the area, for example, 47,000 Lesser Scaup and 5,000 Canvasback in November 2004. Other than lower pool 9, this area receives the second highest diving duck use in the entire McGregor District. It also provides the only major staging and feeding area for divers between Pools 9 and 13, a distance of 125 river miles.

#### *Rationale*

In the Grant County portion of Pool 11, open water hunting is allowed through a special exemption to the Wisconsin regulations. The prohibition of open-water hunting in the designated a portion of the Refuge limits disturbance of thousands of Canvasback and Lesser Scaup that migrate through the Refuge, two species of management concern due to relatively small or declining populations. This action represents a scaling-back of proposals in earlier alternatives based on public input, and to ensure the action targets the current area of need versus potential need triggered by any state open water regulation changes, which may, in fact, never materialize.

## Savanna District

### **Pool 12, Kehough Slough, Illinois, 343 acres**

#### *General Description*

Under Alternative E, Kehough Slough is classified as a “small” closed area (less than 1,000 acres) that will be closed to the use of motors and designated a voluntary avoidance area October 15 to the end of the state duck hunting season. Under this proposal the use of motors would not be allowed and the public will be asked to voluntarily avoid entering the area during the stated time period to minimize disturbance of waterfowl.

The area is characterized as a backwater lake that contains extensive emergent vegetation surrounded by floodplain forest. Water levels are dependent upon Mississippi River levels and average 6-18 inches deep. Kehough Slough is an isolated area with only one primary entry/exit channel, it is located in the middle of a chain of seven backwater lakes, and is protected from river currents, as well as wind and wave action.

#### *Background*

There are no historic closed areas in Pool 12. Kehough Slough is currently used by waterfowl hunters and fishermen, but minimal recreational boating or commercial fishing occurs in the area due to shallow water levels. There is an EMP project planned for Kehough Slough, with funding proposed for 2010. The EMP project includes the deepening of 6 backwater lakes for overwintering fish habitat. The EMP project will minimally impact the use of this area by waterfowl, but will encourage other recreational use, especially fishing.

#### *Rationale*

Pool 12 has no existing closed areas. Kehough Slough is located in about the middle of Pool 12 and will be important in the stepping stone concept of providing closed areas for waterfowl by decreasing the existing 46 mile gap between closed areas. It is 18 miles south of the proposed John Deere Marsh closed area in Pool 11 and 15 miles north of the existing Pleasant Creek closed area in Pool 13.

Although Kehough Slough is small in size, it contains a diversity of preferred waterfowl foods and habitat. Energetic studies by Slivinski (2004) show that other areas south of Kehough Slough (Wise Lake) would provide significantly more gross energy for waterfowl. However, Kehough Slough was selected because it is more centrally located within Pool 12 and the Wise Lake area, now with moderate levels of hunting pressure, is within 5 miles of the bottomland east of Crooked Slough on the Lost Mound unit in Pool 13, closed to human entry due to the presence of contaminants. In effect, this part of Lost Mound functions as a closed area, further meeting waterfowl management goals of the Refuge. Kehough Slough lake is isolated from other nearby lakes and will provide undisturbed resting and feeding areas. Due to its isolated location in a forested backwater area, a firing line situation should not develop. There are other backwater lakes located above and below Kehough Slough that will remain open to public access. Waterfowl hunting opportunities in these adjacent backwater lakes should improve due to an increase in waterfowl concentrations in Kehough Slough.

## Savanna District

### **Pool 13, Pleasant Creek, Iowa, 2,067 acres**

#### *General Description*

Pleasant Creek is an existing closed area and in Alternative E it is classified as “large” (greater than 1,000 acres) closed area and thus designated a voluntary avoidance area October 15 to the end of the state duck hunting season. Under this proposal the public will be asked to voluntarily avoid entering

the area during the stated time period to minimize disturbance of waterfowl. The 536-acre reduction in size of the closed area proposed in Alternative D continues in Alternative E. The area is characterized by a wetland complex of five backwater lakes and a moist soil impoundment located adjacent to the lakes. The entire area is surrounded by floodplain forest. There is restricted boat access into this backwater complex due to shallow sloughs and a low levee surrounding the area.

### *Background*

Pleasant Creek is an existing closed area that was established in 1957. It is a management unit in which all of the backwater lakes have water control structures and are surrounded by a 5-mile long perimeter levee with two concrete spillways. A 49-acre moist soil unit was completed in 2003 under an EMP project and provides water level management capabilities to promote emergent vegetation. The area receives significant waterfowl use by providing undisturbed resting and feeding areas.

### *Rationale*

Pleasant Creek is a management unit that has been developed specifically to control water levels for the production of wetland plants, especially waterfowl foods. The extensive low levee system with water control structures and pump station provide capabilities for habitat management. In addition, the isolation of this backwater complex provides an undisturbed area for resting and feeding. Due to its isolation, firing lines have not developed. Pleasant Creek is a successfully functioning management unit that provides valuable habitat for waterfowl. It is important in the stepping stone concept of providing closed areas for waterfowl, with Kehough Slough located 15 miles to the north and Spring Lake located 12 miles to the south. Pleasant Creek has consistently attracted puddle ducks, making it one of the largest puddle duck concentration areas on the Refuge.

The reduction in acreage of the closed area is the result of eliminating a forested tract on the south boundary that contains small pothole areas, but has no sizeable water areas for waterfowl. This opens a significant area to upland game hunting without influencing the effectiveness of the closed area.

## Savanna District

### **Pool 13, Spring Lake, Illinois, 3,686 acres**

#### *General Description*

Under Alternative E, Spring Lake will continue to be a waterfowl Sanctuary, no entry October 1 to the end of the regular state duck hunting season. The lake is a large backwater complex that is divided into Upper Spring Lake and Lower Spring Lake. Upper Spring Lake includes about 600 acres divided into three moist soil units that are intensively managed with water control structures and a primary pump station. Lower Spring Lake includes about 3,000 acres, water levels are dependent upon river stages, and the average water depth is about 12-18 inches with extensive emergent vegetation present; a 28-acre levied moist soil unit is within Lower Spring Lake that contains a water control structure and a pump station for water level manipulation. A 12-mile perimeter levee surrounds Spring Lake with boat access into Lower Spring Lake, but the cross dike prohibits boat access into Upper Spring Lake.

#### *Background*

Spring Lake is an existing waterfowl Sanctuary that was established in 1957. An EMP project was completed in 1998 that rehabilitated the extensive levee system, constructed four moist soil units, and replaced the deteriorated water control structures and pump station. Water levels in the moist

soil units are intensively managed for emergent vegetation production primarily for the benefit of waterfowl. Spring Lake continues to provide excellent habitat and attracts large concentrations of waterfowl. A firing line is established on the southern boundary of Spring Lake, but has not been a significant problem.

#### *Rationale*

Spring Lake is a successfully functioning waterfowl sanctuary. The extensive levee system, with water control structures and pump stations, provide capabilities for intensive habitat management. The production of waterfowl foods has consistently attracted puddle ducks making it one of the largest fall puddle duck concentration areas on the Refuge. Average annual puddle duck use-days on Pool 13 (the bulk of which are at Spring Lake) for the period 1997-2002 reached 1.5 million use-days, about equal to total puddle duck use on Pools 7, 8, and 9 during the same period. Spring Lake is also an important in the stepping stone concept of closed areas with Pleasant Creek closed area located 12 miles north and Elk River closed area located 1 mile southwest.

#### Savanna District

##### **Pool 13, Elk River, Iowa, 1,237 acres**

#### *General Description*

Elk River is an existing closed area and is classified as “large” (greater than 1,000 acres) closed area under Alternative E. It will be designated a voluntary avoidance area October 15 to the end of the state duck hunting season. Under this proposal the public will be asked to voluntarily avoid entering the area during the stated time period to minimize disturbance of waterfowl. This area contains extensive open water and sand bars with minimum submergent or emergent vegetation present. The area is primarily used by waterfowl as loafing habitat. Elk River is not a highly visited recreation area or a travel corridor due to shallow water levels.

#### *Background*

Elk River was established as a closed area in 1957. The area has no habitat management capabilities and water levels are dependent upon Mississippi River levels and range from 6-18 inches deep. Due to shallow water levels, the area is not a popular commercial fishing area or recreation area. The area has consistently attracted puddle ducks and Canada Geese over the years. Hunters tend to concentrate on the eastern boundary of Elk River, but this has not developed into a significant firing line problem.

#### *Rationale*

Elk River continues to attract concentrations of waterfowl, especially dabblers and Canada Geese. The area is important in the stepping stone concept of closed areas with Spring Lake located 1 mile north and Beaver Island located 12 miles south. Although there are no habitat management capabilities, the extensive open water and sand bars provide excellent undisturbed loafing habitat. The concentration of waterfowl in Elk River has benefited hunting in adjacent areas.

## Savanna District

### **Pool 14, Beaver Island, Iowa, 717 acres**

#### *General Description*

Under Alternative E, Beaver Island is established as a new “small” closed area (less than 1,000 acres) and therefore, will be closed to the use of motors and be designated a Voluntary Avoidance Area October 15 to the end of the regular state duck hunting season. Under this configuration the use of motors would not be allowed and the public will be asked to voluntarily avoid entering the area during the stated time period to minimize disturbance of waterfowl.

The area is characterized by a backwater lake containing emergent vegetation surrounded by floodplain forest. The area has no habitat management capabilities and water levels are dependent upon Mississippi River levels and range from 6-12 inches deep. Beaver Island is an isolated area with one primary entry/exit channel and is protected from Mississippi River currents and from wind and wave action.

#### *Background*

There are no closed areas in Pool 14. Beaver Island is currently used by waterfowl hunters and anglers, but minimal recreational boating or commercial fishing occurs in the area due to shallow water levels. At this time, no EMP projects have been funded for Beaver Island.

#### *Rationale*

Beaver Island is a new closed area to be established within Pool 14, which has no existing closed areas. It is located in about the middle of Pool 14 and will be important in the stepping stone concept of closed areas with Elk River located 12 miles to the north. There are no other Refuge closed areas in Pool 14 and Beaver Island will be the last downriver closed area on the Refuge.

Although Beaver Island is small in size, it contains a diversity of habitat, and is isolated to provide undisturbed resting and feeding areas. Due to its isolated location in a forested backwater area, a firing line situation should not develop. There are adjacent backwater areas located west of Beaver Island that will remain open to public access. Waterfowl hunting in these adjacent backwater lakes should improve due to an increase in waterfowl concentrations within the closed area.

## Attachment 1, Appendix Q

### Comments and Response on Waterfowl Disturbance Threshold and Related Waterfowl Hunting Closed Area Issues

The following comments are paraphrased from written comments received via e-mail during the public comment period (December 5, 2005 to March 6, 2006) on Alternative E, Supplement to the Draft Comprehensive Conservation Plan and Environmental Impact Statement for the Upper Mississippi River National Wildlife and Fish Refuge. The comments provided a useful basis for a more detailed discussion of the science behind some of the proposals in Alternative E.

Specifically, the comments were in response to the proposed human-caused disturbance threshold described in Objective 4.2 Waterfowl Hunting Closed Areas contained in Alternative E: Modified Wildlife and Integrated Public Use (pages 20-22 of the full supplement).

Refuge staff developed responses for each comment with important contributions and review by Kevin Kenow of the U.S. Geological Survey. Comments are numbered and in bold, followed by the collective refuge and USGS response.

- 1) ***Food is by far the most important factor that attracts and holds birds in an area. If adequate food is available, birds will tolerate moderate to heavy levels of disturbance.***

*Response:* In a study of three migration areas along the Illinois River that afforded varying degrees of protection, Bellrose (1954, Jour. Wildl. Mgmt, 18:160-169) concluded that security was the factor governing the relative degree of use made of the areas by waterfowl. Jahn and Hunt (1964, Duck and Coot Ecology and Management in Wisconsin) suggested that even the best habitats will be lightly, if at all, used by migrant ducks if human disturbance is excessive. On the Upper Mississippi River National Wildlife and Fish Refuge, Green (1954, Closed Area Recommendations Report) wrote:

“Wildlife habitat conditions in the Goose Island and Crosby Slough Closed Areas (both were located west of Goose Island, Pool 8) are satisfactory, and when we could control boat travel they were widely used by birds. There is ample marsh and aquatic growth to accommodate the ducks, but heavy use by boaters and fishermen militate against use by waterfowl to the extent previously experienced. It is therefore felt that an exchange should be made in order to find a closed area where the birds will not be molested. We feel that Wisconsin Island will fulfill these needs.”

- 2) ***The threshold of one major disturbance per day based on a season-long average is not relevant to any sort of scientifically measurable impact for most waterfowl using the Upper Miss Refuge. In Alternative E, a major disturbance is defined as a human intrusion which displaces 1,000 waterfowl or 50 percent of the waterfowl present in a closed area, whichever is less.***

*Response:* As summarized in the full text of Alternative E, the new policy on setting a threshold of disturbance to guide future entry and use regulation decisions was based on state and public comments received during the first comment period. However, given the food and rest needs of waterfowl in migration, it is recognized that no human disturbance is optimum. Thus, the disturbance rate of one major human-caused disturbance per day is not intended to represent a purely biologically-accepted threshold of disturbance, but a balance between the needs of

waterfowl and the realities of a large open river system, various authorities, different user groups, abundant access points, and the level of surrounding development.

Waterfowl using the Upper Miss Refuge in fall include puddle ducks, diving ducks, geese, and Tundra Swans. According to Korschgen and Dahlgren (1992, Fish and Wildlife Leaflet 13.2.15), not all waterfowl are equally sensitive to disturbance. Among those most vulnerable include diving ducks, especially canvasbacks and lesser scaup. Also, large flocks of waterfowl are more susceptible than small flocks.

We used results from the last three monitoring episodes for the Lake Onalaska Voluntary Waterfowl Avoidance Area (VWAA) in setting the threshold. Although the VWAA benefits many species of waterfowl, diving ducks, including canvasbacks, likely benefit the most. Each year, observations were conducted from 15 October through 14 November, **or 31 days**. Boats intruded into the VWAA in 1993 on 74 occasions and resulted in disturbance to waterfowl present in the VWAA in 44 instances (17 minor and **27 major disturbances**). A minor disturbance is defined as <1000 birds and a major as >1,000 birds. In 1997, boats intruded into the VWAA on 53 occasions and disturbed waterfowl in 51 instances (22 minor and **29 major disturbances**). In 2004, boats intruded into the VWAA on 71 occasions and resulted in disturbance to waterfowl present in the VWAA in 41 instances (12 minor and **29 major disturbances**). These data represent conservative disturbance estimates as boating activity and disturbances to waterfowl were not monitored before sunrise or after sunset (Kenow et al. 2003, Waterbirds 26(1): 77-87 and Kenow et al. 2005, USGS Report to Region 3, USFWS).

Conversely, how many disturbances per day will negatively impact waterfowl? Havera et al. (1992, Wildl. Soc. Bull. 20:290-298) studied human disturbance and its effects on diving ducks in Keokuk Pool, Navigation Pool 19. During daylight hours, they found waterfowl were likely disturbed at all sites in their study area an average of 5.7 and 4.0 times/day in fall 1986 and fall 1987, respectively. Their conclusion: this level of disturbance affects feeding and resting behavior and can influence the ability of the birds' to accumulate the necessary energy and nutrient reserves.

- 3) ***Waterfowl and other birds have a need to keep their flight muscles in top shape through exercise flights. Each and every bird needs to exercise during every 24-hour period. They cannot allow their flight muscles to atrophy since flying is their most precious attribute. This is an important drive that has not received much study, especially on fall migration areas.***

*Response:* A review of the literature and discussions with other scientists yielded no published accounts that specifically addressed the need of waterfowl (or other birds) to maintain flight capabilities through daily exercise flights. There is evidence to suggest that capacity of flight muscle is primarily under hormonal control (Bishop et al. 1995, Am. J. Physiol. 269:R64-R72; Bishop et al. 1998, Physiol. Zool. 71:198-207); even under the extreme situations of initial development of flight muscles in juveniles and muscle recovery following extended flightless periods (i.e., molt). Muscle hypertrophy occurs prior to migration in both the pectoralis muscles and cardiac muscles of birds (Butler and Bishop 2000, pp. 391-435 in Sturkie's Avian Physiology, 5th ed.) and is largely independent of exercise (Bishop et al. 1998, op. cit.). Work conducted on flight muscle development in Barnacle Geese (Bishop et al. 1998, op. cit.) and flight muscle recovery in molting Eared Grebes (Gaunt et al. 1990, Auk 107:649-659) suggest flight muscle capacity does not seem to require prolonged or high-load exercise, but rather infrequent wing-flapping may suffice. In the case of grebes, individuals engaged in wing-flapping for a total of only about 5 minutes per day (in 3-10 sec bursts).

According to one rather dated source, a perceived need or “drive” to fly is perhaps confused with “Zugunruhe,” a twice yearly cycle of nocturnal restlessness, which occurs in migratory birds during the migration season. It is tied to the neuro-endocrine system stimulated by day length (photoperiod) and cold (or warm) weather, and also coincides with increased fat deposition and enlargement of gonads of migrants in the spring (Welty, C. 1962. *The life of birds*. W.B. Saunders Co., Philadelphia. 546 pp.)

Regardless, at migration stopover sites, waterfowl likely fly many times during the day. In addition to responding to human-caused disturbances, waterfowl also fly back and forth to feeding sites, to escape predators, or move to more protected habitat in response to weather.

- 4) *Within the Upper Miss Refuge, most areas (open and closed) are no more than an hour's flight away for most if not all waterfowl species. If birds face intolerable disturbance in one area they can easily find a better location after a brief flight.*

*Response:* Waterfowl select sites based on many factors, among them are habitat structure, water depth, food availability, low risk of predation, thermal cover, and protection from human disturbance (Fredrickson and Reid, 1988, Fish and Wildlife Leaflet 13.2.1 and Jahn and Hunt, 1964, op. cit.). The presence of an individual at a particular site suggests that the individual selected the site and it meets its particular needs at given point in time. It is unknown whether a ‘better location’ is available that meets the needs of that individual, if intolerable disturbance moves the bird. The move becomes energetically costly to the bird both in terms of time loss from acquiring or conserving energy reserves and in terms of energy expended in flight to locate another area (flight is energetically costly at 12-15x basal metabolic rate).

Fall survey data clearly show that ducks, swans, and geese are not evenly distributed on the Refuge. Between 1997-2002, most of the waterfowl use days occurred in Pools 7, 8, 9, and 13; a trend that continues today. Revising the Refuge’s Closed Area System in CCP is being proposed, in part, to provide the habitat necessary to better distribute waterfowl along the entire length of the Refuge. Along with providing habitat, addressing human disturbance concerns is part of that effort.

A variety of strategies exists within and among waterfowl species to meet their needs and not all individuals or species require the same resources simultaneously (Frederickson and Reid, 1988, Fish and Wildlife Leaflet 13.1.1). As a result, providing a diverse habitat base in closed areas is critical to meeting the needs of many different species of waterfowl during the hunting season. Because of their habitat preferences, some species of puddle ducks (e.g., Mallards and Wood Ducks) may be better suited to find alternative locations outside of closed areas in off-Refuge locations. But are these alternative sites a ‘better location?’

For Canvasbacks and Tundra Swans, few migration areas exist in the Mississippi Flyway during fall migration that provides adequate resources to meet the birds’ needs. Further, it has been well documented by Korschgen (1989, pp. 157-180 in *Habitat Management for Migrating and Wintering Waterfowl in North America*) and Thorson (2002, Masters Thesis) just how important the Upper Mississippi River is to Canvasbacks and Tundra Swans during fall migration. Thorson identified Tundra Swan site preferences as part of his project. During the 1998 and 1999 fall migrations, Tundra Swans used sites with an abundance of aquatic vegetation in shallow water depths (<1.2 m) interspersed with small islands (<5 ha) within large open aquatic area, protected from human disturbance. The occurrence of this preferred situation is rather limited on the UMR. Similar work has also been done for Canvasbacks by Korschgen (1989, op. cit.).

- 5) *Single disturbances in all probability have no significant affect on birds and negative results will be difficult to scientifically demonstrate. Even multiple daily disturbances, especially within larger closed areas, are not likely to have any measurable affect.*

*Response:* It is generally accepted that disturbance can increase existence energy requirements and reduce feeding time (Fredrickson and Drobney 1979, in T. A. Bookhout, ed., *Waterfowl and wetlands – an integrated review*). Determining the energetic costs of a single disturbance to waterfowl activities in the field is difficult to document. However, we do know that there are real costs associated with disturbance that results in flight. Flight is the most expensive daily activity in terms of energetic costs (12-15x basal metabolic rate). Temperatures are also a factor, with colder weather requiring birds to conserve energy by flying less (Fredrickson and Reid, 1988, op. cit.).

Fredrickson and Reid (1988, op. cit.) estimated that a duck with a body mass the size of a Mallard or Canvasback would require 3 days to replenish endogenous fat reserves feeding in good quality habitat after undergoing an 8-hour flight. With disturbance resulting in 2-hours of flight per day, that same Mallard or Canvasback would require an additional 2 days of feeding to replenish its reserves. In poor quality habitat, estimates are that it would require that Mallard or Canvasback 5 days to replenish fat reserves without disturbance, and 8 days if disturbances result in flight of 2 hours per day. Korschgen et al. (1985, *Wildl. Soc. Bull.* 13:290-296) estimated that human-caused disturbance may have caused Canvasbacks staging on Lake Onalaska to fly 1 hour/day. This extra flight caused Canvasbacks to consume an additional increment of food, perhaps as much as 75 kcal/day above their estimated 400 kcal for maintenance (Korschgen, unpubl. data). Kahl (1991, *Wildl. Soc. Bull.* 19:242-248) reported that the energetic cost to Canvasbacks by boating disturbances on Lake Poygan, Wisconsin averaged 14-42 kcal/day for flight plus incremental feeding activity to compensate for this flight. Temperatures are also a factor, with colder weather requiring birds to conserve energy by flying less (Fredrickson and Reid, op. cit.).

The observed distribution and patterns of daily use on the UMR are likely the result of multiple daily disturbances and representative of a collective ‘measurable effect’. With multiple daily disturbances occurring in a given area, waterfowl respond by changing food habits, feeding only at night, losing weight, or deserting the area entirely. Repeated disturbances may even limit waterfowl use in a given area (Korschgen and Dahlgren, 1992, op. cit.). On Pools 7 and 8, we have documented that waterfowl respond to human disturbance by avoiding areas when disturbed during the day and returning to feed at night, usually beginning in November after food in the closed areas is exhausted. Less well-documented are the energy costs to individual birds engaged in this activity.

- 6) *Rather than using a season-long average of one major disturbance per day in any given closed area as the threshold, the main measure of too much disturbance should be determined by comparing bird numbers in any given year for that closed area with past use, the total number of birds using the Refuge, and the quality and distribution of food resources in that closed area. If waterfowl use of the closed area changes over time while habitat quality remains comparable, then disturbance may need to be reduced.*

*Response:* The metric you suggest we use to determine when disturbance may need to be reduced in a given closed area is complicated by a number of extrinsic variables that vary annually, and dictate how many birds eventually migrate down the Mississippi Flyway. Among them are continental waterfowl populations, number of birds using the flyway, chronology of the season, weather conditions, and habitat availability elsewhere. On the Upper Miss River, there is also annual variability in food availability and quantity in individual closed areas. These many variables make a direct comparison difficult.

The metric we propose to use, an average of one major human-caused disturbance per day through the fall season, requires us to continue monitoring each closed area. As noted earlier, we have multiple years of data available for the Lake Onalaska VWAA. In the La Crosse District, we also have baseline data for the Goose Island No Hunting Zone and the Wisconsin Islands Closed Area. In addition to recording details of each disturbance, we also record waterfowl numbers and

note the location of waterfowl concentration areas. This information has been used, and will continue to be used, to measure how well individual closed areas are meeting expectations.

- 7) *Efforts to reduce disturbance within closed area using voluntary avoidance and education are endorsed.*

*Response:* In Alternative E we are proposing a revised Refuge Closed Area System of 22 areas totaling 45,755 acres. Three of the units (Pool Slough, Pool 9; Guttenberg Ponds portion of the 12 Mile Sanctuary; and Spring Lake Sanctuary, Pool 13) would be closed to all entry and use from October 1 to the end of the respective state duck hunting season.

The existing Lake Onalaska Closed Area (Pool 7) and associated Voluntary Waterfowl Avoidance Area would not be affected and current entry and use regulations for the existing Bertom/McCartney Closed Area (Pool 11) would also remain the same.

In each of the remaining 17 units, the public will be asked to practice voluntary avoidance from October 15 to the end of the regular state duck hunting season. In addition, in small closed areas (1,000 acres or less), there will be a “no motor” restriction beginning October 15 through the end of the regular duck hunting season.

Awareness and education will be an important part of the campaign to minimize human disturbance in each of these areas, just as it has since the inception of the Lake Onalaska Voluntary Waterfowl Avoidance Area.

Periodic closed area monitoring will be conducted to determine how well the program is working. As noted in No. 2, if the disturbance exceeds the threshold level, the Refuge will, in coordination with other agencies, move to implement more restrictive regulations such as no motors, no fishing, or no entry on an individual closed area basis.

- 8) *Most large closed areas have multiple inaccessible areas that waterfowl can use to escape disturbance.*

*Response:* Each closed area is different and species reaction to human disturbance varies. As noted above in our response to No. 2, diving ducks are the most vulnerable to disturbance. On Lake Onalaska, we have documented that a single boat crossing the open water of the Lake Onalaska Closed Area/VWAA in late October can flush thousands of diving ducks off the lake. Depending on the duration of the disturbance, these birds may settle back on the water after a brief flight, climb high and remain in the air for some time, or completely leave the pool. Havera (1992, op. cit.) found similar responses by diving ducks to disturbance using Keokuk Pool during fall migration. When feeding birds are disturbed, they may be flushed from preferred habitat and relocate to less desirable habitat. The same birds must also replenish energy used to escape the disturbance.

Another example: In the Wisconsin Islands Closed Area, we have documented that two boats entering this closed area simultaneously down Raft Channel and through Benover Slough flushed nearly every duck, Tundra Swan, and Canada Goose using the upper section of the closed area. When flushed from this area, comparable habitat does not exist elsewhere in the closed area, especially on cold days with strong winds.

Given the small size of the Goose Island No Hunting Zone (876 acres), when waterfowl (puddle ducks, Tundra Swans, and Canada Geese) are flushed as a result of human disturbance, finding suitable escape sites within this protected area may be limited.,

Conversely, those puddle ducks, Tundra Swans, and Canada Geese concentrated in the embayments and protected marshes found along the barrier islands in the larger Lake Onalaska Closed Area have the best chance of finding suitable protected habitat to relocate to when disturbed.

- 9) *September through November is the least stressful time of year for birds using the upper Midwest and Upper Mississippi River. They have two objectives: maintenance of adequate body condition and maintenance of their flight muscles so they can survive and continue their migration at a later date. Some fat reserves are added but not enough for the birds to become fat.*

*Response:* Fat deposition is essential to meeting the energetic requirements associated with migration and survival (Fredrickson and Reid, 1988, op. cit.). This is just as true for juvenile Blue-winged Teal migrating down the Upper Mississippi River in September as it is for the juvenile Tundra Swans that use the Wisconsin Islands Closed Area in November.

From J. Takekawa (1987, PhD dissertation): “In many waterfowl species, including canvasback, body weight is highest when individuals arrive on the wintering grounds and gradually decreases through the winter until resources improve immediately before spring migration. Canvasbacks which are heaviest upon arrival on wintering areas are most likely to survive through the winter and through the following year (Haramis et al. 1986). Canvasbacks may gain more than 170 g during fall staging (J. Serie, USFWS, unpubl. data). ... Adult canvasbacks may increase their body weight by 10 percent, and immature ducks may add 15 percent of their body weight on Lake Onalaska. ... Thus, fall staging areas serve as crucial habitats where canvasbacks can develop energy reserves that may enhance survival through the next year.”

- 10) *Birds do not feed continuously each day during the period September through November and need adequate exercise to maintain body/flight muscle tone. Loafing and resting are other daily activities.*

*Response:* Waterfowl spend an appreciable amount of time feeding. Canvasbacks spent 19 percent of the time foraging (underwater) on Lake Onalaska (Takekawa, 1987, op. cit.). However, the true proportion of time foraging is higher than this when one accounts for the period between dives. Also, upper GI tract capacity and food passage rate limit food intake as canvasback require 3.2 hours to digest winter buds of wildcelery. In addition, most of the remaining time was spent in energy-conserving behaviors such as resting and sleeping

*Requirements for exercise to maintain body/flight muscle tone are addressed in No. 3.*