

STATE OF NEBRASKA

DEPARTMENT OF WATER RESOURCES

In the Matters of Applications A-17004)
through A-17009 for Permits to)
Appropriate Water for Instream Flows) ORDER
on the Platte River.)
Water Division 1-A.)

These matters came on for consideration before the Director of the Department of Water Resources. The Director FINDS:

1. On July 25, 1990, Central Platte Natural Resources District (NRD) filed applications A-17004, A-17005, A-17006, A-17007, A-17008, and A-17009 for permits to appropriate water for instream flows in the Platte River. Together, the six applications seek the State's authority for Central Platte to maintain certain river flows in a reach of the Platte River generally extending between Lexington and Columbus. The ultimate objective is to maintain habitat for five bird species. Except for sandhill cranes, all have been officially designated as threatened or endangered. Flows specified in each application would either be a factor in providing bird habitat in the Platte valley or be a factor in providing habitat for food sources consumed by the birds. Each application and accompanying materials specified certain flows and river reaches. Particular species and other information were also identified. With one exception, each application specifies several time intervals. For clarification herein, the applications will be subdivided and identified as:

<u>APPLICATION</u>	<u>TIME PERIOD</u>	<u>PURPOSE</u>	<u>SPECIES TO BE BENEFITTED</u>	<u>REACH</u>	<u>FLOW REQUESTED*</u>
A-17004a	Jan. 1 - June 23	Maintain Fish/Macroinvertebrates as Food Sources	Terns/Plovers	J-2 Mouth - Columbus	500
b	June 24 - Aug. 22	Maintain Fish/Macroinvertebrates as Food Sources	Terns/Plovers	J-2 Mouth - Columbus	600
c	Aug. 23 - Dec. 31	Maintain Fish/Macroinvertebrates as Food Sources	Terns/Plovers	J-2 Mouth - Columbus	500
A-17005a	Jan. 1 - Feb. 25	Maintain Fish/Waterfowl as Food Sources	Bald Eagles	J-2 Wasteway Gate to Mouth	750
b	Dec. 10 - Dec. 31	Maintain Fish/Waterfowl as Food Sources	Bald Eagles	J-2 Wasteway Gate to Mouth	750
A-17006a	Jan. 1 - Feb. 25	Maintain Fish/Waterfowl as Food Sources	Bald Eagles	J-2 Mouth - Elm Creek	1,100
b	Dec. 10 - Dec. 31	Maintain Fish/Waterfowl as Food Sources	Bald Eagles	J-2 Mouth - Elm Creek	1,100
A-17007a	Feb. 15 - Feb. 28	Initiate Biological Activity	Whooping/Sandhill Cranes	J-2 Mouth - Chapman	1,100
b	Mar. 1 - Mar. 31	Maintain Staging/Roosting Habitat	Sandhill Cranes	J-2 Mouth - Chapman	1,100
c	Oct. 1 - Oct. 11	Maintain Staging/Roosting Habitat	Sandhill Cranes	J-2 Mouth - Chapman	1,100
A-17008a	Apr. 1 - Apr. 14	Maintain Staging/Roosting Stopover Habitat	Whooping/Sandhill Cranes	J-2 Mouth - Grand Island	1,300
b	Apr. 15 - May 3	Maintain Staging/Roosting Stopover Habitat	Whooping Cranes	J-2 Mouth - Grand Island	1,500
c	Oct. 12 - Nov. 10	Maintain Staging/Roosting Stopover Habitat	Whooping Cranes	J-2 Mouth - Grand Island	1,500
A-17009	Apr. 1 - Apr. 14	Maintain Staging/Roosting Habitat	Sandhill Cranes	Grand Island - Chapman	1,100

*In cubic feet per second (cfs)

Filed with the applications were certain studies, mathematical model results, maps, lists of persons who testified at a public hearing held by Applicant, tables of Platte River flow data and other materials.

2. The Department published notice of the applications as provided in Neb. Rev. Stat. § 46-2,114, (1943), as amended. Filing as Objectors were the State of Wyoming; The National Audubon Society; Lower Platte North NRD; Keith County Economic Development Corporation; Nebraska Chapter of the Sierra Club; Nebraska Water Users, Inc.; Twin Platte NRD; Gary Phillips; Platte Valley Irrigation District; Nebraska Public Power District; North Platte Valley Irrigators' Association; Joe Jeffrey, D.V.M.; Upper Big Blue NRD; Tri-Basin NRD; Central Nebraska Public Power & Irrigation District; City of Fremont; Beerline Canal Company; and City of Kearney. The North Platte Valley Irrigators' Association, Keith County Economic Development Corporation and Gary Phillips subsequently withdrew from the proceeding. During the course of the hearing, Audubon and Sierra Club changed their status to proponents. Kearney, Beerline, Jeffrey and Platte Valley Irrigation District were dismissed as parties before the conclusion of the hearing.
3. A prehearing conference was held on March 20, 1991. Following time for discovery and preparation, a hearing commenced on July 1. It concluded on September 25. On July 17, a session was held in Grand Island for receipt of comments by the public. Six persons testified. Following receipt of the hearing transcript, parties submitted briefs in lieu of closing arguments.
4. An application for instream flows shall be approved if the Director makes a favorable finding for the various factors identified in § 46-2,115, namely:
 - a. There is unappropriated water available to provide for the instream appropriation;
 - b. The appropriation is necessary to maintain the instream use or uses for which the appropriation has been requested;
 - c. The appropriation will not interfere with any senior surface water appropriation;
 - d. The rate and timing of the flow is the minimum necessary to maintain the instream use or uses for which the appropriation has been requested; and
 - e. The application is in the public interest.

5. In determining whether an application is in the public interest, § 46-2,116 requires consideration of:
 - a. The economic, social and environmental value of the instream use or uses including, but not limited to, recreation, fish and wildlife, induced recharge for municipal water systems, and water quality maintenance; and
 - b. The economic, social and environmental value of reasonably foreseeable alternative out-of-stream uses of water that will be foregone or accorded junior status if the appropriation is granted.
6. In determining whether to approve the applications, § 37-435 requires the Department to consult with the Game and Parks Commission to ensure that approval would not jeopardize the continued existence of endangered or threatened species or result in the destruction or modification of their critical habitat. Following consultation with the Commission, the Department determined that approval of A-17004 through A-17009 would not jeopardize endangered or threatened species or result in destruction or modification of their critical habitat (E 2, 2A).

It is CONCLUDED:

1. In seeking approval of applications for water appropriations, the burden of proof falls upon Applicant. Central Platte is responsible for making a persuasive demonstration for each item required by law.
2. Applicant fulfilled all procedural requirements in presenting its applications, including the holding of public hearings on each application pursuant to § 46-2,110. Evidence of such hearings was made part of the record (E 42, 43).
3. An instream flow appropriation is defined under § 46-2,108. In pertinent part the statute states, "Instream appropriation shall mean the undiverted application of the waters of a natural stream . . ." (emphasis added). With A-17005, Central Platte requested an instream appropriation for waters in a canal. Specifically, Applicant seeks an appropriation within the wasteway from the J-2 gate to the wasteway mouth or confluence with the Platte River. The testimony of Ron Bishop, Manager for Central Platte, explicitly referred to this waterway as a "canal" (T 1568-1569).

There is no evidence to the effect that the wasteway was a natural drainage feature altered or otherwise improved in order to convey water. As a man-made waterway, it cannot be said that the appropriation, if granted, would be within a natural stream. Accordingly, the Director is without authority to grant the appropriation requested under A-17005, and the application should be dismissed [In Drainage District No. 1 v.

Suburban District, 139 Neb 460, 298 N.W.131 (1941) and Northport Irrigation District v. Jess, 215 Neb 152, 337 N.W.2d 733 (1983)].

4. Unappropriated Water:

Witnesses Woodward and Frick referenced their testimony to hydrographs and tabular data depicting flows at several locations downstream from the J-2 Return (E 28-29, 109-109c). Both agreed that recorded flows at the gaging stations innately reflect the consequences of diversions by appropriators from the river (T 1278-1279, 2977, 3026).

The hydrographs and tabular data indicate a highly variable flow regime. At least part of the time flows specified in each application have been recorded passing the various measuring stations. From Exhibits 28 through 39, the percentage of time particular flows are equal to or exceed the various requests ranges from 22 percent to 92 percent. The following tabulation may be extracted:

Application/ Flow Request	Time Period	MEASURING STATION			
		Overton	Odessa	Grand Island	Duncan
<u>A-17004</u>					
500 cfs	Jan. 1 - June 23	91%	88%	90%	92%
600 cfs	June 24 - Aug. 22	29%	24%	29%	29%
500 cfs	Aug. 23 - Dec. 31	85%	75%	71%	66%
<u>A-17006</u>					
1,100 cfs	Dec. 10 - Feb. 25	77%	--	--	--
<u>A-17007</u>					
1,100 cfs	Feb. 15 - Feb. 28	86%	83%	80%	--
1,100 cfs	Mar. 1 - Mar. 31	87%	85%	87%	--
1,100 cfs	Oct. 1 - Oct. 11	37%	29%	25%	--
<u>A-17008</u>					
1,300 cfs	Apr. 1 - Apr. 14	67%	60%	75%	--
1,500 cfs	Apr. 15 - May 3	39%	34%	49%	--
	Oct. 12 - Nov. 10	24%	22%	22%	--
<u>A-17009</u>					
1,100 cfs	Apr. 1 - Apr. 14	--	--	84%	--

To achieve a more precise understanding, Frick stated that historic flow data should be adjusted to reflect the potential, full use of existing irrigation rights (T 2977-2978). When asked how the adjustment ought to be made, he indicated that a determination of available natural flow must be coupled with a determination of historic irrigation requirements (T 3038-3042). Frick did not produce examples to illustrate his refinements. The record does not contain information necessary to make the refinements he recommended.

The need for Frick's suggested refinements is contrary to Woodward's and his own, earlier testimony. Given available water supplies and accepting as fact past distribution of water was allowed according to the principles of prior appropriation (which have been the rule in Nebraska for nearly 100 years), the record contains no basis upon which to conclude that historic irrigation diversions did not properly fulfill demands. Therefore, it may be concluded that the historic records fairly reflect current and reasonably expected river flows, and, to Woodward's and Frick's original claims, adjustments are deemed unnecessary.

Another potential adjustment requires consideration and allowance for unconstructed but pending applications for other diversions that would be senior to Applicant's. Bishop identified (T 2141-2143, 2148) the Landmark Project and the Prairie Bend II Project.

All pending applications for the Landmark Project recently were turned down.¹ The Prairie Bend II Project is Applicant's own project. If granted, its Prairie Bend appropriations would be senior in priority. Despite that fact, Bishop stated that Central Platte would intentionally operate Prairie Bend in such a manner as to first honor its own instream flow permits (T 2143). Therefore, there are no pending senior applications that would in fact or in effect further deplete existing flows. No adjustments of the historical records to account for pending projects are required.

In his cross-examination, Woodward was the only witness to discuss uses of impounded water. Below the J-2 mouth, only the Kearney Canal has authority to use stored water. In response to inquiry, Woodward said he believed Kearney Canal used no stored water (T 1299-1300, 1306, 1308-1309, 1311-1312; E 54). On that point he was not disputed. Considering Kearney's geographic location along the river and its various appropriations (one dating to 1882), it's understandable why stored water is not often needed. Thus, use of impounded water to supplement natural flow also is not a factor requiring further refinement of the historical record.

In summation, adjustments to more precisely assess potential full use of irrigation rights, other potential project demands or the use of stored water to supplement natural flows are unneeded. Historic records displayed in the hydrographs and tabular presentations, then, depict all unappropriated flows downstream from the J-2 mouth.

¹The Director's December 16, 1991, denial was appealed to the Supreme Court. Outcome of that appeal is pending.

From a simple, mathematical comparison, flows at the Platte River measuring stations are often less than the amounts requested. As an extreme, the statistical expectation of 1,500 cfs or more during a four-week period in October and November (A-17008) is only 22 percent. For some that ought to mean rejection of the applications.

Exhibits 29 through 39 and 109 through 109C indicate that flows of the Platte River are highly variable. Nonetheless, species identified with the applications and native to the Platte River have adapted to the fluctuating flow regime (testimony of Lauer, Bishop and Chadwick; T 1561, 1815, 1841, 2740).

Central Platte's applications stand for a desire to maintain particular river flows believed necessary so that certain wildlife species might be maintained or preserved. None of the applications contemplate investment, construction or operation of an enterprise where anticipated revenues are expected to repay expenses. Conventional methods and standards of assessment appropriate to traditional proposals, therefore, are judged inappropriate for Central Platte's applications.

Barring dramatic and lasting flow reductions, it is reasonable to conclude that each identified population will continue to use and to depend, at least in part, on habitat and food sources in the Platte valley. Thus, whether requested flows pass a particular measuring station during much or very little of the time is not determinative. It is judged that the "fairly continuous and dependable" standard established In Re Application A-15738, 226 Neb 146, 410 N.W.2d, 101, (1987), must be considered within the context of the applications at hand. To this reviewer, applications A-17004, A-17006, A-17007, A-17008 and A-17009 meet that standard.

5. The Appropriation is Necessary to Maintain the Instream Use or Uses for Which it has been Requested:

The Supreme Court In Re Application A-16642, 236 Neb 671, 463 N.W.2d 591(1990) provided guidance to implementation of § 46-2,115(2). Accordingly, the Director's finding of a "causal link between maintaining the flow and maintaining the use for which the flow is requested" is a prerequisite to determining whether "the appropriation is necessary to maintain the instream use or uses for which the appropriation has been requested." This analysis continues with that guidance in mind.

- a. **A-17004** The purpose of A-17004 is to provide adequate habitat for forage fish and aquatic macroinvertebrates that serve as a food source for interior least terns and piping plovers. In conjunction with terns, small fish species such as the sand shiner, plains killifish, and flathead minnow were identified. According to the

undisputed testimony of Holz (T 1010-1011), by consensus, the experts believe habitat needs of aquatic macroinvertebrates are met as long as the habitat needs of forage fish are met. Thus, what holds for forage fish also holds for aquatic macroinvertebrates.

Evidence in the record clearly shows a causal link between maintaining requested flows and maintaining adequate forage fish habitat. Each fish species requires some water flow in order to survive; fish cannot survive without water. Exhibit 18 illustrates the relationship of flows to maintaining habitat for a representative forage fish species, the sand shiner. Exhibit 27 is collaborative. In addition to the exhibits, the testimony of Holz (T 990-1008), Lauer (T 1668-1674), Lock (T 68-82) and Hutchinson (T 428-432) all indicate that a causal link exists between maintaining the requested flows and maintaining adequate habitat for the identified forage fish species.

- b. **A-17006** The purpose of A-17006 is to maintain adequate habitat for fish and waterfowl species utilized as food sources by wintering bald eagles.

Oddly, virtually all the evidence regarding A-17006 focuses on providing habitat suitable for bald eagle feeding, rather on fish and waterfowl species' habitat needs. According to the testimony of Bishop, the requested flow was selected because it is believed it would prevent the formation of ice in the river during the wintertime (T 1577, 1578).

Exhibit 18 indicates that ice-free conditions allow eagles direct access to carp and gizzard shad. Those food fish species were said to be killed or stunned while passing through the turbines in the Johnson hydroelectric plant. Additionally, Exhibit 18 indicates that ice-free water "attracts" waterfowl which also serve as a food source for bald eagles (Exhibit 18, II-3/II-4).

Little evidence which addressed the relationship between river flows and fish or waterfowl habitat was introduced. Nevertheless, Exhibit 18 indicates that gizzard shad and carp are food sources for bald eagles along the designated stretch of river. While the relationship of requested flows to fish habitat was not well-developed, the need for some flow is apparent. Likewise, the need for at least some flow for waterfowl is also apparent (Lock, T 58-65). Accordingly, a causal link between maintaining requested flows and maintaining adequate habitat for fish was established.

- c. **A-17007a** The purpose of requested flows during February 15 to 28 is to initiate late winter biological

activity in wet meadows adjacent to the Platte River. In lay terms, biological activity refers to production of crustaceans and other life forms believed essential to the reproductive health of sandhill and whooping cranes.

In support of flows during February 15 to 28, Applicant offered Exhibits 7, 8, 9, 13 and 14. To some minimal degree, each exhibit indicates that continued existence of wet meadows is linked to ground water levels. But, none of the exhibits demonstrated a well-understood relationship between ground water levels and wet meadows. More importantly, none of the exhibits demonstrated any clear or convincing causal relationship between river stage and the initiation of biological activity in the wet meadows.

The live testimony of Lock and Currier proved to be equally unpersuasive. While each witness clearly showed the importance of wet meadows to whooping cranes and sandhill cranes, both failed to tie the recommended flows to the initiation of biological activity. Lock's flow recommendations, which he claimed initiate biological activity, were not based upon any convincing and factual evidence (T 162-165). No research or associated study was conducted, examined or identified by him. Currier made a preliminary analysis of data collected during a study of a related matter, but his conclusions are far too speculative to be convincing (T 4022-4034, 4085-4105).

While wet meadows appear to be quite important to whooping cranes, the linkage between the requested flows and the initiation of biological activity was not shown. Accordingly, the portion of A-17007 concerning flows from February 15 to 28 should not be approved.

A-17007b & A-17007c During all of March, specified flows are needed to maintain staging and roosting habitat for migrating sandhill cranes. The purpose of requested flows during October 1 through 11 also is to maintain sandhill crane roosting habitat.

In support of flows for March 1 to 31 (A-17007b), Applicant relied upon Exhibit 20 as well as the testimony of Holz (T 990-1008) and Lauer (T 1697-1705). Virtually all the evidence presented shows that sandhill cranes rely considerably upon the Platte River for roosting during their spring migration. Exhibit 20 illustrates the relationship between requested flows and maintaining adequate roosting habitat. It shows that crane roosting habitat is directly linked to river flows. While other factors may be important to sandhill

crane habitat, there is no doubt that a causal link exists.

As with the presentation of evidence for A-17007b, Applicant relied upon Exhibit 20 and the testimony of Holz (T 990-1008) and Lauer (T 1697-1705) for the October 1 to 11 time period. While sandhill cranes utilize the Platte River during October to a lesser extent than during the spring, the river remains important in providing roosting habitat during the fall migration. For the same reasons expressed for the March 1 to 31 interval, a clear, causal link was established between requested flows and maintaining roosting habitat under A-17007c.

- d. **A-17008** The purpose of flows requested for April 1 to April 14 in A-17008 is to maintain staging and roosting habitat for sandhill cranes. Stopover habitat for migrating whooping cranes is the purpose of flows for the two time intervals between April 1 to May 3 and from October 12 to November 10.

Although the assertions of Objectors, that the Platte River is essential to the continued existence of the whooping crane might be relevant to certain federally required consultations or those done pursuant to § 37-435, they are not material consideration of A-17008 under § 46-2,115. Relevant here is whether whooping cranes actually utilize the river and whether the requested flow will aid in maintaining habitat.

A-17008a As with A-17007b (March 1 - 31), a causal link between the requested flows during April 1 to 14 and maintaining adequate roosting habitat for sandhill cranes was made clear. Exhibit 20 clearly indicates that requested flows would provide slightly less than maximum habitat for sandhill cranes. While this measure of habitat could be obtained with a lesser flow, it is worth noting that requested flows simultaneously address the habitat requirements of the whooping crane.

From the record, it is apparent that whooping cranes do utilize the Platte River as stopover habitat. Exhibits 17, 19 and 50, along with the testimony of Lauer (T 1697-1705), and Holz (T 990-1008), all substantiate at least occasional use of the Platte River by whooping cranes during this time period.

To the extent that whooping cranes have been observed to utilize the Platte River, certain roost-site characteristics have been identified. Those characteristics are set forth in Exhibit 17. Site characteristics were utilized in the development of various whooping crane roosting habitat models. One model, C-5, is described in Exhibit 19. The C-5 model establishes a relationship

between various flows and availability of roosting habitat for whooping cranes. Exhibits 23, 24, 25 and 26 also demonstrate the relationship between flows and roosting habitat. In view of such evidence it is clear that a causal link exists between requested flows and their expressed purposes.

A-17008b & A-17008c During April 15 to May 3 and October 12 to November 10 a clear causal link between the requested flows and maintaining stopover habitat for whooping cranes was established. As previously noted, the Platte River occasionally serves as stopover habitat for whooping cranes during their annual migrations. According to Exhibits 17, 19 and 50, as well as the testimony of Lauer (T 1697-1705) and Holz (T 990-1008), whooping crane habitat is linked to flow rates. For these reasons and those set forth in the previous subsection, Applicant met its burden of proof in demonstrating a causal link.

- e. **A-17009** The purpose of A-17009 is to maintain adequate staging and roosting habitat for migrating sandhill cranes. As previously indicated, Exhibit 20, along with the testimony of Lauer (T 1697-1705) and Holz (T 990-1008), convincingly shows sandhill cranes utilize the Platte River extensively during their annual spring and fall migrations. For these reasons, as well as the reasons set forth under A-17007b and A-17007c, a causal link was established by Applicant.

6. Instream Appropriation will not Interfere with Senior Surface Water Appropriations:

With each application Central Platte specifically stated that the application would have no effect on other senior appropriations. Officially recognized water appropriations and pending applications within Water Division 1-A are tabulated in Exhibit 54. If approved, A-17004 through A-17009 would be junior in priority to nearly all of the other appropriations in Division 1-A. That fact, plus the absence of evidence in the record indicating that senior appropriators would be affected, makes compelling the claim that granting the applications would not adversely impact other appropriations. In addition, § 46-2,119 makes it clear that instream flow appropriations are subject to the same "first in time, first in right" standards that are binding on all other water appropriators. Accordingly, it must be concluded that granting the applications would not affect senior water appropriations.

7. Rate and Timing is Minimum Necessary for the Uses:

Important direction for consideration and application of § 46-2,115(4) was provided In Re Application A-16642 supra.

Therein the court stated:

. . . the real issue is not what minimum necessary means but, rather, what is the nature of the use for which the appropriation is requested. If . . . the use is to provide for the maintenance of the fishery at its present habitat quality, then the minimum necessary flow is the lowest flow rate which would assure no degradation in the quality of the habitat, . . .

Id. at 610.

Contrary to the urgings of some, the minimum amount of flow is not necessarily the least amount indispensably required for continued survival. Instead, each application must be examined to determine if the flow rates requested are the least amount necessary to fulfill their intended purposes.

- a. **A-17004** According to Exhibit 17 and the testimony of Lock, Holz, Faanes, and Sidle, food sources for interior least terns are red shiner, sand shiner, big mouth shiner, emerald shiner, plains killifish, gizzard shad, creek chub, carp and carp sucker (T 225, 735-736, 1016, 3601). Bowman indicated that the diet of piping plovers is macroinvertebrates. He and Holz stated that river flows and their timing sufficient to maintain habitat for forage fish also are sufficient to maintain habitat for macroinvertebrates (T 881, 1010).

To these broad observations and claims, the record is without an opposing view. When it came to the matter of quantification, however, the parties disagreed over various analytical methods and results. Evidence presented to determine the minimum flow necessary included data from habitat modeling, historical flow analyses, water temperature studies and fish kill reports.

Habitat Modeling

Central Platte presented results of mathematical modeling that related the amount of habitat suitable for forage fish to the amount of flow in the J-2 mouth to Chapman reach (E 10, 18, 27; T 1557-1560). Applicant modeled habitat for the sand shiner, using that species as an indicator of habitat needs for all forage fish (T 1015-1018). Flows of 750 cfs correlated with the most suitable habitat for sand shiners. The amount of suitable habitat declined markedly with lower flows (E 10, 27). Applicant's request of 500 cfs represents somewhat more than 90 percent of maximum available habitat (E 27).

Several witnesses disagreed with Central Platte's modeling approach. Objector's witness Chadwick stated that to properly analyze the impact of flows and forage fish habitat, at least three species should be included (T 2778). Hutchinson and Holz agreed. They said that the Game and Parks Commission and the Biology Work Group (a group of technical specialists organized by the U.S. Department of the Interior to study habitat management along the Platte River) also advocate modeling more than one species. A "guild" approach was suggested (T 564, 576, 1119; E 17, p. 91).

To determine habitat and flow relationships, disciples of the guild approach utilize several species in order to quantify habitat. Included in their model would be larger fish such as adult channel catfish. Judging by Chadwick's remarks, the outcome would likely yield larger flow values (E 93, pp. 18-20). Thus, Central Platte's sand shiner model may underestimate the flow needed for forage fish habitat. But, even though it may be conservative, Applicant's model results are not at odds with its requests for 500 cfs and 600 cfs for forage fish. Even if the guild procedure produced more reliable estimates of greater magnitudes, § 46-2,115 implicitly bars granting larger rates.

Historical Flow

In terms of historic flows, not challenged was the soundness of Applicant's 500 cfs request. But, Objector's witness Chadwick did challenge the 600 cfs request. In his opinion, 600 cfs is too large because flows greater than or equal to that value are rarely experienced during the summer. Yet, abundant fish populations exist in the river, he said (T 2696). Chadwick claimed that 300 cfs is a better estimate (T 2697). Later, he acknowledged that should flows never exceed 300 cfs, present fish populations would not be maintained (T 2752).

Lauer and Bishop stated that forage fish in the Platte River are adapted to and rely upon fluctuations of high and low flows. (In conjunction with Exhibits 29 through 39 and 109 through 109C, the magnitude of fluctuations was already discussed.) Chadwick agreed with Lauer and Bishop. Over time, forage fish species have adapted to harsh conditions, he said. The species are fecund, have multiple spawning periods and their numbers increase rapidly when river flows are sufficient (T 2740). As a consequence, convincing is the argument of Lauer and Bishop (T 1561, 1815, 1841). A significant range of flow is vital to forage fish. By creating the potential for other consumptive uses, the range of flows likely would be improperly skewed downward if Chadwick's 300 cfs recommendation were adopted.

Water Temperatures

Bowman indicated that chemical and physical characteristics of water are the most important factors determining the quality of the aquatic medium (T 3410). As a physical parameter, Bishop discussed water temperature. To prevent water temperatures from reaching a lethal elevation (T 1565-1566), he stated that forage fish habitat in the summer is dependent upon certain flows. Hutchinson and Dinan discussed a relationship between water temperature and flow rates (T 558-559, 3821-3823). From a standpoint of cause and effect, Objector's witness Miller disagreed. He claimed the dominant factor affecting water temperature is air temperature. According to him, flow rates are not significant when correlated with water temperature (T 2844, 2856).

Miller based his opinion on a water temperature model that included a five-day, time-step average (T 2824). Miller also used simple and multiple, linear regression models to test the significance of flow as a determinant of water temperatures. From that analysis he determined air temperature to be a highly significant variable relating to water temperature. Flow rate, though it improved the predictive ability of his linear regression model, was judged not significant.

Miller did not consider the possible covariance of independent variables. Neither did he rule out the possibility that flows affect water temperature in a nonlinear fashion (T 2849-2853; E 95, 96). As a result, the impact of flow rates on water temperatures cannot be ruled out based solely on Miller's analysis.

With modifications, Dinan fundamentally employed the same model used by Miller. Dinan chose a daily time step and selected more refined coefficients. His model also included water widths and lateral inflow temperatures. Dinan's model allowed him to conclude that flow rates greater than 800 cfs decrease the likelihood of reaching lethal water temperatures (T 3866-3867, 3876-3879, 3882, 3884, 3897).

In order to better understand the correlation of coinciding air temperature and water temperature conditions, Dinan examined exceedance curves for both. None of the curves were displayed during the proceeding, but his conclusions went unchallenged. By inspection, he concluded that high river flows during the summer coincide with lower water temperatures (T 3870, 3872-3874). Results of a step-wise, linear regression test added support to his conclusion that both air temperature and water flow have a significant effect on water temperature. Based on these analyses, Dinan finally concluded that given a specified air temperature when

flows diminish, the average daily water temperature and the daily fluctuation in water temperature both increase (T 3822-3823, 3825, 3830, 3948, 3866, 3903-3904).

Both Miller and Dinan indicated that air temperature is a major factor affecting water temperature. Miller failed to carry his analyses far enough to rule out the question of whether flow rate is a factor affecting water temperature. Dinan went the necessary extra step. He presented convincing evidence that flow rate does impact water temperature.

Fish Kills

Chadwick (T 2692, 2694, 2769), Lingle (T 642, 644, 647-648, 650, 653, 658-659, 671, 1472-1474, 1506-1507), Dinan (T 3838, 3900), Lauer (T 1780) and Hutchinson (T 506-507) presented evidence of fish kills during summertime low flow periods. Exhibit 11 records the number of fish kills attributed to high water temperatures. Recorded flows ranged from 87 to 950 cfs. Lingle reported a particular fish kill he observed on July 2, 1991. The Grand Island gage recorded 178 cfs that day (T 1506). Although there was much discussion of what constituted a fish kill and of the accuracy of the reports (T 2741-2792, 3900), Chadwick indicated his only concern related to estimated numbers of dead fish (T 2756).

The impact of fish kills on fish populations generally, also was discussed. Lingle reported seeing no large fish for one year following a 1988 fish kill (T 1471). Except for a possible reduction in species composition he judged not statistically significant (T 2738), Chadwick said he saw essentially no effects on fish populations after the 1988 fish kill. Dinan contrasted numbers for two river reaches; one impacted and another not impacted by the 1988 fish kill. Following analysis using the T-test statistical method, he concluded that the difference in average numbers of species per site was significant, and he took exception to Chadwick's view (T 3915). The result of Dinan's analytical appraisal is more compelling. Long lasting, detrimental impacts on fish populations are likely to result from low flows during summer months.

For all of these reasons, Applicant's 500 cfs and 600 cfs requests under A-17004 are judged to be the minimum necessary. The time intervals and stream reaches specified were not disputed, and judging by the experts' testimony, they are appropriate.

- b. **A-17006** Before proceeding with further review of A-17006, it is important to remember and bear in mind

its intended purpose. The application is intended to maintain habitat for fish and waterfowl species utilized as food sources by overwintering bald eagles in the reach of the Platte River between the J-2 mouth and Elm Creek (emphasis added).

The record concerning the presence of winter time ice relates to feeding activities by eagles. It does not relate to peculiar winter time habitat requirements of fish eaten by eagles. As a result, the experts' testimony concerning the difficulties ice presents to feeding activities of eagles is irrelevant. Moreover, for A-17004b and A-17004c, the propriety of 500 cfs for forage fish during January 1 through June 23 and during August 23 through December 31 was established and effectively reduces A-17006 to being duplicative.

Although it was established that eagles sometimes eat waterfowl, absent from the record is an explanation of why ice-free conditions are necessary for waterfowl habitat. Thus for waterfowl, Applicant failed to carry its burden of proof.

Application A-17006 therefore should be denied in its entirety.

- c. **A-17007 and A-17009** The remaining A-17007b and A-17007c as well as A-17009 relate to staging and stopover habitat for migrating sandhill cranes. Bowman, Lauer, Holz and Bishop all discussed crane usage during the periods specified and throughout the reach identified in the applications (T 888, 978-979, 981, 1856, 1701-1708, 2172; E 50, pp. 11-24). In terms of timing and location, no one disputed their claims.

The 1,100 cfs requested is that rate believed to produce the maximum amount of sandhill crane habitat. The request was based upon output from a computer model used by Applicant (T 1603-1604, 1605-1607; E 20). The model correlated flow in the river and the amount and quality of sandhill crane habitat provided by that flow (E 20). Although the stated purpose of the flow request is to provide adequate habitat, Bishop stated that 1,100 cfs was chosen because Central Platte wanted to maximize habitat for sandhill cranes (T 1607).

Objector's witness Simons also developed a crane habitat flow model (CRANHAB). According to his model results, maximum habitat is created with flows of 1,000 cfs (T 2894-2900; E 98). Curiously, at Applicant's request, Simons' model was introduced into the record (T 2896).

Witness Carlson challenged the method used to characterize roosting habitat in both Applicant's and Simons' CRANHAB models. According to him, neither model

properly took into consideration macrohabitat characteristics (T 4148, 4164-4165).

Even though Carlson's comments were directed at a version of Simons' CRANHAB model for whooping crane habitat, his criticism is judged applicable to the sandhill crane adaptation of CRANHAB. Sandhill cranes were said to prefer roosting in wide, water-filled channels (E 20, pp. 8-14; E 50, p. II-27). In effect, then, Simons' model is literally too narrow in scope. It only accounts for shallow, water-filled areas in which a crane can stand. Simons' method completely discounts the presence of deeper water, which contributes to the value of a roost site. [The testimony of Holz included discussion of a similar problem in whooping crane roosting models (T 997)].

Briefly presented were the results of two other versions of Applicant's sandhill crane model. To characterize roosting habitat, they included macrohabitat characteristics. Model output indicated flows as great as 1,500 to 1,700 cfs were needed to provide optimal habitat (E 22; T 1152-1158).

Based on the record, Applicant's initial model is judged more reliable than Simons'. When different formulae for macrohabitat characteristics are added, Applicant's model understates optimal flow rates by 400 to 600 cfs. Nonetheless, § 46-2,115 is binding on Central Platte. Its applications A-17007b, A-17007c and A-17009 should not fail or be reduced, but they cannot be approved for more than 1,100 cfs.

- d. **A-17008** In reference to timing and location, A-17008 appears proper. The record, including the views of Bowman, Lauer, Holz and Bishop (T 888, 978-979, 981, 1856, 1701-1708, 2172; E 50) is undisputed.

According to Bishop, 1,300 cfs was specified for A-17008a because it lies midway between 1,100 cfs (specified in A-17007 for sandhill and whooping cranes) and 1,500 cfs (specified in A-17008b for whooping cranes only). His explanation is an example of sound mathematics but unconvincing science. Other witnesses filled the gap.

Holz and Bishop stated that the 1,300 cfs request for whooping cranes had root in the results of a set of whooping crane habitat models developed cooperatively by the Fish and Wildlife Service and the Bureau of Reclamation (T 977-978, 997-1009, 1608-1609, 4128-4136; E 22, 23, 24, 25, 26). According to Woodward and Carlson, these models differ only in the formulae used to characterize whooping crane roost habitat (T 1148-1150; E 22). There was no consensus among the witnesses on

which of the formulae for roost characteristics should be selected. Accordingly, maximum habitat could be expected at flows ranging from 1,700 to 2,500 cfs (E 22). All the models indicate less habitat would be provided at 1,500 cfs. As flows diminish further, habitat for whooping cranes drops rapidly (E 145, 146).

Simons challenged the formula used to characterize water depth in several of the models developed by Applicant's witnesses. His criticism, that some of the models could label as suitable roost site locations where water is too deep for roosting, has merit. The extent of any over-estimation, however, was not discussed. One of the models employed by Applicant (C-4R) incorporated a formula that avoided this problem. Results from that model were not significantly different from the others (E 22, 23, 24, 25, 26, 145, 146).

Simons also developed his own model---CRANHAB. His CRANHAB model employed a different approach to characterizing whooping crane habitat (T 2864-2869-2872; E 99). With his model, Simons predicted that flows of 1,000 cfs would provide maximum habitat for whooping cranes (E 99; T 2872).

Carlson's subsequent testimony was compelling. He undermined the credibility of CRANHAB by noting that it did not adequately portray macrohabitat (T 4148-4151, 4153-4156). Carlson also pointed out that CRANHAB predicted no habitat under certain flow conditions and at locations where whooping cranes actually have been observed roosting (T 4156-4158).

Only one model successfully withstood criticism. According to the C-4R model, optimal whooping crane habitat can be expected at a flow of 2,400 cfs. Had Central Platte specified that rate, it conceivably could have been allowed. Instead, the rates requested in its A-17008a, A-17008b and A-17008c together with the limitation of § 46-2,115 prohibit granting rates greater than those requested.

8. Public Interest:

Applicant offered extensive evidence indicating that each application would be in the public interest if it were allowed. Supalla, an economist, served as Applicant's key witness. He prepared Exhibit 49. In his testimony and in Exhibit 49, Supalla considered a wide number of public interest variables. The list included State economic output, household income, employment security, public services, recreation values, aesthetic values, environmental impacts, water quality impacts, and consistency with State water use goals. Supalla's efforts focused primarily on threatened and

endangered species, but they are judged to have broader implications.

It is significant that his analysis weighed the various economic, social and environmental variables without necessarily assigning a dollar value to each. Under a strict economic evaluation, the dollar values Supalla calculated indicate that the requested flows would not be in the public interest. Supalla noted, however, that Nebraskans generally placed great value in preserving wildlife populations and in associated aesthetic and recreational opportunities (T 2417-2422). When these economically unquantified factors are taken into account, the public interest scales tipped decidedly in Applicant's favor, he claimed. This assessment holds true for all the applications be they for the benefit of threatened and endangered species or for sandhill cranes (T 2425).

Wyoming attempted to rebut Supalla's testimony through the testimony of Watts. With regard to Exhibit 49, Watts was critical of Supalla's methodology. Specifically, he argued that Supalla should have employed a marginal or incremental analysis of competing uses in order to allow weighting the various factors more effectively (T 3308-3314). On rebuttal, Supalla responded to this criticism by stating that with the information presently available, the marginal or incremental analysis would have been inappropriate for the applications.

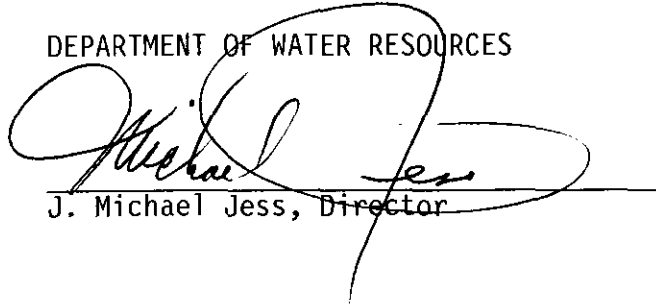
While Watts aimed additional criticisms at Supalla's analysis, he offered no new evidence which could lead one to a conclusion contrary to that reached by Supalla. Indeed, Watts did not even have an opinion as to whether granting the application would be in the public interest (T 3358). No other witnesses effectively discredited Supalla or offered convincing evidence that granting the applications would not be in the public interest. Accordingly, when reviewing all the evidence, it is clear that granting the application would be in the public interest.

It is therefore ORDERED:

1. Applications A-17004a, A-17004b and A-17004c are APPROVED.
2. All of application A-17005 is DISMISSED.
3. All of application A-17006 is DENIED.
4. Application A-17007a, which requests flows from February 15 to February 28 for the initiation of biological activity in wet meadows, is DENIED. Applications A-17007b and A-17007c, which request flows from March 1 to March 31 and from October 1 to October 11, are respectively APPROVED.
5. Applications A-17008a, A-17008b and A-17008c are APPROVED.

6. Application A-17009 is APPROVED.
7. Each approved application shall be so identified and will be administered by the Department in accordance with § 46-2,119. If frequently called upon to administer water, Central Platte NRD may be required to provide measuring devices of a type and at locations specified by the Department.

DEPARTMENT OF WATER RESOURCES



A large, stylized handwritten signature in black ink, appearing to read "Michael Jess", is written over a horizontal line. The signature is written in a cursive style with large loops and a long tail that extends downwards.

J. Michael Jess, Director

July 2, 1992

A copy of this Order was mailed by first class mail on July 2, 1992, to all parties of record or their attorneys.