

Basin-wide Technical Committee Guidance Document – Procedures for Annual Accounting Review and Robust Review to Assist Integrated Management Planning and Facilitate Reporting to the Platte River Recovery and Implementation Program

EXECUTIVE SUMMARY

This document was developed to assist the Nebraska Department of Natural Resources (Department), the Twin Platte Natural Resources District, the Central Platte Natural Resources District, the Tri-Basin Natural Resources District, the South Platte Natural Resources District and the North Platte Natural Resources District (NRDs or singularly NRD) in estimating the effects, in quantified terms, of management activities on the Platte River system for purposes of the Platte River Recovery and Implementation Program accounting, integrated management and basin-wide planning efforts for the joint integrated water resources management of the overappropriated portions of the Platte River Basin in Nebraska. The analyses described in this document provide a means of tracking and quantifying the benefits of management actions employed for integrated management planning purposes. They are not intended to take precedence over the analyses used by an NRD to implement management actions according to their rules and regulations, but rather to provide a general understanding of the net effects of all management actions implemented according to the NRD's rules and regulations. While the procedures in this document represent a basin-wide approach that is mutually agreed upon, they are not necessarily comprehensive for integrated management planning purposes. As such, a NRD and the Department may jointly develop and use additional procedures or methods for specific, or further refined, integrated management plan goals and objectives.

This document contains two levels of analyses: 1) annual accounting review procedures, and 2) robust review procedures. The annual accounting review will provide an annual preliminary estimate of the relative effects of management activities that have been implemented since the most recent robust review. For purposes of developing this document and to provide historical context, the previous "post-1997" depletions report, completed by the Cooperative Hydrology Study (COHYST), serves as the most recent robust review. Future robust review procedures will follow the process and concepts outlined in this document and will incorporate additional tools not in existence during the previous robust review. The robust review will facilitate an understanding of system routing of total streamflow as well as groundwater accretions and depletions to baseflow.

For purposes of the annual accounting and robust reviews, each respective NRD, in coordination with the Department, will use the following procedures to estimate the effects in location and timing of any given management activity. Management activity information used in each annual accounting review analysis may be used in the robust review process along with other information gathered as part of the integrated management plan tracking and reporting requirements.

INTRODUCTION AND BACKGROUND

On September 15, 2004, the Nebraska Department of Natural Resources (Department) adopted an order designating the Platte River Basin upstream of the Kearney Canal diversion as overappropriated. Portions of the North Platte Natural Resources District, the

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South Platte Natural Resources District, the Twin Platte Natural Resources District, the Central Platte Natural Resources District, and the Tri-Basin Natural Resources District (NRDs or singularly NRD) were designated as overappropriated. In addition, a portion or the entirety of each of these NRDs was determined to be fully appropriated. Pursuant to Neb. Rev. Stat. § 46-715(1)(a), when a designation of overappropriated or a determination of fully appropriated is made by the Department, the affected NRD must jointly develop an integrated management plan (IMP) with the Department. The designation of overappropriated also requires the affected NRDs and the Department to develop a basin-wide plan in conjunction with the individual NRD IMPs.

As required by statute, the overall goal of an overappropriated basin is to return to a fully appropriated status using an incremental approach, with each increment lasting 10 years. The goals for the first ten year increment are (1) to address the impact of streamflow depletions to (a) surface water appropriations and (b) water wells constructed in aquifers dependent upon recharge from streamflow, to the extent those depletions are due to water use initiated after July 1, 1997, and, (2) to prevent streamflow depletions that would cause noncompliance by Nebraska with an interstate cooperative agreement. Additional goals and objectives for the joint IMPs and basin-wide plan can be found in those documents.

In order to meet the goals and objectives of the IMPs and the basin-wide plan, the NRDs and the Department engage in management activities on both an individual NRD and basin-wide scale. This document was developed so that the impacts of these management activities on the goals and objectives of the IMP and basin-wide plan could be quantified and the effectiveness of the management activities could be assessed. Each IMP includes a section on tracking of management activities by both the NRD and the Department which provides the information to be used in the analyses described in this document.

This document contains the procedures and analyses that will be used in the annual accounting and robust reviews. The annual accounting review will provide an annual preliminary estimate of the relative effects of management activities since the most recent robust review. For purposes of developing this document and to provide historical context, the previous “post-1997” depletions report, completed by the Cooperative Hydrology Study (COHYST), serves as the most recent robust review. Future robust review procedures will follow the process and concepts outlined in this document and will incorporate additional tools not in existence during the previous robust review. The robust review will facilitate an understanding of system routing of total streamflow as well as groundwater accretions and depletions to baseflow.

ASSUMPTIONS AND LIMITATIONS

The assumptions and limitations of the modeling tools and analyses used in the annual accounting and robust reviews will be incorporated into their respective documentation.

PROCEDURES FOR ANNUAL ACCOUNTING REVIEW

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This document was developed to assist the Department and the NRDs in outlining a consistent methodology of calculating depletions and accretions to the stream when such calculations are necessary (e.g., permitting of new uses). These guidelines are intended to be utilized by the Department and each NRD to evaluate new permits to determine the difference in the rate of depletion between the new permitted use and any corresponding offset.

In order to meet the requirements of Neb. Rev. Stat. § 46-715(5)(d)(ii), calculations will be performed on all new permitted uses to determine the difference in the rate of depletion between the new permitted use and any corresponding offset. These calculations will be summarized in annual reports submitted by each NRD and the Department, followed by a review from the respective NRD and the Department to assess the progress being made toward achieving the goals and objectives of the IMP and basin-wide plan. The annual report will include an update of the balance of the depletions and offsets for all new permitted activities from the current year through the year 2048 or a later date, if determined to be appropriate by the Department and the respective NRD. All of the annual reports will be compiled by the Department and then provided to the Platte River Recovery and Implementation Program, as required by Nebraska's New Depletions Plan.

New permitted uses include:

1. New appropriations granted by the Department;
2. Variances granted by the Department;
3. Transfers approved by the Department;
4. Municipal transfer permits granted by the Department and any corresponding permit(s) issued by the NRD;
5. Industrial transfer permits granted by the Department and any corresponding permit(s) issued by the NRD;
6. Variances granted by the NRD; and
7. Transfers approved by the NRD.

In addition to an evaluation of any new permitted uses, the annual report may include an update on any additional management activities implemented by the Department and/or the NRD (e.g. retirement of irrigated acres, augmentation projects, etc.) during the year. This portion of the annual report may provide an evaluation of the rate of net streamflow change resulting from the implementation of these management activities.

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The general process for determining the rate of net streamflow change consists of calculating the difference in the rate of streamflow depletion between the prior condition and the future condition at the location of any new water use and the location of any corresponding offset(s). The annual accounting calculations will be completed in a manner that is consistent with previously conducted evaluations (e.g., COHYST 1997-2048 post-1997 depletions) according to the Department's and respective NRD's understanding of the best available annual information. While the most recent modeling analysis defines the methods that will be used to annually project depletions and accretions, future analysis will seek to refine the temporal and spatial resolution. The annual accounting calculations will utilize some or all the following variables:

DEP Factor_{prior} = the annual rate of stream depletion through the year 2048 that would have occurred if a use were to continue. If the use is supplied by surface water, the DEP Factor is assumed to be 100% unless conditions would warrant modification (e.g., administration of junior surface water appropriations or lands served by commingled sources). If the use is supplied by groundwater, the DEP Factor will be determined in a manner that is consistent with the most recent model analysis agreed to by the Department and respective NRD used to establish the management objectives (e.g., COHYST models).

CU_{prior} = the estimated consumptive use under the prior condition.

If the prior condition was irrigated cropland, the crop irrigation consumptive use will be estimated from the best available data (e.g., CROPSIM corn consumptive use estimates) that reflects the necessary irrigation requirement in excess of the effective precipitation. These estimates will be developed in a manner that is consistent with the most recent model analysis agreed to by the Department and respective NRD used to establish the management objectives (e.g., COHYST models).

If the prior condition was dryland crops or pasture, the crop irrigation consumptive use will be zero.

If the prior condition was something other than irrigated cropland (e.g., industrial use) then information will be obtained and evaluated by the Department and respective NRD to estimate the consumptive use.

DEP Factor_{future} = the annual rate of stream depletion occurring through the year 2048 from the future use. If the use is supplied by surface water, the DEP Factor is assumed to be 100% unless conditions would warrant modification (e.g., administration of junior surface water appropriations or lands served by commingled sources). If the use is supplied by groundwater, then the DEP Factor will be determined in a manner that is consistent with the most recent model analysis agreed to by the

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Department and respective NRD used to establish the management objectives (e.g., COHYST models).

CU_{future} = the estimated consumptive use under the future condition.

If the future condition will be irrigated cropland, the crop irrigation consumptive use will be estimated from the best available data (e.g., CROPSIM corn consumptive use estimates) that reflects the necessary irrigation requirement in excess of the effective precipitation. These estimates will be developed in a manner that is consistent with the most recent model analysis agreed to by the Department and respective NRD used to establish the management objectives (e.g., COHYST models).

If the future condition will be dryland crops or pasture, the irrigation consumptive use will be zero.

If the future condition will be something other than irrigated cropland (e.g., industrial use) then information will be obtained and evaluated by the Department and respective NRD to estimate the consumptive use.

R = the change in recharge that is estimated to occur due to conversion of land from one landuse category to another. This change in recharge value will be used in the calculations of net streamflow depletion in a manner that is consistent with the most recent model analysis agreed to by the Department and respective NRD used to establish the management objectives (e.g., COHYST models).

A = this variable will be utilized to reflect the administration of junior surface water appropriations, as the availability of water may influence the level of consumptive use that occurs on surface water irrigated acres. The Department will track the appropriations that are in priority on a daily basis and report this information to the respective NRD at the end of the irrigation season. This information will be utilized to adjust the consumptive use requirements as necessary to reflect the administration that occurred in that year. This variable, when projected into the future, will be estimated in a manner mutually agreeable to the Department and respective NRD as being reasonable and plausible.

$CO_{(sw/gw)}$ = if lands are served by commingled sources (i.e., both surface water and groundwater), this variable will be utilized by the Department and respective NRD to reflect the amount of consumptive use that each source provides.

AUG = this variable represents a surface water, groundwater or surface water and groundwater project used for retiming of the water supply. A

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project is expected to experience limited consumptive use (e.g., evaporation if water is periodically stored) and increase the water supply for a specific period of time. The benefits to the groundwater and/or surface water system from such a project may accrue throughout the year or only for portions of the year, depending on how the project is operated.

The following examples are provided as a means to illustrate how the annual accounting may be completed for various scenarios. The examples do not limit the Department and a NRD from adapting the procedures described in this document to accommodate unique site-specific conditions. The examples only show calculations for a ten year period, but it is anticipated that they would be applied through the year 2048 or further if the Department and NRD determine it is appropriate.

Example 1 – Retirement of groundwater irrigated acres to dryland acres

The example below illustrates a conversion of retired groundwater irrigated acres to dryland acres. This calculation was completed using methods consistent with the most recent model analysis agreed to by the Department and respective NRD used to establish the management objectives (e.g., COHYST models).

Equation: $DEP\ Factor_{prior} * (CU_{prior} - R) = \text{Future Net Rate of Streamflow Accretion}$

(A ten year period is represented but calculations would be completed through at least the year 2048.)

Year	DEP Factor _{prior}	CU _{prior} (acre-feet)	R (irrigated to dryland conversion) (acre-feet)	Future Net Rate of Accretion (acre-feet)
1	0.33	100	20	26.4
2	0.35	100	20	28.4
3	0.38	100	20	30.2
4	0.40	100	20	31.9
5	0.42	100	20	33.4
6	0.43	100	20	34.7
7	0.45	100	20	36.0
8	0.46	100	20	37.2
9	0.48	100	20	38.2
10	0.49	100	20	39.2

Example 2 – Retirement of surface water irrigated acres to dryland acres

The example below illustrates a conversion of retired surface water irrigated acres to dryland acres. Retirement of surface water irrigated acres represents the discontinuation of diversion for those acres. This calculation was completed using methods consistent with the most recent model analysis agreed to by the Department and respective NRD

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used to establish the management objectives (e.g., COHYST models). The simple approach outlined here applies to direct surface water diversions not associated with an irrigation district or canal company. Retirement of surface water irrigated acres receiving surface water from an irrigation district or canal company may require a more detailed analysis.

Equation:
$$\text{DEP Factor}_{\text{prior}} * (\text{CU}_{\text{prior}} - \text{R}) - \text{A} = \text{Future Net Rate of Streamflow Accretion}$$

(A ten year period is represented but calculations would be completed through at least the year 2048.)

Year	DEP Factor _{prior}	CU _{prior} (acre-feet)	R (Irrigated to Dryland Conversion) (acre-feet)	A (Adjustment for Administration) (acre-feet)	Future Net Rate of Accretion (acre-feet)
1	1.00	100	20	5	75
2	1.00	100	20	10	70
3	1.00	100	20	0	80
4	1.00	100	20	0	80
5	1.00	100	20	5	75
6	1.00	100	20	15	65
7	1.00	100	20	10	70
8	1.00	100	20	0	80
9	1.00	100	20	0	80
10	1.00	100	20	0	80

Example 3 – Conversion of commingled irrigated acres to groundwater irrigated acres

The example below illustrates conversion of commingled irrigated acres to groundwater only irrigated acres. This example assumes that CU_{prior} is 100 acre-feet and that supply is 75% surface water and 25% groundwater, so CO_{sw} = 0.75 and CO_{gw} = 0.25. This calculation was completed using methods consistent with the most recent model analysis agreed to by the Department and the respective NRD used to establish the management objectives (e.g., COHYST models). The simple approach outlined here applies to direct surface water diversions not associated with an irrigation district or canal company. Retirement of surface water irrigated acres receiving surface water from an irrigation district or canal company may require a more detailed analysis.

Equation:
$$(\text{DEP Factor}_{\text{prior sw}} * \text{CU}_{\text{prior}} * \text{CO}_{\text{sw}}) - \text{A} - (\text{DEP Factor}_{\text{prior gw}} * \text{CU}_{\text{prior}} * \text{CO}_{\text{gw}}) - (\text{DEP Factor}_{\text{future gw}} * \text{CU}) = \text{Future Net Rate of Streamflow Accretion}$$

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(A ten year period is represented but calculations would be completed through at least the year 2048.)

Year	DEP Factor (prior sw)	CU (CU _{prior} * CO _{sw}) (acre-feet)	A (Adjustment for Administration) (acre-feet)	DEP Factor (prior gw)	CU (CU _{prior} * CO _{gw}) (acre-feet)	DEP Factor (future gw)	CU (future gw) (acre-feet)	Future Net Rate of Accretion (acre-feet)
1	1.00	75.00	5.00	0.33	25.00	0.04	75.00	58.9
2	1.00	75.00	10.00	0.35	25.00	0.09	75.00	49.3
3	1.00	75.00	0.00	0.38	25.00	0.14	75.00	54.8
4	1.00	75.00	0.00	0.40	25.00	0.19	75.00	50.7
5	1.00	75.00	5.00	0.42	25.00	0.23	75.00	42.2
6	1.00	75.00	15.00	0.43	25.00	0.27	75.00	29.0
7	1.00	75.00	10.00	0.45	25.00	0.30	75.00	31.2
8	1.00	75.00	0.00	0.46	25.00	0.33	75.00	38.7
9	1.00	75.00	0.00	0.48	25.00	0.35	75.00	36.4
10	1.00	75.00	0.00	0.49	25.00	0.38	75.00	34.4

Example 4 – Development of a surface water retiming project

The example below illustrates a surface water retiming project utilizing previously unappropriated surface water and allowing that water to return to the surface water system via return flows from aquifer recharge. However, these types of projects will typically require more extensive data than is used in this example. Additionally, due to the variable nature of the surface water sources for such projects (e.g., transferred appropriations, junior rights, etc.) and the infrastructure by which the water will be supplied, the benefits of these projects may only accrue during specific time periods.

Equation: $(DEP\ Factor_{future} * AUG) = \text{Future Net Rate of Streamflow Accretion}$

(A ten year period is represented but calculations would be completed through at least the year 2048.)

Year	DEP Factor (future)	AUG (future) (acre-feet)	Future Net Rate of Accretion (acre-feet)
1	0.33	25	8.2
2	0.35	25	8.9
3	0.38	25	9.4
4	0.40	25	10.0
5	0.42	25	10.4
6	0.43	25	10.9
7	0.45	25	11.2

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8	0.46	25	11.6
9	0.48	25	11.9
10	0.49	25	12.3

Example 5 – Retirement of a non-municipal industrial water use served by groundwater with a direct surface water discharge

The example below illustrates the retirement of a non-municipal industrial use served by groundwater with a direct surface water discharge. This calculation was completed using methods consistent with the evaluation process utilized in the most recent model analysis agreed to by the Department and respective NRD to establish the management objectives (e.g., COHYST models) and the non-municipal industrial tracking procedures outlined in the IMP.

Equation: $(\text{DEP Factor}_{\text{prior gw}} * \text{CU}_{\text{prior gw}}) - (\text{DEP Factor}_{\text{prior sw}} * \text{CU}_{\text{prior sw}}) = \text{Future Net Rate of Streamflow Accretion}$

(A ten year period is represented but calculations would be completed through at least the year 2048.)

Year	DEP Factor (prior gw)	CU (prior gw) (acre-feet)	DEP Factor (prior sw)	CU (prior sw) (acre-feet)	Future Net Rate of Accretion (acre-feet)
1	0.33	50	1.00	10	6.5
2	0.35	50	1.00	10	7.7
3	0.38	50	1.00	10	8.9
4	0.40	50	1.00	10	9.9
5	0.42	50	1.00	10	10.9
6	0.43	50	1.00	10	11.7
7	0.45	50	1.00	10	12.5
8	0.46	50	1.00	10	13.2
9	0.48	50	1.00	10	13.9
10	0.49	50	1.00	10	14.5

PROCEDURES FOR ROBUST REVIEW

In addition to the annual accounting review, a robust review of the progress being made toward achieving the goals and objectives of the IMPs and basin-wide plan will be conducted every five years. The first robust review will be completed following calibration of the numerical modeling tools currently in development. The robust review will serve to evaluate the management activities that have occurred prior to and during the five year period of review to ensure that they are sufficient to meet the goals and objectives of each IMP and the basin-wide plan. Based on the outcome of the robust

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review, the Department and respective NRD will determine if modifications to the IMP are necessary.

The robust review will incorporate the 1997 baseline level of water uses and the current level of water uses to determine the net depletions due to ground water uses initiated or expanded subsequent to July 1, 1997. This review will utilize the appropriate ground water and surface water models to represent management activities in each NRD (e.g., permits, transfers, refinements and other management activities) to evaluate the availability of water supplies at the 1997 level of development compared to the current level of development.

The model(s) will consider the following, but not limited to, items:

1. Recharge from new surface water appropriations granted by the Department;
2. Recharge changes from surface water transfers approved by the Department;
3. Any municipal transfer permit granted by the Department and any corresponding permit(s) issued by the NRD;
4. Any industrial transfer permit granted by the Department and any corresponding permit(s) issued by the NRD;
5. New well construction permits granted by the NRD;
6. Variances granted by the NRD;
7. Transfers approved by the NRD;
8. Changes in municipal consumptive use;
9. Changes in industrial consumptive use;
10. Changes in livestock consumptive use;
11. Intentional recharge projects; and
12. Other management activities completed by the NRD or the Department.

The model(s) utilized for this process will be calibrated with sufficient temporal variability to represent the seasonal signature of impacts of stresses defined on a monthly basis or as currently configured in the accepted model. The evaluation period of the models will be the years 1998 through at least 2048 or, as determined by the Department and the respective NRD, a later date (e.g., to provide a 50 year planning analysis). Two model runs will be completed for the analysis; the first will represent the 1997 level of

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development with the second model run representing the changes that have occurred subsequent to July 1, 1997, through the end of the current five-year review period.

Development of Irrigation Consumptive Use Requirements

Groundwater Exclusive Irrigation

Baseline Level of Development –

Consumptive use for groundwater exclusive irrigation will be determined utilizing a similar process to that previously developed by COHYST or an equivalent process which, if used, will be evaluated by the respective NRD and the Department. This process will utilize the 1997 irrigated acres and crop mix or crop type to determine consumptive use requirements and recharge for fully irrigated crops.

Current Level of Development –

For areas in which all groundwater irrigation pumping is not metered, the current best estimate of irrigated acres and crop mix will be used in conjunction with irrigation requirements for fully irrigated crops to determine consumptive use requirements and recharge. If an area is metered, then the metered data, in conjunction with irrigated acres, crop type, and irrigation efficiency, will be utilized to determine consumptive use.

Groundwater Irrigation within the Boundaries of Surface Water Irrigation Districts

Baseline Level of Development –

Acres receiving surface water from an irrigation district or canal company will be assessed utilizing a process similar to that previously developed by COHYST or an equivalent process which, if used, will be evaluated by the respective NRD and the Department for determining groundwater irrigated acres. Once the acres are determined to be irrigated with ground water, the amount of surface water delivered will be estimated using available diversion records or other relevant information. Such estimates will be evaluated by the respective NRD and the Department. If the deliveries of surface water are not sufficient to meet the crop irrigation requirements for all of the acres within the boundaries of the surface water irrigation district or being served by a canal company and wells are available, then the remaining crop irrigation requirement will be assumed to be met with groundwater, unless site specific information is available and more specific methods are developed to incorporate the refined information. If available, these analyses will be completed by utilizing surface water modeling.

Current Level of Development –

Current commingled pumping records or, if not available, commingled pumping estimates will be used in the analysis to determine the current level of development of groundwater pumping on commingled acres. Development of the commingled pumping estimates is dependent on the data that is available.

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Surface Water Appropriations (Excludes Small Pumper Surface Water Irrigation)

Baseline Level of Development –

Baseline deliveries for surface water will be estimated for each appropriation (e.g., canal diversions or hydropower) assuming there are no changes in appropriations, transfers, or operational assumptions. The estimated deliveries will be incorporated into the surface water operations model and reflect operations under 1997 conditions and system capacity with no systemic changes in operations or appropriations.

Current Level of Development –

Current deliveries for surface water will be estimated for each appropriation (e.g., canal diversions, hydropower or instream flow) and incorporated into the surface water operations model. These deliveries would reflect intentional modifications in operations (e.g., transfers, intentional recharge and conjunctive management) and changes in the purposes reflected in appropriations granted through the end of the then current five-year robust review period. The surface water operations model will also incorporate and/or analyze the effects to the US Fish and Wildlife Service target streamflows for threatened and endangered species.

Small Pumper Surface Water Irrigation

Baseline Level of Development –

Baseline consumptive use for small pumper surface water irrigation will be developed using the active appropriations in 1997, the acres associated with each appropriation, and the assumption that the crop is fully irrigated corn. If the Department adjudicates a surface water appropriation and determines that only a portion of the appropriation was being used in 1997, the consumptive use calculations will be modified accordingly. The recharge associated with these surface water irrigated acres will be incorporated into the groundwater model and any changes in recharge will be incorporated at the time the acres are adjudicated. The total diversion amount will be calculated by assuming 70% efficiency of the irrigation system with a water application rate of 20% in June and 40% in both July and August, unless site-specific information regarding application amounts and efficiency of the irrigation system is available.

Current Level of Development –

Current consumptive use for small pumper surface water irrigation will be developed using current active appropriations, the acres associated with each appropriation, and the assumption that the crop is fully irrigated corn. If, during the course of the then current five-year review period, the Department adjudicates a surface water appropriation and determines that only a portion of the appropriation is being used, the consumptive use

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calculations will be modified accordingly. The recharge associated with these surface water irrigated acres will be incorporated into the groundwater model and any changes in recharge will be incorporated at the time they are adjudicated. The total diversion amount will be calculated by assuming 70% efficiency of the irrigation system with a water application rate of 20% in June and 40% in both July and August, unless site-specific information regarding application amounts and efficiency of the irrigation system is available.

Development of Municipal/Domestic Consumptive Use Requirements

Baseline Level of Development –

A NRD will calculate the baseline consumptive use for each municipality in the District based on historic consumptive use data for the period of August 1, 2001, through July 31, 2006. Per capita consumptive use will be determined from groundwater pumping volumes and wastewater discharge volumes, when available, and the population of the municipality. Large industrial uses will be subtracted from the municipal uses prior to determination of the per capita use as they will be tracked independently (see *Development of Industrial Consumptive Use Requirements* below). The average of the baseline per capita volumes for each municipality within the county will be multiplied by the 1997 population in the county to arrive at total county consumptive use. The county consumptive use will be distributed according to the physical distribution of the population in the county.

Current Level of Development –

At least once during each five year review period, and more often if requested by the Department or as determined by the respective NRD, the NRD will re-calculate the per capita consumptive use of a municipality and respective county, using the procedures described above, based upon similar, but updated, data and make any necessary adjustments to the per capita volumes. The same process described in the baseline section above will be utilized to calculate and distribute the updated county consumptive use volumes with the updated county population statistics.

Development of Commercial/Industrial Consumptive Use Requirements

Baseline Level of Development –

Commercial/industrial uses permitted prior to July 1, 1997, will be identified by the NRDs and the Department. A baseline consumptive use for each large commercial/industrial use permitted prior to July 1, 1997 will be developed. The baseline consumptive use for each large commercial/industrial use will be utilized for developing pumping requirements for input into the groundwater model.

Current Level of Development –

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Each NRD will continue to annually collect pumping and discharge, if available, volumes or, if served by a municipality, delivery volumes to determine the consumptive use for each large commercial/industrial user. Additionally, each NRD will collect data for the period of August 1, 2001, through July 31, 2006, to determine a baseline consumptive use for each commercial/industrial user not served by a municipality, but permitted subsequent to July 1, 1997. The consumptive use data for the large commercial/industrial users served by a municipality or by a non-municipal source permitted subsequent to July 1, 1997, will be utilized for developing pumping requirements for input into the groundwater model.

Development of Livestock Consumptive Use Requirements

Baseline Level of Development –

The Department will develop a consumptive use estimate and county population baselines for livestock (cattle). For livestock facilities being tracked independently by a NRD, a baseline population and consumptive use will be established. The consumptive use will either be determined using flow meter data or by multiplying the livestock consumptive use estimate, developed by the Department, for each facility by the baseline population. The county baseline populations for these large facilities will be subtracted from the county cattle population data and the consumptive use per animal of each facility will be averaged per county to determine the county cattle consumptive use. The county cattle consumptive use will be used to establish the consumptive use baseline for cattle that are not a part of a large livestock facility that is being tracked by a NRD. All consumptive use associated with livestock will be incorporated into the groundwater model using data available from the sources listed above and/or the Nebraska Department of Environmental Quality, which may include representative well locations for ground water withdrawal points.

Current Level of Development –

The Department will develop updated county cattle populations for every five year review period. If being tracked by a NRD, the updated population for large livestock facilities within a county will be subtracted from the baseline county cattle population to determine the current county cattle population. The updated county cattle population will be multiplied by the cattle consumptive use estimate to determine changes in consumptive use. The consumptive use estimate will be determined by the Department unless the NRD is tracking a large livestock facility, in which case, the consumptive use will be determined by using flow meter data or by multiplying the livestock consumptive use estimates, developed by the Department, by the updated cattle population of the facility. The updated consumptive use estimates will be incorporated into the groundwater model using data available from the sources listed above and/or the Nebraska Department of Environmental Quality, which may include representative well locations for ground water withdrawal points.

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Development of Sand Pits/Small Surface Water Bodies Consumptive Use Requirements

Baseline Level of Development –

The Department will establish a baseline inventory for sand pits/small surface water bodies adjacent to the Platte River in existence prior to July 1, 1997. The surface area for these pits/water bodies will be determined using GIS. The surface area will be multiplied by a representative pan evaporation value for the area in which the pit/water body is located to determine the baseline evaporation amount.

Current Level of Development –

The Department will update the inventory of the sand pits/small surface water bodies adjacent to the Platte River to identify changes in the number of pits/water bodies or in the surface area of those in the baseline inventory. The updated surface water area of the pits/water bodies will be multiplied by a representative pan evaporation for the area in which the pit/water body is located to determine the current evaporation amount. This amount will be compared to the baseline evaporation amount to determine the change in consumptive use.

In addition to the inventory of sand pits/small surface water bodies adjacent to the Platte River, a tracking system will be developed for new surface water bodies that result from specific projects that require consultation with the Department (e.g., Nebraska Department of Roads borrow pits). The amount of consumptive use and the required corresponding offset for these projects will be estimated by the Department using the Natural Resources Conservation Service consumptive use calculator. Once the offset for the project has occurred, no additional tracking of these surface water bodies will occur.

Robust Review Compliance Evaluation

Once all of the data described in the annual accounting review and robust review sections has been compiled, the model(s) will be populated with the compiled data and run twice; once for a baseline condition simulation and once for a current condition simulation from years 1997 to 2048. The baseline evaluation will use 1997 conditions into the future and the current evaluation will use transient yearly conditions from 1997 to 2010, and 2010 conditions into the future. Simulations may extend beyond the year 2048 at the discretion of the Department and the applicable NRD to provide an extended management timeframe consistent with previous analyses (e.g., to provide a 50 year analysis). Subsequent evaluations will use transient yearly conditions from 1997 to the then current robust review year, and robust review year conditions into the future.

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The results from these simulations will compare the difference between the baseline results and the current condition results to evaluate the management activities within each NRD over the five-year robust review evaluation period.

Relationship between Annual Accounting and Robust Reviews

Annual Accounting Review

The annual accounting review provides an “on the fly” estimation of the relative effects on the surface water system of new accretions resulting from management activities along with any new depletions resulting from permitted new uses. The annual accounting review serves as the informational foundation for the robust review with respect to permitted changes and management activities. In addition, the annual accounting review provides:

- A year-by-year mechanism to gage the relative changes to the surface water system due to management activities. This mechanism includes actions such as annual tabulation of permitted changes and record of day-to-day operations.
- Coordination between NRDs and the Department regarding reporting categories to avoid double-counting uses.
- Creation of a database to provide a transparent framework and consistent processing of reported data.
- Calculation of consumptive use changes associated with permitted activities.
- Simple analytical calculations (with a foundation in previous and current COHYST and/or Western Water Use Management Model data) to provide a reasonable estimate of effects from each management activity.
- A summation of all effects to the surface water system from simple analytical calculations to provide contextual understanding and estimate of the aggregate effects to the surface water system.

Robust Review

The robust review includes information collected during the annual accounting review in addition to use of the following information and procedures:

- Processing of periodic (five-year) data using the robust review procedure and consumptive use data from the annual accounting review to create numerical/routing/watershed model inputs.
- Periodic (five-year) data collection/development to aid assessment of non-permitted activities.
- Numerical/routing/watershed analysis to quantify the likely effects of permitted and non-permitted changes on the surface water system within the overappropriated portions of the Platte River Basin.

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The annual accounting and robust reviews are complementary components of a coordinated integrated management process. They enable nearly continuous monitoring of permitted activities within the Basin (annual accounting review) and facilitate analysis of non-regulated (e.g., small water bodies) changes in combination with permitted activities to provide an overall quantification of system changes (robust review).

Reporting Process

IMP/Basin-wide Plan:

The Department/NRD integrated management decision-making occurs within the framework of the individual IMPs and the basin-wide plan. In the spring of each year, information regarding the previous year's management activities is assembled and shared between the Department and the NRDs. This information is thoroughly reviewed for quality assurance and to provide the most consistent basin-wide reporting possible. The shared information is reported on at an annual meeting which invites stakeholder comments, reviews tracking and accounting of yearly management activities for each NRD and the Department, identifies ongoing and future studies and additional management priorities, and assesses the success in accomplishing the goals and objectives of each IMP and the basin-wide plan.

Nebraska New Depletions Plan:

The report required for the Nebraska New Depletions Plan is generated by the Department. It aggregates the information gathered for the annual accounting review and the robust review, when appropriate, for the relevant portions of the Platte River Basin above, within and below the critical habitat reach.