



2014 WATER ACTION PLAN UPDATE



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2014 Water Action Plan Project Update:
Active, Future & Inactive WAP Projects



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164 **Acronyms**

165

166	AF	acre-feet
167	AFY	acre-feet per year
168	cfs	cubic feet per second
169	CNPPID	The Central Nebraska Public Power and Irrigation District
170	CPNRD	Central Platte Natural Resources District
171	EA	Environmental Account (in Lake McConaughy)
172	EDO	Executive Director's Office
173	FERC	Federal Energy Regulatory Commission
174	GC	Governance Committee
175	NCCW	Net Controllable Conserved Water
176	NDNR	Nebraska Department of Natural Resources
177	NPNRD	North Platte Natural Resources District
178	NPPD	Nebraska Public Power District
179	NRD	Natural Resources District
180	PRRIP or Program	Platte River Recovery Implementation Program
181	SDHF	Short Duration High Flow
182	USBR	United States Bureau of Reclamation
183	USFWS	United States Fish and Wildlife Service
184	WAC	Water Advisory Committee
185	WAP	Water Action Plan for the Program
186	WWDC	Wyoming Water Development Commission

187 **Definitions**

188

189 **Associated habitat:** With respect to the interior least tern, whooping crane, and piping
190 plover: habitat located in the Platte River valley beginning near Lexington, Nebraska,
191 and extending eastward to Chapman, Nebraska. With respect to the pallid sturgeon:
192 habitat located in the lower Platte River between its confluence with the Elkhorn River
193 and its confluence with the Missouri River.

194

195 **Excess flows:** Streamflows greater than the water right appropriations and in excess of
196 the maximum of either the USFWS target flows or the CPNRD/Nebraska Game and
197 Parks Commission instream flows.

198

199 **First Increment:** The Program’s 13-year period beginning January 1, 2007 and ending
200 December 31, 2019.

201

202 **Instream flows:** CPNRD and Nebraska Game and Parks Commission instream flows in
203 the central and lower reaches of the Platte River.

204

205 **Milestone 4:** From the Milestones Document (Program Document, Attachment 2),
206 Milestone 4 is the WAP requirement and states, “The [2000] Reconnaissance-Level
207 Water Action Plan, as may be amended by the Governance Committee, will be
208 implemented and capable of providing at least an average of 50,000 acre-feet per year of
209 shortage reduction to target flows, or for other Program purposes, by no later than the end
210 of the First Increment.”

211

212 **OPSTUDY Model:** The Central Platte River OPSTUDY Model was developed by the
213 USBR and the USFWS as a tool for evaluating management alternatives affecting flows
214 in the central Platte River in Nebraska. The OPSTUDY Model is a water accounting
215 model for tracking gains, losses, diversions from and accretions to the central Platte River
216 system. The model uses a monthly time step for simulating water management scenarios
217 assuming a replication of 1947 through 1994 climatic conditions.

218

219 **Program Document:** The document supporting the October 24, 2006 Platte River
220 Recovery Implementation Program Cooperative Agreement, which defines the purposes,
221 goals, elements, and other aspects of the Program, and includes the Program Finance
222 Document, Milestones Document, Adaptive Management Plan, Land Plan, and Water
223 Plan.

224

225 **Score:** Per the Water Plan References Material (Program Document, Attachment 5,
226 Section 11), “scoring” refers to quantifying the extent to which a water project results (or
227 is anticipated to result) in reductions in streamflow shortages to USFWS target flows.
228 Scoring provides one tool for evaluating and comparing the potential benefits of water
229 projects in the context of the Program and comparative purposes among projects;
230 however, it is not the only means of assessing potential benefits and adverse impacts of
231 projects. A project’s “score” is the quantification of the project’s reduction to USFWS
232 streamflow shortages, as accepted by the Governance Committee.

233 **Shortages to target flows:** When the streamflow is below the USFWS target flow for the
234 time period evaluated, the difference in the streamflow and the target flow is considered
235 the shortage. Shortages are typically calculated at Grand Island, Nebraska.

236

237 **Special Advisor:** Independent consultant contracted by the Program to advise the EDO
238 in specific areas of expertise, such as infrastructure, hydrogeology or economics.

239

240 **Target flows:** USFWS target streamflows from Appendix A-5 and Appendix E in the
241 Water Plan Reference Materials in the Program Document (Attachment 5, Section 11)
242 and utilized as the Program's target streamflow goals.

243

244 **Water Objective:** The water objective is to reduce shortages to USFWS target flows by
245 130,000 to 150,000 AFY on average over the course of the First Increment. The three
246 initial state water projects – the Lake McConaughy Environmental Account, the
247 Pathfinder Modification Project Environmental Account and Tamarack I – are credited to
248 providing a combined 80,000 AFY towards the water objective. The remaining 50,000 to
249 70,000 AFY to meet the water objective will be reached through water supply and
250 conservation projects identified in the WAP.

251 **Executive Summary**

252
253 The Platte River Recovery Implementation Program (PRRIP or Program) is a
254 collaborative process involving the States of Nebraska, Wyoming, and Colorado and the
255 U. S. Department of the Interior, together with water users and environmental groups for
256 the benefit of four threatened or endangered bird and fish species—the whooping crane,
257 interior least tern, piping plover, and pallid sturgeon. The Program was initiated by the
258 October 24, 2006 Cooperative Agreement, which was signed by the Secretary of the
259 Interior and the Governors of the three states.

260
261 The purpose, goals, and elements of the Program were established in the *Final Platte*
262 *River Recovery Implementation Program*, which is also dated October 24, 2006 and is
263 referred to as the Program Document. The Program Document includes the Program’s
264 Adaptive Management, Land, and Water Plans, as well as other foundational information.
265 The Program’s First Increment began on January 1, 2007 and is intended to continue for
266 13 years through December 31, 2019.

267
268 Associated habitat for the three threatened or endangered bird species is defined as the
269 reach of the Platte River extending from Lexington, Nebraska, at the upstream or western
270 end and continuing downstream past Overton, Kearney, and Grand Island. The
271 downstream or eastern end of this habitat is at Chapman, Nebraska. For the pallid
272 sturgeon, the associated habitat is that reach of the lower Platte River between Elkhorn
273 and Missouri Rivers. The U.S. Fish and Wildlife Service (USFWS) defined target flows
274 for the purpose of meeting and maintaining the habitat needs of the threatened or
275 endangered species through the associated habitat reach from Lexington to Chapman,
276 Nebraska. Total shortages to USFWS target flows were estimated to be between 333,100
277 acre-feet per year (AFY) and 417,000 AFY¹.

278
279 The Program’s water objective is to reduce shortages to the USFWS target flows in the
280 habitat reach by 130,000 AFY to 150,000 AFY by the end of the First Increment in 2019.
281 Contributions from the three initial state projects —the Tamarack I Project in Colorado,
282 the Pathfinder Modification Project Environmental Account in Wyoming, and the
283 Environmental Account (EA) in Lake McConaughy in Nebraska—provide a combined
284 total yield of 80,000 AFY toward this objective. The Water Action Plan (WAP) was
285 developed to contribute the remaining 50,000 to 70,000 AFY of yield towards the water
286 objective, which is referred to as the WAP milestone². The milestone includes
287 explanatory information describing the steps needed to successfully implement the WAP
288 and achieve the desired yield by the end of the First Increment. The Program
289 accomplished two significant steps towards completion of the milestone, including
290 development of an updated WAP by the end of Year 3 (2009) and development of

¹ Program Document, Attachment 5, Section 11, Appendix A-4

² Program Document, Attachment 2, Milestone 4. The WAP milestone states the WAP will be implemented and capable of providing at least an average of 50,000 AFY of shortage reduction to target flows, or other Program purposes, by the end of the First Increment.

291 projects that are capable of providing at least an average of 25,000 AFY of reductions to
292 USFWS target flow shortages by the end of Year 8 (2014). The Program operated under
293 other on-going steps regarding WAP operations through 2014, and intends to continue
294 work towards the completion of these steps through the end of the First Increment.

295

296 Through Year 8 of the First Increment, the Program successfully implemented three
297 WAP projects including the Phelps County Canal Groundwater Recharge project, the
298 Pathfinder Municipal Account Lease, and the Central Platte Natural Resources District
299 (CPNRD) water leasing project. A fourth project, the No Cost Net Controllable
300 Conserved Water (NCCW), began actively contributing water to the EA in Lake
301 McConaughy for the Program in 2001. In addition, considerable advancements were
302 completed for the J-2 Regulating Reservoirs project, which is anticipated to begin
303 portions of the construction in 2017.

304

305 In 2010, the Program established a Scoring Subcommittee to assess various WAP project
306 yields and provide the Governance Committee (GC) with recommendations on project
307 scores toward the First Increment objective and the WAP milestone. The project score is
308 considered the project's reduction to USFWS target flows, or the yield of the project
309 towards meeting the WAP milestone. The GC approved project scores for the J-2
310 Regulating Reservoirs, Phelps County Canal Groundwater Recharge and Pathfinder
311 Municipal Account Lease projects for a total combined score of 37,300 AFY, which is
312 approximately 75 percent of the minimum requirement of the WAP to provide at least
313 50,000 AFY. The Program also evaluated several potential WAP projects and
314 determined that they should not be actively pursued during the First Increment. The
315 Program continues to pursue additional projects to develop the remaining yield to reach
316 the WAP milestone.

317

318 During the first half of the First Increment, the Program focused efforts on WAP projects
319 that utilized excess flows and/or storage leases as water supplies. These projects are
320 generally more straight-forward to implement, have a minimal impact on other water
321 users, and yield large volumes of water. The Program is moving into the next phase of
322 WAP project development, which consists of water leasing opportunities and water right
323 acquisitions in Nebraska. These types of projects are likely more challenging to
324 implement as new water markets must be developed and permitting processes must be
325 determined. After substantial effort has been put towards the development of water
326 leasing projects, the Program anticipates moving onto the evaluations of Colorado
327 Groundwater Management (Tamarack III), Nebraska Groundwater Management, and
328 Water Management Incentives in Nebraska in the latter part of the First Increment.
329 Additional projects not listed in this document may also be identified and evaluated as
330 potential WAP projects in the future.

331

332 Based on the existing approved score and projections of future WAP project yields, it is
333 expected the Program will reach and likely surpass the minimum requirement of 50,000
334 AFY, while staying within the proposed Water Plan budget. The yields and budget will
335 continue to be closely monitored by the Program to ensure the future success of the water
336 objective and WAP milestone.

337 The 2014 WAP Update reflects information available through the end of 2014 regarding
338 conceptual project designs, implementation schedules, and cost projections. This is a
339 working document that can be utilized to assess the progress towards completing the
340 Program First Increment WAP milestone and for planning purposes through 2019. The
341 information provided in this document was prepared by the Executive Director’s Office
342 (EDO) in conjunction with the GC, Water Advisory Committee (WAC) and Special
343 Advisors. The yield, cost and Program score projections may change after more detailed
344 evaluations are completed. To that extent, the Program and its partners will continue
345 investigating the WAP projects described herein and develop more accurate yield and
346 cost projections, and are not bound by any of the current estimates.

347
348 The process for advancing WAP projects will remain as previously identified in the 2000
349 Reconnaissance-Level WAP and the 2009 WAP Update. The GC will be provided with
350 WAP project proposals, evaluations, and budgets for project implementation approval or
351 rejection. The EDO will continue to monitor the progress of the WAP towards the
352 milestone to ensure the Program’s success in meeting the First Increment water objective.

353
354 This 2014 WAP Update serves as a status update regarding the Program’s progress
355 implementing the WAP through 2014 (Year 8 of the First Increment). This document
356 also identifies changes since the previous WAPs—the 2000 Reconnaissance-Level WAP³
357 and the 2009 WAP Update⁴—and provides planning and sequencing of projects
358 anticipated in the 2015 through 2019 (Years 9 through 13 of the First Increment)
359 timeframe. It serves as a guide to assess progress and to identify the next steps towards
360 furthering WAP project development.

³ Program Document, Attachment 5, Section 6

⁴ EDO and WAC 2010

361 **Section 1 Introduction**

362

363 The Platte River Recovery Implementation Program (PRRIP or Program) is a
364 collaborative process involving the States of Nebraska, Wyoming, and Colorado; the U.S.
365 Department of the Interior; water users; and environmental groups for the benefit of four
366 threatened or endangered bird and fish species:

367

368 • **Whooping Crane**, listed as endangered in 1967. This is the tallest bird in North
369 America and one of the rarest bird species in the world, with a known population
370 of only a few hundred⁵. The Central Platte basin is a critical stopover on the
371 whooping crane’s migration route.

372 • **Interior Least Tern**, listed as endangered in 1985. The interior least tern is the
373 smallest tern species in North America, and the population is estimated to contain
374 17,500- 18,000 birds⁶. The Central Platte basin serves as a nesting site for these
375 birds.

376 • **Piping Plover**, listed as threatened in 1986. The piping plover is a small
377 shorebird; those birds utilizing the Central Platte River basin are part of the
378 Northern Great Plains population, which numbers around 8,000-10,000⁷.

379 • **Pallid Sturgeon**, listed as endangered in 1990. The pallid sturgeon is a large
380 bottom-dwelling fish which may be found in the lower reach of the Platte River
381 above its confluence with the Missouri River.

382

383 The Program was established through the October 24, 2006 Cooperative Agreement, and
384 the Program purposes, goals, and elements—including the Adaptive Management, Land,
385 and Water Plans—were defined in the *Final Platte River Recovery Implementation*
386 *Program*, which is also dated October 24, 2006 and is referred to as the Program
387 Document.

388

389 The First Increment of the Program, a 13-year period ending in 2019, was initiated in
390 2007 and progressed through Year 8 as of the end of 2014. One of the tasks undertaken
391 during the First Increment is the implementation of a Water Action Plan (WAP) that
392 identifies various projects in each state that can be applied toward the overall water
393 objective of the Program. This report represents the third such iteration of the WAP,
394 following a Reconnaissance-Level WAP⁸ in 2000 and a 2009 WAP Update⁹ at the end of
395 Year 3 of the First Increment. Most Program activities to date focused on the Platte
396 River associated habitat reach for the three avian species, located between Lexington and
397 Chapman, Nebraska. The Program generally operates on a “do no harm” basis with

⁵ International Crane Foundation 2015

⁶ Lott, et al. 2013

⁷ Elliott-Smith, et al. 2009

⁸ Program Document, Attachment 5, Section 6

⁹ EDO and WAC 2010

398 regard to the pallid sturgeon habitat reach of the lower Platte River and the potential
399 effects of upstream Program activities.

400

401 The remainder of this introductory section provides a brief overview of the history and
402 purpose of the WAP, as well as an update on the progress made during the First
403 Increment through the end of Year 8. Section 2 provides context for the geographic and
404 hydrologic settings of the Program, including a summary of historical streamflows at key
405 gages in the associated habitat and locations upstream. Section 3 describes the
406 hydrologic classification of wet, normal, and dry years and sub-annual periods. This
407 section also summarizes instream flows of importance to the Program, including U.S.
408 Fish and Wildlife Service (USFWS) target flows and short-duration high flows (SDHF).
409 Section 4 describes the WAP projects that were first identified in the 2000
410 Reconnaissance-Level WAP and have undergone varying degrees of study and
411 implementation during the First Increment (more detailed project descriptions are
412 included in the report appendices). Approved Program scores for several of the WAP
413 projects are presented in Section 5, and Section 6 discusses the cost analyses performed
414 for WAP projects. Section 7 offers a summary and conclusion to this 2014 WAP Update.

415 **1.1 History and Purpose of the WAP**

416

417 The USFWS developed recommendations for flows that it believes are needed at
418 different times of the year for endangered species and other wildlife. The Program's First
419 Increment water objective is to provide water capable of reducing shortages to the
420 USFWS target flows by an average of 130,000 to 150,000 acre-feet per year (AFY)¹⁰.
421 The USFWS instream flow recommendations for the central Platte River are described in
422 the Program Document¹¹ and are quantified in the Program Water Plan Reference
423 Materials¹². Implementation of the three initial water projects by the states—the
424 Environmental Account (EA) in Lake McConaughy (Nebraska), the Pathfinder
425 Modification Project Environmental Account (Wyoming), and Tamarack I (Colorado)—
426 was credited an average annual 80,000 AFY toward the Program First Increment water
427 objective¹³. The EA in Lake McConaughy has operated during the entirety of the
428 Program. Foreshadowed in the 2009 WAP Update, construction at Pathfinder Reservoir
429 was completed in 2012, and deliveries of water from the Pathfinder Environmental
430 Account to the Program began the same year. Most of the Tamarack infrastructure in
431 Colorado began operating in 2001 and was active during the First Increment through
432 2014, including ten recharge wells at the Tamarack site used to build-up groundwater
433 storage in the area and create future lagged accretions to the river. Six additional wells
434 were drilled in 2013 to enhance the project yield during drier times to better reach the
435 planned water contribution of approximately 10,000 AFY¹⁴.

436

¹⁰ Program Document, page 11

¹¹ Program Document, pages 11-14

¹² Program Document, Attachment 5, Section 11, Appendix A-5 and Appendix E

¹³ Program Document, page 14

¹⁴ Program Document, Attachment 5, Section 3

437 The remaining portion of the First Increment water objective, or 50,000 to 70,000 AFY,
438 will be met through the development and implementation of the WAP (as stipulated in
439 Milestone 4¹⁵). The WAP consists of project concepts that retine excess flows, water
440 leasing projects, groundwater management and water management incentives. The 2000
441 Reconnaissance-Level WAP¹⁶ included a combination of potential projects located in
442 each of the three states: eight projects in Nebraska, four projects in Wyoming, and one
443 project in Colorado. The 2009 WAP Update¹⁷ was prepared by the Program’s Executive
444 Director’s Office (EDO) and provided project updates and assigned “tier” designations to
445 create a priority system for evaluating projects. Permutations of those original 13 WAP
446 projects continue to be studied today.

447
448 This 2014 WAP Update reflects information available through the end of 2014 regarding
449 conceptual project designs, implementation schedules and cost projections. The
450 information provided in this document was prepared by the EDO in conjunction with the
451 Governance Committee (GC), Water Advisory Committee (WAC) and Special Advisors.
452 This is a working document that can be utilized to assess the progress towards completing
453 the Program First Increment WAP milestone and for planning purposes through 2019.
454 The 2014 WAP Update accomplishes the task by building upon the previous versions and
455 further describing the progress made in continuing to study the feasibility of some WAP
456 projects while moving forward with implementation and scoring of others.

457
458 In addition to the previously-established tier status, WAP projects are further defined in
459 this 2014 WAP Update has having “active”, “future,” or “inactive” status determinations,
460 relative to the likelihood of implementation within the First Increment. “Active” projects
461 are considered projects that were implemented and are operational, or projects that were
462 studied for feasibility and the funding for project implementation was initiated. “Future”
463 projects are anticipated to be evaluated for feasibility and potential implementation
464 during the remaining years of the First Increment. “Inactive” projects are currently not
465 anticipated to move into the implementation phase during the First Increment due to
466 feasibility concerns, financial reasons or other reasons, although conditions or
467 opportunities could develop that warrant reconsideration of a project.

468 **1.2 Overview of Progress through the First Increment**

469
470 The following sections identify project feasibility and other evaluation studies undertaken
471 during the First Increment and summarize the progress toward completion of the steps
472 listed under Milestone 4.

473 **1.2.1 Project Studies and Initial Implementation Status**

474
475 Varied stages of development were achieved for the identified WAP projects through
476 Year 8 of the First Increment, including completion of the feasibility and conceptual
477 design studies listed on the following page:

¹⁵ Program Document, Attachment 2.

¹⁶ Program Document, Attachment 5, Section 6

¹⁷ EDO and WAC 2010

- 478 • Water Management Study Phases I and II: Evaluation of Pulse Flows for the
- 479 Platte River Recovery Implementation Program (2008)¹⁸
- 480 • Platte River Recovery Implementation Program 2009 Water Action Plan Update
- 481 (2010)¹⁹
- 482 • Nebraska Ground Water Recharge Pre-Feasibility Study (2010)²⁰
- 483 • CNPPID Reregulating Reservoir: Elwood and J-2 Alternatives Analysis Project
- 484 Report (2010)²¹
- 485 • Canal Winter Operations Feasibility Study (2011)²²
- 486 • Feasibility Study – Elm Creek Regulatory Reservoir (2011)²³
- 487 • CNPPID J-2 Reregulating Reservoir Feasibility Report (2012)²⁴
- 488 • Pilot-Scale Recharge Report for Nebraska Groundwater Recharge Feasibility
- 489 Study (2012)²⁵
- 490 • Conceptual Design Report: J-2 Regulating Reservoir Project (2013)²⁶

491

492 That many of these studies were completed subsequent to the 2009 WAP Update is
 493 indicative of the significant advancement made with regard to the evaluation of WAP
 494 projects as the First Increment progressed. As a result of these collaborative efforts
 495 through the end of 2014, the Program secured initial funding or implementation of five
 496 WAP projects, which are either active at present or planned for construction during the
 497 latter years of the First Increment:

498

- 499 • J-2 Regulating Reservoirs in the Central Nebraska Public Power and Irrigation
- 500 District (CNPPID) system,
- 501 • Nebraska Groundwater Recharge in the Phelps County Canal, also part of the
- 502 CNPPID system,
- 503 • Pathfinder Municipal Account Lease in Wyoming,
- 504 • Central Platte Natural Resources District (CPNRD) Water Leasing project in
- 505 Nebraska, and
- 506 • No Cost Net Controllable Conserved Water (NCCW), made available via a grant
- 507 from the U.S. Bureau of Reclamation (USBR).

508

509 Of these five projects regarded as having active status designations (see Section 4), the
 510 first three have scores that were accepted by the GC for their contributions toward
 511 meeting the First Increment water objective and WAP milestone. The fourth project,
 512 CPNRD water leasing, actively provided a yield to the Program in 2013 and 2014; it is
 513 anticipated that the project scoring process will begin in 2015. Water from the No Cost
 514 NCCW has been added to the EA in Lake McConaughy each year since 2001, but the

¹⁸ Boyle Engineering Corporation et al. 2008a,b

¹⁹ EDO and WAC 2010

²⁰ EDO et al. 2010

²¹ Olsson Associates and Black & Veatch 2010

²² Applegate Group, Inc. 2011

²³ Olsson Associates 2011

²⁴ Olsson Associates and Black & Veatch 2012

²⁵ EA Engineering, Science, and Technology, Inc., and Daniel B. Stephens and Associates, Inc. 2012

²⁶ RJH Consultants, Inc. 2013

515 project has not been scored for Program purposes. Additional projects were studied but
516 were not recommended to move forward into implementation, such as the Elm Creek
517 Reregulating Reservoir and that portion of the NCCW project requiring purchases by the
518 Program; while these evaluations represent progress toward meeting Program water
519 goals, these projects are regarded as inactive for the remainder of the First Increment for
520 budgetary or other reasons, but could be reevaluated if conditions change.

521 **1.2.2 Milestone Status Update**

522

523 Milestone 4 is related to the WAP projects and is stated as follows, per the Program
524 Milestones Document²⁷:

525

526 The [2000] Reconnaissance-Level Water Action Plan, as may be amended by the
527 Governance Committee, will be implemented and capable of providing at least an
528 average of 50,000 acre-feet per year of shortage reduction to target flows, or for
529 other Program purposes, by no later than the end of the First Increment.

530

531 The Explanatory Material and Schedules section of the Milestones Document identifies
532 seven steps that “are necessary to implement the [Program] Water Plan and are needed to
533 successfully complete Milestone 4.” Note that while these steps provide guidance, they
534 are not to be considered as individual milestones for purposes of Endangered Species Act
535 compliance. The steps are listed below, along with their respective status updates as of
536 the end of 2014.

537

538 Milestone Step 4.1: Ongoing

539 The Governance Committee is responsible for allocating funds necessary to
540 implement the [2000] Reconnaissance-Level Water Action Plan in accordance
541 with the Program budget, as approved by the signatories and may be revised by
542 the Governance Committee.

543

544 Milestone Step 4.2: Ongoing

545 The Governance Committee is responsible for acquiring the necessary permits for
546 individual water related activities and for insuring compliance with all relevant
547 local, state and federal laws and regulations.

548

549 Milestone Step 4.3: Ongoing

550 The Governance Committee will determine which projects in the [2000]
551 Reconnaissance-Level Water Action Plan are retained through the
552 reconnaissance, feasibility, and implementation level. Water related activities
553 implemented in accordance with the Water Plan will be credited to the Program’s
554 long-term objective as set forth in the Platte River Recovery Implementation
555 Program, Section III.A.3.a.(1) and the objective for the First Increment of the
556 Program. As appropriate, the Governance Committee will develop and use
557 protocols to determine what quantities of water will be credited to the individual
558 projects.

²⁷ Program Document, Attachment 2

559 The Program operated in compliance with these three steps during the initial 8 years of
560 the First Increment (2007 through 2014). Funding and permitting requirements were
561 satisfied as needed by the GC. Many projects were evaluated through the feasibility level,
562 and several were carried forth to the implementation level. In addition, the GC accepted a
563 set of general assumptions to estimate the quantity of water credited to the Program's
564 milestone from an implemented WAP project, which is referred to as the project score.
565 Assumptions for project scoring are explained in Section 5.1.

566

567 Milestone Step 4.4: Completed

568 Recognizing that the initial [2000] Reconnaissance –Level Water Action Plan
569 (Attachment 5, Section 6 [of the Program Document]), is based on reconnaissance
570 level project evaluations, the Governance Committee will complete feasibility
571 studies on proposed projects and develop a Water Action Plan, if necessary, by
572 the end of Year 3 of the First Increment [2009].

573

574 The Program completed several feasibility studies to advance projects, such as the J-2
575 Regulating Reservoirs, Elm Creek Reregulating Reservoir and the Phelps County Canal
576 Groundwater Recharge project. The Program also completed a 2009 WAP Update, in
577 compliance with the specification that this be done by the end of Year 3 of the First
578 Increment. This 2014 WAP Update provides further progress updates related to the 2000
579 Reconnaissance-Level WAP projects and new projects under consideration.

580

581 Milestone Step 4.5: Completed

582 This Water Action Plan, as may be amended by the Governance Committee, will
583 be capable of providing at least an average of 25,000 acre-feet per year of
584 shortage reduction to target flows, or for other Program purposes, by the end of
585 Year 8 of the First Increment [2014].

586

587 This milestone step is the primary impetus for preparation of this 2014 WAP Update. The
588 Program successfully achieved this goal by implementing or initiating funding for
589 implementation for the following projects: J-2 Regulating Reservoirs, Phelps County
590 Canal Groundwater Recharge, Pathfinder Municipal Account Lease and the Central
591 Platte Natural Resources District (CPNRD) Lease projects. The GC has accepted scores
592 for the J-2 Regulating Reservoirs, the Phelps County Canal Groundwater Recharge
593 project and the Pathfinder Municipal Account Lease. These projects provide a combined
594 score of 37,300 AFY of reduction to USFWS target flow shortages for the Program. The
595 Program also has a lease agreement with the CPNRD for recharge accretions from excess
596 flows and the consumptive use credit from transferred surface water rights. This project
597 has not been officially scored by the GC; however, the project provides a yield for the
598 Program and is anticipated to be scored in 2015.

599

600 Milestone Step 4.6: Ongoing

601 The Governance Committee will ensure that projects implemented under this
602 Water Action Plan are operated in accordance with approved operating plans and
603 that they are having the intended effects on Program purposes.

604

605 Milestone Step 4.7: Ongoing
606 The Governance Committee will ensure that water produced by projects
607 implemented under this Water Action Plan is included in approved tracking and
608 accounting procedures and that these projects are coordinated with other Program
609 activities including other water projects and with the management of the
610 Environmental Account.
611
612 The Program actively operated and managed WAP projects through 2014 in compliance
613 with the specifications of these milestone steps.

614 **Section 2 Geographic and Hydrologic setting of the Program**

615

616 The following sections describe the geography and historical hydrology of the Platte
617 River basin.

618 **2.1 Geographic setting**

619

620 **Figure 1** illustrates the geographic extent of the overall Platte River basin and its major
621 sub-basins, described as follows:

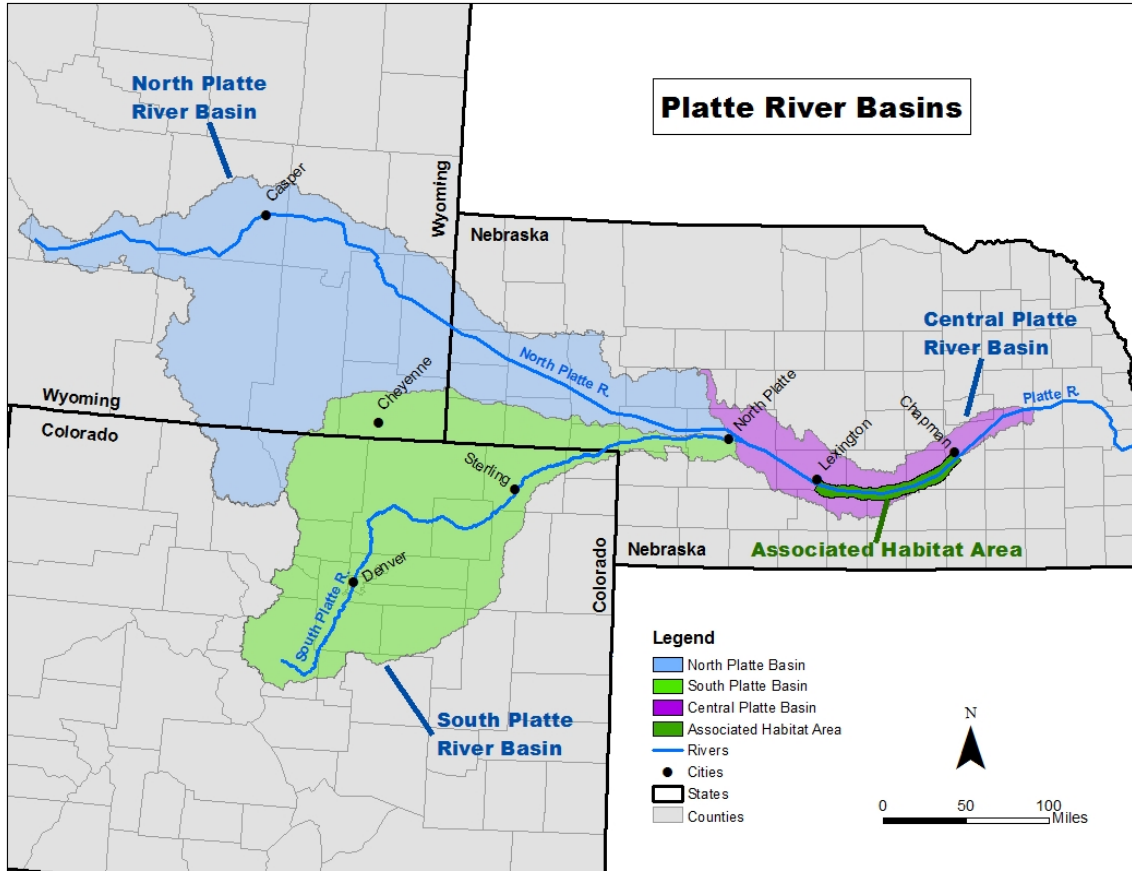
622

- 623 • North Platte River basin – Refers to the drainage of the mainstem river and
624 tributaries from its headwaters in northern Colorado through Wyoming, and
625 through Nebraska to the confluence with the South Platte River.
- 626 • South Platte River basin – Refers to the drainage of the mainstem river and
627 tributaries from its headwaters along the Continental Divide in Colorado to its
628 confluence with the North Platte River in Nebraska.
- 629 • Central Platte River basin – Refers to the drainage of the mainstem river and
630 tributaries from the confluence of the North Platte and South Platte Rivers to the
631 confluence with the Loup River.
- 632 • Platte River basin – Refers to all of the above sub-basins collectively.

633

634 The topography of the basin is highly variable, ranging from mountain peaks exceeding
635 14,000 feet elevation along the Continental Divide in Colorado and Wyoming to an
636 elevation of 1,765 feet at Chapman, Nebraska, the downstream end of the Central Platte
637 basin. The drainage area of the combined sub-basins across the three states is about
638 90,000 square miles. Respective river mainstem lengths are about 618 miles for the North
639 Platte River, 424 miles for the South Platte River, and 310 miles for the Platte River
640 between the confluence just east of North Platte, Nebraska, and the river mouth where it
641 joins the Missouri River south of Omaha, Nebraska²⁸.

²⁸ Freeman 2003



642
643 **Figure 1. Platte River Basin map**

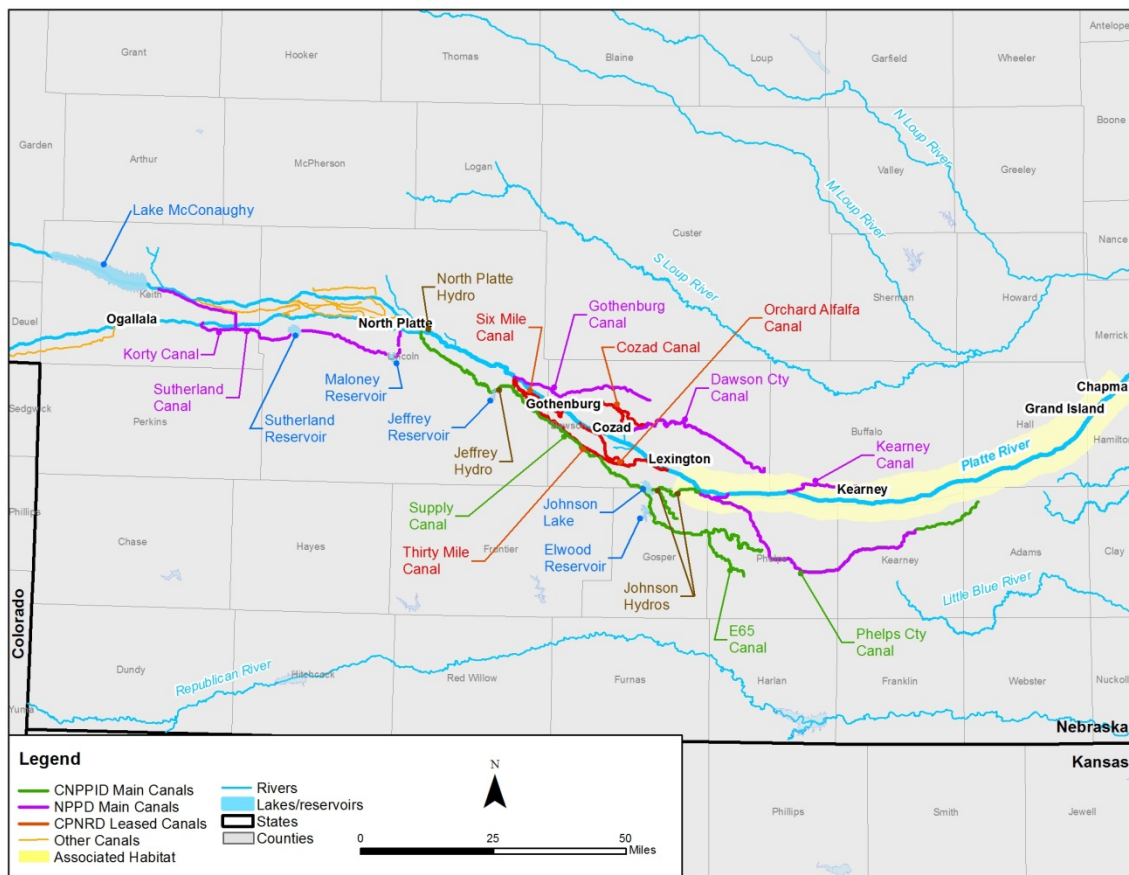
644 Figure 1 also shows the “PRRIP Associated Habitats” for the three threatened or
645 endangered avian species, located in the eastern reaches of the Central Platte basin. For
646 Program purposes, the associated habitats were defined²⁹ as follows:

647
648 [T]he term “associated habitats” means, with respect to the interior least tern,
649 whooping crane, and piping plover, the Platte River valley beginning at the
650 junction of U.S. Highway 283 and Interstate 80 near Lexington, Nebraska, and
651 extending eastward to Chapman, Nebraska, including designated critical habitat
652 for the whooping crane and that portion of any designated critical habitat for
653 piping plover within that Lexington to Chapman reach. With respect to the pallid
654 sturgeon, the term “associated habitat” means the lower Platte River between its
655 confluence with the Elkhorn River and its confluence with the Missouri River.
656 “Associated habitats” may, to the extent approved by the Governance Committee,
657 include any critical habitat in the Lexington to Chapman reach of the Platte River
658 basin which is subsequently designated by the U.S. Fish and Wildlife Service for
659 the target species.

660
661 **Figure 2** provides a more detailed view of the Central Platte basin, including the many
662 canals and reservoirs that are utilized for agricultural irrigation and hydropower

²⁹ Program Document, page 1

663 generation. Most of these canals divert from the rivers between Lake McConaughy and
 664 the upstream end of the associated habitats, with some of the irrigation return flows
 665 accruing to the associated habitat reach.



666
 667 **Figure 2. Central Platte River location map**

668 **2.2 Hydrologic setting**

669
 670 Precipitation, runoff, and streamflows in the Platte River basin are highly variable given
 671 the range of elevations and the corresponding changes in climate as the rivers travel
 672 generally eastward from the Rocky Mountains and across the plains of eastern Colorado
 673 and Wyoming and western and central Nebraska. Hydrologic conditions are further
 674 influenced by the extensive diversions and return flows associated with agricultural,
 675 municipal and industrial, and other uses of water. Numerous on- and off-channel
 676 reservoirs store or retine water during high flow periods when water is plentiful, and
 677 release water to generate power or to meet demands when streamflows are low. **Figure 3**
 678 shows the locations of seven streamflow gages in the Platte River system, which were
 679 selected to illustrate streamflows both upstream of and through the associated habitat.

- 680
 681 • **USGS 06764000 South Platte River at Julesburg, Colorado.** Represents flows
 682 entering Nebraska from Colorado.
 683 • **USGS 06765500 South Platte River at North Platte, Nebraska.** Represents
 684 flows on the South Platte River upstream of the confluence with the North Platte

- 685 River, but between the Kory Diversion and downstream point of return for the
686 Nebraska Public Power District's (NPPD) Sutherland Canal system.
- 687 • **USGS 06674500 North Platte River at Wyoming-Nebraska State Line.**
688 Represents water entering Nebraska from Wyoming.
 - 689 • **USGS 06693000 North Platte River at North Platte, Nebraska.** Represents
690 streamflows just upstream of the confluence with the South Platte River and
691 downstream of Lake McConaughy and several major irrigation diversions.
 - 692 • **USGS 06768000 Platte River near Overton, Nebraska.** Represents
693 streamflows near the upper end of the associated habitats for the avian species,
694 and downstream of the return from the CNPPID's Tri-County Supply Canal,
695 which diverts just below the confluence at North Platte, Nebraska.
 - 696 • **USGS 06770200 Platte River near Kearney, Nebraska.** Represents
697 streamflows near the midpoint of the associated habitats for the threatened and
698 endangered avian species.
 - 699 • **USGS 06770500 Platte River near Grand Island, Nebraska.** Represents
700 streamflows near the downstream end of the associated habitats; this gage is also
701 the location for the assessment of annual hydrologic condition, target flows, and
702 scoring for the Program (see Section 3 and Section 5).

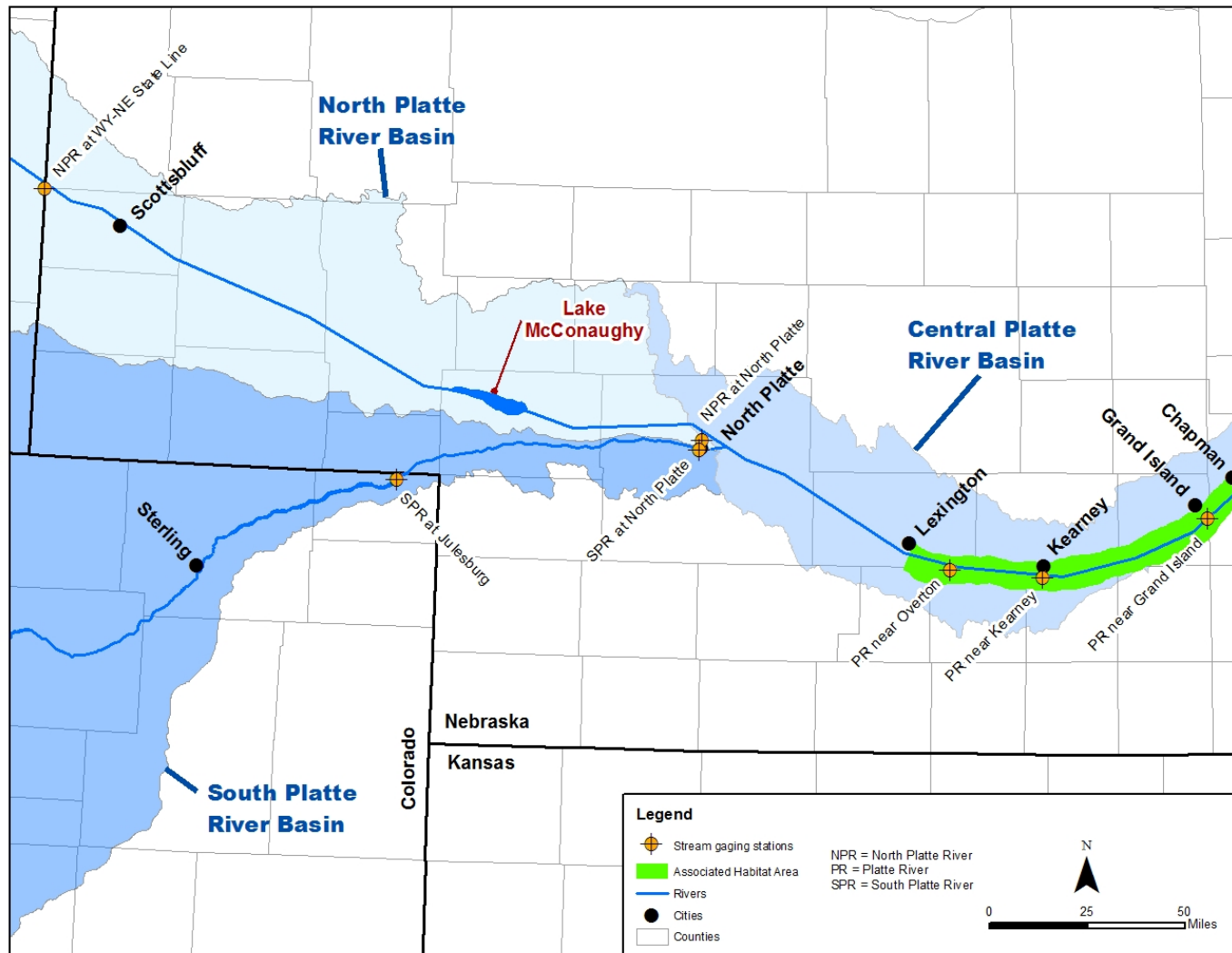


Figure 3. Representative Platte River Basin Streamflow Gage Locations

706 **Table 1** summarizes historical annual flow volumes over several time periods, including
 707 the complete available period of record, the OPSTUDY modeling period (1947-1994),
 708 and the First Increment through Year 8 (2007-2014), subject to data availability. **Figures**
 709 **4 and 5** illustrate historical annual flow volumes and average daily flows, respectively, at
 710 the Grand Island gage (USGS 06770500) over several time periods. Similar figures for
 711 the other six gages are included in **Appendix A**. This data provides valuable context for
 712 understanding the First Increment objective of reducing USFWS target flow shortages by
 713 an average of 130,000 to 150,000 AFY.
 714

Table 1. Average Annual Flow Volumes, in AFY, at Representative Platte River Basin Stream Gages

USGS Gage ID	River and Location	Period of Record	Average Annual Flow Volume [AFY] ^{a,b}		
			Period of Record	OPSTUDY Period (1947-1994)	First Increment through Year 8 (2007-2014)
06764000	South Platte River at Julesburg, CO	1903-1906, 1908-1912, 1914-1921, 1925-2014 ^c	389,100	434,100	392,100
06765500	South Platte River at North Platte, NE	1932-2014 ^d	313,300	311,800	381,500
06674500	North Platte River at WY-NE State Line	1930-2014 ^e	561,200	565,600	671,800
06693000	North Platte River at North Platte, NE	1923-2014 ^f	714,400	548,600	507,400
06768000	Platte River near Overton, NE	1942-2014 ^g	1,125,300	1,181,900	1,065,800
06770200	Platte River near Kearney, NE	1982-2014 ^h	1,151,700	N/A	1,054,900
06770500	Platte River near Grand Island, NE	1935-2014 ⁱ	1,086,600	1,157,000	1,160,400

715 ^a Average annual flow volumes rounded to the nearest 100 AFY.
 716 ^b Only calendar years with complete data were used in the calculations.
 717 ^c Provisional data for 10/1/2013 through 12/31/2014, based on sum of ONEJURCO (Channel #1) and
 718 06763990/PLAJURCO (Right Channel #2) gages.
 719 ^d Provisional data from 10/1/2011 through 12/31/2014. Missing data 11/5/2013 through 1/9/2014.
 720 ^e Provisional data for 12/3/2014 through 12/31/2014. No data due to ice on 12/30/2014 through
 721 12/31/2014.
 722 ^f Provisional data 10/1/2011 through 12/31/2014.
 723 ^g Provisional data for 10/22/2013 through 12/31/2014. No data due to ice on 12/7/2013-2/9/2014,
 724 11/12/2014-11/18/2014, and 12/30/2014-12/31/2014. Missing data on 9/17/2014, 10/10/2014-
 725 10/18/2014, 11/22/2014-11/25/2014, 11/29/2014, 12/1/2014-12/4/2014, and 12/6/2014-12/9/2014.
 726 ^h Provisional data for 11/14/2013 through 12/31/2014. No data due to ice on 12/5/2013-3/9/2014 and
 727 11/11/2014-11/27/2014. No data due to equipment malfunction on 7/14/2014-8/7/2014. Missing data on
 728 1/1/1982-1/26/1982, 10/1/1985-11/18/1985, 10/23/1987-10/25/1987, 10/29/1987, 1/6/1988, 1/28/1988,
 729 2/3/1988-2/4/1988, 2/16/1988, 2/18/1988-2/19/1988, 3/28/1988-3/30/1988, 5/1/1988-5/3/1988, 5/8/1988,
 730 6/23/1988-6/24/1988, 6/27/1988-6/28/1988, 7/7/1988, 7/15/1988, 8/13/1988, 9/7/1988, 9/9/1988,
 731 9/12/1988, 9/16/1988, 9/29/1993-9/30/1993, 10/1/1998-9/30/1999, 10/1/2000-9/30/2001, and
 732 12/27/2014-12/31/2014.
 733 ⁱ Provisional data for 12/2/2013 through 12/31/2014. No data due to ice on 12/4/2013-3/9/2014,
 734 11/11/2014-12/4/2014, and 12/30/2014-12/31/2014.

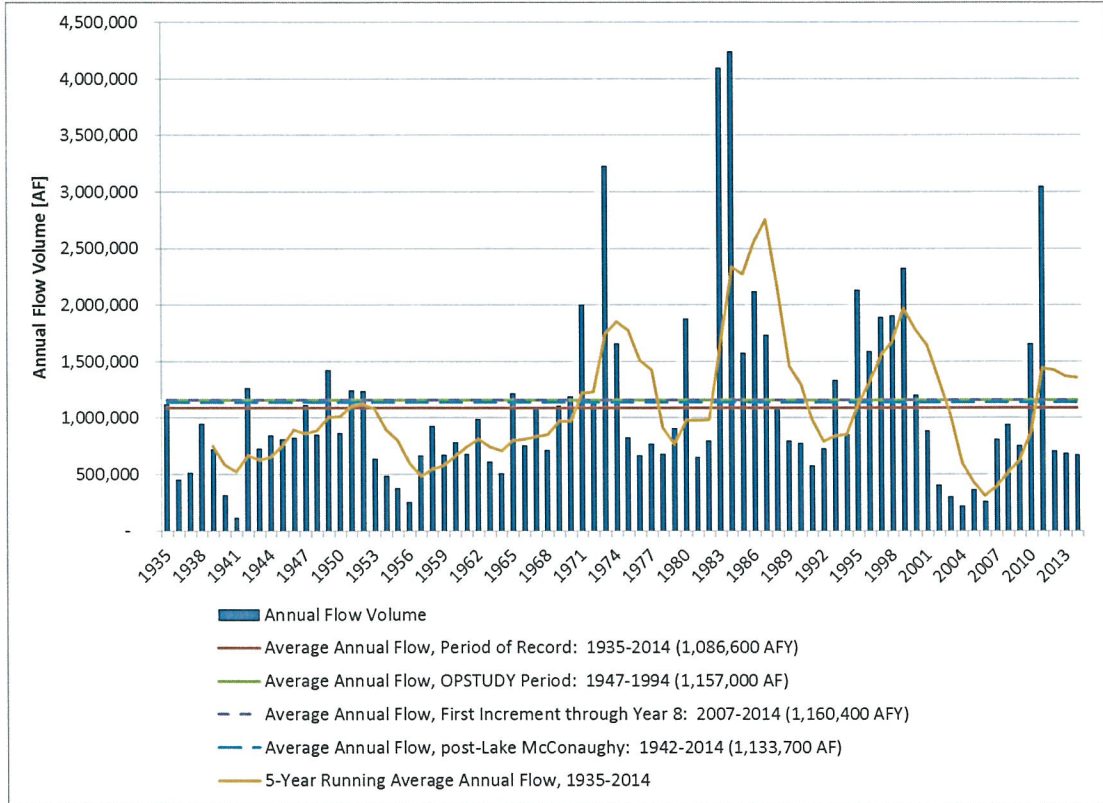


Figure 4. Historical Annual Flow, USGS 06770500 Platte River near Grand Island, NE

735
736

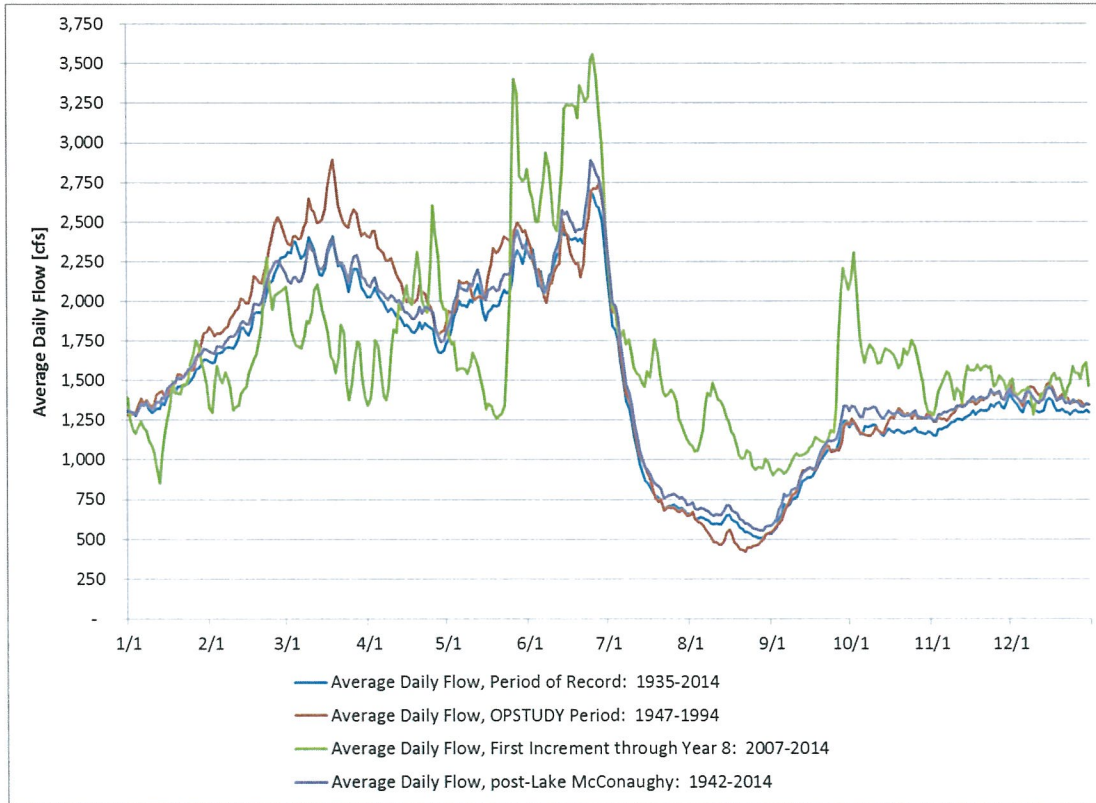


Figure 5. Average Daily Flow, USGS 06770500 Platte River near Grand Island, NE

737
738

Section 3 Target Flows and Short Duration High Flows

The USFWS instream flow recommendations for the central Platte River are described in the Program Document³⁰ and are quantified in the Program Water Plan Reference Materials³¹. These USFWS recommendations for the Central Platte River include target flows, peak flows and other flows deemed important by the USFWS, and are to be examined through the Program’s Adaptive Management Plan and may be modified by the USFWS accordingly. Two subsets of instream flows are addressed in this document, target flows and SDHF events.

The USFWS flow targets apply to the Program’s associated habitat reach for the three threatened or endangered avian species from Lexington to Chapman, Nebraska. The targets vary based on the current hydrologic regime as determined by hydrologic condition designations to account for differences in flow between wet, normal, and dry years. The following sections summarize the methods and results of hydrologic conditions analysis, as well as target flows and SDHF events.

3.1 Wet/Normal/Dry Hydrologic Conditions

Hydrologic condition designations were developed by the USFWS and are determined on an annual and a periodic or “real time” basis with the possibility of a wet, normal, or dry designation.

3.1.1 Annual Hydrologic Condition

Annual hydrologic condition designations are based on streamflow thresholds at the Grand Island gage (USGS 06770500) over calendar years 1947 to 1994, corresponding to the same years used in the OPSTUDY model. The average annual streamflow was calculated from the average daily gaged flows for each year in the period and the years were ranked from highest to lowest average streamflow values. Years with the highest 33% of average annual streamflow were designated as wet, years with the lowest 25% of average annual streamflow were designated as dry, and years with streamflows between these limits were designated as normal³². **Table 2** identifies the calendar years in the 1947-1994 as hydrologically wet, normal, or dry³³.

Table 2. Annual Hydrologic Condition, 1947-1994

Condition	Years
Wet	1949, 1951, 1952, 1965, 1970, 1971, 1972, 1973, 1974, 1980, 1983, 1984, 1985, 1986, 1987, 1993
Normal	1947, 1948, 1950, 1958, 1960, 1962, 1966, 1967, 1968, 1969, 1975, 1977, 1978, 1979, 1982, 1988, 1989, 1990, 1992, 1994
Dry	1953, 1954, 1955, 1956, 1957, 1959, 1961, 1963, 1964, 1976, 1981, 1991

³⁰ Program Document, pages 11-14

³¹ Program Document, Attachment 5, Section 11, Appendix A-5 and Appendix E

³² Program Document, Attachment 5, Section 11

³³ EDO 2011

772 For Program application, the designated years in Table 2 were used to set the annual
 773 target flow regime in the scoring models. In addition, threshold average annual flow
 774 rates and volumes were determined to be the following for the 1947-1994 period:

- 775
- 776 • Wet years: $\geq 1,575$ cubic feet per second (cfs) (1,140,200 AFY)
 - 777 • Dry years: ≤ 939 cfs (679,800 AFY)

778

779 Since the inception of the First Increment, these thresholds have been used every calendar
 780 year to assess a wet, normal, or dry annual hydrologic condition based on the streamflows
 781 at the Grand Island gage. First Increment annual hydrologic conditions are listed below in
 782 **Table 3.**

783 **Table 3. First Increment Annual Hydrologic Conditions, 2007-2014**

Year	Average Annual Flow at Grand Island[cfs]	Hydrologic Condition
2007	1,121	Normal
2008	1,300	Normal
2009	1,039	Normal
2010	2,289	Wet
2011	4,214	Wet
2012	978	Normal
2013	1,025	Normal
2014	1,209	Normal

784

785 Additional information regarding the annual hydrologic condition can be found in the
 786 “Hydrologic Condition Annual and Periodic Designations” document³⁴, as well as the
 787 *Annual Platte River Surface Water Flow Summary*³⁵, which is updated annually by
 788 Program staff.

789 3.1.2 Periodic or “Real Time” Hydrologic Condition

790

791 The methods developed to determine real time hydrologic condition designations were
 792 initially described in a journal paper by Anderson and Rodney³⁶. Real time designations
 793 apply to periods lasting from one to three months and are calculated at the beginning of
 794 the period (hence the “real time” classification). The Program calculates real time
 795 hydrologic designations according to the Anderson and Rodney paper with some
 796 modifications (e.g., the August-September method was developed after the original
 797 paper), with the methods specifically described on the Hydrologic Conditions
 798 Calculations page of the Program website³⁷. The methods for determining the real time
 799 hydrologic condition vary throughout the year, according to this schedule:

- 800
- 801 • December-January-February
 - 802 • March-April

³⁴ EDO 2011

³⁵ EDO 2015

³⁶ Anderson and Rodney 2006

³⁷ <https://www.platteriverprogram.org/PubsAndData/Pages/HydrologicConditionCalculations.aspx>

- 803 • May
- 804 • June
- 805 • July
- 806 • August-September
- 807 • October-November

808

809 The periodic wet, normal, or dry hydrologic condition is used as the basis for varying
810 target flows as needed throughout the course of the year. The target flows are in turn
811 used to evaluate streamflow excesses and shortages on a real time basis and to coordinate
812 Program water project activities.

813 3.2 Target Flows

814

815 Target flows are defined by the USFWS as “recommended species and annual pulse
816 flows for the central Platte River.”³⁸ Target flows do not include Short Duration High
817 Flows, which are described in Section 3.3. The Water Plan Reference Materials³⁹ provide
818 further definitions of the target flow components:

819

- 820 • *Species flows* “were established as recommended...minimum flows for various
821 periods of the years...for the purpose of meeting the habitat needs of native biotic
822 components of the ecosystem.”

- 823 • *Annual pulse flows* “were identified as being important to maintaining the
824 physical structure and other characteristics of the river for biological benefits.”

825

826 These targets are the flow levels that the Program actively seeks to attain through
827 Program water projects and re-timing of river flows through the associated habitat.
828 Deficits to target flows are typically calculated by comparing streamflows at the Grand
829 Island gage (USGS 06770500) to the USFWS target flows. The USFWS estimated a
830 mean annual historic deficit to target flows of 417,000 AFY during wet and normal years
831 and 333,100 AFY during dry years⁴⁰. These flow deficits are equivalent to about 30 to
832 38 percent of the average annual flow volume at the Grand Island gage over the available
833 period of record (see Table 1 and Figure 4). The First Increment water objective of
834 reducing these target flow deficits by 130,000 to 150,000 AFY represents an increase on
835 the order of 12 to 14 percent of the long-term average annual streamflow at the Grand
836 Island gage.

837

838 **Figure 6** illustrates the USFWS daily target flows⁴¹, which vary for wet, normal, and dry
839 hydrologic conditions. **Figure 7** superimposes the average daily flows at the Grand
840 Island gage over the 1947-1994 OPSTUDY modeling period and the USFWS daily target

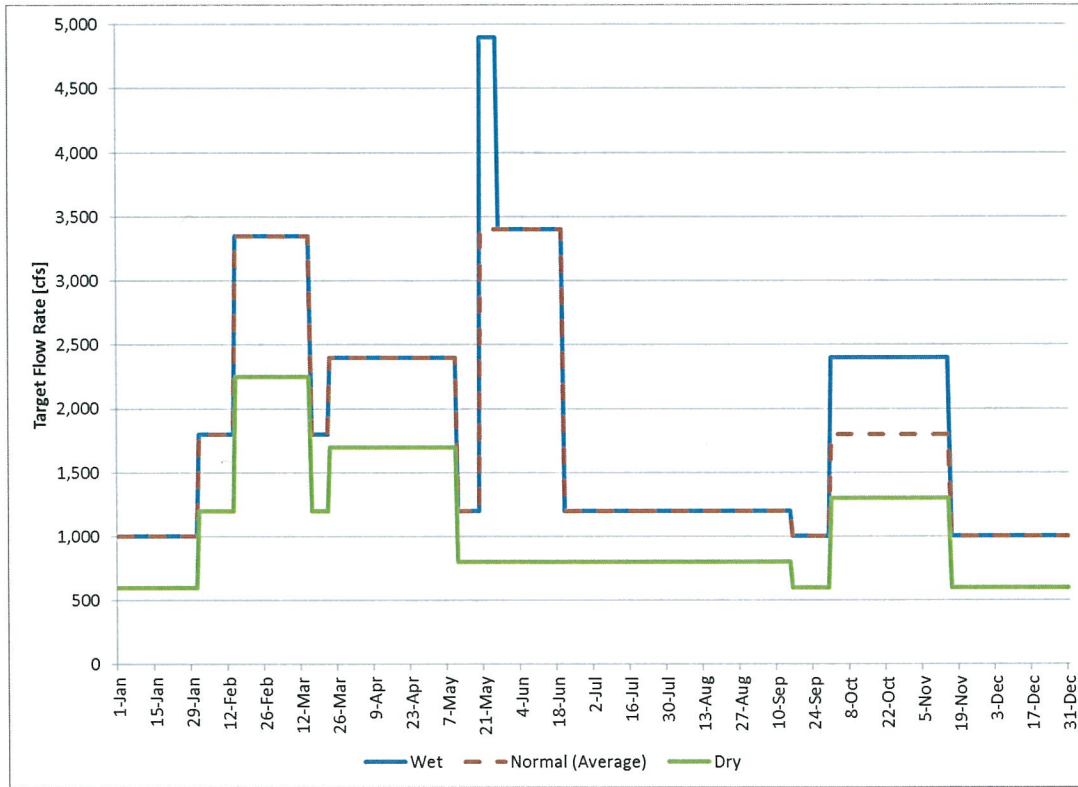
³⁸ Program Document, page 11

³⁹ Program Document, Attachment 5, Section 11

⁴⁰ Program Document, Attachment 5, Section 11, Appendix A-4

⁴¹ Program Document, Attachment 5, Section 11, Appendix A-5

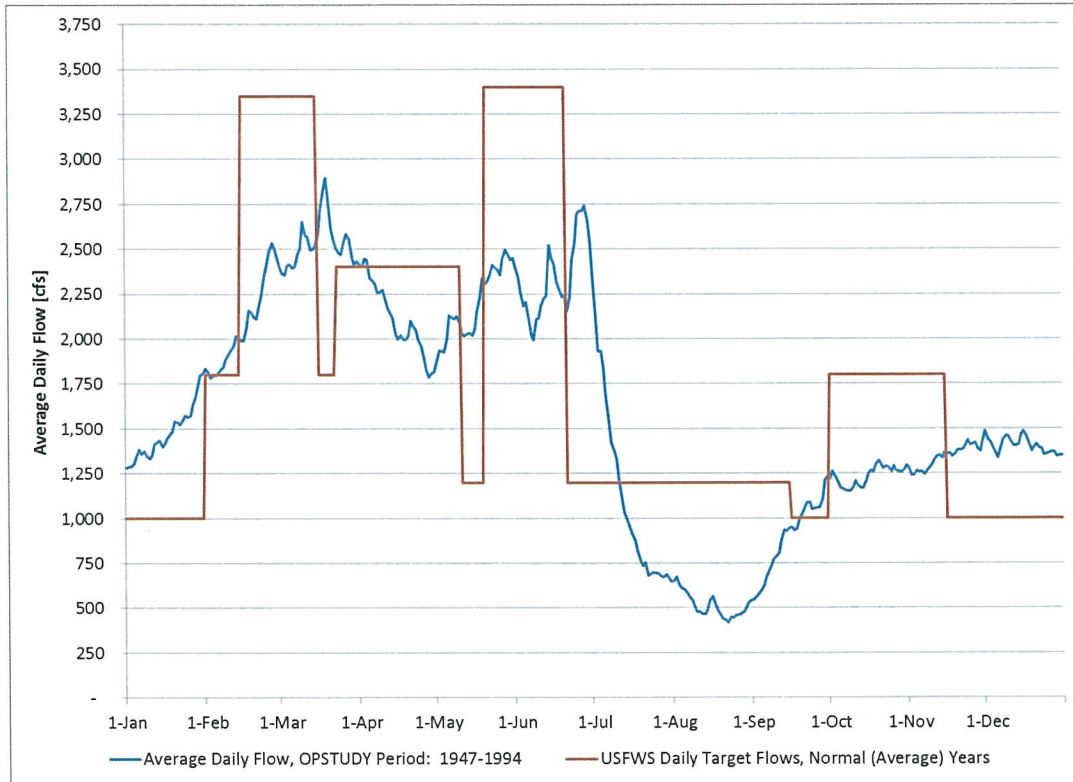
841 flows for normal conditions. **Figure 8** shows the USFWS monthly average target
 842 flows⁴².
 843



844
 845

Figure 6. Daily Target Flows for Wet, Normal, and Dry Hydrologic Conditions.

⁴² Program Document, Attachment 5, Section 11, Appendix A-5



846
847
848

Figure 7. Average Daily Flows at Grand Island Gage with USFWS Daily Target Flows for Normal Conditions



849
850

Figure 8. Monthly Average Target Flows for Wet, Normal, and Dry Hydrologic Conditions.

851 **3.3 Short Duration High Flows**

852

853 In addition to the monitoring of target flows, the Program completed a Water
854 Management Study⁴³ in 2008 to determine the feasibility of delivering “5000 cfs of
855 Program water for three days to the upper end of the associated habitat (at the Overton
856 gage) for pulse flows when demands on water are low (normally September 1-May
857 31).”⁴⁴ Such events are known as SDHF events, which are distinct from the annual pulse
858 flows included in the USFWS target flows and are generally defined in the Water Plan
859 Reference Materials⁴⁵ as “flows of approximately three to five days duration with
860 magnitudes approaching but not exceeding bankfull channel capacity in the habitat
861 reach.” The bankfull capacity in the associated habitat is between 5,000 cfs and 8,000
862 cfs⁴⁶. Flows of this magnitude are desired on an annual or near-annual basis to help
863 scour vegetation encroaching on channel habitat areas and to mobilize sand and build
864 ephemeral sandbars to benefit the target species.

865 **3.3.1 Program SDHF activities**

866

867 The 2000 Reconnaissance-Level WAP identified water projects that could be used
868 toward reducing shortages to target flows; however, at that time, there was no
869 consideration of how projects could be operated to augment an SDHF. The objective is
870 to produce a bankfull SDHF, a substantially higher peak than the maximum target flow,
871 and to control that flow for a specific three days in order to perform the scientific
872 experiments under the Adaptive Management Plan.

873

874 It is anticipated that the chokepoint⁴⁷ on the North Platte River, located near the Highway
875 83 Bridge near North Platte, Nebraska, will be able to convey 3,000 cfs towards an
876 SDHF. Water would be released from the EA in Lake McConaughy and flow down the
877 North Platte River, or be routed through canals to the South Platte River to avoid the
878 choke point limitation. The J-2 Regulating Reservoirs project is designed to provide a
879 2,000 cfs release rate to reach the full 5,000 cfs minimum flow rate for an SDHF though
880 the associated habitat reach. During the First Increment, the Program successfully
881 executed a test flow release in 2009 and another release that reached a peak flow of about
882 4,200 cfs⁴⁸ in 2013.

883 **3.3.2 Natural high flow events**

884

885 Additional high flows in the range of 5,000 cfs to 8,000 cfs occurred in several years as a
886 result of natural flow events; these are tracked in the *Annual Platte River Surface Water*

⁴³ Boyle Engineering Corporation et al. 2008a,b

⁴⁴ Program Document, page 16

⁴⁵ Program Document, Attachment 5, Section 11

⁴⁶ EDO 2015

⁴⁷ The chokepoint is considered a reach of the river where the channel capacity is restricted and not able to convey the Program’s 3,000 cfs goal for SDHF releases from Lake McConaughy. The North Platte chokepoint is in the vicinity of the Highway 83 bridge.

⁴⁸ EDO 2014

887 *Flow Summary* reports⁴⁹ prepared by the EDO. Flow events greater than 5,000 cfs at the
888 Overton gage were observed in five of the first eight years of the First Increment (2008,
889 2010, 2011, 2013, and 2014), as summarized below:

890

891 • 2008 – Peak flow exceeded the 5,000 cfs threshold for three days and exceeded
892 the 8,000 cfs threshold for one day.

893 • 2010 – Flows remained between the 5,000 cfs and 8,000 cfs thresholds for 14
894 consecutive days.

895 • 2011 – Flows exceeded the 5,000 cfs threshold for a total of 70 days, and flows
896 exceeded the 8,000 cfs threshold for nine days.

897 • 2013 – Flows exceeded the 5,000 cfs threshold for a total of 10 days, including
898 six days on which flows exceeded the 8,000 cfs threshold.

899 • 2014 – High flows in June exceeded the 5,000 cfs on eight days.

900

901 The 2008, 2011, and 2013 high flow events included at least three consecutive days of
902 flow greater than 5,000 cfs before May 31 or after September 1, corresponding to the
903 desired pulse flow timing, or SDHF, specified in the Program Document. The other
904 natural high flow events occurred during the summer months (June-August).

⁴⁹ EDO 2015

905 **Section 4 WAP Projects**

906 The 2000 Reconnaissance-Level WAP⁵⁰ identified 13 potential projects in the three states
 907 that could contribute water towards meeting the First Increment water objective. In the
 908 ensuing years, certain projects were prioritized, evaluated, and in some cases,
 909 implemented. Other projects were identified as having low chances for successful
 910 implementation to meet Program needs within the time constraints of the First Increment;
 911 these projects have been studied to a lesser degree. The 2009 WAP Update⁵¹ introduced
 912 project sequencing via a tier structure, the purpose of which was “not necessarily to select
 913 one project over another, but rather to identify a general sequencing of projects to help
 914 focus the WAP related efforts.” Tracking and prioritization of WAP projects was further
 915 enhanced by the designation of each project in this 2014 WAP Update as “active,”
 916 “future,” or “inactive” following additional assessment subsequent to the 2009 WAP
 917 Update.

918
 919 **Table 4** is a summary of the tier designations and project status updates. More detailed
 920 information on each project status as of the end of 2014 is included in Appendix B (active
 921 project descriptions), Appendix C (future project descriptions), and Appendix D (inactive
 922 project descriptions).

923
 924

Table 4. List of WAP project tiers and project status updates

Tier	Project	Location	Status
Tier 1	J-2 Regulating Reservoirs	Nebraska	Active
	Elm Creek Reregulating Reservoir	Nebraska	Inactive
	Nebraska Groundwater Recharge	Nebraska	Active
	Net Controllable Conserved Water (No Cost)	Nebraska	Active
	Net Controllable Conserved Water (Purchased)	Nebraska	Inactive
	Pathfinder Municipal Account Lease	Wyoming	Active
	Glendo Reservoir Storage	Wyoming	Inactive
	Colorado Groundwater Management	Colorado	Future
Tier 2	Nebraska Water Leasing	Nebraska	Active/Future
	Nebraska Water Management Incentives	Nebraska	Future
	Nebraska Groundwater Management	Nebraska	Future
Tier 3	Power Interference	Nebraska	Inactive
	Wyoming Water Leasing	Wyoming	Inactive
	LaPrele Reservoir	Wyoming	Inactive

925

926 **Figure 9** is a reference map identifying the locations of WAP projects that have fixed
 927 locations or area boundaries. The map also shows the locations of the three initial state
 928 projects, the Lake McConaughy EA in Nebraska, the Pathfinder Modification Project
 929 Environmental Account in Wyoming, and the Tamarack I groundwater recharge and re-
 930 timing project in Colorado.

⁵⁰ Program Document, Attachment 5, Section 6

⁵¹ EDO and WAC 2010

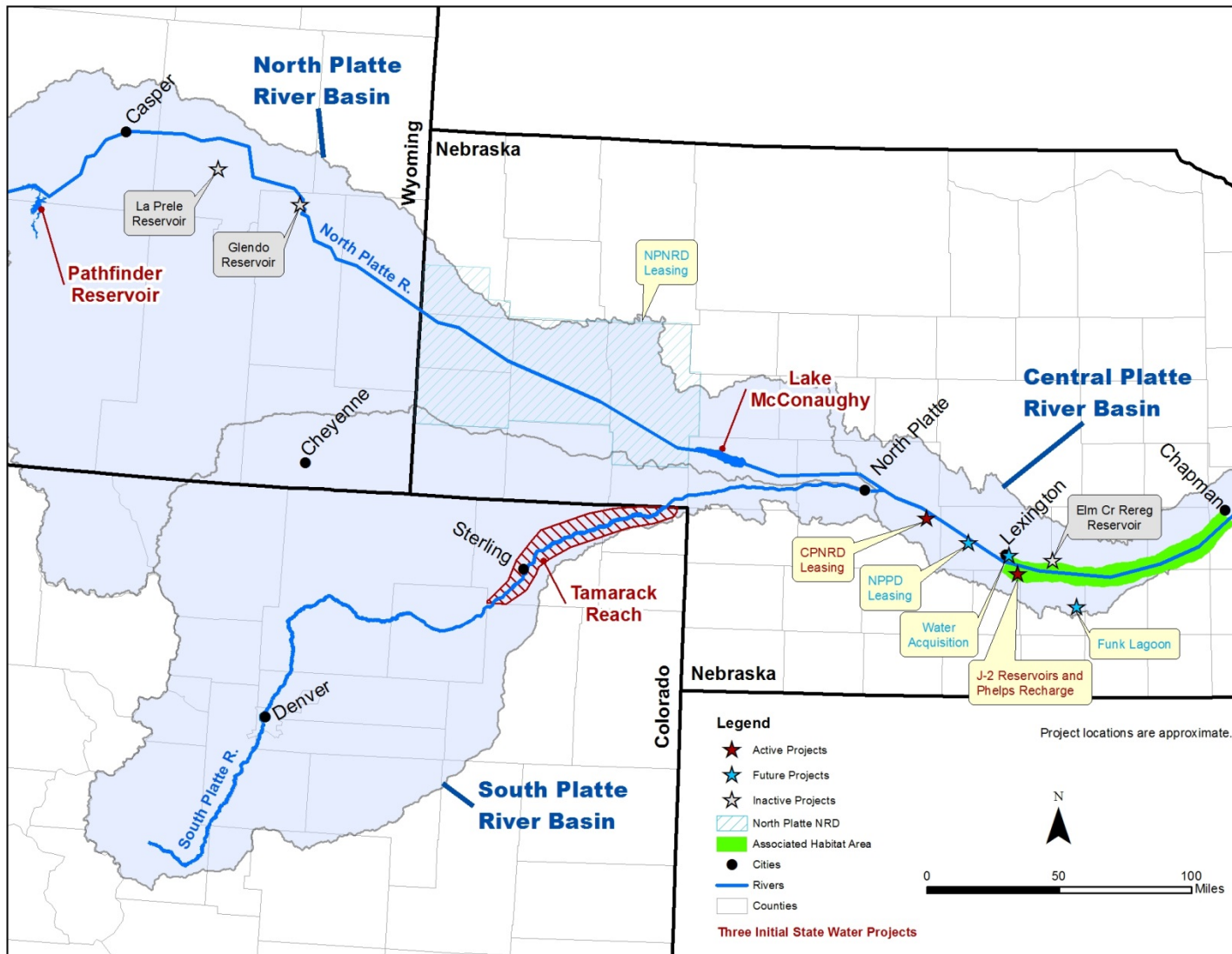


Figure 9. Locations and status of WAP projects

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932

4.1 Project Sequencing and Tier Classification

The Program focused on prioritizing the advancement of tier 1 WAP projects during the First Increment from 2007 through 2014. The tier designations refer to First Increment project sequencing established in the 2009 WAP Update to place a higher priority on more cost- and yield-efficient projects. Tier 1 WAP projects involve retiming water from times of excess flows to times of shortages to USFWS target flows as well as storage leasing, such as the Pathfinder Municipal Account Lease. These types of projects were selected as the priority for evaluations since they utilize existing water supplies and do not require “dry up” of agricultural land or impact other water rights holders. These types of projects also have relatively large yields and require less-extensive permitting requirements through the Nebraska Department of Natural Resources (NDNR) as the water supply is from unappropriated flows or existing supplies.

Tier 1 reservoir projects are the most operationally efficient as they allow the Program to control water and make releases during critical periods. Feasibility studies were completed for reservoir projects early in the First Increment to allow sufficient time to complete alternatives analyses, design and peer review, water service agreements, permitting and construction, as these can be lengthy processes. Reservoirs were also evaluated early in the First Increment to assess the capability of providing a 2,000 cfs release to augment SDHF releases out of the EA in Lake McConaughy.

Tier 1 groundwater recharge projects that retime excess flows were also prioritized for the early part of the First Increment. Pre-feasibility⁵² and feasibility⁵³ studies were completed under the Program’s guidance for various canals in the Central Platte River region, with a preferred option selected for full implementation. The Program also advanced the Pathfinder Municipal Account Lease and evaluated the purchased NCCW project. Evaluations for most of the tier 1 WAP projects listed in the 2009 WAP Update have been completed, with either a decision to implement projects or to consider the projects inactive for the First Increment. Colorado Groundwater Management (Tamarack III) is a remaining tier 1 project to be evaluated for potential future implementation. If developed into a WAP project, the Tamarack III project is expected to yield less than the 17,000 AFY initially estimated in the 2000 Reconnaissance-Level WAP. The Program will work with the State of Colorado to assess the likelihood of expanding the existing Tamarack project and the continued viability for Tamarack III to serve as a WAP project.

The tier 2 projects consist of Nebraska Water Leasing projects, Nebraska Groundwater Management and conserved water from implementation of Water Management Incentives in Nebraska. Water leasing projects became the tier 2 priority beginning in 2014 and will likely involve the development of new water markets and new permitting processes through the NDNR. The historical consumptive use of transferred surface water rights will need to be quantified, and the potential groundwater depletions from increased well pumping on those lands will be evaluated if groundwater pumping replaces surface water irrigation. Groundwater depletions are typically less than the surface water right’s

⁵² EDO et al. 2010

⁵³ EA Engineering, Science, and Technology, Inc. and Daniel B. Stephens and Associates, Inc. 2012

977 historical consumptive use credit at the river; therefore, there is a “net” credit after
978 deducting the impact from new groundwater depletions. The offset requirements for
979 depletions are also a policy issue to consider for future water leasing projects. The GC
980 formed an ad-hoc Water Negotiations Committee in 2014 to aid in furthering negotiations
981 and evaluating agreements for tier 2 water leasing projects.
982

983 In the latter part of the First Increment, the Program may evaluate the lower-priority tier 2
984 projects including) Nebraska Groundwater Management and Water Management
985 Incentives in Nebraska. The Water Management Incentives projects are predicted to be
986 more challenging than the tier 1 and the other tier 2 projects. The Program will likely
987 assist with studies of quantification of Water Management Incentives activities towards
988 the end of the First Increment and may acquire water from these types of projects by
989 2019. The EDO will assess the most efficient incentive-based projects likely to succeed
990 in central Nebraska.
991

992 All of the tier 3 projects are considered inactive and are not anticipated to be
993 implemented in the First Increment.

994 **4.2 Project summaries**

995
996 The following sections provide brief descriptions and status updates of the 13 WAP
997 projects; more details are provided in Appendix B (active project descriptions), Appendix
998 C (future project descriptions), and Appendix D (inactive project descriptions).

999 **4.2.1 Tier 1 WAP Projects**

1000
1001 As shown in Table 4, seven of the WAP projects were classified as tier 1, as follows (see
1002 Appendix B for more detailed project descriptions):
1003

- 1004 • **J-2 Regulating Reservoirs** – The proposed J-2 Regulating Reservoirs are an
1005 ACTIVE project that would be located in the CNPPID system in Gosper and
1006 Phelps Counties in the Central Platte basin of Nebraska, near the upper end of the
1007 associated habitat reach. Pursuant to a water service agreement with the CNPPID,
1008 the reservoirs would retime water to be released when there are shortages to
1009 USFWS target flows. Project score for the Program is 30,600 AFY, based on a 75
1010 percent interest in the project.
1011
- 1012 • **Elm Creek Reregulating Reservoir** – This project, which would be located in
1013 Dawson and Buffalo Counties, was evaluated in a 2011 feasibility study that
1014 identified an optimal scenario involving retiming of flows via stored water
1015 supplied from winter well pumping and the capture of excess Platte River flows
1016 during the non-winter months. Given the constraints of the WAP project budget
1017 and the costs of yield from the Elm Creek Reregulating Reservoir relative to other
1018 reservoir options, the GC declined to move forward with this project, and it now
1019 has an INACTIVE status.
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- **Nebraska Groundwater Recharge** – This WAP project is currently ACTIVE, with initial implementation through the Phelps County Canal. The Phelps County Canal is located in the CNPPID system in Gosper and Phelps Counties. The Program signed temporary water service agreements with the CNPPID to deliver excess flows into the canal during the non-irrigation season (mid-September through mid-April), which are contained by a check structure and allowed to seep from the canal to recharge the underlying aquifer. The project has been active since 2011 and provides a score of 2,700 AFY for the Program, based on a 75 percent interest in the project. A concept to increase the efficiency of the recharge project through groundwater pumping may be considered in the future, which would increase the score of the Phelps County Canal Groundwater Recharge project. The Program may also consider additional recharge operations under the CNPPID’s system using Elwood Reservoir.
- **Net Controllable Conserved Water (NCCW)** – This project involves water saved within the CNPPID system as a result of conservation measures implemented to enhance canal distribution and delivery, on-farm irrigation, and optimal reservoir operations. Pursuant to terms in the CNPPID’s Federal Energy Regulatory Commission (FERC) license, the saved water could be acquired by the Program and stored in the EA in Lake McConaughy.
 - No Cost NCCW – Approximately 314 AFY of NCCW was made available through a grant with the USBR; this amount is added to the EA in Lake McConaughy each year on October 1 at no cost to the Program. Although the No Cost NCCW has not been officially scored for Program purposes, the ongoing annual contributions to the EA designate it as an ACTIVE project for the WAP. Modeling performed for the 2009 WAP Update⁵⁴ estimated the project yield at the associated habitat to be in the range of 217-300 AFY, depending on assumed losses from the North Platte and Platte Rivers downstream of Lake McConaughy.
 - Purchased NCCW – Additional NCCW could be purchased by the Program as a WAP project. Consistent with the FERC license, the CNPPID submitted various yield, cost, payment, and duration offers to the Program in 2013, but the GC did not accept the offers. As a result, the component of the project requiring purchases by the Program is considered INACTIVE for the remainder of the First Increment. The Program will continue to receive the portion of the NCCW saved from conservation activities funded by the USBR grant on an annual basis. Although the GC did not accept the offers that the CNPPID was required to make under the FERC license, that water could still be a possible source of supply for a future project under different terms, such as a lease of storage water from the CNPPID as described in Section 4.2.2 and Appendix C (Section C-2.0).
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⁵⁴ EDO and WAC 2010

- 1065 • **Pathfinder Municipal Account Lease** – The Pathfinder Modification Project
1066 included 20,000 AF of recaptured reservoir capacity allocated to Wyoming for
1067 municipal uses. In 2011, the Program signed an agreement with the Wyoming
1068 Water Development Commission (WWDC) to purchase 38,400 AF from this
1069 account as a WAP project. This Pathfinder Municipal Account Lease is an
1070 ACTIVE project that provides an average yield of 4,800 AFY at Pathfinder
1071 Reservoir from 2012 through 2019, and a score for the Program of 4,000 AFY at
1072 Grand Island, Nebraska.
- 1073
- 1074 • **Glendo Reservoir Storage** – Glendo Reservoir is located on the North Platte
1075 River southeast of Glendo, WY. The 2000 Reconnaissance-Level WAP made
1076 assumptions regarding the viability of using Glendo Reservoir storage water as a
1077 Program component that were superseded by the terms of the subsequent
1078 Nebraska v. Wyoming lawsuit settlement. With Wyoming’s allocation of Glendo
1079 storage water required to meet replacement water obligations described in the
1080 settlement stipulation, this WAP project is presently considered INACTIVE for
1081 Program purposes. However, the January 2015 Wyoming Water Strategy⁵⁵
1082 proposes repurposing the Glendo Reservoir flood control pool in such a manner
1083 that may bring about future opportunities for the Program.
- 1084
- 1085 • **Colorado Groundwater Management** – Tamarack III is a potential FUTURE
1086 extension of the existing Tamarack I and II projects in northeastern Colorado.
1087 Tamarack III would utilize existing infrastructure to retine excess flows through
1088 aquifer recharge in the lower South Platte River.

1089 **4.2.2 Tier 2 WAP Projects**

1090
1091 Three of the WAP projects were classified as tier 2, as follows (see Appendix C for more
1092 detailed project descriptions):

- 1093
- 1094 • **Nebraska Water Leasing** – This WAP project is ACTIVE through a lease
1095 agreement the Program signed with the CPNRD in December 2013 for the net
1096 consumptive use credit from transferred surface water rights and groundwater
1097 recharge accretions of excess flows in the Thirty-Mile, Cozad, and Orchard-
1098 Alfalfa Canals. The Program’s lease agreement is for up to 20,500 AFY
1099 (maximum lease volume at the project location) through the end of the First
1100 Increment in 2019. Additional lease agreements for surface water, groundwater,
1101 and/or storage with other districts such as the CNPPID, CPNRD, North Platte
1102 Natural Resources District (NPNRD), NPPD or individual irrigators within those
1103 districts will be pursued in the FUTURE.
- 1104
- 1105 • **Nebraska Water Management Incentives** – These are FUTURE WAP projects
1106 that would consist primarily of programs resulting in reductions in consumptive
1107 use through practices such as conservation cropping, deficit irrigation, or land
1108 fallowing. Other options include changes to on-farm irrigation practices that

⁵⁵ Mead 2015

1109 would improve efficiency and conserve water by reducing return flows that do not
1110 benefit the associated habitat reach.

1111

- 1112 • **Nebraska Groundwater Management** – This consists of possible FUTURE
1113 WAP projects involving lowering of the water table in areas of high groundwater
1114 by active pumping or passive means, switching irrigation sources from surface
1115 water to groundwater, or a conjunctive use project under the CNPPID system that
1116 would increase flows in the Central Platte River. Example groundwater
1117 management projects were identified in both the 2000 Reconnaissance-Level
1118 WAP and the 2009 WAP Update, including Funk Lagoon, which was studied in
1119 2013 and 2014, and a potential dewatering project with an individual landowner,
1120 which was reviewed in 2012.

1121 **4.2.3 Tier 3 WAP Projects**

1122

1123 The final three WAP projects classified as tier 3 are as follows (see Appendix D for more
1124 detailed project descriptions):

1125

- 1126 • **Power Interference** – This WAP project would entail paying hydroelectric
1127 generators (CNPPID or NPPD) to modify the release of water through the
1128 hydropower turbines to benefit the Program. These modifications could include
1129 changes in the timing of power generation or bypassing water to reduce USFWS
1130 target flow shortages through the associated habitat reach. This project is not
1131 currently included in the budget estimate for the First Increment and is considered
1132 INACTIVE.
- 1133
- 1134 • **Wyoming Water Leasing** – Water leasing in Wyoming, considered an
1135 INACTIVE WAP project, would be based on temporary or permanent agreements
1136 with irrigators or irrigation districts that would voluntarily lease the consumptive
1137 use credit of their water rights. Proposed water exports from Wyoming require
1138 the approval of the State Engineer (for all exports) and the state legislature (for
1139 exports exceeding 1,000 AF), a potential obstacle for the implementation of water
1140 leasing to benefit the Program.
- 1141
- 1142 • **LaPrele Reservoir** – Located on LaPrele Creek approximately 13 miles upstream
1143 of the confluence with the North Platte River in Wyoming, this potential WAP
1144 project assumes the Program could lease approximately 5,000 AF of storage in
1145 the reservoir. This project is not currently included in the budget estimate for the
1146 First Increment and is therefore considered to be INACTIVE.

1147 Section 5 WAP Project Scoring

1148

1149 The following sections summarize approved scoring assumptions, WAP project scores
1150 accepted by the GC through 2014, and the anticipated total WAP project score by the end
1151 of the First Increment.

1152 5.1 Approved Scoring Assumptions

1153

1154 A project score is in reference to the Program's First Increment objective of reducing
1155 shortages to USFWS target flows by an average of 130,000 to 150,000 AFY; WAP
1156 projects are 50,000 to 70,000 AFY of that total. The score of a project is considered the
1157 yield of the project routed to Grand Island, Nebraska, and credited during shortages to
1158 USFWS target flows. The score is modeled by the Program using OPSTUDY hydrology
1159 datasets from 1947 through 1994 and is therefore based on the similar hydrologic
1160 modeling data and assumptions as previous modeling efforts, but does not necessarily
1161 reflect the yield of a project during actual operations. The water yield at the project
1162 location may be greater than the project score, as routing losses are deducted from the
1163 project location to Grand Island, Nebraska, and accretions are not credited to the score if
1164 they occur at the river during excesses to USFWS target flows.

1165

1166 In 2010, the GC formed an ad-hoc Scoring Subcommittee to advance WAP project
1167 scoring. The Scoring Subcommittee recommended utilizing a set of score assumptions to
1168 maintain consistency between projects. These assumptions are utilized to aid the Scoring
1169 Subcommittee and GC in assigning project scores. The recommended assumptions were
1170 presented to the GC and accepted at the June 2010 GC meeting⁵⁶. **Table 5** is a summary
1171 of the accepted general scoring assumptions utilized to score the J-2 Regulating
1172 Reservoirs, the Phelps County Canal Groundwater Recharge project, and the Pathfinder
1173 Municipal Account Lease. Additional assumptions and variations in the scoring
1174 methodology may be applied on a project-specific basis with the approval of the GC.

⁵⁶ EDO 2010. June 2010 GC meeting minutes.

1175

Table 5. General WAP project score assumptions approved by the GC

Component	Data
Hydrology	OPSTUDY Adjusted Present Condition with Three State Projects (without pulse flows). EA Flows included at Grand Island, but not available for WAP project retiming.
Analysis Period	1947-1994
Analysis Time Step ^a	Monthly
Excesses/Shortages Calculation & Score Location	Evaluated at Grand Island, Nebraska
Target Flows	Appendix A-5, Column 4 or 8, depending on daily or monthly time step (provided in the Program Document)
Routing	Water Management Committee (WMC) Loss Model, updated through 2006 ^b

1176

^a Generally, scoring is intended to be completed on a monthly basis unless project-specific assumptions justify the use of something different, such as a daily model.

1177

1178

^b See Boyle Engineering Corporation et al. 2008a,b

1179

1180

Several of the WAP projects utilize excess flows as a water supply, as this source of water does not impact other water users. The estimated annual excesses are an average of 393,000 AFY based on the J-2 Regulating Reservoirs daily score model using OPSTUDY hydrology at Grand Island from 1947-1994. Based on this volume of annual excesses, it is anticipated that multiple Program projects that divert excess flows can operate simultaneously without significant impacts to individual project yields. There may be times when there is competition for excess flows among projects on a daily time step; in which case, certain projects may be prioritized, such as the J-2 Regulating Reservoirs. The Scoring Subcommittee takes the combined operations into account when evaluating and recommending scores for the GC to approve.

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When assigning a score to a project, the goal is for a WAP project to provide water to benefit the full extent of the associated habitat reach whenever possible. It is assumed that projects above the Overton gage will be given a full score credit. However, some projects start downstream of the beginning of the associated habitat reach. WAP projects from which water accrues to the Platte River below Overton, Nebraska may be given a pro-rata share of score credit based on the distance within the associated habitat reach that the project yield benefits. Note that projects are scored based on their ability to reduce USFWS target flow shortages; however, project yields can be utilized for other Program purposes during actual operations, such as SDHF. In addition to meeting a portion of the Program’s water objective, a share of project yields (for projects in Nebraska) may be reserved for project sponsors and/or the State of Nebraska. In some cases, the NDNR may not utilize their share of projects, in which case, the water may be leased back to the Program.

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5.2 Approved Project Scores

1205

1206

Three WAP projects have been scored towards fulfilling the Program’s First Increment WAP milestone⁵⁷ of reducing shortages to target flows by at least 50,000 AFY:

1207

⁵⁷ Program Document, Attachment 2

- 1208 • J-2 Regulating Reservoirs,
- 1209 • Phelps County Canal Groundwater Recharge project, and
- 1210 • Pathfinder Municipal Account Lease.

1211
 1212 The J-2 Regulating Reservoirs project is anticipated to begin portions of the construction
 1213 in 2017; the GC accepted a score for this project based on the design in the feasibility-
 1214 level analyses. The Phelps County Canal Groundwater Recharge project and the
 1215 Pathfinder Municipal Account Lease are operational projects for which the Program
 1216 currently receives score credit. The GC has approved the project scores in **Table 6** for a
 1217 total of 37,300 AFY, or about 75 percent of the milestone shortage reduction. The
 1218 CPNRD water leasing project is active and generating yield for the Program, but has not
 1219 yet been scored; the scoring process for this WAP project is anticipated to begin in 2015.
 1220 Likewise, the 314 AFY of No Cost NCCW is actively contributed to the EA in Lake
 1221 McConaughy on October 1 each year, but the project has not been officially scored for
 1222 the Program.

1223
 1224 **Table 6. WAP project scores approved by the GC towards the First Increment milestone**

Project	Percentage of project yield for Program use	Program score (AFY)
J-2 Regulating Reservoirs	75%	30,600
Phelps County Canal Groundwater Recharge	75%	2,700
Pathfinder Municipal Account Lease	100%	4,000
Total	-	37,300

1225
 1226 The full score for the J-2 Regulating Reservoirs for the Program and other sponsors is
 1227 40,800 AFY, of which 75 percent (30,600 AFY) is allocated to the Program. This score
 1228 was based on a total storage⁵⁸ volume of 13,959 AF; if the final design of the reservoirs
 1229 has a different storage capacity, the score may be updated accordingly. The remaining 25
 1230 percent of project yield from the J-2 Regulating Reservoirs (10,200 AFY) is allocated to
 1231 the NDNR for the purpose of satisfying depletions plan obligations. The NDNR
 1232 performs a periodic review of post-1997 depletions to USFWS target flows due to new
 1233 and expanded uses of water and secures water supplies to offset depletions exceeding
 1234 1997 levels as specified in the Nebraska New Depletions Plan⁵⁹.

1235
 1236 The GC originally approved a score of 1,800 AFY for the Phelps County Canal
 1237 Groundwater Recharge project, representing a 50 percent interest in the project for the
 1238 Program. Based on the draft permanent water service agreement⁶⁰ with the CNPPID, the
 1239 Program will now have use of 75 percent of the project, increasing the score from 1,800

⁵⁸ Use of the term “storage” in the context of the J-2 Regulating Reservoirs is a reference to that term in its engineering or common usage for capacity. The reservoirs are not considered to be storage reservoirs in the context of state water appropriations.

⁵⁹ Program Document, Attachment 5, Section 8

⁶⁰ CNPPID 2014a

1240 AFY to 2,700 AFY. The remaining yield from the project is reserved for use by the
1241 NDNR.
1242
1243 The total reduction to target flow shortages at Grand Island, Nebraska for anticipated
1244 WAP projects is over 60,000 AFY by the end of the First Increment. This estimated score
1245 includes the active project yields from Table 6 plus additional project yields anticipated
1246 to be secured by 2019. This is a projected volume and will change based on available
1247 water sources for the individual projects.

1248 **Section 6 WAP Project Costs**

1249

1250 The following information describes an update to the cost estimates for WAP projects,
1251 based on the EDO consultation with the Special Advisor for economics, George Oamek.

1252 **6.1 Current WAP Cost Estimates**

1253

1254 The 2000 Reconnaissance-Level WAP provided estimated costs for the 13 identified
1255 projects and estimated the length of time required for their implementation. In the report,
1256 the present value of estimated WAP costs through 2019 was estimated to range from
1257 \$36.9 to \$68.8 million⁶¹.

1258

1259 For purposes of comparing costs on a consistent basis between years, it is useful to
1260 express project costs in terms of annual equivalent costs, in dollars per acre-foot per
1261 year (\$/AFY). Annual equivalent costs are the sum of annualized capital cost plus annual
1262 O&M (operation and maintenance) expenditures. Annualized capital costs are the
1263 estimated capital costs amortized over the project's useful life. Dividing annual
1264 equivalent cost by the project yield, in AF, results in its estimated cost per AF.

1265

1266 The 2009 WAP Update estimated that the total annual equivalent cost of projects
1267 implemented between 2010 and 2019 would be approximately \$15.5 million per year,
1268 with yield towards target flows estimated at 83,400 AFY. This resulted in an estimated
1269 annual equivalent water cost of about \$186 per AF, as measured in 2009 dollars (see
1270 **Table 7**, which is from the 2009 WAP Update). As indicated above, this \$186 per AF
1271 was composed of a capital component representing the amortized capital cost of the
1272 projects amortized over their useful lives, and an annual operational component.

1273

1274 To provide a consistent basis for comparison between estimated 2009 and 2014 WAP
1275 costs, the 2009 cost estimate was updated to 2014 dollars using the USBR cost escalation
1276 factors, or cost indices⁶² (see **Table 8** for the 2009 WAP Update in 2014 dollars). These
1277 factors covered earthen dam structures, canals and laterals, pipelines, and other cost
1278 trends. This indexing increased the annual equivalent cost per AF of the 2009 WAP to
1279 approximately \$214.

⁶¹ It is important to note that the net present value estimates were developed for decision-making purposes and do not include the impact of cost escalation during the projects' planning and construction phases. As a result, these estimates are not directly comparable to cash flow estimates, which focus upon out-of-pocket expenditures for each year of the analysis, including cost escalation.

⁶² http://www.usbr.gov/pmts/estimate/cost_trend.html, Last accessed April 24, 2015.

Table 7. 2009 WAP Update table: Economic comparison of 2009 WAP Project cost estimates (in 2009 dollars)^c

WAP Project	Initial Cost [2009 \$]	Useful Life [Years]	Annualized Initial Cost, Using Assumed Discount Rate ^a and Useful Life [2009 \$]	Annual Operations and Maintenance [2009 \$]	Total Annual Cost [2009 \$]	Yield towards Target Flow ^b [AFY]	Annual Equivalent Cost [\$/AF]
Tier 1							
J-2 Regulating Reservoirs	40,039,000	50	1,556,100	321,000	1,877,100	30,000	63
Elm Creek Reregulating Reservoirs					-		-
NE Groundwater Recharge	36,000	30	1,800	117,038	118,838	1,800	66
NCCW, No Cost	-	-		-	-	300	-
NCCW, Purchased	-			5,700,700	5,700,700	7,500	760
Pathfinder Municipal Account				716,100	716,100	3,900	184
Glendo Storage					-		-
CO Groundwater Management (Tamarack III)				765,000	765,000	17,000	45
Tier 2							
NE Water Leasing				1,942,807	1,942,807	7,000	278
NE Water Management Incentives				3,261,933	3,261,933	7,000	466
NE Groundwater Management	1,634,900	30	83,400	18,267	101,667	1,400	73
Tier 3							
Power Interference				212,287	212,287	1,400	152
WY Water Leasing				364,032	364,032	3,900	93
LaPrele Reservoir				415,570	415,570	2,200	189
TOTAL	41,709,900		1,641,300	13,834,734	15,476,034	83,400	186

1280 ^a Assumed Discount Rate = 3.00 percent. Costs may not include all pre-feasibility and feasibility level expenditures.

1281 ^b Note that this column represents either the yield at the project location, or the estimated score of the project at Grand Island, Nebraska. ^c **This table is**

1282 **reproduced from Table 8 of the 2009 WAP Update.**

Table 8. 2009 WAP Update table in 2014 dollars: Economic comparison of 2009 WAP Project cost estimates (converted to 2014 dollars)

WAP Project	Initial Cost [2014 \$]	Useful Life [Years]	Annualized Initial Cost, Using Assumed Discount Rate^a and Useful Life [2014 \$]	Annual Operations and Maintenance [2014 \$]	Total Annual Cost [2014 \$]	Yield towards Target Flow^b [AFY]	Annual Equivalent Cost [\$/AF]
Tier 1							
J-2 Regulating Reservoirs	45,895,044	50	1,783,700	367,949	2,151,649	30,000	72
Elm Creek Reregulating Reservoirs					-		-
NE Groundwater Recharge	41,265	30	2,100	134,156	136,256	1,800	76
NCCW, No Cost	-	-		-	-	300	-
NCCW, Purchased	-			6,534,476	6,534,476	7,500	871
Pathfinder Municipal Account				820,836	820,836	3,900	210
Glendo Storage							
CO Groundwater Management (Tamarack III)				876,888	876,888	17,000	52
Tier 2							
NE Water Leasing				2,252,246	2,252,246	7,000	322
NE Water Management Incentives				3,781,474	3,781,474	7,000	540
NE Groundwater Management	1,895,297	30	96,700	21,176	117,876	1,400	84
Tier 3							
Power Interference				246,098	246,098	1,400	176
WY Water Leasing				422,013	422,013	3,900	108
LaPrele Reservoir				476,351	476,351	2,200	217
TOTAL	47,831,607		1,882,500	15,933,663	17,816,163	83,400	214

1283 ^a Assumed Discount Rate = 3.00 percent. Costs may not include all pre-feasibility and feasibility level expenditures.

1284 ^b Note that this column represents either the yield at the project location, or the estimated score of the project at Grand Island, Nebraska.

1285 Since 2009, significant progress has been made towards implementing the identified
1286 projects, with uncertainties about project costs and project yields being substantially
1287 reduced. For example, two of the more prominent projects in terms of total yield, the J-2
1288 Regulating Reservoirs and Nebraska Water Leasing projects, are past the reconnaissance
1289 planning phase and are now in the design⁶³ and negotiation phases, respectively. As a
1290 result, there are still uncertainties associated with the ultimate costs of projects and their
1291 yields, but the uncertainties are much less than the 2000 Reconnaissance-Level WAP and
1292 the 2009 WAP Update.

1293

1294 Also during the 2009 WAP Update, there were reasonable concerns about rapidly
1295 escalating construction costs diminishing what the Program could afford to develop, plus
1296 high crop commodity prices driving-up farm incomes to record high levels, and reducing
1297 interests irrigators had shown in leasing irrigation water. However, the national and
1298 regional economies have cooled, construction cost escalation rates are near their long-
1299 term averages and crop commodity prices have dropped significantly, stopping the
1300 escalation in water lease rates. Although cost escalation rates are generally near average,
1301 site-specific projects may experience above-average escalation rates, such as the J-2
1302 Regulating Reservoirs.

1303

1304 **Table 9** reevaluates updated cost estimates and project yields for comparison to the
1305 estimates developed in 2009. The 2014 updated estimates reveal a less expensive average
1306 annual equivalent cost for projects, even with cost escalation. Specifically, some changes
1307 since the 2009 WAP include:

1308

- 1309 • NCCW purchased from the CNPPID is not currently being considered as a water
1310 supply option.
- 1311 • Projects in the tier 3 category, including Power Interference, Wyoming water
1312 leasing, and LaPrele Reservoir, are not currently being considered.
- 1313 • Water leasing in Nebraska is being developed on a slightly larger scale than
1314 anticipated in 2009.

⁶³ Design of the J-2 Regulating Reservoirs is being undertaken by the CNPPID, which will construct, own, and operate the reservoirs. Program water benefits will come from regulating performed in accordance with a water service agreement with the CNPPID.

Table 9. Economic comparison of 2014 WAP Project cost estimates (in 2014 dollars)

WAP Project	Initial Cost [2014 \$]	Useful Life [Years]	Annualized Initial Cost, Using Assumed Discount Rate^a and Useful Life [2014 \$]	Annual Operations and Maintenance at end of First Increment [2014 \$]	Total Annual Cost [2014 \$]	Yield towards Target Flow^b [AFY]	Annual Equivalent Cost [\$/AF]
Tier 1							
J-2 Regulating Reservoirs	58,540,000	50	2,275,200	400,000	2,675,200	30,600	87
Elm Creek Reregulating Reservoirs				-	-	-	-
NE Groundwater Recharge ^c	357,840	30	18,300	185,400	203,700	3,450	59
NCCW, No Charge	-	-		-	-	250	-
NCCW, Purchased	-			-	-	-	-
Pathfinder Municipal Account	1,958,400	8	279,000	-	279,000	4,000	70
Glendo Storage				-	-	-	-
CO Groundwater Management (Tamarack III)				570,000	570,000	10,000	57
Tier 2							
NE Water Leasing, CPNRD ^d				1,075,000	1,075,000	4,780	225
NE Water Leasing, NPPD				154,000	154,000	430	358
NE Water Leasing, CNPPID, from Storage				1,462,300	1,462,300	4,050	361
NE Water Leasing, CNPPID, from Irrigators				904,400	904,400	4,050	223
NE Water Leasing, NPNRD				1,126,000	1,126,000	4,050	278
NE Water Management Incentives				600,000	600,000	1,800	333
NE Groundwater Management		0		-	2,400	-	-
Tier 3							
Power Interference				-	-	-	-
WY Water Leasing				-	-	-	-
LaPrele Reservoir				-	-	-	-
TOTAL	60,903,340	-	2,574,900	6,477,100	9,052,000	67,460	134

1315 ^a Assumed Discount Rate = 3.00 percent. Costs may not include all pre-feasibility and feasibility level expenditures.

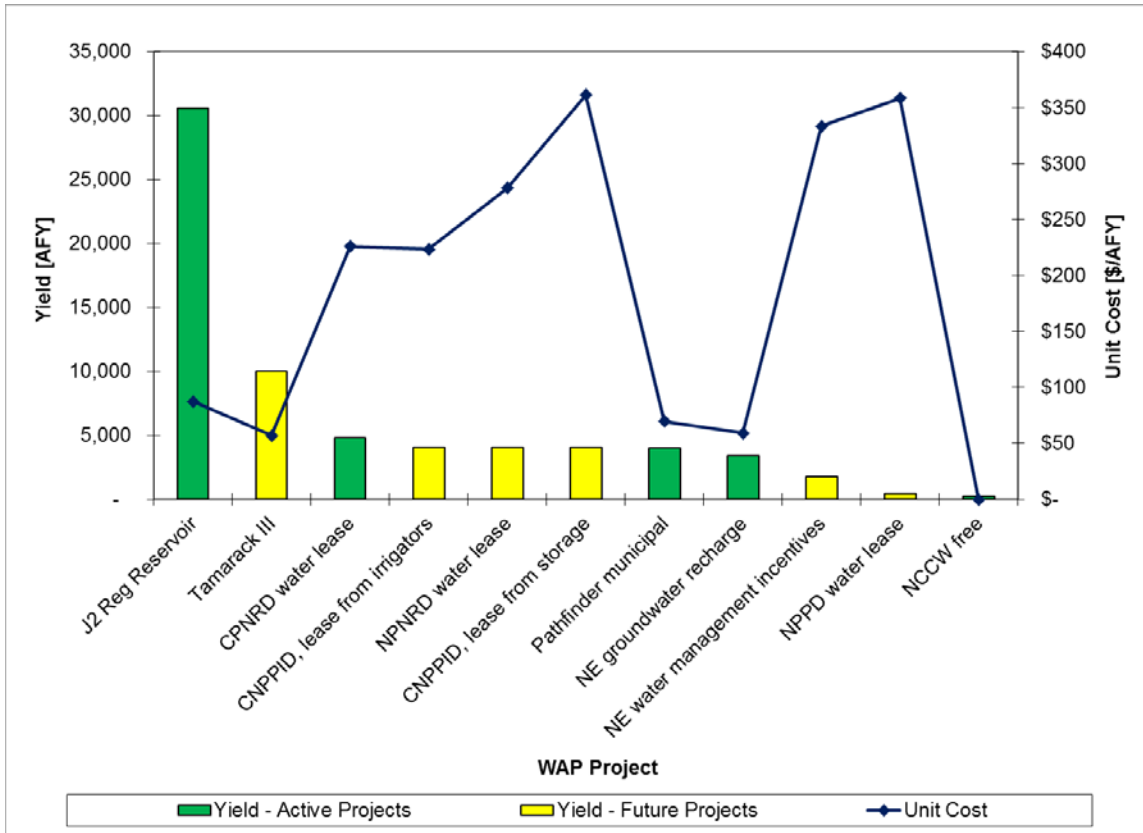
1316 ^b Estimated score of the project at Grand Island, Nebraska at the end of the First Increment.

1317 ^c This line includes the Phelps County Canal Groundwater Recharge project, groundwater pumping of recharged water under the Phelps County Canal system and the Elwood Reservoir seepage project.

1318 ^d This line is for water leasing with the CPNRD and acquisition of a surface water right in the CPNRD. The initial upfront cost of the identified acquisition is not included in the cost estimate as it is relatively insignificant in comparison to total costs; however, the yield of the acquisition is included.

1320

1321 For purposes of assessing the “bang for the buck” with respect to the projects, **Figure 10**
 1322 ranks the projects by annual yield (note that this is the yield at the project location) and
 1323 shows the associated annual equivalent cost per AF of each. Figure 10 shows that, in
 1324 terms of economic costs, the J-2 Regulating Reservoirs, Pathfinder Municipal Account
 1325 Lease, Nebraska Groundwater Recharge and Colorado Ground Water Management
 1326 (Tamarack III) projects provide the most economical water supply, as currently projected.
 1327



1328 **Figure 10. WAP project annual yields (AFY) and estimated unit costs in 2014 (dollar/AF/year)**
 1329

1330 It is interesting to note that in addition to economic feasibility, the financial feasibility of
 1331 the combination of projects is critical. That is, can the most economical combinations of
 1332 the projects be financed considering possible high up-front costs? The J-2 Regulating
 1333 Reservoirs project is an example. Although it is one of the lower cost projects for water
 1334 on a per AF basis, it has the highest initial cost. In addition, a majority of the J-2
 1335 Regulating Reservoirs cost is allocated to the Program and ultimately the federal
 1336 government, who may have less flexibility in managing funds over time compared to
 1337 other stakeholders.

1338 6.2 Cash Flow Analysis

1339
 1340 **Table 10** provides a cash flow update for this 2014 WAP Update. Similar to the 2009
 1341 WAP Update, the assumed rate of cost escalation, or inflation, is generally 3 percent⁶⁴,

⁶⁴ Some escalation factors may be greater, based on negotiated agreements or projected rate increases for specific projects.

1342 applied to future expenditures through the First Increment. The 2014 updated estimates
1343 reveal a less expensive WAP than the 2009 WAP in terms of overall expenditures, even
1344 with cost escalation. This is due to a lower overall yield of approximately 67,500 AFY⁶⁵
1345 and the Program's method of strategically selecting projects that are the most cost- and
1346 yield-efficient.

1347

1348 It should also be noted that the 2009 cash flow analysis assumed implementation of all
1349 WAP projects, which is beyond the Program water objective for the First Increment. In
1350 the 2009 WAP Update, it was estimated that approximately \$161 million would have
1351 been spent to achieve the 83,400 AFY yield through the First Increment. The updated
1352 cash flow analysis shown in Table 10 contributes towards an estimated yield of 66,500
1353 AFY, which is within Program First Increment water objective for the WAP (50,000-
1354 70,000 AFY) and within the budget, at a total estimated cost of \$87.6 million.

1355 Observations about the cash flow analysis include:

1356

- 1357 • On a proportionate per AF basis, the estimated cost of achieving the Program's
1358 water objective/milestone for the WAP has not increased over time and may be
1359 less than estimated in the 2009 WAP Update. The projects the Program has
1360 selected for implementation are the preferred cost- and yield-efficient alternatives
1361 of the projects identified in previous WAPs.
- 1362 • The 2014 WAP Update estimates a cash outlay of \$87.6 million for an estimated
1363 yield of 66,500 AFY, which is significantly less than the 2009 WAP update cost
1364 of \$161 million cash outlay for a yield of over 80,000 AFY. The Program more
1365 closely evaluated the relationship of project yields and costs to obtain a cash
1366 outlay that reflects anticipated operations and scenarios in the 2014 WAP Update.

⁶⁵ This represents the yield at the end of the First Increment.

Table 10. Actual and estimated WAP expenditures through 2019, including anticipated inflation (all values in dollars)

WAP Project	Expenditures to Date ^b	2014, Budgeted	Estimated*					TOTALS
			2015	2016	2017	2018	2019	
Tier 1								
J-2 Regulating Reservoirs ^a	14,865,500	-	14,823,800	15,268,500	15,726,500	281,400	289,800	61,255,500
Elm Creek Reregulating Reservoir	-	-	-	-	-	-	-	-
NE Groundwater Recharge ^c	157,800	88,300	310,100	165,900	172,100	178,600	185,400	1,258,200
NCCW, No Cost	-	-	-	-	-	-	-	-
NCCW, Purchased	-	-	-	-	-	-	-	-
Pathfinder Municipal Account	1,958,400	-	-	-	-	-	-	1,958,400
Glendo Storage	-	-	-	-	-	-	-	-
CO Groundwater Management (Tamarack III)	-	-	-	604,300	622,400	641,100	660,300	2,528,100
Tier 2								
NE Water Leasing, CPNRD ^d	34,200	175,000	1,035,100	959,900	996,300	1,034,300	1,074,100	5,308,900
NE Water Leasing, NPPD	-	-	147,700	138,600	143,400	148,400	153,600	731,700
NE Water Leasing, CNPPID, from Storage	-	-	625,000	910,000	946,400	1,406,100	1,462,300	5,349,800
NE Water Leasing, CNPPID, from Irrigators	-	-	385,100	561,200	584,200	781,900	904,400	3,216,800
NE Water Leasing, NPNRD	-	-	390,000	721,000	742,600	983,500	1,125,500	3,962,600
NE Water Management Incentives	-	-	-	-	655,600	675,300	695,600	2,026,500
NE Groundwater Management	47,100	-	-	-	-	-	-	47,100
Tier 3								
Power Interference	-	-	-	-	-	-	-	-
WY Water Leasing	-	-	-	-	-	-	-	-
LaPrele Reservoir	-	-	-	-	-	-	-	-
Subtotal for WAP Projects	17,063,000	263,300	17,716,800	19,329,400	20,589,500	6,130,600	6,551,000	87,643,600

1367 ^a Cost allocable to PRRIP.

1368 ^b Expenditures to date may not include all pre-feasibility and feasibility level expenditures, as some of these expenditures may be under different budget line
1369 items.

1370 ^c This line includes the Phelps County Canal Groundwater Recharge project, groundwater pumping of recharged water under the Phelps County Canal System
1371 and the Elwood Reservoir seepage project.

1372 ^d This line includes water leasing with the CPNRD and acquisition of an identified surface water right in the CPNRD.

1373 *Note: Estimated future costs change based on the volumes of water anticipated to be leased or purchased each year from 2015 through 2019, which change
1374 annually for some projects. This table was developed using projected inflation rates and/or inflation rates described in executed agreements, in conjunction with
1375 projected yields over the remaining years of the First Increment.

1376 Section 7 Conclusions

1377

1378 The First Increment water objective is to reduce USFWS target flows shortages by
1379 130,000 AFY to 150,000 AFY, with the WAP projects supplying an average of at least
1380 50,000 AFY towards the objective. The three initial state projects are fully operational
1381 and are credited at providing 80,000 AFY towards the water objective. The Program has
1382 made significant advances in WAP project development since the 2009 WAP Update.
1383 Three WAP projects have been implemented since that time including the Phelps County
1384 Canal Groundwater Recharge project, the Pathfinder Municipal Account Lease and the
1385 CPNRD Water Leasing project. These projects are currently providing annual yields for
1386 Program uses and have been for multiple years. The Program already entered into a water
1387 service agreement with the CNPPID for the J-2 Regulating Reservoirs project, and the
1388 CNPPID is in the permitting and design phase, with significant work completed towards
1389 the implementation of this project. The Program made a significant payment in 2013 for
1390 the J-2 Regulating Reservoirs and is securing the necessary remaining funds for the
1391 construction cost of the reservoirs, with anticipated project construction beginning in
1392 2017.

1393

1394 The Program also evaluated several other potential WAP projects that were ultimately not
1395 recommended for implementation, including the Elm Creek Reregulating Reservoir and
1396 the NCCW for purchase. These projects were not recommended because their yields and
1397 associated costs were generally unfavorable in comparison to other WAP projects.

1398

1399 During the First Increment to date (2007-2014), the Program focused efforts on WAP
1400 projects that utilized excess flows and/or storage leases as water supplies. These projects
1401 are generally more straight-forward to implement, have a minimal impact on other water
1402 users and yield large volumes of water. The Program is moving into the next phase of
1403 WAP project development, which consists of water leasing opportunities and water right
1404 acquisitions in Nebraska. These types of projects are likely more challenging to
1405 implement as new water markets must be developed and permitting processes must be
1406 determined. After working towards the development of water leasing projects in
1407 Nebraska, the Program anticipates moving onto the evaluations of Colorado Groundwater
1408 Management (Tamarack III) and Water Management Incentives in Nebraska in the latter
1409 years of the First Increment (ending in 2019). Additional projects not listed in this
1410 document may also be identified and evaluated as potential WAP projects.

1411

1412 In 2010, the GC developed a Scoring Subcommittee to assess various WAP project yields
1413 toward the First Increment water objective of reducing shortages to target flows. The total
1414 project score approved by the GC for WAP projects as of the end of 2014 (Year 8 of the
1415 First Increment) is 37,300 AFY⁶⁶. This score is approximately 75 percent of the
1416 minimum WAP contribution requirement of 50,000 AFY towards the First Increment

⁶⁶ This score represents the J-2 Regulating Reservoir, the Phelps County Canal Groundwater Recharge project and the Pathfinder Municipal Account Lease projects. The CPNRD Water Lease is an active project that currently contributes a yield to the Program; however, the project has not been scored by the GC.

1417 WAP milestone. The yields and budget will continue to be closely monitored by the
1418 Program to ensure the future success of the water objective and WAP milestone.
1419
1420 Moving forward, the Program partners agree to continue investigating the WAP projects
1421 described in this document and its appendices in order to develop more accurate yield and
1422 cost projections, but are not bound by any of the current estimates presented herein.
1423 Given the success in meeting the milestone steps (see Section 1.2.2), it is anticipated that
1424 the Program will achieve its goal of securing at least 50,000 AFY from WAP projects by
1425 the end of the First Increment, and that this will be accomplished within the budget
1426 allocated for the Water Plan. Although the active projects identified above (e.g., J-2
1427 Regulating Reservoirs and Phelps County Canal Groundwater Recharge projects) relied
1428 on the retiming of excess flows and involved comparatively simple permitting
1429 requirements, it is anticipated that pursuit of additional water leasing projects will be the
1430 focus of WAP activities for the coming years. These leasing activities will require more
1431 complex analysis of consumptive use, depletions, and other factors; establishment of
1432 markets for leasing transactions; and more arduous permitting.
1433
1434 Given these considerations, the process for continuing to advance WAP projects will
1435 remain as previously identified in the 2000 Reconnaissance-Level WAP and the 2009
1436 WAP Update. In that regard, the Program intends to maintain a methodical and
1437 conservative approach when assessing potential projects for implementation, particularly
1438 given the interrelated nature of projects and other efforts progressing within the Platte
1439 River basin. The GC will be provided with WAP project proposals, evaluations and
1440 budgets for project implementation approval or rejection. The EDO will continue to
1441 monitor the progress of the WAP towards the First Increment milestone to advance the
1442 Program's success in meeting the First Increment water objective.

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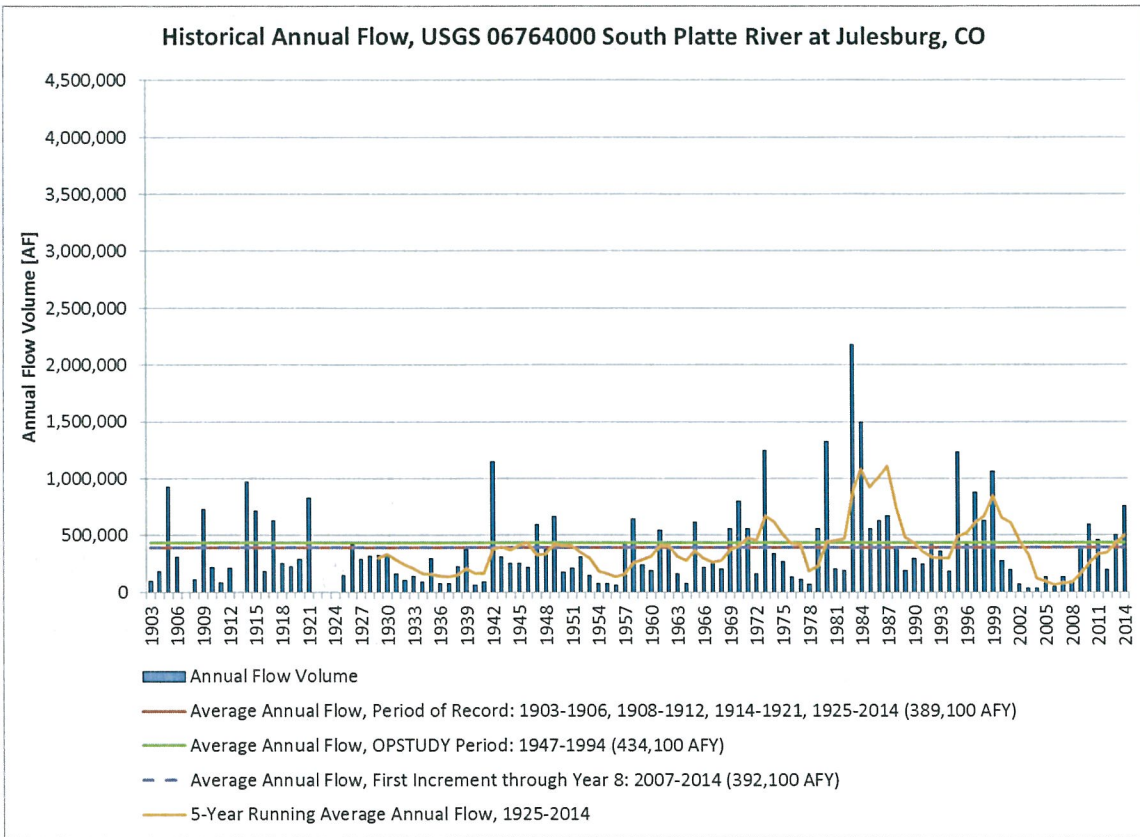
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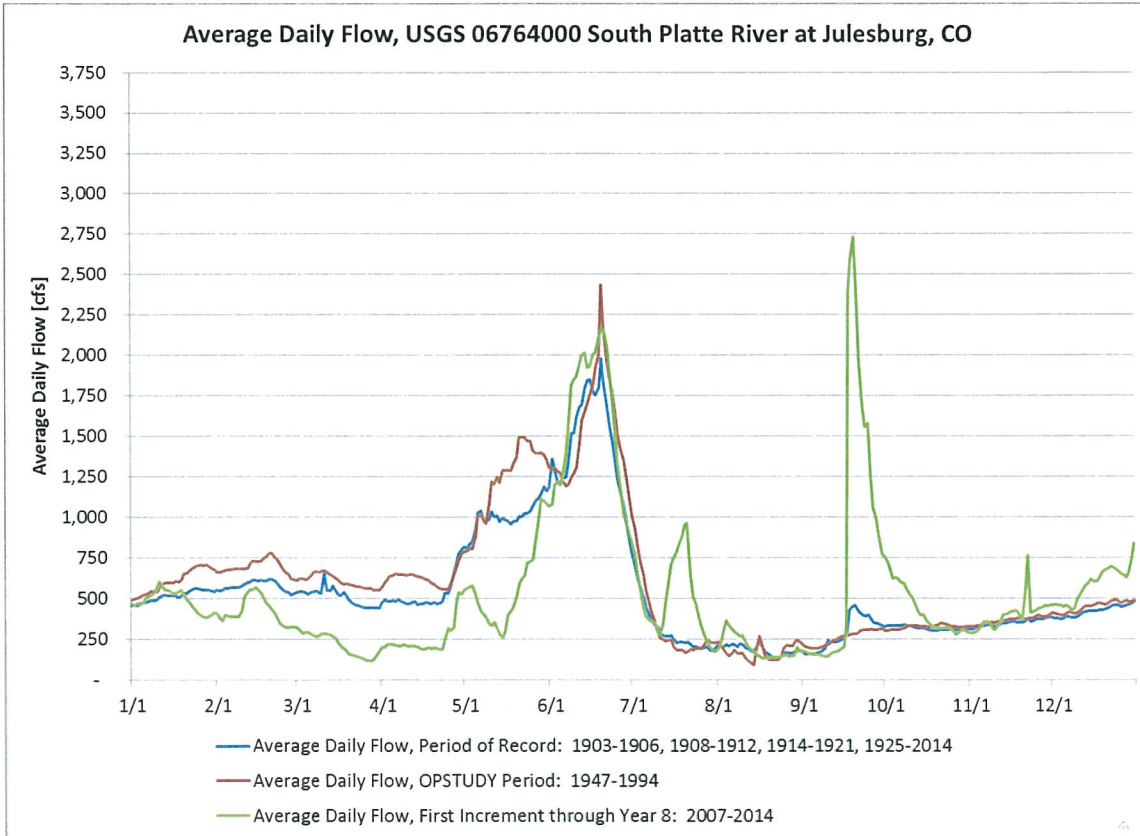
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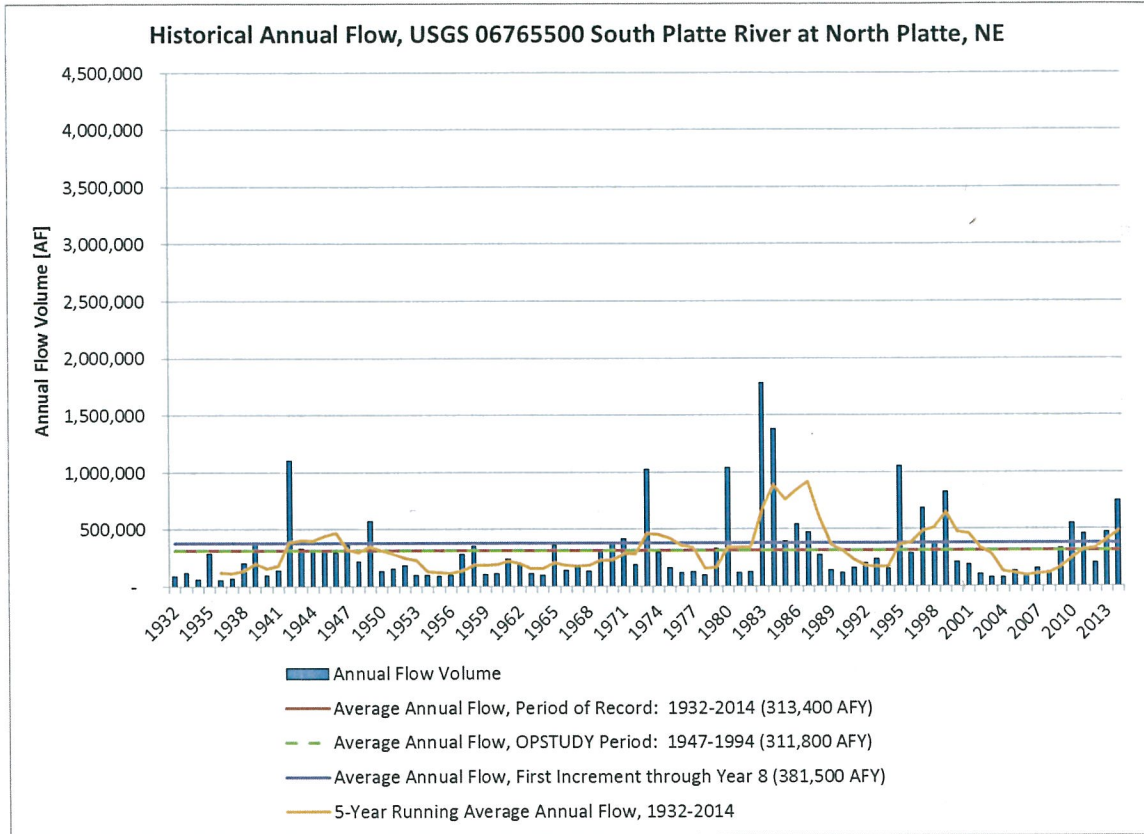
1567 **Appendix A – Historical Streamflows at Representative Gages**



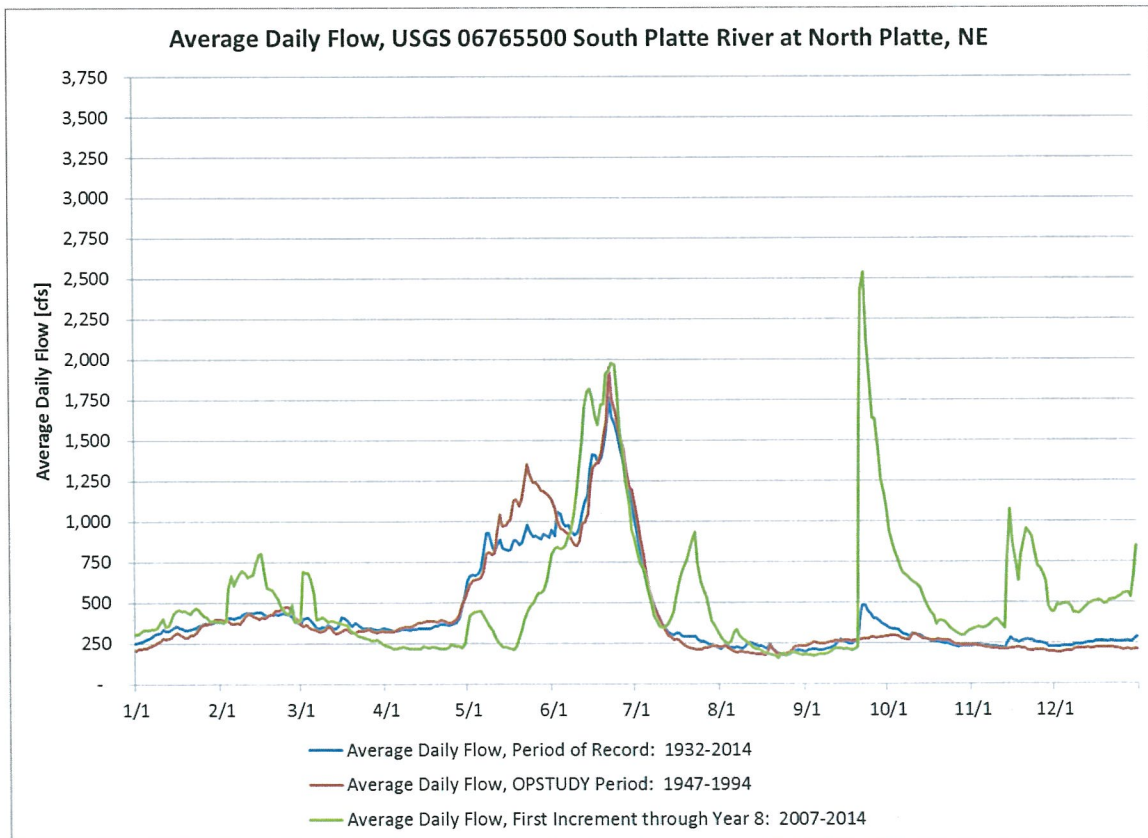
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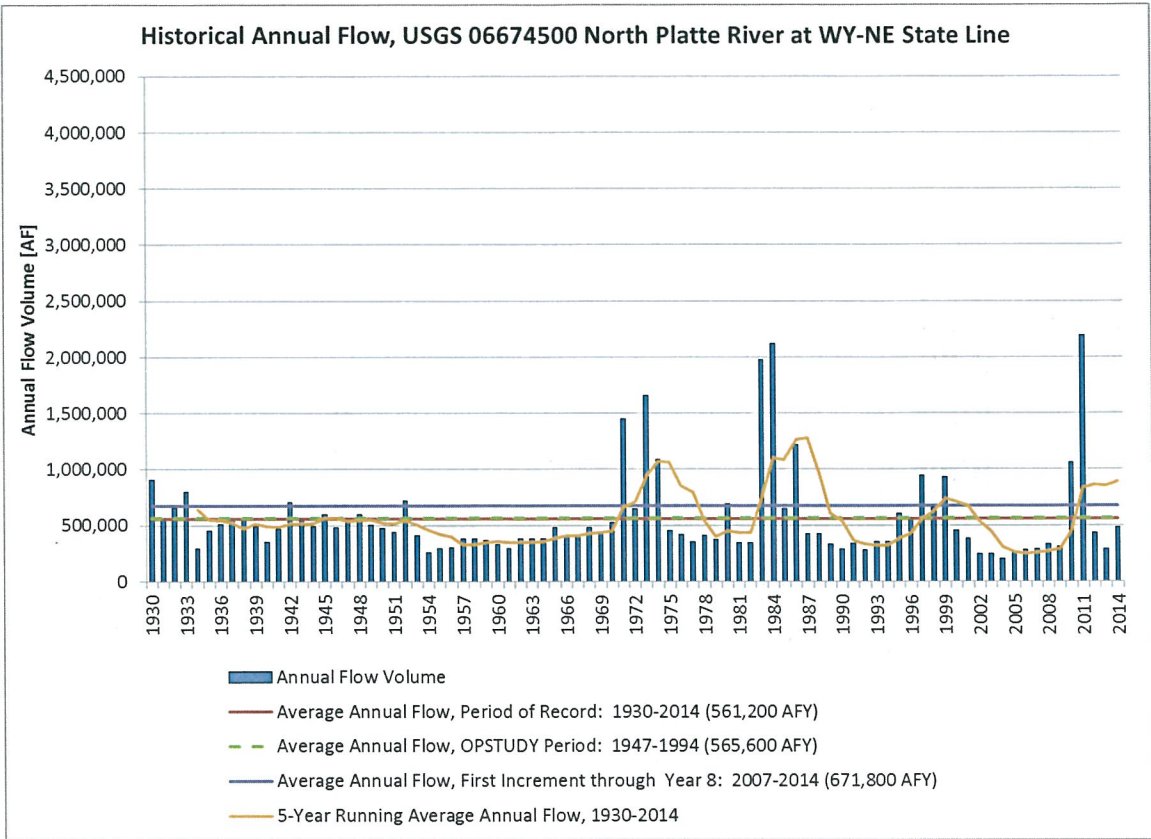
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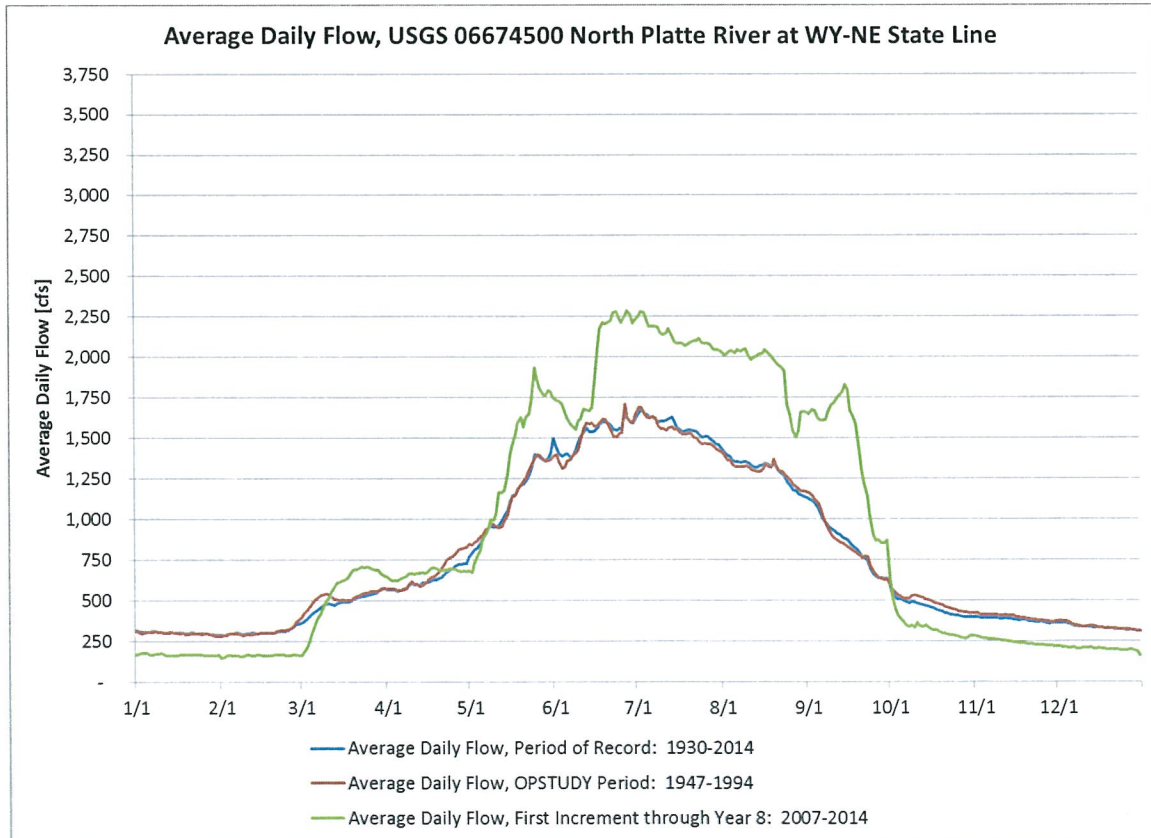
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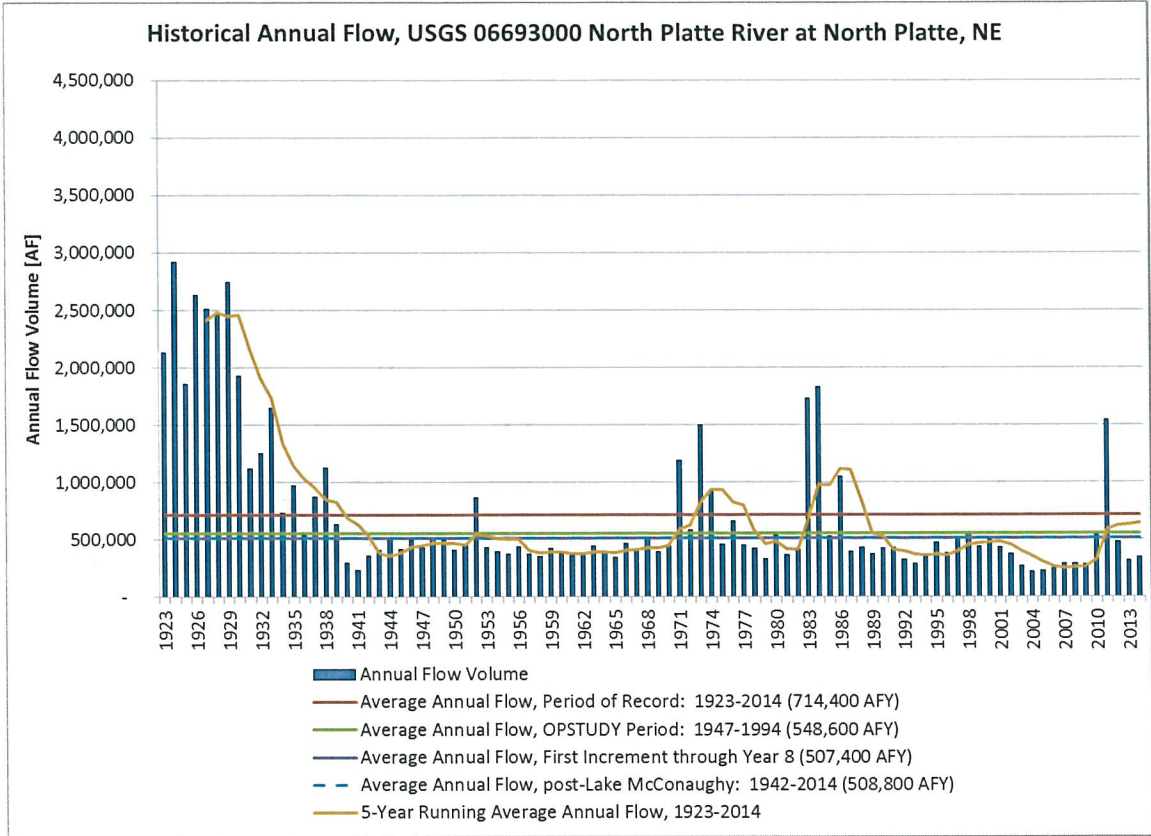
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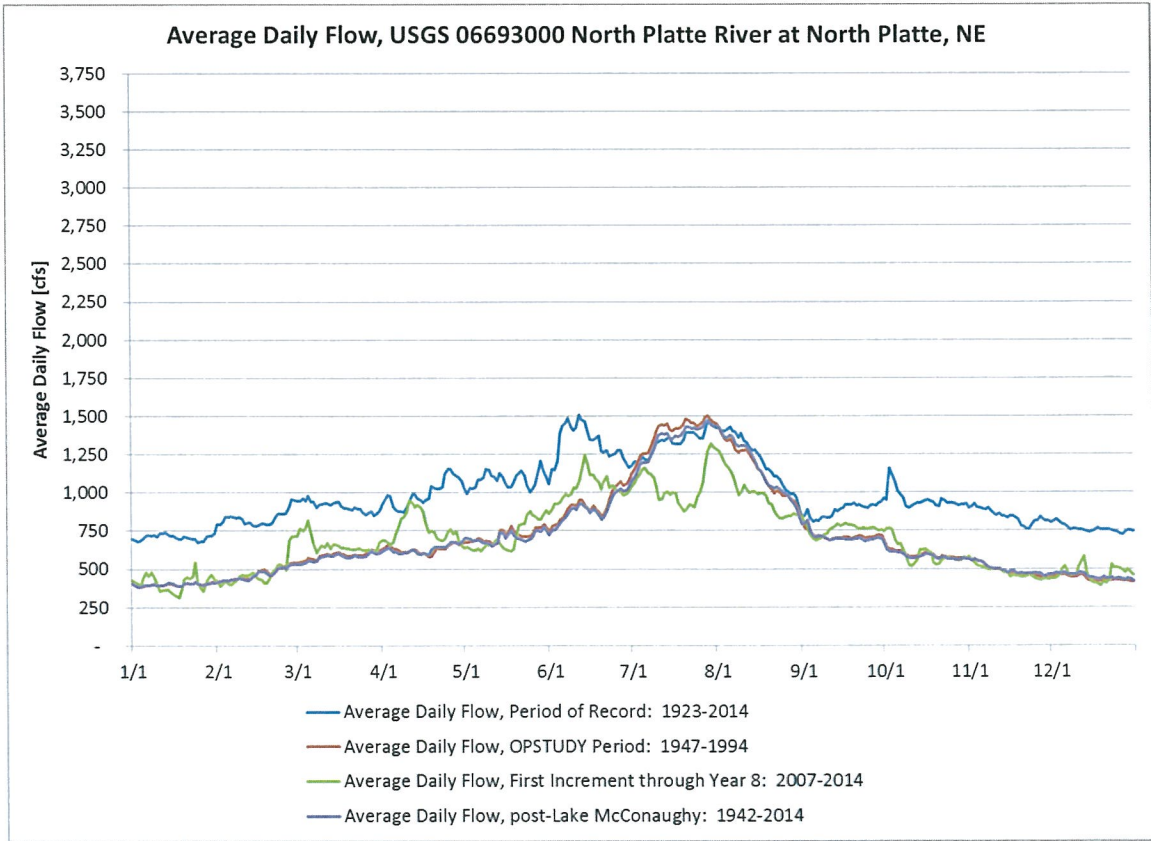
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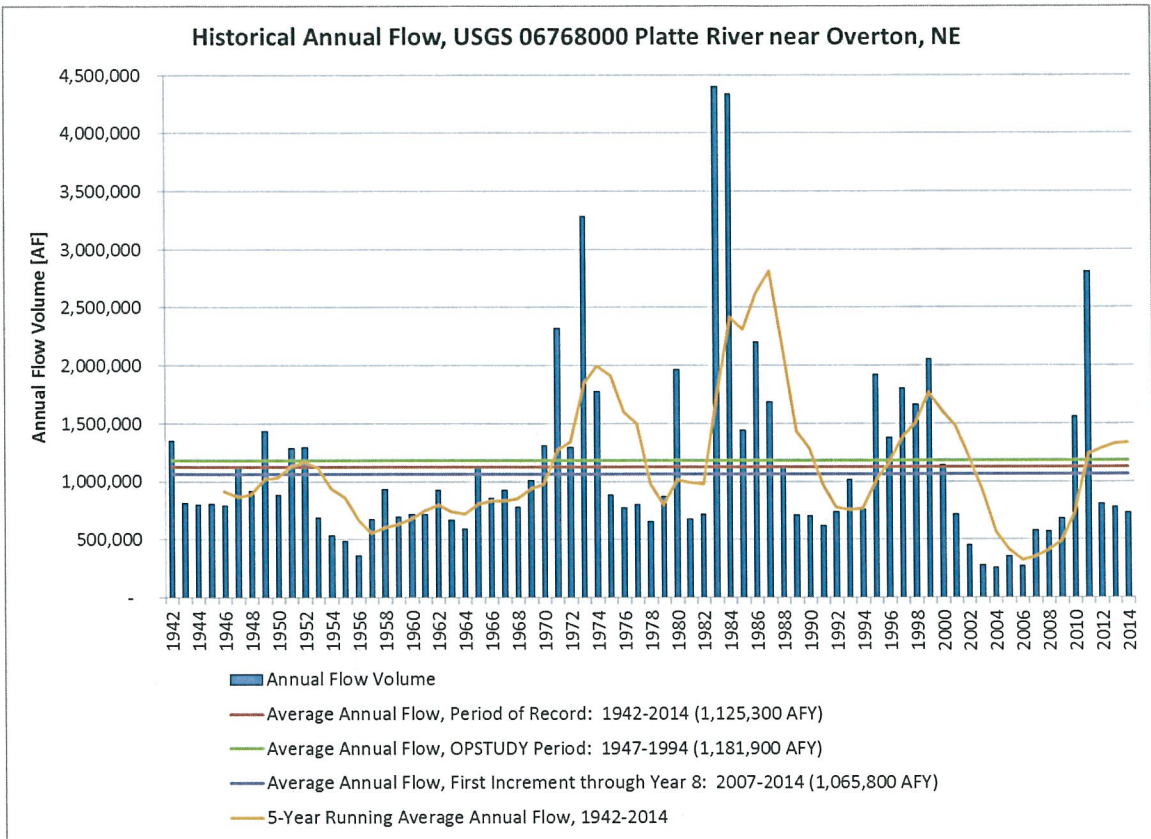
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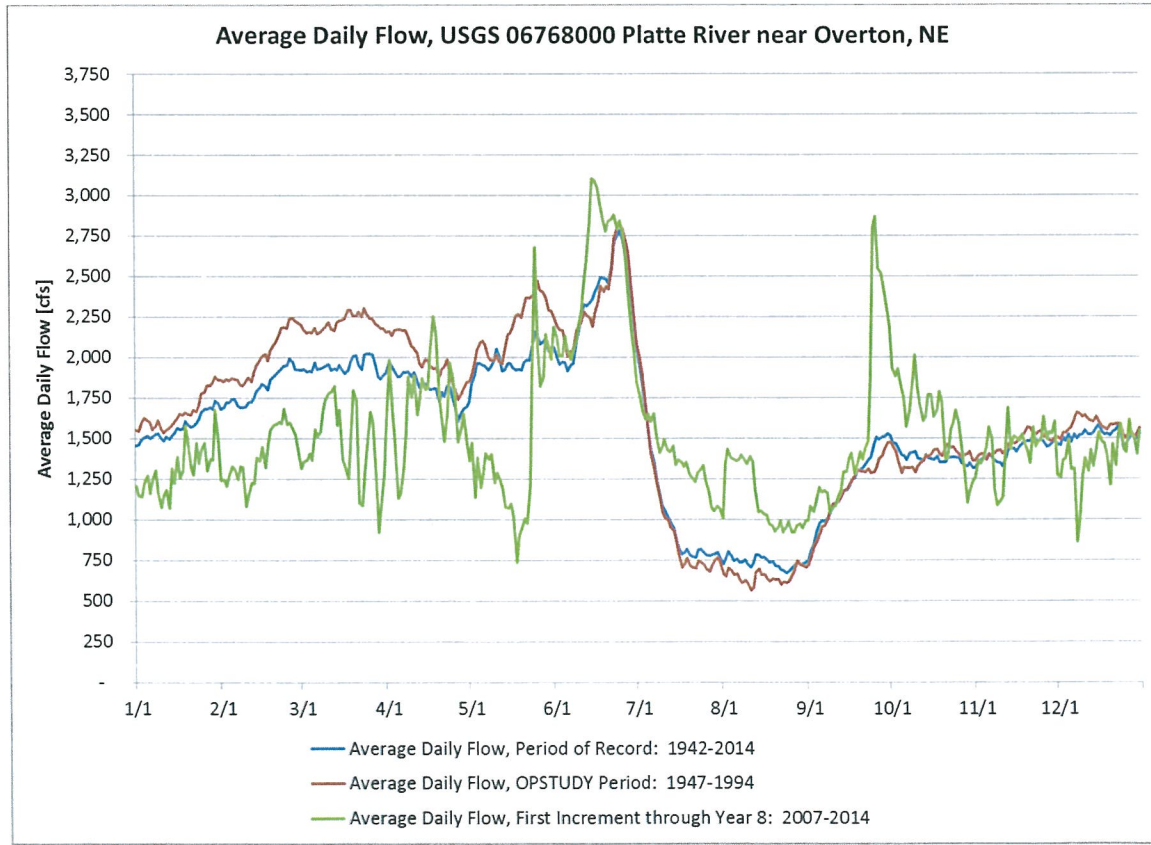
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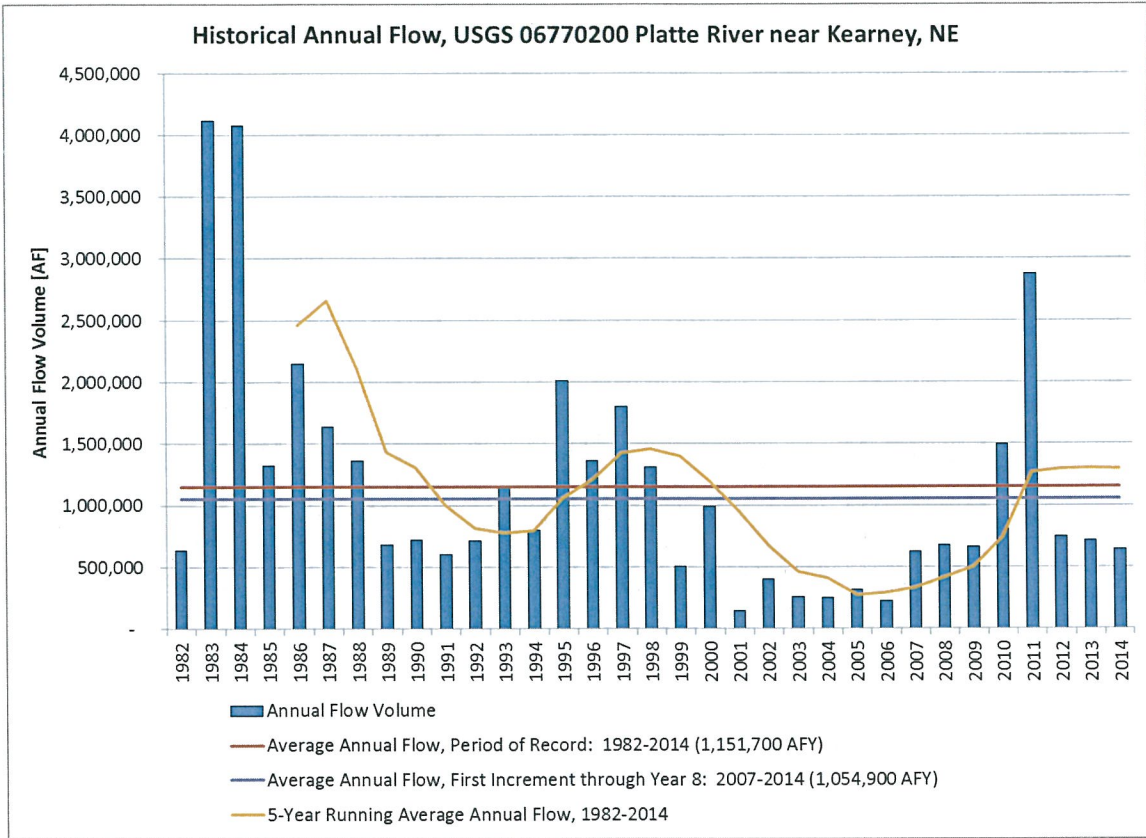
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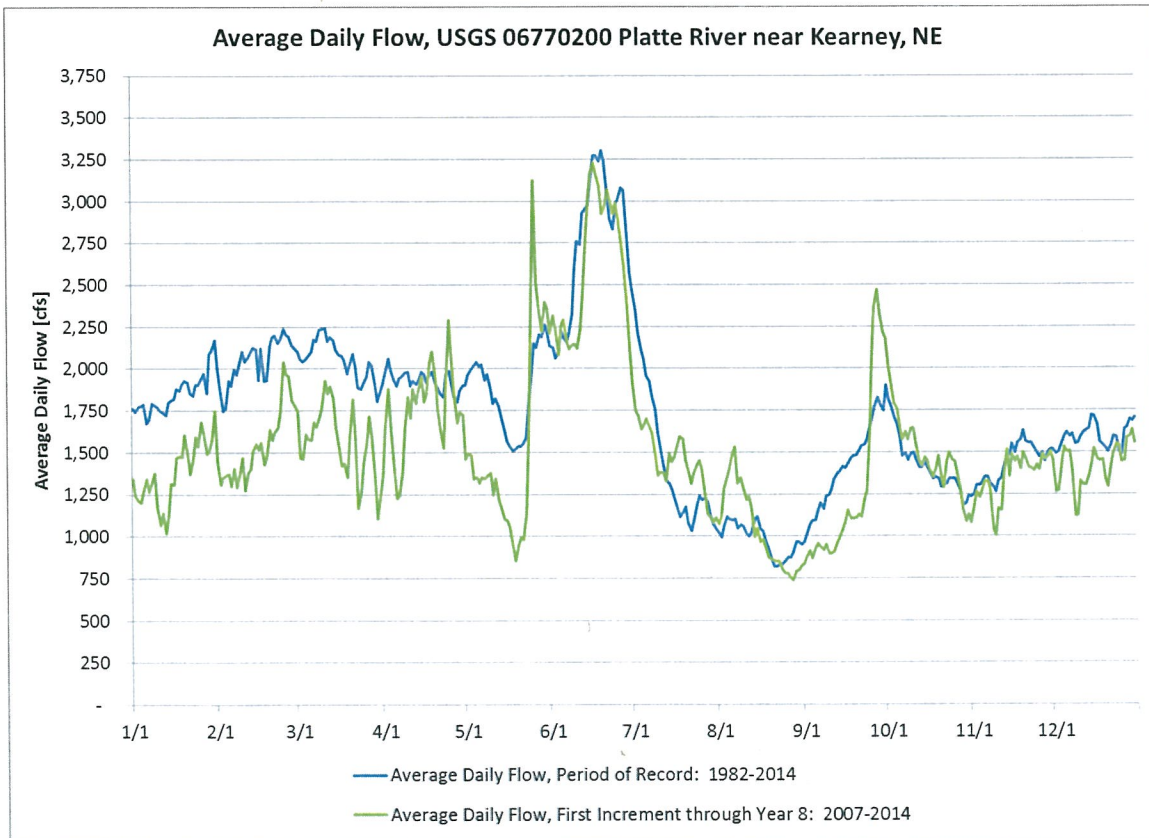
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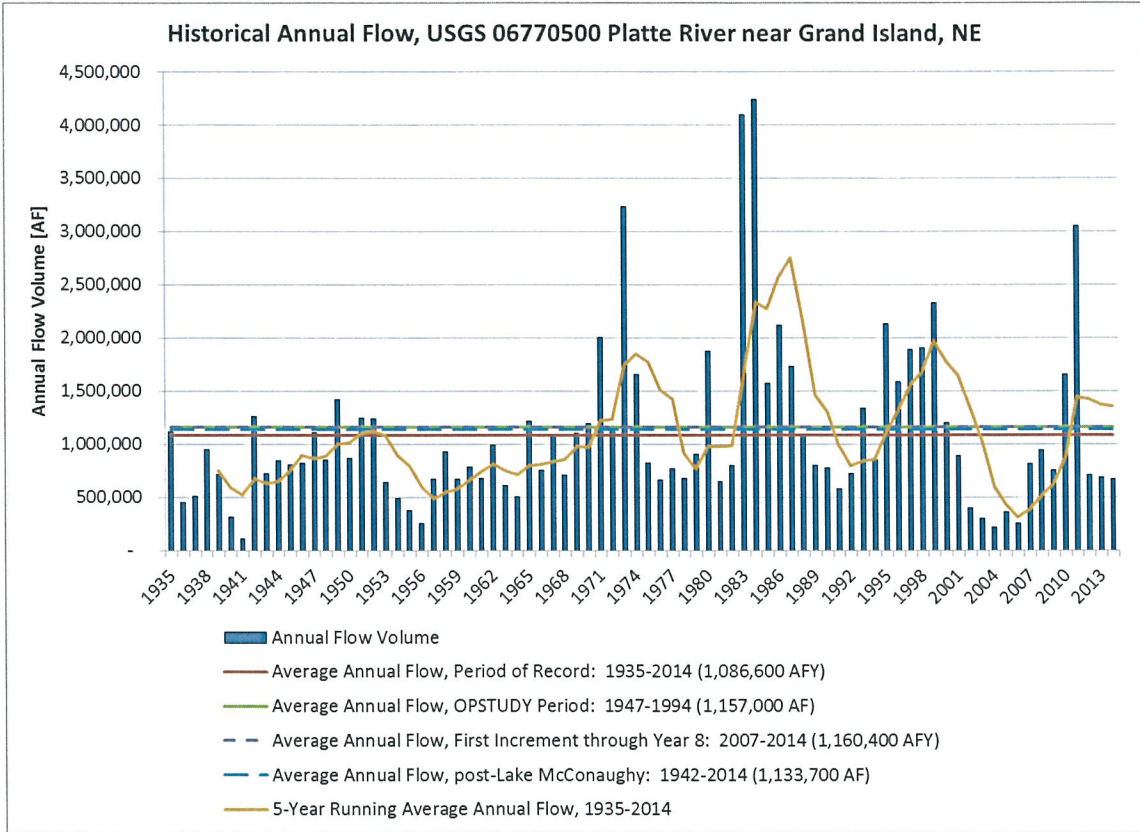
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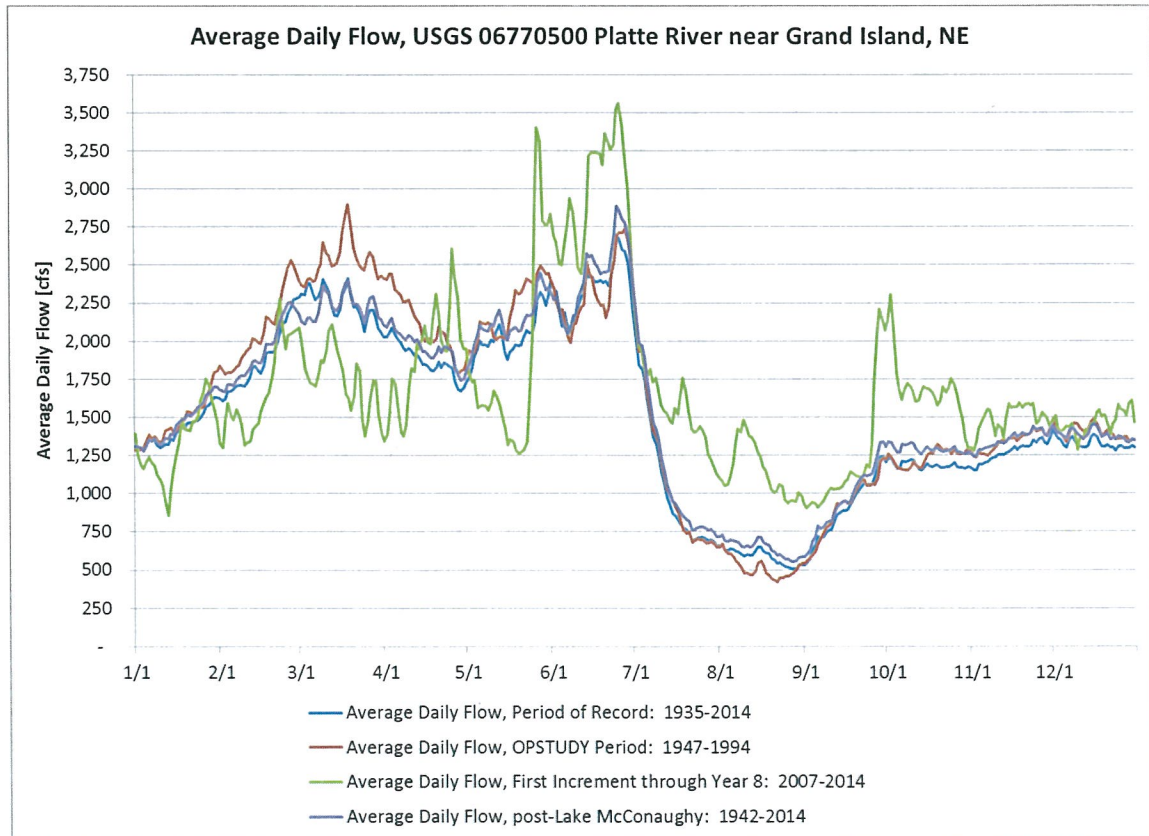
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1583 **Platte River Recovery Implementation Program**
1584 **2014 Water Action Plan Update**

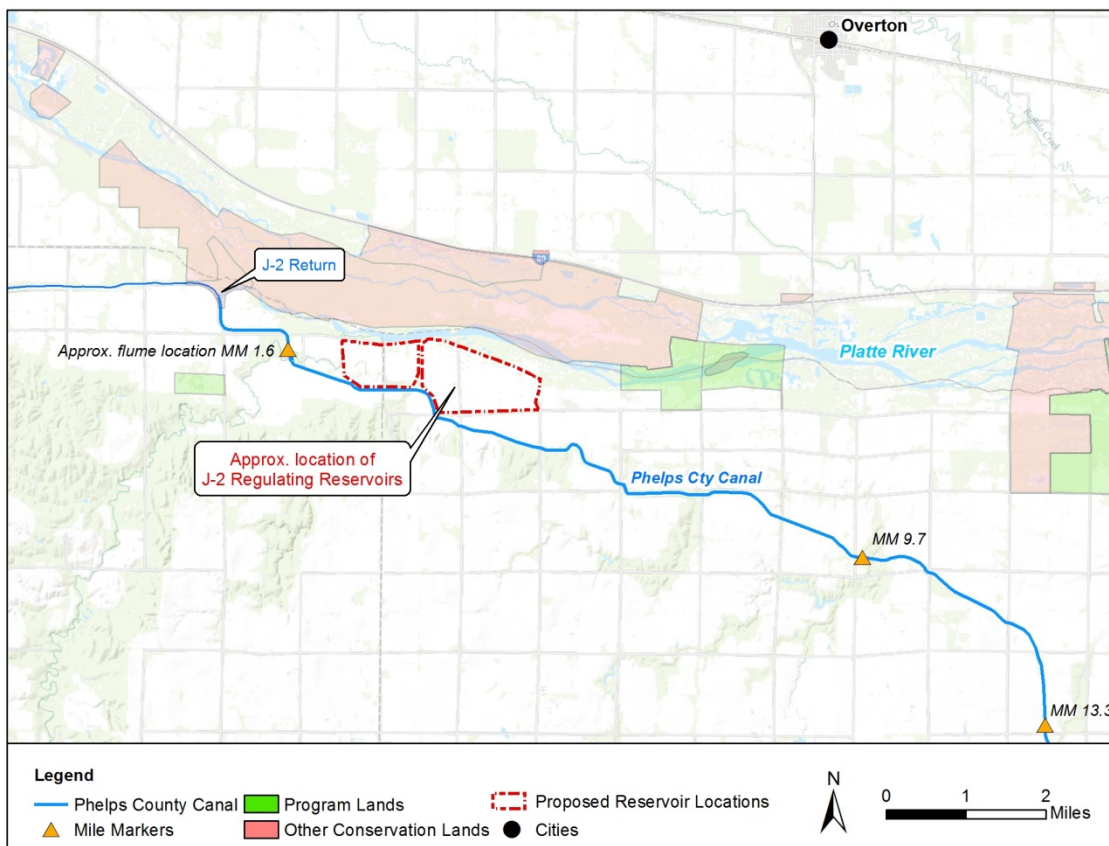
1585 **Appendix B – Active Project Descriptions**

1586 Active projects are considered either currently implemented and operational projects or
 1587 projects the Program has commenced funding for implementation. There are 5 WAP
 1588 projects considered active at this time: the J-2 Regulating Reservoirs (tier 1), the Phelps
 1589 County Canal Groundwater Recharge project (tier 1), the Pathfinder Municipal Account
 1590 Lease (tier 1), the CPNRD water leasing project (tier 2), and the No Cost NCCW (tier 1).
 1591 The GC has approved scores for the active projects, except for the CPNRD water lease
 1592 and the No Cost NCCW, which will likely be scored in 2015. Although the J-2
 1593 Regulating Reservoirs project is not constructed; significant work has been completed to
 1594 advance the project to implementation and the Program is in the process of securing the
 1595 funds for construction. The tier designations refer to the 2009 WAP Update designations
 1596 for sequencing projects during the First Increment.

1597 **B-1.0 J-2 Regulating Reservoirs**

1598 **B-1.1 Project Description**

1599 The proposed J-2 Regulating Reservoirs⁶⁷ are located in the CNPPID system in Gosper
 1600 and Phelps Counties in the Central Platte region of Nebraska, as shown in **Figure B-1**.
 1601

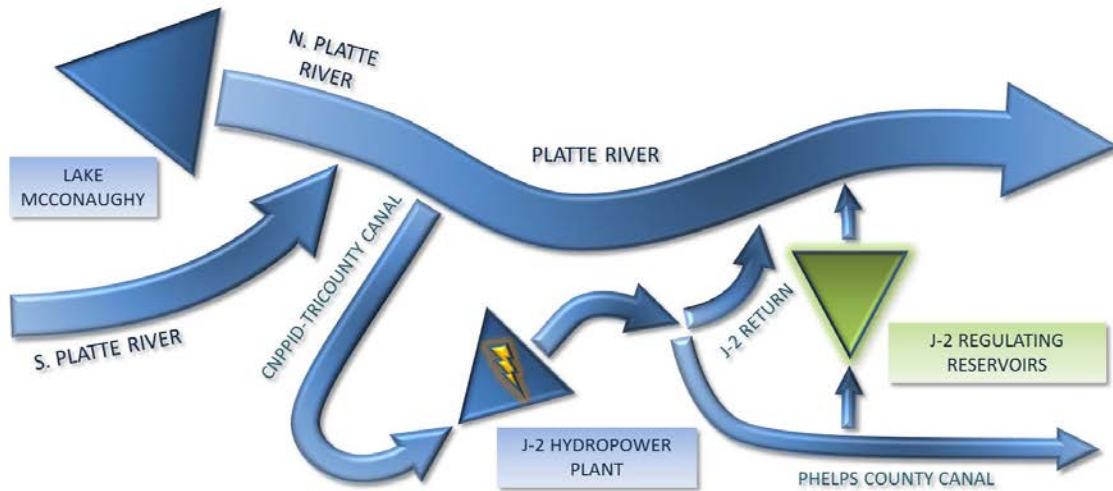


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 1603

Figure B-1. Preliminary Location Map of the Proposed J-2 Regulating Reservoirs.

⁶⁷ This project was previously referred to as the CNPPID Reregulating Reservoir in the 2000 Reconnaissance-Level WAP and the 2009 WAP Update.

1604 The reservoirs would retine excess to USFWS target flows and instream flows to times
1605 of USFWS target flow shortages. A schematic of the proposed J-2 Regulating Reservoirs
1606 is shown in **Figure B-2**.



1607
1608 **Figure B-2. Schematic of the J-2 Regulating Reservoirs.**
1609

1610 There are two proposed reservoir cells and each cell has an inlet on the Phelps County
1611 Canal and an outlet to the Platte River to release retimed water for target flow shortages,
1612 SDHF events, and other Program purposes. The project benefits the Program, the
1613 NDNR, and the CNPPID. The CNPPID will build, own, and operate the reservoirs and
1614 utilize one reservoir cell during the irrigation season, while the Program and the NDNR
1615 will utilize the retimed water to reduce shortages in the river throughout the year. The
1616 funding for the project will come from the three parties: the Program, the NDNR, and the
1617 CNPPID.

1618
1619 The Program signed a water service agreement⁶⁸ with the CNPPID and the NDNR in
1620 2013 regarding the ownership of the proposed reservoirs, the purpose and operations, the
1621 construction services and payments, and the terms. The water service agreement is
1622 referred to as the “Three Party Agreement”. The Program will utilize 75 percent of the
1623 yield and the NDNR will utilize 25 percent of the yield of the project. The CNPPID will
1624 also utilize the reservoirs to operate their J-2 hydropower plant at peak efficiency and
1625 reduce fluctuations to irrigation deliveries into the Phelps County Canal and releases to
1626 the Platte River. Portions of the J-2 Regulating Reservoirs project are anticipated to
1627 begin construction activities in 2017. The NDNR approved the CNPPID’s petition to
1628 modify their system by extending the Supply Canal, constructing two new regulating
1629 reservoirs, and adding two new return flow points in 2014⁶⁹.

1630 **B-1.2 Alternatives Evaluated**

1631 The regulating reservoir concepts were evaluated in a pre-feasibility study⁷⁰ completed in
1632 2010, a feasibility report⁷¹ in 2012 and a conceptual design report⁷² in 2013. In the pre-

⁶⁸ CNPPID 2013a

⁶⁹ Approval of Petition MIP-5064, signed by the NDNR August 29, 2014.

⁷⁰ Olsson Associates and Black & Veatch 2010

1633 feasibility study, there were various configurations of the J-2 Regulating Reservoirs and
1634 Elwood Reservoir alternatives considered. The J-2 Regulating Reservoirs alternative
1635 with Area 1 and Area 2 (now referred to as Reservoirs 1 and 2) was the recommended
1636 alternative in the study, due to its ability to provide a high yield and low unit cost relative
1637 to the other alternatives. In addition, the location of the project is ideal for providing
1638 water to the habitat reach, including releases of 2,000 cfs for an SDHF⁷³. In 2014 and
1639 2015, the CNPPID also evaluated and rejected a variation on the alternative that would
1640 have placed the project across the south river channel on Jeffrey Island. The CNPPID is
1641 moving into the preliminary design phase with the recommended alternative.

1642

1643 Recommended alternative

1644 J-2 Regulating Reservoirs with cells known as Reservoir 1 and Reservoir 2 in Phelps and
1645 Gosper Counties.

1646 **B-1.3 Yield**

1647 The GC approved a scoring methodology and a preliminary score for the J-2 Regulating
1648 Reservoirs in 2010⁷⁴. Utilizing the same scoring assumptions as approved by the GC in
1649 2010, the J-2 Regulating Reservoirs project score was updated in 2012 to reflect the
1650 feasibility-level storage capacity and the co-sponsorship with the NDNR and the
1651 CNPPID. The J-2 Regulating Reservoirs score is 30,600 AFY⁷⁵ for the Program,
1652 representing a storage volume of 13,959 AFY and a 75 percent interest in the yield. The
1653 project score is based on the design in the feasibility report for the recommended
1654 alternative. The CNPPID will use Reservoir 2 during the irrigation season to operate
1655 their J-2 hydropower plant at an improved efficiency rate. This will reduce the storage⁷⁶
1656 volume available to regulate for Program purposes during the irrigation season; the
1657 impact of the CNPPID's use of Reservoir 2 is included in the 30,600 AFY score for the
1658 Program.

1659 **B-1.4 Costs**

1660 The cost for the project is shared between the Program, the NDNR, and the CNPPID per
1661 the water service agreement. The Program's portion is 75 percent of the construction
1662 cost and the NDNR's portion is 25 percent of the construction cost, after deducting the
1663 CNPPID's portion of 5 percent or up to \$2,500,000. The Program's total portion of the
1664 reservoir cost is approximately \$58,000,000 and includes construction, permitting, and
1665 land acquisition costs. Annual operating costs may be added per year.

1666

⁷¹ Olsson Associates and Black & Veatch 2012

⁷² RJH Consultants, Inc. 2013

⁷³ It is assumed 3,000 cfs will be released from the EA in Lake McConaughy, in conjunction with the J-2 Regulating Reservoirs, to reach the minimum 5,000 cfs goal for a SDHF.

⁷⁴ EDO 2010. June 2010 GC meeting minutes.

⁷⁵ The total score for the project is 40,800 AFY; 75% of the project (30,600 AFY) is for the Program's use and 25% of the project (10,200 AFY) is for the NDNR's use. The GC accepted the revised score in 2012 [EDO 2012].

⁷⁶ Use of the term "storage" in the context of the J-2 Regulating Reservoirs in a reference to that term in its engineering or common usage for capacity. The reservoirs are not considered to be storage reservoirs in the context of state water appropriations.

1667 The Program has expended approximately \$15,474,000 to date on the reservoir WAP
1668 project, or approximately \$14,612,000 on pre-construction costs and \$862,000 on
1669 feasibility studies and testing. The CNPPID has expended \$1,000,000 on pre-
1670 construction costs and \$50,000 on feasibility studies. The NDNR has expended
1671 approximately \$4,900,000 on pre-construction costs to date.
1672

1673 The Program will secure the remaining funds needed for its share of payments under the
1674 water service agreement in 2015, 2016, and 2017 or about \$14,400,000 per year for a
1675 total of \$43,200,000. This cost covers the Program's portion of the base construction
1676 cost (general site work, seepage management/liner, embankments, slope protection,
1677 tributary work, inlets/outlets, Phelps County Canal work), mobilization and
1678 demobilization (1.5 percent of base construction cost), bonds and insurance (1 percent of
1679 base construction cost), a 20 percent contingency on the direct construction cost (base
1680 construction cost plus mobilization and demobilization and bonds and insurance),
1681 construction engineering (8 percent of the direct construction cost), and a 2.5 percent
1682 administration cost (based on the subtotal cost less CNPPID's share of \$1,500,000 for
1683 construction costs). The construction cost estimate is based on the J-2 Regulating
1684 Reservoirs conceptual design report prepared by RJH Consultants, Inc. in 2013⁷⁷.

1685 **B-1.5 Next Steps**

1686 The CNPPID is working on land acquisitions, licensing through the Federal Energy
1687 Regulatory Commission (FERC), and the preliminary design of the J-2 Regulating
1688 Reservoirs.

1689 **B-2.0 Nebraska Groundwater Recharge: Phelps County Canal**

1690 **B-2.1 Project Description**

1691 The Phelps County Canal is located in the CNPPID's system in Gosper, Phelps, and
1692 Kearney Counties. The Program has signed temporary water service agreements with the
1693 CNPPID to deliver water into the canal during the non-irrigation season, considered
1694 approximately mid-September through mid-April, for recharge operations. Excess flows
1695 available in the CNPPID system are delivered into the canal and allowed to seep from the
1696 canal and recharge the underlying aquifer. The Program utilizes seepage that occurs in
1697 the main canal from the beginning of the canal in Gosper County to Mile Post 13.3⁷⁸ in
1698 Phelps County, which is shown in the location map in **Figure B-3**.

⁷⁷ RJH Consultants, Inc. 2013

⁷⁸ Mile Post 13.3 refers to the approximate distance in canal miles from the beginning of the canal to the checked location where recharge operations occur.

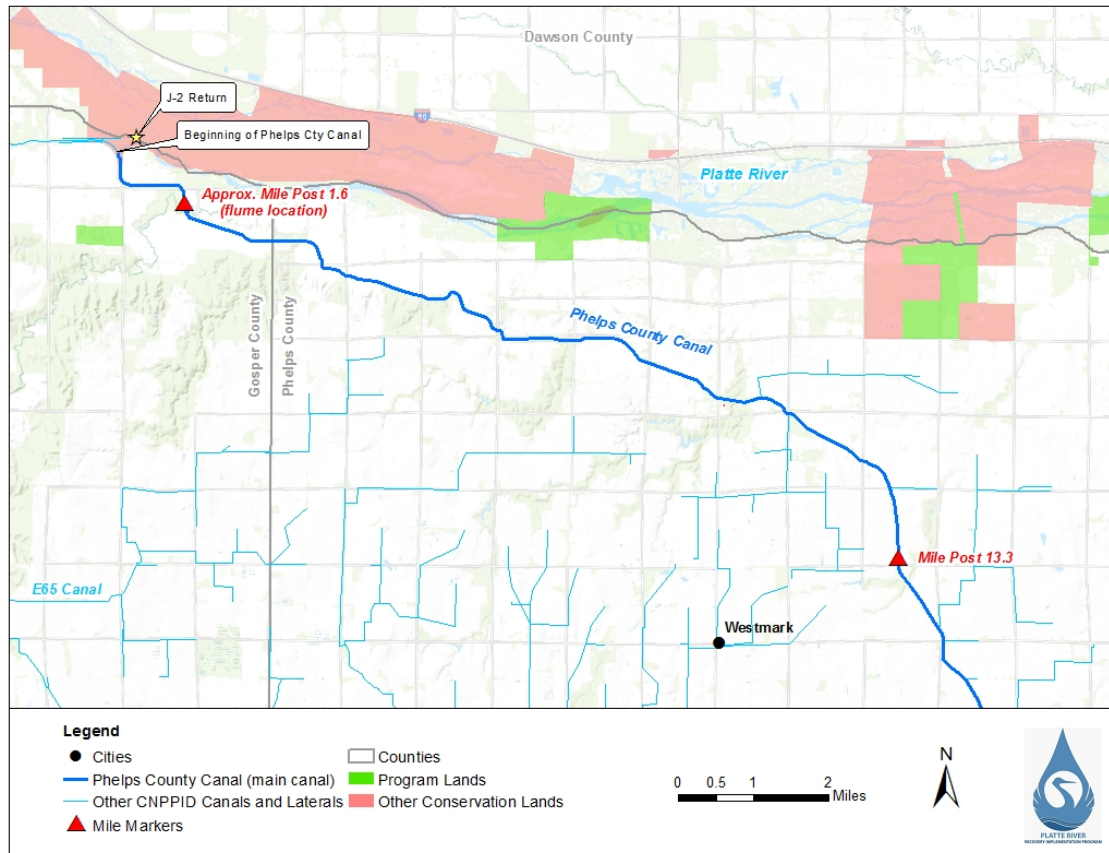


Figure B-3. Location Map of the Phelps County Canal.

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There is a check structure at Mile Post 13.3, which allows the CNPPID to maintain water levels in the canal sections. The seepage from recharge operations returns to the Platte River as direct groundwater discharge and from discharge through drains that flow to the Platte River. The modeled recharge accretions at the river that occur during shortages to USFWS target flows are credited to the Program score.

The Program completed a Nebraska groundwater recharge project pre-feasibility study⁷⁹ in 2010 and a feasibility-level pilot program study⁸⁰ in 2012. The Phelps County Canal groundwater recharge project was selected as the preferred option of the various configurations identified in the pre-feasibility study and further studied in the feasibility study. The Phelps County Canal groundwater recharge project has been operational as a WAP project for the Program since the fall of 2012. Annual recharge report summaries are available for 2012 through 2014 operations and include water diverted into the canal for recharge, the water level measurements in designated monitoring wells, and the recharge rates and volumes.

⁷⁹ EDO et al. 2010

⁸⁰ EA Engineering, Science, and Technology, Inc., and Daniel B. Stephens and Associates, Inc. 2012

1717 **B-2.2 Alternatives Evaluated**

1718 A pre-feasibility study was conducted in August 2010 to identify the most feasible
1719 groundwater recharge concepts and configurations in the central Platte River region. In
1720 the pre-feasibility report, the Program completed evaluations of the Phelps County Canal,
1721 Thirty Mile Canal, Gothenburg Canal, and the Dawson County Canal⁸¹. These canals
1722 were selected through a screening process in coordination with the Groundwater
1723 Recharge Workgroup, an ad-hoc subcommittee of the WAC. In the pre-feasibility study,
1724 the two recommended alternatives for further feasibility studies were locations along the
1725 Phelps County Canal and the Gothenburg Canal. After the pre-feasibility findings, the
1726 NPPD completed a winter operations report⁸² for the Gothenburg Canal, Dawson County
1727 Canal, and the Kearney Canal to assess potential non-irrigation season recharge
1728 operations. The report concluded recharge operations in the fall and spring are more
1729 feasible than mid-winter recharge operations in the NPPD canals. The Program decided
1730 to focus on the Phelps County Canal for the feasibility study in 2012, as this was the
1731 preferred canal that could accommodate recharge operations through the winter months.

1732
1733 The Program also evaluated potential recharge operations in the E65 Canal in the
1734 CNPPID’s system in 2014. The EDO and William Hahn, EDO Special Advisor in
1735 hydrogeology, completed an investigation to determine whether recharge in the E65
1736 Canal would benefit the Program. It was assumed the Program would recharge in the
1737 section of canal below Elwood Reservoir, from approximately Mile Post 5.9 to 13.9.
1738 There is a check structure at Mile Post 13.9, which could be used to control the water
1739 levels in the canal and the location of recharge operations. It was also assumed recharge
1740 would accrete to Plum Creek and flow as surface water to the Platte River, as Plum Creek
1741 intersects the path from the E65 canal to the river. Based on the results of the
1742 investigation, it appears a significant portion of water recharged in the canal may accrete
1743 to the Republican Basin, based on the estimated location of the groundwater divide⁸³.
1744 The results suggest recharge in the E65 Canal would not be an efficient WAP project and
1745 this information was presented to the WAC⁸⁴. The E65 Canal has not been evaluated
1746 further for recharge operations as a WAP project.

1747

1748 Recommended Alternative

1749 Phelps County Canal groundwater recharge project, up to Mile Post 13.3.

1750 **B-2.3 Yield**

1751 The GC approved a score for the Program’s portion of the Phelps County Canal
1752 Groundwater Recharge project in 2013⁸⁵, assuming the Program would have a 50 percent
1753 interest in the project yield, based on the temporary water service agreements with the

⁸¹ Some of the study sites were identified in the 2000 WAP and additional site options were incorporated in the 2009 WAP Update.

⁸² Applegate Group, Inc. 2011

⁸³ The split of the groundwater returns to the Platte Basin or the Republican Basin from canal recharge may be subject to reconsideration as new modeling is completed by the NDNR and other new information comes to light.

⁸⁴ EDO 2014c. August 2014 WAC meeting minutes.

⁸⁵ EDO 2014a. December 2013 GC meeting minutes.

1754 CNPPID. The proposed 2014 permanent water service agreement⁸⁶ with the CNPPID
1755 states the Program will have access to 75 percent of the yield, instead of the initial 50
1756 percent estimate. Maintaining the same assumptions as the GC-accepted score, the
1757 revised score is 2,700 AFY⁸⁷, based on a 75 percent interest in the yield. This includes a
1758 minor impact to the score due to the operations of the J-2 Regulating Reservoirs,
1759 although it is anticipated the CNPPID will be able to operate both projects
1760 simultaneously. The Program will utilize 75 percent of the yield and the NDNR will
1761 utilize the remaining 25 percent of the yield and associated costs.

1762 **B-2.4 Costs**

1763 The Program and the CNPPID have utilized annual temporary water service agreements
1764 to operate the Phelps County Canal groundwater recharge project. The CNPPID delivers
1765 excess flows available in their system into the canal during excesses to USFWS target
1766 flows and instream flows. The deliveries are measured by the CNPPID at the flume
1767 located at Mile Post 1.6 in the canal. The CNPPID charges the Program based on the
1768 measured volume of deliveries. The cost per AF of water delivered through the flume
1769 began at \$25 per AF in 2011 with a new price set at \$27 per AF in 2014, escalating at 4
1770 percent per year through the First Increment. The Program has expended a total of
1771 approximately \$857,000 on Nebraska Groundwater Recharge feasibility studies and
1772 Phelps County Canal recharge operations through 2014.

1773 **B-2.5 Next Steps**

1774 Section B-2.5.1 describes efforts underway to secure a permanent water service
1775 agreement for recharge operations. Section B-2.5.2 describes a new concept to enhance
1776 the score of the recharge project by pumping recharged water directly to the Platte River,
1777 which is under consideration by the Program. Section B-3.5.3 provides a brief
1778 description of a new concept to recharge water in Elwood Reservoir.

1779 **B-2.5.1 Permanent Water Service Agreement**

1780 The Program and the CNPPID are working on a permanent water service agreement for
1781 recharge operations. The CNPPID applied for a permanent permit to appropriate excess
1782 flows for the recharge project with the NDNR in September 2012. The status of the
1783 applications is pending but the applications are anticipated to be approved in 2015. The
1784 Program anticipates recharging each year through the end of the First Increment, as
1785 excess flows are available⁸⁸.

1786 **B-2.5.2 Groundwater Pumping Concept to Increase Score**

1787 Groundwater pumping is a new concept to increase the efficiency of water use in the
1788 Phelps County Canal Groundwater Recharge project. The Program intends to construct
1789 wells to pump groundwater directly to the Platte River during times of shortages to

⁸⁶ CNPPID 2014a

⁸⁷ The GC accepted a score of 1,800 AFY for the Program's portion of the project, which was assumed to be 50 percent of the total project yield. This score has been updated to 2,700 AFY to represent a 75 percent interest for the Program.

⁸⁸ Note, however, that the beginning of the Phelps County Canal will be enlarged to convey 1,675 cfs (the current capacity is approximately 1,000 cfs in this section) as part of the J-2 Regulating Reservoirs project. As a result, there may be times when recharge in the canal cannot occur due to construction.

1790 USFWS target flows. The project would capture and retime water stored in the aquifer
1791 from recharge operations between the Phelps County Canal and the Platte River. Since
1792 recharge accretions are not controllable and may return to the river during excesses to
1793 target flows, groundwater pumping would allow the Program to pump recharged water to
1794 the river during shortage periods only to maximize the score. Pumping would also allow
1795 the recharged water to return to the river in a timelier manner than recharge operations
1796 alone. The groundwater would likely be pumped into an adjacent drain and return to the
1797 river as surface flow. The groundwater pumping concept may require revised or
1798 additional permitting through the NDNR.

1799

1800 Yield

1801 The preliminary score model analysis used the assumption that each well can pump at
1802 1,000 gallons per minute from March through November (the wells will only be operated
1803 during shortages to target flows). It was assumed the Program would pump from two
1804 wells at a maximum of approximately 1,700 AFY. The anticipated score is
1805 approximately 500 AFY combined for both wells; however, a score has not been assigned
1806 for this project. The 500 AFY estimated score represents the net increase in the score
1807 when groundwater pumping is added to the Phelps County Canal Groundwater Recharge
1808 project, as compared to the recharge project score alone (without pumping operations).
1809 The analysis takes into account the combined modeling of recharge accretions,
1810 groundwater pumping direct deliveries to the river and lagged groundwater depletions
1811 from pumping. Additional wells could be constructed in future phases of this project;
1812 however, it is dependent on the accretions from the Phelps County Canal Groundwater
1813 Recharge project.

1814

1815 Cost

1816 The estimated cost associated with this project is for the construction of two new wells.
1817 Cost estimates also include future maintenance, pumping operation costs, and personnel
1818 time to aid in monitoring, testing, and maintenance. The estimated construction cost for
1819 two wells is approximately \$154,000 and includes: construction, electrical hookup and
1820 power lines, flow meters, monitoring wells, engineering specifications and final design,
1821 construction oversight, data analyses and well testing. Based on the preliminary analysis
1822 completed by the EDO, it was assumed two wells would pump an average of
1823 approximately 1,700 AFY, collectively. This is based on the modeled Phelps County
1824 Canal Groundwater Recharge project operations and the intended groundwater pumping
1825 operations (based on OPSTUDY Hydrology from 1947-1994, utilized in the Program's
1826 score model). The estimated costs for annual pumping, maintenance and personnel time
1827 for two wells are approximately \$29,000 per year. The feasibility of this project is
1828 currently under evaluation by the Program. See **Table B-1** for the cost breakdown for one
1829 well during the first year of operations.

1830

Table B-1. Phelps County Canal groundwater pumping project cost summary.

No. of Wells	Construction Cost	Piping from Well to Ditch	Landowner Lease Cost Per Year	Pumping Cost per AF [1000 gpm/well]	Avg. Annual Pumping [AF]	Years of Pumping
	(A)	(B)	(C)	(D)	(E)	(F)
1	\$85,000	\$8,500	\$1,000	\$5.20	830	1

Maintenance Per Year	Personnel Costs Per Year	Total Cost (rounded)
(G)	(H)	(I)
\$1,500	\$8,000	\$108,000

- 1831 (A) Estimated cost based on data provided by Hahn Water Resources, LLC (EDO Special Advisor) for
- 1832 construction, engineering plans and oversight. The addition of a second well is an additional \$69,000.
- 1833 (B) Initial estimate to route water from well location to drains using piping.
- 1834 (C) Rough estimate to utilize landowner property for well construction/easement. Note that lease costs may
- 1835 not be applicable if the well is located on Program land.
- 1836 (D) Estimated cost based on data provided by Hahn Water Resources, LLC (EDO Special Advisor).
- 1837 (E) Estimated volume of pumping in preliminary analysis for one well.
- 1838 (F) Estimated number of years of pumping.
- 1839 (G) Estimated cost based on data provided by Hahn Water Resources, LLC (EDO Special Advisor).
- 1840 (H) Based on a cost of \$50 per hour for one full month (160 hrs) of personnel time.
- 1841 (I) Total first year cost for one well (construction, piping to ditch, lease costs, pumping, maintenance,
- 1842 personnel costs).

1843

1844 Next Steps

1845 The Program will continue to refine the cost and score estimates for the pumping project
 1846 to enhance the Phelps County Canal recharge project. One well is anticipated to be
 1847 constructed on Program property and the other is anticipated to be on private land
 1848 between the Phelps County Canal and the Platte River. Further refinement of the well
 1849 locations will be considered. Revised or additional permitting through the NDNR may
 1850 need to be obtained if the project advances into implementation.

1851

1852 **B-2.5.3 Elwood Reservoir Seepage**

1853 The Program intends to evaluate seepage in Elwood Reservoir in the CNPPID’s system
 1854 as a potential Nebraska Groundwater Recharge project. Excesses to USFWS target
 1855 flows/instream flows available in the CNPPID’s system would be delivered into Elwood
 1856 Reservoir and allowed to seep. The seepage is anticipated to accrue, in part or in full, to
 1857 Plum Creek and flow as surface water to the confluence with Platte River, downstream of
 1858 the J-2 Return. Accretions at the Platte River would be routed to Grand Island, Nebraska
 1859 and credited during shortages to USFWS target flow shortages for Program score credit.
 1860 Detailed yield and cost evaluations of this project have not been evaluated at this time.
 1861 Preliminary cost estimates range from \$43 to \$53 per AF of water delivered into Elwood
 1862 Reservoir under a water service agreement with the CNPPID, and estimated diversions
 1863 are approximately 500 AFY for the Program. The NDNR and the Program would likely
 1864 share the yield. The Program may work with the CNPPID and the NDNR to complete

1865 feasibility analysis and water service agreement negotiations in the latter years of the
1866 First Increment.

1867 **B-3.0 Pathfinder Municipal Account**

1868 **B-3.1 Project Description**

1869 The Pathfinder Modification Project recaptured 53,493 AF of permitted storage space in
1870 Pathfinder Reservoir that was lost to sedimentation. An “Environmental Account” of
1871 33,493 AF was established as one of the Program’s three initial state water projects. The
1872 three initial state water projects collectively provide an average of 80,000 AFY toward
1873 the Program’s First Increment water objective. The State of Wyoming has the exclusive
1874 right to contract with the USBR for the use of the remaining 20,000 AF of recaptured
1875 capacity that is referred to as the “Wyoming Account.”⁸⁹ In 2011, the Program signed an
1876 agreement⁹⁰ with the WWDC to purchase a total of 38,400 AF from the Wyoming
1877 Account as a WAP project. The purchased water represents an average of 4,800 AFY
1878 from 2012 through 2019, available at Pathfinder Reservoir. **Figure B-4** is a photograph
1879 of construction activities in 2011.
1880



1881 **Figure B-4. Pathfinder Dam ogee weir construction in 2011.**
1882

1883 **B-3.2 Yield**

1884 In both 2012 and 2013, the Program utilized the 4,800 AFY of water available under the
1885 agreement. In 2014, the WWDC offered the Program an additional 4,800 AF, for a total
1886 of 9,600 AF at Pathfinder Reservoir, and the Program accepted the offer. It is anticipated
1887 that 4,800 AFY will be available in future years from 2015 through 2018. The Program
1888 may be able enter into an additional agreement with the WWDC for additional water in
1889 the future. The GC approved a project score of 4,000 AFY for the Pathfinder Municipal
1890 Account Lease in 2014⁹¹.

⁸⁹ The Wyoming Account is also known as the Municipal Account.

⁹⁰ WWDO 2011

⁹¹ EDO 2014b. March 2014 GC meeting minutes.

1891 **B-3.3 Costs**

1892 The Program paid a lump sum of \$1,958,400 for the 38,400 AF under the agreement with
1893 the WWDC in fiscal year 2012. This equates to \$51 per AF of water in Pathfinder
1894 Reservoir.

1895 **B-3.4 Next Steps**

1896 There are no additional steps for the project; it is considered complete. WWDC will
1897 continue to provide an estimate of water available under the agreement on or before the
1898 first day May of each year. The Executive Director of the Program, in consultation with
1899 the EA Manager, will respond with the quantity of water the Program would like to have
1900 released from the Wyoming Account. The water is then released in September each year,
1901 unless an alternative release schedule is requested by the Program. The Pathfinder
1902 Municipal Account Lease water is then routed to Lake McConaughy and entered into the
1903 EA for subsequent release. This will continue until the Program has utilized the
1904 purchased volume of 38,400 AF.

1905 **B-4.0 Nebraska Water Leasing: Central Platte NRD Lease**

1906 **B-4.1 Project Description**

1907 The Program signed a water use lease agreement⁹² with the CPNRD in December 2013 to
1908 lease transferred surface water rights and groundwater recharge in the Thirty-Mile, Cozad
1909 and the Orchard Alfalfa Canals⁹³. The Program's lease agreement is for up to 20,500
1910 AFY through 2019 from the two sources of water:

1911

- 1912 1. Net consumptive use credit from transferred natural flow surface water rights in the
1913 Six Mile, Cozad, Thirty-Mile, and Orchard-Alfalfa Canals. The water will be
1914 transferred from irrigation use to instream use for the Program. The increase in
1915 groundwater irrigation due to the transfer is accounted for in the consumptive use
1916 analysis; therefore, the Program will purchase the "net" consumptive use credit.
1917
- 1918 2. Recharge of excess flows in the Cozad, Thirty-Mile, and Orchard-Alfalfa Canals.
1919 The Program will purchase accretions from recharge.
1920

1921 The CPNRD submitted permit applications with the NDNR for excess flow
1922 appropriations for groundwater recharge in the canals in 2011; the permits are currently
1923 pending. The Program began purchasing lease water from recharge accretions in 2013.
1924 The CPNRD is working on the permit application process for the surface water transfers
1925 with the NDNR. Pending NDNR permit approval, yields from the surface water lease are
1926 projected to be available for the Program beginning in 2015. In 2013 and 2014, the
1927 CPNRD completed work to improve the canals and installed new structures and
1928 measuring devices for use in the surface water transfers and groundwater recharge
1929 operations.

⁹² CPNRD 2013

⁹³ The CPNRD has lease agreements with Thirty-Mile Canal Company (Thirty-Mile Canal), the Cozad Ditch Company (Cozad Canal) and the Southside Irrigation Company (Orchard-Alfalfa Canal) for use of the canals. The CPNRD also bought out the water rights in the Six Mile Canal from landowners.

1930 **B-4.2 Yield**

1931 The lease agreement is for a volume of water not to exceed 20,500 AF annually, assumed
1932 to be at the project location, from a combination of the transferred surface water rights
1933 and the groundwater recharge accretions. The CPNRD will offer the Program at least 50
1934 percent of the yields from each project, per the agreement. The CPNRD will provide
1935 water quantifications as the monthly net effect at the river, resulting in fully consumable
1936 water for Program use. The consumptive use credit will be diverted into the canals and
1937 returned to the river via a return structure with a measurement device. This project has
1938 not been assigned a score towards the First Increment milestone at this time; however, a
1939 score is anticipated to be assigned in 2015.

1940 **B-4.3 Costs**

1941 The transferred surface water consumptive use credit and the excess flow recharge
1942 accretions under the current lease agreement are priced at the same rate. The 2015 surface
1943 water cost is estimated at \$40⁹⁴ per AF of consumptive use credit returned to the river.
1944 The cost for recharged water began at \$35 per AF in 2013 and has increased at a rate of
1945 7.5 percent per year, to approximately \$40 in 2015. Billing will be based on the volume
1946 of water provided to the Program in a given calendar year, based on the CPNRD's
1947 estimates. In 2013 and 2014, the Program expended \$56,000 for recharge water
1948 accretions from the CPNRD water leasing project.

1949 **B-4.4 Next Steps**

1950 The CPNRD will continue to work on permitting with the NDNR for both the surface
1951 water rights and groundwater recharge operations. The CPNRD is also working on the
1952 development of potential recharge ponds to enhance the project and water accounting
1953 forms. The Program will also work with the CPNRD to determine appropriate costs for
1954 transferred surface water. It is anticipated that the Program will begin the score analysis
1955 for this project in 2015.

1956 **B-5.0 Net Controllable Conserved Water (No Cost)**

1957 **B-5.1 Project Description**

1958 Net Controllable Conserved Water (NCCW) (tier 1) is water saved within the CNPPID
1959 system through the implementation of a combination of conservation measures for canal
1960 distribution and delivery, on-farm changes in irrigation, and optimal reservoir operations.
1961 The saved water from conservation activities is stored in Lake McConaughy (due to the
1962 conservation measures, the water does not need to be released and remains in storage).
1963 These activities were completed to comply with the CNPPID's agreement with the
1964 National Wildlife Federation to provide reductions to average annual diversions of
1965 surface water. The CNPPID's FERC license requires that the portion of the NCCW that
1966 resulted from a grant with the USBR is added to the EA in Lake McConaughy on
1967 October 1 each year at no cost to the Program.

⁹⁴ Note that a revised cost of \$150 per AF for consumptive use credit for transferred surface water was utilized by the Program for budget projections, beginning in 2015. The contract may be renegotiated with a price increase.

1968 **B-5.2 Yield**

1969 The yield from the No Cost NCCW is approximately 314 AFY at Lake McConaughy,
1970 and this amount has been actively entered into the EA for the Program since Water Year
1971 2001. The project has not been officially scored for the Program, but modeling
1972 completed for the 2009 WAP Update⁹⁵ estimated project yields of 217-300 AFY at the
1973 associated habitat. The range of yield was derived based on varying assumptions of
1974 losses in the reaches of the North Platte River and Platte River downstream of Lake
1975 McConaughy. The 2009 WAP Update further states that “This portion of water is
1976 anticipated to be available through the Program First Increment, but will eventually be
1977 retired as the lifecycles of the associated project mature and yields drop off.”

⁹⁵ EDO and WAC 2010

1978 **Platte River Recovery Implementation Program**
1979 **2014 Water Action Plan Update**

1980 **Appendix C – Future Project Descriptions**

1981 Future projects are scheduled for feasibility studies in the latter years of the First
1982 Increment from 2015 through 2019. After evaluating the results of project feasibility,
1983 yield and cost information, the Program will decide whether these projects shall be
1984 implemented and credited towards the First Increment objective and WAP milestone or
1985 whether these projects shall be considered inactive for the remainder of the First
1986 Increment. Inactive projects will not be further pursued.

1987

1988 The evaluations for most tier 1 projects have been completed, except for the Colorado
1989 Groundwater Management (Tamarack III) project, which will be evaluated in the
1990 remaining years of the First Increment. The future tier 2 projects scheduled for
1991 evaluation from 2015 through 2019 are Nebraska Water Leasing and Acquisitions,
1992 Nebraska Groundwater Management, and Water Management Incentives. There are no
1993 tier 3 projects scheduled for evaluation from 2015 through 2019, as all of the tier 3
1994 projects are considered inactive.

1995 **C-1.0 Nebraska Water Leasing: NPPD Lease**

1996 **C-1.1 Project Description**

1997 The NPPD proposes to temporarily transfer the consumptive use portion of the natural
1998 flow available from 886.5 relinquished acres under the Dawson Canal Water
1999 Appropriation D-622 to an instream use for the Program. Irrigators have willingly
2000 relinquished these surface water rights to the NPPD. The NPPD filed for a temporary
2001 change of appropriation permit with the NDNR in July 2013. The permit application
2002 requested a temporary change from irrigation to instream use for 6 years from May 14,
2003 2014 through 2019 at a rate of a maximum of 7.6 cfs up to a maximum of 761 AFY.
2004 Based on the NPPD's analysis of water right availability data from 2001 through 2013,
2005 the transfer will yield an average annual consumptive use volume of 718 AF. The
2006 Program submitted a letter of support for the temporary change of use that was included
2007 with the permit application.

2008

2009 The NPPD filed an amendment to the application in May 2014 and the permit application
2010 status is currently pending. For this water leasing project, the NPPD intends to continue
2011 diverting Appropriation D-622 into the Dawson County Canal and then return the
2012 consumptive use portion to the Platte River. The yield will be available for the Program
2013 just downstream of the Dawson County Canal headgate, at a return flow station that will
2014 be constructed after the permit is approved.

2015 **C-1.2 Yield**

2016 The yield of the project estimated by the NPPD is an average of 718 AFY of consumptive
2017 use credit with a maximum of 761 AFY of consumptive use credit at the project location.
2018 This estimate is based on 2001-2013 data on water availability. The maximum yield
2019 estimate calculation is shown in **Table C-1**, provided by the NPPD.

2020

Table C-1 . Summary of the NPPD lease maximum yield estimate.

(A) Transferred Acres	(B) Weighted Average CIR [inches/acre]	(C) Proportion of Natural Flow	(D) Natural Flow CIR [inches/acre]	(E) Max Volume of Water for Transfer [AF]
886.5	11.1	93%	10.3	761

2021

(A) Relinquished acres historically irrigated with surface water.

2022

(B) Average based on cropping patterns in the canal area and CIR values from the Platte River Cooperative Hydrology Study (COHYST).

2023

2024

(C) Proportion of natural flow diverted into the canal (the remaining 7 percent is storage water, which will not be transferred).

2025

2026

(D) Natural Flow CIR = Columns (B × C).

2027

(E) Transfer Volume = Columns (A × D) ÷ 12 inches/foot.

2028

*CIR = Crop Irrigation Requirement

2029

C-1.3 Costs

2030

The NPPD lease cost per AF is based on a projected maximum cost estimate completed by the EDO. There are potentially two cost considerations in the per AF cost estimate:

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2032

(1). Cost associated with the consumptive use credit for relinquished surface water with the NPPD, and (2). Cost associated with offsets to mitigate increased groundwater irrigation on relinquished surface water lands.

2033

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2036

For the consumptive use credit cost estimate, the EDO multiplied the crop irrigation requirement (CIR) per acre by the NPPD’s initial asking price of \$160 per acre of cropland. The CIR value was calculated by NPPD as 10.3 inches/acre. This is based on a weighted average canal area CIR of 11.1 inches/acre multiplied by 93% percent, which is the estimated proportion of natural flow in the canal (storage water will not be transferred). The EDO divided the \$160/acre by (10.3 inches/12 inches per foot) to obtain an estimated water leasing cost for the consumptive use portion, which equates to a unit cost of approximately \$190 per AF of consumptive use credit, with an estimated 3.4 percent annual cost escalation after the first year of operations. A final price will be determined during the water lease negotiations when a final agreement is signed between the Program and the NPPD.

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The second potential cost consideration is for offset water to mitigate depletions to the Platte River basin due to increased groundwater irrigation on relinquished surface water lands. The NDNR has suggested the lease entity or the Program should be responsible for mitigating any increase in depletions from transferring the surface irrigation water to instream uses. It is assumed the Program will lease water to offset these depletions; although, the consumptive use credit in the NPPD lease agreement could also be utilized to mitigate offsets. The Program intends to lease recharge accretions from the CPNRD recharge operations on the Thirty Mile, Cozad and Orchard-Alfalfa Canals, described in Appendix B (Section B-4.0) of this document. The cost for offset water is estimated at \$40 per AF in 2015, escalating at 7.5 percent per year thereafter, based on the Program’s existing lease agreement the CPNRD for recharge accretions. During excesses to target and instream flows, the Program assumes offsets will not be required.

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2060 **C-1.4 Next Steps**

2061 The Program will work with the NPPD towards negotiating an agreement to lease the
2062 transferred surface water for instream use, which will require approval by the GC.
2063 Assuming the GC approves a lease agreement with the NPPD, it is anticipated the
2064 Program will work with the CPNRD to lease recharge credits to offset any depletions
2065 created by an increase in groundwater pumping on lands previously irrigated by the
2066 transferred surface water rights. The CPNRD and the Program will complete the
2067 calculations to determine the groundwater depletions and required offset volume. The
2068 NPPD will continue to work with the NDNR to permit the surface water transfer and will
2069 also construct the required equipment and measuring devices once the transfer has been
2070 approved. After the lease agreements are in place, the Program will score the project
2071 towards the First Increment water objective and WAP milestone.

2072 **C-2.0 Nebraska Water Leasing: CNPPID Storage Lease**

2073 **C-2.1 Project Description**

2074 The CNPPID has a water leasing option for storage water in Lake McConaughy. The
2075 Program would enter into an agreement with the CNPPID to lease water from
2076 appropriation A-2374 in Lake McConaughy⁹⁶, which would be transferred into the
2077 Program's EA for subsequent release during shortages or for other Program uses. A
2078 long-term draft water service agreement has been proposed between the CNPPID and the
2079 Program. The ability to transfer leased water into the EA allows the Program to control
2080 the releases to critical periods for the species. It also allows the water to be utilized for
2081 SDHF releases.

2082 **C-2.2 Yield**

2083 The annual yield of storage water may change from year to year based on the volume of
2084 storage water the CNPPID is willing to offer in any given year. Based on the draft
2085 permanent water service agreement⁹⁷, the CNPPID would notify the Program on May 1st
2086 each year as to the volume of water available for lease and the Program would request the
2087 desired amount by August 1st. The EDO estimates an average annual volume of 3,900
2088 AFY (and up to a maximum of 5,000 AFY) through the end of the First Increment,
2089 although the amount offered to the Program will fluctuate annually, based on the volume
2090 of water the CNPPID is willing to lease. This volume is assumed to be the yield at Lake
2091 McConaughy.

2092 **C-2.3 Costs**

2093 The proposed cost per AF of leased water in the draft water service agreement is \$250
2094 beginning in 2015 and escalating at 4 percent per year.

2095 **C-2.4 Next Steps**

2096 The Program will work with the CNPPID to finalize a water service agreement and
2097 complete the required permitting through the NDNR, if required. The project will then be

⁹⁶ Some of the water for this lease could come from, though may not necessarily come from, water that was available for the NCCW option (see Section 4.2.1 and Section D-2.0).

⁹⁷ CNPPID 2014b

2098 scored by the Scoring Subcommittee, in coordination with the EDO, and the results will
2099 be presented to the GC for approval.

2100 **C-3.0 Nebraska Water Leasing: CNPPID System Irrigator Leases**

2101 **C-3.1 Project Description**

2102 The irrigator leases under the CNPPID's system would be with individual irrigators
2103 interested in temporarily leasing their surface water rights to the Program. The storage
2104 water needed to serve those irrigators would no longer be released from storage in Lake
2105 McConaughy for irrigation purposes, but would remain in Lake McConaughy and
2106 transferred into the EA for the Program. The consumptive use portion of the leased water
2107 rights would be available for Program uses and the return flows associated with the water
2108 rights may be maintained through releases from the EA. The CNPPID would manage the
2109 processes and operations of the individual lease agreements. The surface water irrigators
2110 may switch to groundwater for irrigation; therefore, the Program will evaluate leasing
2111 additional water to offset new depletions, or may utilize the net effect of the water right
2112 and account for depletions in the consumptive use estimate. As an alternative to
2113 groundwater, irrigators may choose to convert to dryland farming.

2114 **C-3.2 Yield**

2115 It is anticipated the Program could lease an average of 3,800 AFY through the First
2116 Increment (and up to a maximum of 5,000 AFY), as a preliminary estimate. The yield
2117 available for the Program will change from year to year, based on the amount of willing
2118 lessors. The available consumptive use credit and potential increased groundwater
2119 depletions will be estimated by the Program, in conjunction with the CNPPID, the Tri-
2120 Basin NRD, and the NDNR. It is assumed this yield projection will be available at Lake
2121 McConaughy.

2122 **C-3.3 Costs**

2123 The cost per AF of the surface water in the CNPPID's system includes two pieces: the
2124 cost associated with leasing the consumptive use portion from individual irrigators and
2125 the cost associated with offsetting increased depletions from groundwater irrigation,
2126 similar to the cost components listed in the NPPD lease described in Appendix C (Section
2127 C-1.0). It was assumed the lease cost for consumptive use credit would be \$150 per AF
2128 beginning in 2015 and increase at a rate of 4 percent per year, based on the initial
2129 estimate by the EDO Special Advisor in economics, George Oamek.

2130
2131 The second cost consideration is for offset water to cover depletions from increased
2132 groundwater irrigation on leased surface water lands. It is anticipated the Program will
2133 provide the offsets for the lease agreements, although the consumptive use credit from the
2134 surface water leases could also be utilized to offset depletions. The most likely source of
2135 offset water will be from the CPNRD's groundwater recharge projects on the Thirty Mile,
2136 Cozad and Orchard-Alfalfa Canals, described in Appendix B (Section B-4.0) of this
2137 document. The CPNRD recharged water lease cost is \$40 per AF beginning in 2015 and
2138 escalating at 7.5 percent per year, based on the Program's existing agreement with the
2139 CPNRD (for recharged water as a WAP project). It is assumed the Program will not be
2140 required to offset depletions during excesses to target and instream flows.

2141 **C-3.4 Next Steps**

2142 The Program and the CNPPID will identify interested parties for water leasing
2143 opportunities. The Program will further evaluate the water values based on crop prices in
2144 the CNPPID’s service area for use in negotiations with individual irrigators. The surface
2145 water rights consumptive use credit and the potential offsets for increased groundwater
2146 depletions will be analyzed. The Program will work with the CPNRD and the CNPPID
2147 to evaluate both the surface water rights and any new groundwater irrigation on those
2148 lands. The permitting requirements through the NDNR for the transferred surface water
2149 rights will be explored and the appropriate permit(s) will be obtained. After the project is
2150 active and lease agreements have been executed, the Program will work towards
2151 approving a score for water leases under the CNPPID system towards the First Increment
2152 WAP milestone.

2153 **C-4.0 Nebraska Water Leasing: North Platte NRD Irrigator Leases and**
2154 **Acquisition**

2155 **C-4.1 Project Description**

2156 The NPNRD potential acquisition opportunity could be either temporary leasing or
2157 permanent acquisition of surface water and/or groundwater with individual irrigators or
2158 irrigation districts within the NPNRD. Surface water in the NPNRD would benefit the
2159 Program as water would be available in the North Platte River and could be controlled in
2160 Lake McConaughy. The consumptive use credit from the surface water rights would be
2161 entered into the EA and released for target flow shortages or other Program purposes;
2162 therefore, all of the consumptive use credit could be controlled and subsequently utilized
2163 by the Program. The return flow associated with the water rights will be maintained in
2164 the river. At this time, it is assumed irrigators will switch to dry land farming or will “dry
2165 up” their land and cease irrigation; therefore, there are no increased groundwater
2166 depletions or offsets required.

2167 **C-4.2 Yield**

2168 The lease agreements and historical consumptive use evaluations would be managed by
2169 the NPNRD. The yield estimate provided in this section is a preliminary estimate utilized
2170 by the EDO for planning purposes. Actual yields available for lease by the Program will
2171 be based on a free-market system and will vary throughout the remaining years in the
2172 First Increment. The estimated yield is an average of approximately 3,700 AFY of
2173 consumptive use credit (and up to a maximum of 5,000 AFY), available at the project
2174 locations; however, the actual annual yields will fluctuate from year to year. The leased
2175 water will be available on the North Platte River above Lake McConaughy and will be
2176 added to the Program’s EA. The collective yield of water leases will be further explored
2177 in the upcoming years.

2178 **C-4.3 Costs**

2179 The cost would be on a free-market system with willing lessors (or sellers). Based on an
2180 evaluation by the EDO’s Special Advisor in economics, the estimated cost is \$200 per
2181 AF of consumptive use credit, increasing by an estimated 3 percent per year after 2015.
2182 This is based on crop prices in the area.

2183 **C-4.4 Next Steps**

2184 The Program is currently working with the NPNRD to explore potential leasing
2185 opportunities with interested parties. If interested parties are identified, the Program will
2186 work with the NPNRD to calculate the consumptive use credit of the water rights
2187 available for lease. The Program will also negotiate water right prices with the lessors (or
2188 sellers) and install any necessary new measuring and recording equipment to allow the
2189 transfer to occur. The Program will score the water leasing projects towards the First
2190 Increment milestone, assuming the GC agrees to move forward with leases in the
2191 NPNRD.

2192 **C-5.0 Nebraska Water Acquisition: Surface Water in the CPNRD**

2193 **C-5.1 Project Description**

2194 The Program has an opportunity to purchase 40 AF of surface water from an irrigator in
2195 the CPNRD. This is a new project in the 2014 WAP Update that has not been included in
2196 previous WAPs. The surface water right is from a tributary to the Platte River, located
2197 near Lexington, Nebraska, and would benefit the Program's full habitat reach. The water
2198 would be transferred from irrigation use to instream use for Program purposes through a
2199 permit with the NDNR. The irrigator would switch to groundwater as the source of
2200 supply; therefore, the net effects of the replacement pumping will be factored into the
2201 yield. The net effect consumptive use credit would be a permanent source of water for
2202 the Program. The CPNRD will aid the Program in estimating the surface water credit and
2203 serve as the lead on the negotiations and transactional aspects of the acquisition with the
2204 irrigator. Additional water acquisition transactions may be available in the future, but no
2205 other specific opportunities have been identified at this time.

2206 **C-5.2 Yield**

2207 The yield of the water right, identified in the previous paragraph, has been estimated by
2208 the CPNRD as 40 AFY, which represents the net consumptive use credit. The net
2209 consumptive use credit is considered the usable credit after accounting for increased
2210 groundwater depletions from switching from surface water to groundwater irrigation.
2211 This is the yield at the project location. There may be additional water acquisition
2212 opportunities similar to this in the future; however, the yields associated with those
2213 projects are unknown.

2214 **C-5.3 Costs**

2215 The price of the surface water right described in the previous sections is \$2,500 per AF of
2216 estimated net consumptive use credit, plus a one-time transaction fee of 10 percent. This
2217 equates to a total cost of \$110,000 for the acquisition. There are no other water
2218 acquisitions identified at this time.

2219 **C-5.4 Next Steps**

2220 The Program will work with the irrigator selling the water right, the CPNRD and the
2221 NDNR to determine the net consumptive use credit and the permitting requirements to
2222 transfer the water from irrigation to instream use for the Program. A purchase agreement
2223 has been drafted and will be reviewed by the EDO's Special Advisor in economics and
2224 the GC. After a transfer agreement is in place, the GC will assign a score to the project.

2225 The Program will continue to explore additional opportunities to acquire water in the
2226 future.

2227 **C-6.0 Nebraska Groundwater Management**

2228 **C-6.1 Project Description**

2229 Groundwater management can be accomplished through various projects including active
2230 groundwater pumping from high groundwater areas, passive lowering of the groundwater
2231 table, switching from surface water to groundwater irrigation, or a conjunctive use project
2232 under the CNPPID system. The 2009 WAP Update identified new groundwater
2233 management concepts (Tier 2) for the Dry Creek/Fort Kearney Cutoffs referenced in the
2234 2000 Reconnaissance-Level WAP. Two projects have been evaluated for groundwater
2235 management since that time: the Funk Lagoon (identified in both previous WAPs) and a
2236 dewatering project with an individual landowner under the Phelps County Canal. The
2237 Program anticipates continuing to evaluate Groundwater Management projects for
2238 potential implementation. Groundwater Management projects may also overlap with
2239 Groundwater Recharge or Water Leasing WAP projects in the future.

2240 **C-6.1.1 Funk Lagoon**

2241 The Funk Lagoon was evaluated as a Nebraska Groundwater Management project in
2242 2013 and 2014. The Funk Lagoon is a series of basins that fill with water from runoff
2243 and precipitation, located in the Tri-Basin NRD south of Kearney, Nebraska. The
2244 property is located just north of the Phelps County Canal, which can be used to provide a
2245 water supply to the lagoon. The Funk Lagoon property is owned by the USFWS and
2246 managed by the Rainwater Basin Wetland Management District as waterfowl habitat.
2247 The Program worked with the Rainwater Basin Wetland Management District and the
2248 CNPPID in 2013 to divert water into Funk Lagoon for groundwater testing. The
2249 CNPPID delivered approximately 2,050 AF of excess flows in 2013 to supply the Funk
2250 Lagoon, per a water service agreement⁹⁸ with the Program in September 2013. The
2251 Program collected groundwater level data from four monitoring wells equipped with
2252 measuring and recording devices in the area.

2253
2254 The EDO and the Special Advisor in hydrogeology, William Hahn, identified various
2255 project concepts to utilize the Funk Lagoon as a WAP project. The initial concept
2256 consisted of retiming leased water from the CNPPID in the Funk Lagoon with subsequent
2257 releases to reduce shortages to USFWS target flows by retiming flows. The natural
2258 runoff in the Funk Lagoon could also be used to reduce shortages to target flows. Other
2259 groundwater management techniques could also be evaluated. For the initial work
2260 completed in 2013 and 2014, the Program focused on monitoring groundwater levels and
2261 seepage impacts in the vicinity.

2262 **C-6.1.2 Dewatering with Individual Landowner**

2263 A dewatering project with a landowner under the Phelps County Canal was briefly
2264 reviewed in 2012. The landowner was interested in working with the Program to dewater
2265 high groundwater on an irrigated parcel of land between the canal and the Platte River.

⁹⁸ CNPPID 2013b

2266 The EDO and the Special Advisor in hydrogeology reviewed the project concept and
2267 ultimately determined it was not likely a favorable project based on several factors,
2268 including the timing of groundwater pumping and the yield. The project wasn't
2269 considered further.

2270
2271 No additional Nebraska Groundwater Management projects have been identified at this
2272 time; however, there may be future opportunities to cosponsor projects with the
2273 Rainwater Basin Wetland Management District. The Program intends to continue
2274 evaluation of Funk Lagoon concepts and identifying other options for Groundwater
2275 Management projects in the central Platte River region.

2276 **C-6.2 Yield**

2277 The estimated project yield has not been updated since the 2009 WAP Update. The
2278 Program's yield was previously estimated at 1,400 AFY at the associated habitat.

2279 **C-6.3 Costs**

2280 The costs to implement Groundwater Management projects have not been updated since
2281 the 2000 Reconnaissance-Level WAP. The maximum estimated cost for Groundwater
2282 Management projects identified in the 2000 WAP is \$590,000 in capital costs plus
2283 additional costs for operation and maintenance of projects. This is associated with a
2284 consumptive use volume of 1,400 AFY at the habitat location.

2285
2286 The Program expended approximately \$47,000 in 2013 for the study of the Funk Lagoon.
2287 The expenditures included water delivery costs with the CNPPID and equipment for four
2288 monitoring wells to track groundwater levels in the vicinity of Funk Lagoon. The wells
2289 are owned by the CNPPID and each well was equipped with continuous measuring and
2290 recording devices. The unit cost described in the water service agreement with the
2291 CNPPID was \$25/AF of water delivered from the Phelps County Canal to the Funk
2292 Lagoon. The Rainwater Basin Wetland Management District cosponsored the Funk
2293 Lagoon project and paid 20% of the lease cost. The CNPPID delivered approximately
2294 2,050 AF into Funk Lagoon in September and October of 2013 during excesses to target
2295 and instream flows.

2296 **C-6.4 Next Steps**

2297 The Program will continue to explore options with the Rainwater Basin Wetland
2298 Management District to cosponsor Groundwater Management Projects in the Central
2299 Platte River basin. Data collected from monitoring wells at the Funk Lagoon in 2013 will
2300 be evaluated and the project concept may be reconsidered in the future. At the November
2301 2013 Finance Committee meeting, the Funk Lagoon project was tentatively removed
2302 from the WAP budget for the First Increment, but if further investigation demonstrates
2303 sufficient potential, it may be reinstated.

2304 **C-7.0 Colorado Groundwater Management (Tamarack III)**

2305 **C-7.1 Project Description**

2306 Tamarack III is a potential extension of the existing Tamarack I and II projects in eastern
2307 Colorado. Tamarack III would retime excess flows through aquifer recharge in the lower

2308 South Platte River. Tamarack I is one of the Program’s three initial state water projects
2309 and Tamarack II is utilized by the State of Colorado to offset depletions under the
2310 Colorado’s New Depletions Plan. Tamarack III would use the existing Tamarack I and II
2311 infrastructure. During times of excesses in the river, surface water would be diverted
2312 directly from the South Platte River via canals or wells located adjacent to the river, and
2313 delivered to recharge sites.

2314

2315 The recharge sites are varying distances from the river to allow accretions to reach the
2316 river at different time periods. Colorado’s water needs under the Tamarack project will
2317 be met prior to utilizing the accretions as a WAP project for the Program, as determined
2318 by Colorado. The recharged water accreting to the Platte River that exceeds the needs of
2319 Colorado in the first two phases of Tamarack would be credited to the Program score
2320 during shortages to USFWS target flows.

2321 **C-7.2 Yield**

2322 There have not been any project yield evaluations since the 2009 WAP Update and the
2323 2000 Reconnaissance-Level WAP. The estimated yield in the previous WAPs is 17,000
2324 AF of reduction to USFWS target flow shortages, based on historical hydrology of
2325 excesses flows. The Program has reduced this projection for budgeting purposes to
2326 approximately 10,000 AFY in the habitat reach; however, this estimate is subject to
2327 change.

2328

2329 Colorado completed a water availability study to evaluate the impact of the dry years in
2330 the 2000s on excesses available on the South Platte River. Based on this evaluation, it
2331 was estimated that between 2007 and 2013, only 37 percent of the months during the
2332 December through March period had excesses. This is lower than the historical period of
2333 1947 through 1994⁹⁹, which showed 59 percent of months with excesses during the
2334 December through March period. The reduction in available excess flows has limited the
2335 diversions into the Tamarack I project, and will impact the development of Tamarack III
2336 as a WAP project. In 2013, six additional wells were drilled for Tamarack I to increase
2337 the yield of the project to meet the goal of approximately 10,000 AFY. As shown in
2338 annual reports from Colorado, the Tamarack II recharge projection is adequately
2339 replacing depletions in river flows from current and projected Colorado population
2340 growth.

2341 **C-7.3 Costs**

2342 There have not been any project updates since the 2009 WAP Update and the 2000
2343 Reconnaissance-Level WAP. The estimated cost remains \$45 per AF of retimed water
2344 for the Program. Additional infrastructure costs for the Tamarack III project will be
2345 completed by the State of Colorado and/or the South Platte Water Related Activities
2346 Program (SPWRAP), which is a non-profit group for water users working with the State
2347 of Colorado to meet water obligations under the Program. The lease costs with Colorado
2348 and SPWRAP will be negotiated to determine a final cost per AF of retimed water.

⁹⁹ The Tamarack I estimated yield is based on the 1947 through 1994 period.

2349 **C-7.4 Next Steps**

2350 The Program will work with the State of Colorado to determine the feasibility of the
2351 project, and the yield and costs associated with Tamarack III. An agreement between the
2352 Program and the State of Colorado/ SPWRAP may be negotiated and executed to lease
2353 Tamarack III water as a future WAP project.

2354 **C-8.0 Water Management Incentives**

2355 **C-8.1 Project Description**

2356 Water Management Incentives projects consist primarily of programs resulting in
2357 reductions in consumptive use, or in the case of on-farm changes in irrigation techniques,
2358 reductions in return flows that do not return to the Platte River above the associated
2359 habitat. The programs evaluated in the 2000 Reconnaissance-Level WAP assumed the
2360 water rights involved with Water Management Incentives projects are dependent on
2361 storage rights in Lake McConaughy. An irrigation district or individual irrigators with
2362 storage rights in Lake McConaughy will be paid to reduce their irrigation diversions
2363 through conservation cropping, deficit irrigation, land fallowing or changes in irrigation
2364 techniques. The reduction in consumptive use would be added to the Lake McConaughy
2365 EA when storage space is available, and subsequently released during times of shortages
2366 at the associated habitat.

2367 **C-8.2 Yield**

2368 The yield has not been updated since the 2000 Reconnaissance-Level WAP and the 2009
2369 WAP Update. The estimated yield is approximately 7,000 AFY at the associated habitat
2370 for one or a combination of the projects. For the purpose of future budgeting, the ED
2371 Office reduced this volume to approximately 3,000 AFY at the project location. Yield
2372 estimates will be further refined in the future as water management incentive projects are
2373 identified.

2374 **C-8.3 Costs**

2375 The cost has not been updated since the 2000 Reconnaissance-Level WAP and the 2009
2376 WAP Update. The 2000 Reconnaissance-Level WAP lists unit costs at approximately
2377 \$80-\$217 per AF of consumptive use credit saved. As a preliminary estimate for the
2378 2014 WAP Update, the cost is estimated to be approximately \$200 per AF of water at the
2379 project location.

2380 **C-8.4 Next Steps**

2381 The Program will work with irrigation districts to determine if there opportunities for
2382 Water Management Incentives projects. If opportunities exist, the Program in conjunction
2383 with any project sponsors, will estimate the saved water available at Lake McConaughy
2384 for transfer into the EA. The EDO will continue to evaluate information regarding
2385 cooperative efforts to incentivize water conservation technology and management
2386 techniques in agriculture to assist in prioritizing methods that are both cost-effective and
2387 likely to succeed in Nebraska. As projects are identified, the Program will work with the
2388 Special Advisor in economics to determine appropriate unit costs to lease or purchase
2389 saved water in the various reaches of the river. The necessary permitting requirements
2390 will be completed and obtained through the NDNR, if necessary.

2391 **Platte River Recovery Implementation Program**
2392 **2014 Water Action Plan Update**

2393 **Appendix D – Inactive Project Descriptions**

2394 Inactive projects have been conceptually and/or financially evaluated for feasibility;
2395 however, the Program decided not to pursue implementation of these projects during the
2396 First Increment. Tier 3 WAP projects are also included in this section as they are not
2397 anticipated to be active during the First Increment. The inactive projects in this section
2398 are not anticipated to move forward into implementation or provide a score towards
2399 fulfilling the Program's First Increment objective or WAP milestone.

2400 **D-1.0 Elm Creek Reregulating Reservoir**

2401 **D-1.1 Project Description**

2402 A feasibility study¹⁰⁰ was completed in 2011 for the Elm Creek Reregulating Reservoir
2403 project (tier 1) in Dawson and Buffalo Counties, Nebraska. The optimal scenario
2404 identified in the feasibility study incorporated a combination of pumping wells for winter
2405 storage and capturing summer excess flows in the reregulating reservoir. The optimal
2406 alternative included the following design concepts:

2407

2408 Water Supply Source:

- 2409 • Non-winter operations: Platte River excesses to target flows (and instream flows)
2410 diverted into the Dawson County Canal with an increased capacity of 125 cfs
2411 (divert excesses March 1 through November 15).
- 2412 • Winter operations: Water pumped from groundwater wells with 70 cfs pump
2413 capacity along Dawson County Canal (pump groundwater as supply September 1
2414 through May 1).

2415

2416 Reservoir Capacity (two options):

- 2417 • Beneficial storage volume of 19,850 AF to obtain the 38,000 AF yield.
- 2418 • Beneficial storage volume of 12,000 AF produces a lower yield, but the per AF
2419 cost remains relatively the same for both capacities (total cost changes with size).

2420

2421 Channel Conveyance Capacity:

- 2422 • Reservoir releases of 1,000 cfs or less provide the lowest life cycle cost with
2423 optimal releases at 700 to 800 cfs (capacity of 1,000 cfs will require improvement
2424 costs for channel capacity and flood protection measures).

2425 **D-1.2 Yield & Costs**

2426 The optimal alternative of the 33 scenarios presented in the feasibility study provided
2427 both the highest reservoir release to target flow shortages of approximately 38,000 AFY
2428 and the lowest life cycle cost of \$37 per AF. The yield is associated with the storage
2429 volume capacity of 19,850 AF and is an estimate of releases from the reservoir (not the
2430 score). The total reservoir cost was approximately \$70 million and included canal
2431 improvements, groundwater pumping and 50-year operational costs. The Program
2432 expended approximately \$290,000 in 2009 and 2010 on the feasibility study, which was
2433 coordinated with the CPNRD.

¹⁰⁰ Olsson Associates 2011

2434 **D-1.3 Recommendations**

2435 In 2011, the WAC was presented with the results in April 2011 from the feasibility
2436 study¹⁰¹ completed on the Elm Creek Reregulating Reservoir. The WAC's opinion was
2437 not favorable towards the project based on the cost per unit yield and operational
2438 difficulties associated with providing inflows to the reservoir. The GC was presented
2439 with the WAC's comments at the June 2011 meeting and the GC agreed to not move
2440 forward pursuing the reservoir project¹⁰². The Program's water budget is not sufficient for
2441 multiple reservoir projects and the J-2 Regulating Reservoirs project was selected as the
2442 preferred alternative from a yield, operational, and cost standpoint.

2443 **D-2.0 Net Controllable Conserved Water (Purchased)**

2444 **D-2.1 Project Description**

2445 Net Controllable Conserved Water (NCCW) (tier 1) is water saved within the CNPPID
2446 system through the implementation of a combination of conservation measures for canal
2447 distribution and delivery, on-farm changes in irrigation, and optimal reservoir operations.
2448 The saved water from conservation activities is stored in Lake McConaughy (due to the
2449 conservation measures, the water does not need to be released and remains in storage).
2450 These activities were completed to comply with the CNPPID's agreement with the
2451 National Wildlife Federation to provide reductions to average annual diversions of
2452 surface water. The CNPPID's FERC license required the CNPPID to offer the NCCW to
2453 the Program at the average cost to the CNPPID and its customers to develop.

2454 **D-2.2 Yield & Costs**

2455 The estimated yield of the project for purchased NCCW is 10,586 AFY at Lake
2456 McConaughy (this does not include the no-cost NCCW). Consistent with its FERC
2457 license obligation, the CNPPID made an initial offer to the Program on March 4, 2013
2458 with subsequent offers made on September 5, 2013 and December 2, 2013. The NCCW
2459 final offer dated December 2, 2013 was for 10,586 AFY at Lake McConaughy at a total
2460 annual cost of \$3,351,830 in 2014 and escalating to \$5,030,022 by 2037. There was an
2461 option to purchase a lesser amount at a pro-rated cost; however, the offer required the
2462 Program to pay for a set volume of water each year, regardless if that volume was
2463 available in Lake McConaughy in any given year.

2464 **D-2.3 Recommendations**

2465 The GC did not accept the offers due to the high unit cost and the required upfront
2466 payment for the total volume of water purchased through 2038, which would have been
2467 \$57,922,300 for the full 10,586 AFY. This upfront cost would not fit within the Water
2468 Plan budget, considering the J-2 Regulating Reservoirs project was approved and utilizes
2469 the majority of the WAP budget. The GC removed this WAP project from future
2470 Program activities in 2013¹⁰³. This project is considered inactive for the remainder of the
2471 First Increment, unless other terms for an agreement different from those required by the
2472 CNPPID's FERC license can be negotiated with the CNPPID. Alternately, conserved
2473 water retained in the CNPPID's account in Lake McConaughy could be a source of water

¹⁰¹ Olsson Associates 2011

¹⁰² EDO 2011a,b. June 2011 GC meeting minutes and July 2011 WAC meeting minutes.

¹⁰³ EDO 2014a. December 2013 GC meeting minutes.

2474 for a storage lease with the CNPPID as described in Section 4.2.2 and Appendix C
2475 (Section C-2.0).

2476 **D-3.0 Glendo Reservoir**

2477 **D-3.1 Project Description**

2478 Glendo Reservoir (tier 1) is on the North Platte River southeast of the town of Glendo,
2479 Wyoming. In the 2000 Reconnaissance-Level WAP, it was anticipated that an
2480 amendment to the 1953 Order Modifying and Supplementing the North Platte Decree
2481 would allow the use of Glendo storage water as a component of the Program. The Final
2482 2001 Settlement Stipulation for the Nebraska v. Wyoming lawsuit modified the original
2483 1945 North Platte Decree (as amended in the 1953 Modified Decree). The provisions in
2484 the stipulation (Exhibits 10 and 11) required Wyoming to provide replacement water for
2485 depletions to the North Platte River from wells and tributaries from the Whalen Diversion
2486 Dam to the state line reach. Wyoming's allocation of Glendo storage water is needed to
2487 meet all or a portion of the replacement water obligations described above; therefore,
2488 Wyoming's allocation of Glendo storage water is no longer directly available for
2489 Program uses.

2490
2491 Although Wyoming's allocation is likely not available for the Program during the First
2492 Increment, there may still be future opportunities for the Program to utilize stored water
2493 in Glendo Reservoir. In January 2015, Governor Mead proposed a water strategy for
2494 Wyoming that included a water management initiative in Glendo Reservoir, referred to as
2495 the Glendo Reservoir Full Utilization Project. The project will seek federal authorization
2496 to reallocate a portion of the flood control pool managed by the U.S. Army Corps of
2497 Engineers for other operational uses¹⁰⁴. It is unknown at this time whether the Program
2498 would be able to utilize the reallocated storage; however, the Program intends to stay
2499 informed on the progression of this project.

2500 **D-3.2 Yield & Costs**

2501 There have not been any updates since the 2009 WAP Update. This project is considered
2502 inactive and is not anticipated to yield water for the Program's First Increment milestone.
2503 The yield estimate in the 2000 Reconnaissance-Level WAP was approximately 2,650
2504 AFY at Glendo Reservoir with unit costs ranging from \$5 to \$75 per AF.

2505 **D-3.3 Recommendations**

2506 Wyoming's allocation of Glendo Reservoir storage water is no longer available for use
2507 by the Program. This project is considered inactive through the First Increment.

2508 **D-4.0 Power Interference**

2509 The Power Interference project (tier 3) entails paying hydroelectric generators to modify
2510 the release of water through the hydropower turbines for Program benefits. The
2511 modifications could include changes in timing of generation or bypassing water in order
2512 to reduce target flows shortages in the habitat reach. Projects may involve the CNPPID
2513 system or the NPPD system. There are no updates from the 2000 Reconnaissance-Level

¹⁰⁴ Mead 2015

2514 WAP and the 2009 WAP Update. This project is not currently included in the budget
2515 estimate for the First Increment and is considered inactive.

2516 **D-5.0 LaPrele Reservoir**

2517 LaPrele Reservoir (tier 3) is located on LaPrele Creek approximately 13 miles upstream
2518 of the confluence with the North Platte River. This potential WAP project assumes the
2519 Program could lease approximately 5,000 AF of storage in the reservoir that is available
2520 to the Panhandle Eastern Pipeline Company (PEPL). The PEPL's share of reservoir
2521 storage is limited by the yield of its share and the conditions under which water may be
2522 put to beneficial use in the context of the Program. There are no updates from the 2000
2523 Reconnaissance-Level WAP and the 2009 WAP Update. This project is not currently
2524 included in the budget estimate for the First Increment and is considered inactive.

2525 **D-6.0 Wyoming Water Leasing**

2526 Water leasing in Wyoming (tier 3) would entail temporary lease agreements with
2527 irrigators or irrigation districts that voluntarily lease the consumptive use credit of their
2528 water rights. The 2000 Reconnaissance-Level WAP assumed the leases would be
2529 dependent on storage rights. The existing requirement for legislative approval to allow
2530 export of water from Wyoming creates a significant obstacle to this potential source of
2531 supply. The Program will continue to monitor the advancement of any changes in
2532 legislation and work under the existing rules should opportunities arise. There are
2533 currently no updates from the 2000 Reconnaissance-Level WAP and the 2009 WAP
2534 Update. This project is not currently included in the budget estimate for the First
2535 Increment and is considered inactive.